LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

ADMINISTRATIVE RECORD

Volume 45

2018

Bate Stamp Numbers
00905142 – 00906718

Prepared for

Department of the Army
Longhorn Army Ammunition Plant

1976 – 2018

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
ADMINISTRATIVE RECORD – CHRONOLOGICAL INDEX

VOLUME 45

2018

A. Title: Report (cont'd) – Draft Quarterly Evaluation Report, 2nd Quarter (April–June) 2018, Groundwater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Bhate Environmental Associates, Inc.
Recipient: U.S. Army Corps of Engineers, Tulsa District
Date: October 8, 2018
Bate Stamp: 00905142 – 00906026

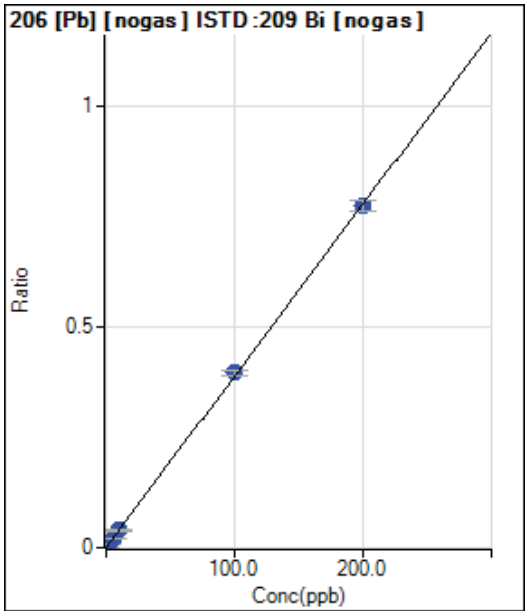
B. Title: Minutes – Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP), 20 September 2018
Author(s): Department of the Army
Recipient: All Parties
Date: October 15, 2018
Bate Stamp: 00906027 – 00906038

C. Title: Report – Comprehensive Land Use Control (LUC) Management Plan
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: October 15, 2018
Bate Stamp: 00906039 – 00906477

D. Title: Minutes – Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting, Longhorn Army Ammunition Plant (LHAAP), July 19, 2018
Author(s): Department of the Army
Recipient: All Parties
Date: October 18, 2018
Bate Stamp: 00906478 – 00906518

E. Title: Report – Draft Final 4th Annual Remedial Action Operations Report (November 2017 and June/July 2018), LHAAP-35A (58), Shops Area, Longhorn Army Ammunition Plant, Karnack, Texas, October 2018
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: October 23, 2018
Bate Stamp: 00906519 – 00906718

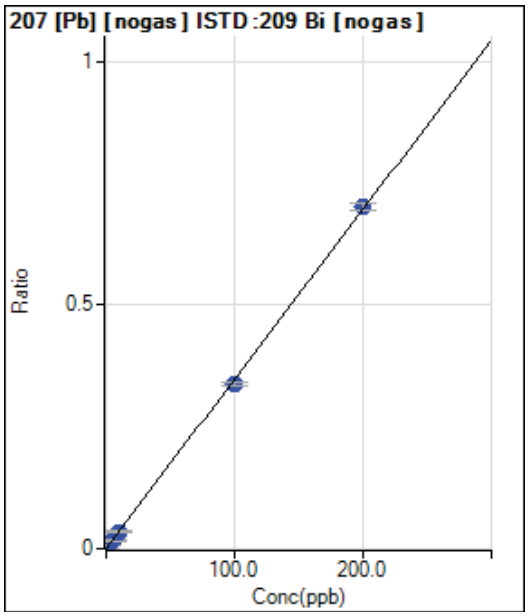
Calibration for 135_ICV.d



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1	☐	0.000	0.000	76.67	0.0001	P	39.1
2	☐	2.000	1.970	7161.71	0.0077	P	7.8
3	☐	5.000	4.939	17883.48	0.0193	P	5.0
4	☐	10.000	10.005	36120.47	0.0389	P	4.3
5	☐	100.000	102.084	361132.89	0.3964	P	3.4
6	☐	200.000	198.960	691517.99	0.7724	P	3.3
7	☐	1.000					

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Min Conc: <None>

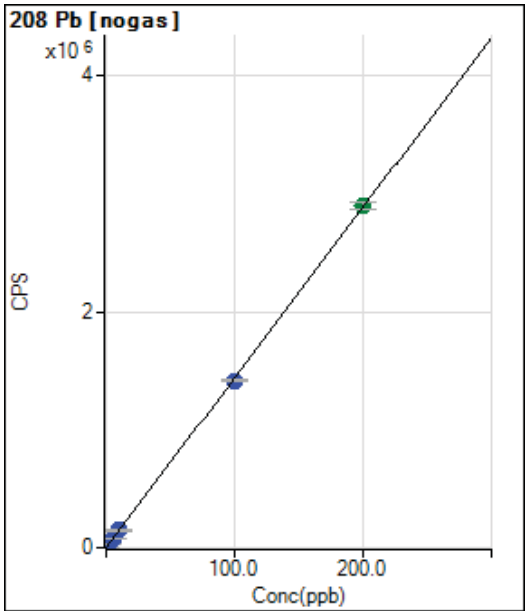


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2	☐	2.000	2.032	6621.48	0.0071	P	7.6
3	☐	5.000	4.805	15597.74	0.0168	P	5.9
4	☐	10.000	9.950	32202.35	0.0347	P	4.7
5	☐	100.000	97.186	308244.24	0.3383	P	1.3
6	☐	200.000	201.414	627682.15	0.7010	P	2.1
7	☐	1.000					

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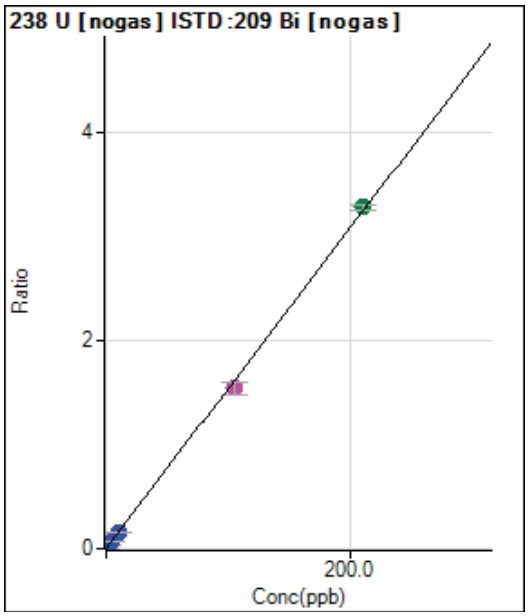
Calibration for 135_ICV.d



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1	☐	0.000	0.000	266.67		P	23.8
2	☐	2.000	2.034	29574.43		P	4.0
3	☐	5.000	4.942	71469.63		P	2.1
4	☐	10.000	10.103	145811.40		P	1.1
5	☐	100.000	98.320	1416699.51		P	0.6
6	☐	200.000	200.836	2893590.32		A	2.0
7	☐	1.000					

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R = 0.9999
DL = 0.01323
BEC = 0.01851

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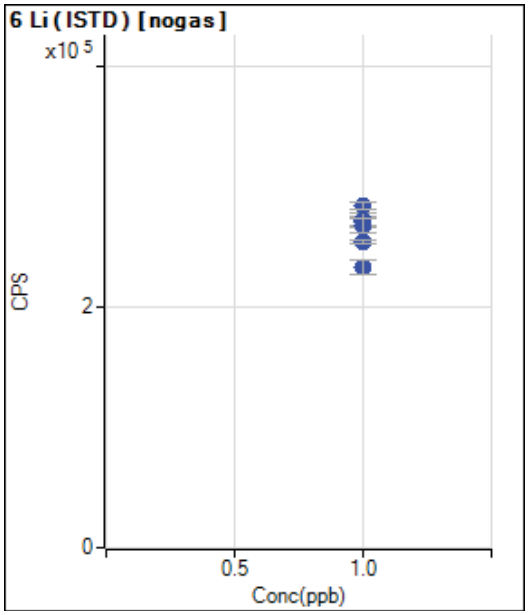


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2	☐	2.000	1.930	27651.38	0.0298	P	3.3
3	☐	5.000	4.842	69513.02	0.0748	P	2.5
4	☐	10.000	9.716	139287.65	0.1501	P	2.2
5	☐	105.000	99.920	1405705.92	1.5428	M	7.8
6	☐	210.000	212.558	2939653.19	3.2819	A	1.3
7	☐	1.000					

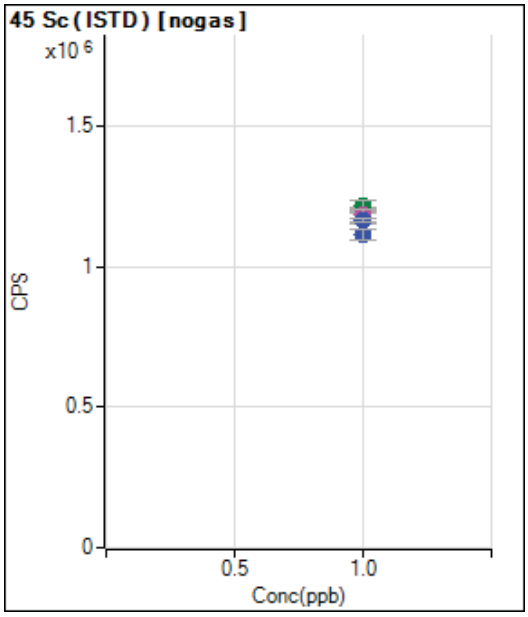
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Calibration for 135_ICV.d

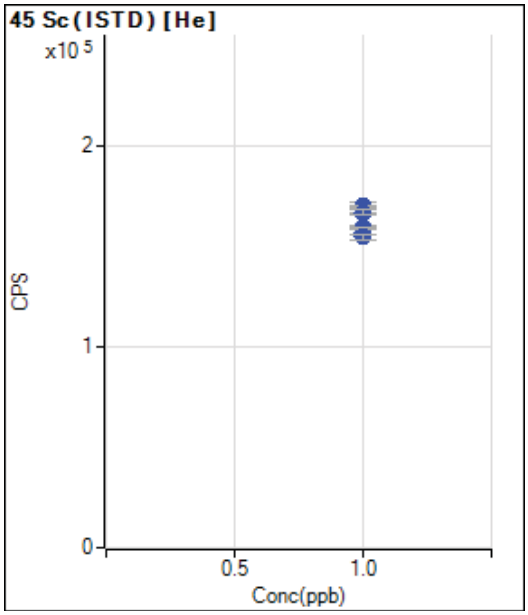


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2		1.000		272930.52		P	3.7
3		1.000		283813.82		P	2.2
4		1.000		267551.39		P	4.1
5		1.000		253879.98		P	1.0
6		1.000		233560.19		P	4.9
7		1.000					

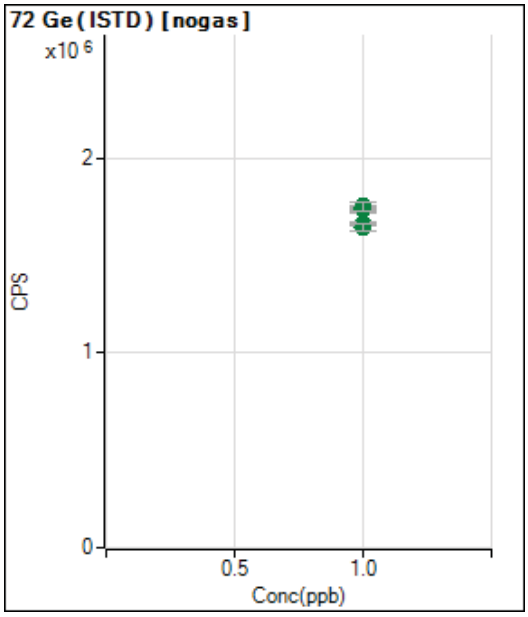


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2		1.000		1171736.65		M	3.3
3		1.000		1214488.45		A	4.1
4		1.000		1187655.56		M	3.0
5		1.000		1163651.62		P	1.4
6		1.000		1113487.30		P	3.4
7		1.000					

Calibration for 135_ICV.d

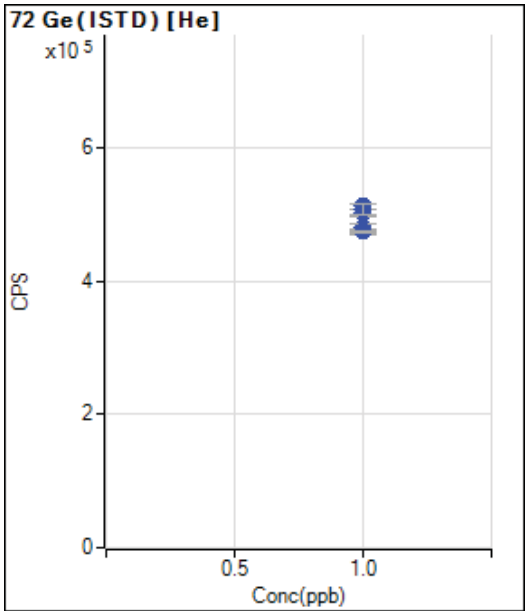


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2		1.000		170268.73		P	0.5
3		1.000		167177.93		P	1.6
4		1.000		157119.08		P	4.5
5		1.000		159382.63		P	0.2
6		1.000		155068.01		P	1.7
7		1.000					

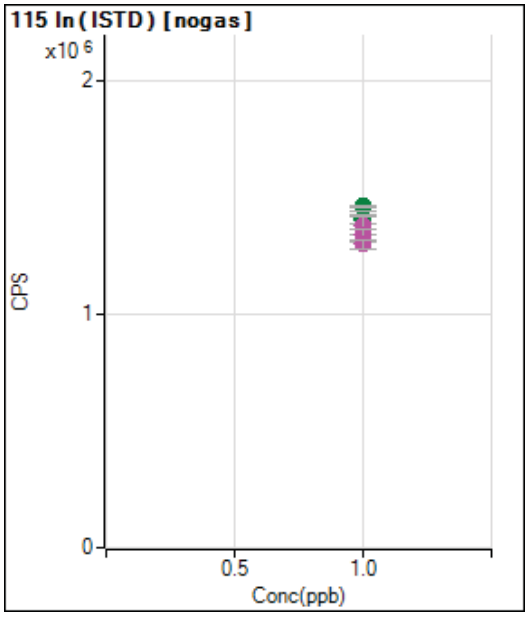


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2		1.000		1747530.76		A	0.7
3		1.000		1733333.10		A	1.4
4		1.000		1749307.11		A	2.8
5		1.000		1665691.48		A	1.0
6		1.000		1646104.51		A	2.3
7		1.000					

Calibration for 135_ICV.d

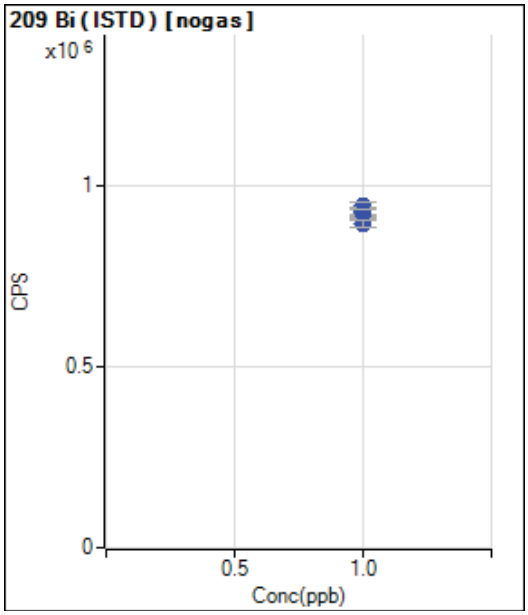


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1	☐	1.000		511869.67		P	1.6
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3	☐	1.000		507394.98		P	2.8
4	☐	1.000		477420.79		P	3.8
5	☐	1.000		480560.68		P	1.6
6	☐	1.000		474087.71		P	0.3
7	☐	1.000					



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		1461101.55		A	0.5
2	☐	1.000		1410395.35		A	3.7
3	☐	1.000		1399124.84		A	2.3
4	☐	1.000		1381354.05		M	6.1
5	☐	1.000		1336873.40		M	3.7
6	☐	1.000		1298485.93		M	2.9
7	☐	1.000					

Calibration for 135_ICV.d



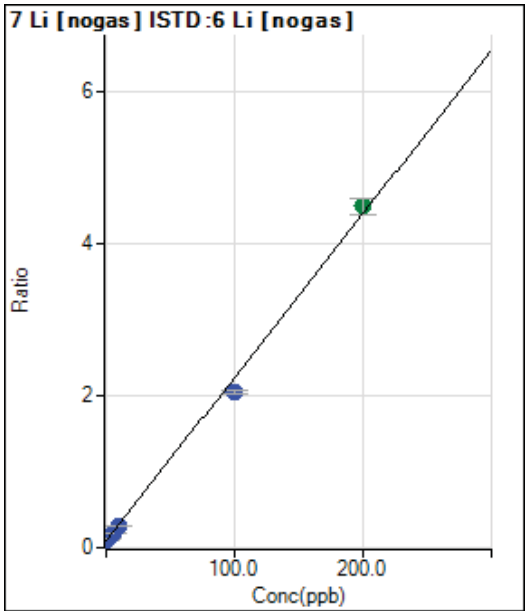
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1	☐	1.000		945669.31		P	2.2
2	☐	1.000		927207.36		P	1.9
3	☐	1.000		929858.61		P	3.2
4	☐	1.000		928457.49		P	1.5
5	☐	1.000		911218.58		P	0.6
6	☐	1.000		895555.64		P	2.1
7	☐	1.000					

Calibration for 205_ICV.d

Batch Folder: C:\Agilent\ICPMH\1\DATA\060518B.b\
Analysis File: 060518B.batch.bin
DA Date-Time: 2018-06-05 22:37:26
Calibration Title:
Calibration Method: External Calibration
VIS Interpolation Fit:

Level	Standard Data File	Sample Name	Acq. Date-Time
1	198CALB.d	CAL BLK	2018-06-05 22:22:36
2	199CALS.d	2/10/200	2018-06-05 22:24:35
3	200CALS.d	5/25/500	2018-06-05 22:26:34
4	201CALS.d	10/50/1000	2018-06-05 22:28:34
5	202CALS.d	100/500/10K	2018-06-05 22:30:35
6	203CALS.d	200/1000/20K	2018-06-05 22:32:31
7			

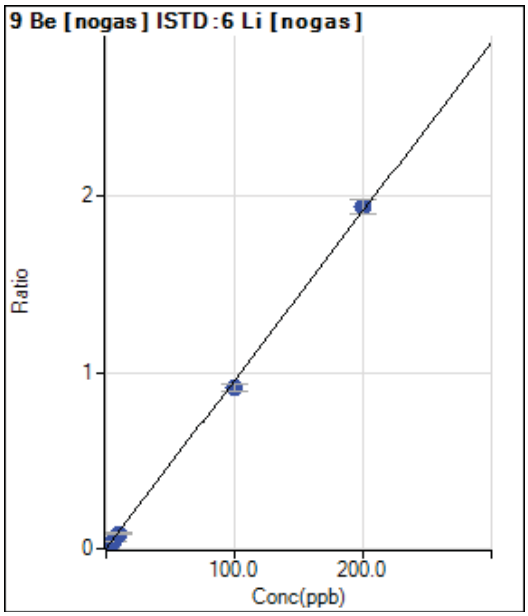
Calibration for 205_ICV.d



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1	☐	0.000	0.000	25624.30	0.0889	P	1.4
2	☐	2.000	1.657	35586.87	0.1247	P	5.0
3	☐	5.000	4.270	52258.37	0.1810	P	0.5
4	☐	10.000	8.897	79753.72	0.2807	P	1.0
5	☐	100.000	90.834	527049.81	2.0471	P	2.6
6	☐	200.000	204.660	1101312.80	4.5008	A	4.7
7	☐	1.000					

y = 0.0216 * x + 0.0889
R = 0.9986
DL = 0.1741
BEC = 4.126

Weight: <None>
Min Conc: <None>

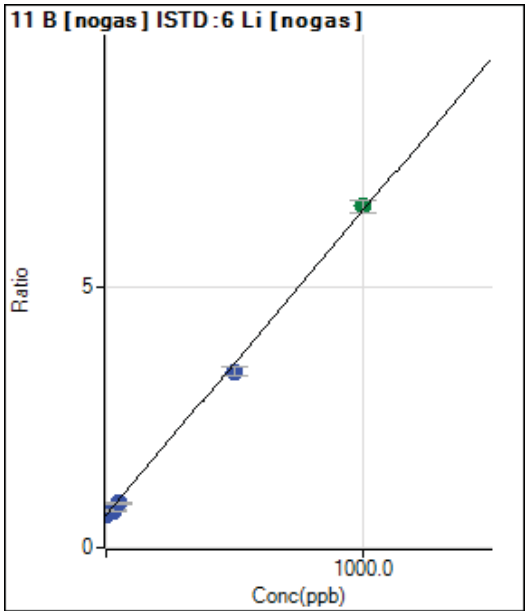


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	26.67	0.0001	P	43.6
2	☐	2.000	1.734	4760.67	0.0167	P	3.7
3	☐	5.000	4.221	11683.80	0.0405	P	0.6
4	☐	10.000	9.009	24506.00	0.0863	P	5.6
5	☐	100.000	95.250	234518.27	0.9112	P	4.5
6	☐	200.000	202.447	473938.58	1.9366	P	4.2
7	☐	1.000					

y = 0.0096 * x + 9.2668E-005
R = 0.9996
DL = 0.01268
BEC = 0.009688

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Min Conc: <None>

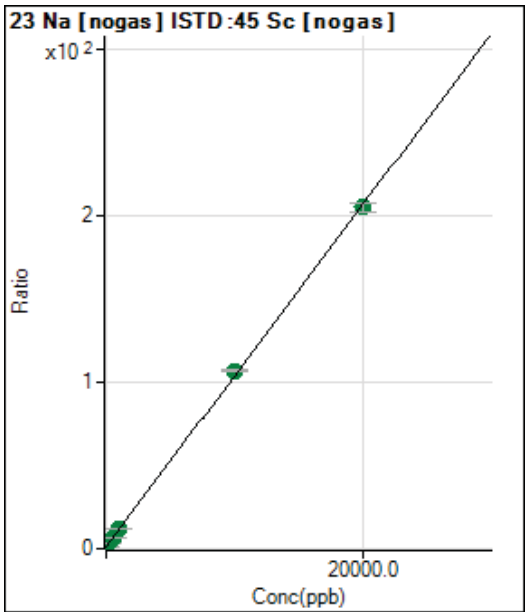
Calibration for 205_ICV.d



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1	☐	0.000	0.000	179623.61	0.6238	P	3.6
2	☐	10.000	4.169	185017.12	0.6482	P	3.1
3	☐	25.000	14.430	204416.77	0.7080	P	1.6
4	☐	50.000	39.522	242685.84	0.8543	P	1.9
5	☐	500.000	472.334	869395.74	3.3782	P	5.0
6	☐	1000.000	1014.680	1600899.51	6.5409	A	4.1
7	☐	5.000					

y = 0.0058 * x + 0.6238
R = 0.9995
DL = 11.41
BEC = 107

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Min Conc: <None>

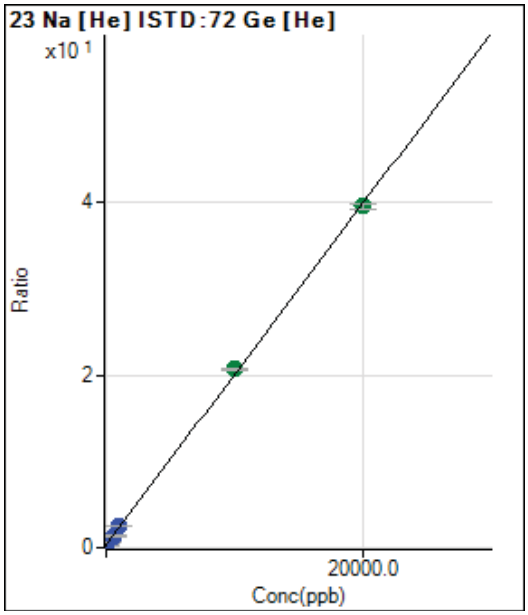


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1149044.85	1.1334	M	4.1
2	☐	200.000	204.629	3286355.61	3.2335	A	2.9
3	☐	500.000	502.845	6406434.52	6.2942	A	1.5
4	☐	1000.000	1049.891	12080044.28	11.9087	A	0.8
5	☐	10000.00	10294.506	107500510.7	106.788	A	0.9
6	☐	20000.00	19850.135	201358150.3	204.860	A	2.9
7	☐	100.000					

y = 0.0103 * x + 1.1334
R = 0.9998
DL = 13.59
BEC = 110.4

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Min Conc: <None>

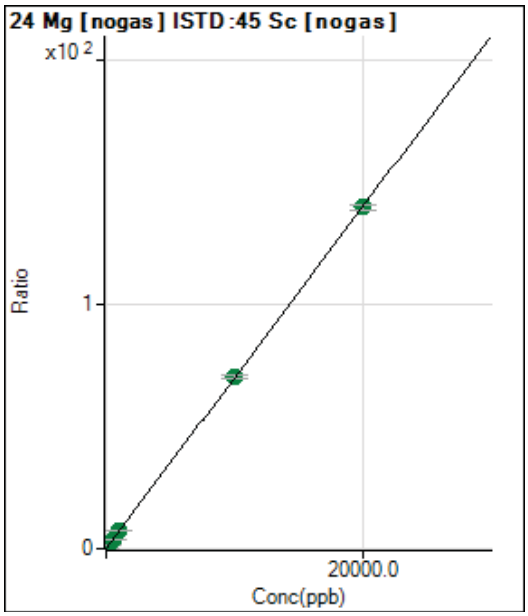
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	135108.12	0.3132	P	2.6
2	☐	200.000	216.934	310461.96	0.7425	P	2.5
3	☐	500.000	525.663	565986.81	1.3534	P	2.5
4	☐	1000.000	1094.262	1015635.79	2.4786	P	1.9
5	☐	10000.00	10296.026	8582414.87	20.6871	A	0.5
6	☐	20000.00	19846.463	16233853.09	39.5856	A	1.9
7	☐	100.000					

y = 0.0020 * x + 0.3132
R = 0.9998
DL = 12.41
BEC = 158.3

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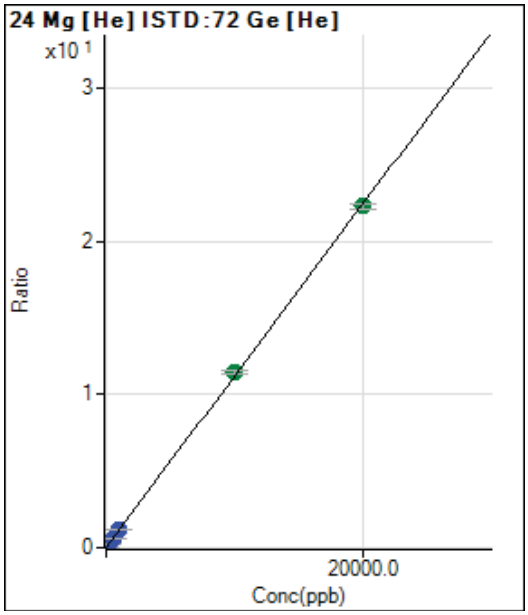


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	6869.21	0.0068	P	4.5
2	☐	200.000	208.931	1492890.82	1.4690	A	3.3
3	☐	500.000	505.303	3606436.02	3.5432	A	3.3
4	☐	1000.000	1042.734	7409018.14	7.3045	A	2.1
5	☐	10000.00	10062.953	70903005.75	70.4339	A	1.5
6	☐	20000.00	19966.165	137374028.0	139.743	A	1.7
7	☐	100.000					

y = 0.0070 * x + 0.0068
R = 1.0000
DL = 0.1299
BEC = 0.9675

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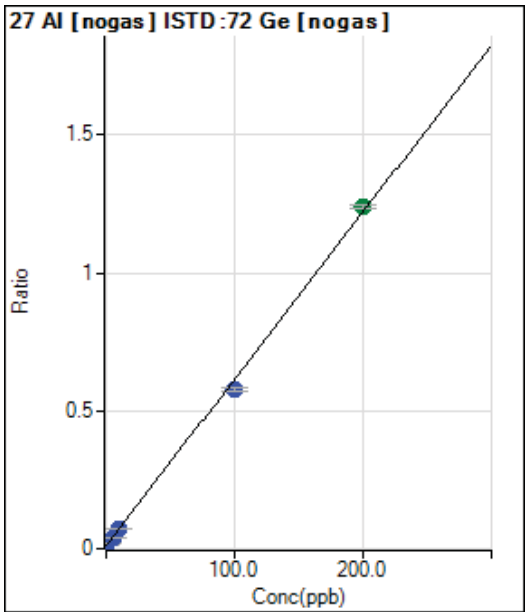
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	876.71	0.0020	P	18.3
2	☐	200.000	212.871	100712.28	0.2409	P	3.6
3	☐	500.000	527.085	248183.56	0.5934	P	2.4
4	☐	1000.000	1079.693	497266.75	1.2135	P	1.8
5	☐	10000.00	10240.633	4767526.49	11.4926	A	2.0
6	☐	20000.00	19874.893	9145568.82	22.3027	A	1.8
7	☐	100.000					

y = 0.0011 * x + 0.0020
R = 0.9999
DL = 0.9911
BEC = 1.81

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Min Conc: <None>

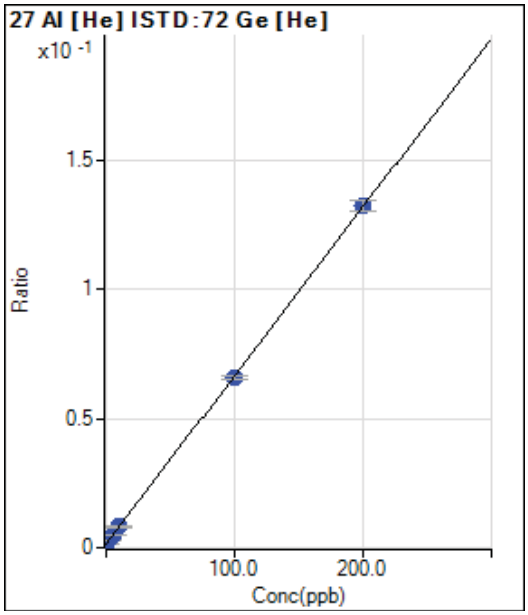


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	15159.56	0.0102	P	1.5
2	☐	2.000	2.121	35086.27	0.0231	P	4.4
3	☐	5.000	5.035	62122.81	0.0407	P	2.1
4	☐	10.000	10.371	108874.70	0.0729	P	1.3
5	☐	100.000	93.927	861611.55	0.5781	P	1.6
6	☐	200.000	203.016	1766506.69	1.2376	A	1.1
7	☐	1.000					

y = 0.0060 * x + 0.0102
R = 0.9993
DL = 0.07686
BEC = 1.693

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Min Conc: <None>

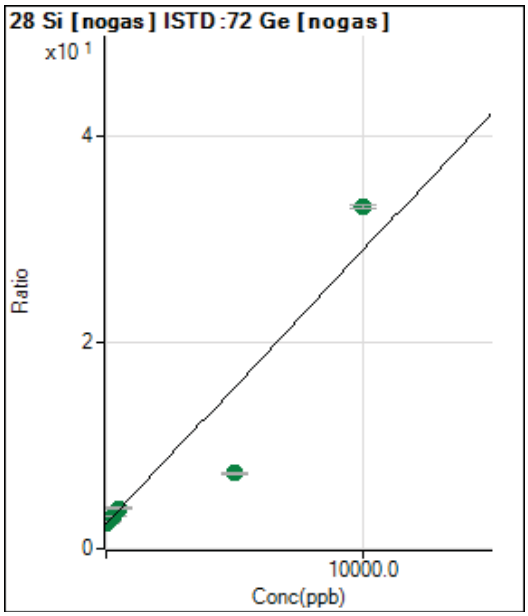
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	-0.361	510.02	0.0012	P	3.8
2	☐	2.000	2.090	1163.39	0.0028	P	3.8
3	☐	5.000	5.616	2126.83	0.0051	P	5.4
4	☐	10.000	10.292	3333.68	0.0081	P	3.6
5	☐	100.000	98.789	27336.72	0.0659	P	1.7
6	☐	200.000	200.575	54254.49	0.1323	P	3.3
7	☐	1.000					

y = 6.5268E-004 * x + 0.0014
R = 1.0000
DL = 0.2042
BEC = 2.173

Weight: <None>
Min Conc: <None>

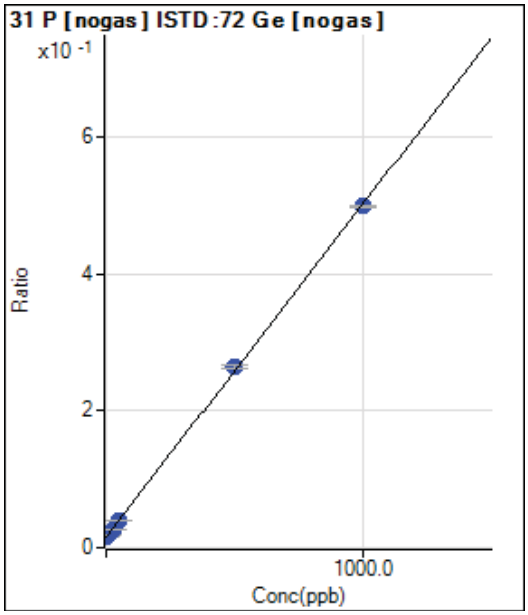


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	3557240.67	2.4021	A	2.3
2	☐	100.000	73.899	3954066.30	2.5981	A	3.1
3	☐	250.000	259.262	4718862.64	3.0898	A	1.0
4	☐	500.000	578.171	5874815.33	3.9357	A	2.6
5	☐	5000.000	1852.861	10905661.92	7.3167	A	1.4
6	☐	10000.00	11569.691	47231534.30	33.0897	A	0.9
7	☐	5.000					

y = 0.0027 * x + 2.4021
R = 0.9412
DL = 63.38
BEC = 905.6

Weight: <None>
Min Conc: <None>

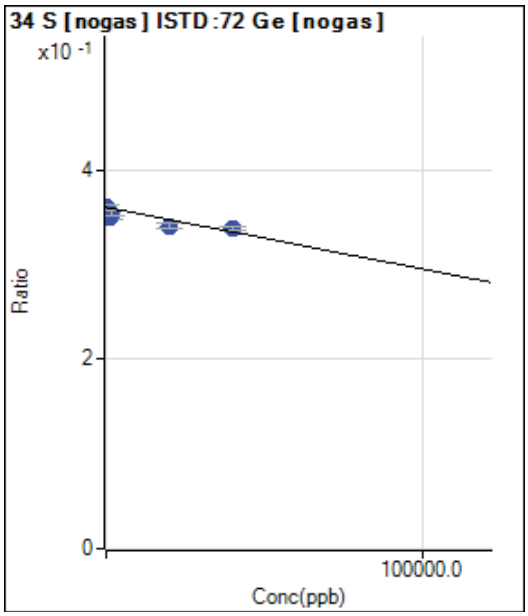
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	22567.08	0.0152	P	1.9
2	☐	10.000	8.538	29513.29	0.0194	P	3.3
3	☐	25.000	24.967	41806.53	0.0274	P	1.0
4	☐	50.000	50.991	59751.07	0.0400	P	1.1
5	☐	500.000	511.912	393620.05	0.2641	P	1.5
6	☐	1000.000	994.010	711521.63	0.4985	P	0.8
7	☐	5.000					

y = 4.8618E-004 * x + 0.0152
R = 0.9999
DL = 1.755
BEC = 31.34

Weight: <None>
Min Conc: <None>

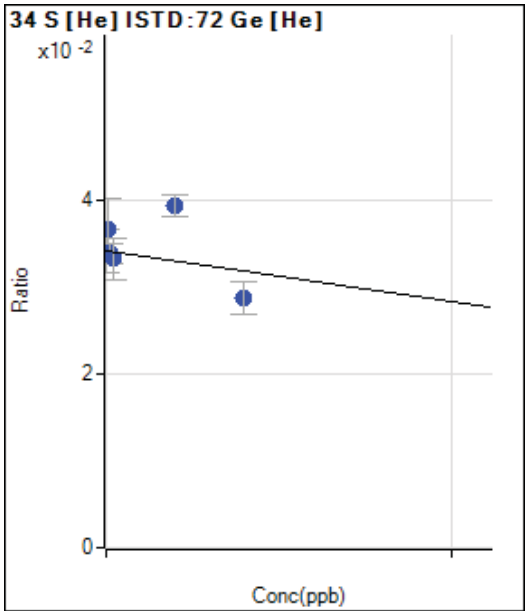


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	534569.41	0.3609	P	1.8
2	☐	400.000	12725.691	536741.39	0.3526	P	2.2
3	☐	1000.000	16169.636	535123.33	0.3504	P	0.8
4	☐	2000.000	9729.710	529338.94	0.3546	P	1.2
5	☐	20000.00	29955.681	508863.99	0.3414	P	2.0
6	☐	40000.00	34133.176	483392.18	0.3387	P	1.6
7	☐	100.000					

y = -6.5136E-007 * x + 0.3609
R = -0.8779
DL = -3.029E+04
BEC = -5.541E+05

Weight: <None>
Min Conc: <None>

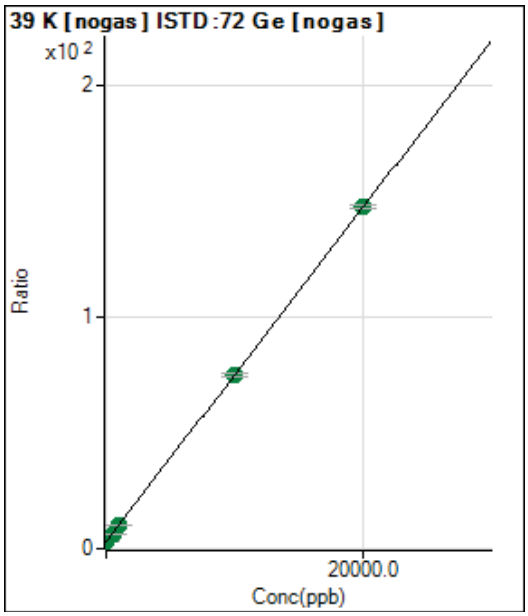
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	14741.43	0.0341	P	15.0
2	☐	400.000	-43196.029	15342.69	0.0366	P	18.7
3	☐	1000.000	5315.252	14140.96	0.0338	P	6.3
4	☐	2000.000	15735.371	13607.44	0.0332	P	14.0
5	☐	20000.00	-87904.465	16276.55	0.0392	P	6.5
6	☐	40000.00	93593.543	11739.64	0.0287	P	13.2
7	☐	100.000					

y = -5.8202E-008 * x + 0.0341
R = -0.4374
DL = -2.63E+05
BEC = -5.863E+05

Weight: <None>
Min Conc: <None>

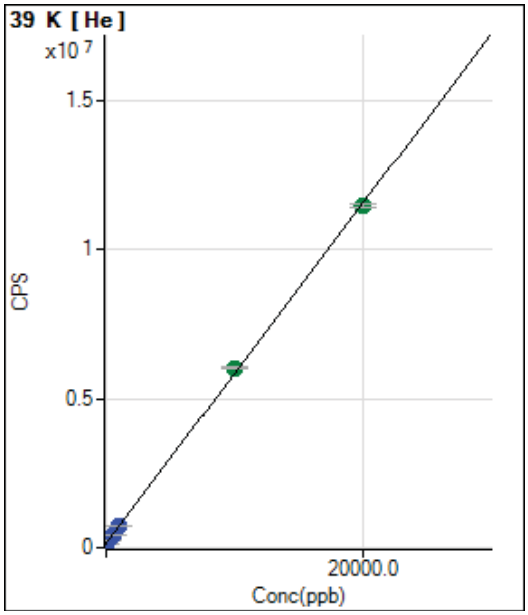


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	4433385.13	2.9936	A	1.4
2	☐	200.000	192.097	6664822.29	4.3793	A	3.1
3	☐	500.000	477.763	9835564.28	6.4401	A	1.1
4	☐	1000.000	1019.466	15445625.87	10.3480	A	2.3
5	☐	10000.00	9939.529	111321898.3	74.6970	A	2.2
6	☐	20000.00	20029.897	210514442.2	147.488	A	1.0
7	☐	100.000					

y = 0.0072 * x + 2.9936
R = 1.0000
DL = 16.95
BEC = 415

Weight: <None>
Min Conc: <None>

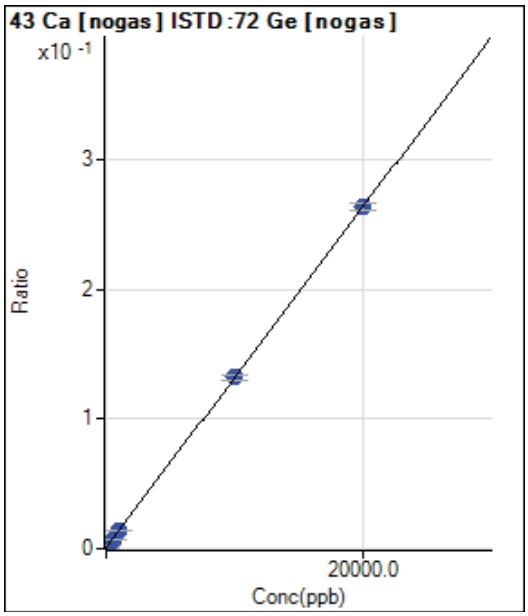
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	145181.70		P	1.3
2	☐	200.000	205.131	262002.63		P	0.8
3	☐	500.000	517.472	439878.34		P	0.7
4	☐	1000.000	1041.963	738572.54		P	1.4
5	☐	10000.00	10327.930	6026868.87		A	1.2
6	☐	20000.00	19833.449	11440198.16		A	0.9
7	☐	100.000					

y = 569.4933 * x + 145181.6967
R = 0.9998
DL = 10.09
BEC = 254.9

Weight: <None>
Min Conc: <None>

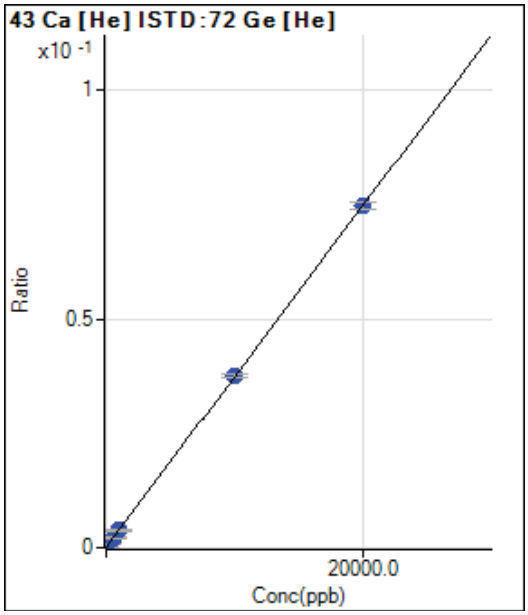


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1030.04	0.0007	P	11.4
2	☐	200.000	206.208	5177.46	0.0034	P	3.3
3	☐	500.000	478.648	10656.52	0.0070	P	1.7
4	☐	1000.000	1036.406	21345.78	0.0143	P	2.3
5	☐	10000.00	10010.961	196845.73	0.1321	P	2.7
6	☐	20000.00	19993.171	375542.92	0.2631	P	2.0
7	☐	100.000					

y = 1.3126E-005 * x + 6.9529E-004
R = 1.0000
DL = 18.05
BEC = 52.97

Weight: <None>
Min Conc: <None>

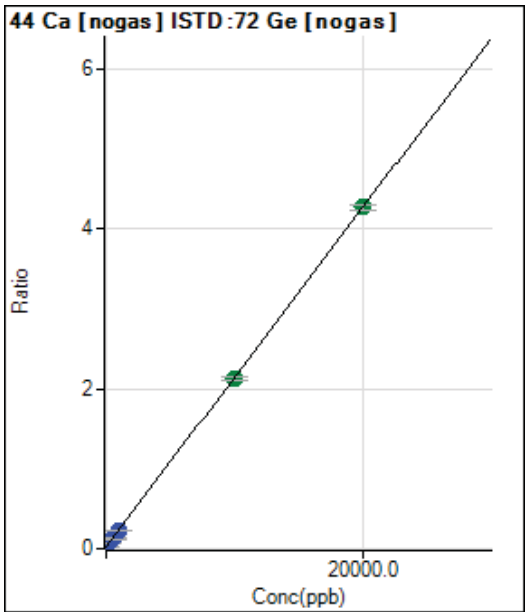
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	23.33	0.0001	P	138.
2	☐	200.000	263.813	433.35	0.0010	P	34.0
3	☐	500.000	552.880	886.71	0.0021	P	11.6
4	☐	1000.000	1025.826	1590.10	0.0039	P	11.6
5	☐	10000.00	10044.050	15576.68	0.0375	P	2.0
6	☐	20000.00	19974.724	30605.38	0.0746	P	2.2
7	☐	100.000					

y = 3.7329E-006 * x + 5.3834E-005
R = 1.0000
DL = 59.69
BEC = 14.42

Weight: <None>
Min Conc: <None>

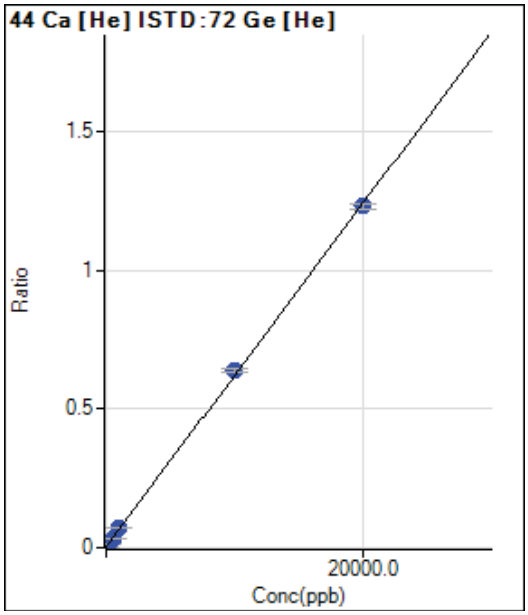


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	31640.38	0.0214	P	4.1
2	☐	200.000	197.986	96404.66	0.0633	P	0.9
3	☐	500.000	486.344	190016.67	0.1244	P	2.1
4	☐	1000.000	1011.706	351948.37	0.2358	P	1.0
5	☐	10000.00	9945.634	3172635.89	2.1289	A	2.1
6	☐	20000.00	20026.959	6087859.28	4.2653	A	1.4
7	☐	100.000					

y = 2.1191E-004 * x + 0.0214
R = 1.0000
DL = 12.27
BEC = 100.8

Weight: <None>
Min Conc: <None>

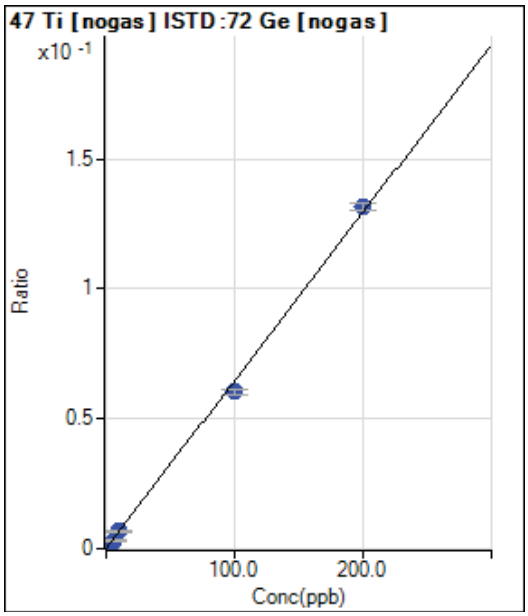
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1180.06	0.0027	P	17.6
2	☐	200.000	197.231	6254.51	0.0150	P	0.6
3	☐	500.000	520.822	14639.29	0.0350	P	3.2
4	☐	1000.000	1096.181	28956.06	0.0706	P	2.7
5	☐	10000.00	10295.100	265742.44	0.6406	P	1.2
6	☐	20000.00	19847.148	505361.28	1.2324	P	1.5
7	☐	100.000					

y = 6.1954E-005 * x + 0.0027
R = 0.9998
DL = 23.33
BEC = 44.17

Weight: <None>
Min Conc: <None>

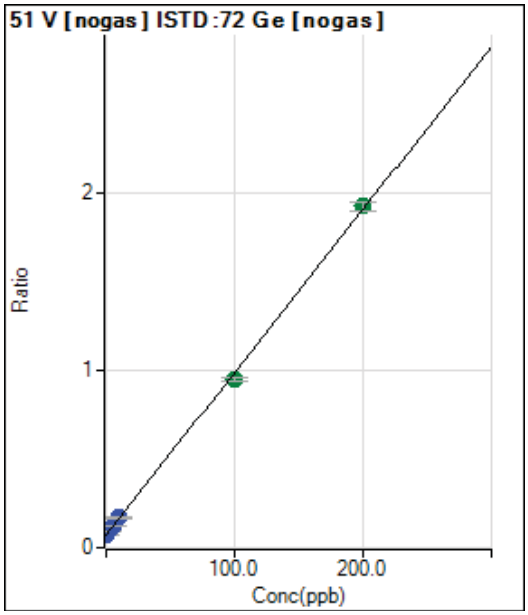


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	160.00	0.0001	P	40.2
2	☐	2.000	1.986	2120.16	0.0014	P	5.7
3	☐	5.000	4.635	4740.69	0.0031	P	10.3
4	☐	10.000	10.173	9969.52	0.0067	P	6.3
5	☐	100.000	93.524	90218.80	0.0605	P	3.7
6	☐	200.000	203.239	187618.57	0.1315	P	2.0
7	☐	1.000					

y = 6.4627E-004 * x + 1.0783E-004
R = 0.9993
DL = 0.201
BEC = 0.1669

Weight: <None>
Min Conc: <None>

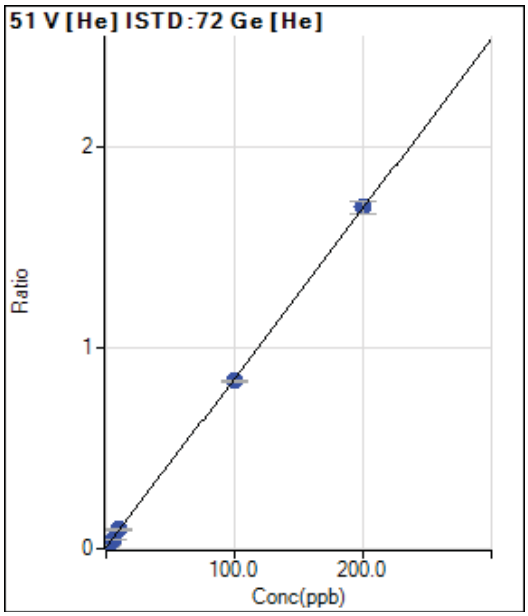
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	105512.10	0.0712	P	5.2
2	☐	2.000	2.141	138237.92	0.0909	P	7.0
3	☐	5.000	5.832	190569.06	0.1248	P	3.8
4	☐	10.000	10.610	251690.18	0.1686	P	4.1
5	☐	100.000	95.627	1414192.64	0.9490	A	2.8
6	☐	200.000	202.134	2749954.03	1.9267	A	2.3
7	☐	1.000					

y = 0.0092 * x + 0.0712
R = 0.9996
DL = 1.22
BEC = 7.759

Weight: <None>
Min Conc: <None>

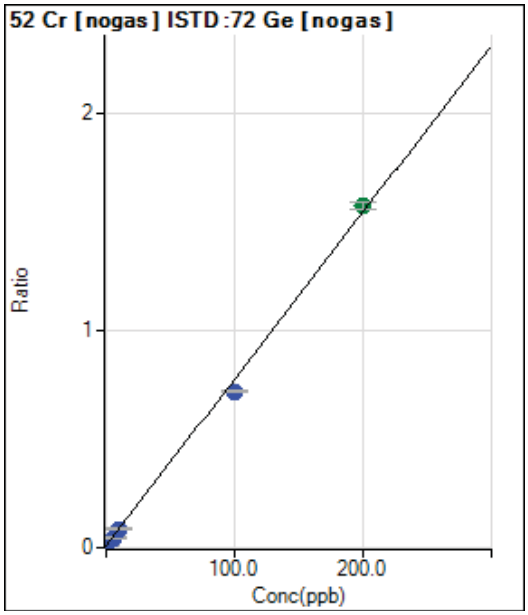


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	-0.023	1991.44	0.0046	P	4.1
2	☐	2.000	2.089	9387.05	0.0224	P	1.6
3	☐	5.000	5.139	20162.23	0.0482	P	2.0
4	☐	10.000	10.647	38820.38	0.0947	P	2.4
5	☐	100.000	98.370	346656.04	0.8356	P	1.6
6	☐	200.000	200.778	697109.00	1.7005	P	3.4
7	☐	1.000					

y = 0.0084 * x + 0.0048
R = 0.9999
DL = 0.06716
BEC = 0.5694

Weight: <None>
Min Conc: <None>

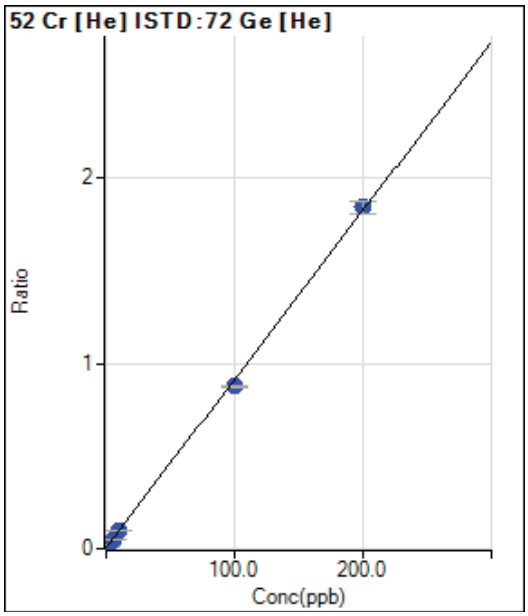
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	13635.26	0.0092	P	2.3
2	☐	2.000	1.938	36673.32	0.0241	P	4.3
3	☐	5.000	4.766	69979.16	0.0458	P	2.4
4	☐	10.000	10.161	130269.18	0.0873	P	1.8
5	☐	100.000	92.700	1075061.44	0.7214	P	2.2
6	☐	200.000	203.649	2246243.77	1.5738	A	2.2
7	☐	1.000					

y = 0.0077 * x + 0.0092
R = 0.9991
DL = 0.08172
BEC = 1.198

Weight: <None>
Min Conc: <None>

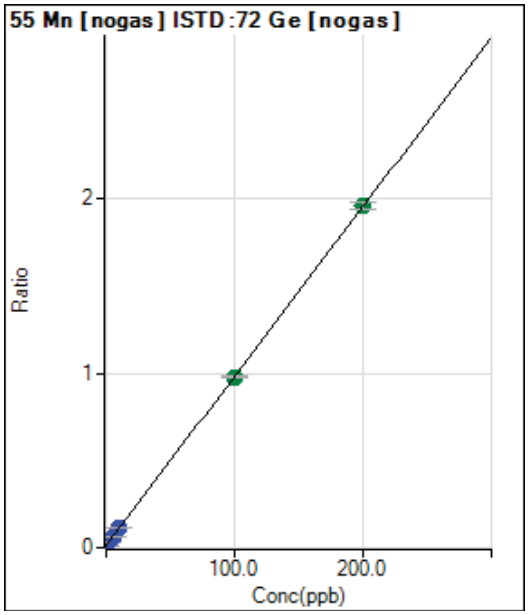


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	2190.17	0.0051	P	2.2
2	☐	2.000	2.025	9829.42	0.0235	P	3.5
3	☐	5.000	4.807	20418.21	0.0488	P	2.0
4	☐	10.000	10.453	41065.88	0.1002	P	0.7
5	☐	100.000	95.850	363973.98	0.8773	P	1.3
6	☐	200.000	202.057	755813.25	1.8438	P	3.6
7	☐	1.000					

y = 0.0091 * x + 0.0051
R = 0.9997
DL = 0.03722
BEC = 0.558

Weight: <None>
Min Conc: <None>

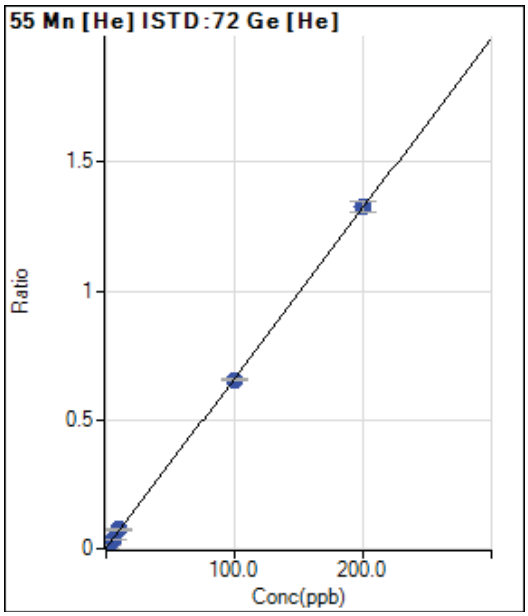
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	18255.97	0.0123	P	2.1
2	☐	2.000	1.863	46298.25	0.0304	P	3.5
3	☐	5.000	4.742	89171.23	0.0584	P	1.7
4	☐	10.000	10.233	166737.99	0.1117	P	2.8
5	☐	100.000	99.321	1456216.38	0.9770	A	0.9
6	☐	200.000	200.336	2794878.50	1.9582	A	2.2
7	☐	1.000					

y = 0.0097 * x + 0.0123
R = 1.0000
DL = 0.07927
BEC = 1.269

Weight: <None>
Min Conc: <None>

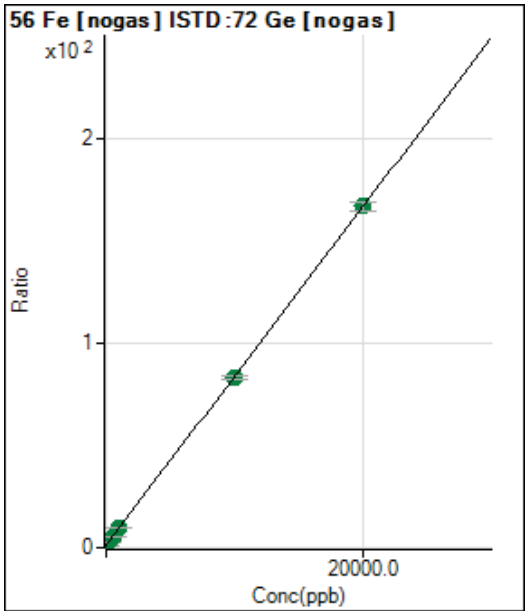


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1233.40	0.0029	P	7.6
2	☐	2.000	2.118	7034.83	0.0168	P	5.8
3	☐	5.000	4.945	14822.82	0.0354	P	1.3
4	☐	10.000	10.787	30298.58	0.0739	P	1.5
5	☐	100.000	98.803	271238.98	0.6538	P	1.2
6	☐	200.000	200.559	542880.50	1.3242	P	3.0
7	☐	1.000					

y = 0.0066 * x + 0.0029
R = 1.0000
DL = 0.09872
BEC = 0.434

Weight: <None>
Min Conc: <None>

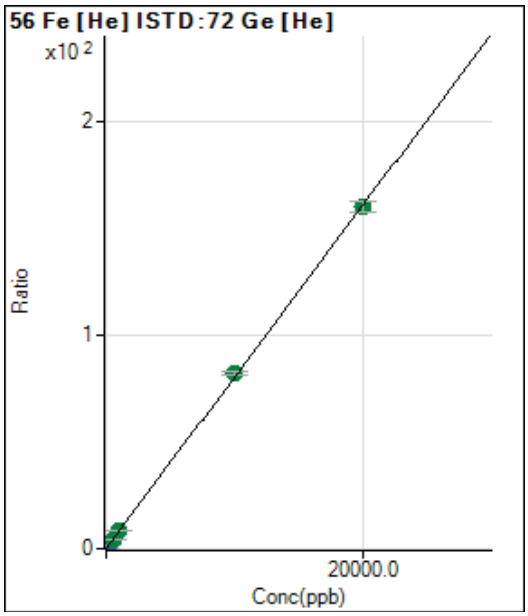
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1678235.19	1.1333	A	3.2
2	☐	200.000	189.778	4116996.06	2.7040	A	1.2
3	☐	500.000	484.390	7853534.03	5.1424	A	1.9
4	☐	1000.000	1035.534	14487514.91	9.7041	A	0.6
5	☐	10000.00	9924.649	124094956.9	83.2764	A	2.6
6	☐	20000.00	20036.391	238303405.3	166.968	A	2.3
7	☐	100.000					

y = 0.0083 * x + 1.1333
R = 1.0000
DL = 13.34
BEC = 136.9

Weight: <None>
Min Conc: <None>

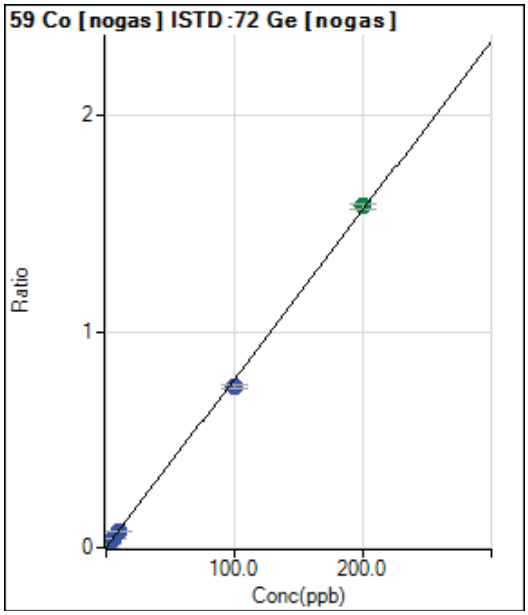


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	14856.19	0.0344	P	0.7
2	☐	200.000	206.835	709223.06	1.6961	P	2.3
3	☐	500.000	517.304	1752863.15	4.1904	A	0.2
4	☐	1000.000	1086.520	3591614.32	8.7635	A	1.0
5	☐	10000.00	10205.350	34027376.16	82.0239	A	1.6
6	☐	20000.00	19892.498	65532297.36	159.850	A	3.1
7	☐	100.000					

y = 0.0080 * x + 0.0344
R = 0.9999
DL = 0.0919
BEC = 4.286

Weight: <None>
Min Conc: <None>

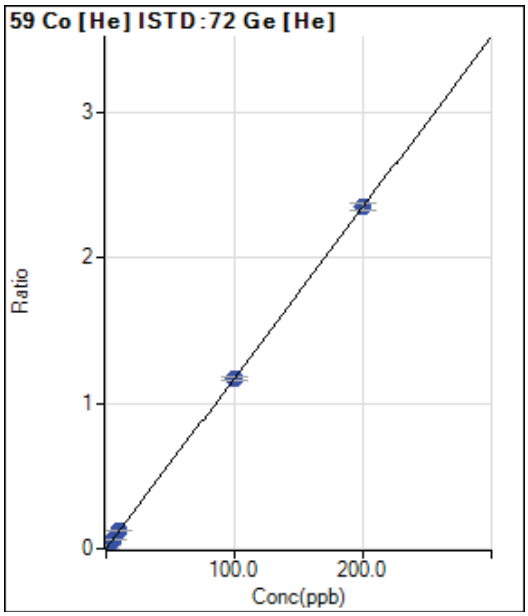
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	340.01	0.0002	P	36.7
2	☐	2.000	1.966	23735.67	0.0156	P	3.2
3	☐	5.000	4.866	58423.13	0.0383	P	0.5
4	☐	10.000	10.077	117898.88	0.0790	P	0.6
5	☐	100.000	95.474	1112098.92	0.7462	P	1.5
6	☐	200.000	202.263	2255977.73	1.5806	A	1.8
7	☐	1.000					

y = 0.0078 * x + 2.3004E-004
R = 0.9996
DL = 0.0324
BEC = 0.02944

Weight: <None>
Min Conc: <None>

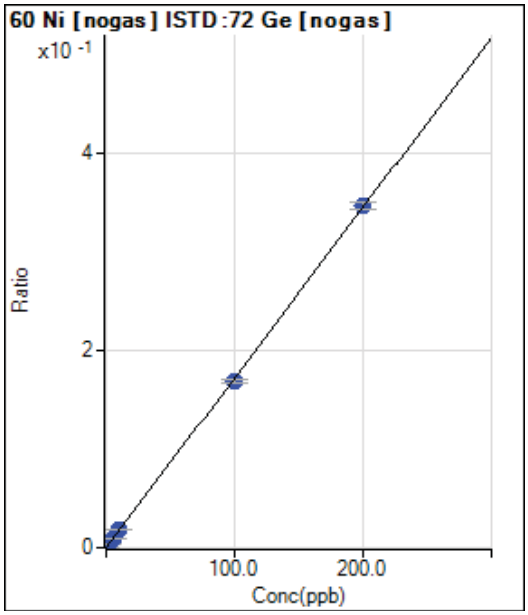


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	73.33	0.0002	P	14.6
2	☐	2.000	2.157	10659.91	0.0255	P	4.2
3	☐	5.000	5.020	24713.60	0.0591	P	1.5
4	☐	10.000	10.895	52478.48	0.1280	P	1.0
5	☐	100.000	99.910	486507.47	1.1728	P	2.5
6	☐	200.000	199.998	962511.36	2.3475	P	2.2
7	☐	1.000					

y = 0.0117 * x + 1.6977E-004
R = 1.0000
DL = 0.006347
BEC = 0.01446

Weight: <None>
Min Conc: <None>

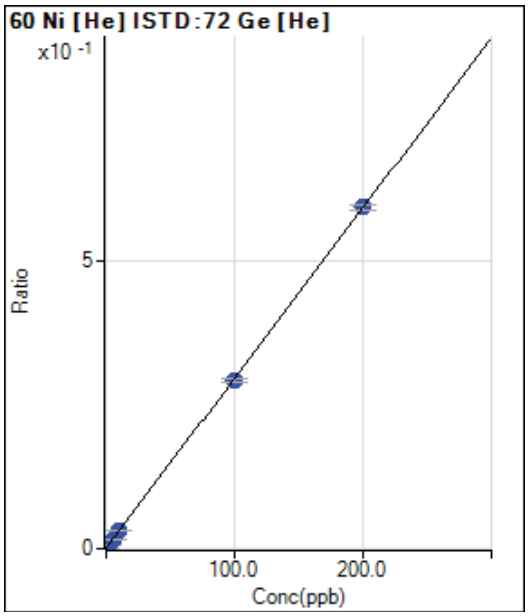
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.146	236.67	0.0002	P	50.8
2	☐	2.000	2.207	5640.97	0.0037	P	4.0
3	☐	5.000	5.141	13371.70	0.0088	P	3.6
4	☐	10.000	10.490	26806.41	0.0180	P	1.4
5	☐	100.000	98.094	251374.59	0.1687	P	2.9
6	☐	200.000	200.923	493291.88	0.3456	P	2.2
7	☐	1.000					

y = 0.0017 * x - 9.0964E-005
R = 0.9999
DL = 0.1411
BEC = -0.05287

Weight: <None>
Min Conc: <None>

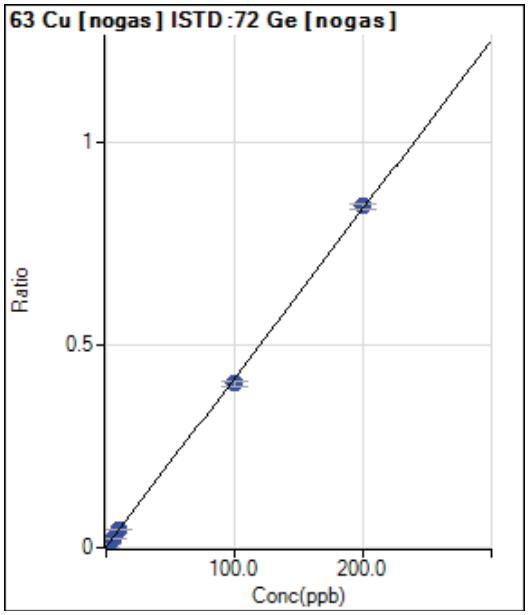


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	-0.221	136.67	0.0003	P	23.7
2	☐	2.000	2.028	2910.28	0.0070	P	5.8
3	☐	5.000	5.343	7008.08	0.0168	P	3.9
4	☐	10.000	10.331	12908.02	0.0315	P	2.6
5	☐	100.000	99.090	121871.78	0.2938	P	2.1
6	☐	200.000	200.430	243266.60	0.5932	P	1.7
7	☐	1.000					

y = 0.0030 * x + 9.7033E-004
R = 1.0000
DL = 0.07642
BEC = 0.3284

Weight: <None>
Min Conc: <None>

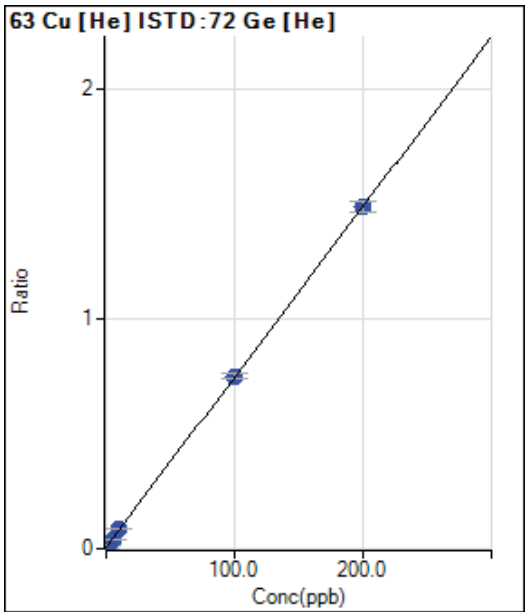
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	2853.60	0.0019	P	6.8
2	☐	2.000	2.075	16057.25	0.0106	P	7.0
3	☐	5.000	5.021	34846.73	0.0228	P	1.9
4	☐	10.000	10.185	66162.45	0.0443	P	2.3
5	☐	100.000	96.614	601844.76	0.4039	P	3.3
6	☐	200.000	201.682	1200428.58	0.8411	P	1.7
7	☐	1.000					

y = 0.0042 * x + 0.0019
R = 0.9998
DL = 0.09444
BEC = 0.4629

Weight: <None>
Min Conc: <None>

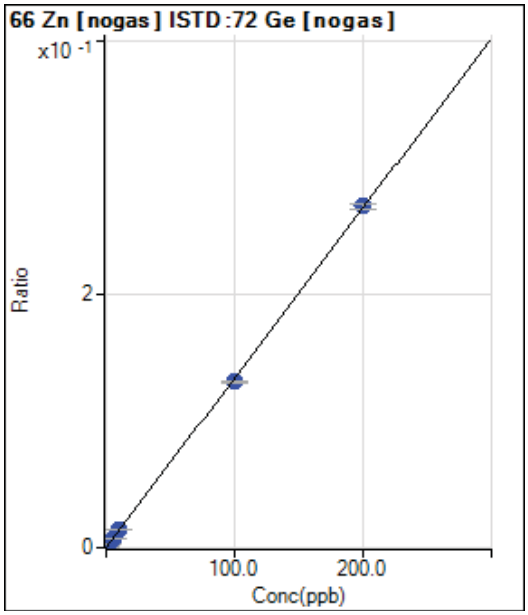


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	-0.383	1416.75	0.0033	P	4.2
2	☐	2.000	1.767	8025.21	0.0192	P	6.0
3	☐	5.000	4.828	17495.23	0.0418	P	4.1
4	☐	10.000	10.662	34840.06	0.0850	P	0.5
5	☐	100.000	100.303	310414.11	0.7483	P	3.1
6	☐	200.000	199.822	608696.97	1.4847	P	3.1
7	☐	1.000					

y = 0.0074 * x + 0.0061
R = 1.0000
DL = 0.05548
BEC = 0.8264

Weight: <None>
Min Conc: <None>

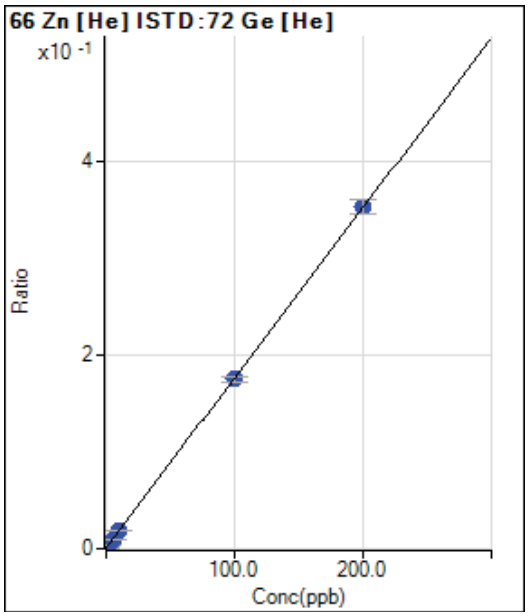
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.501	1033.38	0.0007	P	15.5
2	☐	2.000	2.256	4637.33	0.0030	P	5.3
3	☐	5.000	5.180	10636.58	0.0070	P	1.1
4	☐	10.000	10.228	20495.05	0.0137	P	1.9
5	☐	100.000	97.707	195081.61	0.1309	P	1.7
6	☐	200.000	201.128	384546.16	0.2694	P	1.8
7	☐	1.000					

y = 0.0013 * x + 2.6294E-005
R = 0.9999
DL = 0.2418
BEC = 0.01963

Weight: <None>
Min Conc: <None>

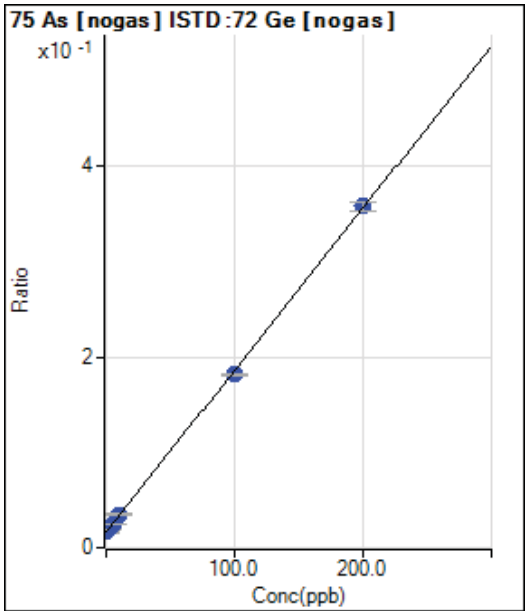


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.064	370.01	0.0009	P	19.2
2	☐	2.000	1.826	1650.10	0.0039	P	9.4
3	☐	5.000	5.273	4180.55	0.0100	P	3.9
4	☐	10.000	10.295	7708.39	0.0188	P	1.8
5	☐	100.000	99.125	72473.62	0.1747	P	2.4
6	☐	200.000	200.418	144472.53	0.3525	P	4.3
7	☐	1.000					

y = 0.0018 * x + 7.4384E-004
R = 1.0000
DL = 0.2812
BEC = 0.4238

Weight: <None>
Min Conc: <None>

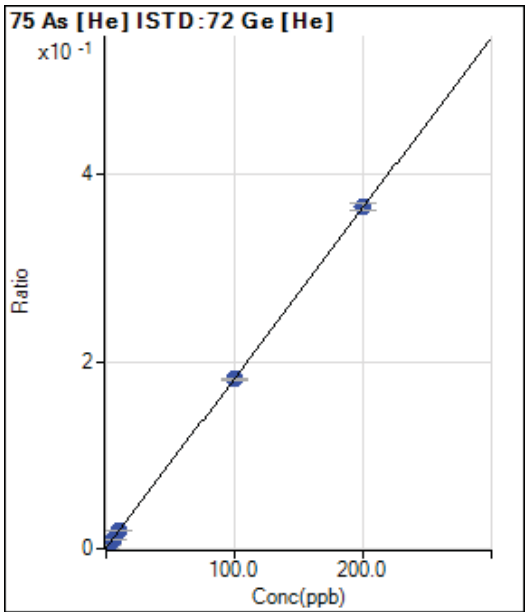
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		0.000	0.058	24189.74	0.0163	P	5.8
2		2.000	2.103	30121.75	0.0198	P	5.8
3		5.000	5.277	38484.32	0.0252	P	2.9
4		10.000	10.951	52001.15	0.0348	P	3.2
5		100.000	97.334	270693.04	0.1816	P	1.1
6		200.000	201.277	511298.49	0.3582	P	2.6
7		1.000					

y = 0.0017 * x + 0.0162
R = 0.9999
DL = 1.663
BEC = 9.55

Weight: <None>
Min Conc: <None>

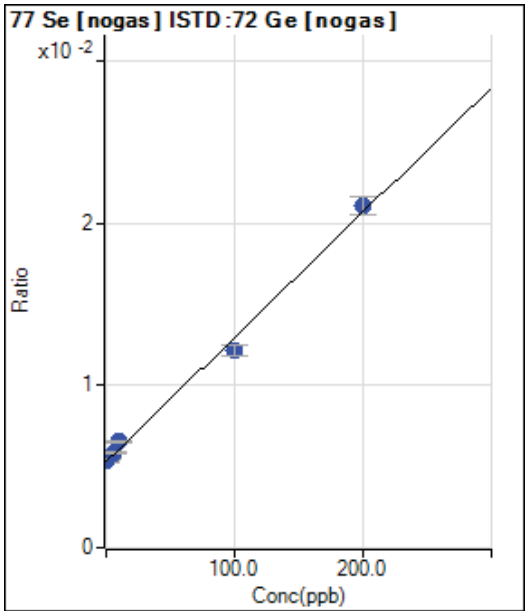


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1		0.000	0.000	157.78	0.0004	P	6.5
2		2.000	2.039	1704.53	0.0041	P	7.6
3		5.000	5.086	4023.79	0.0096	P	4.6
4		10.000	10.440	7938.43	0.0194	P	3.5
5		100.000	99.227	75077.96	0.1810	P	1.4
6		200.000	200.362	149688.58	0.3651	P	2.0
7		1.000					

y = 0.0018 * x + 3.6580E-004
R = 1.0000
DL = 0.03944
BEC = 0.201

Weight: <None>
Min Conc: <None>

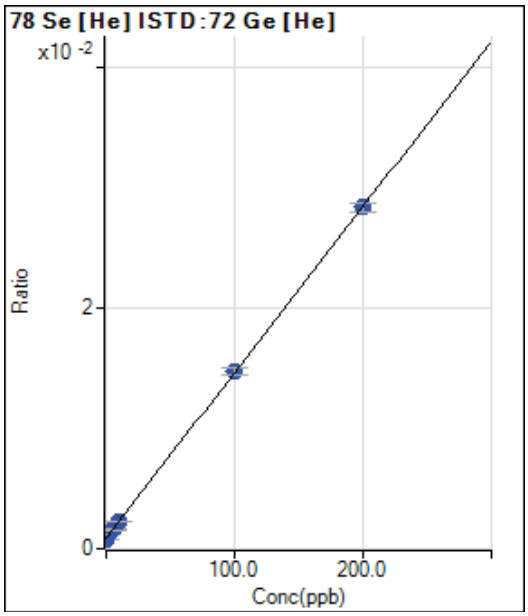
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	7868.47	0.0053	P	2.6
2	☐	2.000	3.928	8538.79	0.0056	P	6.9
3	☐	5.000	6.977	8932.31	0.0058	P	3.0
4	☐	10.000	16.451	9822.81	0.0066	P	1.8
5	☐	100.000	89.670	18199.33	0.0122	P	5.6
6	☐	200.000	204.773	30065.14	0.0211	P	5.3
7	☐	1.000					

y = 7.6941E-005 * x + 0.0053
R = 0.9974
DL = 5.479
BEC = 69.04

Weight: <None>
Min Conc: <None>

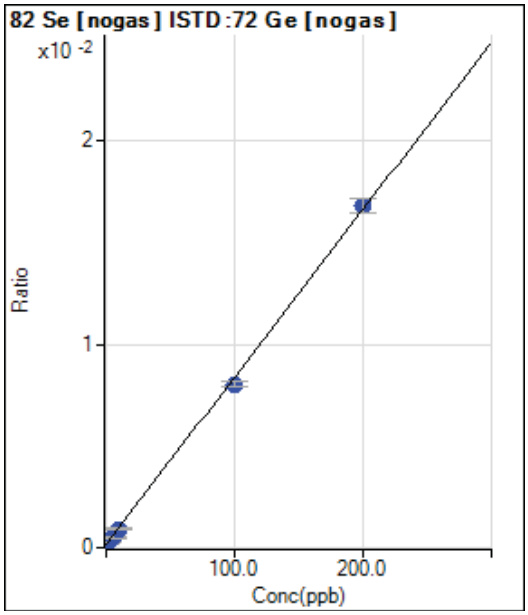


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	-0.696	336.67	0.0008	P	1.6
2	☐	2.000	2.419	505.34	0.0012	P	4.8
3	☐	5.000	5.167	663.35	0.0016	P	10.6
4	☐	10.000	9.890	916.03	0.0022	P	3.4
5	☐	100.000	100.445	6087.70	0.0147	P	4.2
6	☐	200.000	199.774	11613.05	0.0283	P	2.5
7	☐	1.000					

y = 1.3737E-004 * x + 8.7604E-004
R = 1.0000
DL = 0.2788
BEC = 6.377

Weight: <None>
Min Conc: <None>

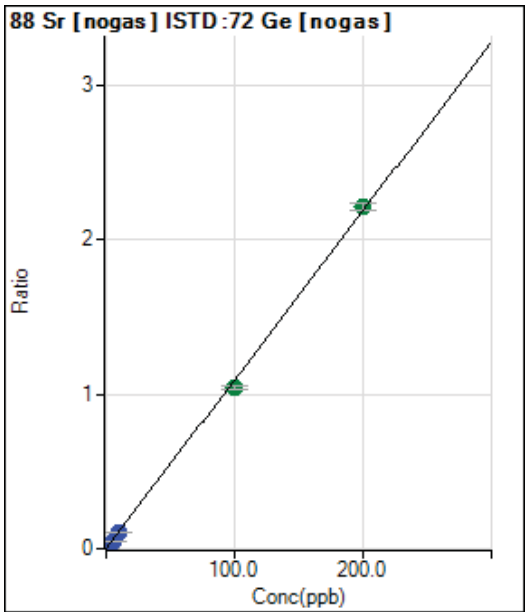
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	243.34	0.0002	P	14.2
2	☐	2.000	1.541	443.35	0.0003	P	41.5
3	☐	5.000	4.292	790.03	0.0005	P	11.8
4	☐	10.000	9.196	1373.41	0.0009	P	3.4
5	☐	100.000	95.899	11994.15	0.0080	P	2.7
6	☐	200.000	202.113	23949.55	0.0168	P	4.2
7	☐	1.000					

y = 8.2217E-005 * x + 1.6426E-004
R = 0.9997
DL = 0.8524
BEC = 1.998

Weight: <None>
Min Conc: <None>

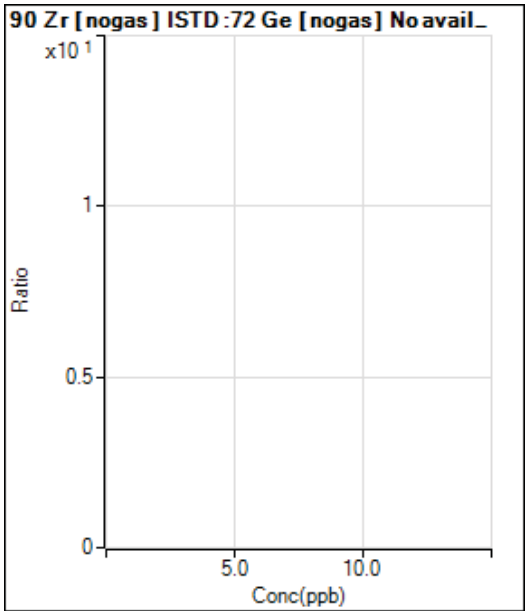


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	693.36	0.0005	P	23.1
2	☐	2.000	1.936	32924.00	0.0216	P	3.8
3	☐	5.000	4.695	79127.38	0.0518	P	3.5
4	☐	10.000	9.826	161141.75	0.1079	P	0.6
5	☐	100.000	95.554	1558010.13	1.0455	A	2.5
6	☐	200.000	202.240	3157489.01	2.2122	A	2.0
7	☐	1.000					

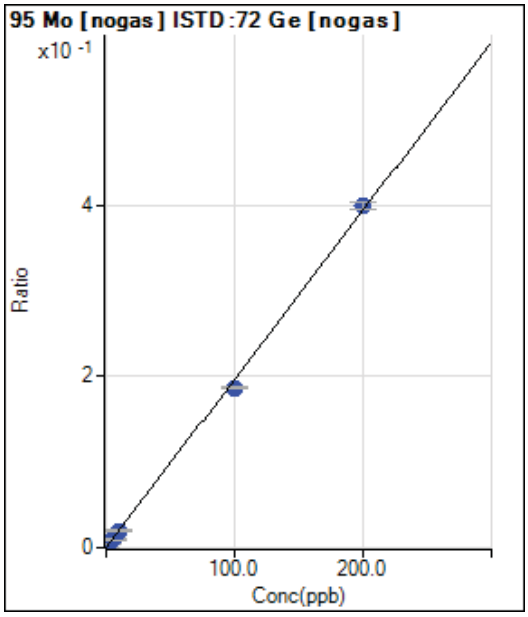
y = 0.0109 * x + 4.6831E-004
R = 0.9997
DL = 0.02971
BEC = 0.04282

Weight: <None>
Min Conc: <None>

Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000					
2	☐	2.000					
3	☐	5.000					
4	☐	10.000					
5	☐	100.000					
6	☐	200.000					
7	☐	1.000					

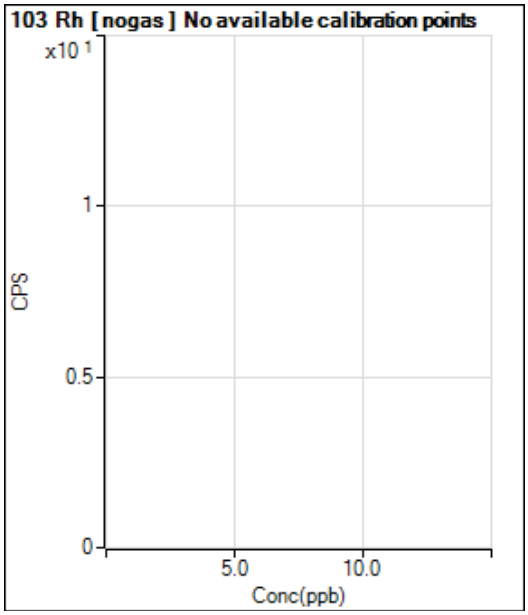


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	110.00	0.0001	P	32.4
2	☐	2.000	2.022	6157.84	0.0040	P	6.5
3	☐	5.000	4.859	14696.22	0.0096	P	6.7
4	☐	10.000	10.107	29761.91	0.0199	P	2.1
5	☐	100.000	94.688	277448.66	0.1862	P	1.4
6	☐	200.000	202.654	568559.85	0.3983	P	2.2
7	☐	1.000					

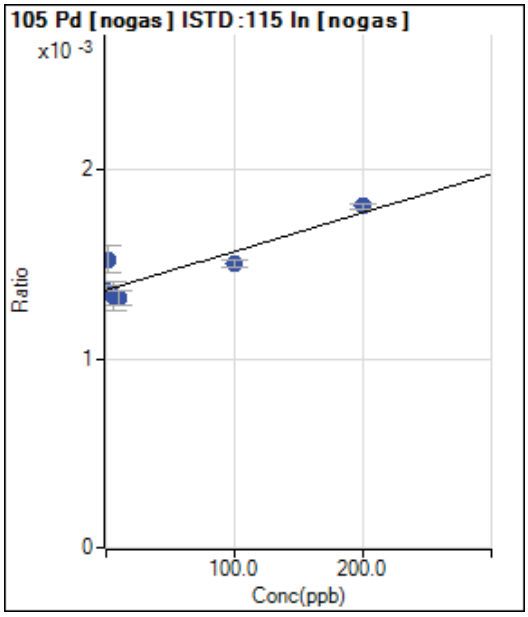
y = 0.0020 * x + 7.4212E-005
R = 0.9995
DL = 0.03666
BEC = 0.03776

Weight: <None>
Min Conc: <None>

Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐			23.33		P	137.
2	☐			23.33		P	24.7
3	☐			23.33		P	65.5
4	☐			20.00		P	50.0
5	☐			86.67		P	29.0
6	☐			190.01		P	15.8
7	☐						

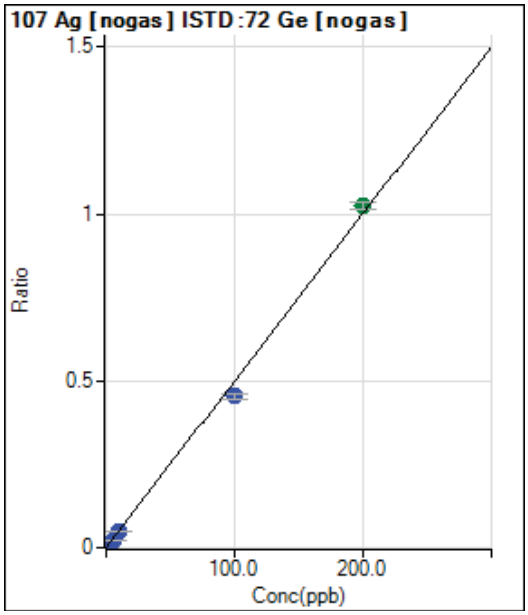


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1633.44	0.0014	P	3.4
2	☐	2.000	80.100	1846.79	0.0015	P	9.8
3	☐	5.000	-15.678	1613.43	0.0013	P	11.8
4	☐	10.000	-19.982	1566.76	0.0013	P	5.9
5	☐	100.000	69.434	1766.79	0.0015	P	2.2
6	☐	200.000	216.518	2046.81	0.0018	P	1.4
7	☐	1.000					

y = 2.0518E-006 * x + 0.0014
R = 0.8879
DL = 67.47
BEC = 665.2

Weight: <None>
Min Conc: <None>

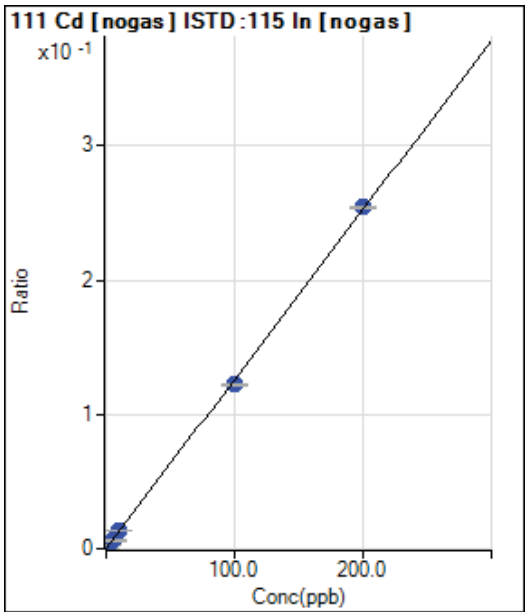
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	103.33	0.0001	P	48.1
2	☐	2.000	1.893	14502.82	0.0095	P	4.1
3	☐	5.000	4.789	36668.40	0.0240	P	2.6
4	☐	10.000	10.061	75182.92	0.0504	P	0.3
5	☐	100.000	90.725	675804.16	0.4535	P	3.1
6	☐	200.000	204.641	1459880.19	1.0229	A	2.2
7	☐	1.000					

y = 0.0050 * x + 6.9660E-005
R = 0.9985
DL = 0.02012
BEC = 0.01394

Weight: <None>
Min Conc: <None>

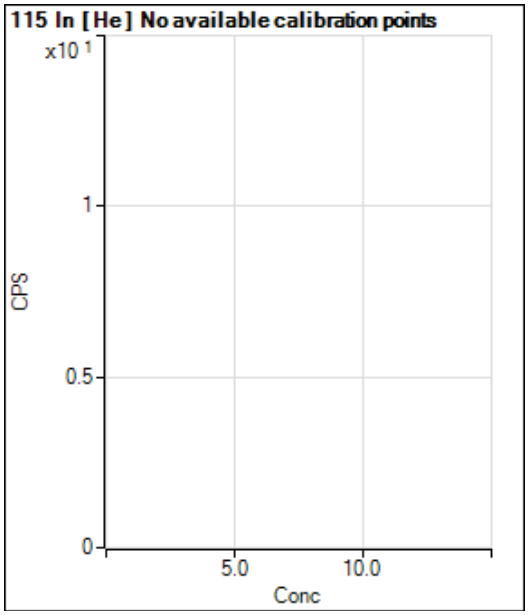


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	13.33	0.0000	P	115.
2	☐	2.000	2.003	3070.33	0.0025	P	10.6
3	☐	5.000	4.839	7401.68	0.0061	P	3.8
4	☐	10.000	10.398	15527.06	0.0131	P	3.6
5	☐	100.000	96.713	142929.24	0.1220	P	1.6
6	☐	200.000	201.628	287647.75	0.2542	P	0.4
7	☐	1.000					

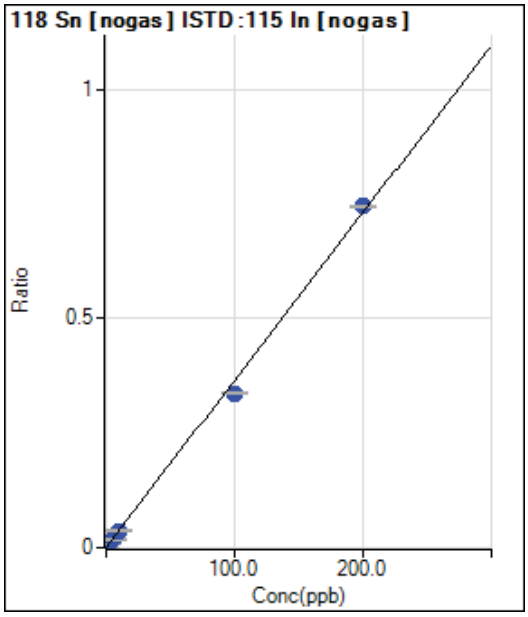
y = 0.0013 * x + 1.1253E-005
R = 0.9998
DL = 0.03079
BEC = 0.008925

Weight: <None>
Min Conc: <None>

Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐			474151.89		P	1.5
2	☐			474405.25		P	2.3
3	☐			465672.97		P	0.5
4	☐			466584.36		P	1.1
5	☐			462127.95		P	2.4
6	☐			452852.88		P	1.4
7	☐						

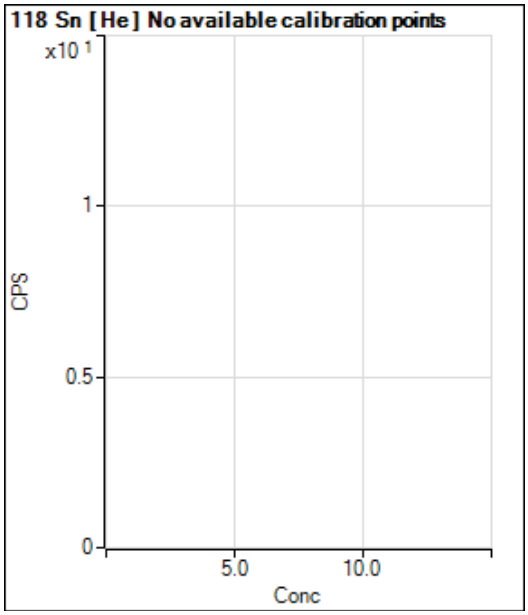


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	743.36	0.0006	P	12.2
2	☐	2.000	1.828	8802.34	0.0073	P	4.5
3	☐	5.000	4.742	21663.79	0.0179	P	3.6
4	☐	10.000	9.951	43671.53	0.0369	P	3.7
5	☐	100.000	92.119	394368.08	0.3365	P	1.0
6	☐	200.000	203.951	842068.01	0.7443	P	0.5
7	☐	1.000					

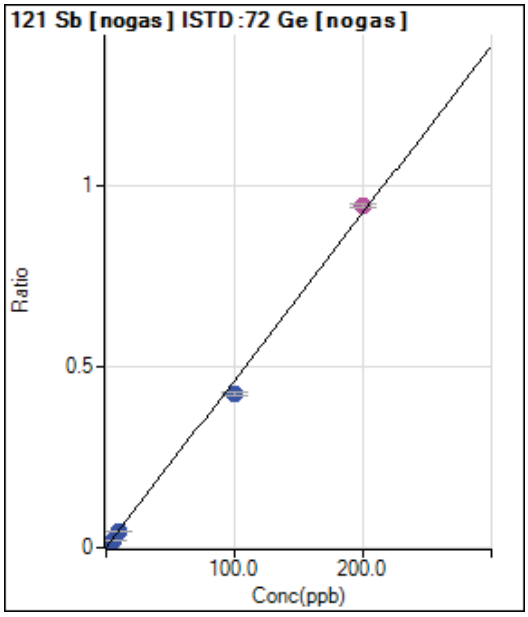
y = 0.0036 * x + 6.2065E-004
R = 0.9989
DL = 0.0623
BEC = 0.1702

Weight: <None>
Min Conc: <None>

Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐			390.01		P	9.2
2	☐			3987.19		P	7.5
3	☐			9255.94		P	1.8
4	☐			19514.47		P	4.3
5	☐			174830.79		P	3.4
6	☐			363965.91		P	0.7
7	☐						

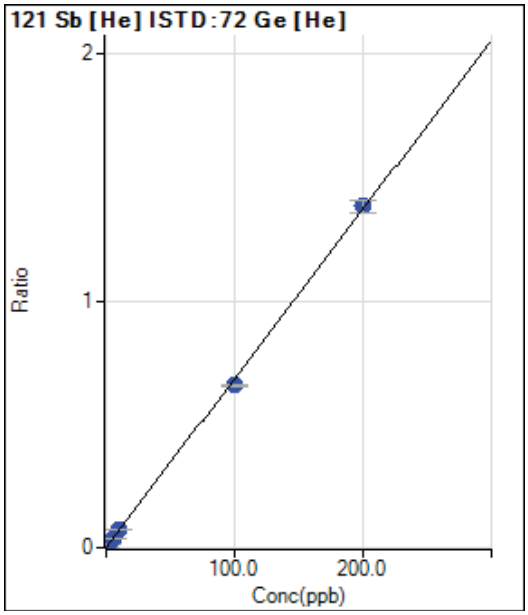


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	1353.41	0.0009	P	9.7
2	☐	2.000	1.929	14959.96	0.0098	P	6.5
3	☐	5.000	4.622	34033.45	0.0223	P	2.1
4	☐	10.000	9.876	69545.31	0.0466	P	1.7
5	☐	100.000	91.987	635214.01	0.4262	P	2.6
6	☐	200.000	204.023	1347773.11	0.9443	M	1.2
7	☐	1.000					

y = 0.0046 * x + 9.1320E-004
R = 0.9989
DL = 0.05766
BEC = 0.1975

Weight: <None>
Min Conc: <None>

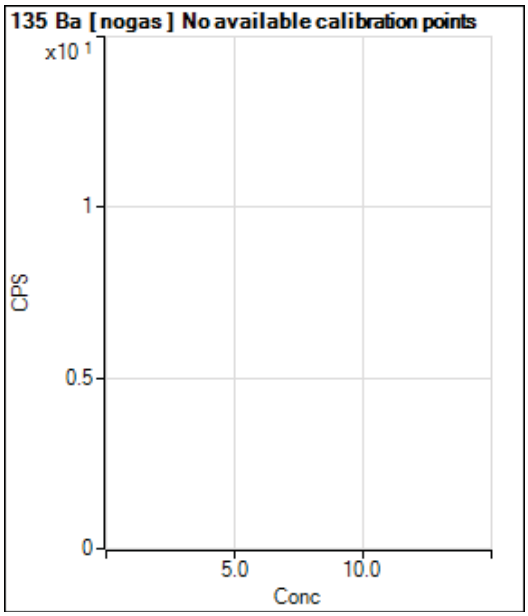
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	470.01	0.0011	P	5.7
2	☐	2.000	2.044	6307.89	0.0151	P	2.6
3	☐	5.000	5.125	15126.71	0.0362	P	3.4
4	☐	10.000	10.621	30239.77	0.0738	P	0.6
5	☐	100.000	95.991	273045.26	0.6582	P	1.1
6	☐	200.000	201.970	567185.49	1.3836	P	3.6
7	☐	1.000					

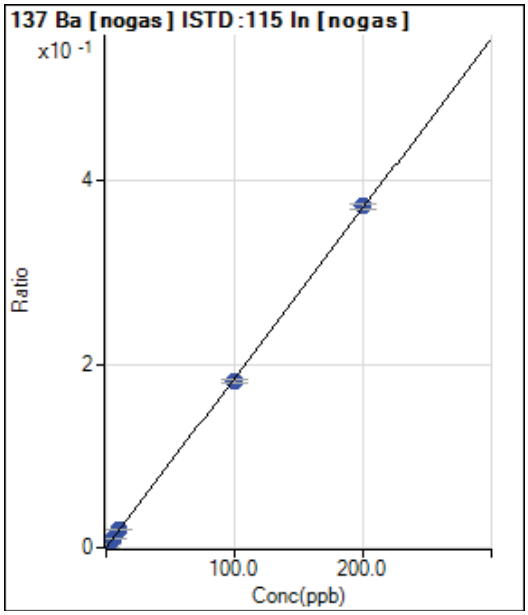
y = 0.0068 * x + 0.0011
R = 0.9997
DL = 0.02709
BEC = 0.1592

Weight: <None>
Min Conc: <None>



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐			133.34		P	69.7
2	☐			2693.59		P	4.5
3	☐			6574.69		P	3.5
4	☐			13108.53		P	1.6
5	☐			121004.98		P	2.9
6	☐			245333.08		P	3.0
7	☐						

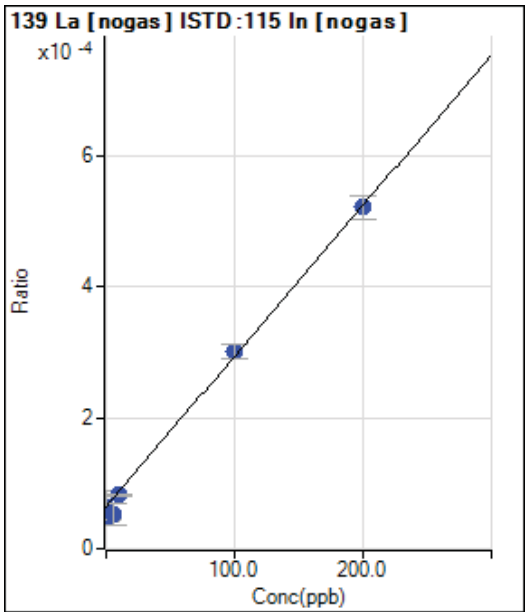
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	163.34	0.0001	P	38.6
2	☐	2.000	1.940	4510.69	0.0037	P	8.1
3	☐	5.000	4.868	11077.02	0.0092	P	1.7
4	☐	10.000	10.098	22294.73	0.0188	P	0.8
5	☐	100.000	97.905	212655.30	0.1815	P	2.3
6	☐	200.000	201.046	421448.78	0.3725	P	1.5
7	☐	1.000					

y = 0.0019 * x + 1.3697E-004
R = 0.9999
DL = 0.08574
BEC = 0.07395

Weight: <None>
Min Conc: <None>

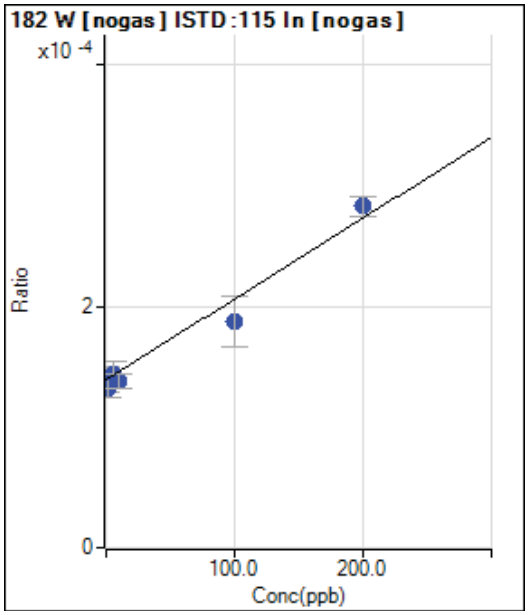


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	76.67	0.0001	P	73.0
2	☐	2.000	-6.443	60.00	0.0000	P	16.7
3	☐	5.000	-5.339	63.33	0.0001	P	59.7
4	☐	10.000	7.499	96.67	0.0001	P	5.8
5	☐	100.000	103.136	353.34	0.0003	P	7.3
6	☐	200.000	198.900	590.02	0.0005	P	6.9
7	☐	100.000					

y = 2.2988E-006 * x + 6.4440E-005
R = 0.9986
DL = 61.37
BEC = 28.03

Weight: <None>
Min Conc: <None>

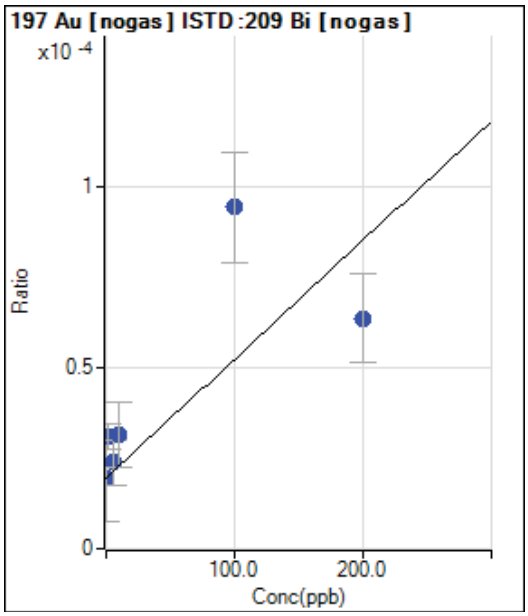
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	166.67	0.0001	P	14.5
2	☐	2.000	-10.530	160.00	0.0001	P	10.8
3	☐	5.000	6.086	173.33	0.0001	P	15.1
4	☐	10.000	-1.842	163.33	0.0001	P	9.1
5	☐	100.000	72.170	220.01	0.0002	P	22.1
6	☐	200.000	214.605	320.01	0.0003	P	5.6
7	☐	1.000					

y = 6.6929E-007 * x + 1.3923E-004
R = 0.9875
DL = 90.47
BEC = 208

Weight: <None>
Min Conc: <None>

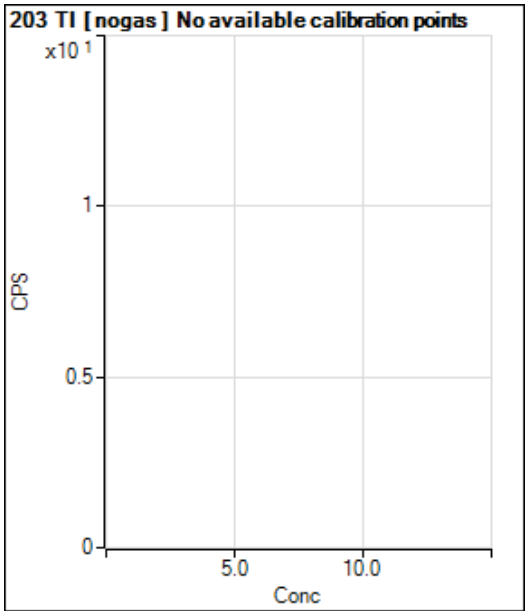


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	16.67	0.0000	P	124.
2	☐	2.000	34.884	26.67	0.0000	P	23.1
3	☐	5.000	13.007	20.00	0.0000	P	53.3
4	☐	10.000	36.430	26.67	0.0000	P	57.5
5	☐	100.000	227.628	80.00	0.0001	P	32.4
6	☐	200.000	134.335	53.33	0.0001	P	38.6
7	☐	100.000					

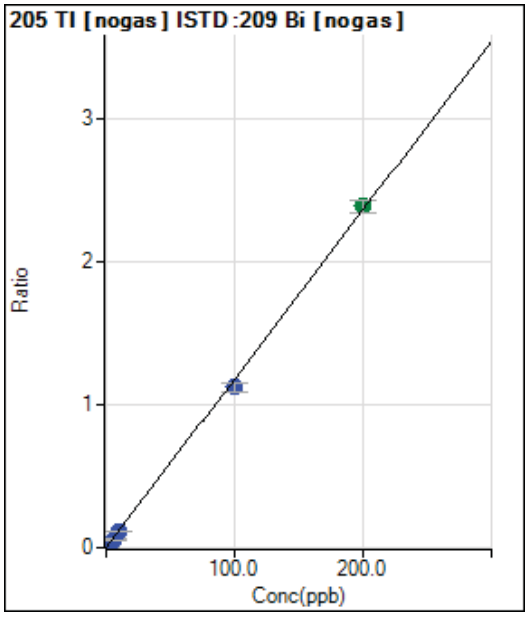
y = 3.2821E-007 * x + 1.9526E-005
R = 0.7323
DL = 221.2
BEC = 59.49

Weight: <None>
Min Conc: <None>

Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐			53.33		P	65.8
2	☐			8055.45		P	0.6
3	☐			19672.11		P	5.0
4	☐			39972.84		P	3.6
5	☐			397502.78		P	2.1
6	☐			788190.77		P	2.4
7	☐						

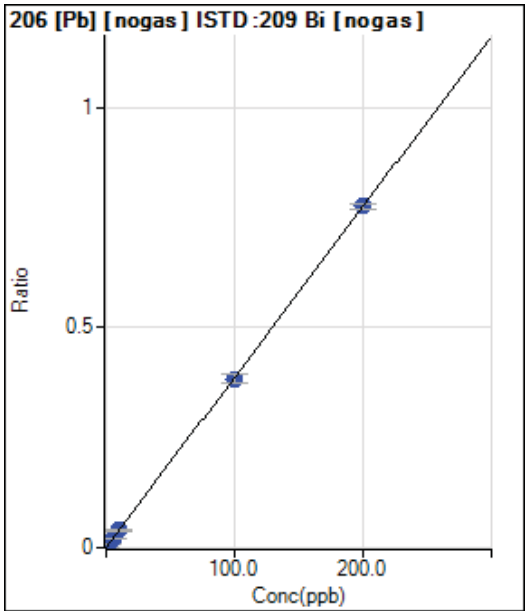


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	123.33	0.0001	P	46.4
2	☐	2.000	1.812	18567.57	0.0215	P	0.8
3	☐	5.000	4.714	47463.12	0.0557	P	8.3
4	☐	10.000	9.715	97659.57	0.1147	P	6.9
5	☐	100.000	95.337	952034.39	1.1245	P	5.6
6	☐	200.000	202.355	1997315.07	2.3865	A	3.7
7	☐	1.000					

y = 0.0118 * x + 1.4511E-004
R = 0.9996
DL = 0.01711
BEC = 0.0123

Weight: <None>
Min Conc: <None>

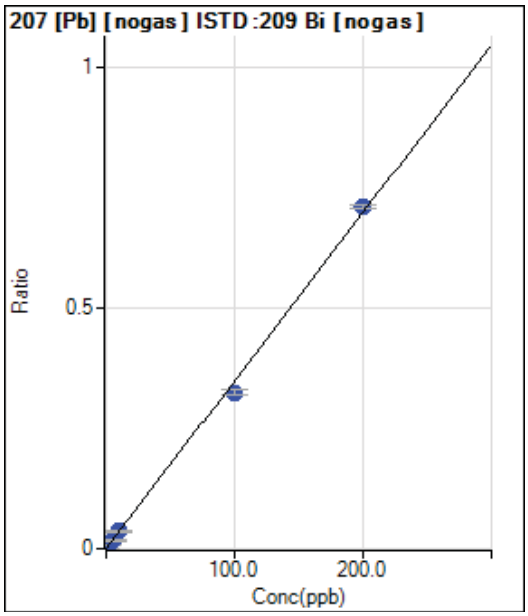
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	76.67	0.0001	P	30.3
2	☐	2.000	1.937	6548.09	0.0076	P	2.2
3	☐	5.000	4.918	16291.78	0.0191	P	5.8
4	☐	10.000	10.301	34019.22	0.0399	P	5.4
5	☐	100.000	99.251	325200.78	0.3840	P	5.1
6	☐	200.000	200.362	648857.37	0.7752	P	1.9
7	☐	1.000					

y = 0.0039 * x + 9.0504E-005
R = 1.0000
DL = 0.02125
BEC = 0.02339

Weight: <None>
Min Conc: <None>

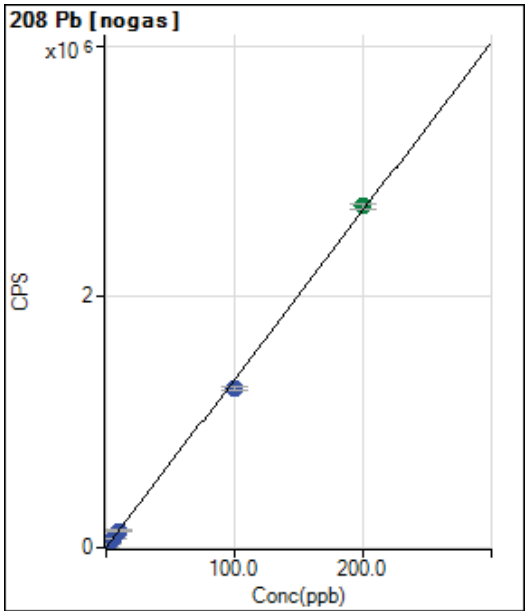


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	46.67	0.0001	P	86.6
2	☐	2.000	1.962	5961.19	0.0069	P	1.5
3	☐	5.000	4.879	14560.05	0.0171	P	5.8
4	☐	10.000	10.329	30749.44	0.0361	P	6.5
5	☐	100.000	93.201	275696.98	0.3254	P	3.1
6	☐	200.000	203.387	594403.42	0.7101	P	1.1
7	☐	1.000					

y = 0.0035 * x + 5.5422E-005
R = 0.9992
DL = 0.04125
BEC = 0.01587

Weight: <None>
Min Conc: <None>

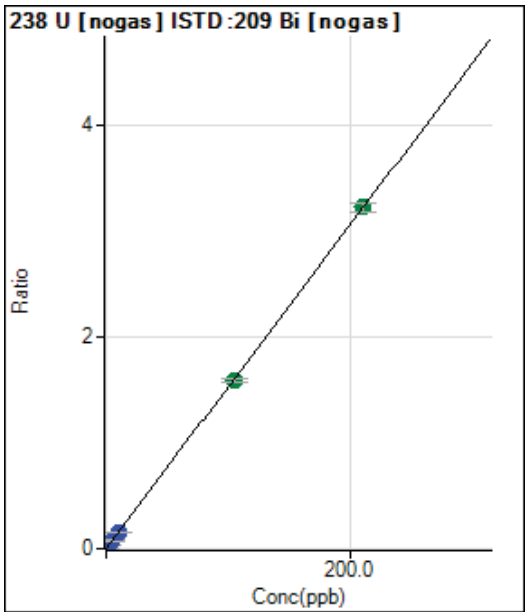
Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	266.67		P	4.3
2	☐	2.000	1.976	26782.38		P	1.4
3	☐	5.000	4.863	65519.40		P	1.9
4	☐	10.000	10.141	136343.42		P	2.2
5	☐	100.000	94.664	1270549.37		P	2.3
6	☐	200.000	202.665	2719803.79		A	1.3
7	☐	1.000					

y = 13418.8944 * x + 266.6667
R = 0.9995
DL = 0.002582
BEC = 0.01987

Weight: <None>
Min Conc: <None>

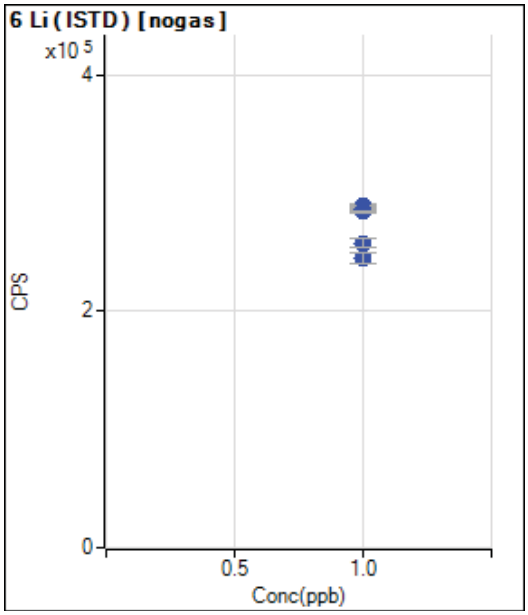


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	0.000	0.000	73.33	0.0001	P	33.4
2	☐	2.000	1.981	26248.93	0.0304	P	7.1
3	☐	5.000	4.899	64022.67	0.0752	P	6.9
4	☐	10.000	10.024	130975.62	0.1537	P	2.2
5	☐	105.000	103.862	1348416.54	1.5917	A	2.5
6	☐	210.000	210.571	2700971.11	3.2270	A	3.0
7	☐	1.000					

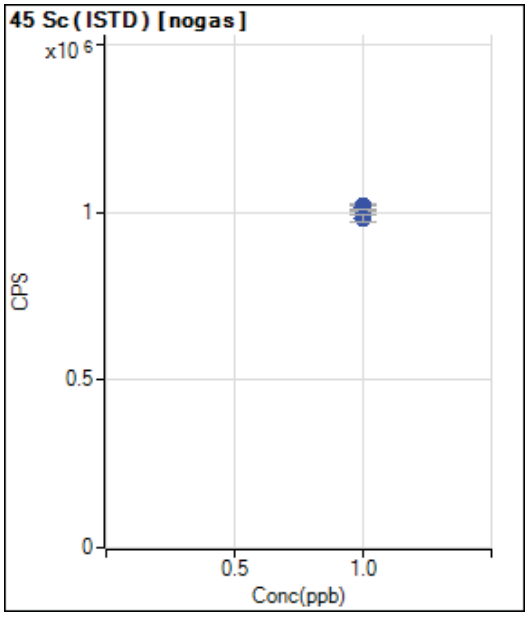
y = 0.0153 * x + 8.6406E-005
R = 1.0000
DL = 0.005657
BEC = 0.005638

Weight: <None>
Min Conc: <None>

Calibration for 205_ICV.d

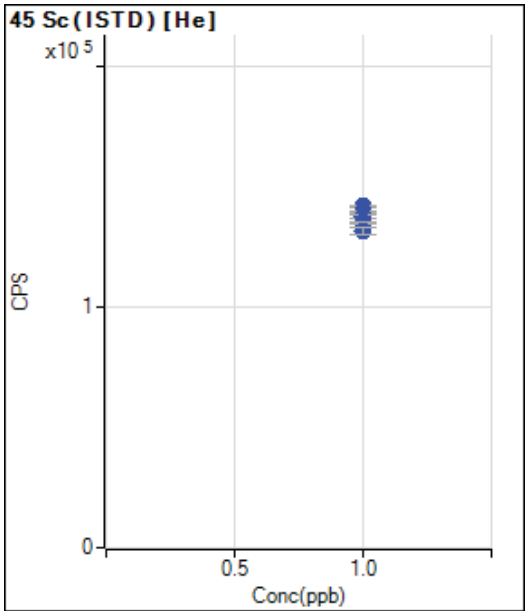


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		288047.02		P	1.7
2	☐	1.000		285515.21		P	1.1
3	☐	1.000		288739.91		P	0.5
4	☐	1.000		284090.33		P	0.5
5	☐	1.000		257591.82		P	2.8
6	☐	1.000		244973.41		P	3.7
7	☐	1.000					

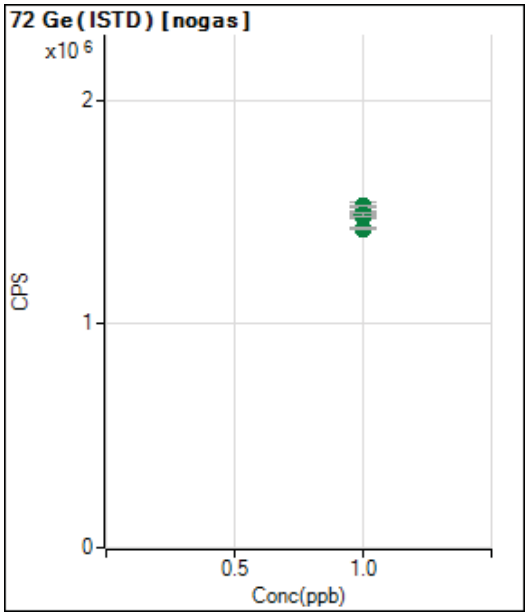


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		1014055.09		P	1.7
2	☐	1.000		1016557.25		P	1.5
3	☐	1.000		1017823.97		P	0.1
4	☐	1.000		1014425.43		P	0.9
5	☐	1.000		1006656.89		P	0.4
6	☐	1.000		983280.37		P	2.3
7	☐	1.000					

Calibration for 205_ICV.d

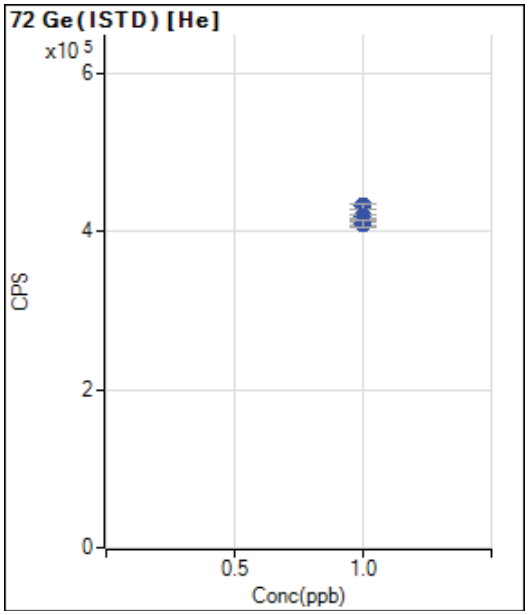


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		142041.26		P	0.4
2	☐	1.000		139474.36		P	3.3
3	☐	1.000		139677.53		P	0.7
4	☐	1.000		137792.81		P	1.5
5	☐	1.000		135328.09		P	0.3
6	☐	1.000		131735.03		P	1.9
7	☐	1.000					

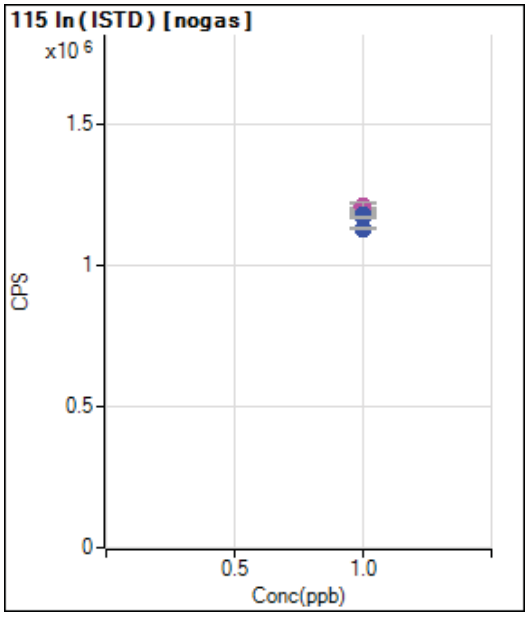


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		1481099.04		A	1.0
2	☐	1.000		1522687.11		A	2.6
3	☐	1.000		1527293.88		A	0.6
4	☐	1.000		1493005.76		A	2.0
5	☐	1.000		1490520.08		A	1.4
6	☐	1.000		1427363.73		A	0.6
7	☐	1.000					

Calibration for 205_ICV.d

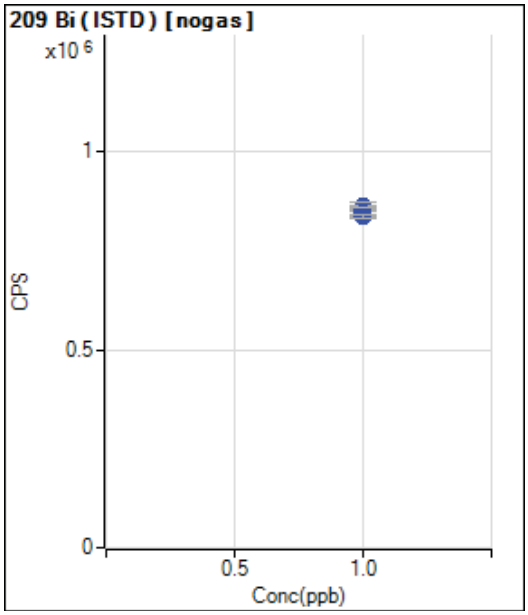


	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		431431.05		P	1.3
2	☐	1.000		418210.61		P	1.1
3	☐	1.000		418294.85		P	1.5
4	☐	1.000		409824.77		P	1.1
5	☐	1.000		414867.82		P	0.6
6	☐	1.000		410157.38		P	2.4
7	☐	1.000					



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		1196446.74		M	1.3
2	☐	1.000		1208952.90		M	1.9
3	☐	1.000		1210251.38		M	2.3
4	☐	1.000		1183403.11		P	0.2
5	☐	1.000		1171953.33		P	0.7
6	☐	1.000		1131425.77		P	0.9
7	☐	1.000					

Calibration for 205_ICV.d



	Rjct	Conc.	Calc Conc.	CPS	Ratio	Det.	RSD
1	☐	1.000		847481.00		P	1.4
2	☐	1.000		863222.70		P	2.2
3	☐	1.000		853517.28		P	4.4
4	☐	1.000		852558.06		P	3.3
5	☐	1.000		847558.27		P	2.9
6	☐	1.000		837042.80		P	0.6
7	☐	1.000					

Wet Chemistry Raw Data

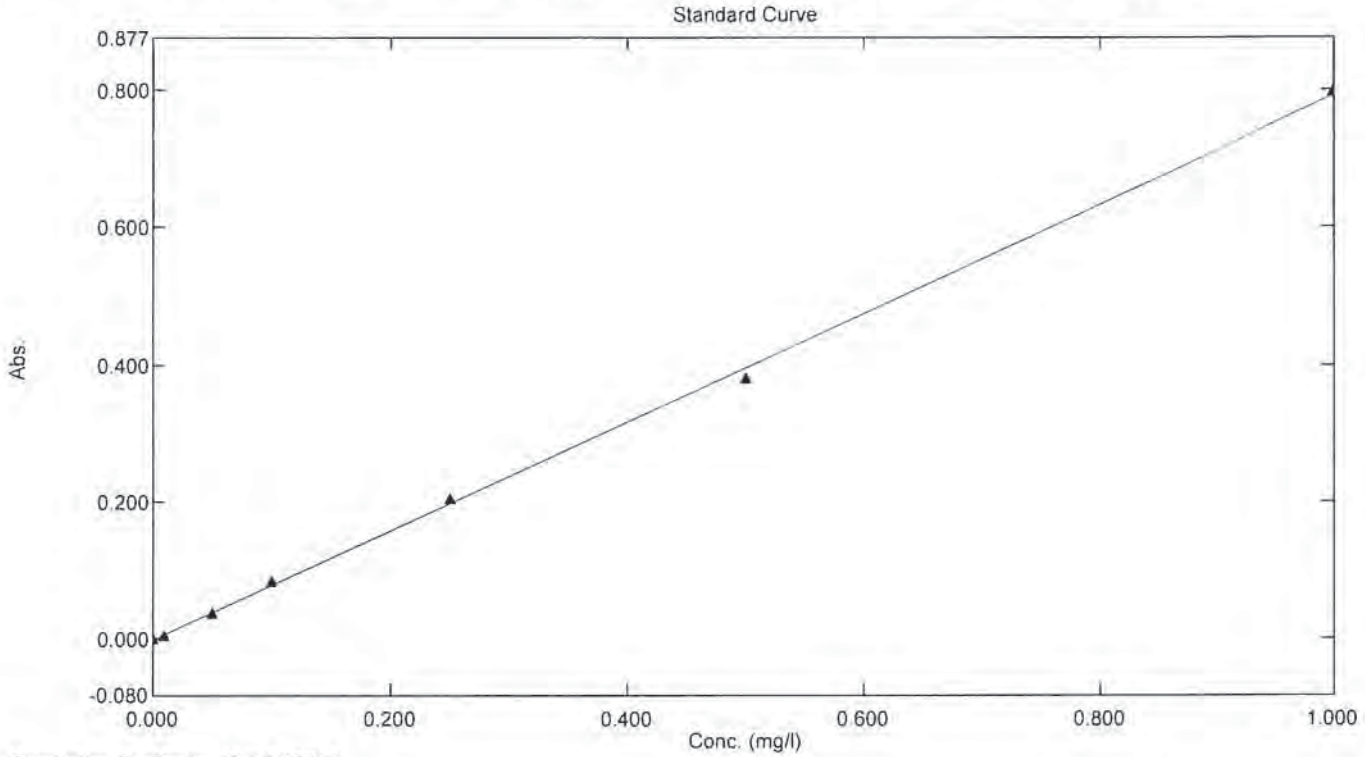
Bhate Environmental Associates, Inc.
Project: LONGHORN GW TREATMENT PLANT
ALS WO# HS18051255

HS180512 55

Standard Table Report

06/11/2018 10:31:16 AM

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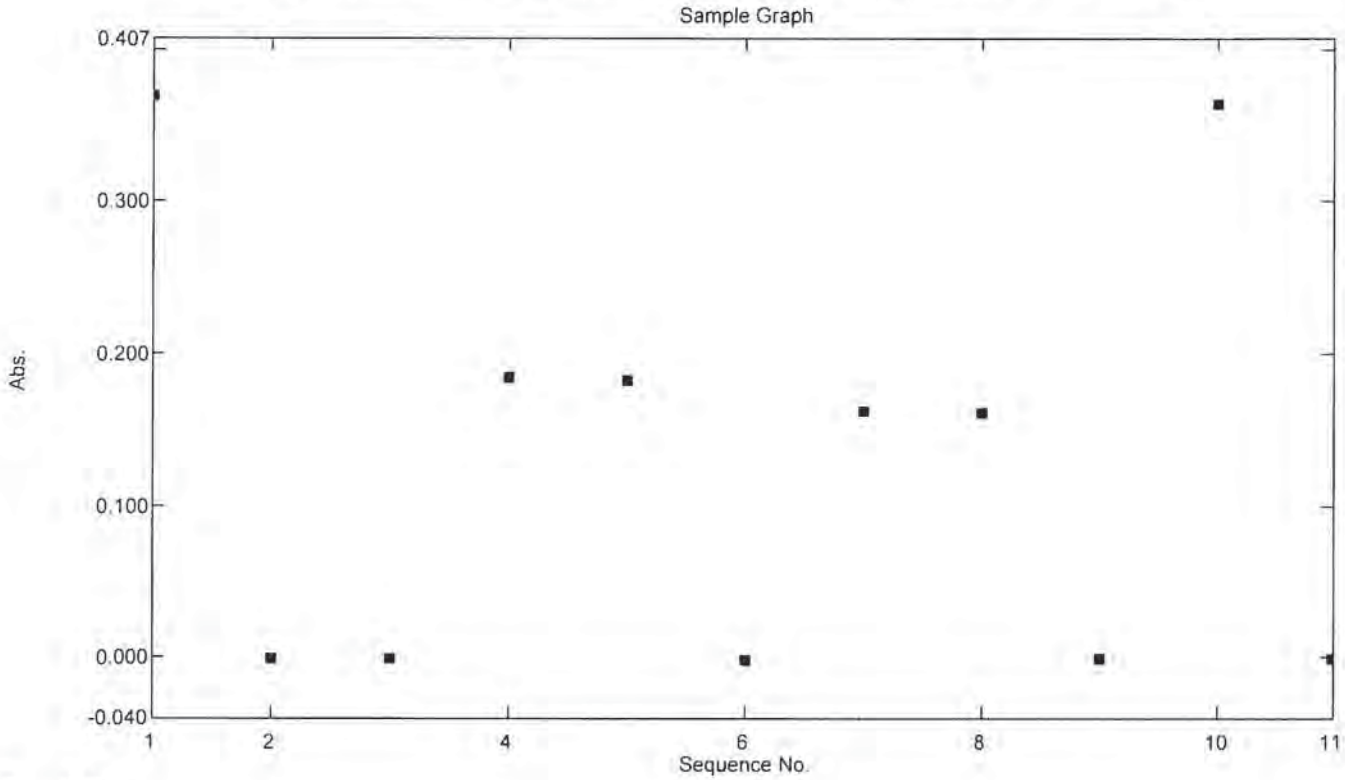
Standard Table

	Sample ID	Type	Ex	Conc	WL540.0	Wgt.Factor	Comments
1	STD1	Standard		0.000	0.000	1.000	
2	STD2	Standard		0.010	0.006	1.000	
3	STD3	Standard		0.050	0.038	1.000	
4	STD4	Standard		0.100	0.084	1.000	
5	STD5	Standard		0.250	0.204	1.000	
6	STD6	Standard		0.500	0.382	1.000	
7	STD7	Standard		1.000	0.797	1.000	
8							

Sample Table Report

06/11/2018 10:31:19 AM

File Name: C:\Program Files (x86)\Shimadzu\UVProbe\Data\CR6+_UNKNOWN\180525_CR6_W.pho



Sample Table

	Sample ID	Type	Ex	Conc	WL540.0	Comments
1	CCV	Unknown		0.467	0.370	
2	CCB	Unknown		-0.000	-0.001	
3	MBLK	Unknown		-0.001	-0.001	
4	LCS	Unknown		0.233	0.184	
5	LCSD	Unknown		0.231	0.183	
6	18051255.01	Unknown		-0.003	-0.002	FILTER,12:20PM
7	18051255.01MS	Unknown		0.205	0.162	
8	18051255.01MSD	Unknown		0.204	0.161	
9	18051257.01	Unknown		-0.001	-0.001	FILTER
10	CCV2	Unknown		0.460	0.364	
11	CCB2	Unknown		-0.001	-0.001	
12						

Sub Contract Data

Bhate Environmental Associates, Inc.
Project: LONGHORN GW TREATMENT PLANT
ALS WO# HS18051255

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1813746; 1814144; 1814932; 1814934; 1814935

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2095 (215757)

General Set Information: There were ten field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Sample 1814932001 was analyzed and reported at a 1:1,000 dilution. The reporting limit has been adjusted accordingly.

Method QC data: The method blank (LMB 603140) was less than 1/2 the CRDL. The recovery for the LCS (603141) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1813746001 (Client ID: HS18050824-01 50WW10-180515. The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. The initial analysis of field sample 1813746005 failed the Internal Standard recovery of 50 – 150% method requirement, possibly due to a spiking error. The sample was re-prepped, re-analyzed and reported. Manual Integrations was performed for datafile 02APRD01/02 along with datafiles 30MAYD06/07/21/22.

Thomas Bosch May 31, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: May 31, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1814932**
Project ID: HS18051255 052418
Purchase Order: HS18051255
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP140_052418	1814932001	05/24/18	05/26/18	

ANALYTICAL REPORT

Workorder: 34-1814932
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP140_052418**	Sampling Site: NA	Collected: 05/24/2018
Lab ID: 1814932001	Media: 125 mL Nalgene	Received: 05/26/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2095 (HBN: 215757)	**Percent Solid:** NA
	Analyzed: 05/30/2018 11:54	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**12000**	1000	2000	4000	1000	

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 05/31/2018 10:04	/S/ Stephen Brose 05/31/2018 14:00

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1814932
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1814932

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2095 (HBN: 215757)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 603140
Analyzed: 05/30/2018 09:17
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 603141
Analyzed: 05/30/2018 09:31
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.30	5.00	106	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1813746001	MS: 603142	MSD: 603143
Analyzed: 05/30/2018 09:46	Analyzed: 05/30/2018 10:00	Analyzed: 05/30/2018 10:15
Dilution: 1	Dilution: 1	Dilution: 1
Units: ug/L	Units: ug/L	Units: ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	5.39	5	108	78.8	123.8	5.58	112	3.48	0.0	20.0

Continuing Calibration Verification

CCV: 603137	CCV: 603144	CCV: 603231
Analyzed: 05/30/2018 08:32	Analyzed: 05/30/2018 12:08	Analyzed: 05/30/2018 13:18
Units: ug/L	Units: ug/L	Units: ug/L
Criteria: ± 15%	Criteria: ± 15%	Criteria: ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	27.1	25.0	109	26.9	25.0	108	27.4	25.0	110

Interference Check Sample

ICSA: 603139
Analyzed: 05/30/2018 09:02
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	1.24	1.00	124

Limit of Detection Verification

LODV: 603138	LODV: 603145	LODV: 603232
Analyzed: 05/30/2018 08:48	Analyzed: 05/30/2018 12:22	Analyzed: 05/30/2018 13:33
Units: ug/L	Units: ug/L	Units: ug/L
Criteria: ± 50%	Criteria: ± 50%	Criteria: ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.01	1.00	101	1.01	1.00	101	0.948	1.00	94.8

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1814932

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2095 (HBN: 215757)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
05/31/2018 10:04	05/31/2018 14:00

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

18698/#2





10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

COC ID: 9167

1814932

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	
Email:	

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18051255
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18051255-01**	**LH18/24-SP140_052418**	**Water**	**24 May 2018 14:00**
	SUB_Perch-6850			05 Jun 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 5/25/18 18:30

Received By: _____ Date/Time: 5/26/18 9:10

Cooler ID(s): _____ Temperature(s): 2°

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18051255	***Split:***	**Workorder ID:** 1814932	**Level:** ENV_LVL4	**Requested Analysis**	
Client: ALS Environmental (Houston)		**Account:** 8101	**Type:** 125Poly		
Comments:			**Preservatives**		
			COOL		
			Containers		

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	ID(s)	Count	EPA 6850, DoD QSM
1	05/24/2018 14:00	LH18/24-SP140_052418	1814932001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

329 of 431

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Wraith, Julie	05/26/2018 09:10	ALS Sample Receiving	Sample Login
[signature]	5/29/18 1310	GB	storage
R.33.1	5.30.18/07:45	T.Bush	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Houston

Project/Task/Site: _____

Date/Time of Receipt: 5/16/18 910

Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8560	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Meredith Lewis (Signature) Meredith Lewis (Printed Name) 5/16/18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____



Must Deliver Next Business Day
Time and Tempature Sensitive!

ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 25MAY18
ACTWGT: 22.25 LB
CAD: 300130/CAFE3111
DIMS: 19x16x13 IN

BILL SENDER

TO SAMPLE RECEIVING
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS18051257/1260/1255-RJ

FedEx Express

1
12:00 A
4519
05.26

SATURDAY 12:00P
PRIORITY OVERNIGHT

TRK# 0201 4380 9529 4519

XO BTFA

84123
UT-US SLC

atch Worklist

Batch: ELMS/ 2095 **Created:** 5/30/2018 08:11 **Instrument:** **HBN:** 215757
Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1813746 [ENV_LVL4]
Workorder: 1814144 [ENV_LVL4]
Workorder: 1814932 [ENV_LVL4]
Workorder: 1814934 [ENV_LVL4]
Workorder: 1814935 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	603137	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
2	603138	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	
3	603139	ICS for HBN 215757 [ELMS/2095]				ICS	3		E6850..D3Q	5311		5/31/2018	
4	603140	LMB for HBN 215757 [ELMS/2095]				LMB	3		E6850Q413Q	5311		5/31/2018	
5	603141	LCS for HBN 215757 [ELMS/2095]				LCS	3		E6850Q413Q	5311		5/31/2018	
6	1813746001	HS18050824-01 50WW10-180515				SAMPLE	3	1813746001-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
7	603142	HS18050824-01...(1813746001MS)				MS	3		E6850Q413Q	5311		5/31/2018	
8	603143	HS18050824-0...(1813746001MSD)				MSD	3		E6850Q413Q	5311		5/31/2018	
9	1813746002	HS18050824-02 50WW09-180515				SAMPLE	3	1813746002-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
10	1813746003	HS18050824-03 50WW09-180515-FD				FLDDUP	3	1813746003-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
11	1813746004	HS18050824-04 50WW23-180515				SAMPLE	3	1813746004-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
12	1813746005	HS18050824-05 50WW05-180515				SAMPLE	3	1813746005-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
13	1813746006	HS18050824-06 50WW17-180515				SAMPLE	3	1813746006-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
14	1814144001	LH18/24-SP650_051718				SAMPLE	3	1814144001-A	E6850Q41.3	5480	6/14/2018	6/1/2018	
15	1814932001	LH18/24-SP140_052418				SAMPLE	3	1814932001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
16	1814934001	LH18/24-SP650_052418				SAMPLE	3	1814934001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
17	1814935001	LH18/24-SP650_052418				SAMPLE	3	1814935001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
18	603144	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
19	603145	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	
20	603231	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
21	603232	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1813746 (001-06); 1814144 (001); 1814932 (001); 1814934 (001); 1814935 (001) ELMS Batch/HBN ID: 2095 (215757)
Prep Date: 05/30/2018 Analysis Date: 05/30/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAY\30MAY18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:
Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 41827. Dilutions of Working Standard Solution ID 41829 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 04/02/2018, sequence 02APR18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 41830 was used for LCS 603141; Target = 5.0µg/L. ASTM type II water was used for LMB 603140.

MS/MSD: MS/MSD was performed on sample 1813746001 (Client ID: HS18050824-01 50WW10-180515). 5.0µl of Working Standard Solution Horizon ID 41828 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:
1) Results reported in µg/L. Sample 1814932001 was analyzed and reported at a 1:1,000 dilution. The reporting limit has been adjusted accordingly. The initial analysis of field sample 1813746005 failed the Internal Standard recovery of 50 – 150% method requirement, possibly due to a spiking error. The sample was re-prepped, re-analyzed and reported.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAY\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafiles 02APRD01/02 along with datafiles 30MAYD06/07/21/22.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\215757-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — **Description - 6850 WKG Std 100.ug/L**

Standard: 41829
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 WRK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41828	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	10/04/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK — Description - 6850 Stock AccStd 1,000ug/mL

Standard: 36733
MFG: AccuStandard
MFG Lot: 216095148
Part ID: IC-PER-10X-1

Created By: Thomas Bosch
Create Date: 05/10/2017 11:05AM

Amount: 100 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — **Description - 6850 Intermdt AccStd 10.ug/mL**

Standard: 41828
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 INT

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK	Description - Perchlorate ISTD Wrk 1,000ug/L

Standard: 41827	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 05/09/2018 10:05AM	Expires: 05/09/2019
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — **Description - 6850 QC WKG STD 100ug/L**

Standard: 41831
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC WRK 100.ug/L

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — **Description - 6850 QC Intrmdt Std-QC 10ug/mL**

Standard: 41830
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC INT 10.ug/mL

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK — **Description - 6850 QC Stock STD 1,000ug/mL**

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: Thomas Bosch
Create Date: 05/11/2017 01:05PM

Amount: 100 mL
Expires: 03/31/2020
Usable: Yes
Lab Lot: CLO4 QC STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED Reference Material Producer
ANAB ACCREDITED Testing Laboratory

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

** For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

atch Report: C:\HPCHEM\1\DATA\30MAY18D\30MAY18D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#	*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
	*	603137 CCV@25	Vial 71	1	Control	1	1.02906e6	8.597	27.13125
	*	603138 LODV@1.	Vial 72	1	Control	2	4.91456e4	8.746	1.00633
	*	603139 ICS@1.0	Vial 73	1	Control	3	3.92585e4	8.536	1.24353
	*	603140 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
	*	603141 QC@5	Vial 75	1	Control	5	1.80606e5	8.569	5.30329
	*	1813746001	Vial 76	1	Sample	6	0.00000	0.000	0.00000
	*	603142 137461S	Vial 77	1	Sample	7	1.37245e5	8.454	5.38855
	*	603143 137461D	Vial 78	1	Sample	8	1.61939e5	8.470	5.57965
	*	1813746002	Vial 79	1	Sample	9	7.14560e4	8.361	2.66402
	*	1813746003	Vial 80	1	Sample	10	6.12046e4	8.385	2.80285
	*	1813746004	Vial 81	1	Sample	11	0.00000	0.000	0.00000
	*	1813746005	Vial 82	1	Sample	12	0.00000	0.000	0.00000
	*	1813746006	Vial 83	1	Sample	13	0.00000	0.000	0.00000
	*	1814144001	Vial 84	1	Sample	14	0.00000	0.000	0.00000
	*	1814932001 1K	Vial 85	1	Sample	15	3.84295e5	8.839	1.24660e4
	*	603144 CCV@25	Vial 71	1	Control	16	9.75035e5	8.838	26.90405
	*	603145 LODV@1.	Vial 72	1	Control	17	4.57818e4	8.861	1.01213
	*	1814934001	Vial 86	1	Sample	18	9.32499e5	8.441	33.87657
	*	1814935001	Vial 87	1	Sample	19	7.25811e5	8.399	22.74694
	*	1813746005 RE	Vial 82	1	Sample	20	0.00000	0.000	0.00000
	*	603231 CCV@25	Vial 71	1	Control	21	9.74748e5	8.822	27.39369
	*	603232 LODV@1.	Vial 72	1	Control	22	4.38332e4	8.849	9.48247e-1

#	*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
	*	603137 CCV@25	Vial 71	1	Control	1	3.22432e5	8.612	27.37425
	*	603138 LODV@1.	Vial 72	1	Control	2	1.73338e4	8.758	9.91998e-1
	*	603139 ICS@1.0	Vial 73	1	Control	3	1.36799e4	8.558	1.23705
	*	603140 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
	*	603141 QC@5	Vial 75	1	Control	5	5.82740e4	8.586	5.26554
	*	1813746001	Vial 76	1	Sample	6	0.00000	0.000	0.00000
	*	603142 137461S	Vial 77	1	Sample	7	4.56103e4	8.466	5.51401
	*	603143 137461D	Vial 78	1	Sample	8	5.38797e4	8.487	5.72188
	*	1813746002	Vial 79	1	Sample	9	2.49602e4	8.376	2.79768
	*	1813746003	Vial 80	1	Sample	10	2.10324e4	8.399	2.90021
	*	1813746004	Vial 81	1	Sample	11	0.00000	0.000	0.00000
	*	1813746005	Vial 82	1	Sample	12	0.00000	0.000	0.00000
	*	1813746006	Vial 83	1	Sample	13	0.00000	0.000	0.00000
	*	1814144001	Vial 84	1	Sample	14	0.00000	0.000	0.00000
	*	1814932001 1K	Vial 85	1	Sample	15	1.23790e5	8.857	1.26359e4
	*	603144 CCV@25	Vial 71	1	Control	16	3.07089e5	8.854	27.26483
	*	603145 LODV@1.	Vial 72	1	Control	17	1.60481e4	8.876	9.91252e-1
	*	1814934001	Vial 86	1	Sample	18	3.00525e5	8.456	35.29064
	*	1814935001	Vial 87	1	Sample	19	2.36380e5	8.415	23.64992
	*	1813746005 RE	Vial 82	1	Sample	20	0.00000	0.000	0.00000
	*	603231 CCV@25	Vial 71	1	Control	21	3.03819e5	8.840	27.51730
	*	603232 LODV@1.	Vial 72	1	Control	22	1.57022e4	8.869	9.44920e-1

#	*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
	*	603137 CCV@25	Vial 71	1	Control	1	1.53517e5	8.618	5.00000
	*	603138 LODV@1.	Vial 72	1	Control	2	2.20291e5	8.766	5.00000
	*	603139 ICS@1.0	Vial 73	1	Control	3	1.43388e5	8.568	5.00000
	*	603140 LMB	Vial 74	1	Control	4	1.78787e5	8.566	5.00000
	*	603141 QC@5	Vial 75	1	Control	5	1.55079e5	8.590	5.00000
	*	1813746001	Vial 76	1	Sample	6	9.36751e4	8.483	5.00000
	*	603142 137461S	Vial 77	1	Sample	7	1.15938e5	8.473	5.00000
	*	603143 137461D	Vial 78	1	Sample	8	1.31998e5	8.490	5.00000

atch Report: C:\HPCHEM\1\DATA\30MAY18D\30MAY18D.B

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	1813746002	Vial 79	1	Sample	9	1.23091e5	8.379	5.00000
*	1813746003	Vial 80	1	Sample	10	1.00208e5	8.401	5.00000
*	1813746004	Vial 81	1	Sample	11	9.38686e4	8.374	5.00000
*	1813746005	Vial 82	1	Sample	12	7.48830e4	8.421	5.00000
*	1813746006	Vial 83	1	Sample	13	8.67174e4	8.418	5.00000
*	1814144001	Vial 84	1	Sample	14	8.53104e4	9.768	5.00000
*	1814932001 1K	Vial 85	1	Sample	15	1.35180e5	8.856	5000.00000
*	603144 CCV@25	Vial 71	1	Control	16	1.46863e5	8.859	5.00000
*	603145 LODV@1.	Vial 72	1	Control	17	2.04082e5	8.875	5.00000
*	1814934001	Vial 86	1	Sample	18	1.07552e5	8.461	5.00000
*	1814935001	Vial 87	1	Sample	19	1.32221e5	8.419	5.00000
*	1813746005 RE	Vial 82	1	Sample	20	1.07709e5	8.457	5.00000
*	603231 CCV@25	Vial 71	1	Control	21	1.43821e5	8.841	5.00000
*	603232 LODV@1.	Vial 72	1	Control	22	2.08034e5	8.868	5.00000

*** End of Report ***

equence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\MAY\30MAY18D.S

Sequence Table:

Method and Injection Info Part:

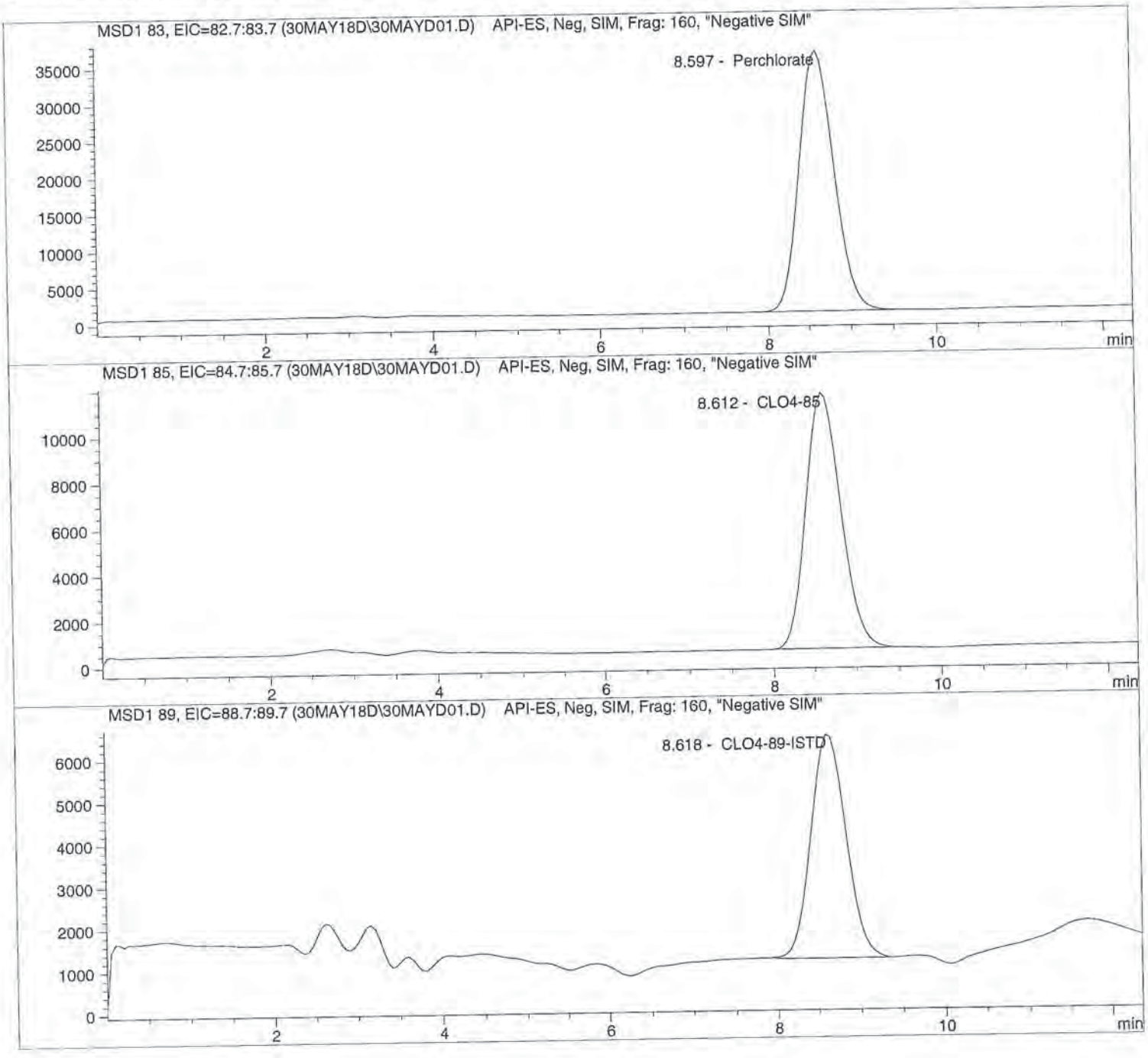
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	603137 CCV@25	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	603138 LODV@1.	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	603139 ICS@1.0	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	603140 LMB	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	603141 QC@5	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	1813746001	CLO4-DOD	1	Sample		
7	Vial 77	603142 137461S	CLO4-DOD	1	Sample		
8	Vial 78	603143 137461D	CLO4-DOD	1	Sample		
9	Vial 79	1813746002	CLO4-DOD	1	Sample		
10	Vial 80	1813746003	CLO4-DOD	1	Sample		
11	Vial 81	1813746004	CLO4-DOD	1	Sample		
12	Vial 82	1813746005	CLO4-DOD	1	Sample		
13	Vial 83	1813746006	CLO4-DOD	1	Sample		
14	Vial 84	1814144001	CLO4-DOD	1	Sample		
15	Vial 85	1814932001 1K	CLO4-DOD	1	Sample		
16	Vial 71	603144 CCV@25	CLO4-DOD	1	Ctrl Samp		
17	Vial 72	603145 LODV@1.	CLO4-DOD	1	Ctrl Samp		
18	Vial 86	1814934001	CLO4-DOD	1	Sample		
19	Vial 87	1814935001	CLO4-DOD	1	Sample		
20	Vial 82	1813746005 RE	CLO4-DOD	1	Sample		
21	Vial 71	603231 CCV@25	CLO4-DOD	1	Ctrl Samp		
22	Vial 72	603232 LODV@1.	CLO4-DOD	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD01.D Sample Name: 603137 CCV@25

Injection Date:	5/30/2018 08:32:15	Seq Line:	1
Sample Name:	603137 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD01.D Sample Name: 603137 CCV@25

Injection Date:	5/30/2018 08:32:15	Seq Line:	1
Sample Name:	603137 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.597	PBA	1029059.8	27.1312	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.612	PBA	322431.6	27.3743	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.618	BBA	153517.3	5.0000	CLO4-89-ISTD

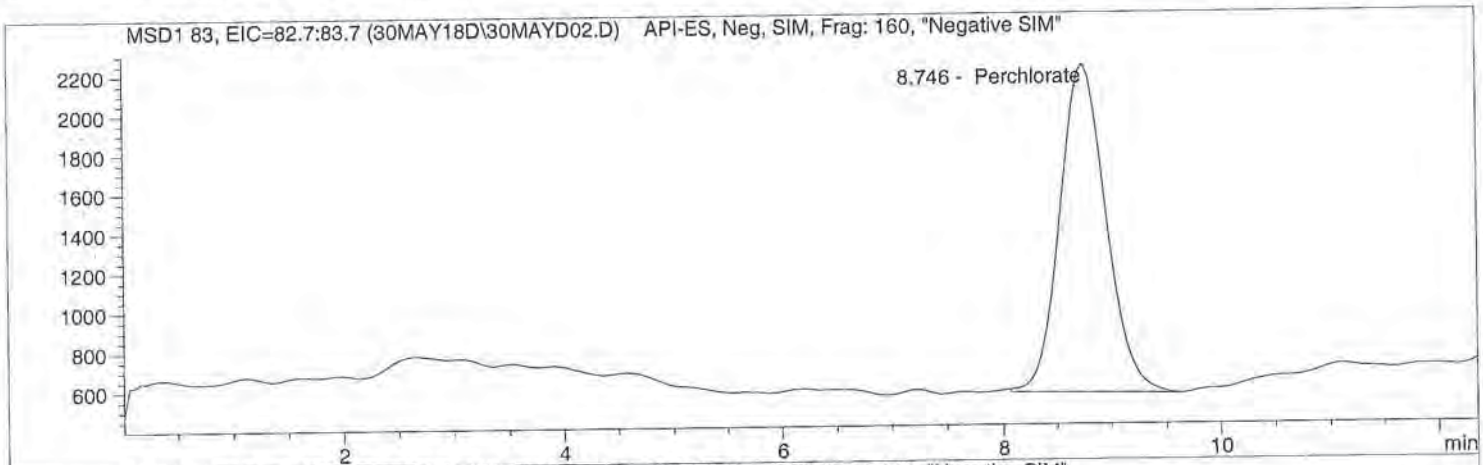
*** End of Report ***

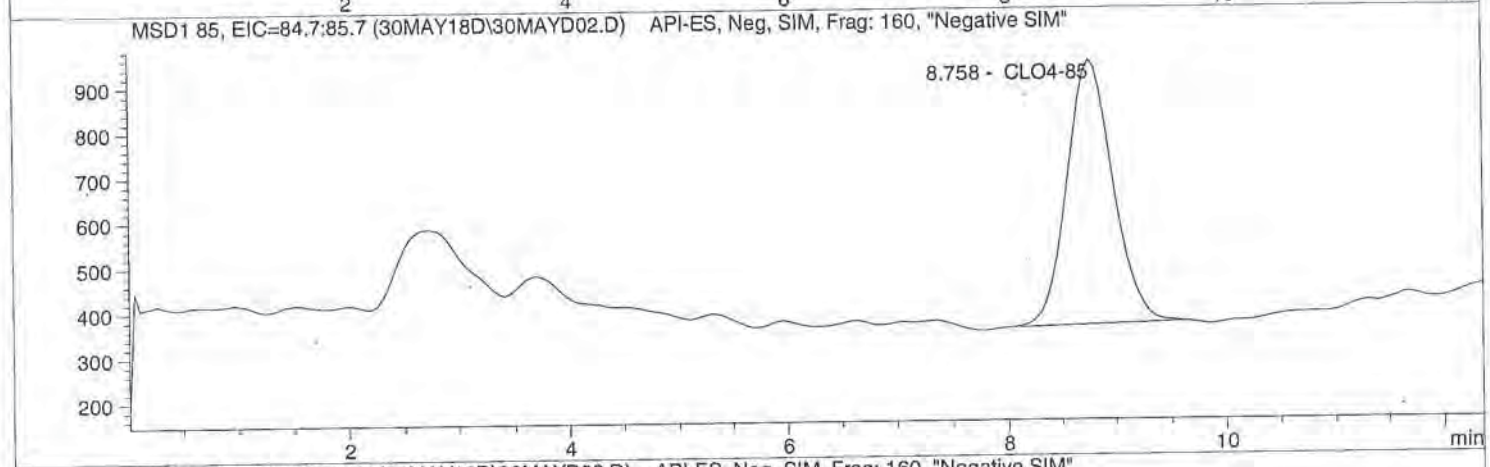
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD02.D Sample Name: 603138 LODV@1.

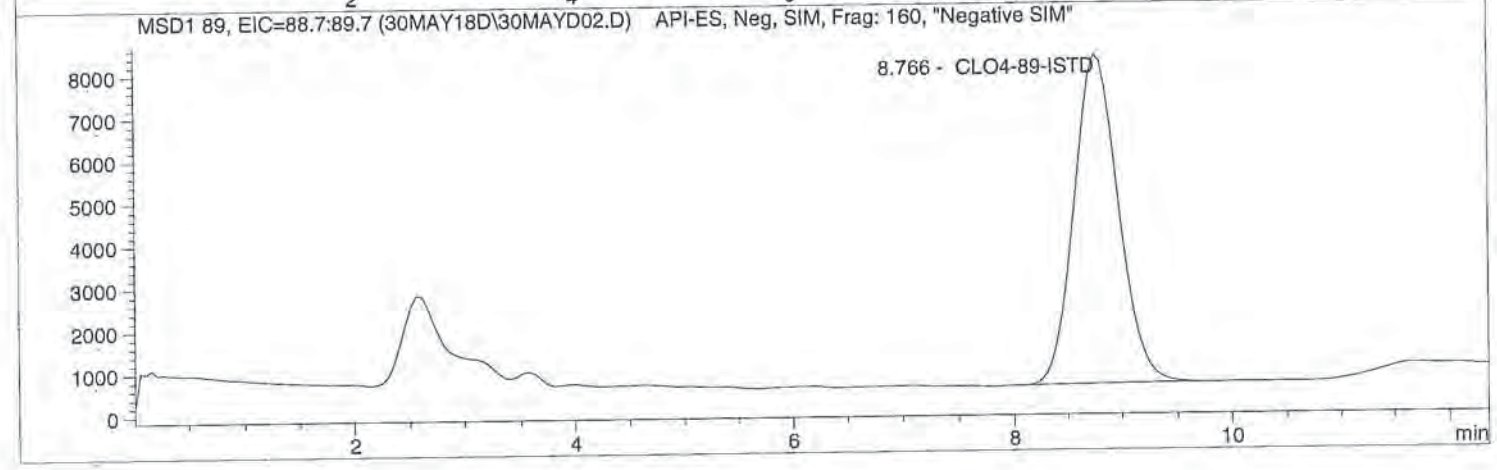
Injection Date:	5/30/2018 08:48:43	Seq Line:	2
Sample Name:	603138 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD02.D Sample Name: 603138 LODV@1.

Injection Date:	5/30/2018 08:48:43	Seq Line:	2
Sample Name:	603138 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.746	BBA	49145.6	1.0063	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.758	PBA	17333.8	0.9920	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.766	BBA	220290.5	5.0000	CLO4-89-ISTD

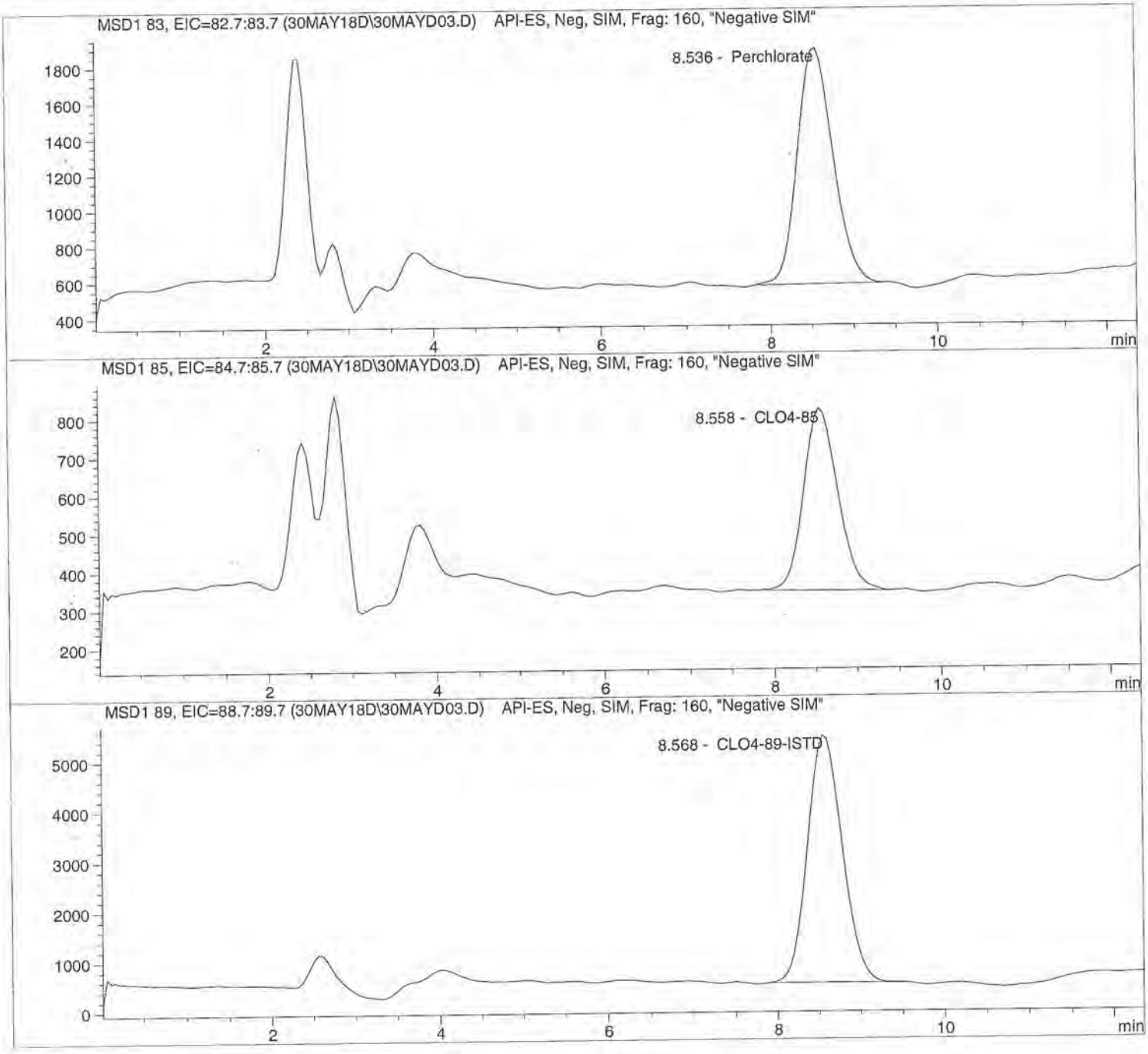
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD03.D Sample Name: 603139 ICS@1.0

Injection Date:	5/30/2018 09:02:54	Seq Line:	3
Sample Name:	603139 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD03.D Sample Name: 603139 ICS@1.0

Injection Date:	5/30/2018 09:02:54	Seq Line:	3
Sample Name:	603139 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.536	BBA	39258.5	1.2435	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.558	BBA	13679.9	1.2371	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.568	PBA	143388.5	5.0000	CLO4-89-ISTD

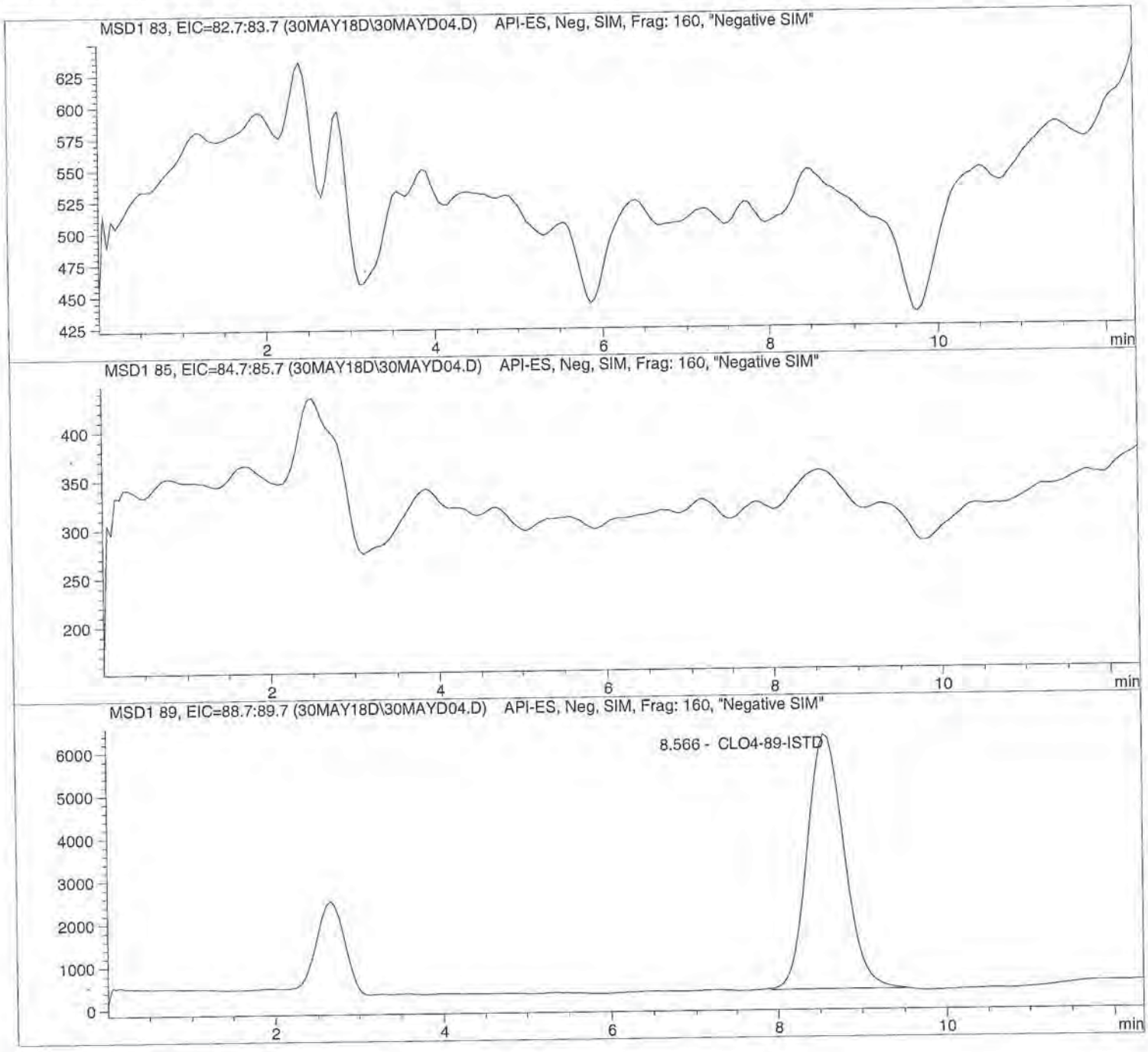
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD04.D Sample Name: 603140 LMB

Injection Date:	5/30/2018 09:17:07	Seq Line:	4
Sample Name:	603140 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD04.D Sample Name: 603140 LMB

Injection Date:	5/30/2018 09:17:07	Seq Line:	4
Sample Name:	603140 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.566	BBA	178787.3	5.0000	CLO4-89-ISTD

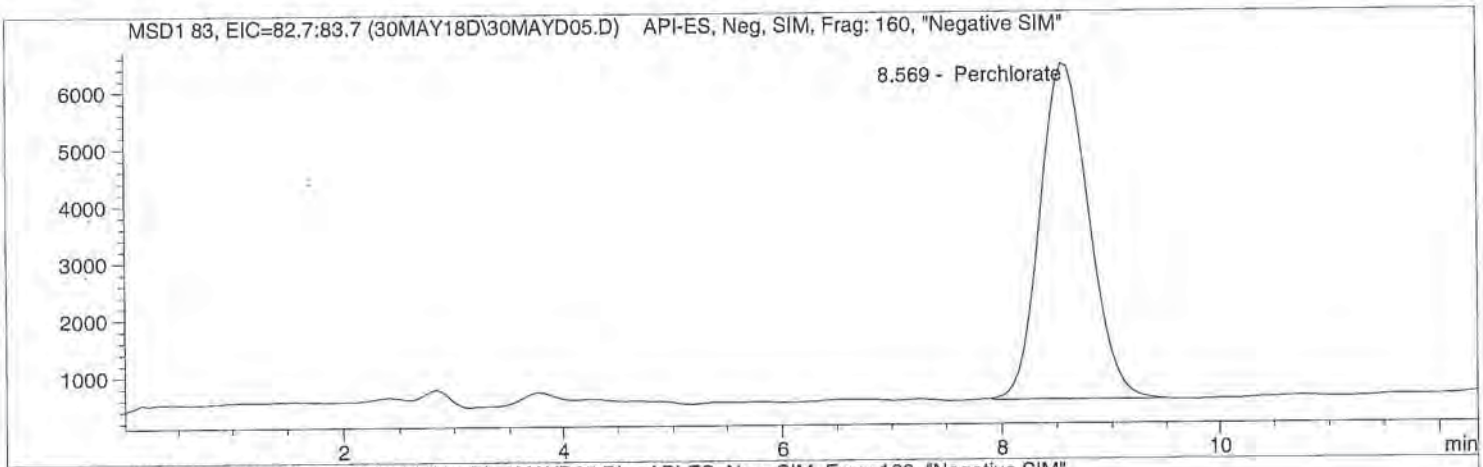
*** End of Report ***

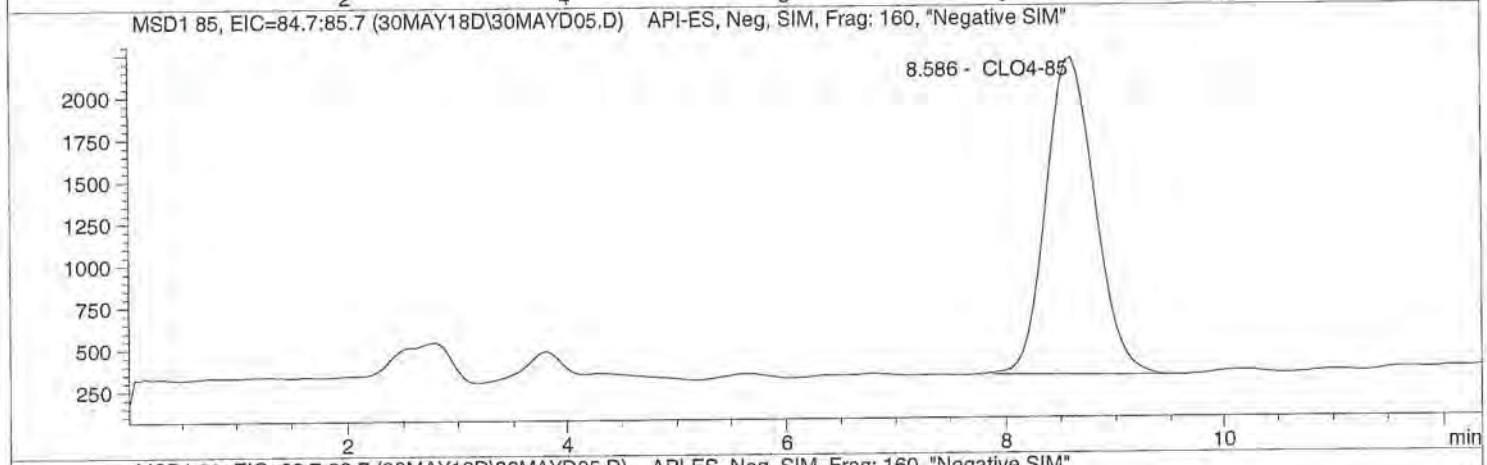
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD05.D Sample Name: 603141 QC@5

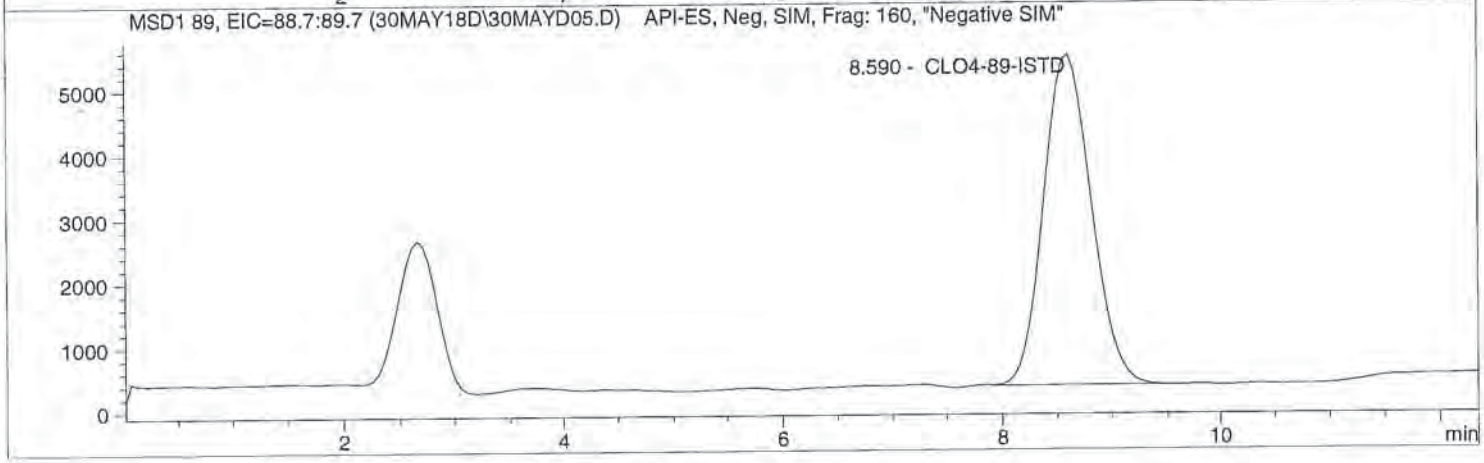
Injection Date:	5/30/2018 09:31:17	Seq Line:	5
Sample Name:	603141 QC@5	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD05.D Sample Name: 603141 QC@5

Injection Date:	5/30/2018 09:31:17	Seq Line:	5
Sample Name:	603141 QC@5	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.569	BBA	180606.1	5.3033	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.586	BBA	58274.0	5.2655	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.590	BBA	155079.4	5.0000	CLO4-89-ISTD

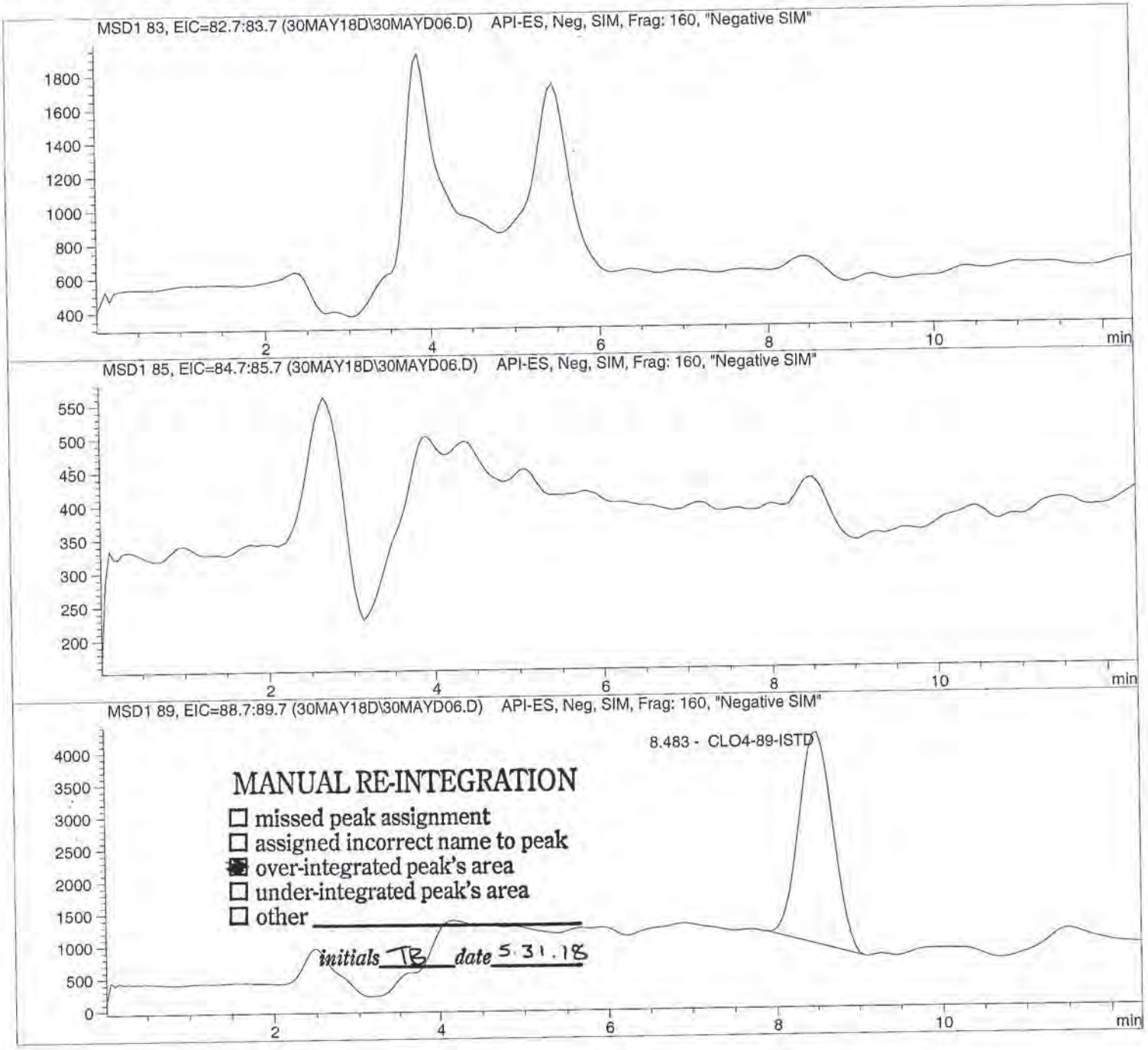
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD06.D Sample Name: 1813746001

Injection Date:	5/30/2018 09:46:40	Seq Line:	6
Sample Name:	1813746001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD06.D Sample Name: 1813746001

Injection Date:	5/30/2018 09:46:40	Seq Line:	6
Sample Name:	1813746001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.483	MM	93675.1	5.0000	CLO4-89-ISTD

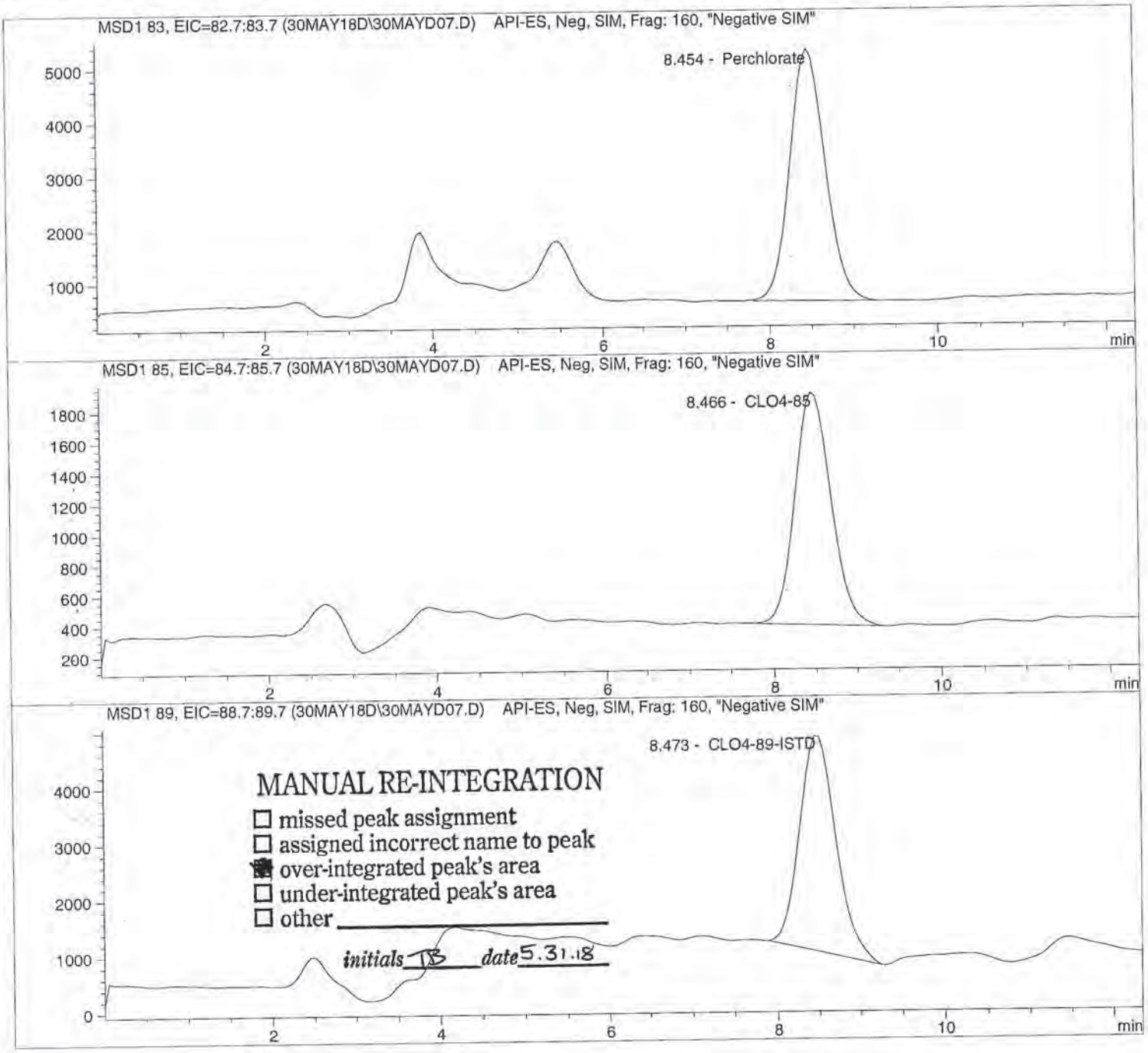
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD07.D Sample Name: 603142 137461S

Injection Date:	5/30/2018 10:00:51	Seq Line:	7
Sample Name:	603142 137461S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD07.D Sample Name: 603142 137461S

Injection Date:	5/30/2018 10:00:51	Seq Line:	7
Sample Name:	603142 137461S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.454	BBA	137244.7	5.3885	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.466	BBA	45610.3	5.5140	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.473	MM	115937.6	5.0000	CLO4-89-ISTD

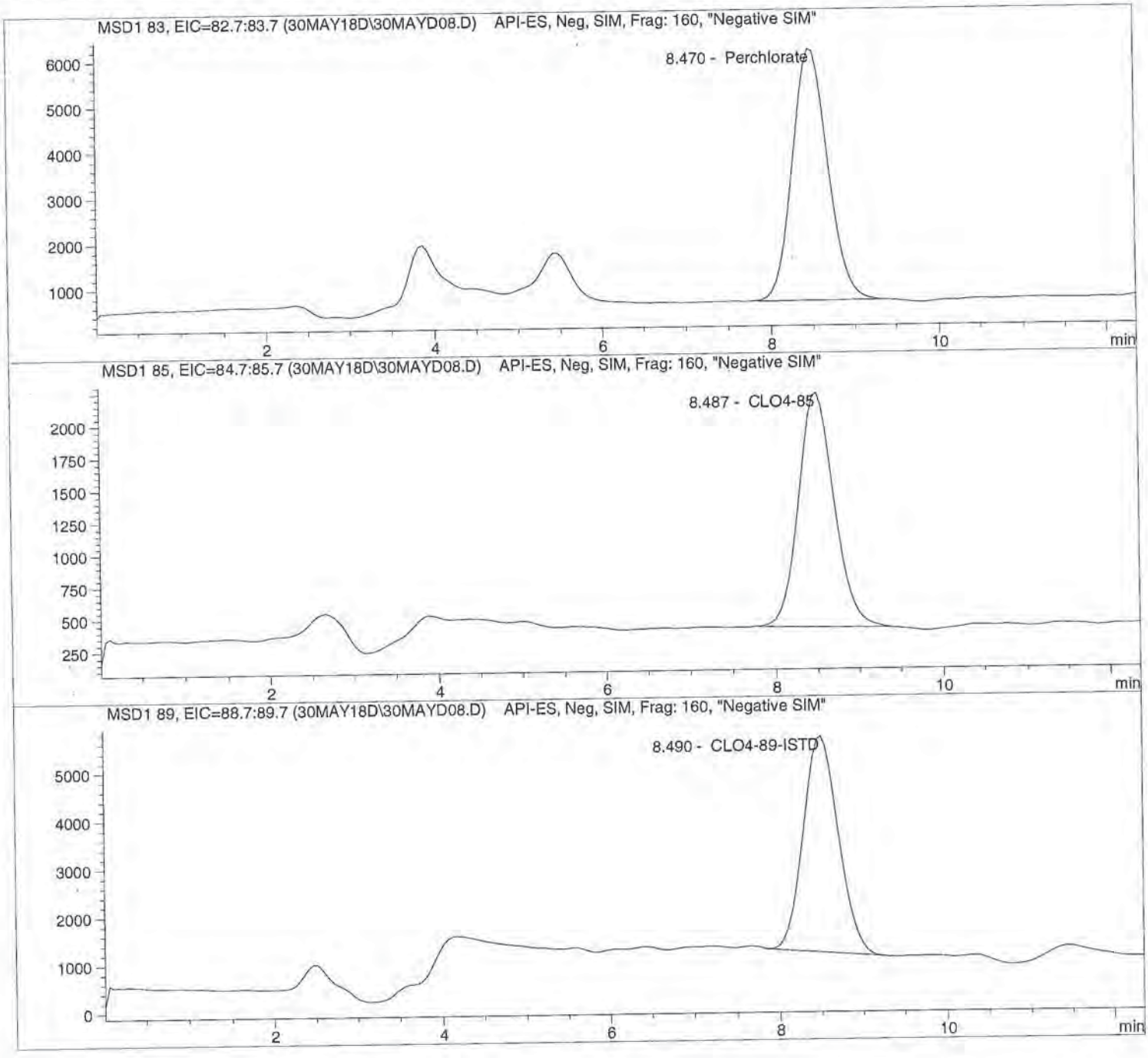
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD08.D Sample Name: 603143 137461D

Injection Date:	5/30/2018 10:15:02	Seq Line:	8
Sample Name:	603143 137461D	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD08.D Sample Name: 603143 137461D

Injection Date:	5/30/2018 10:15:02	Seq Line:	8
Sample Name:	603143 137461D	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.470	BBA	161939.0	5.5796	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.487	BBA	53879.7	5.7219	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.490	BBA	131997.7	5.0000	CLO4-89-ISTD

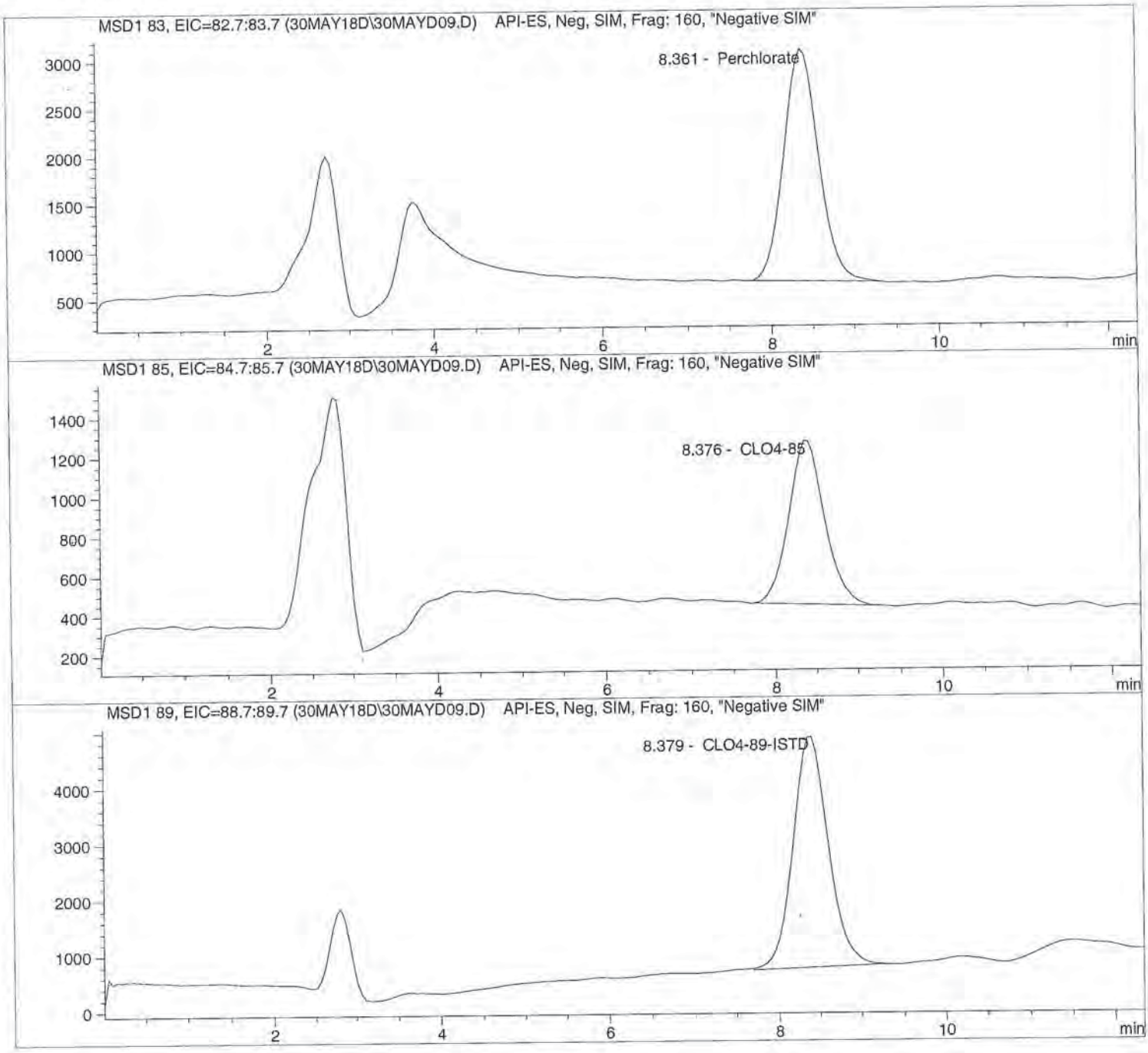
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD09.D Sample Name: 1813746002

Injection Date:	5/30/2018 10:29:13	Seq Line:	9
Sample Name:	1813746002	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD09.D Sample Name: 1813746002

Injection Date:	5/30/2018 10:29:13	Seq Line:	9
Sample Name:	1813746002	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.361	PBA	71456.0	2.6640	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.376	PBA	24960.2	2.7977	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.379	BBA	123091.3	5.0000	CLO4-89-ISTD

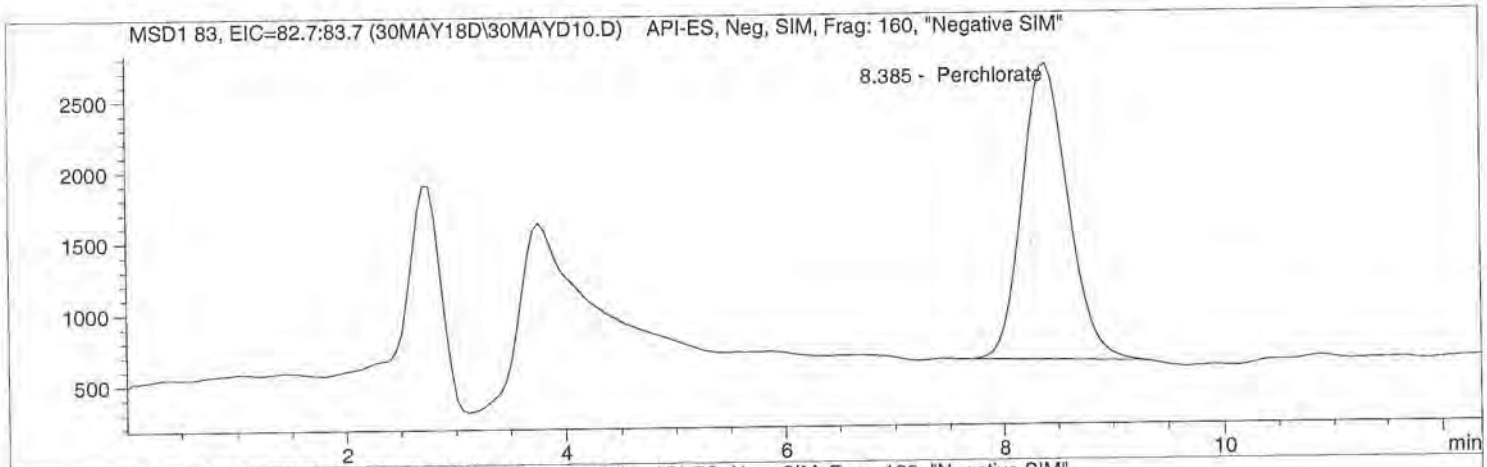
*** End of Report ***

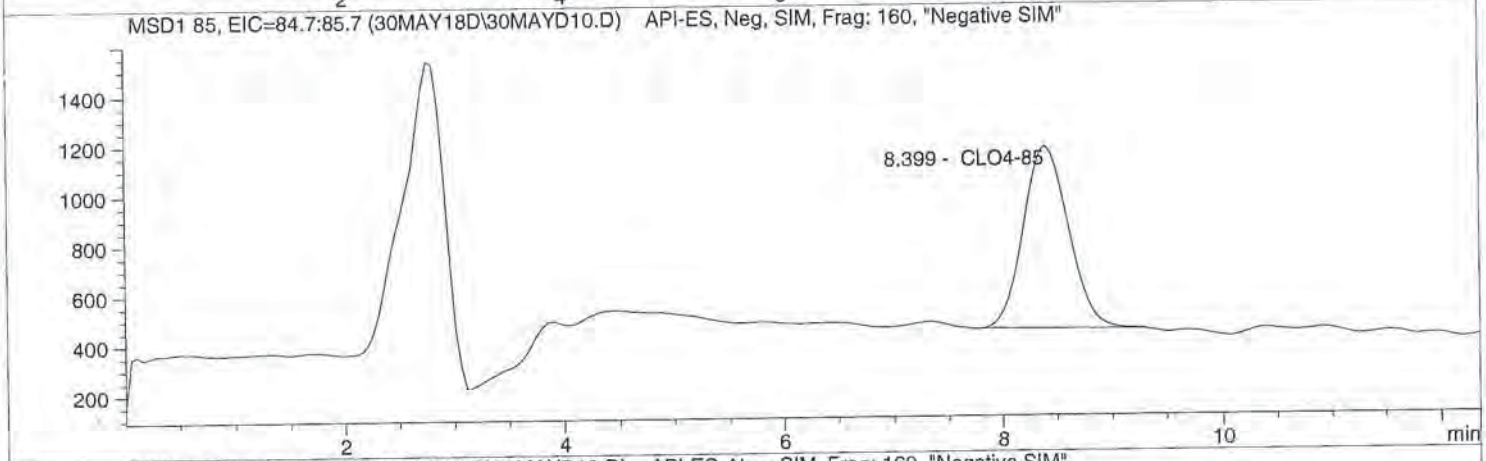
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD10.D Sample Name: 1813746003

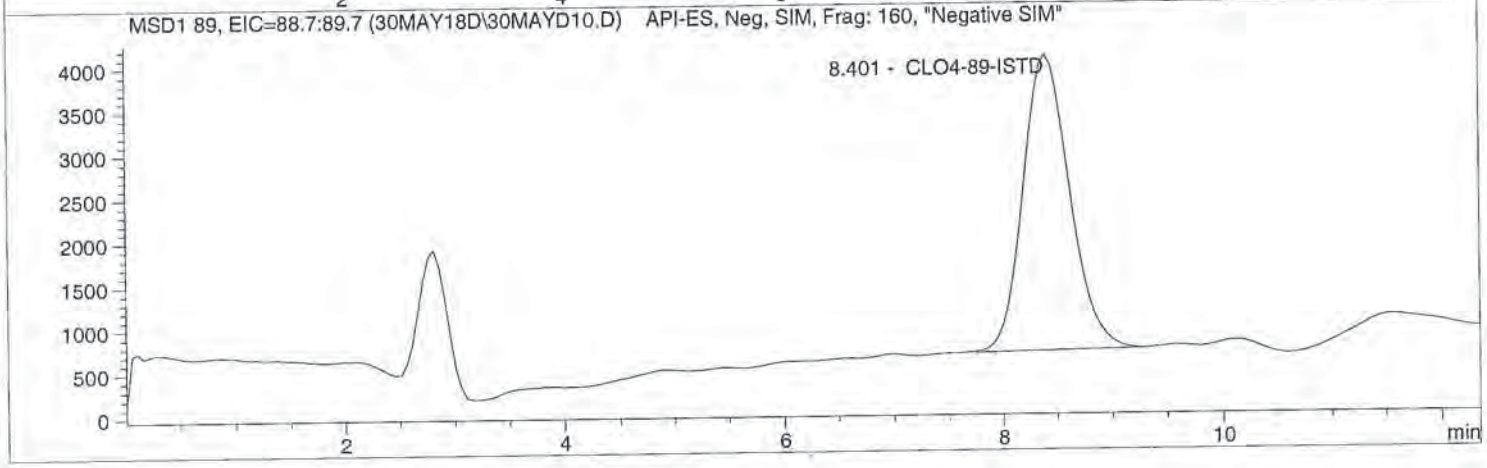
Injection Date:	5/30/2018 10:43:22	Seq Line:	10
Sample Name:	1813746003	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD10.D Sample Name: 1813746003

Injection Date:	5/30/2018 10:43:22	Seq Line:	10
Sample Name:	1813746003	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.385	BBA	61204.6	2.8029	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.399	PBA	21032.4	2.9002	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.401	BBA	100207.8	5.0000	CLO4-89-ISTD

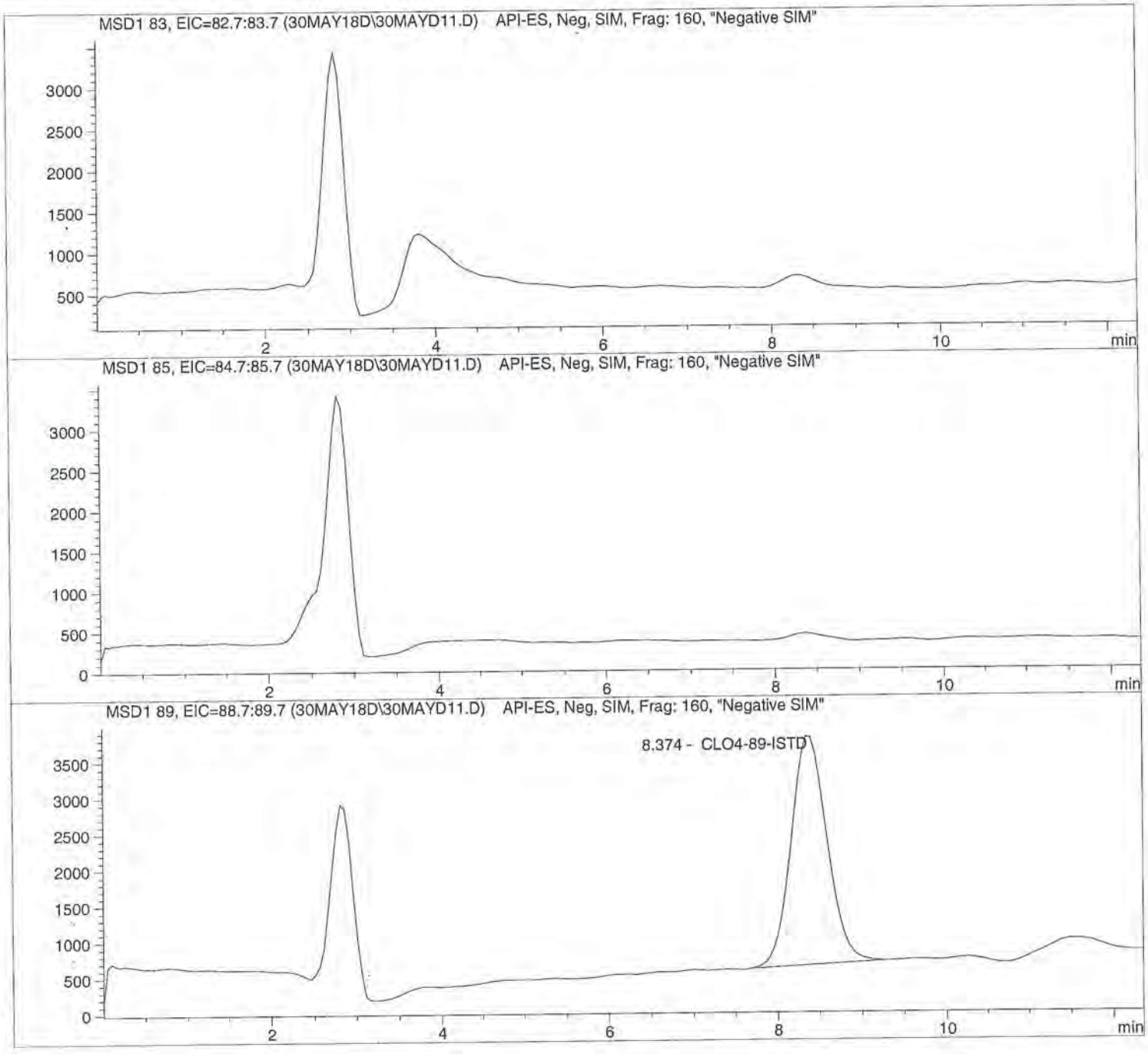
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD11.D Sample Name: 1813746004

Injection Date:	5/30/2018 10:57:34	Seq Line:	11
Sample Name:	1813746004	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD11.D Sample Name: 1813746004

Injection Date:	5/30/2018 10:57:34	Seq Line:	11
Sample Name:	1813746004	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.374	PBA	93868.6	5.0000	CLO4-89-ISTD

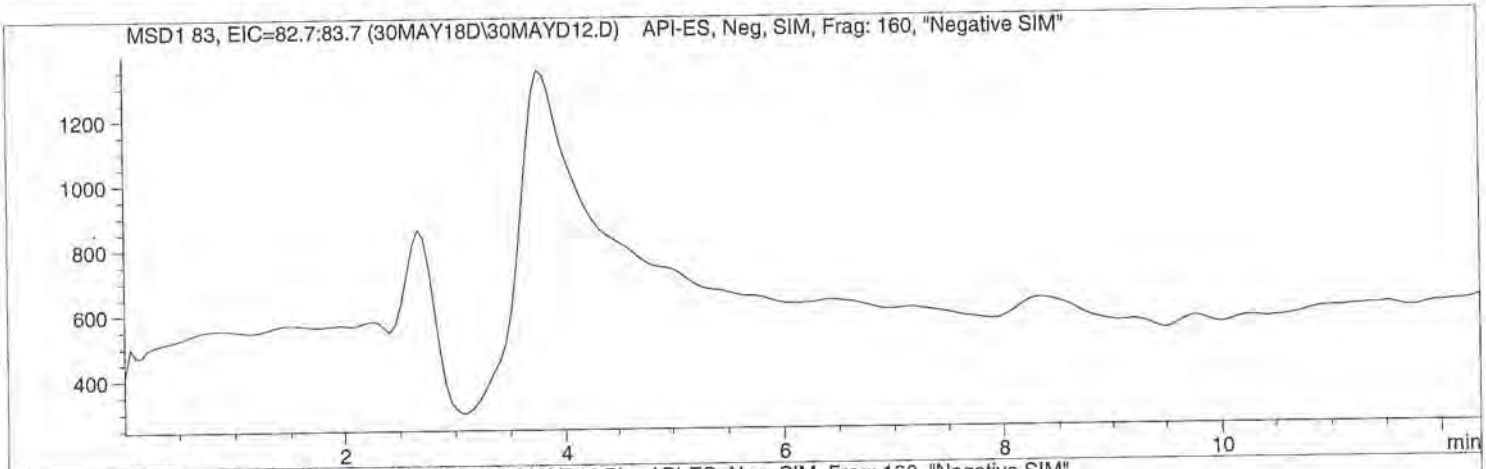
*** End of Report ***

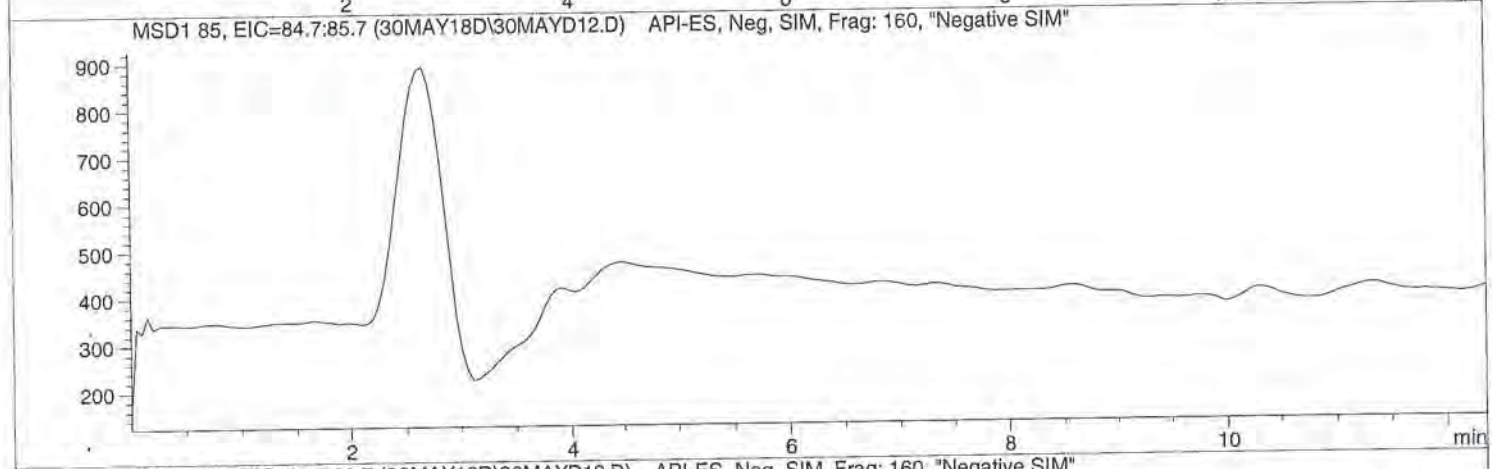
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD12.D Sample Name: 1813746005

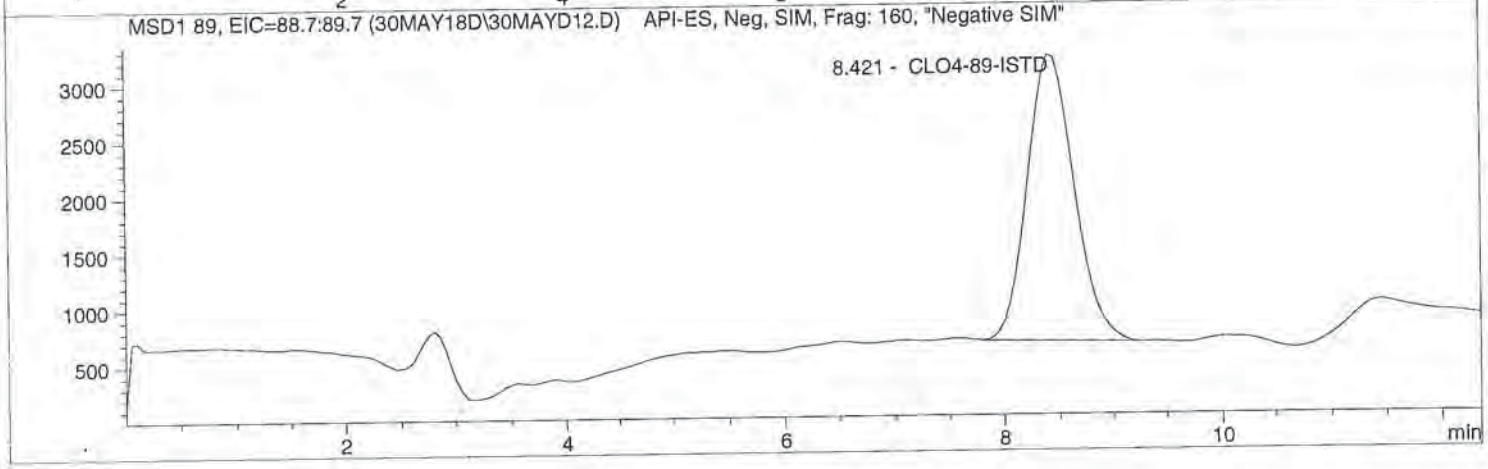
Injection Date:	5/30/2018 11:11:41	Seq Line:	12
Sample Name:	1813746005	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD12.D Sample Name: 1813746005

Injection Date:	5/30/2018 11:11:41	Seq Line:	12
Sample Name:	1813746005	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.421	BBA	74883.0	5.0000	CLO4-89-ISTD

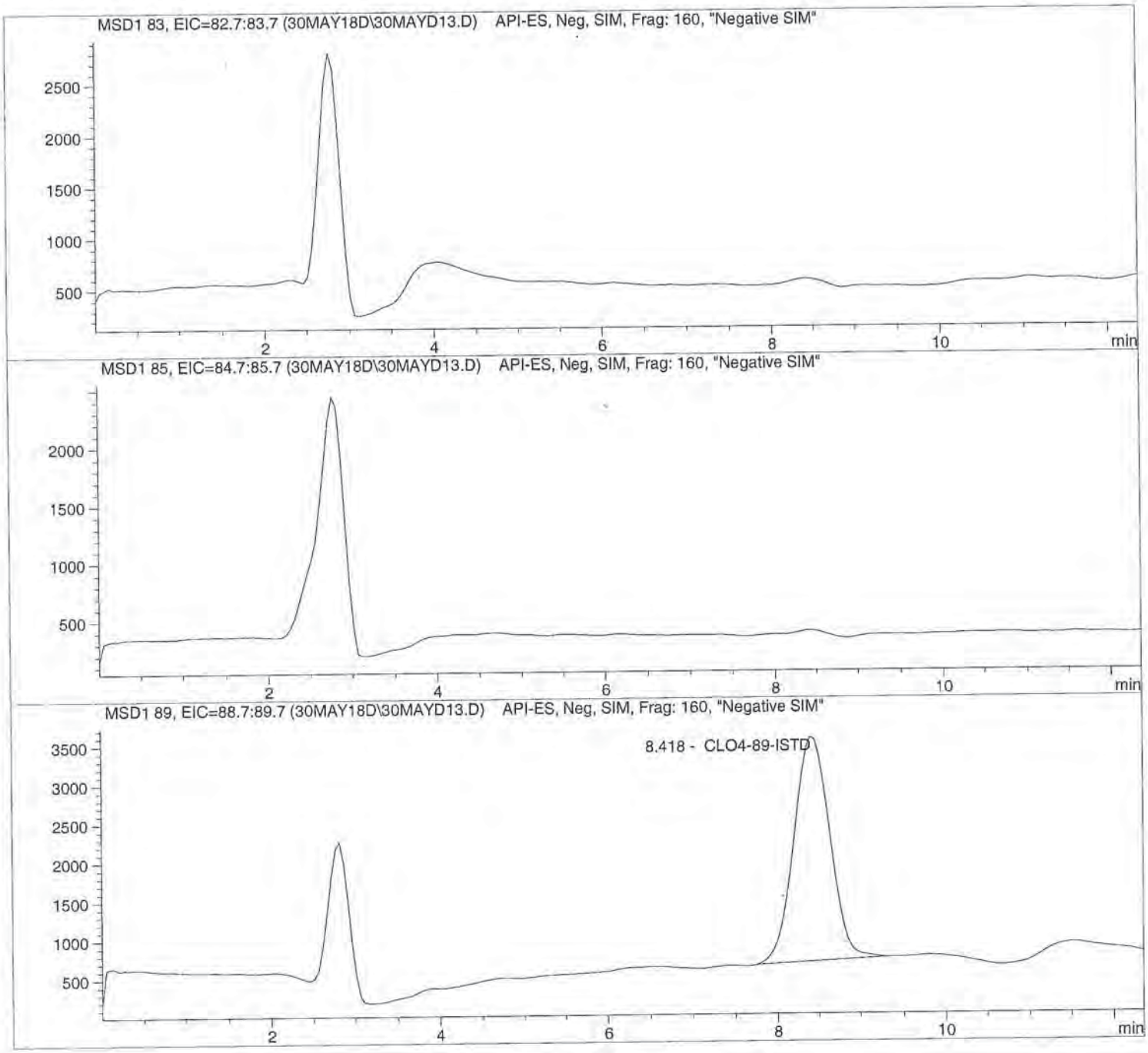
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD13.D Sample Name: 1813746006

Injection Date:	5/30/2018 11:25:48	Seq Line:	13
Sample Name:	1813746006	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD13.D Sample Name: 1813746006

Injection Date:	5/30/2018 11:25:48	Seq Line:	13
Sample Name:	1813746006	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.418	PBA	86717.4	5.0000	CLO4-89-ISTD

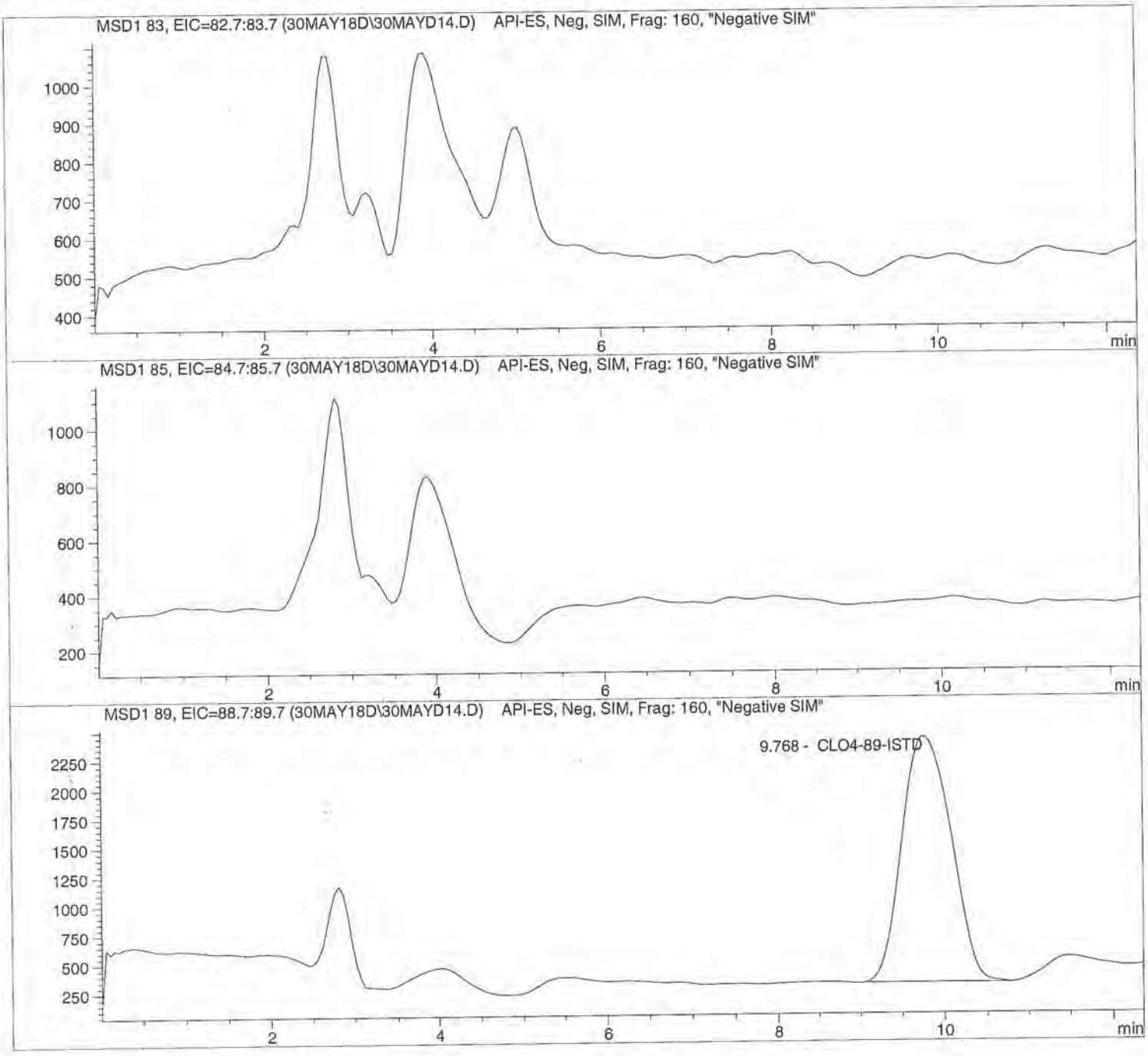
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD14.D Sample Name: 1814144001

Injection Date:	5/30/2018 11:39:56	Seq Line:	14
Sample Name:	1814144001	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD14.D Sample Name: 1814144001

Injection Date:	5/30/2018 11:39:56	Seq Line:	14
Sample Name:	1814144001	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.768	PBA	85310.4	5.0000	CLO4-89-ISTD

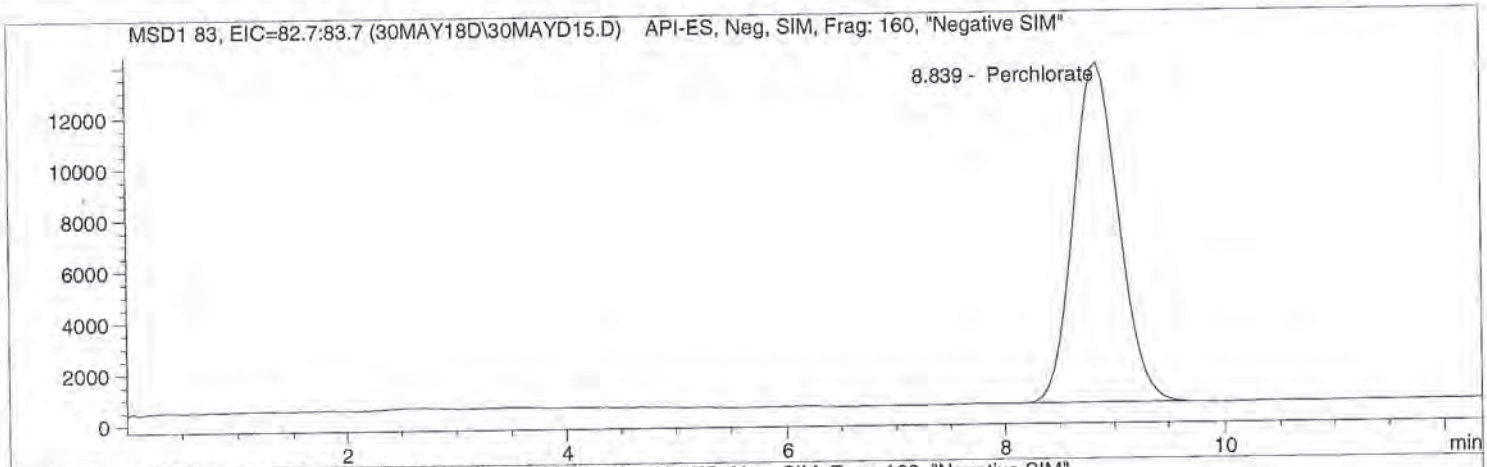
*** End of Report ***

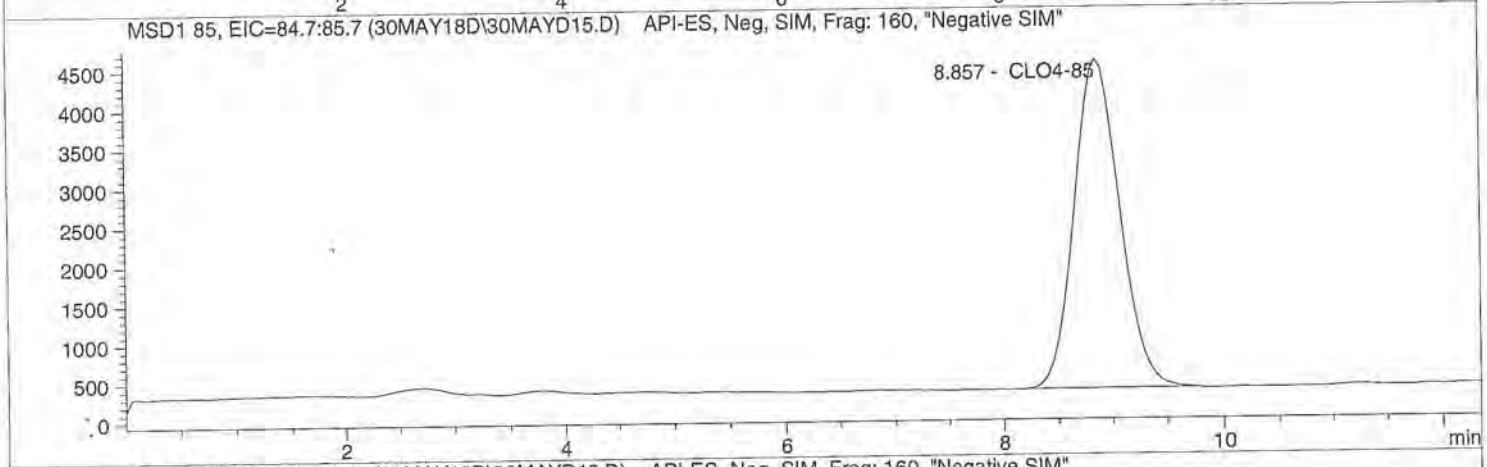
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD15.D Sample Name: 1814932001 1K

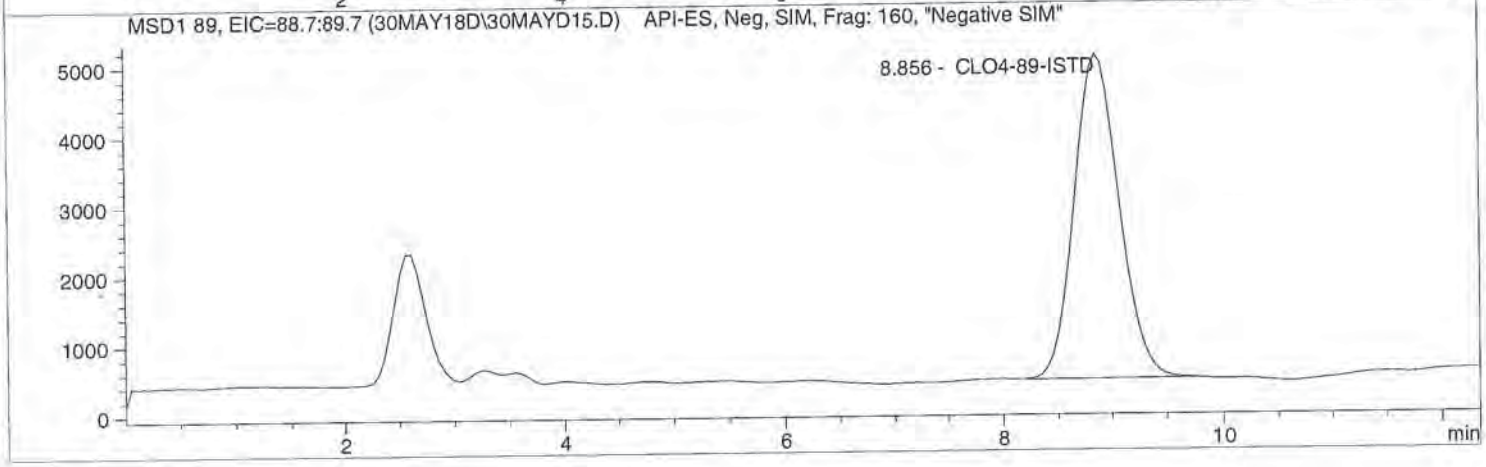
Injection Date:	5/30/2018 11:54:05	Seq Line:	15
Sample Name:	1814932001 1K	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD15.D Sample Name: 1814932001 1K

Injection Date:	5/30/2018 11:54:05	Seq Line:	15
Sample Name:	1814932001 1K	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1000.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.839	PBA	384295.5	12466.0215	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.857	BBA	123789.8	12635.9492	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.856	BBA	135180.3	5000.0000	CLO4-89-ISTD

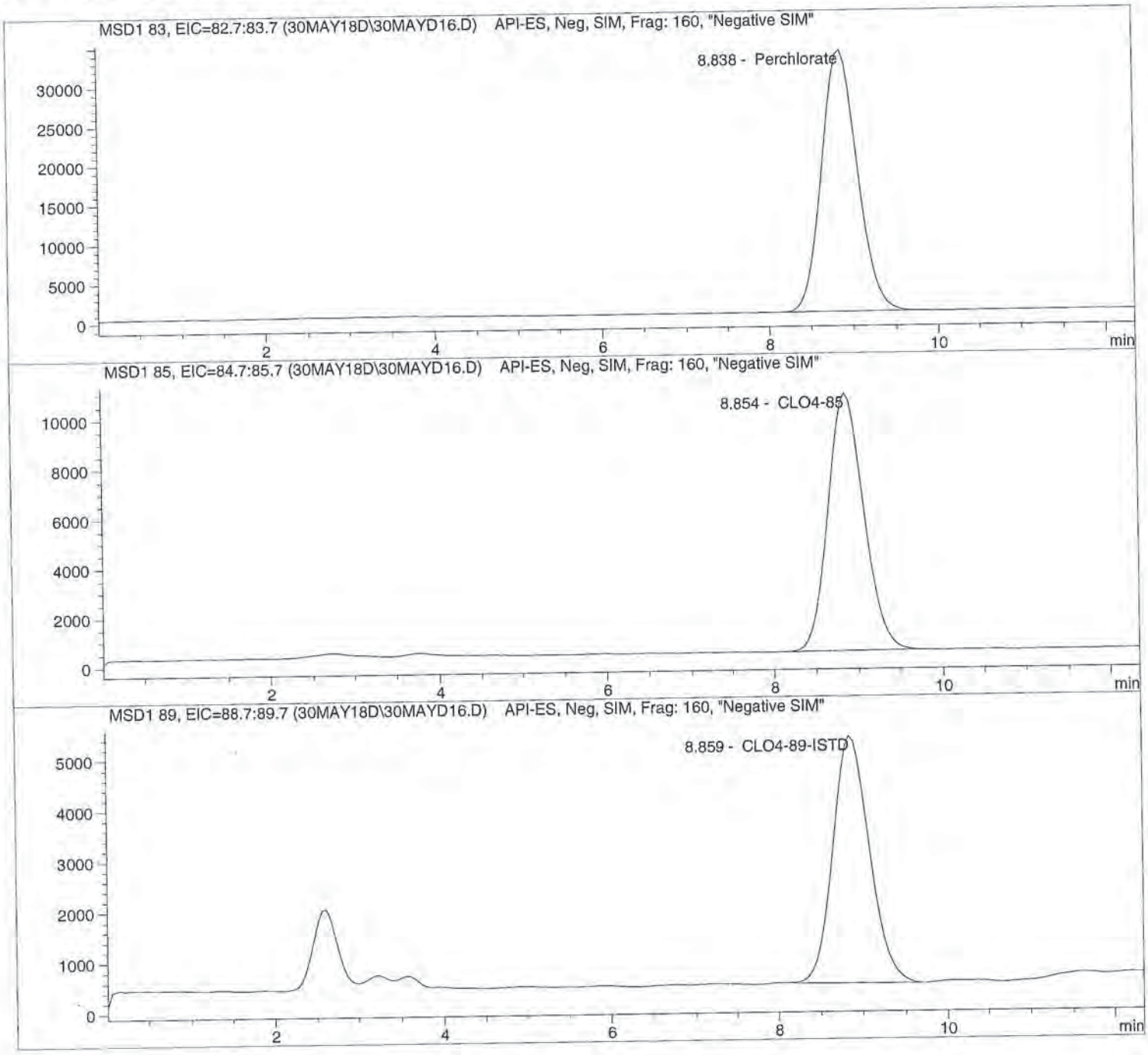
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD16.D Sample Name: 603144 CCV@25

Injection Date:	5/30/2018 12:08:16	Seq Line:	16
Sample Name:	603144 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD16.D Sample Name: 603144 CCV@25

Injection Date:	5/30/2018 12:08:16	Seq Line:	16
Sample Name:	603144 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.838	BBA	975034.7	26.9041	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.854	PBA	307089.1	27.2648	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.859	BBA	146863.3	5.0000	CLO4-89-ISTD

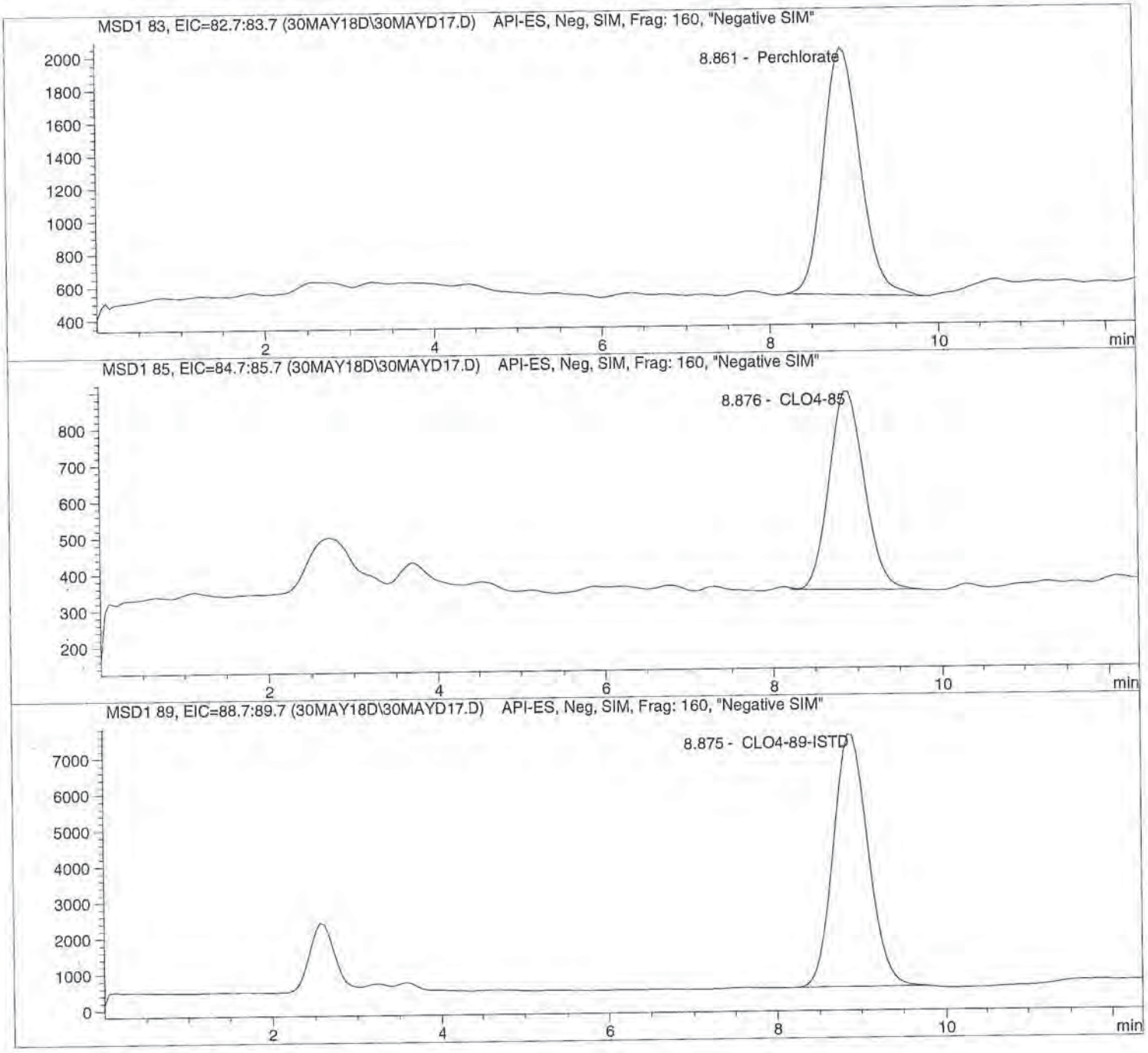
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD17.D Sample Name: 603145 LODV@1.

Injection Date:	5/30/2018 12:22:22	Seq Line:	17
Sample Name:	603145 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD17.D Sample Name: 603145 LODV@1.

Injection Date:	5/30/2018 12:22:22	Seq Line:	17
Sample Name:	603145 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.861	PBA	45781.8	1.0121	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.876	BBA	16048.1	0.9913	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.875	PBA	204081.9	5.0000	CLO4-89-ISTD

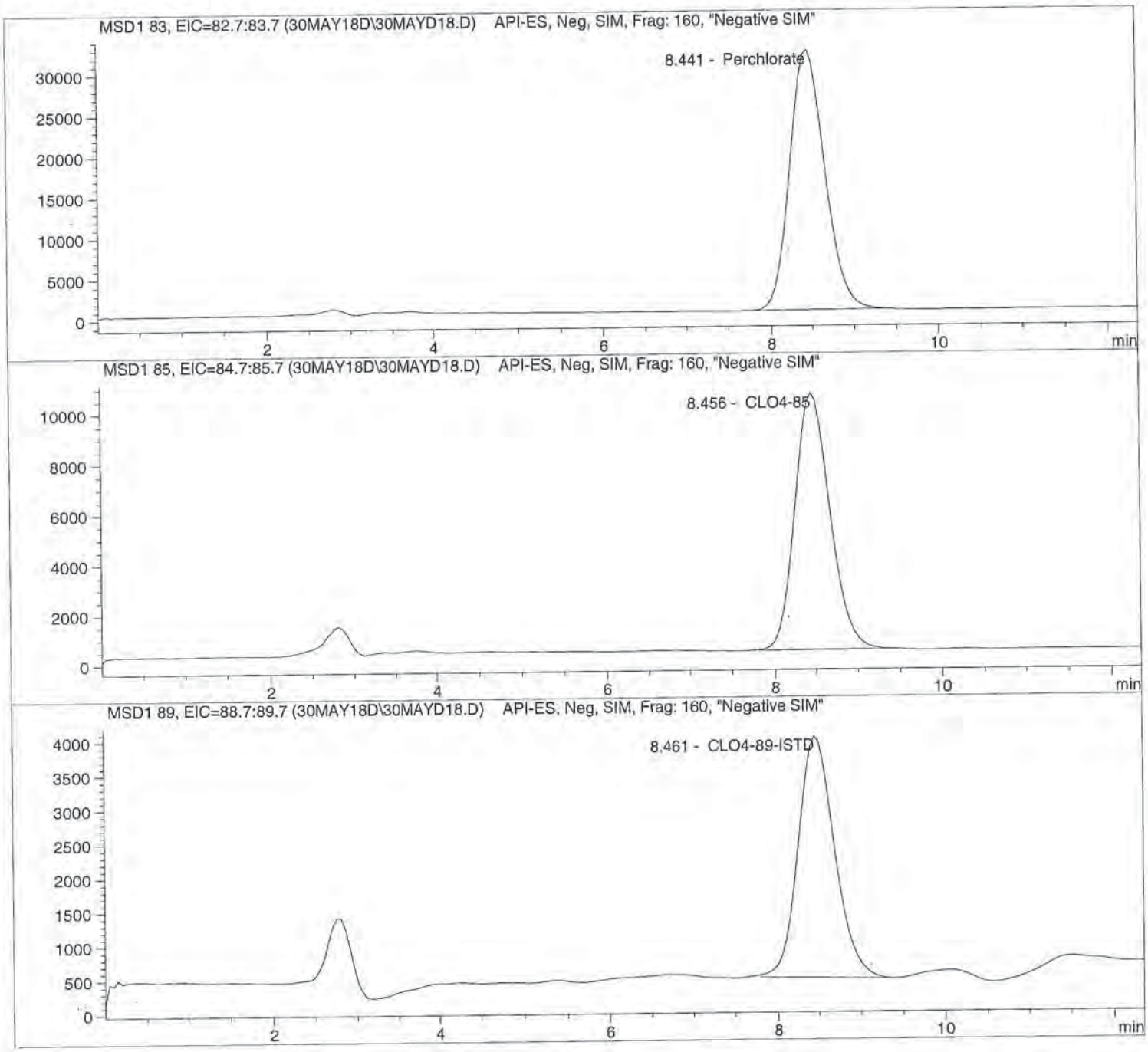
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD18.D Sample Name: 1814934001

Injection Date:	5/30/2018 12:36:32	Seq Line:	18
Sample Name:	1814934001	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD18.D Sample Name: 1814934001

Injection Date:	5/30/2018 12:36:32	Seq Line:	18
Sample Name:	1814934001	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.441	PBA	932498.9	33.8766	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.456	BBA	300524.9	35.2906	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.461	BBA	107551.7	5.0000	CLO4-89-ISTD

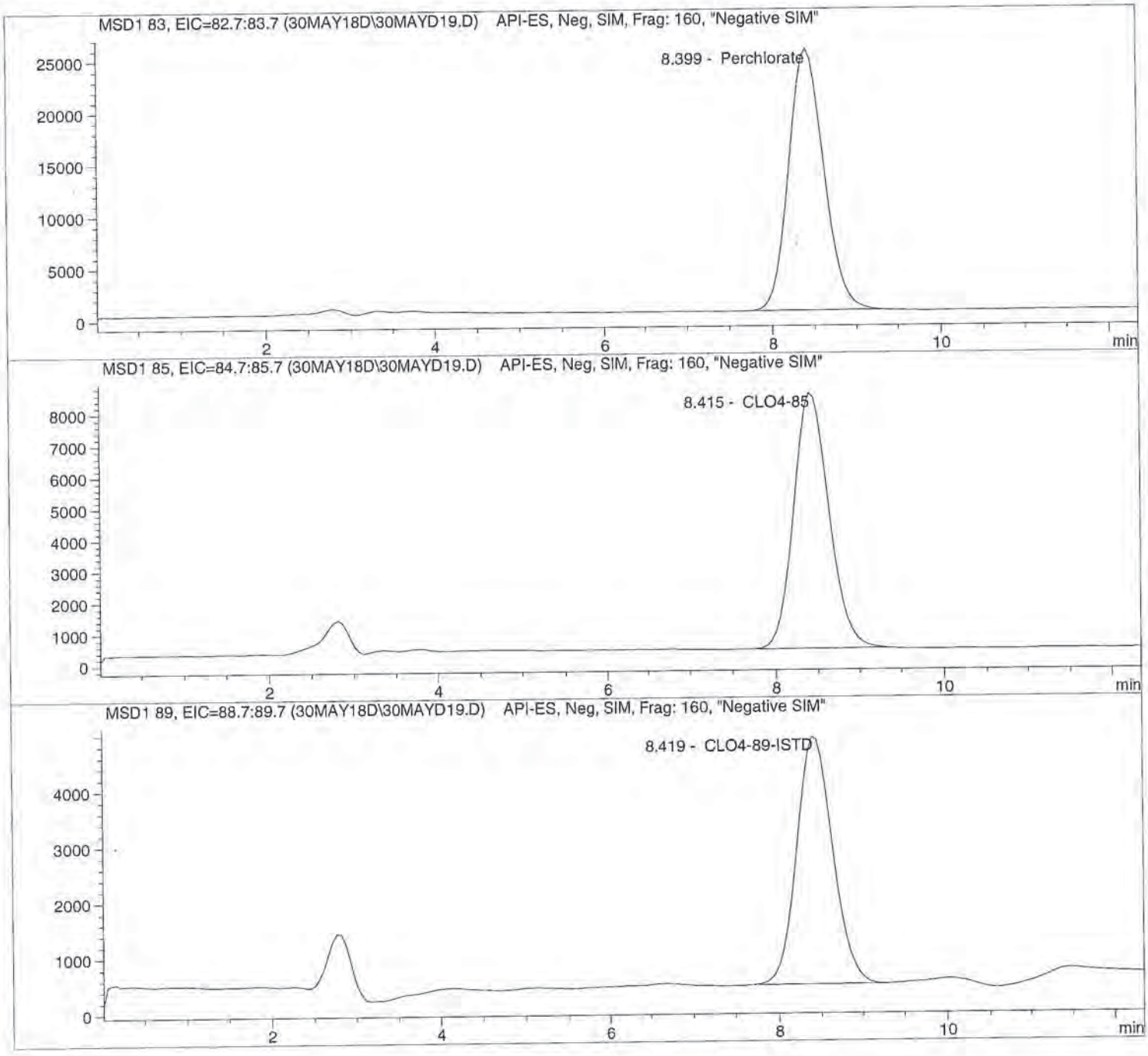
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD19.D Sample Name: 1814935001

Injection Date:	5/30/2018 12:50:38	Seq Line:	19
Sample Name:	1814935001	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD19.D Sample Name: 1814935001

Injection Date:	5/30/2018 12:50:38	Seq Line:	19
Sample Name:	1814935001	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.399	PBA	725810.6	22.7469	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	BBA	236380.5	23.6499	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.419	PBA	132221.0	5.0000	CLO4-89-ISTD

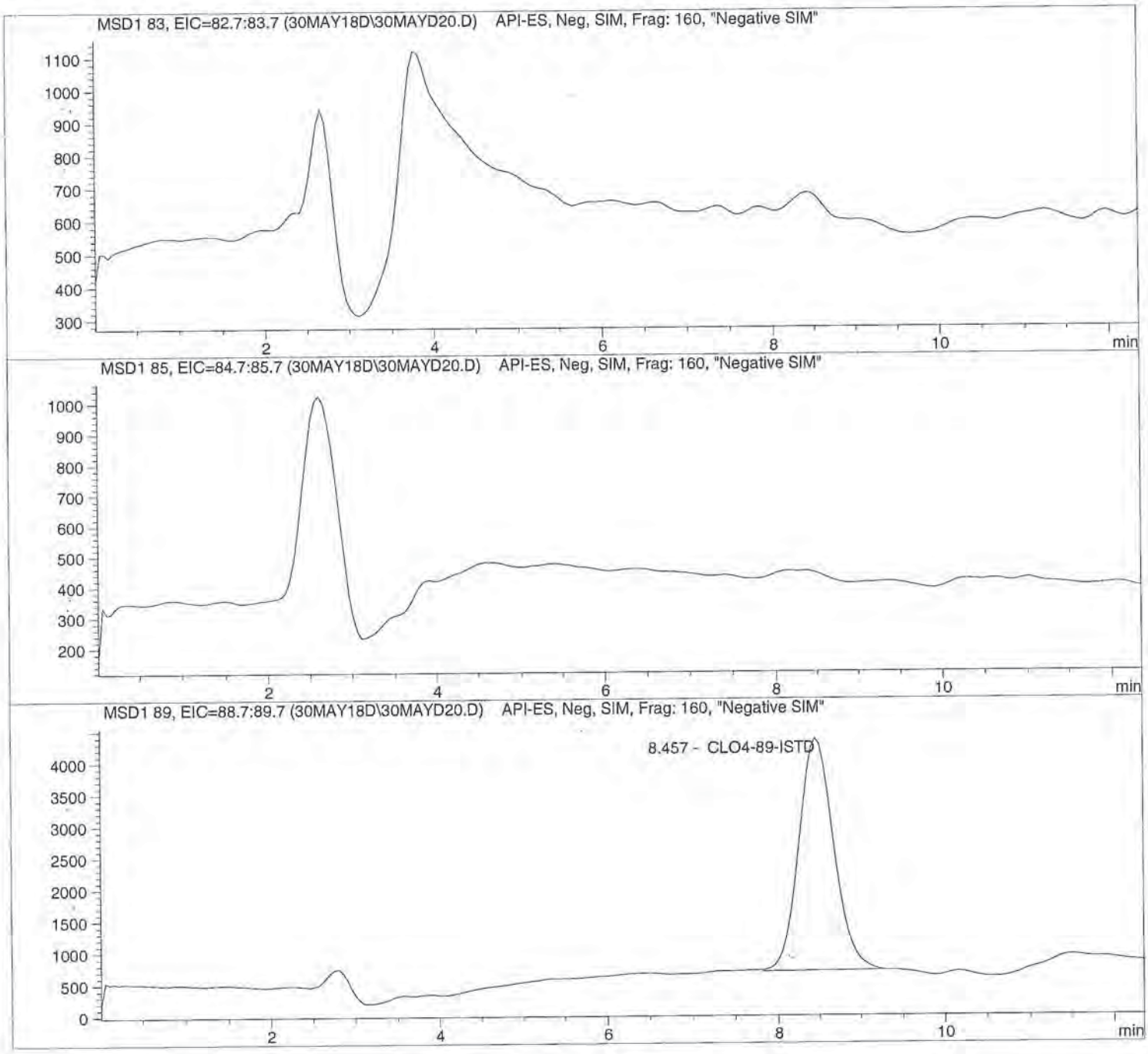
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD20.D Sample Name: 1813746005 RE

Injection Date:	5/30/2018 13:04:47	Seq Line:	20
Sample Name:	1813746005 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD20.D Sample Name: 1813746005 RE

Injection Date:	5/30/2018 13:04:47	Seq Line:	20
Sample Name:	1813746005 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.457	BBA	107709.2	5.0000	CLO4-89-ISTD

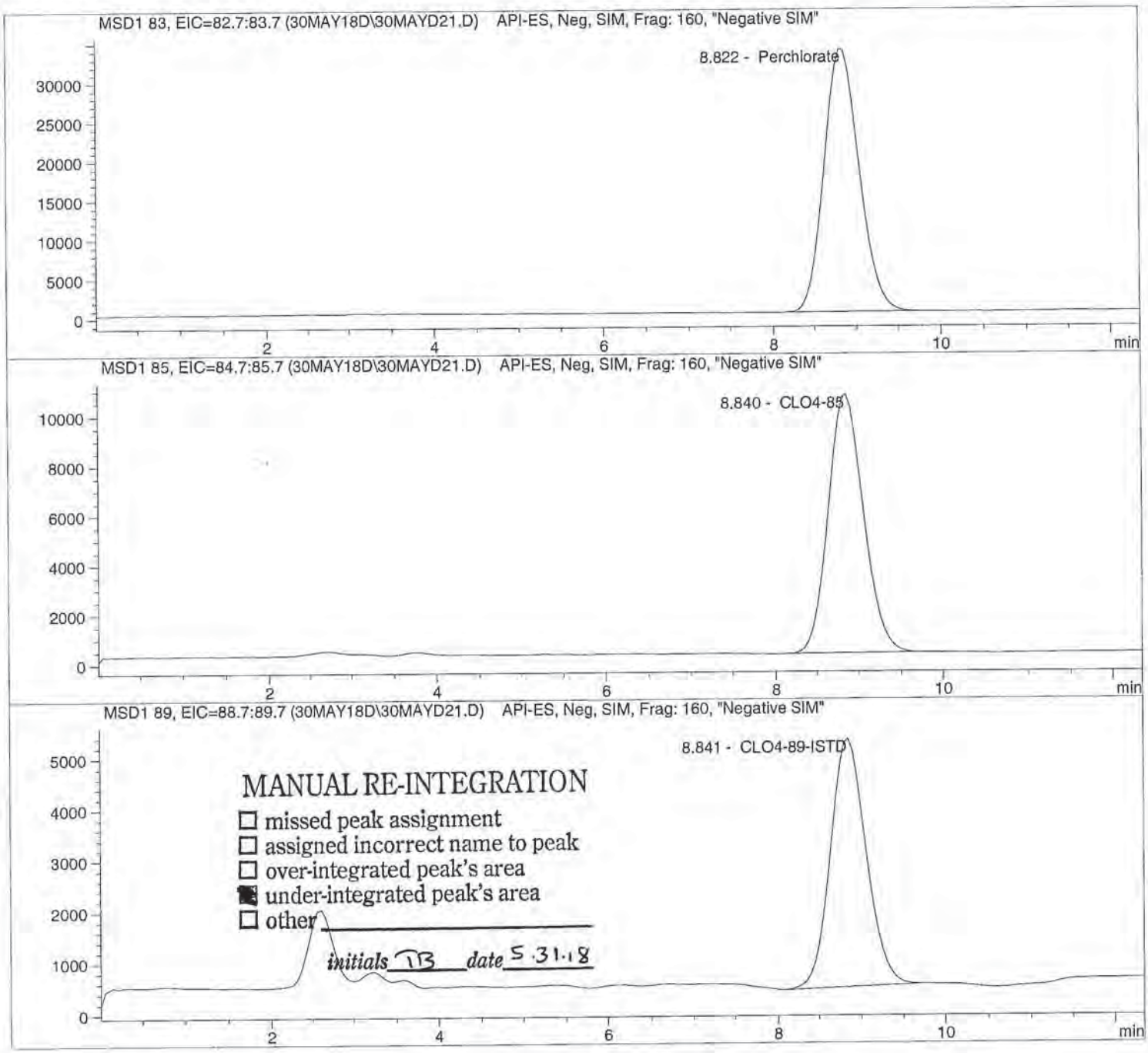
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD21.D Sample Name: 603231 CCV@25

Injection Date:	5/30/2018 13:18:56	Seq Line:	21
Sample Name:	603231 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD21.D Sample Name: 603231 CCV@25

Injection Date:	5/30/2018 13:18:56	Seq Line:	21
Sample Name:	603231 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.822	PBA	974747.6	27.3937	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.840	PBA	303819.0	27.5173	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.841	MM	143821.2	5.0000	CLO4-89-ISTD

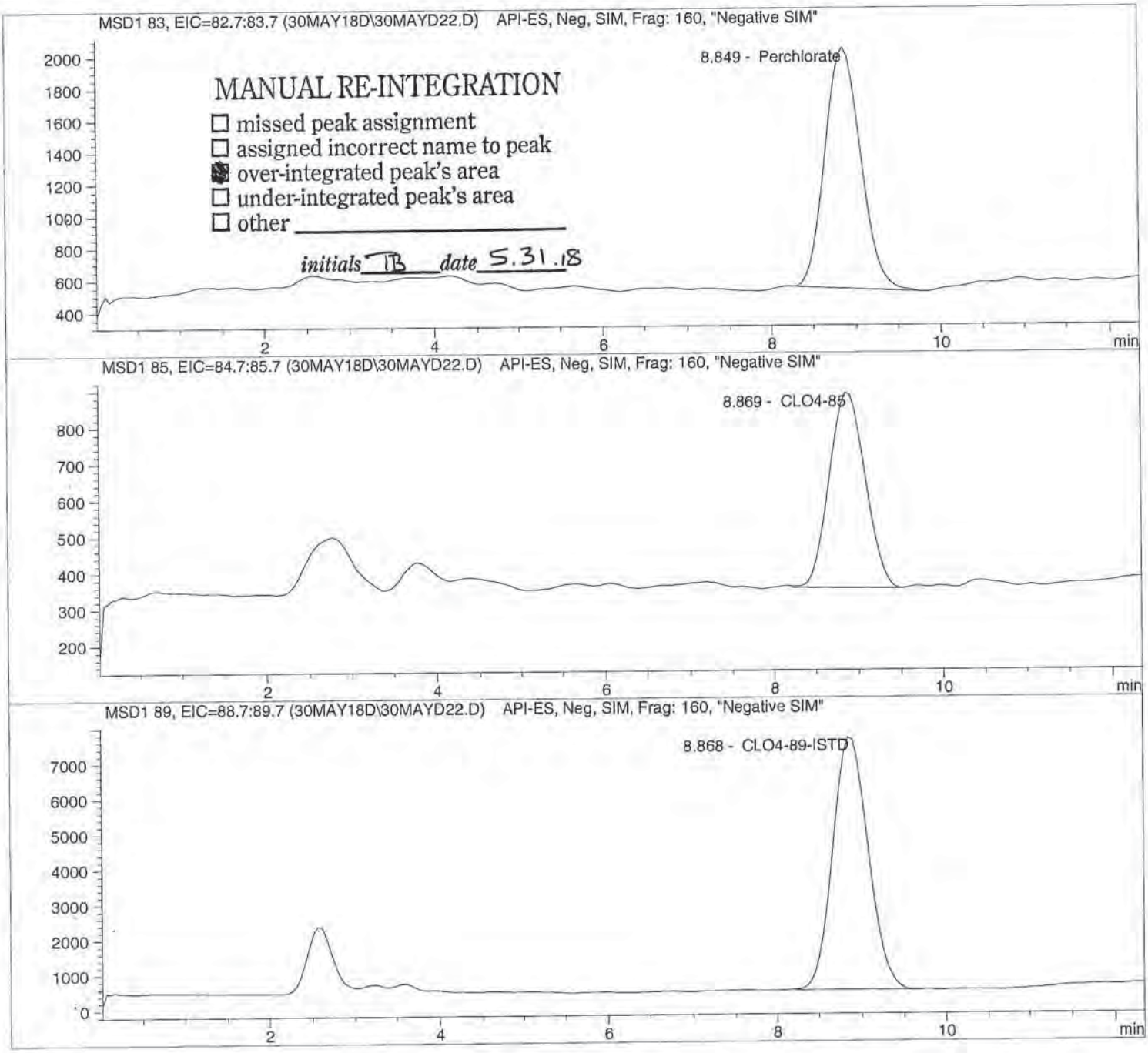
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD22.D Sample Name: 603232 LODV@1.

Injection Date:	5/30/2018 13:33:11	Seq Line:	22
Sample Name:	603232 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD22.D Sample Name: 603232 LODV@1.

Injection Date:	5/30/2018 13:33:11	Seq Line:	22
Sample Name:	603232 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.849	MM	43833.2	0.9482	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.869	BBA	15702.2	0.9449	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.868	BBA	208034.0	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Batch Report: C:\HPCHEM\1\DATA\02APR18D\02APR18I.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	4.75217e4	8.805	1.04383
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	7.57673e4	8.842	1.88584
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	1.87507e5	8.869	5.06681
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	4.00349e5	8.838	9.89695
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	1.13339e6	8.844	25.44483
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	2.22347e6	8.787	49.47140
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	3.56432e6	8.816	75.20096
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	3.99588e5	8.826	10.16984

#	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	1.48071e4	8.787	8.93940e-1
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	2.78914e4	8.863	2.05665
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	6.40466e4	8.880	5.32040
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	1.32002e5	8.855	10.20400
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	3.49808e5	8.856	25.27336
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	6.58628e5	8.801	48.60374
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	1.06294e6	8.833	75.70015
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	1.27530e5	8.845	10.16575

#	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	2.05633e5	8.818	5.00000
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	1.83981e5	8.862	5.00000
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	1.68695e5	8.888	5.00000
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	1.79911e5	8.861	5.00000
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	1.81917e5	8.865	5.00000
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	1.62538e5	8.808	5.00000
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	1.52621e5	8.841	5.00000
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	1.74490e5	8.846	5.00000

*** End of Report ***

Method C:\HPCHEM\1\METHODS\CLO4-DPR.M

Calibration Table

Perchlorate

Calib. Data Modified : 4/2/2018 11:32:41 AM

Calculate : Internal Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : No recalibration if peaks missing

Curve Type : Quadratic (some peaks differ, see below)
Origin : Ignored (some peaks differ, see below)
Weight : Linear (Amnt) (some peaks differ, see below)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

Default Sample ISTD Information (if not set in sample table):

ISTD #	ISTD Amount	Name
1	5.00000	CLO4-89-ISTD

Signal 1: MSD1 83, EIC=82.7:83.7
Signal 2: MSD1 85, EIC=84.7:85.7
Signal 3: MSD1 89, EIC=88.7:89.7

RetTime [min]	Sig	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
8.740	1	1	1.00000	4.75217e4	2.10430e-5		1	Perchlorate
		2	2.00000	7.57673e4	2.63966e-5			
		3	5.00000	1.87507e5	2.66656e-5			
		4	10.00000	4.00349e5	2.49782e-5			
		5	25.00000	1.13339e6	2.20577e-5			
		6	50.00000	2.22347e6	2.24874e-5			
		7	75.00000	3.56432e6	2.10419e-5			
8.787	2	1	1.00000	1.48071e4	6.75351e-5		1	CLO4-85
		2	2.00000	2.78914e4	7.17068e-5			
		3	5.00000	6.40466e4	7.80681e-5			
		4	10.00000	1.32002e5	7.57564e-5			
		5	25.00000	3.49808e5	7.14678e-5			
		6	50.00000	6.58628e5	7.59154e-5			
		7	75.00000	1.06294e6	7.05587e-5			
8.818	3	1	5.00000	2.05633e5	2.43151e-5	+I1		CLO4-89-ISTD
		2	5.00000	1.83981e5	2.71766e-5			
		3	5.00000	1.68695e5	2.96393e-5			
		4	5.00000	1.79911e5	2.77915e-5			
		5	5.00000	1.81917e5	2.74851e-5			
		6	5.00000	1.62538e5	3.07621e-5			

Method C:\HPCHEM\1\METHODS\CLO4-DPR.M

RetTime [min]	Sig	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
		7	5.00000	1.52621e5	3.27608e-5			

More compound-specific settings:

Compound: Perchlorate
- Time Window : From 6.650 min To 10.650 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 0.5
  - Level 3 : 0.2
  - Level 4 : 0.1
  - Level 5 : 0.04
  - Level 6 : 0.02
  - Level 7 : 0.013333

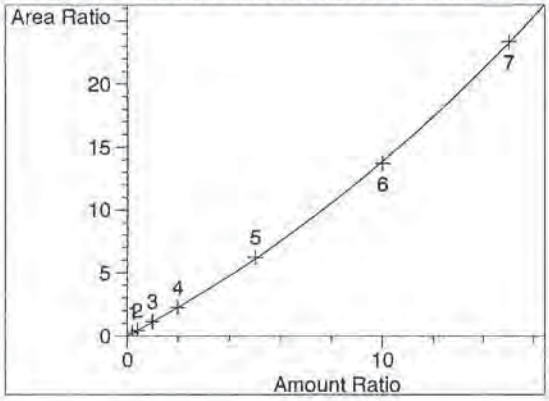
Compound: CLO4-85
- Time Window : From 6.682 min To 10.682 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 0.5
  - Level 3 : 0.2
  - Level 4 : 0.1
  - Level 5 : 0.04
  - Level 6 : 0.02
  - Level 7 : 0.013333

Compound: CLO4-89-ISTD
- Time Window : From 6.711 min To 10.711 min
- Curve Type : Linear
- Origin : Included
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 1
  - Level 3 : 1
  - Level 4 : 1
  - Level 5 : 1
  - Level 6 : 1
  - Level 7 : 1

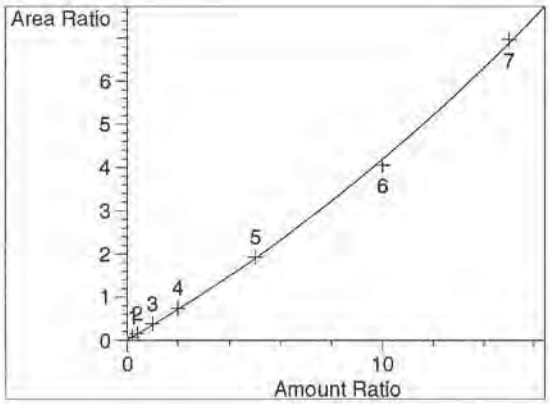
Peak Sum Table

No Entries in table

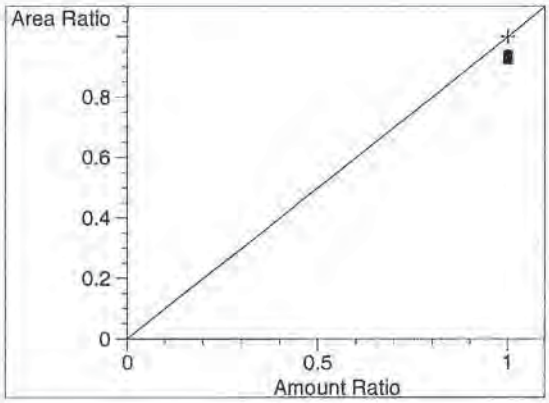
Calibration Curves



Perchlorate at exp. RT: 8.740
MSD1 83, EIC=82.7:83.7
Correlation: 0.99992
Residual Std. Dev.: 0.10616
Formula: $y = ax^2 + bx + c$
a: 3.31374e-2
b: 1.05374
c: 9.66975e-3
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333



CLO4-85 at exp. RT: 8.787
MSD1 85, EIC=84.7:85.7
Correlation: 0.99968
Residual Std. Dev.: 0.07365
Formula: $y = ax^2 + bx + c$
a: 8.04074e-3
b: 3.37521e-1
c: 1.14057e-2
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333



CLO4-89-ISTD at exp. RT: 8.818
MSD1 89, EIC=88.7:89.7
Correlation: 1.00000
Residual Std. Dev.: 0.00000
Formula: $y = mx + b$
m: 1.00000
b: 0.00000
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 1
Level 3 : 1
Level 4 : 1
Level 5 : 1
Level 6 : 1
Level 7 : 1

Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\APR\02APR18D.S

Sequence Table:

Method and Injection Info Part:

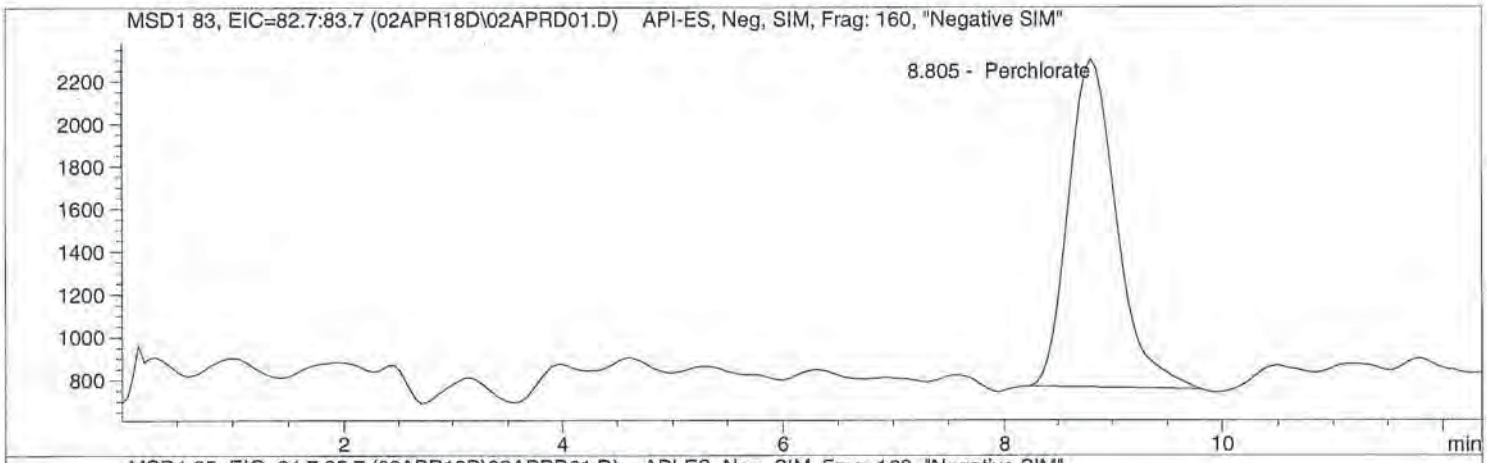
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	ICAL1@ 1.0ug/L	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	ICAL2@ 2.0ug/L	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	ICAL3@ 5.0ug/L	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	ICAL4@ 10.ug/L	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	ICAL5@ 25.ug/L	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	ICAL6@ 50.ug/L	CLO4-DOD	1	Ctrl Samp		
7	Vial 77	ICAL7@ 75.ug/L	CLO4-DOD	1	Ctrl Samp		
8	Vial 78	ICAL Verf@10ug/L	CLO4-DOD	1	Ctrl Samp		

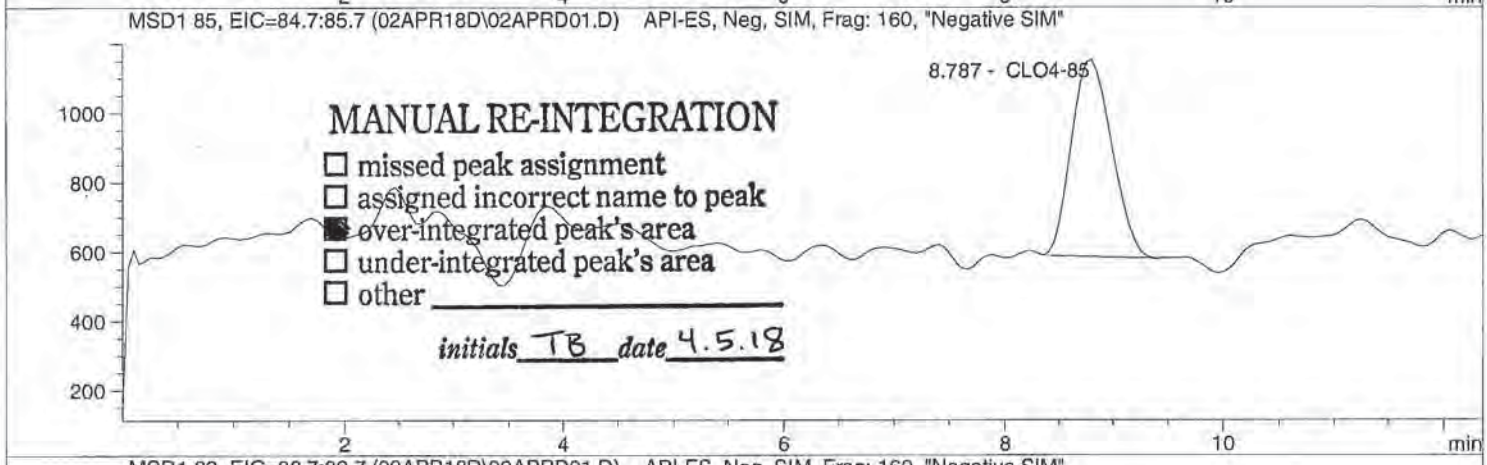
Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

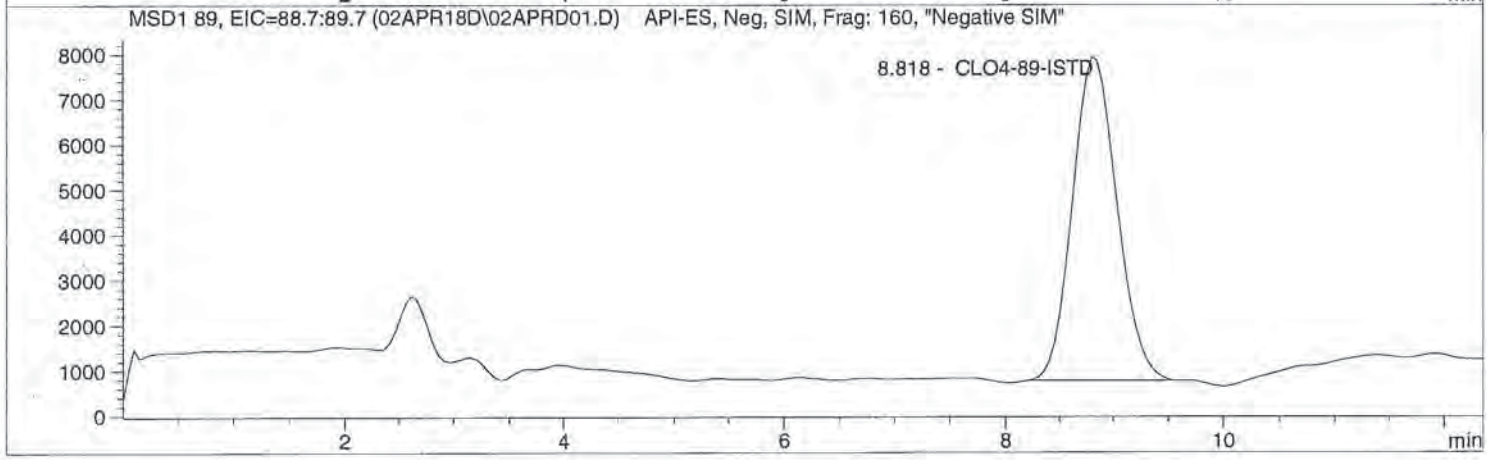
Perchlorate analysis





MANUAL RE-INTEGRATION
☐ missed peak assignment
☐ assigned incorrect name to peak
■ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____

initials TB *date* 4.5.18



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.805	PBA	47521.7	1.0438	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	MM	14807.1	0.8939	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.818	PBA	205633.2	5.0000	CLO4-89-ISTD

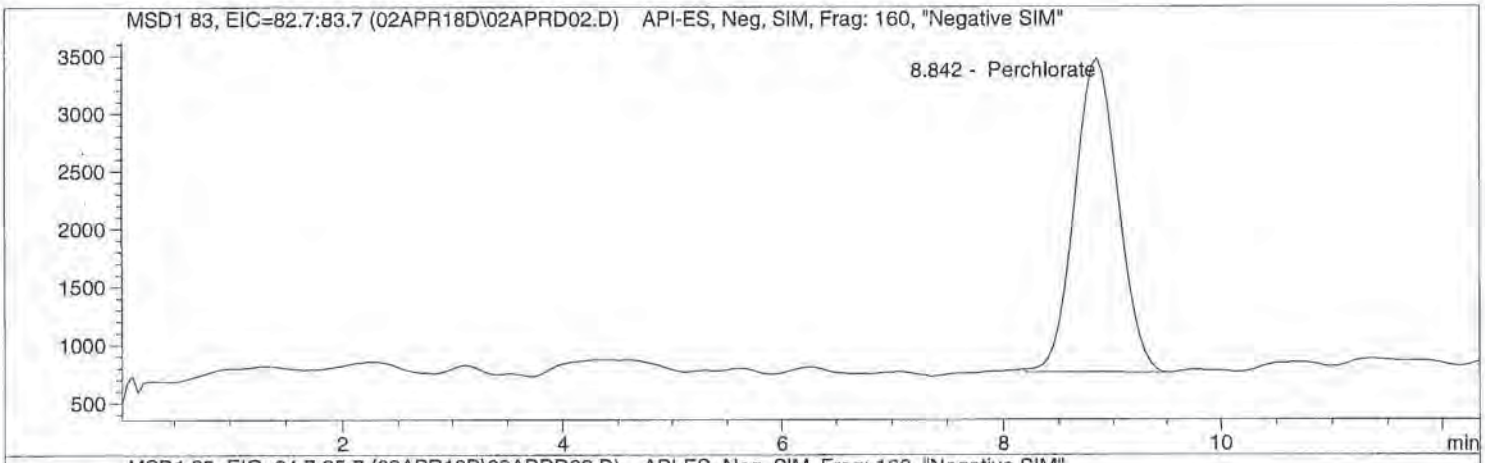
*** End of Report ***

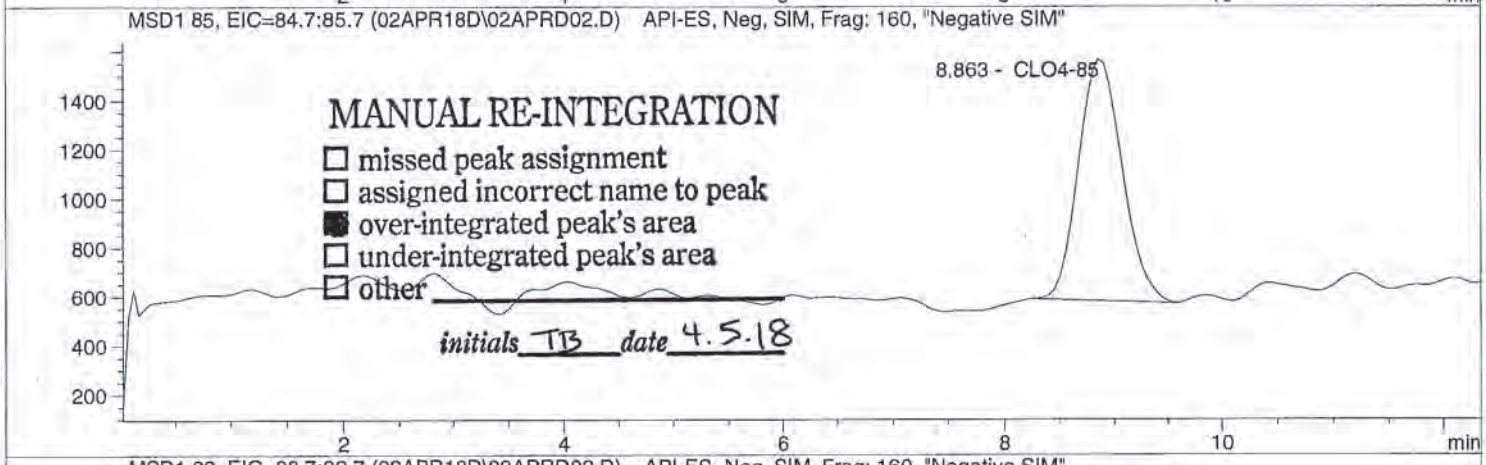
Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

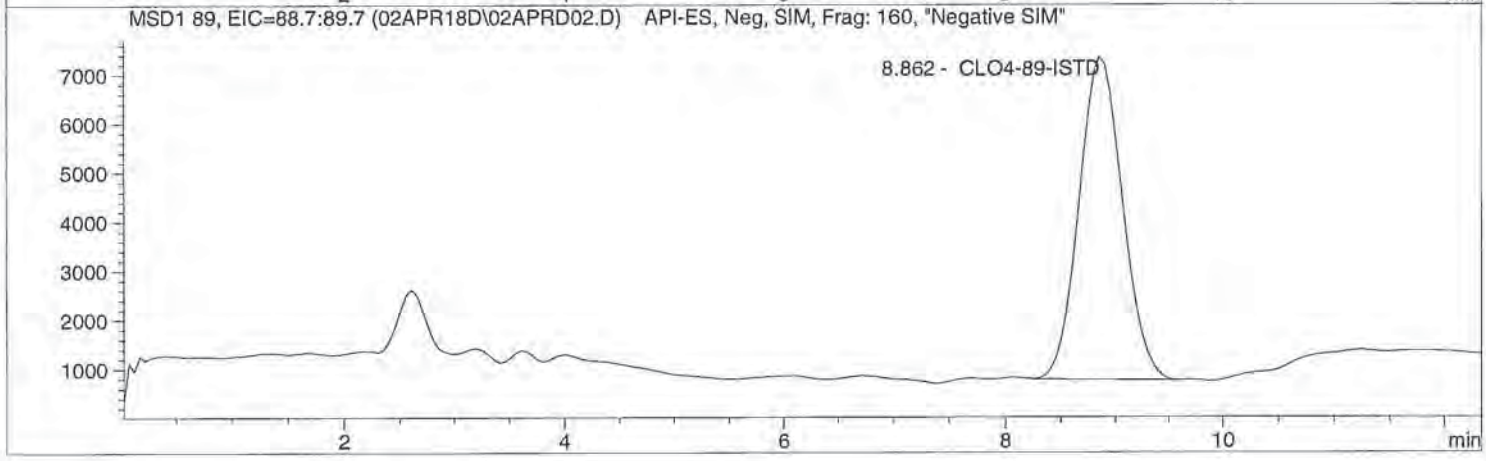
Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis





MANUAL RE-INTEGRATION
☐ missed peak assignment
☐ assigned incorrect name to peak
■ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____
initials TB *date* 4.5.18



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.842	BBA	75767.3	1.8858	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.863	MM	27891.4	2.0567	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.862	BBA	183981.5	5.0000	CLO4-89-ISTD

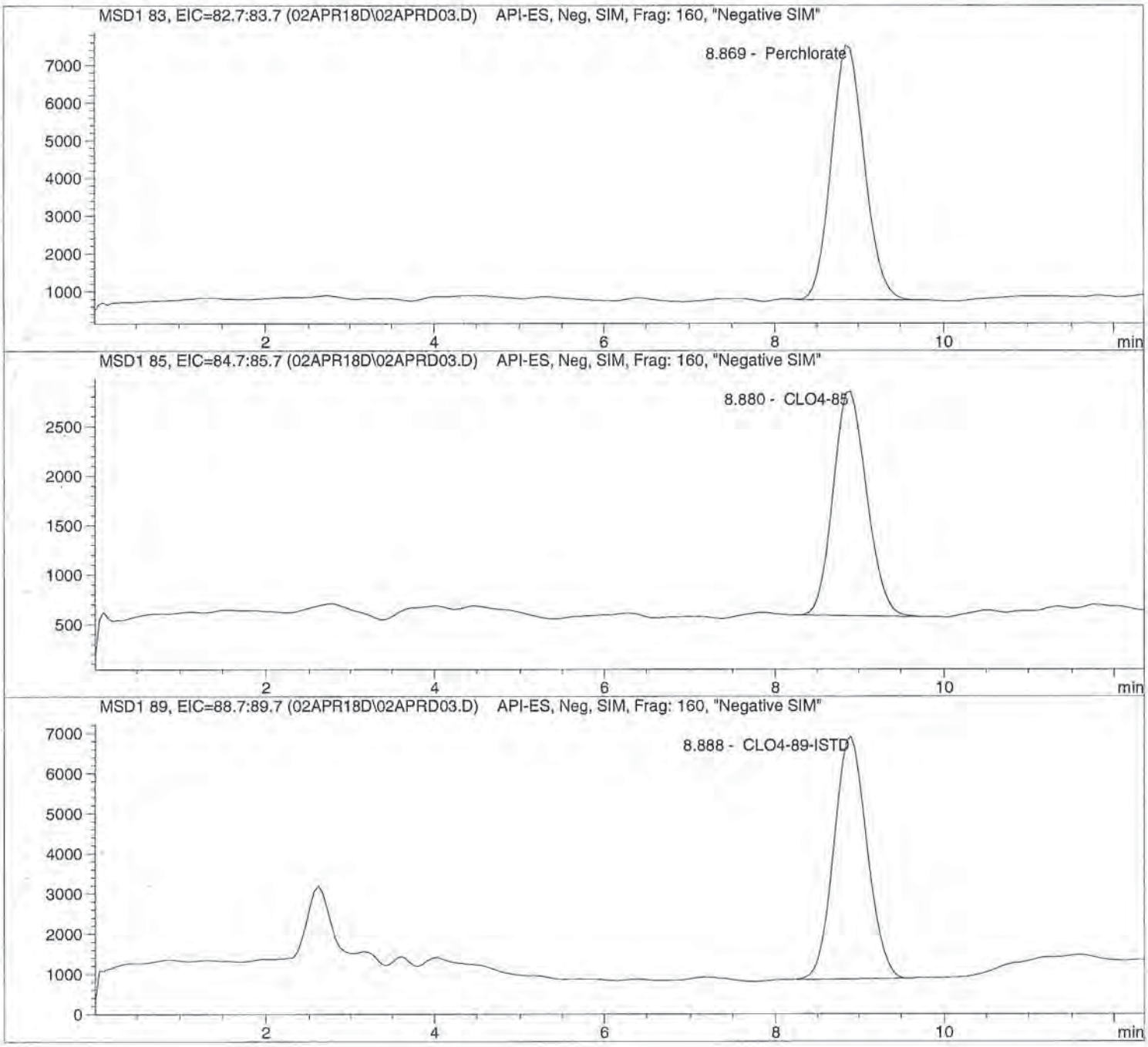
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	4/02/2018 09:36:38	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	4/02/2018 09:36:38	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.869	BBA	187507.2	5.0668	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.880	PBA	64046.6	5.3204	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.888	BBA	168695.0	5.0000	CLO4-89-ISTD

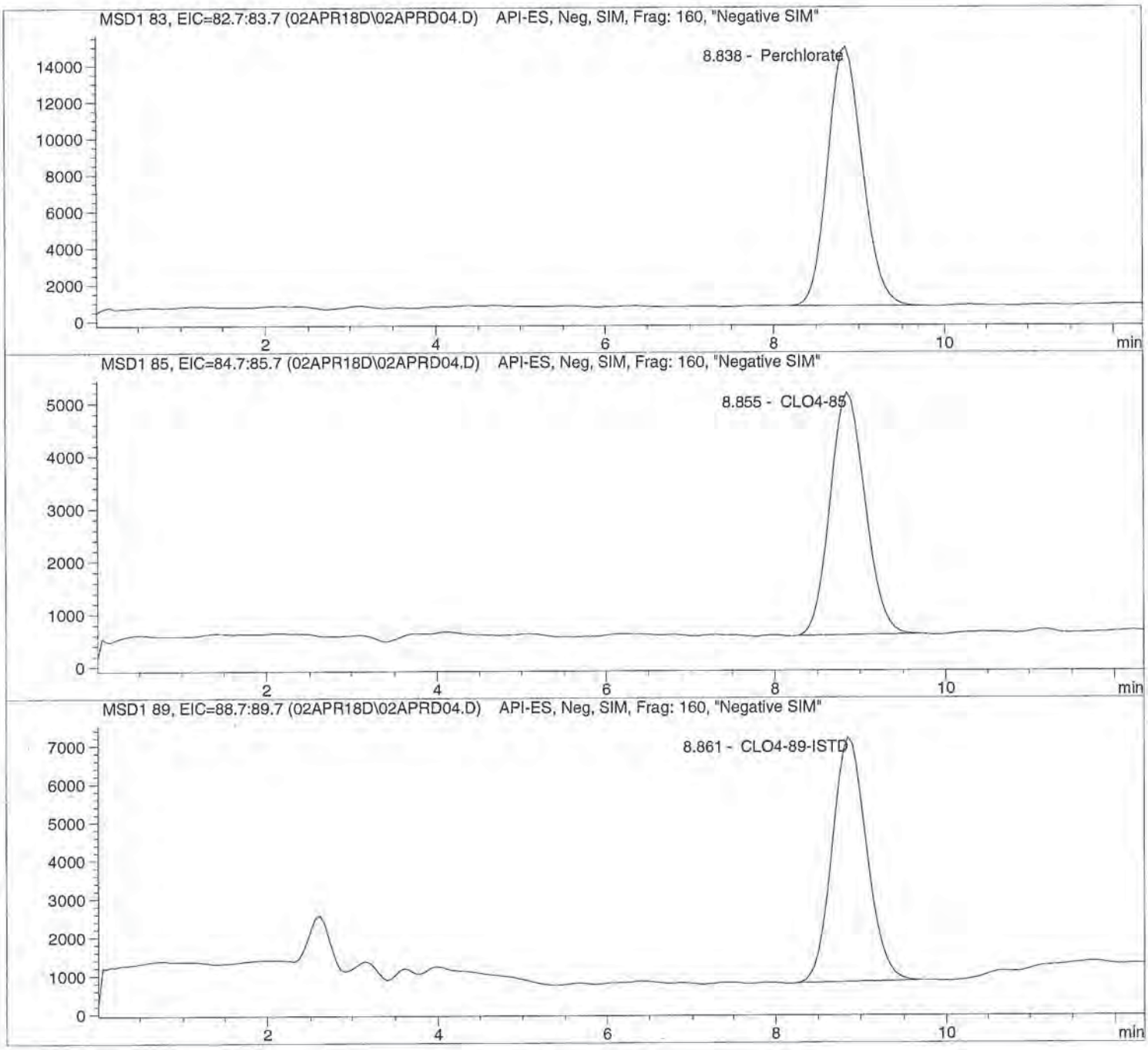
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	4/02/2018 09:50:54	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	4/02/2018 09:50:54	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.838	BBA	400349.0	9.8969	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.855	PBA	132002.1	10.2040	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.861	PBA	179911.2	5.0000	CLO4-89-ISTD

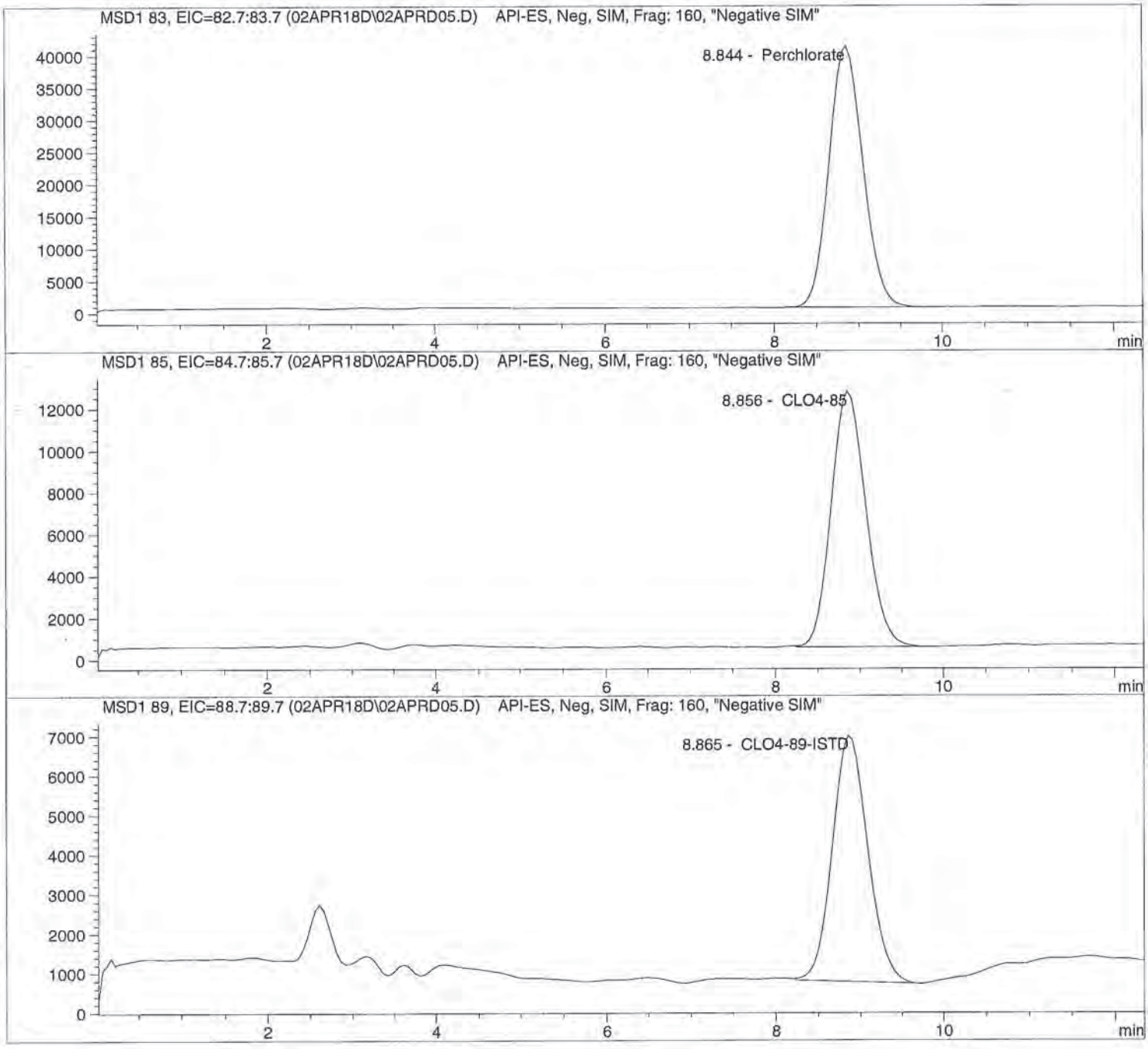
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	4/02/2018 10:05:03	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	4/02/2018 10:05:03	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.844	BBA	1133393.5	25.4448	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.856	BBA	349808.1	25.2734	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.865	BBA	181916.8	5.0000	CLO4-89-ISTD

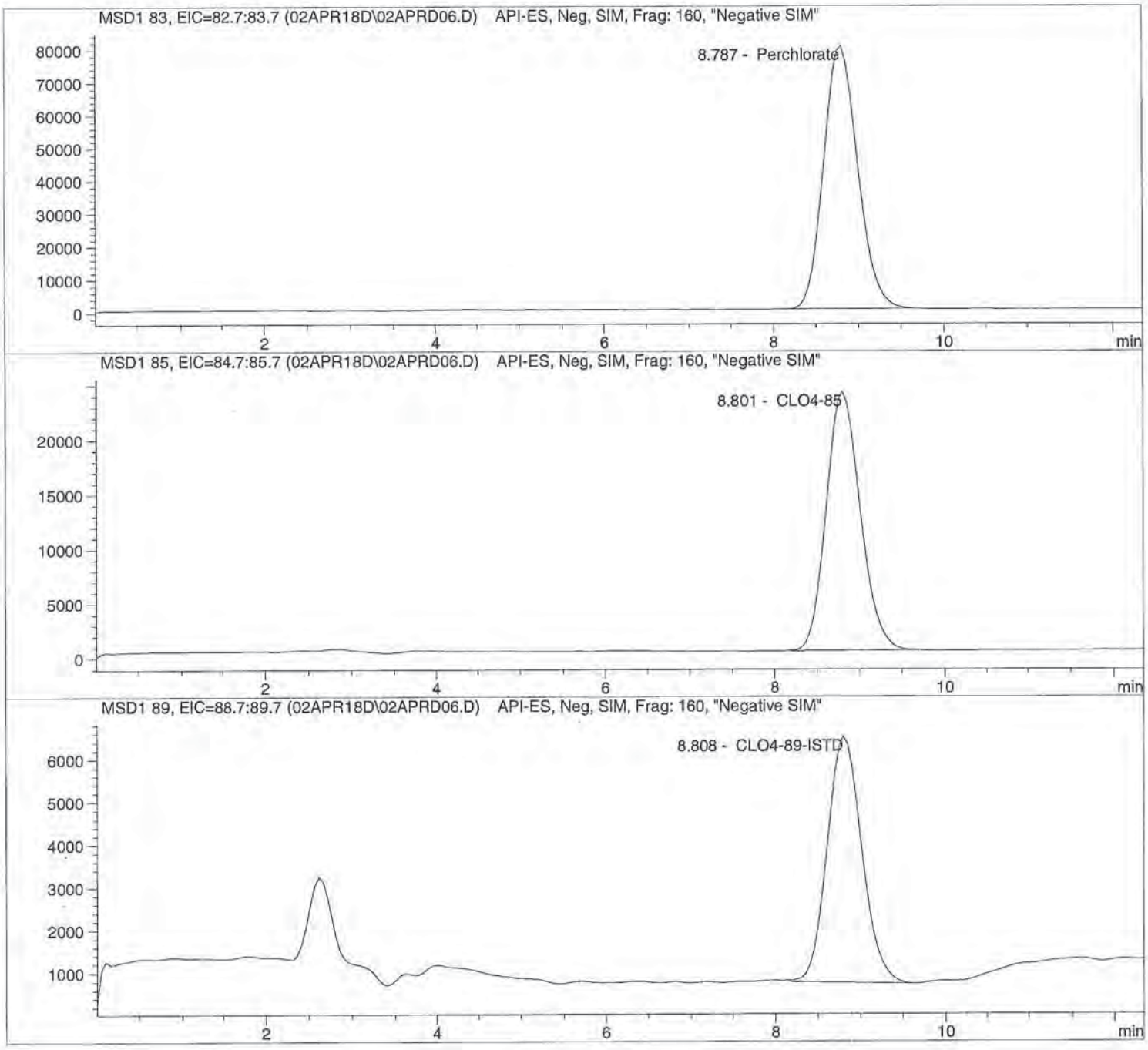
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	4/02/2018 10:19:12	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	4/02/2018 10:19:12	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	50.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	BBA	2223467.0	49.4714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.801	BBA	658628.2	48.6037	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.808	BBA	162537.8	5.0000	CLO4-89-ISTD

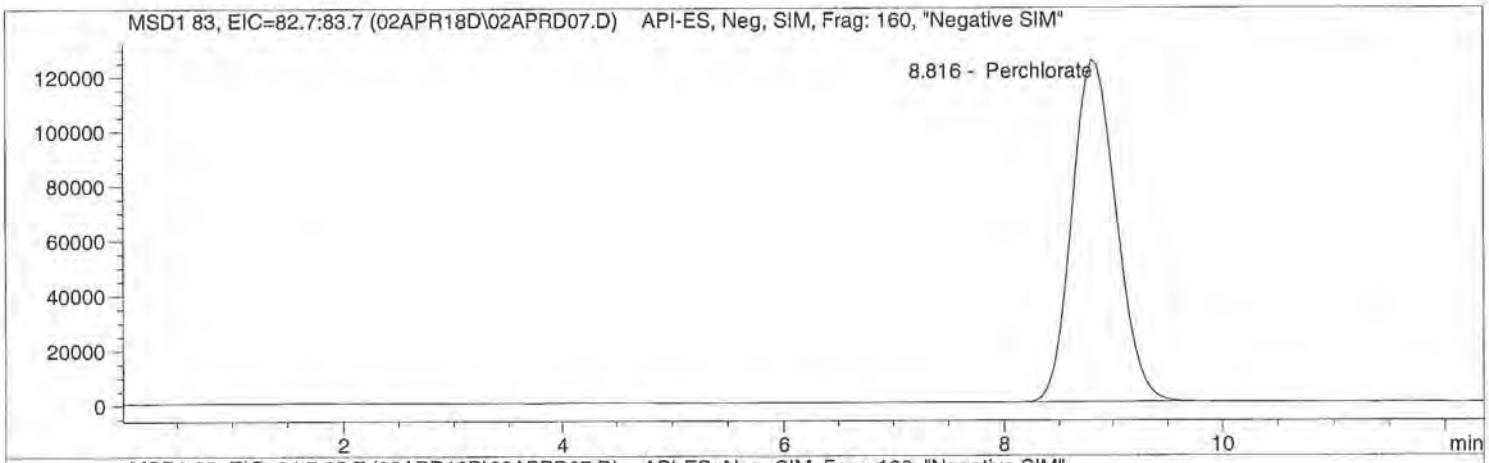
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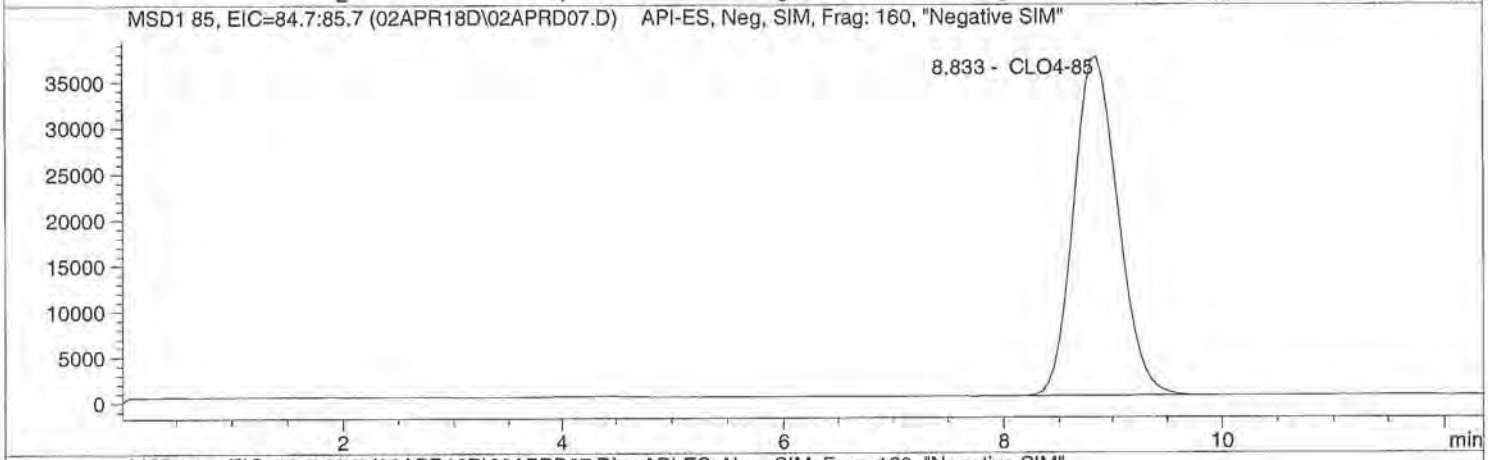
Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD07.D Sample Name: ICAL7@ 75.ug/L

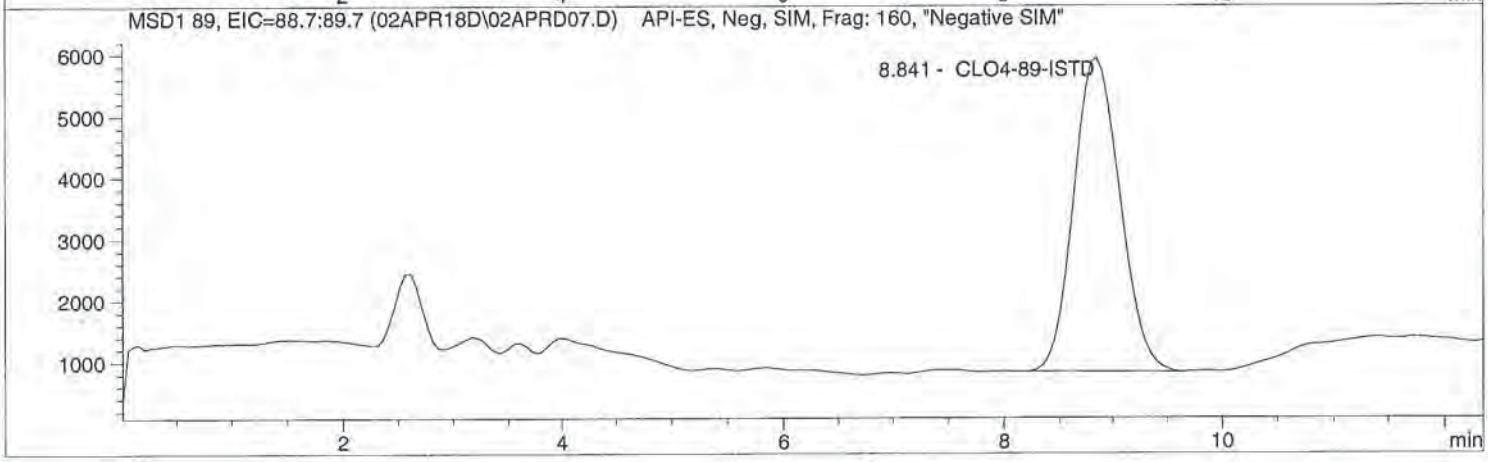
Injection Date:	4/02/2018 10:33:24	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD07.D Sample Name: ICAL7@ 75.ug/L

Injection Date:	4/02/2018 10:33:24	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	75.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.816	PBA	3564322.2	75.2010	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.833	BBA	1062944.2	75.7001	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.841	PBA	152621.4	5.0000	CLO4-89-ISTD

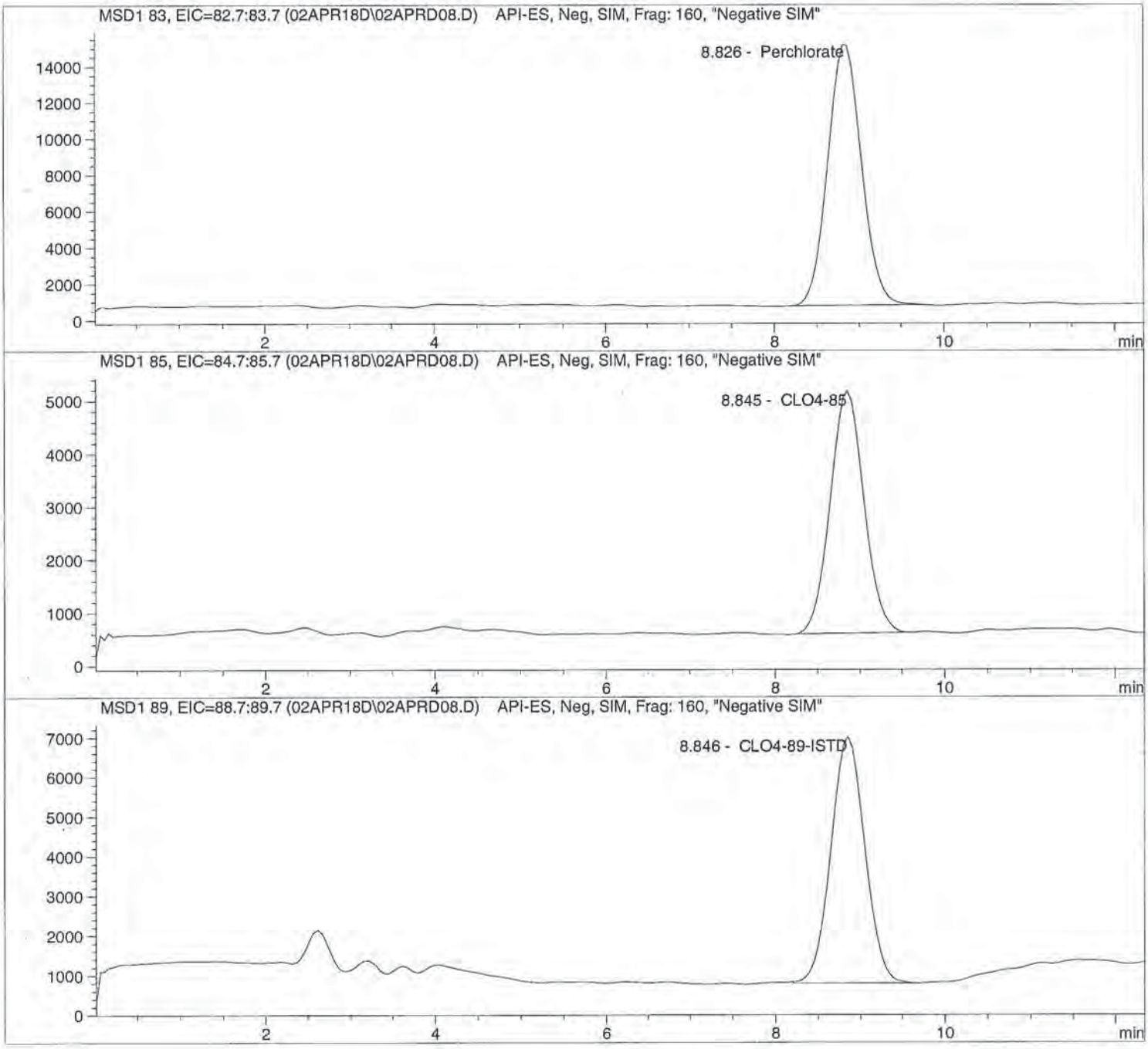
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD08.D Sample Name: ICAL Verf@10ug/L

Injection Date:	4/02/2018 10:47:33	Seq Line:	8
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD08.D Sample Name: ICAL Verf@10ug/L

Injection Date:	4/02/2018 10:47:33	Seq Line:	8
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.826	BBA	399587.8	10.1698	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.845	PBA	127530.4	10.1657	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.846	BBA	174490.2	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

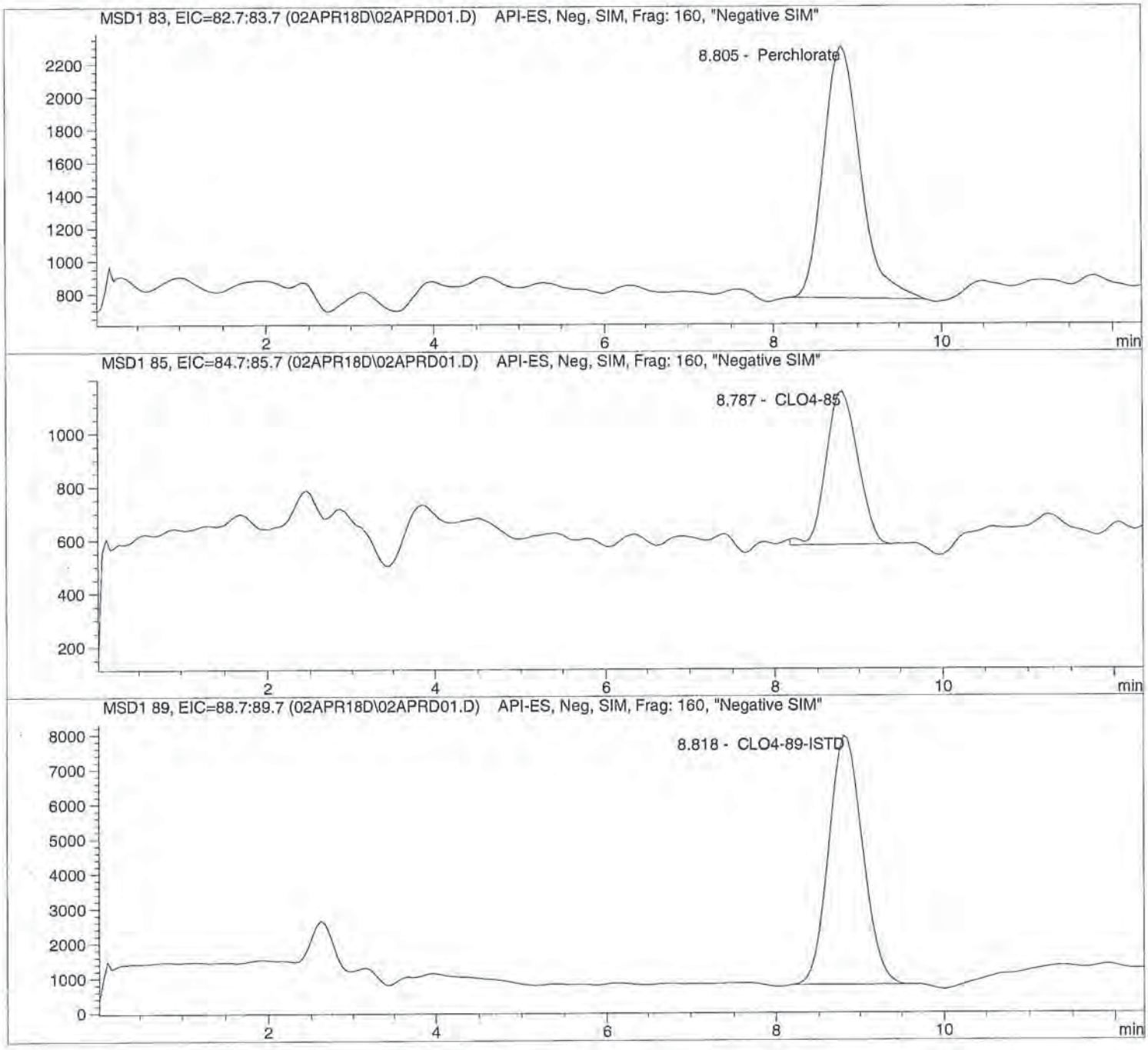
Unmodified

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.805	PBA	47521.7	1.0438	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	BBA	15364.8	0.9338	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.818	PBA	205633.2	5.0000	CLO4-89-ISTD

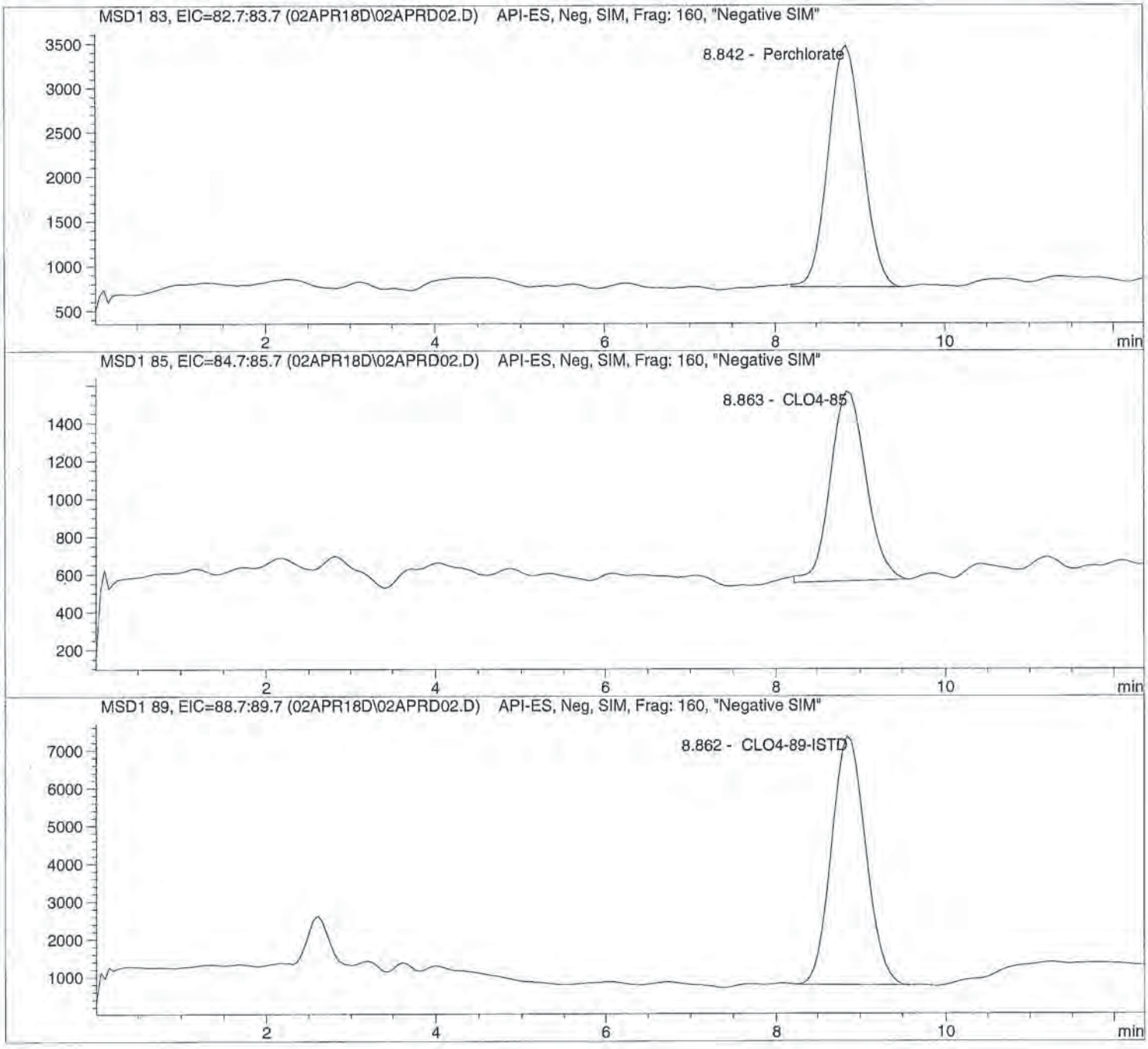
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.842	BBA	75767.3	1.8858	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.863	BBA	29265.6	2.1651	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.862	BBA	183981.5	5.0000	CLO4-89-ISTD

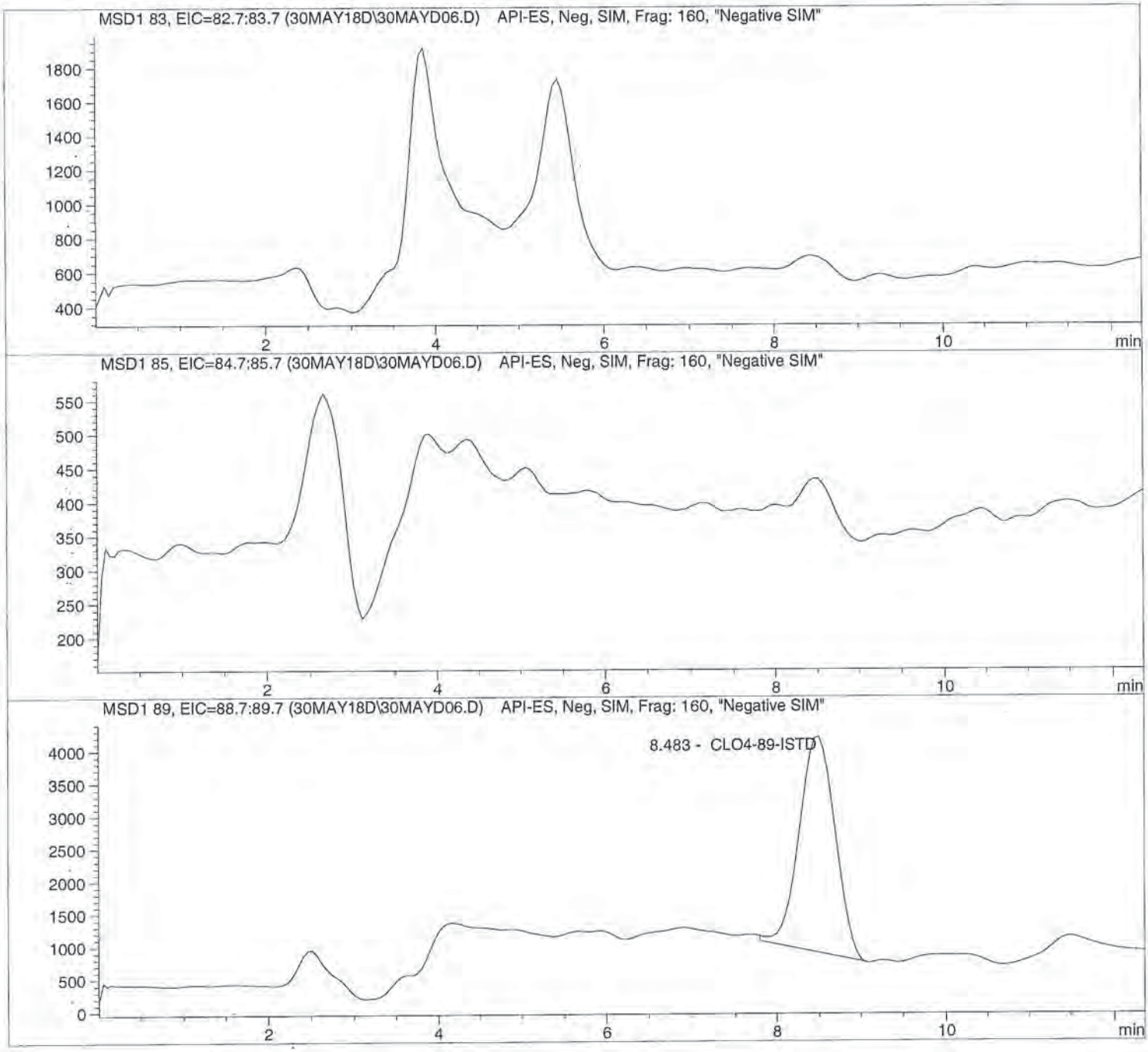
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD06.D Sample Name: 1813746001

Injection Date:	5/30/2018 09:46:40	Seq Line:	6
Sample Name:	1813746001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD06.D Sample Name: 1813746001

Injection Date:	5/30/2018 09:46:40	Seq Line:	6
Sample Name:	1813746001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.483	BBA	96934.4	5.0000	CLO4-89-ISTD

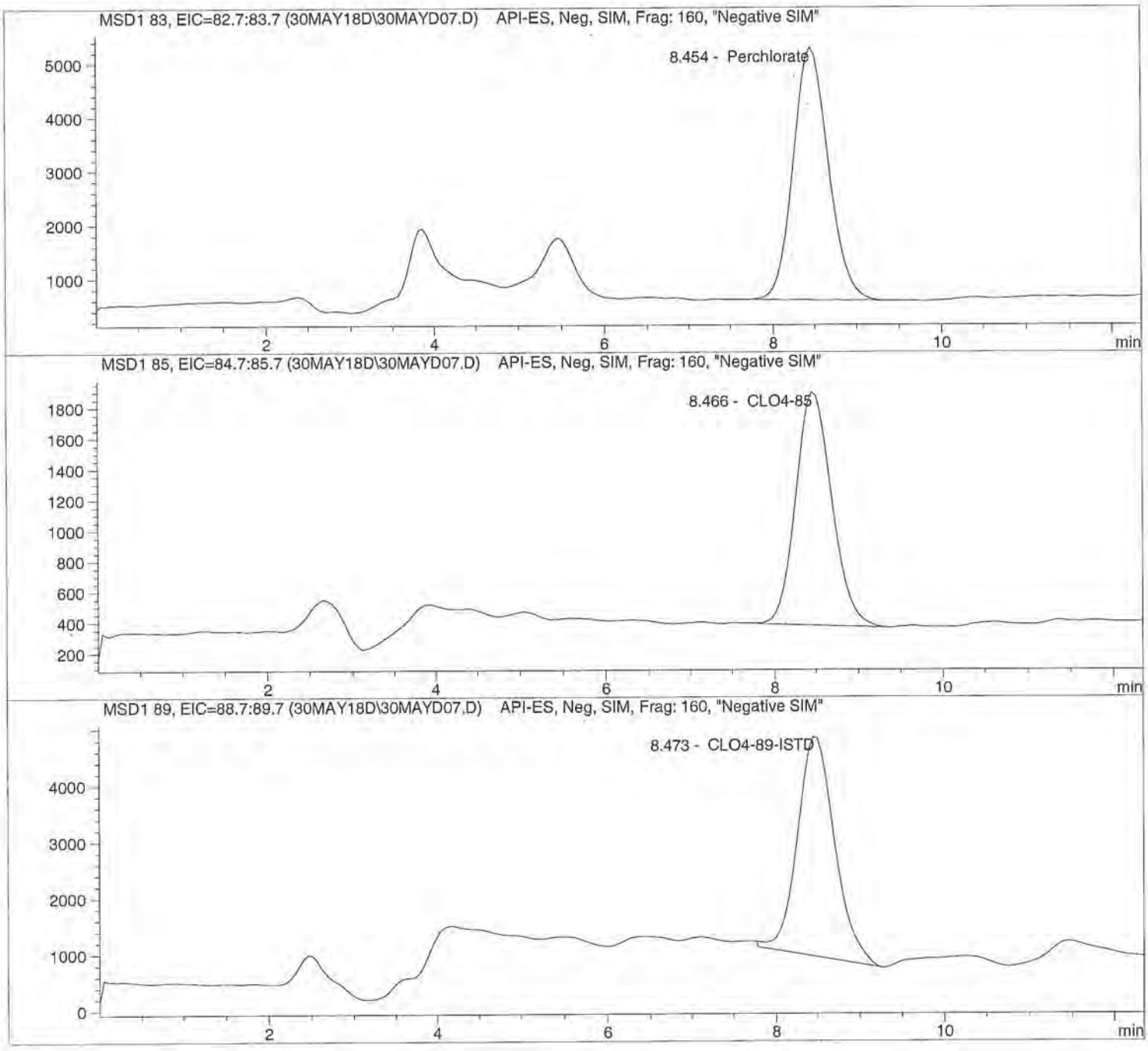
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD07.D Sample Name: 603142 137461S

Injection Date:	5/30/2018 10:00:51	Seq Line:	7
Sample Name:	603142 137461S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD07.D Sample Name: 603142 137461S

Injection Date:	5/30/2018 10:00:51	Seq Line:	7
Sample Name:	603142 137461S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.454	BBA	137244.7	5.1733	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.466	BBA	45610.3	5.2876	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.473	BBA	120876.2	5.0000	CLO4-89-ISTD

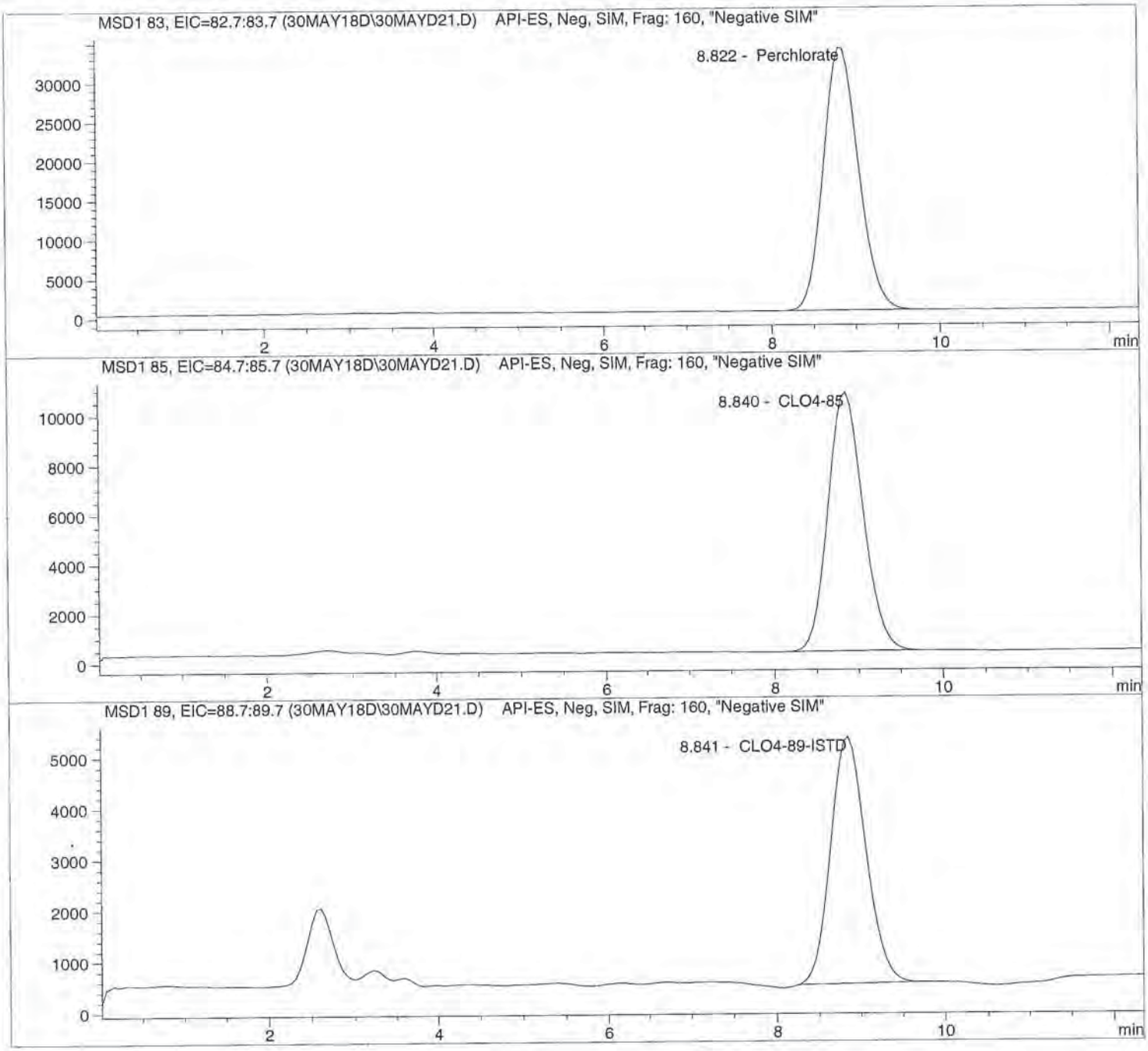
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD21.D Sample Name: 603231 CCV@25

Injection Date:	5/30/2018 13:18:56	Seq Line:	21
Sample Name:	603231 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD21.D Sample Name: 603231 CCV@25

Injection Date:	5/30/2018 13:18:56	Seq Line:	21
Sample Name:	603231 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.822	PBA	974747.6	27.7972	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.840	PBA	303819.0	27.9357	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.841	PBA	141430.9	5.0000	CLO4-89-ISTD

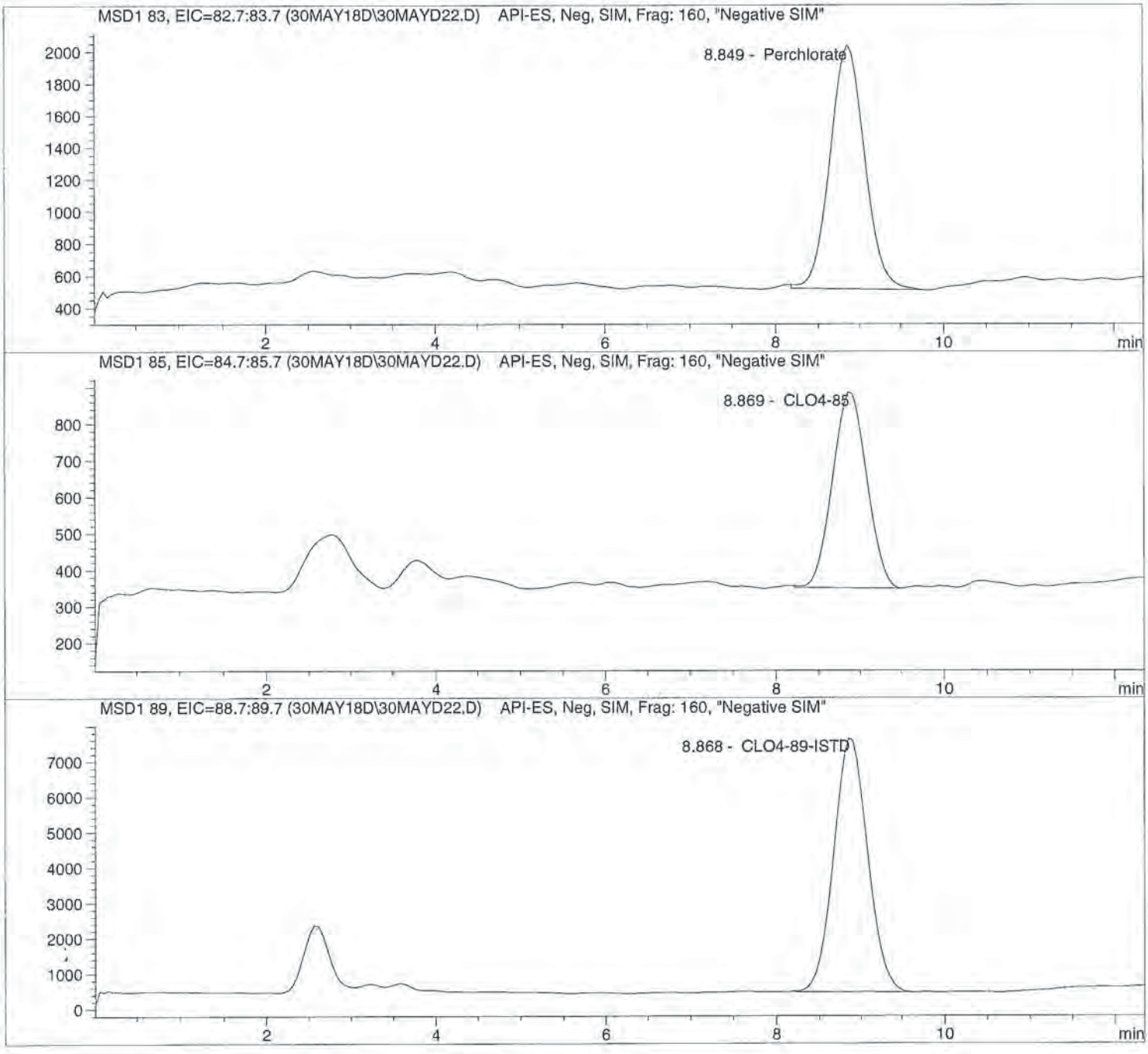
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD22.D Sample Name: 603232 LODV@1.

Injection Date:	5/30/2018 13:33:11	Seq Line:	22
Sample Name:	603232 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD22.D Sample Name: 603232 LODV@1.

Injection Date: 5/30/2018 13:33:11 Seq Line: 22
Sample Name: 603232 LODV@1. Location: Vial 72
Acq Operator: TNB Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Mon, 2. Apr. 2018, 11:32:41 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.849	BBA	44908.3	0.9725	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.869	BBA	15702.2	0.9449	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.868	BBA	208034.0	5.0000	CLO4-89-ISTD

*** End of Report ***

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

June 08, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18051257**

Laboratory Results for: **Longhorn GW Treatment Plant**

Dear Marcia,

ALS Environmental received 2 sample(s) on May 25, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS18051257

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18051257-01	LH18/24-SP650_052418	Water		24-May-2018 14:00	25-May-2018 08:45	☐
HS18051257-02	Trip Blank	Water	ALS-050418-38	24-May-2018 00:00	25-May-2018 08:45	☐

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order:

CASE NARRATIVE

Work Order Comments

• The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 128877

Sample ID: LH18/24-SP650_052418 (HS18051257-01)

• The surrogate recoveries could not be determined due to dilution below the calibration range.

GCMS Volatiles by Method SW8260

Batch ID: R317575

Sample ID: LH18/24-SP650_052418 (HS18051257-01)

• Lowest practical dilution for sample hs18051257-01 due to matrix. Sample is very pungent.

Sample ID: HS18051491-01MS

• MS and MSD are for an unrellated sample.

Metals by Method SW6020

Batch ID: 128909

Sample ID: HS18051255-01MSD

• MSD is for an unrelated sample

WetChemistry by Method SW7196

Batch ID: R317167

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_052418
Collection Date: 24-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051257
Lab ID:HS18051257-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,1,1-Trichloroethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,1,2,2-Tetrachloroethane	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,1,2-Trichloroethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,1-Dichloroethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,1-Dichloroethene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,1-Dichloropropene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2,3-Trichlorobenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2,3-Trichloropropane	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2,4-Trichlorobenzene	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2,4-Trimethylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2-Dibromo-3-chloropropane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2-Dibromoethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2-Dichlorobenzene	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2-Dichloroethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,2-Dichloropropane	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,3,5-Trimethylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,3-Dichlorobenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,3-Dichloropropane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
1,4-Dichlorobenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
2,2-Dichloropropane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
2-Butanone	5.0	U	2.5	5.0	10	ug/L	5	07-Jun-2018 14:15
2-Chlorotoluene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
2-Hexanone	5.0	U	5.0	5.0	10	ug/L	5	07-Jun-2018 14:15
4-Chlorotoluene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
4-Isopropyltoluene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
4-Methyl-2-pentanone	5.0	U	3.5	5.0	10	ug/L	5	07-Jun-2018 14:15
Acetone	5.0	U	2.0	5.0	10	ug/L	5	07-Jun-2018 14:15
Benzene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Bromobenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Bromochloromethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Bromodichloromethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Bromoform	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Bromomethane	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Carbon disulfide	5.0	U	3.0	5.0	10	ug/L	5	07-Jun-2018 14:15
Carbon tetrachloride	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Chlorobenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Chloroethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_052418
Collection Date: 24-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051257
Lab ID:HS18051257-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
Chloroform	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Chloromethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
cis-1,2-Dichloroethene	**3.5**	J	**1.0**	**2.5**	**5.0**	**ug/L**	5	07-Jun-2018 14:15
cis-1,3-Dichloropropene	2.5	U	0.50	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Dibromochloromethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Dibromomethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Dichlorodifluoromethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Ethylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Hexachlorobutadiene	2.5	U	5.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Isopropylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
m,p-Xylene	5.0	U	2.5	5.0	10	ug/L	5	07-Jun-2018 14:15
Methylene chloride	5.0	U	2.0	5.0	10	ug/L	5	07-Jun-2018 14:15
n-Butylbenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
n-Propylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Naphthalene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
o-Xylene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
sec-Butylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Styrene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
tert-Butylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Tetrachloroethene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Toluene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
trans-1,2-Dichloroethene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
trans-1,3-Dichloropropene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Trichloroethene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Trichlorofluoromethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Vinyl chloride	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:15
Surr: 1,2-Dichloroethane-d4	*102*			**0**	*81-118*	*%REC*	*5*	*07-Jun-2018 14:15*
Surr: 4-Bromofluorobenzene	*100*			**0**	*85-114*	*%REC*	*5*	*07-Jun-2018 14:15*
Surr: Dibromofluoromethane	*101*			**0**	*80-119*	*%REC*	*5*	*07-Jun-2018 14:15*
Surr: Toluene-d8	*94.8*			**0**	*89-112*	*%REC*	*5*	*07-Jun-2018 14:15*
SEMIVOLATILES SIM	**Method:SW8270SIM**					Prep:SW3510 / 29-May-2018		Analyst: ACN
1,4-Dioxane	**11**		**1.0**	**1.0**	**1.0**	**ug/L**	100	31-May-2018 12:59
Surr: 2-Fluorobiphenyl	*0*	*S*		0	*40-140*	*%REC*	*100*	*31-May-2018 12:59*
Surr: 4-Terphenyl-d14	*0*	*S*		0	*40-140*	*%REC*	*100*	*31-May-2018 12:59*
Surr: Nitrobenzene-d5	*0*	*S*		0	*40-140*	*%REC*	*100*	*31-May-2018 12:59*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_052418
Collection Date: 24-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051257
Lab ID:HS18051257-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A		**Method:SW6020**				Prep:SW3010A / 30-May-2018		Analyst: JDE
Barium	**0.186**		**0.00190**	**0.00250**	**0.00400**	**mg/L**	1	05-Jun-2018 14:24
Lead	0.00100	U	0.000600	0.00100	0.00200	mg/L	1	05-Jun-2018 14:24
Selenium	0.00200	U	0.00110	0.00200	0.00200	mg/L	1	05-Jun-2018 14:24
Silver	0.00100	U	0.000200	0.00100	0.00200	mg/L	1	05-Jun-2018 14:24
HEXAVALENT CHROMIUM BY SW7196A		**Method:SW7196**				Prep:SW7196		Analyst: JHD
Chromium, Hexavalent	0.0100	U	0.00600	0.0100	0.0100	mg/L	1	25-May-2018 12:20
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	31-May-2018 16:53

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: Trip Blank
Collection Date: 24-May-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18051257
Lab ID:HS18051257-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 12:37
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	07-Jun-2018 12:37
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	07-Jun-2018 12:37
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 12:37
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	07-Jun-2018 12:37
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	07-Jun-2018 12:37
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	07-Jun-2018 12:37
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: Trip Blank
Collection Date: 24-May-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18051257
Lab ID:HS18051257-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	07-Jun-2018 12:37
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	07-Jun-2018 12:37
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 12:37
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 12:37
Surr: 1,2-Dichloroethane-d4	*103*			**0**	*81-118*	*%REC*	*1*	*07-Jun-2018 12:37*
Surr: 4-Bromofluorobenzene	*101*			**0**	*85-114*	*%REC*	*1*	*07-Jun-2018 12:37*
Surr: Dibromofluoromethane	*102*			**0**	*80-119*	*%REC*	*1*	*07-Jun-2018 12:37*
Surr: Toluene-d8	*96.6*			**0**	*89-112*	*%REC*	*1*	*07-Jun-2018 12:37*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

WEIGHT LOG

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

Batch ID: 128877 **Method:** SEMIVOLATILES SIM **Prep:** 3510_B_SIM

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18051257-01	1	990	1 (mL)	0.00101

Batch ID: 128909 **Method:** ICP-MS METALS BY SW6020A **Prep:** 3010A

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18051257-01	1	10	10 (mL)	1

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 128877	**Test Name :** SEMIVOLATILES SIM			**Matrix:** Water		
HS18051257-01	LH18/24-SP650_052418	24 May 2018 14:00		29 May 2018 14:44	31 May 2018 12:59	100
Batch ID 128909	**Test Name :** ICP-MS METALS BY SW6020A			**Matrix:** Water		
HS18051257-01	LH18/24-SP650_052418	24 May 2018 14:00		30 May 2018 09:33	05 Jun 2018 14:24	1
Batch ID R317167	**Test Name :** HEXAVALENT CHROMIUM BY SW7196A			**Matrix:** Water		
HS18051257-01	LH18/24-SP650_052418	24 May 2018 14:00			25 May 2018 12:20	1
Batch ID R317193	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18051257-01	LH18/24-SP650_052418	24 May 2018 14:00			31 May 2018 16:53	1
Batch ID R317575	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18051257-01	LH18/24-SP650_052418	24 May 2018 14:00			07 Jun 2018 14:15	5
HS18051257-02	Trip Blank	24 May 2018 00:00			07 Jun 2018 12:37	1

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: 128909 **Instrument: ICPMS05** **Method: SW6020**

MBLK Sample ID: **MBLK-128909** Units: **mg/L** Analysis Date: **05-Jun-2018 14:10**
Client ID: Run ID: **ICPMS05_317395** SeqNo: **4587771** PrepDate: **30-May-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.00250	0.00400								U
Lead	0.00100	0.00200								U
Selenium	0.00200	0.00200								U
Silver	0.00100	0.00200								U

LCS Sample ID: **LCS-128909** Units: **mg/L** Analysis Date: **05-Jun-2018 14:12**
Client ID: Run ID: **ICPMS05_317395** SeqNo: **4587772** PrepDate: **30-May-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.04455	0.00400	0.05	0	89.1	80 - 120				
Lead	0.05011	0.00200	0.05	0	100	80 - 120				
Selenium	0.049	0.00200	0.05	0	98.0	80 - 120				
Silver	0.04897	0.00200	0.05	0	97.9	80 - 120				

MS Sample ID: **HS18051255-01MS** Units: **mg/L** Analysis Date: **05-Jun-2018 14:18**
Client ID: Run ID: **ICPMS05_317395** SeqNo: **4587775** PrepDate: **30-May-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.4688	0.00400	0.05	0.4238	90.1	80 - 120				O
Lead	0.04672	0.00200	0.05	0.000339	92.8	80 - 120				
Selenium	0.04847	0.00200	0.05	0.00078	95.4	80 - 120				
Silver	0.04637	0.00200	0.05	0.000054	92.6	80 - 120				

MSD Sample ID: **HS18051255-01MSD** Units: **mg/L** Analysis Date: **05-Jun-2018 14:20**
Client ID: Run ID: **ICPMS05_317395** SeqNo: **4587776** PrepDate: **30-May-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.4596	0.00400	0.05	0.4238	71.7	80 - 120	0.4688	1.98	20	SO
Lead	0.04653	0.00200	0.05	0.000339	92.4	80 - 120	0.04672	0.405	20	
Selenium	0.04812	0.00200	0.05	0.00078	94.7	80 - 120	0.04847	0.712	20	
Silver	0.04685	0.00200	0.05	0.000054	93.6	80 - 120	0.04637	1.03	20	

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: 128909 **Instrument: ICPMS05** **Method: SW6020**

PDS Sample ID: **HS18051255-01PDS** Units: **mg/L** Analysis Date: **05-Jun-2018 14:22**
Client ID: Run ID: **ICPMS05_317395** SeqNo: **4587777** PrepDate: **30-May-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Barium	0.5372	0.00400	0.1	0.4238	113	75 - 125				O
Lead	0.102	0.00200	0.1	0.000339	102	75 - 125				
Selenium	0.1075	0.00200	0.1	0.00078	107	75 - 125				
Silver	0.104	0.00200	0.1	0.000054	104	75 - 125				

SD Sample ID: **HS18051255-01SD** Units: **mg/L** Analysis Date: **05-Jun-2018 14:16**
Client ID: Run ID: **ICPMS05_317395** SeqNo: **4587774** PrepDate: **30-May-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Barium	0.4214	0.0200					0.4238	0.567	10	
Lead	0.00500	0.0100					0.000339	0	10	U
Selenium	0.0100	0.0100					0.00078	0	10	U
Silver	0.00500	0.0100					0.000054	0	10	U

The following samples were analyzed in this batch: HS18051257-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: 128877 **Instrument: SV-5** **Method: SW8270SIM**

MBLK Sample ID: **MBLK-128877** Units: **ug/L** Analysis Date: **31-May-2018 11:23**
Client ID: Run ID: **SV-5_317152** SeqNo: **4581728** PrepDate: **29-May-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.010	0.010								U
Surr: 2-Fluorobiphenyl	*0.07104*	*0*	*0.08*	*0*	*88.8*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.0614*	*0*	*0.08*	*0*	*76.7*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.07655*	*0*	*0.08*	*0*	*95.7*	*40 - 140*				

LCS Sample ID: **LCS-128877** Units: **ug/L** Analysis Date: **31-May-2018 11:43**
Client ID: Run ID: **SV-5_317152** SeqNo: **4581729** PrepDate: **29-May-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.07903	0.010	0.08	0	98.8	40 - 140				
Surr: 2-Fluorobiphenyl	*0.07838*	*0*	*0.08*	*0*	*98.0*	*40 - 140*				
Surr: 4-Terphenyl-d14	*0.0694*	*0*	*0.08*	*0*	*86.8*	*40 - 140*				
Surr: Nitrobenzene-d5	*0.08177*	*0*	*0.08*	*0*	*102*	*40 - 140*				

LCSD Sample ID: **LCSD-128877** Units: **ug/L** Analysis Date: **31-May-2018 12:04**
Client ID: Run ID: **SV-5_317152** SeqNo: **4581730** PrepDate: **29-May-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,4-Dioxane	0.07393	0.010	0.08	0	92.4	40 - 140	0.07903	6.66	20	
Surr: 2-Fluorobiphenyl	*0.07041*	*0*	*0.08*	*0*	*88.0*	*40 - 140*	*0.07838*	*10.7*	*20*	
Surr: 4-Terphenyl-d14	*0.06543*	*0*	*0.08*	*0*	*81.8*	*40 - 140*	*0.0694*	*5.9*	*20*	
Surr: Nitrobenzene-d5	*0.08913*	*0*	*0.08*	*0*	*111*	*40 - 140*	*0.08177*	*8.61*	*20*	

The following samples were analyzed in this batch: HS18051257-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **VBLKW-180607** Units: **ug/L** Analysis Date: **07-Jun-2018 12:13**
Client ID: Run ID: **VOA6_317575** SeqNo: **4591238** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **VBLKW-180607** Units: **ug/L** Analysis Date: **07-Jun-2018 12:13**
Client ID: Run ID: **VOA6_317575** SeqNo: **4591238** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*51.76*	*1.0*	*50*	*0*	*104*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.14*	*1.0*	*50*	*0*	*102*	*85 - 114*				
Surr: Dibromofluoromethane	*51.32*	*1.0*	*50*	*0*	*103*	*80 - 119*				
Surr: Toluene-d8	*48.27*	*1.0*	*50*	*0*	*96.5*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-180607** Units: **ug/L** Analysis Date: **07-Jun-2018 10:58**
Client ID: Run ID: **VOA6_317575** SeqNo: **4591237** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	44.85	1.0	50	0	89.7	78 - 124				
1,1,1-Trichloroethane	50.23	1.0	50	0	100	74 - 131				
1,1,2,2-Tetrachloroethane	53.45	1.0	50	0	107	71 - 121				
1,1,2-Trichloroethane	47.57	1.0	50	0	95.1	80 - 119				
1,1-Dichloroethane	53.49	1.0	50	0	107	77 - 125				
1,1-Dichloroethene	48.1	1.0	50	0	96.2	71 - 131				
1,1-Dichloropropene	45.9	1.0	50	0	91.8	78 - 125				
1,2,3-Trichlorobenzene	49.7	1.0	50	0	99.4	69 - 129				
1,2,3-Trichloropropane	51.48	1.0	50	0	103	73 - 122				
1,2,4-Trichlorobenzene	47.95	1.0	50	0	95.9	69 - 130				
1,2,4-Trimethylbenzene	44.6	1.0	50	0	89.2	76 - 124				
1,2-Dibromo-3-chloropropane	56.9	1.0	50	0	114	62 - 128				
1,2-Dibromoethane	47.86	1.0	50	0	95.7	77 - 121				
1,2-Dichlorobenzene	47.74	1.0	50	0	95.5	80 - 119				
1,2-Dichloroethane	50.58	1.0	50	0	101	73 - 128				
1,2-Dichloropropane	50.02	1.0	50	0	100	78 - 122				
1,3,5-Trimethylbenzene	43.86	1.0	50	0	87.7	75 - 124				
1,3-Dichlorobenzene	45.8	1.0	50	0	91.6	80 - 119				
1,3-Dichloropropane	51.76	1.0	50	0	104	80 - 119				
1,4-Dichlorobenzene	46.42	1.0	50	0	92.8	79 - 118				
2,2-Dichloropropane	55.17	1.0	50	0	110	60 - 139				
2-Butanone	122.8	2.0	100	0	123	56 - 143				
2-Chlorotoluene	45.1	1.0	50	0	90.2	79 - 122				
2-Hexanone	108.3	2.0	100	0	108	57 - 139				
4-Chlorotoluene	46.19	1.0	50	0	92.4	78 - 122				
4-Isopropyltoluene	40.66	1.0	50	0	81.3	77 - 127				
4-Methyl-2-pentanone	104.2	2.0	100	0	104	67 - 130				
Acetone	120.5	2.0	100	0	121	39 - 160				
Benzene	47.43	1.0	50	0	94.9	79 - 120				
Bromobenzene	47.97	1.0	50	0	95.9	80 - 120				
Bromochloromethane	50.81	1.0	50	0	102	78 - 123				
Bromodichloromethane	49.19	1.0	50	0	98.4	79 - 125				
Bromoform	51.92	1.0	50	0	104	66 - 130				
Bromomethane	53.82	1.0	50	0	108	53 - 141				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-180607** Units: **ug/L** Analysis Date: **07-Jun-2018 10:58**
Client ID: Run ID: **VOA6_317575** SeqNo: **4591237** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	95.32	2.0	100	0	95.3	64 - 133				
Carbon tetrachloride	43.91	1.0	50	0	87.8	72 - 136				
Chlorobenzene	45.02	1.0	50	0	90.0	82 - 118				
Chloroethane	57.77	1.0	50	0	116	60 - 138				
Chloroform	49.91	1.0	50	0	99.8	79 - 124				
Chloromethane	57.22	1.0	50	0	114	50 - 139				
cis-1,2-Dichloroethene	50.32	1.0	50	0	101	78 - 123				
cis-1,3-Dichloropropene	50.31	1.0	50	0	101	75 - 124				
Dibromochloromethane	50.5	1.0	50	0	101	74 - 126				
Dibromomethane	54.16	1.0	50	0	108	79 - 123				
Dichlorodifluoromethane	44.7	1.0	50	0	89.4	32 - 152				
Ethylbenzene	43.11	1.0	50	0	86.2	79 - 121				
Hexachlorobutadiene	53.02	1.0	50	0	106	66 - 134				
Isopropylbenzene	40.5	1.0	50	0	81.0	72 - 131				
m,p-Xylene	84.99	2.0	100	0	85.0	80 - 121				
Methylene chloride	54.44	2.0	50	0	109	74 - 124				
Naphthalene	57.71	1.0	50	0	115	61 - 128				
n-Butylbenzene	45.55	1.0	50	0	91.1	75 - 128				
n-Propylbenzene	39.86	1.0	50	0	79.7	76 - 126				
o-Xylene	43.58	1.0	50	0	87.2	78 - 122				
sec-Butylbenzene	43.1	1.0	50	0	86.2	77 - 126				
Styrene	45.31	1.0	50	0	90.6	78 - 123				
tert-Butylbenzene	42.73	1.0	50	0	85.5	78 - 124				
Tetrachloroethene	40.68	1.0	50	0	81.4	74 - 129				
Toluene	44.32	1.0	50	0	88.6	80 - 121				
trans-1,2-Dichloroethene	49.5	1.0	50	0	99.0	75 - 124				
trans-1,3-Dichloropropene	52.82	1.0	50	0	106	73 - 127				
Trichloroethene	46.79	1.0	50	0	93.6	79 - 123				
Trichlorofluoromethane	48.68	1.0	50	0	97.4	65 - 141				
Vinyl chloride	51.14	1.0	50	0	102	58 - 137				
Surr: 1,2-Dichloroethane-d4	*50.8*	*1.0*	*50*	*0*	*102*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.45*	*1.0*	*50*	*0*	*98.9*	*85 - 114*				
Surr: Dibromofluoromethane	*51.6*	*1.0*	*50*	*0*	*103*	*80 - 119*				
Surr: Toluene-d8	*48.29*	*1.0*	*50*	*0*	*96.6*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS18051491-01MS** Units: **ug/L** Analysis Date: **07-Jun-2018 15:29**
Client ID: Run ID: **VOA6_317575** SeqNo: **4592155** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.73	1.0	50	0	87.5	78 - 124				
1,1,1-Trichloroethane	47.34	1.0	50	0	94.7	74 - 131				
1,1,2,2-Tetrachloroethane	54.04	1.0	50	0	108	71 - 121				
1,1,2-Trichloroethane	47.32	1.0	50	0	94.6	80 - 119				
1,1-Dichloroethane	52.03	1.0	50	0	104	77 - 125				
1,1-Dichloroethene	43.18	1.0	50	0	86.4	71 - 131				
1,1-Dichloropropene	41.84	1.0	50	0	83.7	78 - 125				
1,2,3-Trichlorobenzene	40.32	1.0	50	0	80.6	69 - 129				
1,2,3-Trichloropropane	52.15	1.0	50	0	104	73 - 122				
1,2,4-Trichlorobenzene	39.98	1.0	50	0	80.0	69 - 130				
1,2,4-Trimethylbenzene	42.6	1.0	50	0	85.2	76 - 124				
1,2-Dibromo-3-chloropropane	55.19	1.0	50	0	110	62 - 128				
1,2-Dibromoethane	48.26	1.0	50	0	96.5	77 - 121				
1,2-Dichlorobenzene	45.39	1.0	50	0	90.8	80 - 119				
1,2-Dichloroethane	49.65	1.0	50	0	99.3	73 - 128				
1,2-Dichloropropane	47.67	1.0	50	0	95.3	78 - 122				
1,3,5-Trimethylbenzene	41.42	1.0	50	0	82.8	75 - 124				
1,3-Dichlorobenzene	44.37	1.0	50	0	88.7	80 - 119				
1,3-Dichloropropane	50.98	1.0	50	0	102	80 - 119				
1,4-Dichlorobenzene	44.51	1.0	50	0	89.0	79 - 118				
2,2-Dichloropropane	49.28	1.0	50	0	98.6	60 - 139				
2-Butanone	126	2.0	100	0	126	56 - 143				
2-Chlorotoluene	43.27	1.0	50	0	86.5	79 - 122				
2-Hexanone	114.8	2.0	100	0	115	57 - 139				
4-Chlorotoluene	44.26	1.0	50	0	88.5	78 - 122				
4-Isopropyltoluene	36.15	1.0	50	0	72.3	77 - 127				S
4-Methyl-2-pentanone	109.3	2.0	100	0	109	67 - 130				
Acetone	120.3	2.0	100	0	120	39 - 160				
Benzene	44.6	1.0	50	0	89.2	79 - 120				
Bromobenzene	46.75	1.0	50	0	93.5	80 - 120				
Bromochloromethane	46.69	1.0	50	0	93.4	78 - 123				
Bromodichloromethane	47.15	1.0	50	0	94.3	79 - 125				
Bromoform	51.88	1.0	50	0	104	66 - 130				
Bromomethane	21.14	1.0	50	0	42.3	53 - 141				S

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS18051491-01MS** Units: **ug/L** Analysis Date: **07-Jun-2018 15:29**
Client ID: Run ID: **VOA6_317575** SeqNo: **4592155** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	82.13	2.0	100	0	82.1	64 - 133				
Carbon tetrachloride	41.81	1.0	50	0	83.6	72 - 136				
Chlorobenzene	43.45	1.0	50	0	86.9	82 - 118				
Chloroethane	57.3	1.0	50	0	115	60 - 138				
Chloroform	48.5	1.0	50	0	97.0	79 - 124				
Chloromethane	38.29	1.0	50	0	76.6	50 - 139				
cis-1,2-Dichloroethene	48.56	1.0	50	0	97.1	78 - 123				
cis-1,3-Dichloropropene	47.93	1.0	50	0	95.9	75 - 124				
Dibromochloromethane	49.85	1.0	50	0	99.7	74 - 126				
Dibromomethane	53.05	1.0	50	0	106	79 - 123				
Dichlorodifluoromethane	29.15	1.0	50	0	58.3	32 - 152				
Ethylbenzene	42.3	1.0	50	0	84.6	79 - 121				
Hexachlorobutadiene	32.27	1.0	50	0	64.5	66 - 134				S
Isopropylbenzene	38.3	1.0	50	0	76.6	72 - 131				
m,p-Xylene	81.78	2.0	100	0	81.8	80 - 121				
Methylene chloride	52.94	2.0	50	0	106	74 - 124				
Naphthalene	49.37	1.0	50	0	98.7	61 - 128				
n-Butylbenzene	37.74	1.0	50	0	75.5	75 - 128				
n-Propylbenzene	37.6	1.0	50	0	75.2	76 - 126				S
o-Xylene	42.11	1.0	50	0	84.2	78 - 122				
sec-Butylbenzene	37.99	1.0	50	0	76.0	77 - 126				S
Styrene	43.9	1.0	50	0	87.8	78 - 123				
tert-Butylbenzene	39.62	1.0	50	0	79.2	78 - 124				
Tetrachloroethene	38.68	1.0	50	0	77.4	74 - 129				
Toluene	42.48	1.0	50	0	85.0	80 - 121				
trans-1,2-Dichloroethene	46.27	1.0	50	0	92.5	75 - 124				
trans-1,3-Dichloropropene	51.12	1.0	50	0	102	73 - 127				
Trichloroethene	43.57	1.0	50	0	87.1	79 - 123				
Trichlorofluoromethane	37.73	1.0	50	0	75.5	65 - 141				
Vinyl chloride	41.82	1.0	50	0	83.6	58 - 137				
Surr: 1,2-Dichloroethane-d4	*50.06*	*1.0*	*50*	*0*	*100*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.65*	*1.0*	*50*	*0*	*99.3*	*85 - 114*				
Surr: Dibromofluoromethane	*50.77*	*1.0*	*50*	*0*	*102*	*80 - 119*				
Surr: Toluene-d8	*47.94*	*1.0*	*50*	*0*	*95.9*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS18051491-01MSD** Units: **ug/L** Analysis Date: **07-Jun-2018 15:54**
Client ID: Run ID: **VOA6_317575** SeqNo: **4592156** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.48	1.0	50	0	87.0	78 - 124	43.73	0.567	20	
1,1,1-Trichloroethane	48.73	1.0	50	0	97.5	74 - 131	47.34	2.9	20	
1,1,2,2-Tetrachloroethane	52.95	1.0	50	0	106	71 - 121	54.04	2.04	20	
1,1,2-Trichloroethane	46.92	1.0	50	0	93.8	80 - 119	47.32	0.842	20	
1,1-Dichloroethane	51.59	1.0	50	0	103	77 - 125	52.03	0.849	20	
1,1-Dichloroethene	44.95	1.0	50	0	89.9	71 - 131	43.18	4.03	20	
1,1-Dichloropropene	43.19	1.0	50	0	86.4	78 - 125	41.84	3.18	20	
1,2,3-Trichlorobenzene	45.93	1.0	50	0	91.9	69 - 129	40.32	13	20	
1,2,3-Trichloropropane	51.26	1.0	50	0	103	73 - 122	52.15	1.72	20	
1,2,4-Trichlorobenzene	44.69	1.0	50	0	89.4	69 - 130	39.98	11.1	20	
1,2,4-Trimethylbenzene	43.26	1.0	50	0	86.5	76 - 124	42.6	1.53	20	
1,2-Dibromo-3-chloropropane	56.89	1.0	50	0	114	62 - 128	55.19	3.03	20	
1,2-Dibromoethane	48.11	1.0	50	0	96.2	77 - 121	48.26	0.308	20	
1,2-Dichlorobenzene	45.53	1.0	50	0	91.1	80 - 119	45.39	0.311	20	
1,2-Dichloroethane	47.98	1.0	50	0	96.0	73 - 128	49.65	3.41	20	
1,2-Dichloropropane	47.17	1.0	50	0	94.3	78 - 122	47.67	1.05	20	
1,3,5-Trimethylbenzene	42.21	1.0	50	0	84.4	75 - 124	41.42	1.9	20	
1,3-Dichlorobenzene	43.97	1.0	50	0	87.9	80 - 119	44.37	0.907	20	
1,3-Dichloropropane	50.66	1.0	50	0	101	80 - 119	50.98	0.63	20	
1,4-Dichlorobenzene	44.23	1.0	50	0	88.5	79 - 118	44.51	0.632	20	
2,2-Dichloropropane	50.08	1.0	50	0	100	60 - 139	49.28	1.61	20	
2-Butanone	127.8	2.0	100	0	128	56 - 143	126	1.43	20	
2-Chlorotoluene	42.97	1.0	50	0	85.9	79 - 122	43.27	0.678	20	
2-Hexanone	117.4	2.0	100	0	117	57 - 139	114.8	2.29	20	
4-Chlorotoluene	44.2	1.0	50	0	88.4	78 - 122	44.26	0.149	20	
4-Isopropyltoluene	38.09	1.0	50	0	76.2	77 - 127	36.15	5.24	20	S
4-Methyl-2-pentanone	110.1	2.0	100	0	110	67 - 130	109.3	0.737	20	
Acetone	119	2.0	100	0	119	39 - 160	120.3	1.06	20	
Benzene	44.43	1.0	50	0	88.9	79 - 120	44.6	0.385	20	
Bromobenzene	45.27	1.0	50	0	90.5	80 - 120	46.75	3.23	20	
Bromochloromethane	45.35	1.0	50	0	90.7	78 - 123	46.69	2.92	20	
Bromodichloromethane	47.22	1.0	50	0	94.4	79 - 125	47.15	0.143	20	
Bromoform	52.35	1.0	50	0	105	66 - 130	51.88	0.913	20	
Bromomethane	31.9	1.0	50	0	63.8	53 - 141	21.14	40.6	20	R

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS18051491-01MSD** Units: **ug/L** Analysis Date: **07-Jun-2018 15:54**
Client ID: Run ID: **VOA6_317575** SeqNo: **4592156** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	83.9	2.0	100	0	83.9	64 - 133	82.13	2.13	20	
Carbon tetrachloride	41.98	1.0	50	0	84.0	72 - 136	41.81	0.399	20	
Chlorobenzene	43.16	1.0	50	0	86.3	82 - 118	43.45	0.661	20	
Chloroethane	51.2	1.0	50	0	102	60 - 138	57.3	11.2	20	
Chloroform	47.83	1.0	50	0	95.7	79 - 124	48.5	1.39	20	
Chloromethane	37.81	1.0	50	0	75.6	50 - 139	38.29	1.25	20	
cis-1,2-Dichloroethene	48.4	1.0	50	0	96.8	78 - 123	48.56	0.32	20	
cis-1,3-Dichloropropene	47.65	1.0	50	0	95.3	75 - 124	47.93	0.582	20	
Dibromochloromethane	49.58	1.0	50	0	99.2	74 - 126	49.85	0.551	20	
Dibromomethane	52.96	1.0	50	0	106	79 - 123	53.05	0.177	20	
Dichlorodifluoromethane	30.01	1.0	50	0	60.0	32 - 152	29.15	2.92	20	
Ethylbenzene	42.83	1.0	50	0	85.7	79 - 121	42.3	1.25	20	
Hexachlorobutadiene	35.31	1.0	50	0	70.6	66 - 134	32.27	9.01	20	
Isopropylbenzene	40.55	1.0	50	0	81.1	72 - 131	38.3	5.7	20	
m,p-Xylene	84.03	2.0	100	0	84.0	80 - 121	81.78	2.71	20	
Methylene chloride	52	2.0	50	0	104	74 - 124	52.94	1.78	20	
Naphthalene	56.53	1.0	50	0	113	61 - 128	49.37	13.5	20	
n-Butylbenzene	40.09	1.0	50	0	80.2	75 - 128	37.74	6.04	20	
n-Propylbenzene	38.57	1.0	50	0	77.1	76 - 126	37.6	2.56	20	
o-Xylene	43.24	1.0	50	0	86.5	78 - 122	42.11	2.66	20	
sec-Butylbenzene	39.99	1.0	50	0	80.0	77 - 126	37.99	5.13	20	
Styrene	44.46	1.0	50	0	88.9	78 - 123	43.9	1.28	20	
tert-Butylbenzene	41.74	1.0	50	0	83.5	78 - 124	39.62	5.21	20	
Tetrachloroethene	39.87	1.0	50	0	79.7	74 - 129	38.68	3.04	20	
Toluene	42.86	1.0	50	0	85.7	80 - 121	42.48	0.892	20	
trans-1,2-Dichloroethene	46.86	1.0	50	0	93.7	75 - 124	46.27	1.27	20	
trans-1,3-Dichloropropene	50.01	1.0	50	0	100	73 - 127	51.12	2.2	20	
Trichloroethene	44.34	1.0	50	0	88.7	79 - 123	43.57	1.74	20	
Trichlorofluoromethane	39.56	1.0	50	0	79.1	65 - 141	37.73	4.72	20	
Vinyl chloride	42.55	1.0	50	0	85.1	58 - 137	41.82	1.73	20	
Surr: 1,2-Dichloroethane-d4	*50.78*	*1.0*	*50*	*0*	*102*	*81 - 118*	*50.06*	*1.43*	*20*	
Surr: 4-Bromofluorobenzene	*50.57*	*1.0*	*50*	*0*	*101*	*85 - 114*	*49.65*	*1.84*	*20*	
Surr: Dibromofluoromethane	*51.5*	*1.0*	*50*	*0*	*103*	*80 - 119*	*50.77*	*1.43*	*20*	
Surr: Toluene-d8	*47.95*	*1.0*	*50*	*0*	*95.9*	*89 - 112*	*47.94*	*0.0161*	*20*	

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client:	Bhate Environmental Associates, Inc.
Project:	Longhorn GW Treatment Plant
WorkOrder:	HS18051257

QC BATCH REPORT

Batch ID: R317575	**Instrument:** VOA6	**Method:** SW8260

The following samples were analyzed in this batch: HS18051257-01 HS18051257-02

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051257

QC BATCH REPORT

Batch ID: R317167 **Instrument: UV-2450** **Method: SW7196**

MBLK Sample ID: **MBLK-317167** Units: **mg/L** Analysis Date: **25-May-2018 12:20**
Client ID: Run ID: **UV-2450_317167** SeqNo: **4582038** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.0100	0.0100								U

LCS Sample ID: **LCS-317167** Units: **mg/L** Analysis Date: **25-May-2018 12:20**
Client ID: Run ID: **UV-2450_317167** SeqNo: **4582039** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.233	0.0100	0.25	0	93.2	80 - 120				

LCSD Sample ID: **LCSD-317167** Units: **mg/L** Analysis Date: **25-May-2018 12:20**
Client ID: Run ID: **UV-2450_317167** SeqNo: **4582040** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.231	0.0100	0.25	0	92.4	80 - 120	0.233	0.862	20	

MS Sample ID: **HS18051255-01MS** Units: **mg/L** Analysis Date: **25-May-2018 12:20**
Client ID: Run ID: **UV-2450_317167** SeqNo: **4582042** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.205	0.0100	0.25	-0.003	83.2	75 - 125				

MSD Sample ID: **HS18051255-01MSD** Units: **mg/L** Analysis Date: **25-May-2018 12:20**
Client ID: Run ID: **UV-2450_317167** SeqNo: **4582043** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chromium, Hexavalent	0.204	0.0100	0.25	-0.003	82.8	75 - 125	0.205	0.489	20	

The following samples were analyzed in this batch: HS18051257-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: **HS18051257**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

ALS Group Houston, Corp Date: 08-Jun-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Oklahoma	2017-088	31-Aug-2018
North Carolina	624-2018	31-Dec-2018
Louisiana	03087 2017-2018	30-Jun-2018
Arkansas	88-0356	27-Mar-2019
Kansas	E-10352 2017-218	31-Jul-2018
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193	30-Apr-2019

Date: 08-Jun-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18051257
Date/Time Received: **25-May-2018 08:45**
Received by: **RPG**

Checklist completed by: *Paresh M. Giga* eSignature — 25-May-2018 Date
Reviewed by: *RJ Modashia* eSignature — 25-May-2018 Date

Matrices: **Water**
Carrier name: **FedEx**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.5c/3.0c U/c	IR11	
Cooler(s)/Kit(s):	3847		
Date/Time sample(s) sent to storage:	5/25/18 10:45		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd., Suite 210 Houston, TX 77099 (281) 530 – 5656 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No.
NWO1312.0150.0
16.0001

Job:
GROUNDWATER TREATMENT PLANT MONTHLY EFFLUENT SAMPLES

Prepared By:
Scott Beesinger

P.O. Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: VOLATILES	SILVER, SELENIUM, LEAD, BARIUM	HEXAVALENT CHROMIUM	1, 4 - DIOXANE	PERCHLORATE					Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_052418	Water	05/24/18 / 14:00		3	X									HCL	
LH18/24-SP650_052418	Water	05/24/18 / 14:00		3			X	X	X					NONE	
LH18/24-SP650_052418	Water	05/24/18 / 14:00		1		X								HNO3	
Trip Blank	Water	05/24/18		2	X									HCL	

HS18051257
Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant

Additional Remarks: **STANDARD TURN AROUND TIME**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	05/24/18	14:30	KG	5/25/18	08:45						

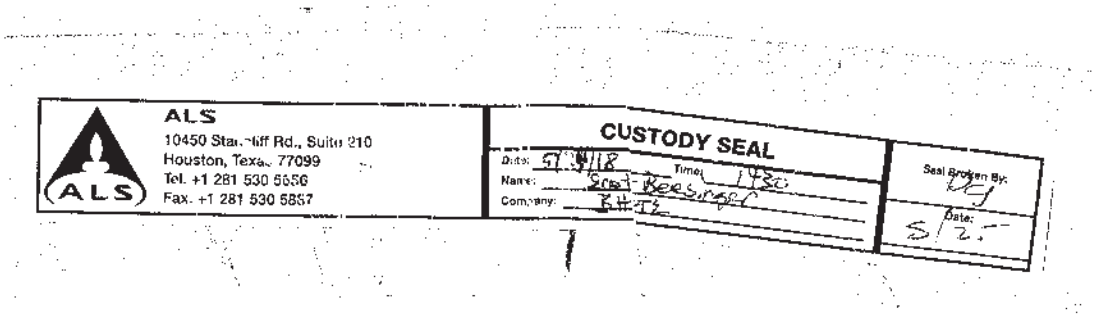
For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition

Remarks:

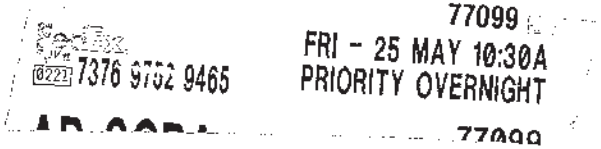
3847 UIC. 3.50 #11 CIF - 0.50

(Word) S:\I-ces\Forms\Chain of Custody - BiWeekly



ALS
10450 Stanniff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5857

CUSTODY SEAL
Date: 5/24/18 Time: 1430
Name: [illegible] Beesinger
Company: RHT
Seal Broken By: DJ
Date: 5/25/18



0222 7376 9752 9465

77099
FRI - 25 MAY 10:30A
PRIORITY OVERNIGHT

77099

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1813746; 1814144; 1814932; 1814934; 1814935

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2095 (215757)

General Set Information: There were ten field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Sample 1814932001 was analyzed and reported at a 1:1,000 dilution. The reporting limit has been adjusted accordingly.

Method QC data: The method blank (LMB 603140) was less than 1/2 the CRDL. The recovery for the LCS (603141) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1813746001 (Client ID: HS18050824-01 50WW10-180515. The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. The initial analysis of field sample 1813746005 failed the Internal Standard recovery of 50 – 150% method requirement, possibly due to a spiking error. The sample was re-prepped, re-analyzed and reported. Manual Integrations was performed for datafile 02APRD01/02 along with datafiles 30MAYD06/07/21/22.

Thomas Bosch May 31, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: May 31, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1814934**
Project ID: HS18051257 052418
Purchase Order: HS18051257
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_052418	1814934001	05/24/18	05/26/18	

ANALYTICAL REPORT

Workorder: 34-1814934
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_052418**	Sampling Site: NA	Collected: 05/24/2018
Lab ID: 1814934001	Media: 125 mL Nalgene	Received: 05/26/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2095 (HBN: 215757)	**Percent Solid:** NA
	Analyzed: 05/30/2018 12:36	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**34**	1.0	2.0	4.0	1	

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 05/31/2018 10:04	/S/ Stephen Brose 05/31/2018 14:00

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1814934
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1814934

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2095 (HBN: 215757)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 603140
Analyzed: 05/30/2018 09:17
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 603141
Analyzed: 05/30/2018 09:31
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.30	5.00	106	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1813746001	**MS:** 603142	**MSD:** 603143
Analyzed: 05/30/2018 09:46	**Analyzed:** 05/30/2018 10:00	**Analyzed:** 05/30/2018 10:15
Dilution: 1	**Dilution:** 1	**Dilution:** 1
Units: ug/L	**Units:** ug/L	**Units:** ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	5.39	5	108	78.8	123.8	5.58	112	3.48	0.0	20.0

Continuing Calibration Verification

CCV: 603137	**CCV:** 603144	**CCV:** 603231
Analyzed: 05/30/2018 08:32	**Analyzed:** 05/30/2018 12:08	**Analyzed:** 05/30/2018 13:18
Units: ug/L	**Units:** ug/L	**Units:** ug/L
Criteria: ± 15%	**Criteria:** ± 15%	**Criteria:** ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	27.1	25.0	109	26.9	25.0	108	27.4	25.0	110

Interference Check Sample

ICSA: 603139
Analyzed: 05/30/2018 09:02
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	1.24	1.00	124

Limit of Detection Verification

LODV: 603138	**LODV:** 603145	**LODV:** 603232
Analyzed: 05/30/2018 08:48	**Analyzed:** 05/30/2018 12:22	**Analyzed:** 05/30/2018 13:33
Units: ug/L	**Units:** ug/L	**Units:** ug/L
Criteria: ± 50%	**Criteria:** ± 50%	**Criteria:** ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.01	1.00	101	1.01	1.00	101	0.948	1.00	94.8

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1814934

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2095 (HBN: 215757)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
05/31/2018 10:04	05/31/2018 14:00

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

18698/#2



10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

COC ID: 9168

1814934

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	
Email:	

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18051257
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18051257-01**	**LH18/24-SP650_052418**	**Water**	**24 May 2018 14:00**
	SUB_Perch-6850			05 Jun 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 5/25/18 1800

Received By: _____ Date/Time: 5/26/18 910

Cooler ID(s): _____ Temperature(s): 2°

00905336

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18051257	***Split:***	**Workorder ID:** 1814934	**Level:** ENV_LVL4
Client: ALS Environmental (Houston)		**Account:** 8101	**Type:** 125Poly
Comments:			**Preservatives**

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 6850, DoD QSM
1	05/24/2018 14:00	LH18/24-SP650_052418	1814934001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

COOL

37 of 56

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	05/26/2018 09:10	ALS Sample Receiving	Sample Login
Julie Warath	5/29/18 1315	OB	Storage
T. Burch	5.30.18/07:45	T. Burch	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Hanson — Project/Task/Site: 1814934

Date/Time of Receipt: 9/21/18 9:15 — Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8560	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Meredith Lewis (Signature) — Meredith Lewis (Printed Name) — 9/21/18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____


Must Deliver Next Business Day
Time and Tempature Sensitive!
ALS
ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US
SHIP DATE: 25MAY18
ACTWGT: 22.25 LB
CAD: 300130/CAFE3111
DIMS: 19x16x13 IN
BILL SENDER
TO SAMPLE RECEIVING
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE
SALT LAKE CITY UT 84123
(801) 268-7700
REF: HS18051257/1260/1255 - RJ
FedEx
Express
SATURDAY 12:00P
PRIORITY OVERNIGHT
TRK# 0201 4380 9529 4519
84123
UT - US SLC
XO BTFA
1
12:00 A
4519
05.26

Batch Worklist

Batch: ELMS/ 2095 **Created:** 5/30/2018 08:11 **Instrument:** **HBN:** 215757

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1813746 [ENV_LVL4]
Workorder: 1814144 [ENV_LVL4]
Workorder: 1814932 [ENV_LVL4]
Workorder: 1814934 [ENV_LVL4]
Workorder: 1814935 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	603137	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
2	603138	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	
3	603139	ICS for HBN 215757 [ELMS/2095]				ICS	3		E6850..D3Q	5311		5/31/2018	
4	603140	LMB for HBN 215757 [ELMS/2095]				LMB	3		E6850Q413Q	5311		5/31/2018	
5	603141	LCS for HBN 215757 [ELMS/2095]				LCS	3		E6850Q413Q	5311		5/31/2018	
6	1813746001	HS18050824-01 50WW10-180515				SAMPLE	3	1813746001-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
7	603142	HS18050824-01...(1813746001MS)				MS	3		E6850Q413Q	5311		5/31/2018	
8	603143	HS18050824-0...(1813746001MSD)				MSD	3		E6850Q413Q	5311		5/31/2018	
9	1813746002	HS18050824-02 50WW09-180515				SAMPLE	3	1813746002-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
10	1813746003	HS18050824-03 50WW09-180515-FD				FLDDUP	3	1813746003-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
11	1813746004	HS18050824-04 50WW23-180515				SAMPLE	3	1813746004-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
12	1813746005	HS18050824-05 50WW05-180515				SAMPLE	3	1813746005-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
13	1813746006	HS18050824-06 50WW17-180515				SAMPLE	3	1813746006-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
14	1814144001	LH18/24-SP650_051718				SAMPLE	3	1814144001-A	E6850Q41.3	5480	6/14/2018	6/1/2018	
15	1814932001	LH18/24-SP140_052418				SAMPLE	3	1814932001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
16	1814934001	LH18/24-SP650_052418				SAMPLE	3	1814934001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
17	1814935001	LH18/24-SP650_052418				SAMPLE	3	1814935001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
18	603144	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
19	603145	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	
20	603231	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
21	603232	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1813746 (001-06); 1814144 (001); 1814932 (001); 1814934 (001); 1814935 (001) ELMS Batch/HBN ID: 2095 (215757)
Prep Date: 05/30/2018 Analysis Date: 05/30/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAY\30MAY18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:
Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 41827. Dilutions of Working Standard Solution ID 41829 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 04/02/2018, sequence 02APR18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 41830 was used for LCS 603141; Target = 5.0µg/L. ASTM type II water was used for LMB 603140.

MS/MSD: MS/MSD was performed on sample 1813746001 (Client ID: HS18050824-01 50WW10-180515). 5.0µl of Working Standard Solution Horizon ID 41828 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:
1) Results reported in µg/L. Sample 1814932001 was analyzed and reported at a 1:1,000 dilution. The reporting limit has been adjusted accordingly. The initial analysis of field sample 1813746005 failed the Internal Standard recovery of 50 – 150% method requirement, possibly due to a spiking error. The sample was re-prepped, re-analyzed and reported.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAY\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafiles 02APRD01/02 along with datafiles 30MAYD06/07/21/22.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\215757-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — **Description - 6850 WKG Std 100.ug/L**

Standard: 41829
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 WRK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41828	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	10/04/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK — **Description - 6850 Stock AccStd 1,000ug/mL**

Standard: 36733
MFG: AccuStandard
MFG Lot: 216095148
Part ID: IC-PER-10X-1

Created By: Thomas Bosch
Create Date: 05/10/2017 11:05AM

Amount: 100 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — **Description - 6850 Intermdt AccStd 10.ug/mL**

Standard: 41828
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 INT

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 41827	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 05/09/2018 10:05AM	Expires: 05/09/2019
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — **Description - 6850 QC WKG STD 100ug/L**

Standard: 41831
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC WRK 100.ug/L

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — **Description - 6850 QC Intrmdt Std-QC 10ug/mL**

Standard: 41830
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC INT 10.ug/mL

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK — **Description - 6850 QC Stock STD 1,000ug/mL**

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: Thomas Bosch
Create Date: 05/11/2017 01:05PM

Amount: 100 mL
Expires: 03/31/2020
Usable: Yes
Lab Lot: CLO4 QC STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ACCREDITATION No. 3 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ACCREDITATION No. 1 TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED TESTING LABORATORY

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes



Signal Word: Warning

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

DR-ORG/INO-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

** For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

WorkOrder: HS18051260

Longhorn GW Treatment Plant

Bhate Environmental Associates, Inc.

Marcia Olive
445 Union Blvd Ste 129
Lakewood CO 80228

12-Jun-2018

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

May 31, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18051260**

Laboratory Results for: **Longhorn GW Treatment Plant**

Dear Marcia,

ALS Environmental received 1 sample(s) on May 25, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 31-May-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS18051260

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18051260-01	LH18/24-SP650_052418	Water		24-May-2018 14:00	25-May-2018 08:45	☐

ALS Group Houston, Corp Date: 31-May-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order:

CASE NARRATIVE

Work Order Comments

- The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

WetChemistry by Method E415.1

Batch ID: R317177

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: R317097

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E350.3

Batch ID: R317085

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp Date: 31-May-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_052418
Collection Date: 24-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051260
Lab ID:HS18051260-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
AMMONIA AS N BY E350.3(ISE)		**Method:E350.3**						Analyst: MZD
Nitrogen, Ammonia (As N)	**15**		**0.20**	**0.20**	**0.20**	**mg/L**	1	30-May-2018 14:24
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**2.40**		**0.100**	**0.100**	**0.250**	**mg/L**	10	25-May-2018 16:50
TOTAL ORGANIC CARBON BY E415.1		**Method:E415.1**						Analyst: AJH
Organic Carbon, Total	**19.2**		**0.500**	**0.600**	**1.00**	**mg/L**	1	31-May-2018 14:46
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	31-May-2018 16:53

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 31-May-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051260

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R317085	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS18051260-01	LH18/24-SP650_052418	24 May 2018 14:00			30 May 2018 14:24	1
Batch ID R317097	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS18051260-01	LH18/24-SP650_052418	24 May 2018 14:00			25 May 2018 16:50	10
Batch ID R317177	**Test Name :** TOTAL ORGANIC CARBON BY E415.1			**Matrix:** Water		
HS18051260-01	LH18/24-SP650_052418	24 May 2018 14:00			31 May 2018 14:46	1
Batch ID R317193	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18051260-01	LH18/24-SP650_052418	24 May 2018 14:00			31 May 2018 16:53	1

ALS Group Houston, Corp Date: 31-May-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051260

QC BATCH REPORT

Batch ID: R317085 **Instrument: WetChem_HS** **Method: E350.3**

MBLK Sample ID: **MBLK-317085** Units: **mg/L** Analysis Date: **30-May-2018 14:24**
Client ID: Run ID: **WetChem_HS_317085** SeqNo: **4579818** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.20	0.20								U

LCS Sample ID: **LCS-317085** Units: **mg/L** Analysis Date: **30-May-2018 14:24**
Client ID: Run ID: **WetChem_HS_317085** SeqNo: **4579819** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.41	0.20	10	0	104	80 - 120				

MS Sample ID: **HS18051073-01MS** Units: **mg/L** Analysis Date: **30-May-2018 14:24**
Client ID: Run ID: **WetChem_HS_317085** SeqNo: **4579823** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	12.5	0.20	10	1.362	111	80 - 120				

MSD Sample ID: **HS18051073-01MSD** Units: **mg/L** Analysis Date: **30-May-2018 14:24**
Client ID: Run ID: **WetChem_HS_317085** SeqNo: **4579824** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	11.72	0.20	10	1.362	104	80 - 120	12.5	6.44	20	

The following samples were analyzed in this batch: HS18051260-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 31-May-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051260

QC BATCH REPORT

Batch ID: R317097 **Instrument: UV-2450** **Method: E365.3**

MBLK Sample ID: **MBLK-317097** Units: **mg/L** Analysis Date: **25-May-2018 16:50**
Client ID: Run ID: **UV-2450_317097** SeqNo: **4581137** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0100	0.0250								U

LCS Sample ID: **LCS-317097** Units: **mg/L** Analysis Date: **25-May-2018 16:50**
Client ID: Run ID: **UV-2450_317097** SeqNo: **4581138** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.269	0.0250	0.25	0	108	85 - 115				

LCSD Sample ID: **LCSD-317097** Units: **mg/L** Analysis Date: **25-May-2018 16:50**
Client ID: Run ID: **UV-2450_317097** SeqNo: **4581922** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.267	0.0250	0.25	0	107	85 - 115	0.269	0.746	20	

MS Sample ID: **HS18051265-02MS** Units: **mg/L** Analysis Date: **25-May-2018 16:50**
Client ID: Run ID: **UV-2450_317097** SeqNo: **4581141** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.236	0.0250	0.25	0.006	92.0	80 - 120				

MSD Sample ID: **HS18051265-02MSD** Units: **mg/L** Analysis Date: **25-May-2018 16:50**
Client ID: Run ID: **UV-2450_317097** SeqNo: **4581142** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.234	0.0250	0.25	0.006	91.2	80 - 120	0.236	0.851	20	

The following samples were analyzed in this batch: HS18051260-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 31-May-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051260

QC BATCH REPORT

Batch ID: R317177 **Instrument: TOC_02** **Method: E415.1**

MBLK Sample ID: **WBLKW3-180530** Units: **mg/L** Analysis Date: **31-May-2018 13:35**
Client ID: Run ID: **TOC_02_317177** SeqNo: **4582202** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	0.600	1.00								U

LCS Sample ID: **WLCSW3-180530** Units: **mg/L** Analysis Date: **31-May-2018 13:51**
Client ID: Run ID: **TOC_02_317177** SeqNo: **4582203** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	9.887	1.00	10	0	98.9	80 - 120				

LCSD Sample ID: **WLCSDW3-180530** Units: **mg/L** Analysis Date: **31-May-2018 14:04**
Client ID: Run ID: **TOC_02_317177** SeqNo: **4582204** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	9.899	1.00	10	0	99.0	80 - 120	9.887	0.121	20	

MS Sample ID: **HS18051270-01MS** Units: **mg/L** Analysis Date: **31-May-2018 15:13**
Client ID: Run ID: **TOC_02_317177** SeqNo: **4582209** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	23.99	1.00	10	13.85	101	80 - 120				

The following samples were analyzed in this batch: HS18051260-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 31-May-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: **HS18051260**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Oklahoma	2017-088	31-Aug-2018
North Carolina	624-2018	31-Dec-2018
Louisiana	03087 2017-2018	30-Jun-2018
Arkansas	88-0356	27-Mar-2019
Kansas	E-10352 2017-218	31-Jul-2018
Texas	T10470231	30-Apr-2019
North Dakota	R193	30-Apr-2019

Date: 31-May-18

Sample Receipt Checklist

Client Name:	Bhate Environmental	Date/Time Received:	**25-May-2018 08:45**
Work Order:	HS18051260	Received by:	**RPG**

Checklist completed by: *Paresh M. Giga* eSignature — 25-May-2018 Date

Reviewed by: *RJ Modashia* eSignature — 25-May-2018 Date

Matrices: **Water**

Carrier name: **FedEx**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.5c/3.0c U/C	IR11	
Cooler(s)/Kit(s):	3847		
Date/Time sample(s) sent to storage:	5/25/18 11:15		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No.
NWO1312.0150.0
16.0001

Job:
GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES

Prepared By:
Scott Beesinger

P.O. Number

HS18051260

Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: AMMONIA-N	TOTAL ORGANIC CARBON	ORTHO-PHOSPHATE	PERCHLORATE							Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_052418	Water	05/24/18 / 14:00		2	X	X									H2SO4	
LH18/24-SP650_052418	Water	05/24/18 / 14:00		2			X	X							NONE	

Additional Remarks: **Standard TAT on all parameters**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	05/24/18	14:30	RG	5/25/18	08:45						

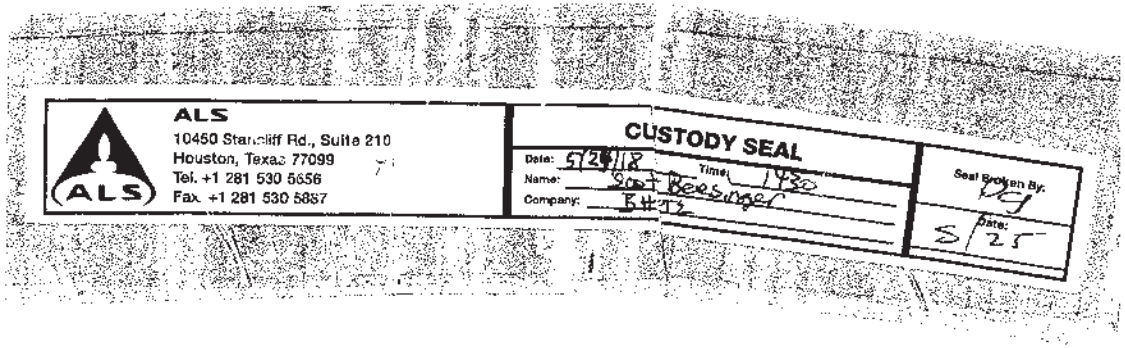
For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition

Remarks:

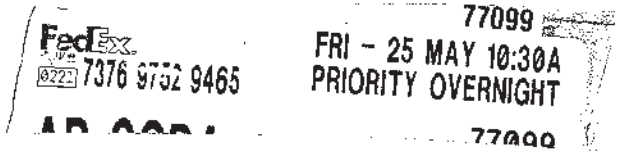
UIC.
3847 3.50
#11
CIF - 0.50

(Word) S:\I-ecs\Forms\Chain of Custody - BiWeekly



ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5857

CUSTODY SEAL
Date: 5/25/18
Time: 1430
Name: Scott Beesinger
Company: BHT
Seal Broken By: DJ
Date: 5/25



FedEx
7376 9752 9465

77099
FRI - 25 MAY 10:30A
PRIORITY OVERNIGHT

77099

Wet Chemistry Raw Data

Bhate Environmental Associates, Inc.
Project: LONGHORN GW TREATMENT PLANT
ALS WO# HS18051260

HS18051260

	T	Analys	Sample Name	Sample ID	Origin	Result	Status	Date / Time	Vial
1	U	NPOC	CCV	306.069.008	TOC_W_9060	NPOC:24.54mg/L	Completed	5/30/2018 8:59:29 PM	1
2	U	NPOC	CCB	Untitled	TOC_W_9060	NPOC:0.05258mg/	Completed	5/30/2018 9:17:00 PM	2
3	U	NPOC	WBLKW1-180530	TOC_W 9060	TOC_W_9060	NPOC:0.07836mg/	Completed	5/30/2018 9:32:12 PM	3
4	U	NPOC	WLCSW1-180530	Untitled	TOC_W_9060	NPOC:9.577mg/L	Completed	5/30/2018 9:47:29 PM	4
5	U	NPOC	HS18051121-08	1/6	TOC_W_9060	NPOC:1.703mg/L	Completed	5/30/2018 10:04:51 PM	5
6	U	NPOC	HS18051121-08MS	2/6	TOC_W_9060	NPOC:12.89mg/L	Completed	5/30/2018 10:23:36 PM	6
7	U	NPOC	HS18051121-08MSD	3/6	TOC_W_9060	NPOC:12.32mg/L	Completed	5/30/2018 10:40:53 PM	7
8	U	NPOC	HS18051121-09	1/2	TOC_W_9060	NPOC:1.076mg/L	Completed	5/30/2018 10:58:10 PM	8
9	U	NPOC	HS18051121-10	1/2	TOC_W_9060	NPOC:1.028mg/L	Completed	5/30/2018 11:15:27 PM	9
10	U	NPOC	HS18051121-11	1/2	TOC_W_9060	NPOC:1.194mg/L	Completed	5/30/2018 11:32:44 PM	10
11	U	NPOC	CCV	306.069.008	TOC_W_9060	NPOC:26.13mg/L	Completed	5/30/2018 11:50:45 PM	11
12	U	NPOC	CCB	Untitled	TOC_W_9060	NPOC:0.2405mg/L	Completed	5/31/2018 12:08:02 AM	12
13	U	NPOC	HS18051186-01	1/2	TOC_W_9060	NPOC:0.8116mg/L	Completed	5/31/2018 12:25:19 AM	13
14	U	NPOC	HS18051186-05	1/2	TOC_W_9060	NPOC:0.9850mg/L	Completed	5/31/2018 12:42:36 AM	14
15	U	NPOC	HS18051186-06	1/2	TOC_W_9060	NPOC:0.9694mg/L	Completed	5/31/2018 1:00:01 AM	15
16	U	NPOC	CCV	306.069.008	TOC_W_9060	NPOC:25.52mg/L	Completed	5/31/2018 1:17:56 AM	16
17	U	NPOC	CCB	Untitled	TOC_W_9060	NPOC:0.2100mg/L	Completed	5/31/2018 1:35:27 AM	17
18	U	NPOC	CCV	306.069.008	05-08-2018_	NPOC:24.77mg/L	Completed	5/31/2018 1:49:20 AM	18
19	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.2475mg/L	Completed	5/31/2018 2:04:38 AM	19
20	U	NPOC	WBLKW2-180530	TOC_W 5310	05-08-2018_	NPOC:0.05855mg/	Completed	5/31/2018 2:19:51 AM	20
21	U	NPOC	WLCSW2-180530	Untitled	05-08-2018_	NPOC:10.25mg/L	Completed	5/31/2018 2:32:59 AM	21
22	U	NPOC	WLCSDW2-180530	Untitled	05-08-2018_	NPOC:9.812mg/L	Completed	5/31/2018 2:46:18 AM	22
23	U	NPOC	HS18051433-01	1/2	05-08-2018_	NPOC:0.1380mg/L	Completed	5/31/2018 3:01:36 AM	23
24	U	NPOC	HS18051434-01	1/2	05-08-2018_	NPOC:0.08967mg/	Completed	5/31/2018 3:14:53 AM	24
25	U	NPOC	HS18051457-01	1/2	05-08-2018_	NPOC:0.1590mg/L	Completed	5/31/2018 3:30:11 AM	25
26	U	NPOC	HS18051314-01	1/2	05-08-2018_	NPOC:0.2272mg/L	Completed	5/31/2018 3:43:19 AM	26
27	U	NPOC	HS18051273-01	1/2	05-08-2018_	NPOC:15.96mg/L	Completed	5/31/2018 3:58:56 AM	27
28	U	NPOC	HS18051273-01MS	1/2	05-08-2018_	NPOC:25.79mg/L	Completed	5/31/2018 4:14:31 AM	28
29	U	NPOC	HS18051370-01	1/2	05-08-2018_	NPOC:6.985mg/L	Completed	5/31/2018 4:29:59 AM	29
30	U	NPOC	CCV	306.069.008	05-08-2018_	NPOC:23.54mg/L	Completed	5/31/2018 4:45:42 AM	30
31	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.1426mg/L	Completed	5/31/2018 5:00:56 AM	31
32	U	NPOC	HS18051371-01	1/2	05-08-2018_	NPOC:5.625mg/L	Completed	5/31/2018 5:16:10 AM	32
33	U	NPOC	HS18051372-01	1/2	05-08-2018_	NPOC:3.239mg/L	Completed	5/31/2018 5:31:36 AM	33
34	U	NPOC	HS18051373-01	1/2	05-08-2018_	NPOC:7.878mg/L	Completed	5/31/2018 5:47:01 AM	34
35	U	NPOC	HS18051374-01	1/2	05-08-2018_	NPOC:3.523mg/L	Completed	5/31/2018 6:00:10 AM	35
36	U	NPOC	CCV	306.069.008	05-08-2018_	NPOC:22.37mg/L	Completed	5/31/2018 6:15:47 AM	36
37	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.1852mg/L	Completed	5/31/2018 6:31:13 AM	37
38	U	NPOC	WBLKW3-180530	TOC_W	05-08-2018_	NPOC:0.05375mg/	Completed	5/31/2018 6:44:22 AM	38
39	U	NPOC	WLCSW3-180530	Untitled	05-08-2018_	NPOC:10.02mg/L	Completed	5/31/2018 6:57:36 AM	39
40	U	NPOC	WLCSDW3-180530	Untitled	05-08-2018_	NPOC:10.19mg/L	Completed	5/31/2018 7:12:55 AM	40
41	U	NPOC	HS18051196-01	1/2	05-08-2018_	NPOC:3.387mg/L	Completed	5/31/2018 7:28:41 AM	41
42	U	NPOC	HS18051307-01	1/2	05-08-2018_	NPOC:4.752mg/L	Completed	5/31/2018 7:41:58 AM	42
43	U	NPOC	HS18051260-01	1/2	05-08-2018_	NPOC:19.07mg/L	Completed	5/31/2018 7:57:17 AM	43
44	U	NPOC	HS18051260-01DF5	1/2	05-08-2018_	NPOC:3.904mg/L	Completed	5/31/2018 8:12:38 AM	44
45	U	NPOC	HS18051270-01	1/2	05-08-2018_	NPOC:13.72mg/L	Completed	5/31/2018 8:27:52 AM	45
46	U	NPOC	HS18051270-01MS	1/2	05-08-2018_	NPOC:24.52mg/L	Completed	5/31/2018 8:43:25 AM	46
47	U	NPOC	HS18051400-01	1/2	05-08-2018_	NPOC:10.81mg/L	Completed	5/31/2018 8:58:44 AM	47
48	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:25.29mg/L	Completed	5/31/2018 9:12:03 AM	48
49	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.2383mg/L	Completed	5/31/2018 9:25:18 AM	49
50	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:23.37mg/L	Completed	5/31/2018 1:13:41 PM	1
51	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.06734mg/	Completed	5/31/2018 1:26:54 PM	2

	T	Analys	Sample Name	Sample ID	Origin	Result	Status	Date / Time	Vial
52	U	NPOC	WBLKW3-180530	Untitled	05-08-2018_	NPOC:0.07692mg/	Completed	5/31/2018 1:42:12 PM	3
53	U	NPOC	WLCSW3-180530	Untitled	05-08-2018_	NPOC:9.887mg/L	Completed	5/31/2018 1:55:37 PM	4
54	U	NPOC	WLCSDW3-180530	Untitled	05-08-2018_	NPOC:9.899mg/L	Completed	5/31/2018 2:08:50 PM	5
55	U	NPOC	HS18051196-01	1/2	05-08-2018_	NPOC:3.295mg/L	Completed	5/31/2018 2:22:03 PM	6
56	U	NPOC	HS18051307-01	1/2	05-08-2018_	NPOC:4.970mg/L	Completed	5/31/2018 2:37:39 PM	7
57	U	NPOC	HS18051260-01	1/2	05-08-2018_	NPOC:19.24mg/L	Completed	5/31/2018 2:50:52 PM	8
58	U	NPOC	HS18051270-01	2/2	05-08-2018_	NPOC:13.85mg/L	Completed	5/31/2018 3:04:05 PM	9
59	U	NPOC	HS18051270-01MS	2/2	05-08-2018_	NPOC:23.99mg/L	Completed	5/31/2018 3:17:18 PM	10
60	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:25.07mg/L	Completed	5/31/2018 3:30:42 PM	11
61	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.1063mg/L	Completed	5/31/2018 3:46:00 PM	12

Instr.Information

System	TOC csh with asi
Instrument Options	TOC/ASI/IC Unit/
Catalyst	Regular Sensitivity

Cal. Curve

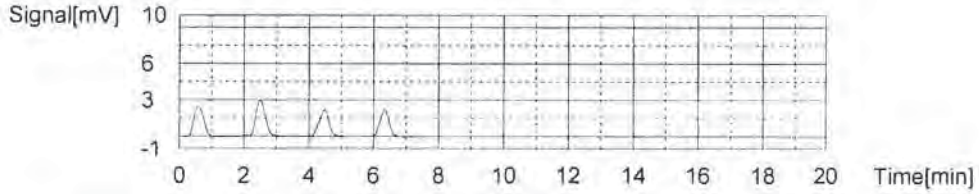
Sample Name:	CAL
Sample ID:	306.067:504-509
Cal. Curve:	05-08-2018_W.2018_05_08_16_59_08.cal
Status	Completed

Type	Anal.
Standard	NPOC

Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	5.281	50uL	1	*******		5/8/2018 5:07:52 PM
2	5.767	50uL	1	*******	E	5/8/2018 5:09:57 PM
3	4.377	50uL	1	*******		5/8/2018 5:12:02 PM
4	4.321	50uL	1	*******		5/8/2018 5:14:07 PM

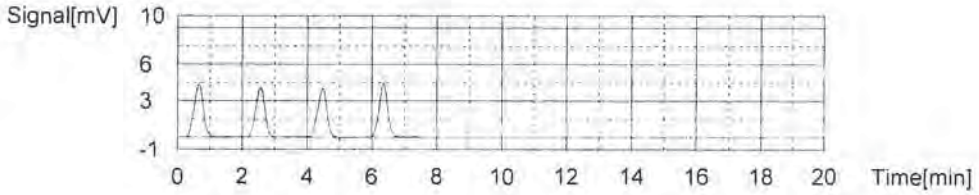
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 4.660



Conc: 2.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	8.552	50uL	1	*******	E	5/8/2018 5:23:05 PM
2	7.956	50uL	1	*******		5/8/2018 5:25:10 PM
3	7.917	50uL	1	*******		5/8/2018 5:27:15 PM
4	7.981	50uL	1	*******		5/8/2018 5:29:20 PM

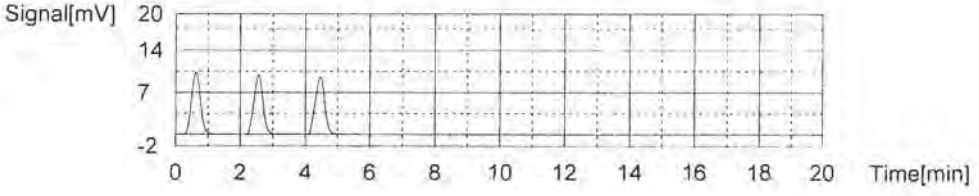
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 7.951



Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	19.68	50uL	1	*******		5/8/2018 5:38:18 PM
2	19.11	50uL	1	*******		5/8/2018 5:40:23 PM
3	19.32	50uL	1	*******		5/8/2018 5:42:28 PM

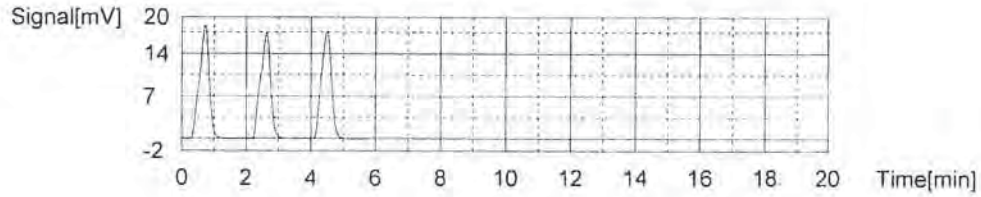
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 19.37



Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	38.73	50uL	1	*******		5/8/2018 5:51:31 PM
2	37.61	50uL	1	*******		5/8/2018 5:53:36 PM
3	38.22	50uL	1	*******		5/8/2018 5:55:41 PM

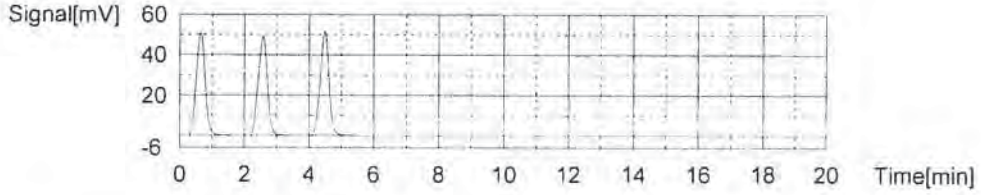
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 38.19



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	97.00	50uL	1	*******		5/8/2018 6:04:44 PM
2	96.71	50uL	1	*******		5/8/2018 6:06:49 PM
3	96.75	50uL	1	*******		5/8/2018 6:08:54 PM

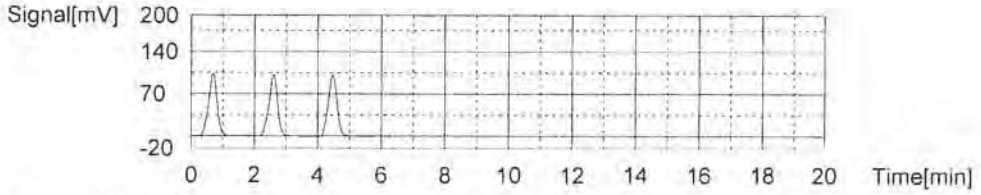
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 96.82



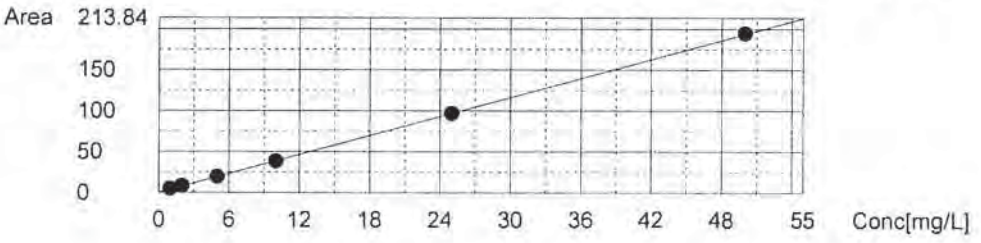
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	195.4	50uL	1	*******		5/8/2018 6:17:57 PM
2	193.7	50uL	1	*******		5/8/2018 6:20:02 PM
3	194.1	50uL	1	*******		5/8/2018 6:22:07 PM

Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 194.4



Slope: 3.881
Intercept 0.07512
r^2 1.0000
r 1.0000
Zero Shift No



Sample

Sample Name: ICV
Sample ID: 306.067.601
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

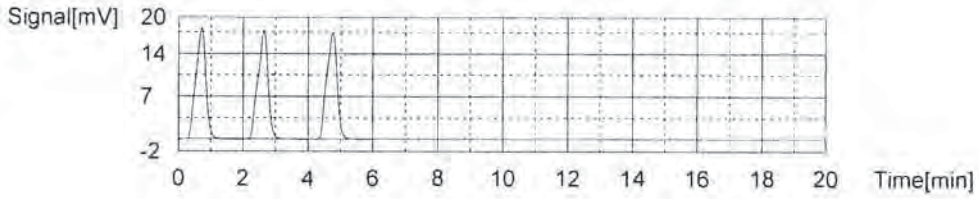
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:9.923mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	38.63	9.934mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:31:10 PM
2	38.67	9.944mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:33:30 PM
3	38.46	9.890mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:35:35 PM

Mean Area 38.59
Mean Conc. 9.923mg/L



Sample

Sample Name: ICB
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

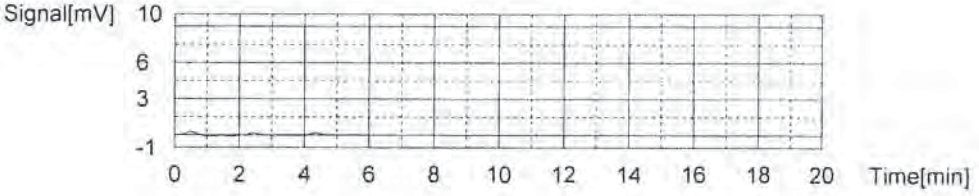
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:0.09481mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	0.4983	0.1090mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:44:38 PM
2	0.3330	0.06645mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:46:43 PM
3	0.4980	0.1090mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:48:48 PM

Mean Area 0.4431
Mean Conc. 0.09481mg/L



Instr.Information

System	TOC csh with asi
Instrument Options	TOC/ASI/IC Unit/
Catalyst	Regular Sensitivity

Sample

Sample Name:	CCV
Sample ID:	Untitled
Origin:	05-08-2018_W.cal
Status	Completed
Chk. Result	

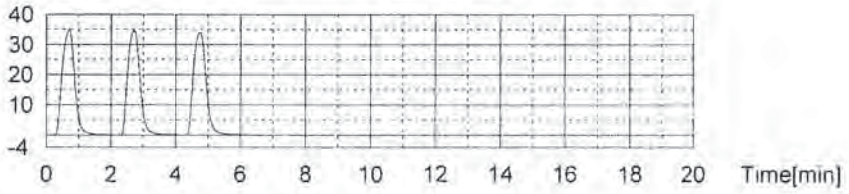
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:23.37mg/L

1. Det

Anal.: NPOC

No.	Area	Conc	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	91.36	23.52mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:09:15 PM
2	90.32	23.25mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:11:28 PM
3	90.59	23.32mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:13:41 PM

Mean Area 90.76
Mean Conc. 23.37mg/L



Sample

Sample Name:	CCB
Sample ID:	Untitled
Origin:	05-08-2018_W.cal
Status	Completed
Chk. Result	

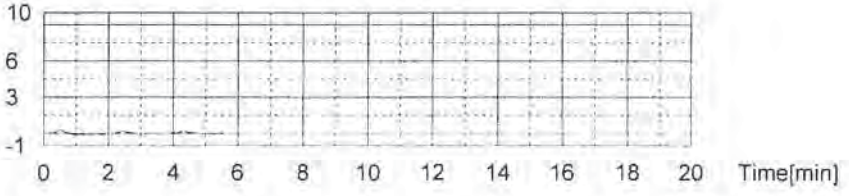
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:0.06734mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	0.4382	0.09355mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:22:44 PM
2	0.3109	0.06075mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:24:49 PM
3	0.2603	0.04771mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:26:54 PM

Mean Area 0.3365
Mean Conc. 0.06734mg/L



Sample

Sample Name: WBLKW3-180530
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

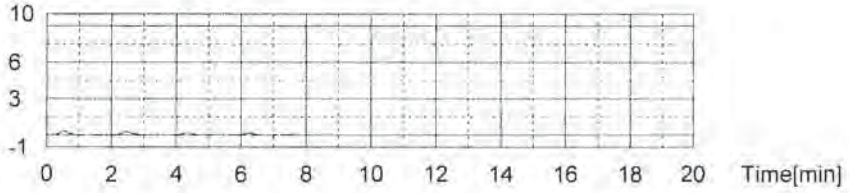
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:0.07692mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	0.6206	0.1405mg/L	50uL	1	E	05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:35:57 PM
2	0.5104	0.1122mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:38:02 PM
3	0.3297	0.06560mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:40:07 PM
4	0.2809	0.05302mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:42:12 PM

Mean Area 0.3737
Mean Conc. 0.07692mg/L



Sample

Sample Name: WLCSW3-180530
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

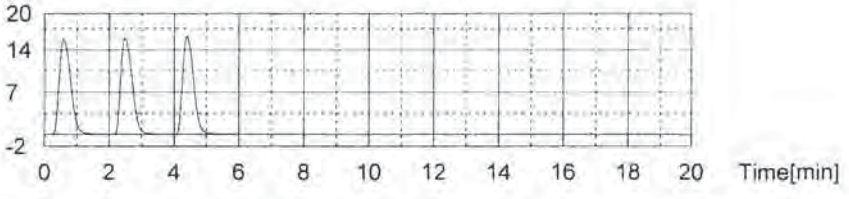
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:9.887mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	38.45	9.888mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:51:10 PM
2	38.65	9.939mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:53:15 PM
3	38.24	9.834mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 1:55:37 PM

Mean Area 38.45
Mean Conc. 9.887mg/L



Sample

Sample Name: WLCSDW3-180530
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

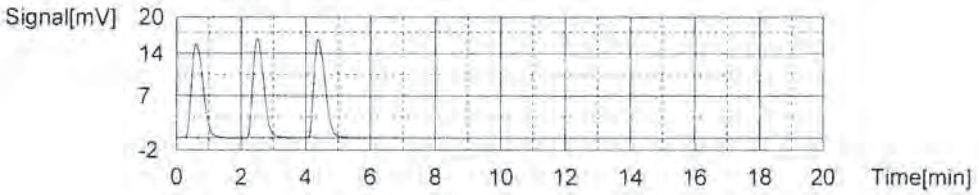
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:9.899mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	38.58	9.921mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 2:04:40 PM
2	38.29	9.847mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 2:06:45 PM
3	38.61	9.929mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 2:08:50 PM

Mean Area 38.49
Mean Conc. 9.899mg/L



Sample

Sample Name: HS18051260-01
Sample ID: 1/2
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

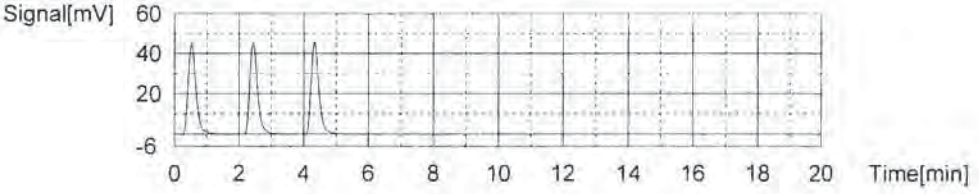
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:19.24mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	74.40	19.15mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 2:46:42 PM
2	74.42	19.16mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 2:48:47 PM
3	75.40	19.41mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 2:50:52 PM

Mean Area 74.74
Mean Conc. 19.24mg/L



Sample

Sample Name: HS18051270-01
Sample ID: 2/2
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

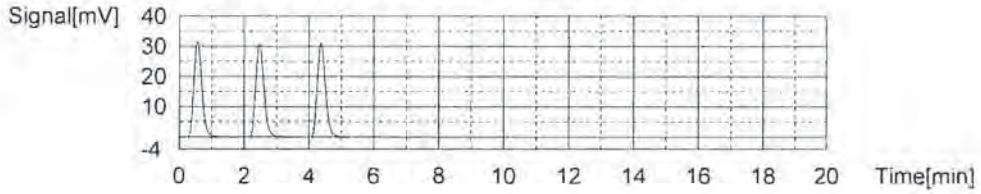
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:13.85mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	53.67	13.81mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 2:59:55 PM
2	53.82	13.85mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:02:00 PM
3	53.97	13.89mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:04:05 PM

Mean Area 53.82
Mean Conc. 13.85mg/L



Sample

Sample Name: HS18051270-01MS
Sample ID: 2/2
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

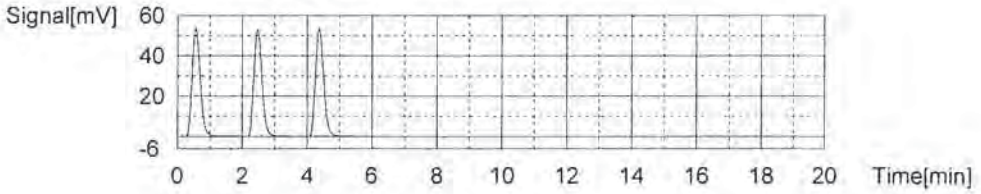
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:23.99mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	93.16	23.98mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:13:08 PM
2	92.52	23.82mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:15:13 PM
3	93.92	24.18mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:17:18 PM

Mean Area 93.20
Mean Conc. 23.99mg/L



Sample

Sample Name: CCV
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

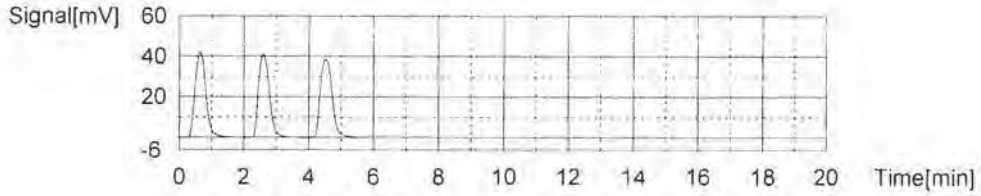
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:25.07mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	97.79	25.18mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:26:26 PM
2	96.23	24.78mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:28:31 PM
3	98.08	25.25mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:30:42 PM

Mean Area 97.37
Mean Conc. 25.07mg/L



Sample

Sample Name: CCB
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

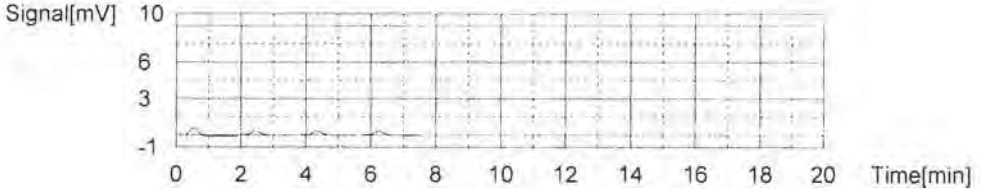
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:0.1063mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	0.9894	0.2356mg/L	50uL	1	E	05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:39:45 PM
2	0.4918	0.1074mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:41:50 PM
3	0.5086	0.1117mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:43:55 PM
4	0.4628	0.09989mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/31/2018 3:46:00 PM

Mean Area 0.4877
Mean Conc. 0.1063mg/L

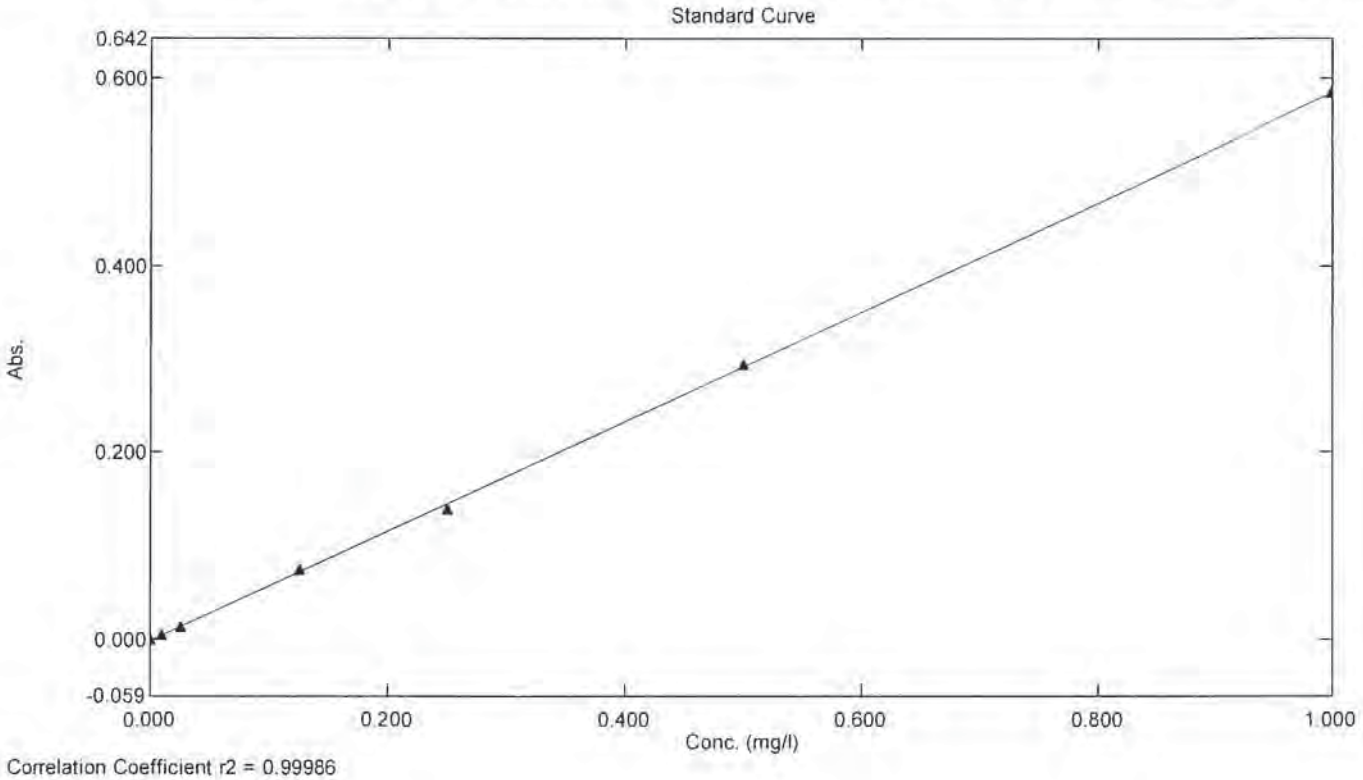


HS1805126O

Standard Table Report

06/11/2018 11:01:27 AM

File Name: C:\Program Files (x86)\Shimadzu\UVProbe\Data\O_PO4_UNKNOWN\ORTHO_2018\180525_P_ORTH



Correlation Coefficient r2 = 0.99986

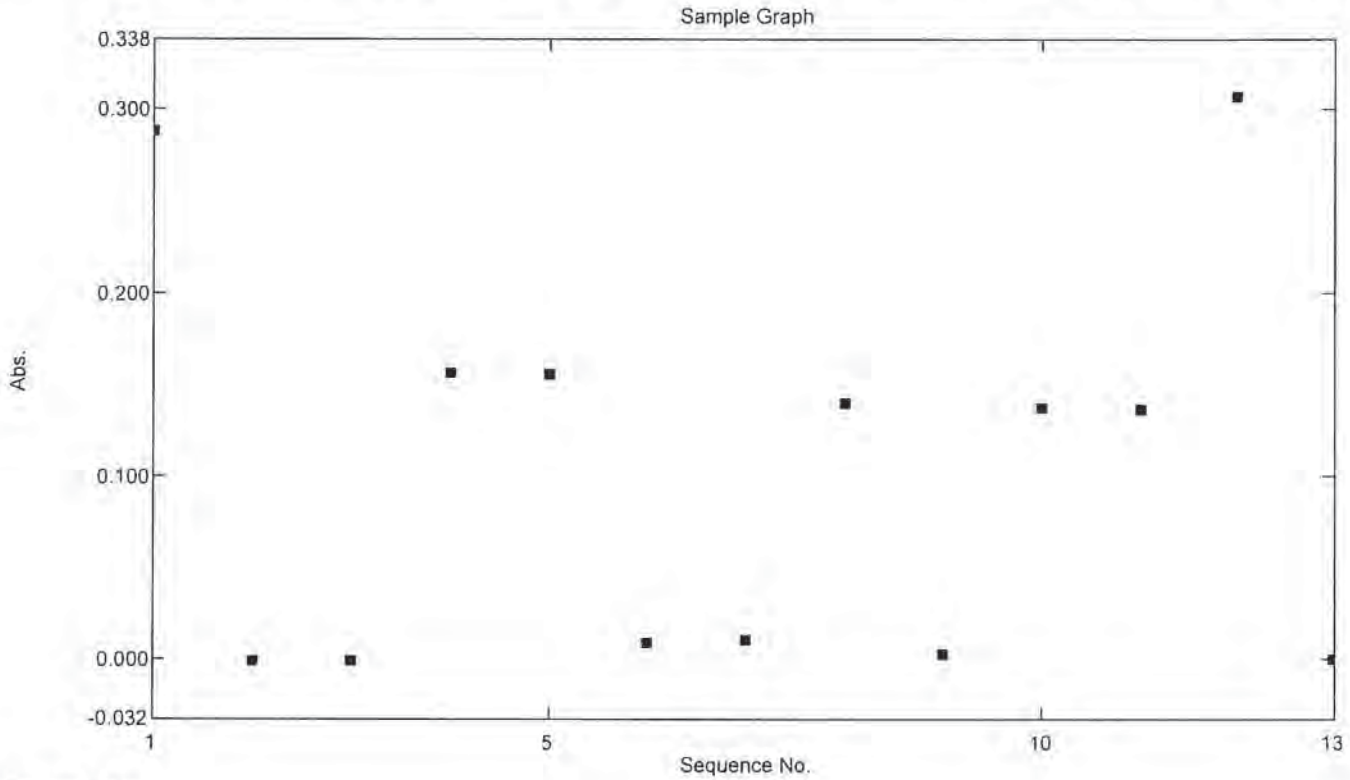
Standard Table

	Sample ID	Type	Ex	Conc	WL880.0	Wgt.Facto	Comments
1	STD1	Standard		0.000	-0.000	1.000	
2	STD2	Standard		0.010	0.006	1.000	
3	STD3	Standard		0.025	0.014	1.000	
4	STD4	Standard		0.125	0.075	1.000	
5	STD5	Standard		0.250	0.140	1.000	
6	STD6	Standard		0.500	0.294	1.000	
7	STD7	Standard		1.000	0.584	1.000	
8							

Sample Table Report

06/11/2018 10:31:50 AM

File Name: C:\Program Files (x86)\Shimadzu\UVProbe\Data\O_PO4_UNKNOWN\ORTHO_2018\180525_P_ORT



Sample Table

	Sample ID	Type	Ex	Conc	WL880.0	Comments
1	CCV	Unknown		0.494	0.288	
2	CCB	Unknown		-0.001	-0.001	
3	MBLK	Unknown		-0.001	-0.001	
4	LCS	Unknown		0.269	0.156	
5	LCSD	Unknown		0.267	0.156	
6	180501258.01	Unknown		0.017	0.009	FILTER,4:50PM
7	180501258.02	Unknown		0.019	0.011	
8	180501260.01	Unknown		0.240	0.140	PF:10X
9	180501265.02	Unknown		0.006	0.003	
10	180501265.02MS	Unknown		0.236	0.137	
11	180501265.02MSD	Unknown		0.234	0.136	
12	CCV2	Unknown		0.527	0.308	
13	CCB2	Unknown		0.001	-0.000	
14						

NIT-AmN-W-ISE

HS1805/1260

ALS Laboratory Group

Ion Selective Electrode Logbook

Logbook 306

Analyst: MD			Date: 05/30/2018
Method: SM4500NH3-D/EPA 350.3 or SM4500 NH3 B-F			
Probe Calibration Date: 05/30/2018	Cal Std ID: 30606(03-07)		Probe ID: SR15/90
Std Level	mV	Conc., mg/L:	Sodium Thiosulfate ID:
STD 1 (mg/L): 0.2	115.2	0.2001	Std Level / mV / Conc., mg/L:
STD 2 (mg/L):	75.4	1.002	STD 4 (mg/L): 10 — 17.9 — 10.05
STD 3 (mg/L): 5	35.2	5.05	STD 5 (mg/L): 50 — -23.6 — 50.16
LSC / MS Spike ID: 2970206404			ICAL Date & Slope: 100.8 / -59.5 mV
ICV Cal STD ID: 30606 5401			
DPD Reagent ID: 2970204302			

WO # / SX #	Bottle #	Initial g or ml	Final Vol. ml	Dilution Factor	Initial Conc. mg/L	Final Conc. mg/L	Chlorine Check (+/-)	Comments
ICV		50ml	50ml		10.18			
CCB					0.02930			
MBLK					0.02935			
LCS					10.41			
HS1805 01071-01					0.07346		+ve	
HS1805 01073-01					0.362		-ve	
HS1805 01260-01					14.065		-ve	
HS1805 01295-01					0.04265		-ve	
HS1805 01347-01					0.03313		-ve	
HS1805 01354-01					12.92		-ve	
HS1805 01073-01MS					12.50			
HS1805 01073-01MSD					11.72			
CCV		50ml	50ml		10.22			
CCB		"	"		0.02133			

Batch ID:	Reported By	Reviewed By:
317082 / 350.3 317085	MD	MD

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Sub Contract Data

Bhate Environmental Associates, Inc.
Project: LONGHORN GW TREATMENT PLANT
ALS WO# HS18051260

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1813746; 1814144; 1814932; 1814934; 1814935

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2095 (215757)

General Set Information: There were ten field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Sample 1814932001 was analyzed and reported at a 1:1,000 dilution. The reporting limit has been adjusted accordingly.

Method QC data: The method blank (LMB 603140) was less than 1/2 the CRDL. The recovery for the LCS (603141) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1813746001 (Client ID: HS18050824-01 50WW10-180515. The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. The initial analysis of field sample 1813746005 failed the Internal Standard recovery of 50 – 150% method requirement, possibly due to a spiking error. The sample was re-prepped, re-analyzed and reported. Manual Integrations was performed for datafile 02APRD01/02 along with datafiles 30MAYD06/07/21/22.

Thomas Bosch May 31, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: May 31, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1814935**
Project ID: HS18051260 052418
Purchase Order: HS18051260
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_052418	1814935001	05/24/18	05/26/18	

ANALYTICAL REPORT

Workorder: 34-1814935
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_052418**	Sampling Site: NA	Collected: 05/24/2018
Lab ID: 1814935001	Media: 125 mL Nalgene	Received: 05/26/2018
Matrix: Water	Sampling Parameter: NA	

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable	**Analysis:** EPA 6850, DoD QSM Water	**Instrument ID:** LCMS04
	Batch: ELMS/2095 (HBN: 215757)	**Percent Solid:** NA
	Analyzed: 05/30/2018 12:50	**Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**23**	1.0	2.0	4.0	1	

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 05/31/2018 10:04	/S/ Stephen Brose 05/31/2018 14:00

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1814935
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1814935

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2095 (HBN: 215757)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 603140
Analyzed: 05/30/2018 09:17
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 603141
Analyzed: 05/30/2018 09:31
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.30	5.00	106	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

	Sample: 1813746001	MS: 603142	MSD: 603143
Analyzed:	05/30/2018 09:46	05/30/2018 10:00	05/30/2018 10:15
Dilution:	1	1	1
Units:	ug/L	ug/L	ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	5.39	5	108	78.8	123.8	5.58	112	3.48	0.0	20.0

Continuing Calibration Verification

	CCV: 603137	CCV: 603144	CCV: 603231
Analyzed:	05/30/2018 08:32	05/30/2018 12:08	05/30/2018 13:18
Units:	ug/L	ug/L	ug/L
Criteria:	± 15%	± 15%	± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	27.1	25.0	109	26.9	25.0	108	27.4	25.0	110

Interference Check Sample

ICSA: 603139
Analyzed: 05/30/2018 09:02
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	1.24	1.00	124

Limit of Detection Verification

	LODV: 603138	LODV: 603145	LODV: 603232
Analyzed:	05/30/2018 08:48	05/30/2018 12:22	05/30/2018 13:33
Units:	ug/L	ug/L	ug/L
Criteria:	± 50%	± 50%	± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.01	1.00	101	1.01	1.00	101	0.948	1.00	94.8

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1814935

Limits:	Client SOW/Contract Specified	**Preparation:**	NA
Basis:	DoD QSM	**Batch:**	NA
		Prepared By:	NA
Analysis:	EPA 6850		
Batch:	ELMS/2095 (HBN: 215757)		
Analyzed By:	Thomas Bosch		

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
05/31/2018 10:04	05/31/2018 14:00

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

18698/#2





10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

COC ID: 9170

1814935

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	
Email:	

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18051260
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18051260-01**	**LH18/24-SP650_052418**	**Water**	**24 May 2018 14:00**
	SUB_Perch-6850			05 Jun 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 5/25/18 18:00

Received By: _____ Date/Time: 5/26/18 1900

Cooler ID(s): 852 Temperature(s): 2°

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18051260	Split:	Workorder ID: 1814935	Level: ENV_LVL4	Requested Analysis	
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly		
Comments:			Preservatives	EPA 6850, DoD QSM	
			COOL		

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis
1	05/24/2018 14:00	LH18/24-SP650_052418	1814935001		Water	A	1	A
2								
3								
4								
5								
6								
7								
8								
9								
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Wrath, Julie	05/25/2018 09:10	ALS Sample Receiving	Sample Login
Julie Wrath 5/29/18 1320		GB	Storage
R.33.1	5.30.18/07:45	T. Bush	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

1814935

Client Name: ALS Thornton

Project/Task/Site:

Date/Time of Receipt: 9/26/18 915

Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8500	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Signature Meredith Lewis Printed Name 9/26/18 Date

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: Printed Name Returned to Sample Receipt by: Signature Date:

CRIR.doc Revised 01/01/2018


Must Deliver Next Business Day
Time and Tempature Sensitive!
ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US
SHIP DATE: 25MAY18
ACTWGT: 22.25 LB
CAD: 300130/CAFE3111
DIMS: 19x16x13 IN
BILL SENDER
TO SAMPLE RECEIVING
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE
SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS18051257/1260/1255-RJ
FedEx Express
SATURDAY 12:00P
PRIORITY OVERNIGHT
TRK# 0201 4380 9529 4519
XO BTFA
84123
UT-US SLC
1
12:00 A
4519
05:26

atch Worklist

Batch: ELMS/ 2095 **Created:** 5/30/2018 08:11 **Instrument:** **HBN:** 215757
Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1813746 [ENV_LVL4]
Workorder: 1814144 [ENV_LVL4]
Workorder: 1814932 [ENV_LVL4]
Workorder: 1814934 [ENV_LVL4]
Workorder: 1814935 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	603137	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
2	603138	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	
3	603139	ICS for HBN 215757 [ELMS/2095]				ICS	3		E6850..D3Q	5311		5/31/2018	
4	603140	LMB for HBN 215757 [ELMS/2095]				LMB	3		E6850Q413Q	5311		5/31/2018	
5	603141	LCS for HBN 215757 [ELMS/2095]				LCS	3		E6850Q413Q	5311		5/31/2018	
6	1813746001	HS18050824-01 50WW10-180515				SAMPLE	3	1813746001-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
7	603142	HS18050824-01...(1813746001MS)				MS	3		E6850Q413Q	5311		5/31/2018	
8	603143	HS18050824-0...(1813746001MSD)				MSD	3		E6850Q413Q	5311		5/31/2018	
9	1813746002	HS18050824-02 50WW09-180515				SAMPLE	3	1813746002-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
10	1813746003	HS18050824-03 50WW09-180515-FD				FLDDUP	3	1813746003-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
11	1813746004	HS18050824-04 50WW23-180515				SAMPLE	3	1813746004-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
12	1813746005	HS18050824-05 50WW05-180515				SAMPLE	3	1813746005-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
13	1813746006	HS18050824-06 50WW17-180515				SAMPLE	3	1813746006-A	E6850Q41.3	5480	6/12/2018	5/31/2018	
14	1814144001	LH18/24-SP650_051718				SAMPLE	3	1814144001-A	E6850Q41.3	5480	6/14/2018	6/1/2018	
15	1814932001	LH18/24-SP140_052418				SAMPLE	3	1814932001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
16	1814934001	LH18/24-SP650_052418				SAMPLE	3	1814934001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
17	1814935001	LH18/24-SP650_052418				SAMPLE	3	1814935001-A	E6850Q41.3	5480	6/21/2018	6/8/2018	
18	603144	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
19	603145	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	
20	603231	CCV for HBN 215757 [ELMS/2095]				CCV	3		E685041C3Q	5311		5/31/2018	
21	603232	LODV for HBN 215757 [ELMS/2095				LODV	3		E6850..D3Q	5311		5/31/2018	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1813746 (001-06); 1814144 (001); 1814932 (001); 1814934 (001); 1814935 (001) ELMS Batch/HBN ID: 2095 (215757)
Prep Date: 05/30/2018 Analysis Date: 05/30/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\MAY\30MAY18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:
Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 41827. Dilutions of Working Standard Solution ID 41829 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 04/02/2018, sequence 02APR18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 41830 was used for LCS 603141; Target = 5.0µg/L. ASTM type II water was used for LMB 603140.

MS/MSD: MS/MSD was performed on sample 1813746001 (Client ID: HS18050824-01 50WW10-180515). 5.0µl of Working Standard Solution Horizon ID 41828 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:
1) Results reported in µg/L. Sample 1814932001 was analyzed and reported at a 1:1,000 dilution. The reporting limit has been adjusted accordingly. The initial analysis of field sample 1813746005 failed the Internal Standard recovery of 50 – 150% method requirement, possibly due to a spiking error. The sample was re-prepped, re-analyzed and reported.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\MAY\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafiles 02APRD01/02 along with datafiles 30MAYD06/07/21/22.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\215757-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — **Description - 6850 WKG Std 100.ug/L**

Standard: 41829
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 WRK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41828	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	10/04/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK — Description - 6850 Stock AccStd 1,000ug/mL

Standard: 36733
MFG: AccuStandard
MFG Lot: 216095148
Part ID: IC-PER-10X-1

Created By: Thomas Bosch
Create Date: 05/10/2017 11:05AM

Amount: 100 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — **Description - 6850 Intermdt AccStd 10.ug/mL**

Standard: 41828
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 INT

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK		Description - Perchlorate ISTD Wrk 1,000ug/L
Standard: 41827	Created By: Thomas Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 05/09/2018 10:05AM	Expires: 05/09/2019
MFG Lot: TNB: 05/09/2018	Verified By: Thomas Bosch	Usable: Yes
Pipette ID: Not Provided	Verify Date:	Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — **Description - 6850 QC WKG STD 100ug/L**

Standard: 41831
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC WRK 100.ug/L

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — **Description - 6850 QC Intrmdt Std-QC 10ug/mL**

Standard: 41830
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC INT 10.ug/mL

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK — **Description - 6850 QC Stock STD 1,000ug/mL**

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: Thomas Bosch
Create Date: 05/11/2017 01:05PM

Amount: 100 mL
Expires: 03/31/2020
Usable: Yes
Lab Lot: CLO4 QC STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ACCREDITATION No. 3 REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED ACCREDITATION No. 1 TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes



Signal Word: Warning

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

DR-ORG/INO-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

** For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

atch Report: C:\HPCHEM\1\DATA\30MAY18D\30MAY18D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#	*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
	*	603137 CCV@25	Vial 71	1	Control	1	1.02906e6	8.597	27.13125
	*	603138 LODV@1.	Vial 72	1	Control	2	4.91456e4	8.746	1.00633
	*	603139 ICS@1.0	Vial 73	1	Control	3	3.92585e4	8.536	1.24353
	*	603140 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
	*	603141 QC@5	Vial 75	1	Control	5	1.80606e5	8.569	5.30329
	*	1813746001	Vial 76	1	Sample	6	0.00000	0.000	0.00000
	*	603142 137461S	Vial 77	1	Sample	7	1.37245e5	8.454	5.38855
	*	603143 137461D	Vial 78	1	Sample	8	1.61939e5	8.470	5.57965
	*	1813746002	Vial 79	1	Sample	9	7.14560e4	8.361	2.66402
	*	1813746003	Vial 80	1	Sample	10	6.12046e4	8.385	2.80285
	*	1813746004	Vial 81	1	Sample	11	0.00000	0.000	0.00000
	*	1813746005	Vial 82	1	Sample	12	0.00000	0.000	0.00000
	*	1813746006	Vial 83	1	Sample	13	0.00000	0.000	0.00000
	*	1814144001	Vial 84	1	Sample	14	0.00000	0.000	0.00000
	*	1814932001 1K	Vial 85	1	Sample	15	3.84295e5	8.839	1.24660e4
	*	603144 CCV@25	Vial 71	1	Control	16	9.75035e5	8.838	26.90405
	*	603145 LODV@1.	Vial 72	1	Control	17	4.57818e4	8.861	1.01213
	*	1814934001	Vial 86	1	Sample	18	9.32499e5	8.441	33.87657
	*	1814935001	Vial 87	1	Sample	19	7.25811e5	8.399	22.74694
	*	1813746005 RE	Vial 82	1	Sample	20	0.00000	0.000	0.00000
	*	603231 CCV@25	Vial 71	1	Control	21	9.74748e5	8.822	27.39369
	*	603232 LODV@1.	Vial 72	1	Control	22	4.38332e4	8.849	9.48247e-1

#	*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
	*	603137 CCV@25	Vial 71	1	Control	1	3.22432e5	8.612	27.37425
	*	603138 LODV@1.	Vial 72	1	Control	2	1.73338e4	8.758	9.91998e-1
	*	603139 ICS@1.0	Vial 73	1	Control	3	1.36799e4	8.558	1.23705
	*	603140 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
	*	603141 QC@5	Vial 75	1	Control	5	5.82740e4	8.586	5.26554
	*	1813746001	Vial 76	1	Sample	6	0.00000	0.000	0.00000
	*	603142 137461S	Vial 77	1	Sample	7	4.56103e4	8.466	5.51401
	*	603143 137461D	Vial 78	1	Sample	8	5.38797e4	8.487	5.72188
	*	1813746002	Vial 79	1	Sample	9	2.49602e4	8.376	2.79768
	*	1813746003	Vial 80	1	Sample	10	2.10324e4	8.399	2.90021
	*	1813746004	Vial 81	1	Sample	11	0.00000	0.000	0.00000
	*	1813746005	Vial 82	1	Sample	12	0.00000	0.000	0.00000
	*	1813746006	Vial 83	1	Sample	13	0.00000	0.000	0.00000
	*	1814144001	Vial 84	1	Sample	14	0.00000	0.000	0.00000
	*	1814932001 1K	Vial 85	1	Sample	15	1.23790e5	8.857	1.26359e4
	*	603144 CCV@25	Vial 71	1	Control	16	3.07089e5	8.854	27.26483
	*	603145 LODV@1.	Vial 72	1	Control	17	1.60481e4	8.876	9.91252e-1
	*	1814934001	Vial 86	1	Sample	18	3.00525e5	8.456	35.29064
	*	1814935001	Vial 87	1	Sample	19	2.36380e5	8.415	23.64992
	*	1813746005 RE	Vial 82	1	Sample	20	0.00000	0.000	0.00000
	*	603231 CCV@25	Vial 71	1	Control	21	3.03819e5	8.840	27.51730
	*	603232 LODV@1.	Vial 72	1	Control	22	1.57022e4	8.869	9.44920e-1

#	*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
	*	603137 CCV@25	Vial 71	1	Control	1	1.53517e5	8.618	5.00000
	*	603138 LODV@1.	Vial 72	1	Control	2	2.20291e5	8.766	5.00000
	*	603139 ICS@1.0	Vial 73	1	Control	3	1.43388e5	8.568	5.00000
	*	603140 LMB	Vial 74	1	Control	4	1.78787e5	8.566	5.00000
	*	603141 QC@5	Vial 75	1	Control	5	1.55079e5	8.590	5.00000
	*	1813746001	Vial 76	1	Sample	6	9.36751e4	8.483	5.00000
	*	603142 137461S	Vial 77	1	Sample	7	1.15938e5	8.473	5.00000
	*	603143 137461D	Vial 78	1	Sample	8	1.31998e5	8.490	5.00000

atch Report: C:\HPCHEM\1\DATA\30MAY18D\30MAY18D.B

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	1813746002	Vial 79	1	Sample	9	1.23091e5	8.379	5.00000
*	1813746003	Vial 80	1	Sample	10	1.00208e5	8.401	5.00000
*	1813746004	Vial 81	1	Sample	11	9.38686e4	8.374	5.00000
*	1813746005	Vial 82	1	Sample	12	7.48830e4	8.421	5.00000
*	1813746006	Vial 83	1	Sample	13	8.67174e4	8.418	5.00000
*	1814144001	Vial 84	1	Sample	14	8.53104e4	9.768	5.00000
*	1814932001 1K	Vial 85	1	Sample	15	1.35180e5	8.856	5000.00000
*	603144 CCV@25	Vial 71	1	Control	16	1.46863e5	8.859	5.00000
*	603145 LODV@1.	Vial 72	1	Control	17	2.04082e5	8.875	5.00000
*	1814934001	Vial 86	1	Sample	18	1.07552e5	8.461	5.00000
*	1814935001	Vial 87	1	Sample	19	1.32221e5	8.419	5.00000
*	1813746005 RE	Vial 82	1	Sample	20	1.07709e5	8.457	5.00000
*	603231 CCV@25	Vial 71	1	Control	21	1.43821e5	8.841	5.00000
*	603232 LODV@1.	Vial 72	1	Control	22	2.08034e5	8.868	5.00000

*** End of Report ***

equence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\MAY\30MAY18D.S

Sequence Table:

Method and Injection Info Part:

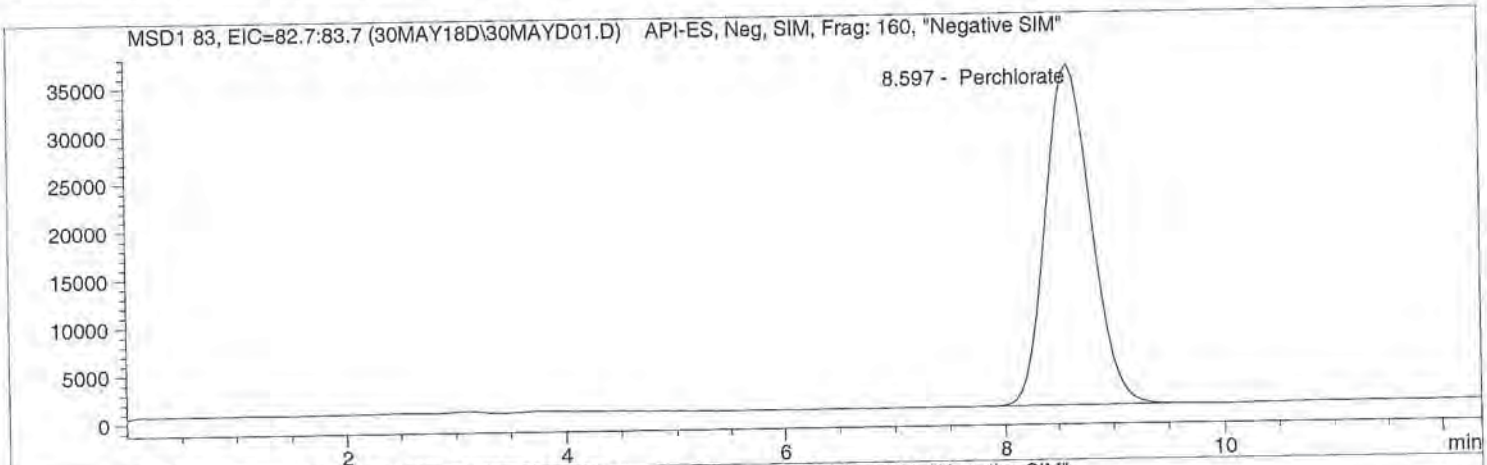
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	603137 CCV@25	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	603138 LODV@1.	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	603139 ICS@1.0	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	603140 LMB	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	603141 QC@5	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	1813746001	CLO4-DOD	1	Sample		
7	Vial 77	603142 137461S	CLO4-DOD	1	Sample		
8	Vial 78	603143 137461D	CLO4-DOD	1	Sample		
9	Vial 79	1813746002	CLO4-DOD	1	Sample		
10	Vial 80	1813746003	CLO4-DOD	1	Sample		
11	Vial 81	1813746004	CLO4-DOD	1	Sample		
12	Vial 82	1813746005	CLO4-DOD	1	Sample		
13	Vial 83	1813746006	CLO4-DOD	1	Sample		
14	Vial 84	1814144001	CLO4-DOD	1	Sample		
15	Vial 85	1814932001 1K	CLO4-DOD	1	Sample		
16	Vial 71	603144 CCV@25	CLO4-DOD	1	Ctrl Samp		
17	Vial 72	603145 LODV@1.	CLO4-DOD	1	Ctrl Samp		
18	Vial 86	1814934001	CLO4-DOD	1	Sample		
19	Vial 87	1814935001	CLO4-DOD	1	Sample		
20	Vial 82	1813746005 RE	CLO4-DOD	1	Sample		
21	Vial 71	603231 CCV@25	CLO4-DOD	1	Ctrl Samp		
22	Vial 72	603232 LODV@1.	CLO4-DOD	1	Ctrl Samp		

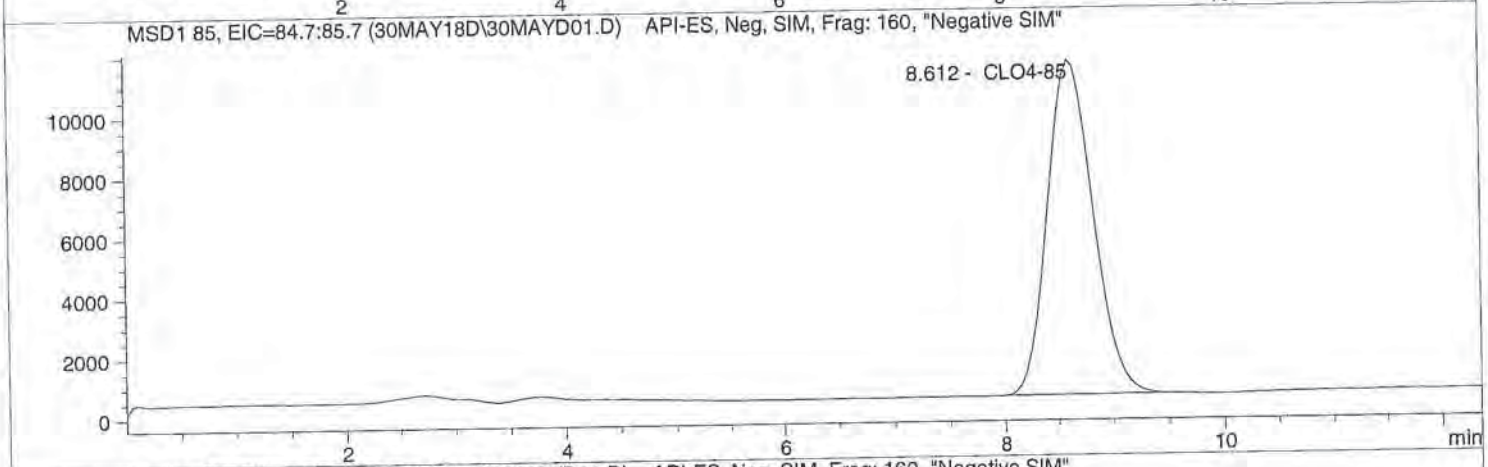
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD01.D Sample Name: 603137 CCV@25

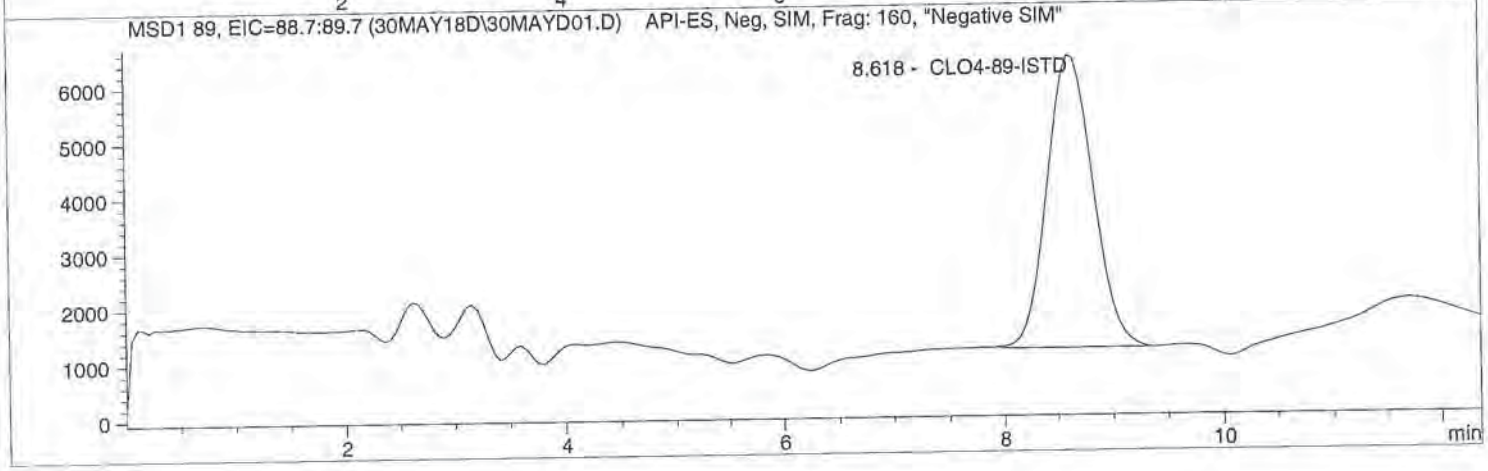
Injection Date:	5/30/2018 08:32:15	Seq Line:	1
Sample Name:	603137 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD01.D Sample Name: 603137 CCV@25

Injection Date:	5/30/2018 08:32:15	Seq Line:	1
Sample Name:	603137 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.597	PBA	1029059.8	27.1312	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.612	PBA	322431.6	27.3743	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.618	BBA	153517.3	5.0000	CLO4-89-ISTD

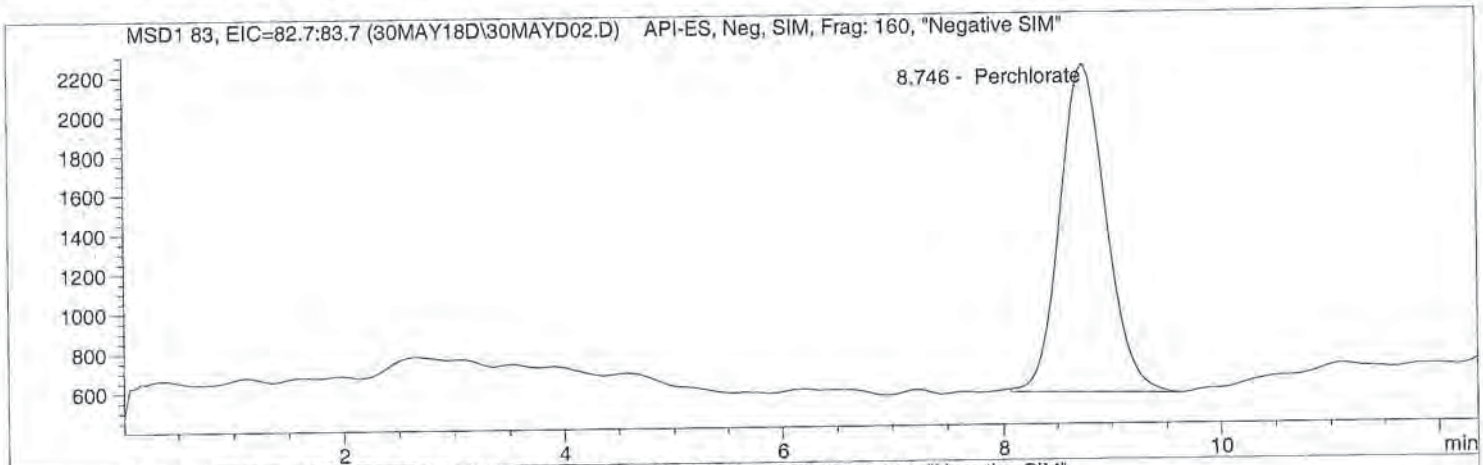
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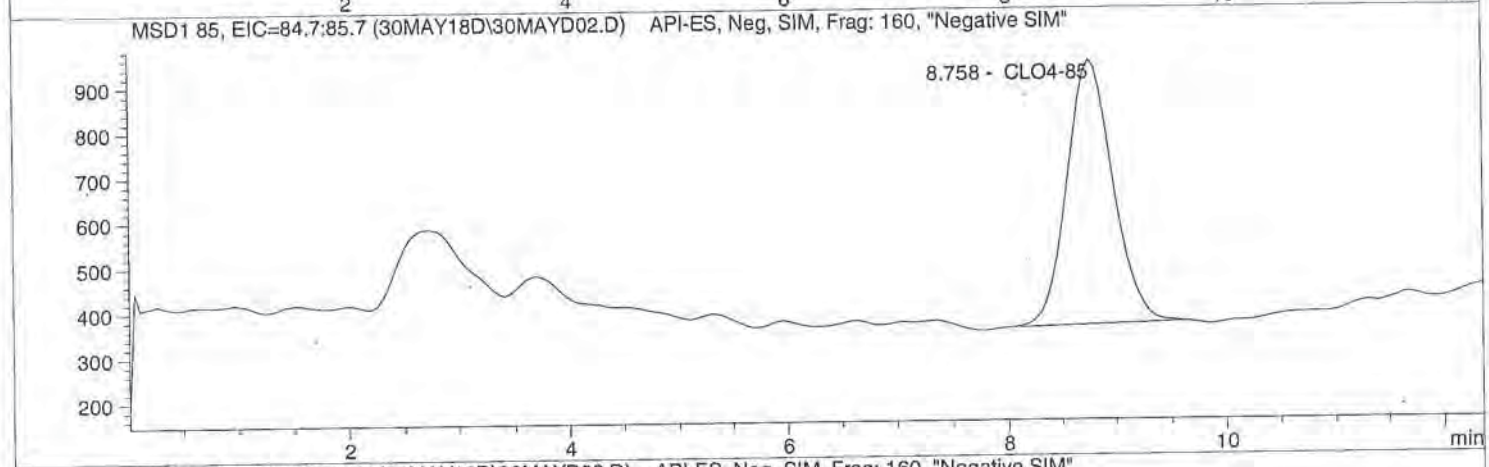
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD02.D Sample Name: 603138 LODV@1.

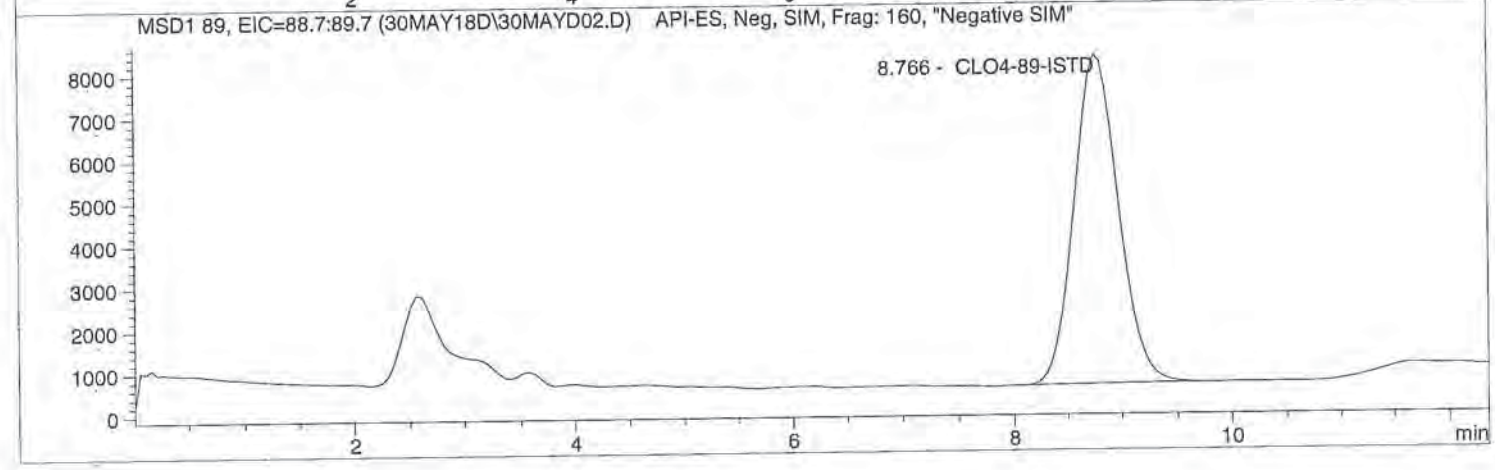
Injection Date:	5/30/2018 08:48:43	Seq Line:	2
Sample Name:	603138 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD02.D Sample Name: 603138 LODV@1.

Injection Date:	5/30/2018 08:48:43	Seq Line:	2
Sample Name:	603138 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.746	BBA	49145.6	1.0063	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.758	PBA	17333.8	0.9920	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.766	BBA	220290.5	5.0000	CLO4-89-ISTD

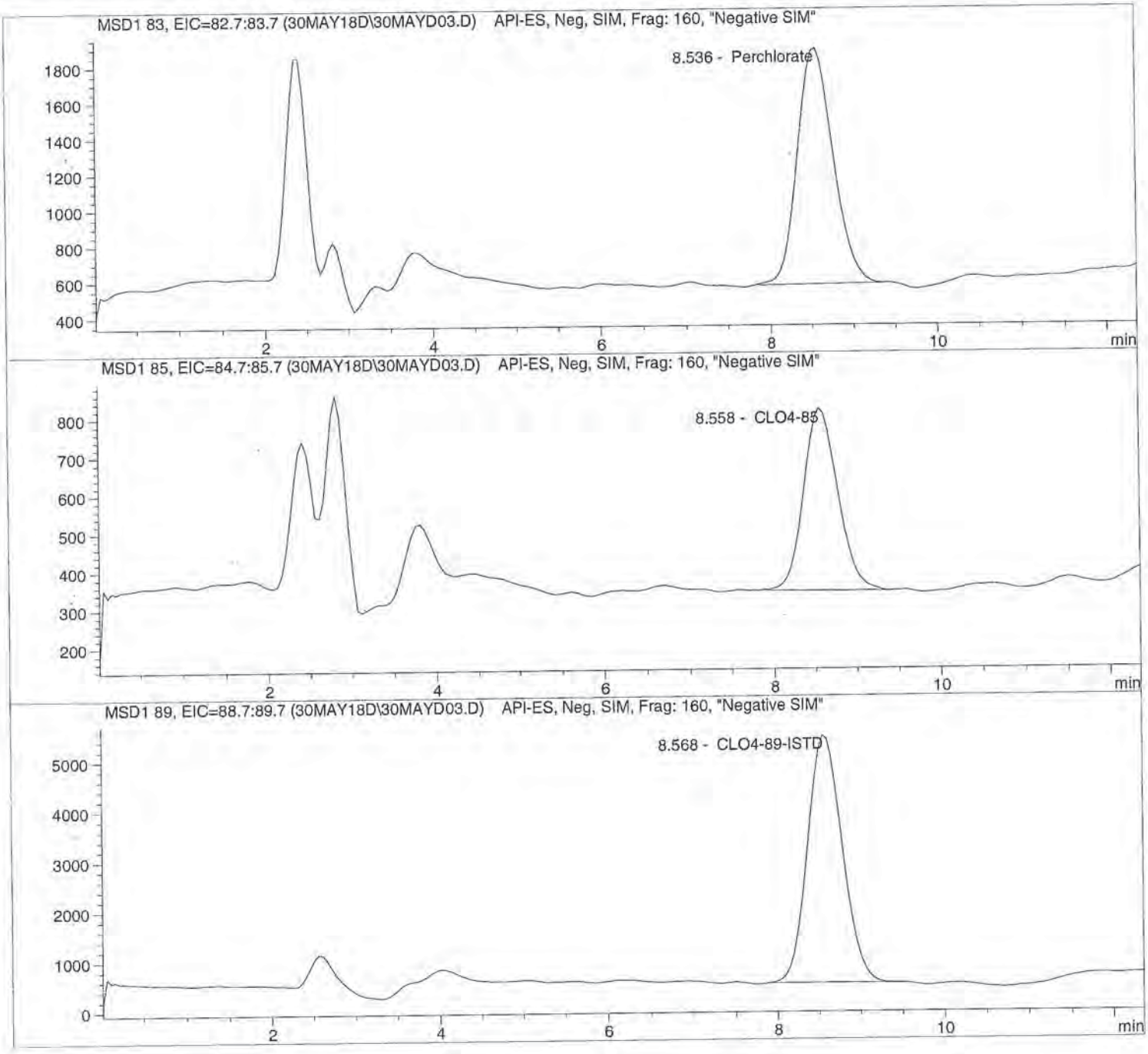
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Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD03.D Sample Name: 603139 ICS@1.0

Injection Date:	5/30/2018 09:02:54	Seq Line:	3
Sample Name:	603139 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD03.D Sample Name: 603139 ICS@1.0

Injection Date:	5/30/2018 09:02:54	Seq Line:	3
Sample Name:	603139 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.536	BBA	39258.5	1.2435	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.558	BBA	13679.9	1.2371	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.568	PBA	143388.5	5.0000	CLO4-89-ISTD

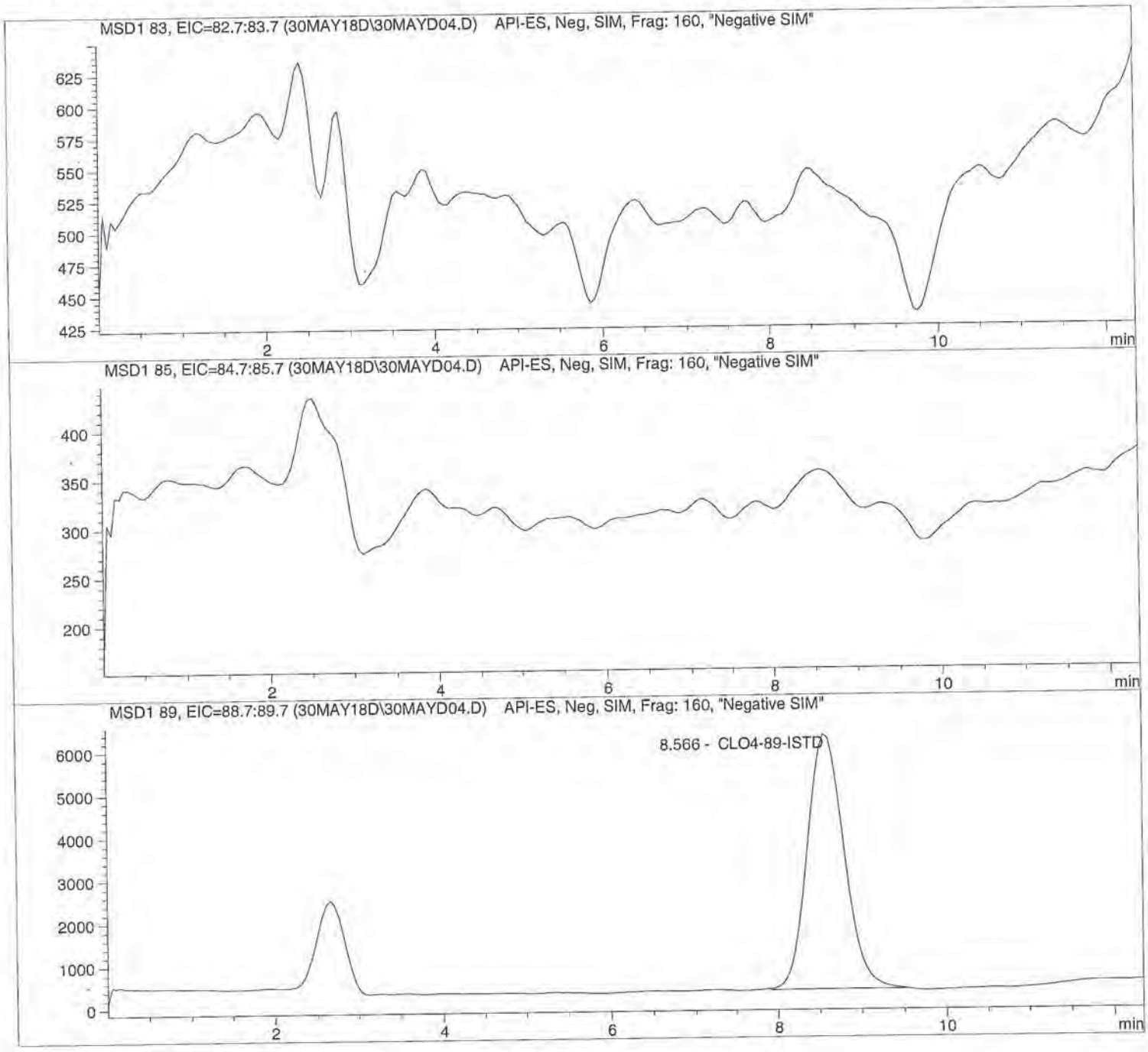
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD04.D Sample Name: 603140 LMB

Injection Date:	5/30/2018 09:17:07	Seq Line:	4
Sample Name:	603140 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD04.D Sample Name: 603140 LMB

Injection Date:	5/30/2018 09:17:07	Seq Line:	4
Sample Name:	603140 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.566	BBA	178787.3	5.0000	CLO4-89-ISTD

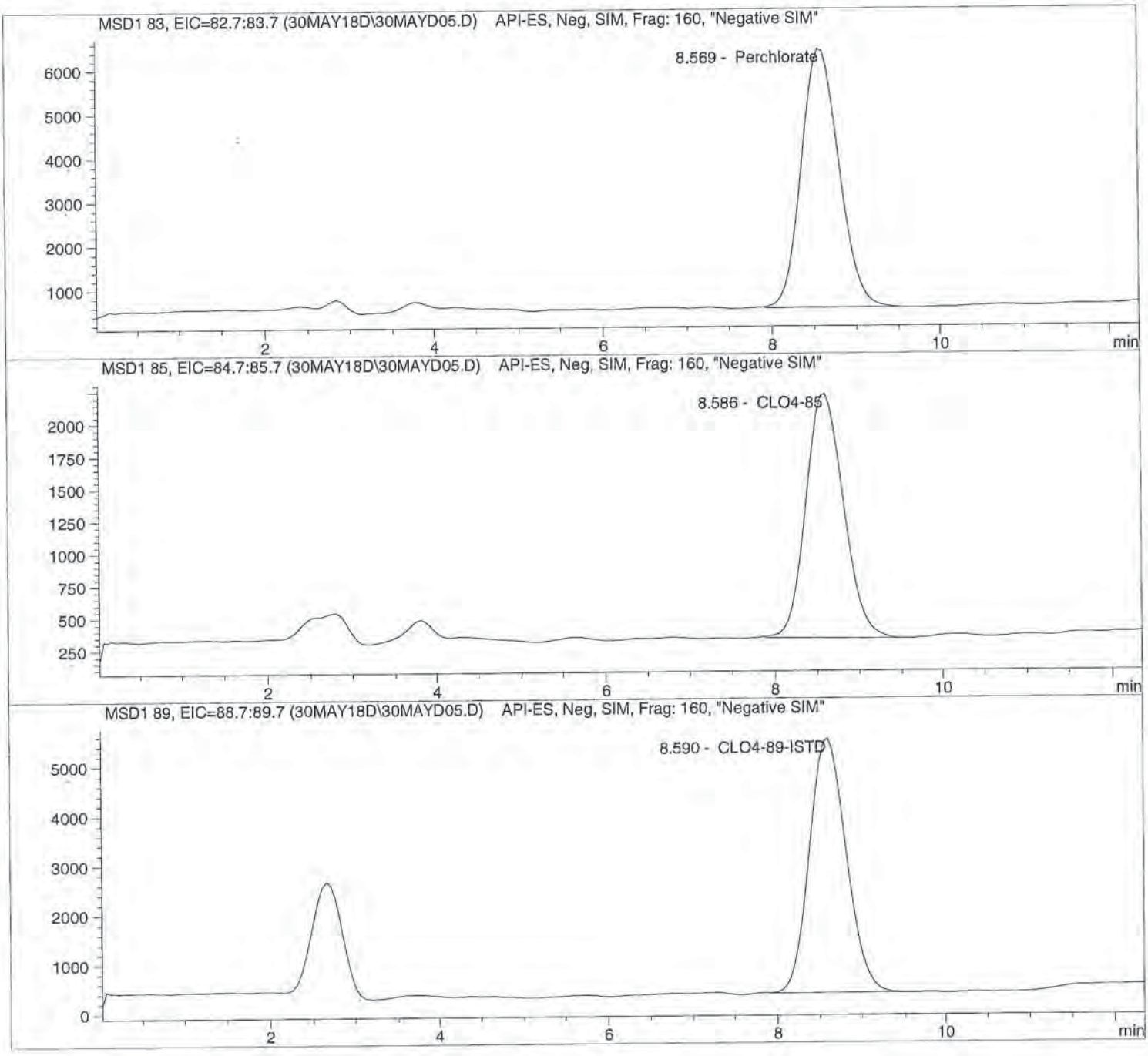
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Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD05.D Sample Name: 603141 QC@5

Injection Date:	5/30/2018 09:31:17	Seq Line:	5
Sample Name:	603141 QC@5	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD05.D Sample Name: 603141 QC@5

Injection Date:	5/30/2018 09:31:17	Seq Line:	5
Sample Name:	603141 QC@5	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.569	BBA	180606.1	5.3033	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.586	BBA	58274.0	5.2655	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.590	BBA	155079.4	5.0000	CLO4-89-ISTD

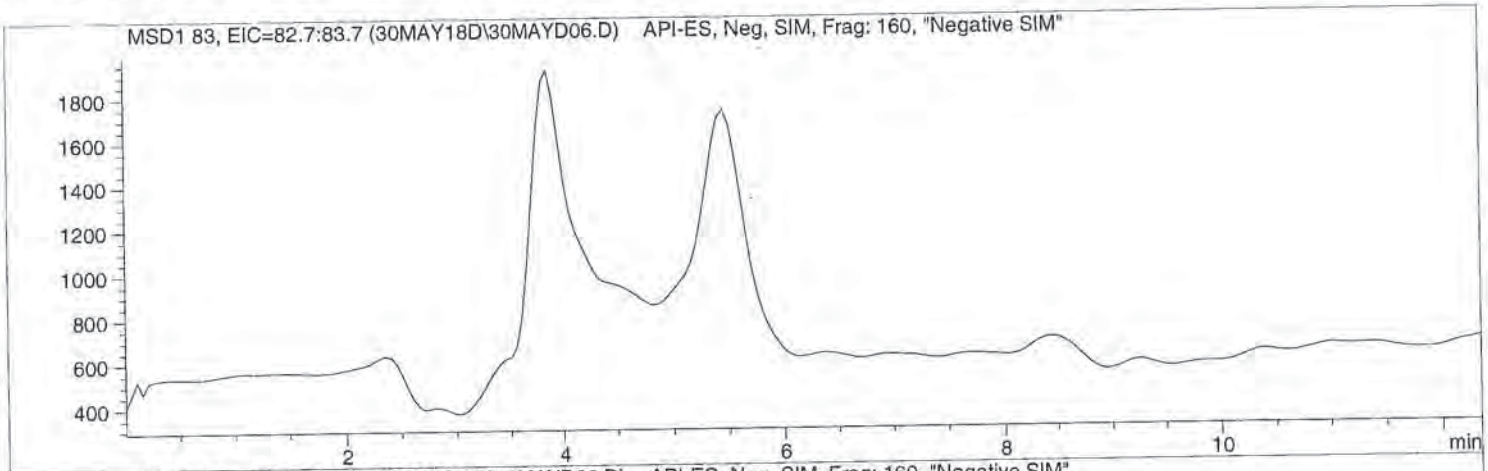
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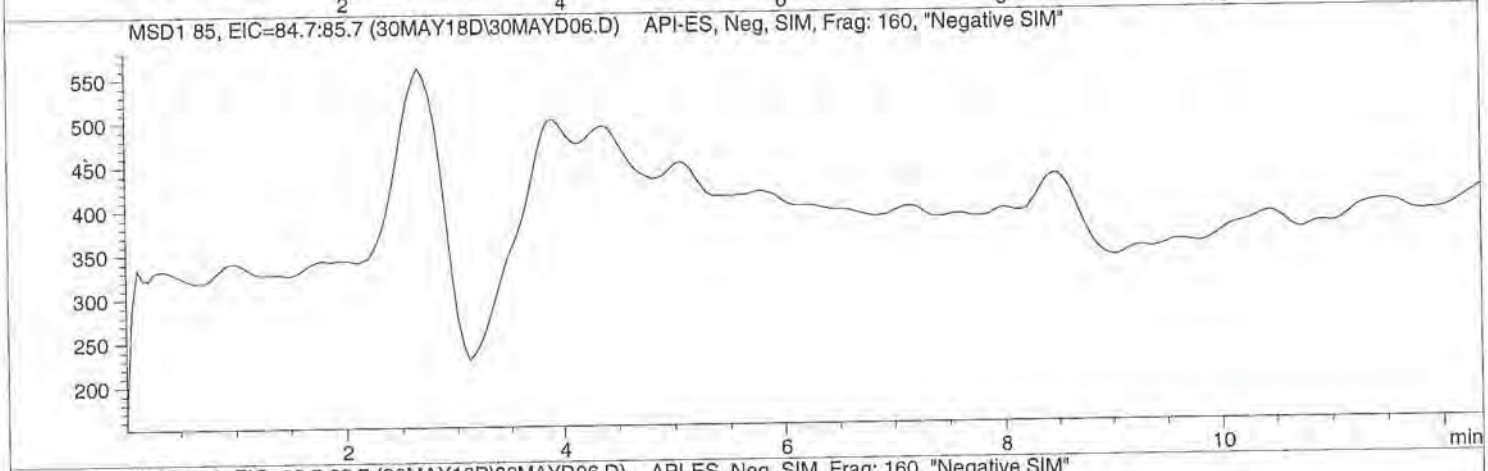
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD06.D Sample Name: 1813746001

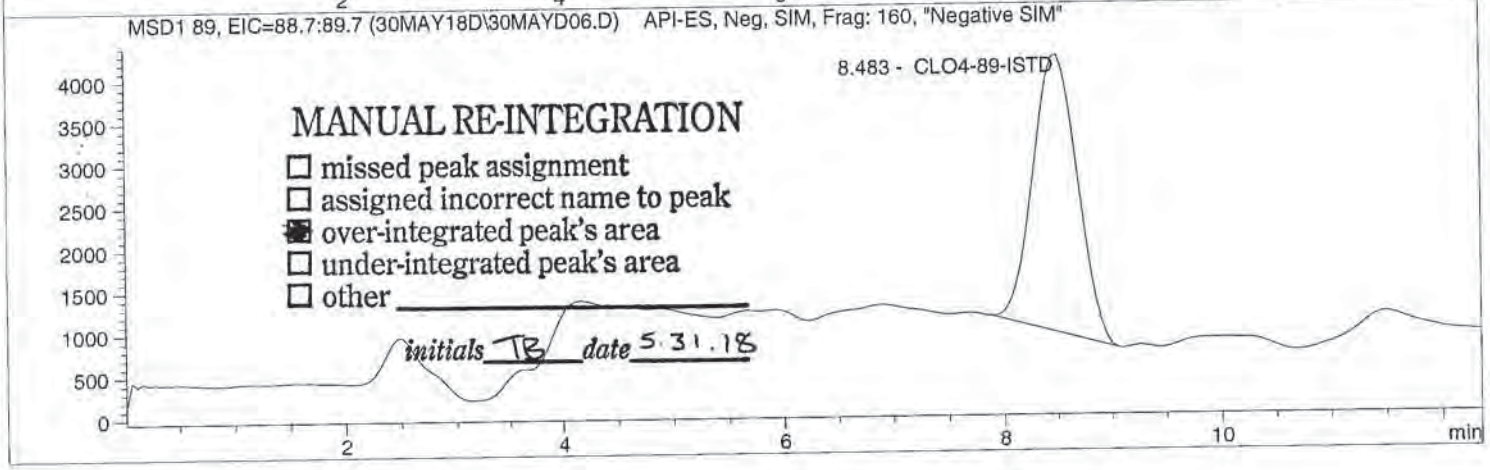
Injection Date:	5/30/2018 09:46:40	Seq Line:	6
Sample Name:	1813746001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







MANUAL RE-INTEGRATION

- ☐ missed peak assignment
- ☐ assigned incorrect name to peak
- ■ over-integrated peak's area
- ☐ under-integrated peak's area
- ☐ other _____

initials TB *date* 5.31.18

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD06.D Sample Name: 1813746001

Injection Date:	5/30/2018 09:46:40	Seq Line:	6
Sample Name:	1813746001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.483	MM	93675.1	5.0000	CLO4-89-ISTD

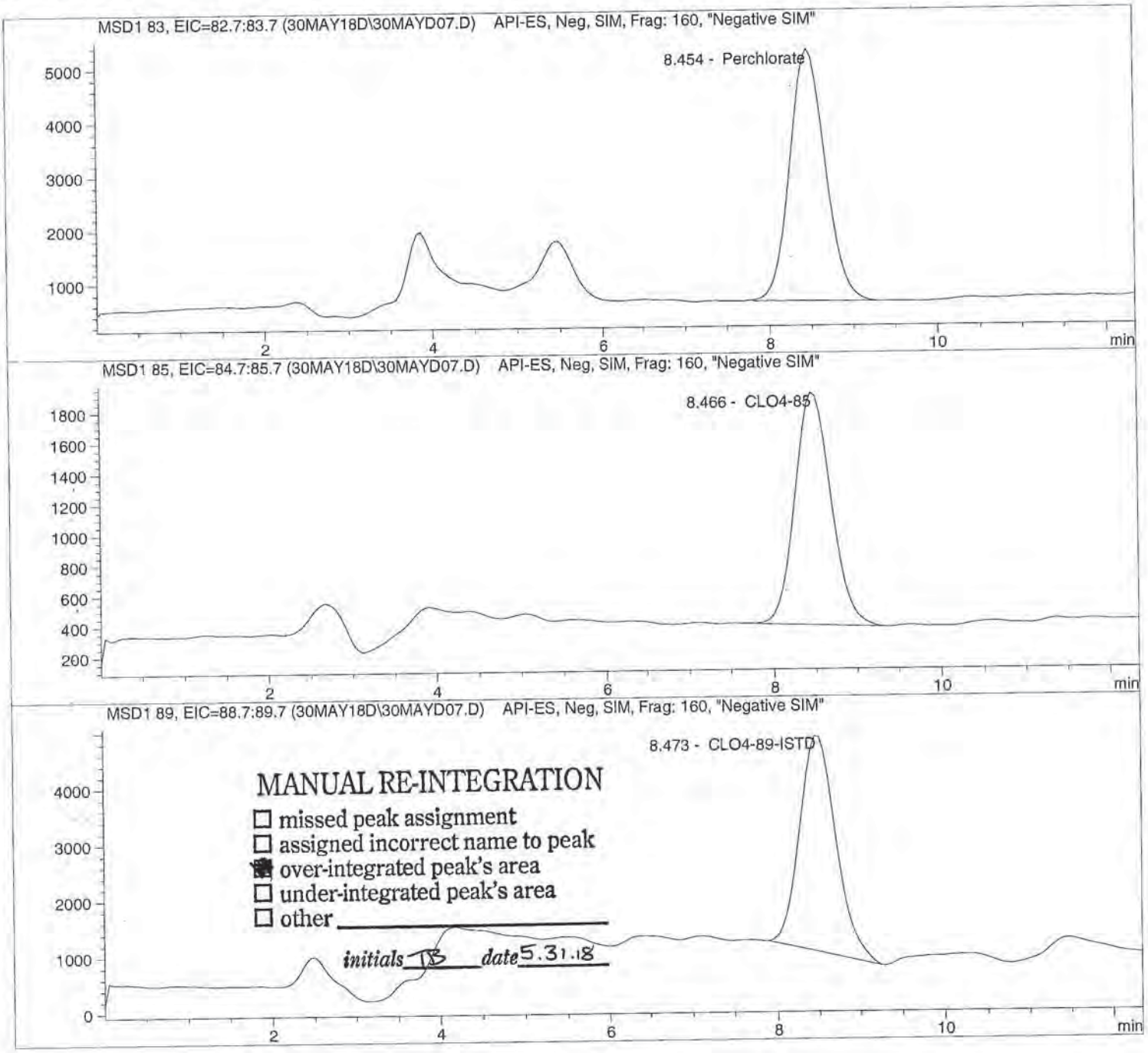
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Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD07.D Sample Name: 603142 137461S

Injection Date:	5/30/2018 10:00:51	Seq Line:	7
Sample Name:	603142 137461S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD07.D Sample Name: 603142 137461S

Injection Date:	5/30/2018 10:00:51	Seq Line:	7
Sample Name:	603142 137461S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.454	BBA	137244.7	5.3885	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.466	BBA	45610.3	5.5140	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.473	MM	115937.6	5.0000	CLO4-89-ISTD

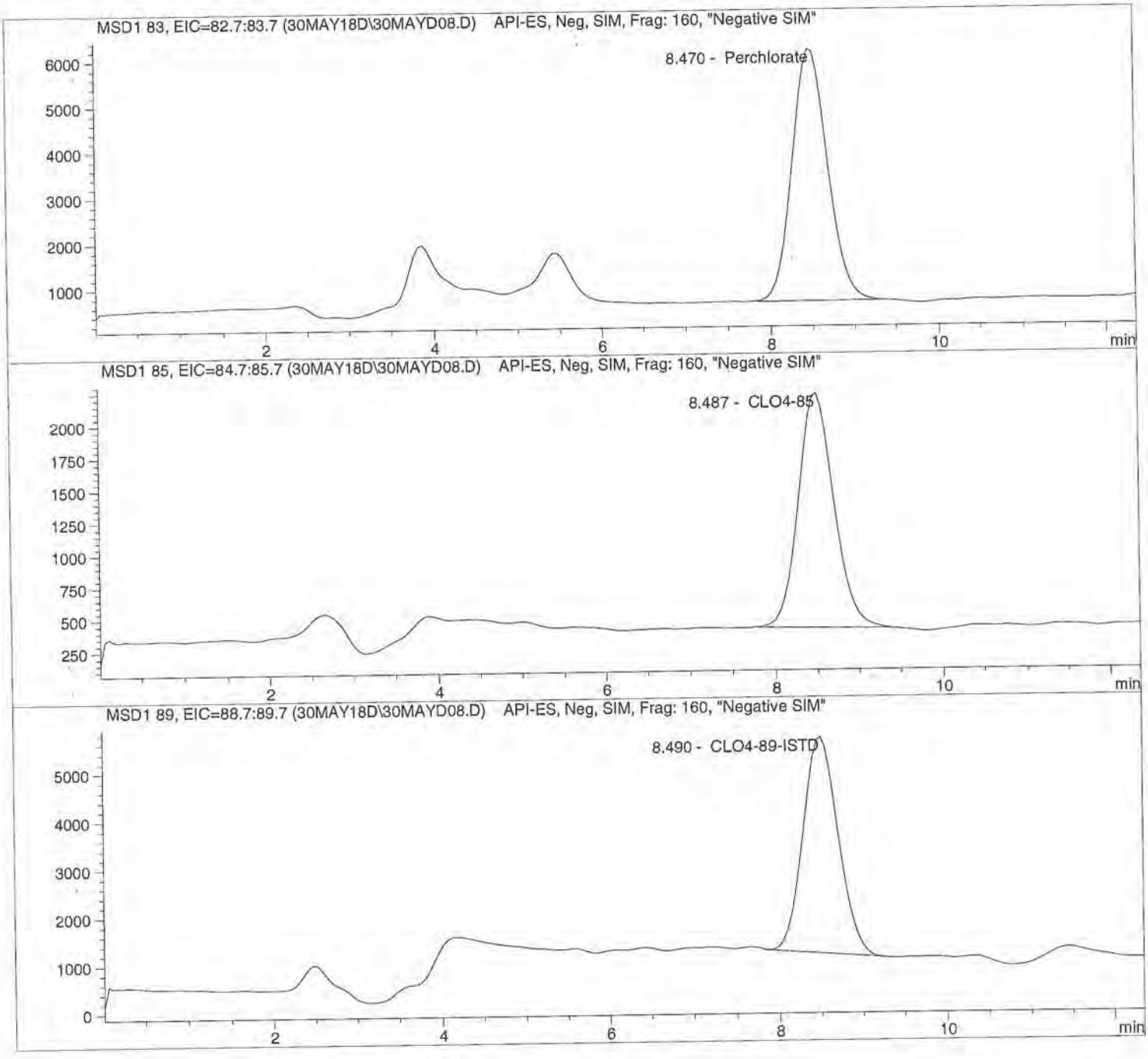
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD08.D Sample Name: 603143 137461D

Injection Date:	5/30/2018 10:15:02	Seq Line:	8
Sample Name:	603143 137461D	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD08.D Sample Name: 603143 137461D

Injection Date:	5/30/2018 10:15:02	Seq Line:	8
Sample Name:	603143 137461D	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.470	BBA	161939.0	5.5796	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.487	BBA	53879.7	5.7219	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.490	BBA	131997.7	5.0000	CLO4-89-ISTD

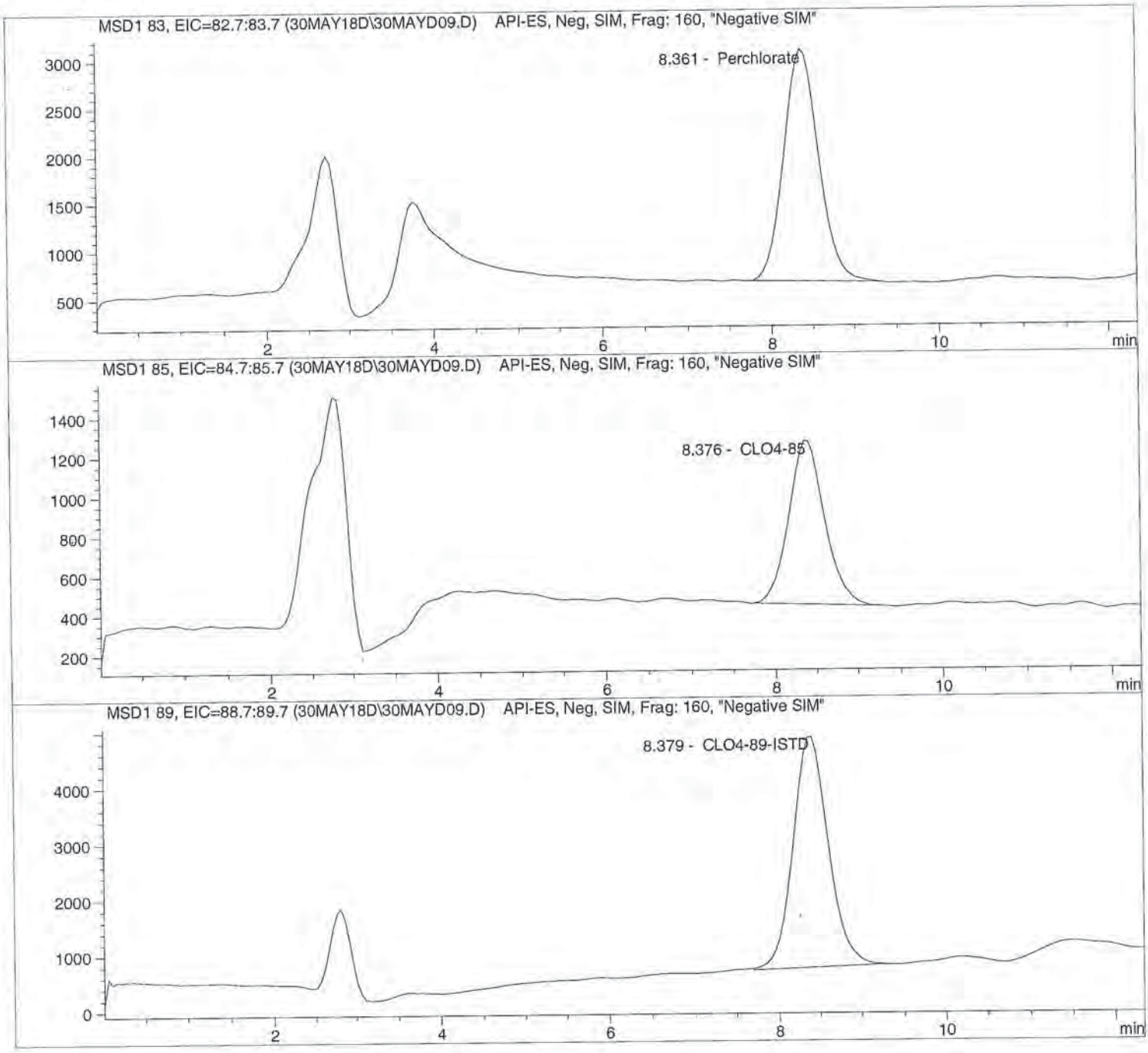
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD09.D Sample Name: 1813746002

Injection Date:	5/30/2018 10:29:13	Seq Line:	9
Sample Name:	1813746002	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD09.D Sample Name: 1813746002

Injection Date:	5/30/2018 10:29:13	Seq Line:	9
Sample Name:	1813746002	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.361	PBA	71456.0	2.6640	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.376	PBA	24960.2	2.7977	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.379	BBA	123091.3	5.0000	CLO4-89-ISTD

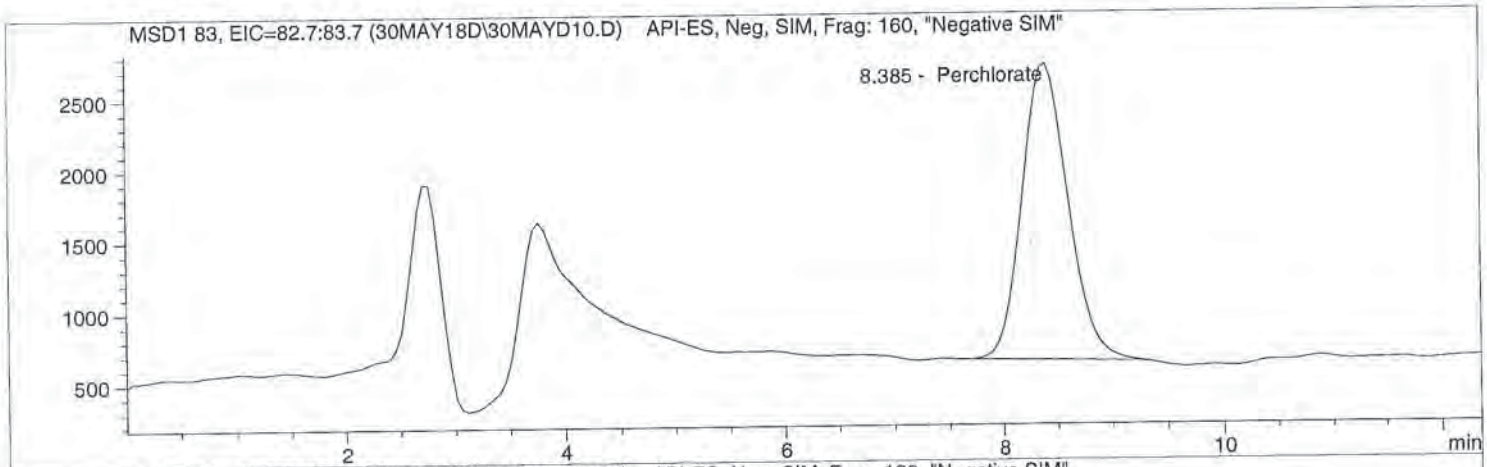
*** End of Report ***

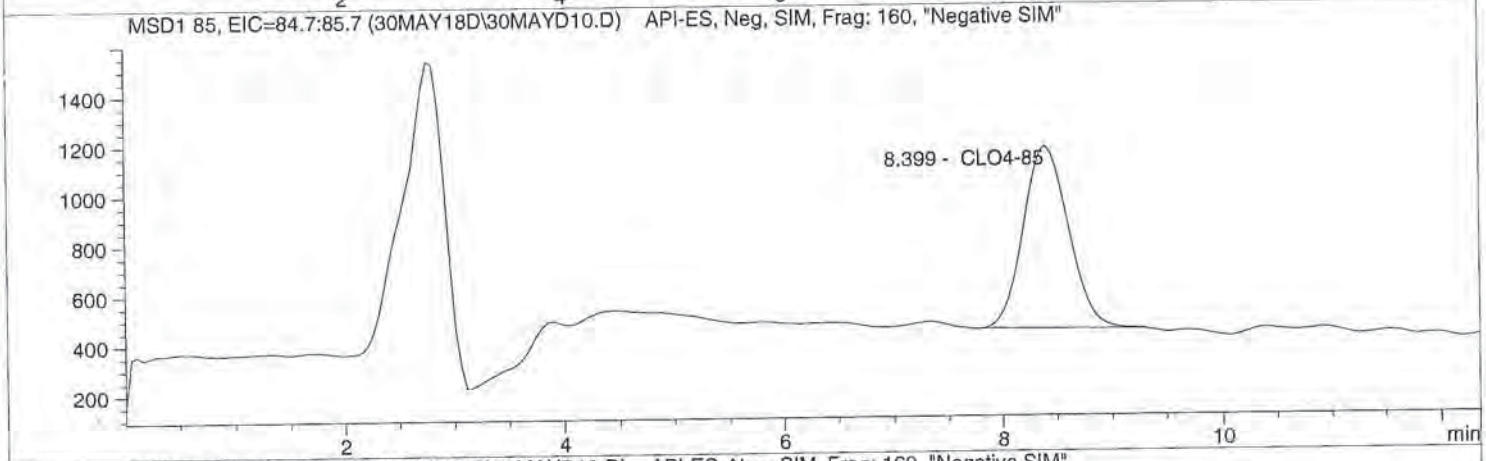
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD10.D Sample Name: 1813746003

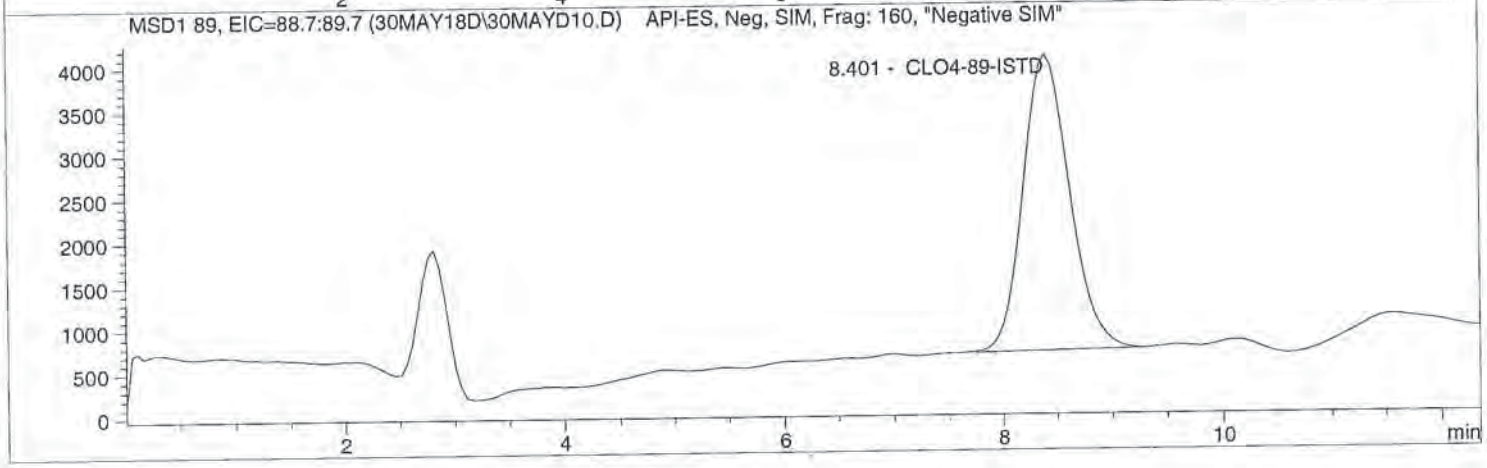
Injection Date:	5/30/2018 10:43:22	Seq Line:	10
Sample Name:	1813746003	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD10.D Sample Name: 1813746003

Injection Date:	5/30/2018 10:43:22	Seq Line:	10
Sample Name:	1813746003	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.385	BBA	61204.6	2.8029	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.399	PBA	21032.4	2.9002	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.401	BBA	100207.8	5.0000	CLO4-89-ISTD

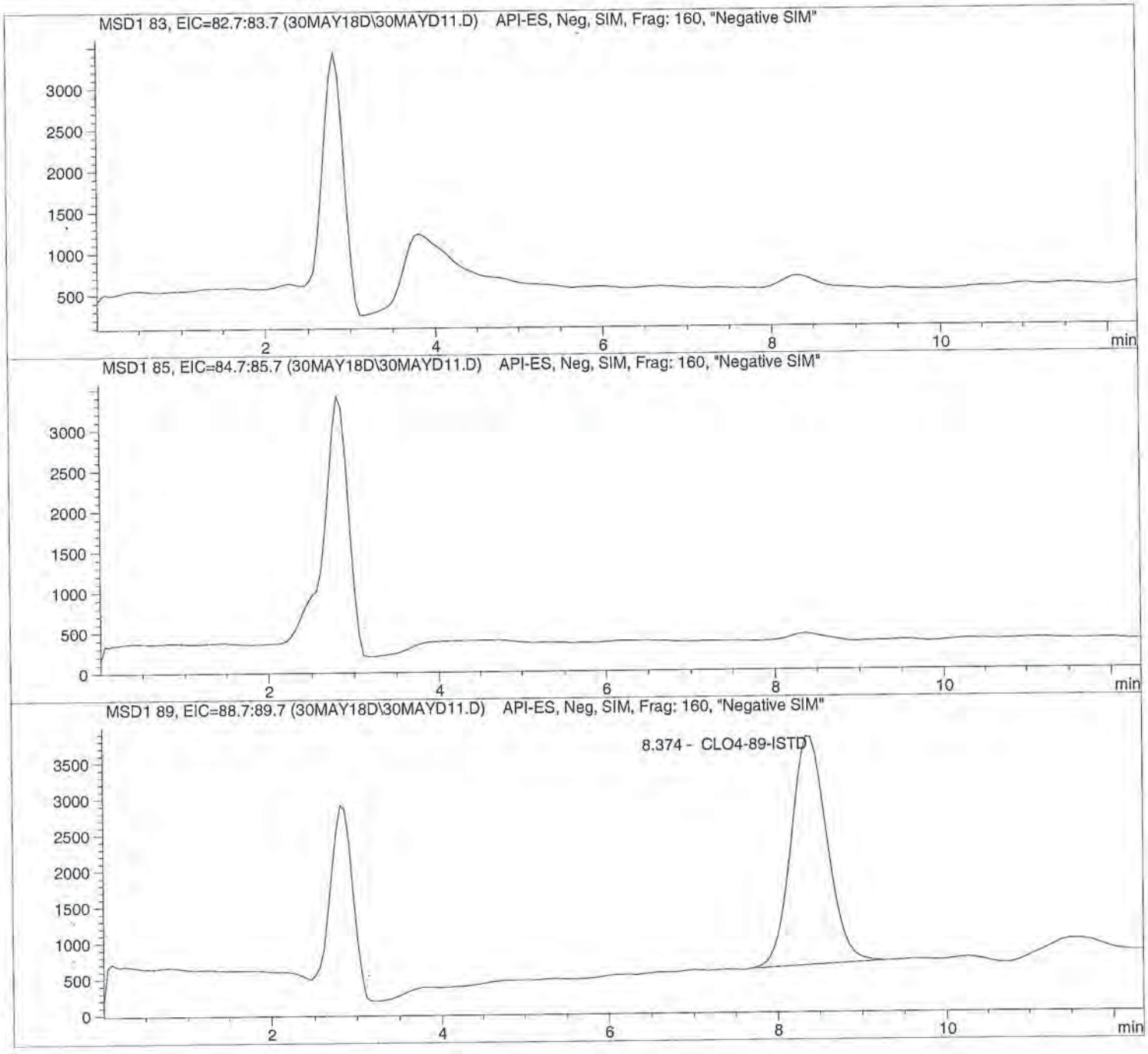
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD11.D Sample Name: 1813746004

Injection Date:	5/30/2018 10:57:34	Seq Line:	11
Sample Name:	1813746004	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD11.D Sample Name: 1813746004

Injection Date:	5/30/2018 10:57:34	Seq Line:	11
Sample Name:	1813746004	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.374	PBA	93868.6	5.0000	CLO4-89-ISTD

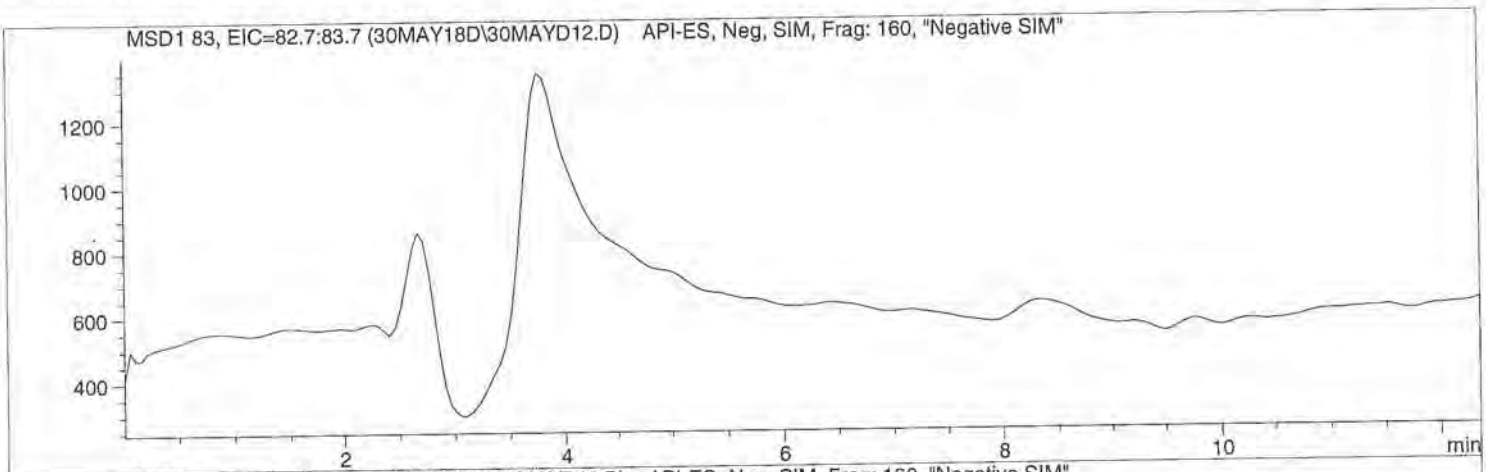
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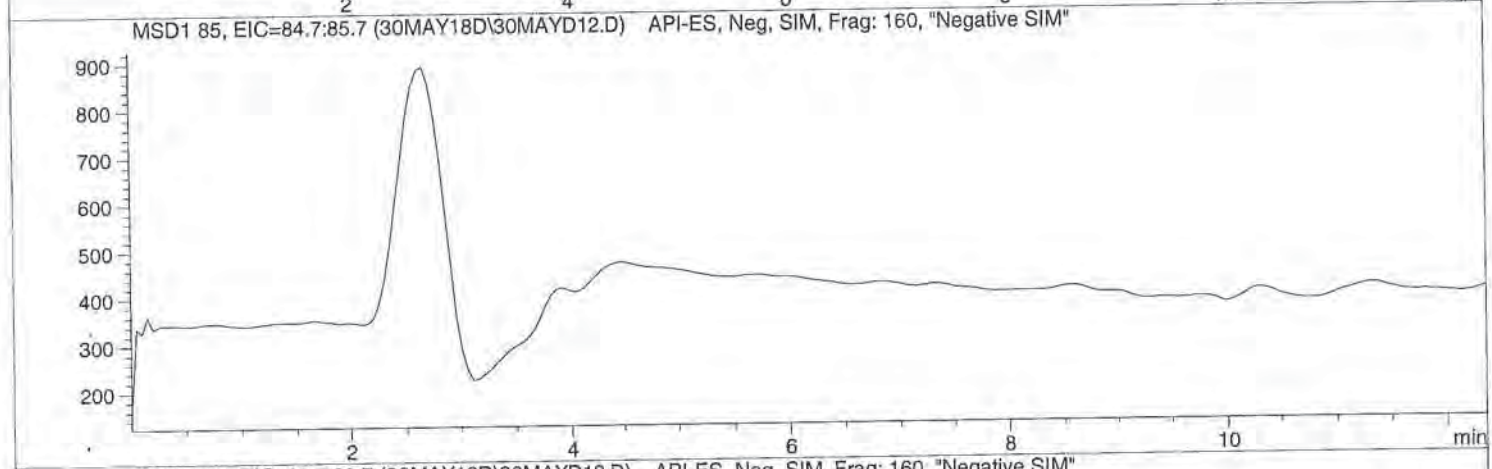
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD12.D Sample Name: 1813746005

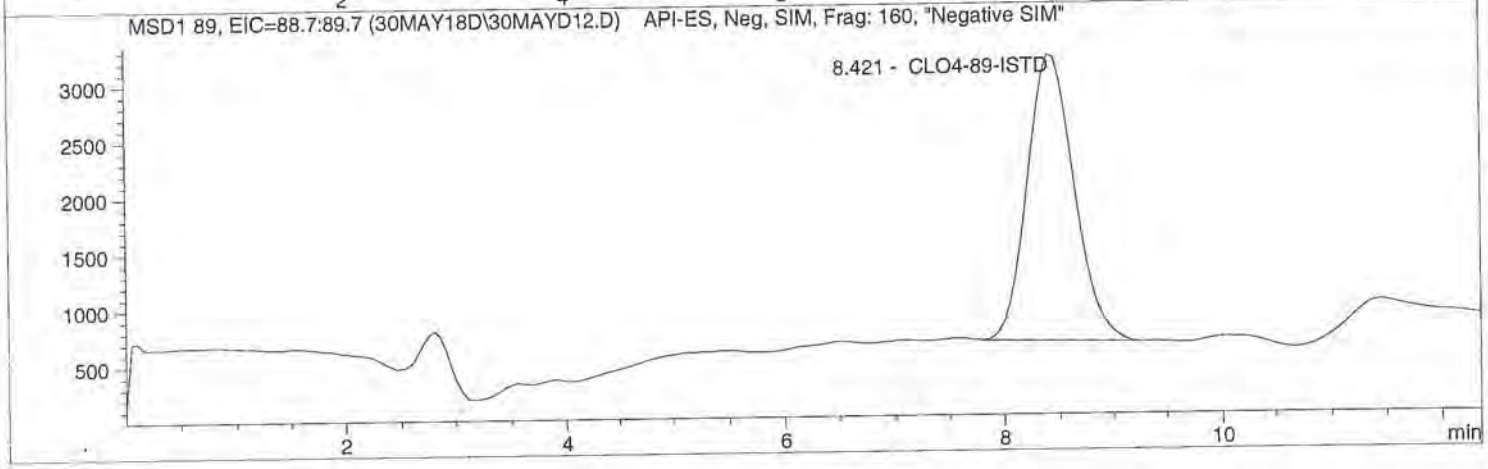
Injection Date:	5/30/2018 11:11:41	Seq Line:	12
Sample Name:	1813746005	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD12.D Sample Name: 1813746005

Injection Date:	5/30/2018 11:11:41	Seq Line:	12
Sample Name:	1813746005	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.421	BBA	74883.0	5.0000	CLO4-89-ISTD

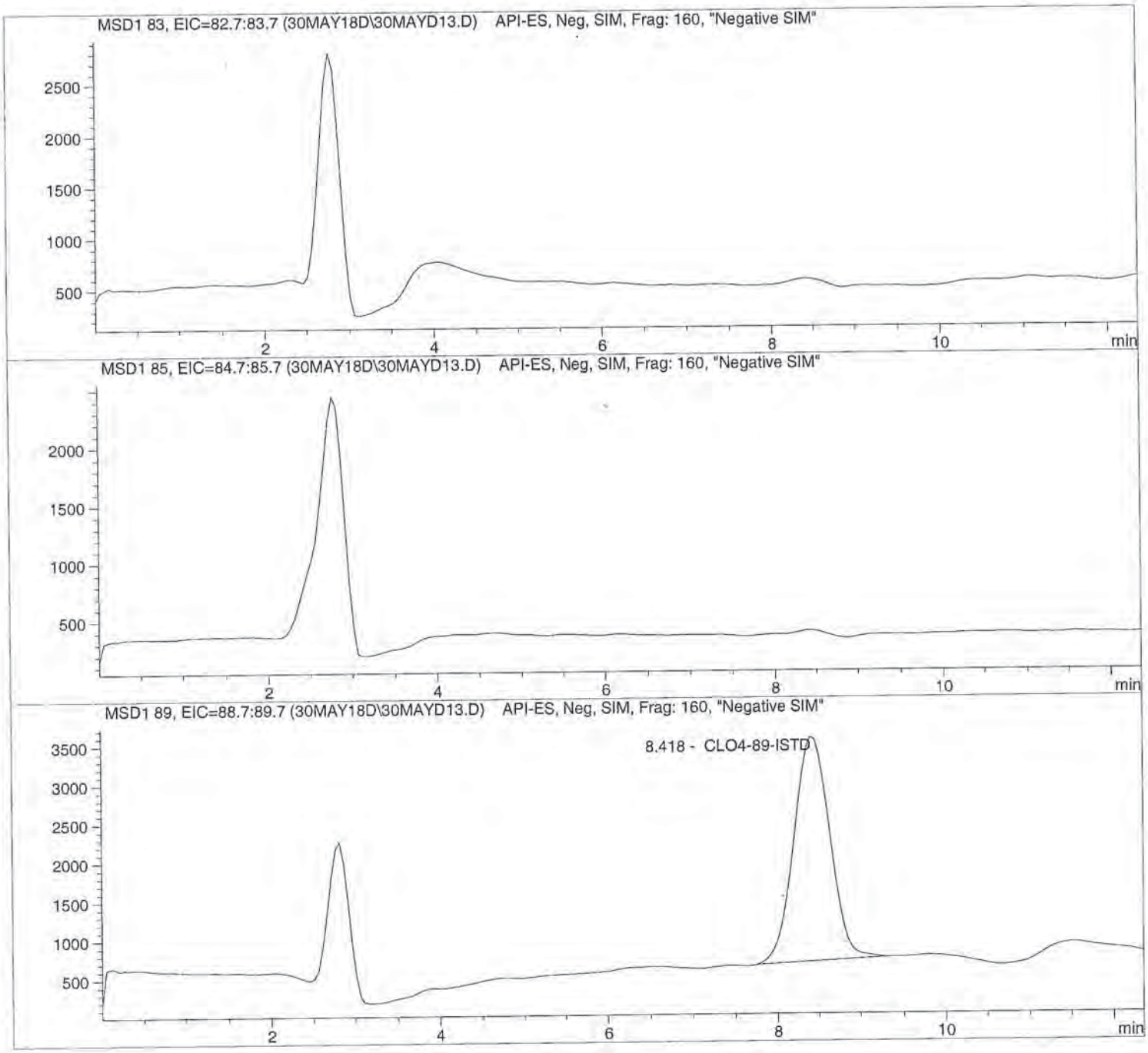
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD13.D Sample Name: 1813746006

Injection Date:	5/30/2018 11:25:48	Seq Line:	13
Sample Name:	1813746006	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD13.D Sample Name: 1813746006

Injection Date:	5/30/2018 11:25:48	Seq Line:	13
Sample Name:	1813746006	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.418	PBA	86717.4	5.0000	CLO4-89-ISTD

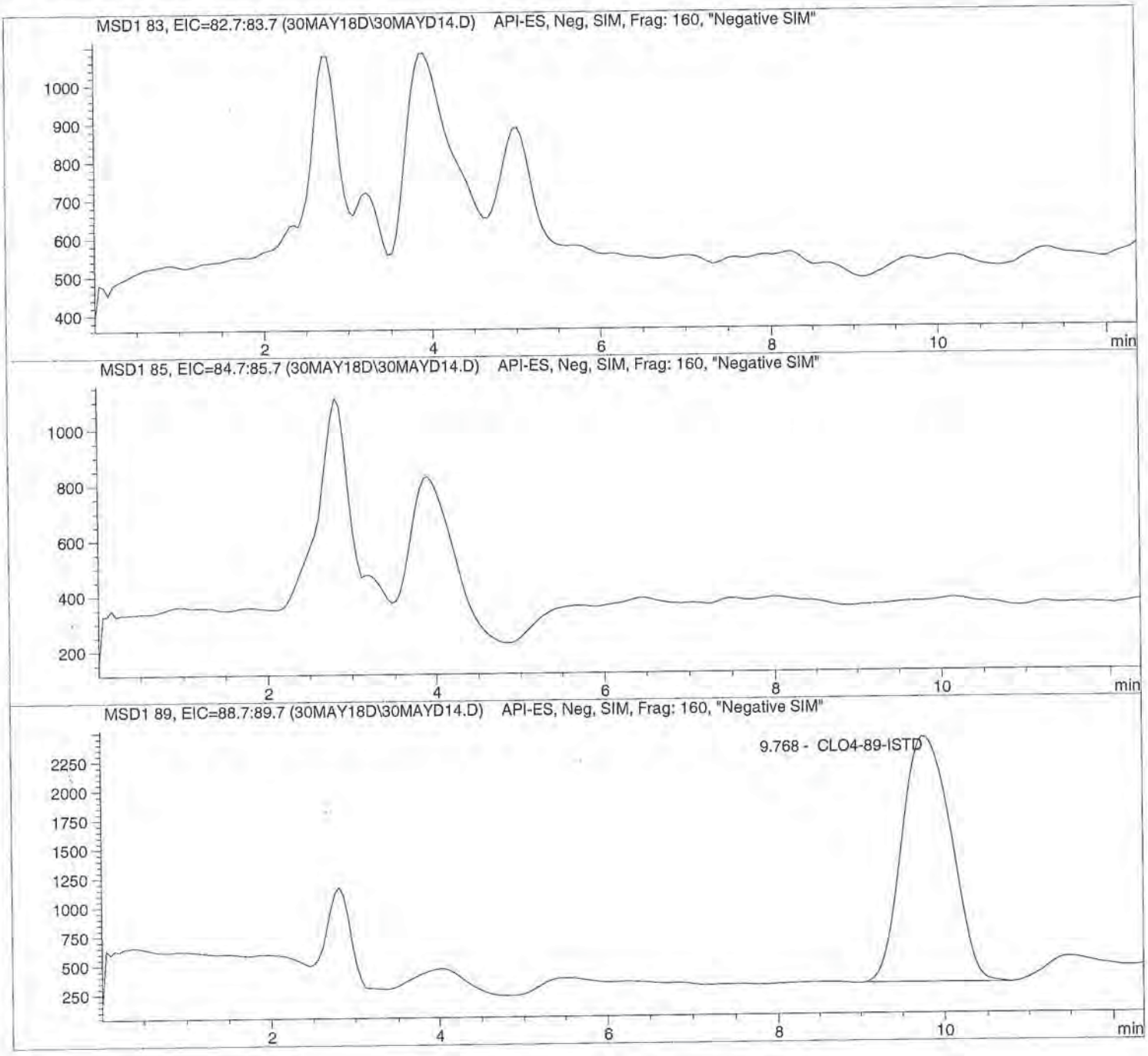
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD14.D Sample Name: 1814144001

Injection Date:	5/30/2018 11:39:56	Seq Line:	14
Sample Name:	1814144001	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD14.D Sample Name: 1814144001

Injection Date:	5/30/2018 11:39:56	Seq Line:	14
Sample Name:	1814144001	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.768	PBA	85310.4	5.0000	CLO4-89-ISTD

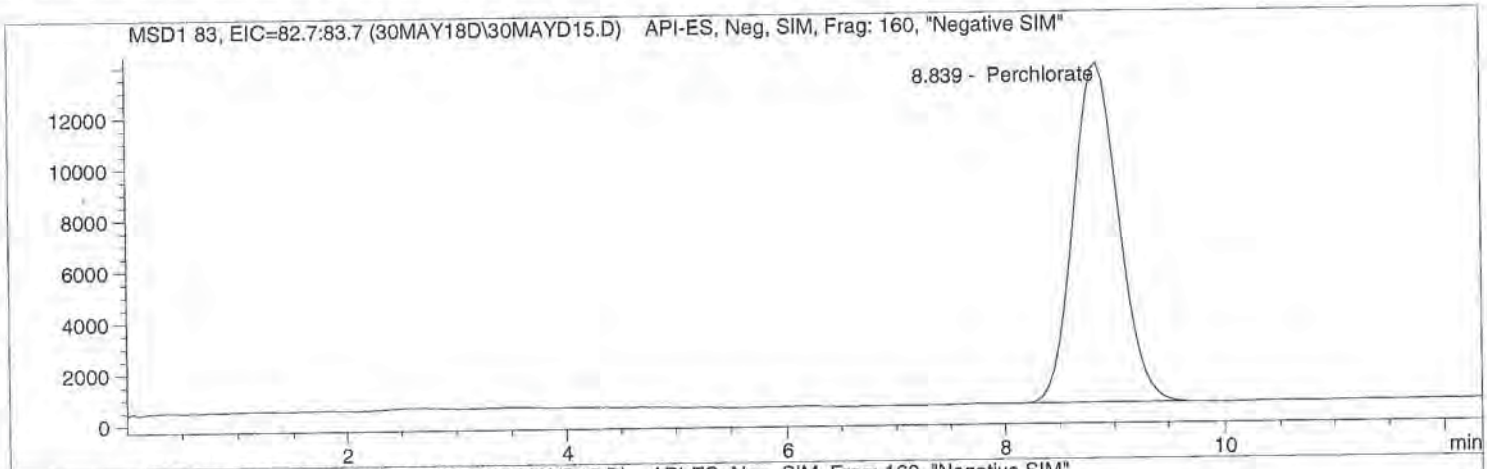
*** End of Report ***

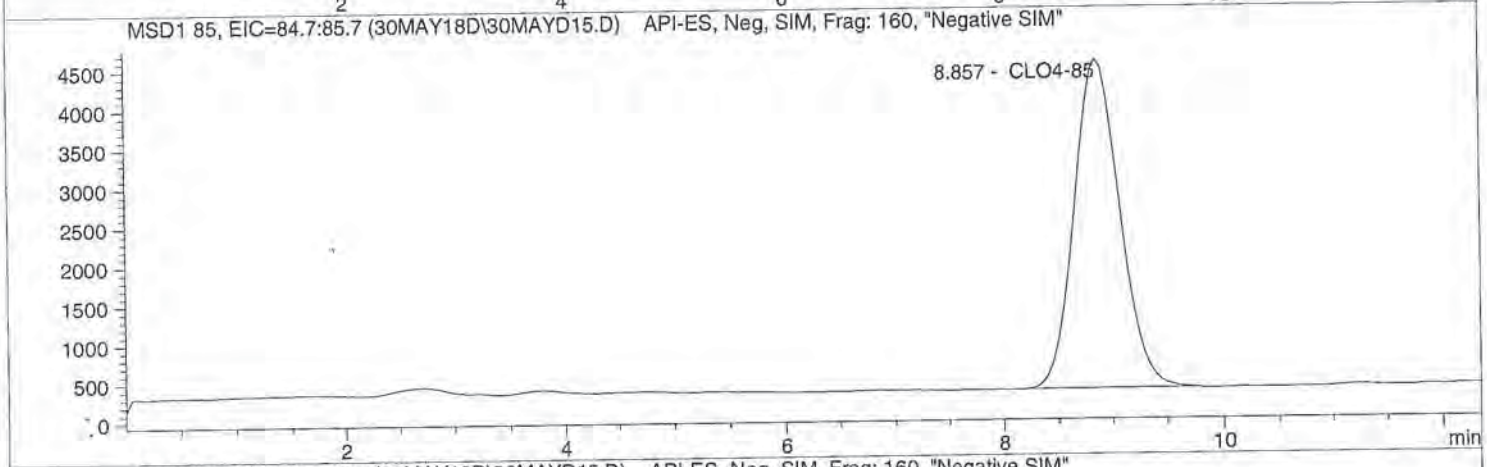
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD15.D Sample Name: 1814932001 1K

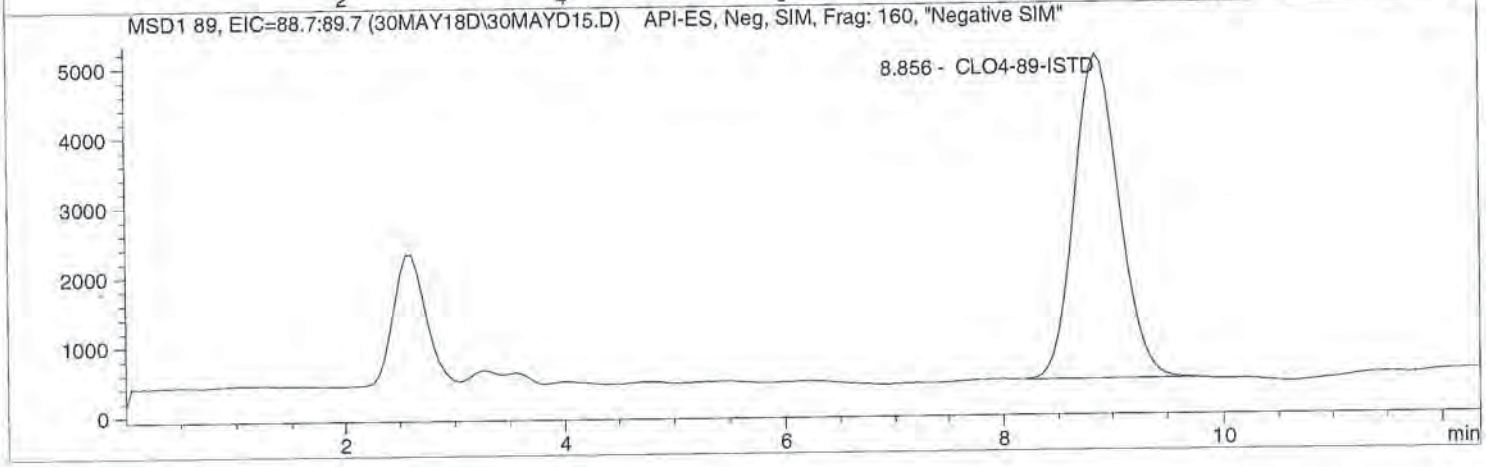
Injection Date:	5/30/2018 11:54:05	Seq Line:	15
Sample Name:	1814932001 1K	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD15.D Sample Name: 1814932001 1K

Injection Date:	5/30/2018 11:54:05	Seq Line:	15
Sample Name:	1814932001 1K	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1000.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.839	PBA	384295.5	12466.0215	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.857	BBA	123789.8	12635.9492	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.856	BBA	135180.3	5000.0000	CLO4-89-ISTD

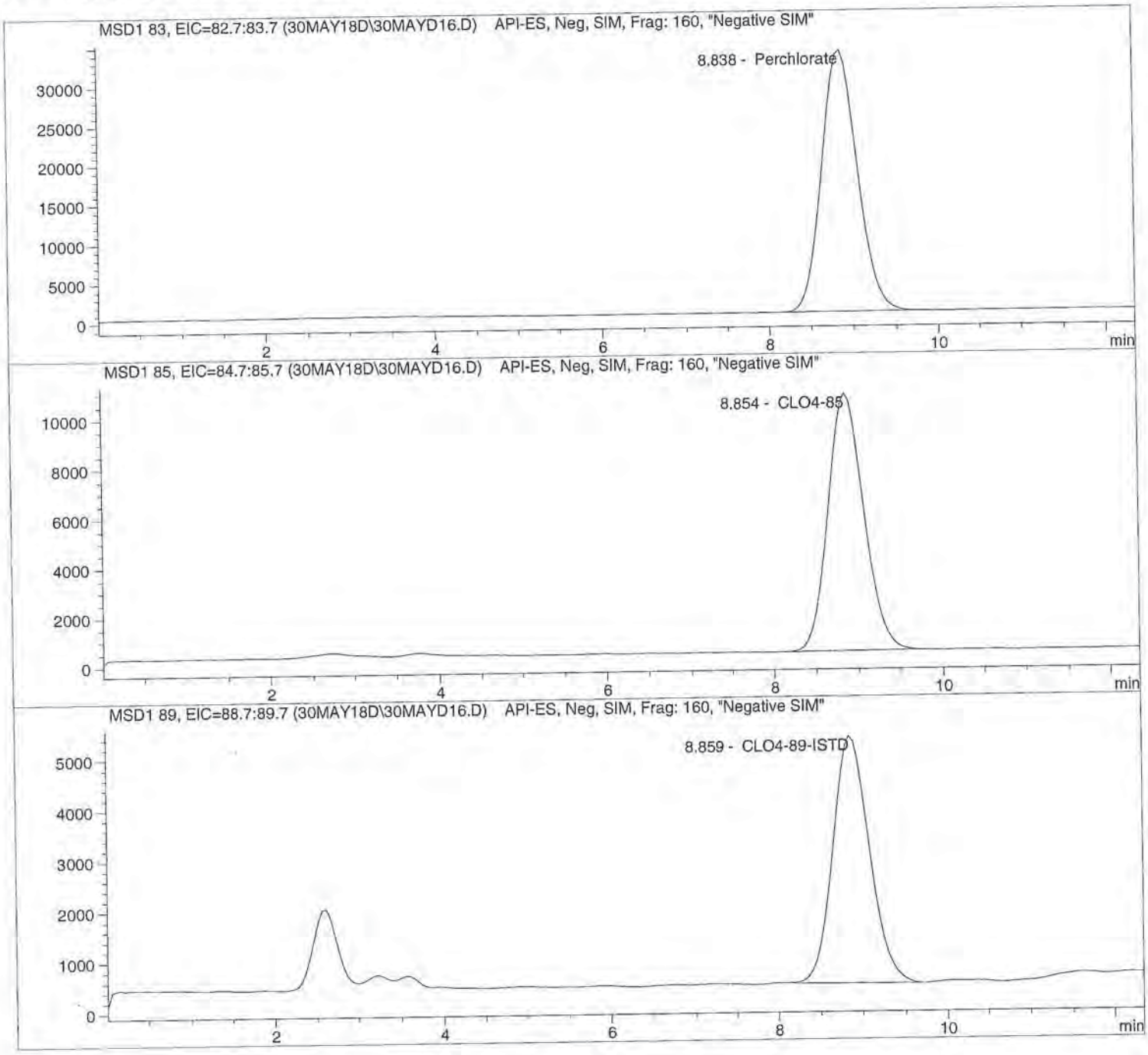
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD16.D Sample Name: 603144 CCV@25

Injection Date:	5/30/2018 12:08:16	Seq Line:	16
Sample Name:	603144 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD16.D Sample Name: 603144 CCV@25

Injection Date:	5/30/2018 12:08:16	Seq Line:	16
Sample Name:	603144 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.838	BBA	975034.7	26.9041	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.854	PBA	307089.1	27.2648	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.859	BBA	146863.3	5.0000	CLO4-89-ISTD

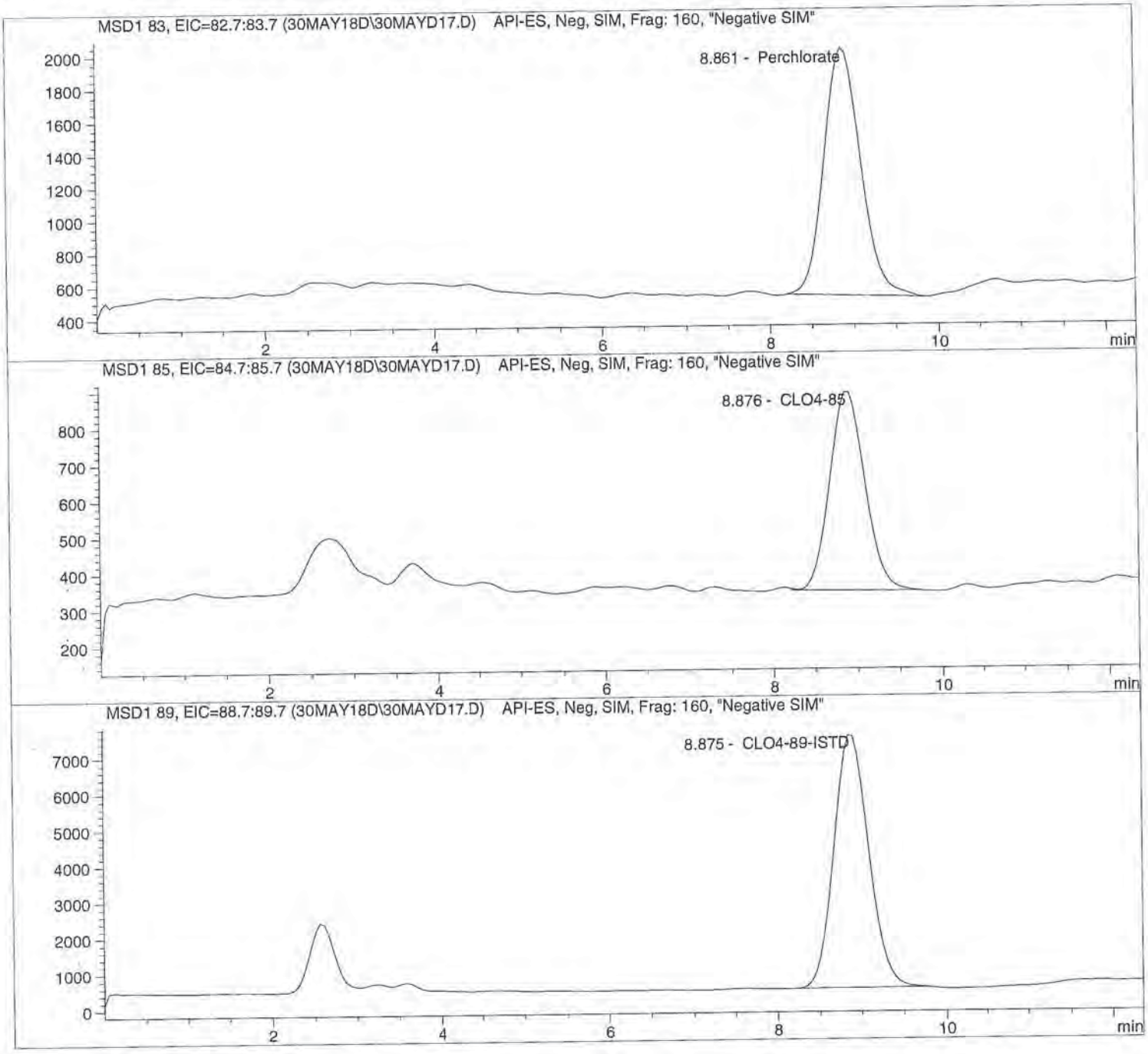
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD17.D Sample Name: 603145 LODV@1.

Injection Date:	5/30/2018 12:22:22	Seq Line:	17
Sample Name:	603145 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD17.D Sample Name: 603145 LODV@1.

Injection Date:	5/30/2018 12:22:22	Seq Line:	17
Sample Name:	603145 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.861	PBA	45781.8	1.0121	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.876	BBA	16048.1	0.9913	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.875	PBA	204081.9	5.0000	CLO4-89-ISTD

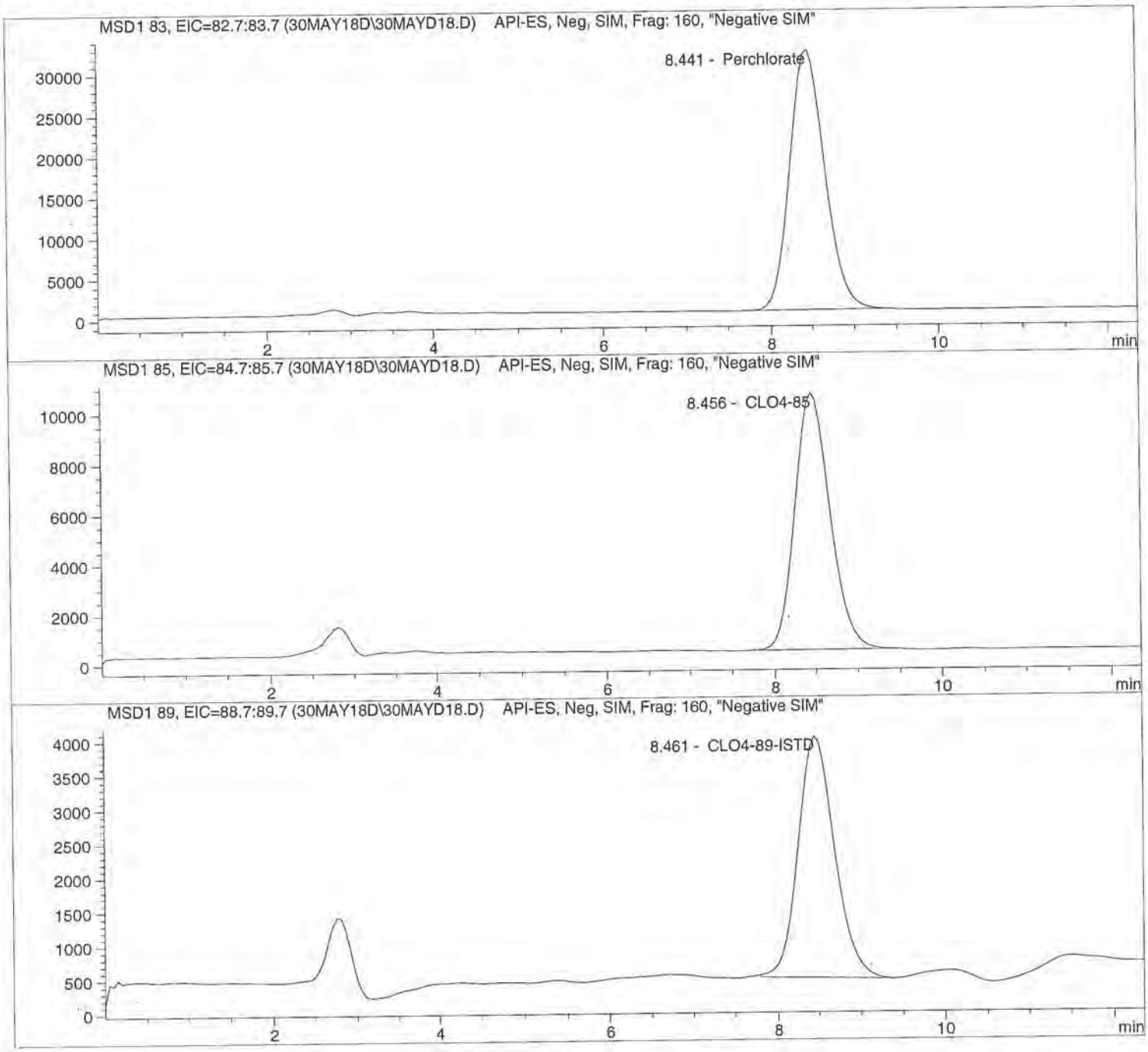
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD18.D Sample Name: 1814934001

Injection Date:	5/30/2018 12:36:32	Seq Line:	18
Sample Name:	1814934001	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD18.D Sample Name: 1814934001

Injection Date:	5/30/2018 12:36:32	Seq Line:	18
Sample Name:	1814934001	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.441	PBA	932498.9	33.8766	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.456	BBA	300524.9	35.2906	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.461	BBA	107551.7	5.0000	CLO4-89-ISTD

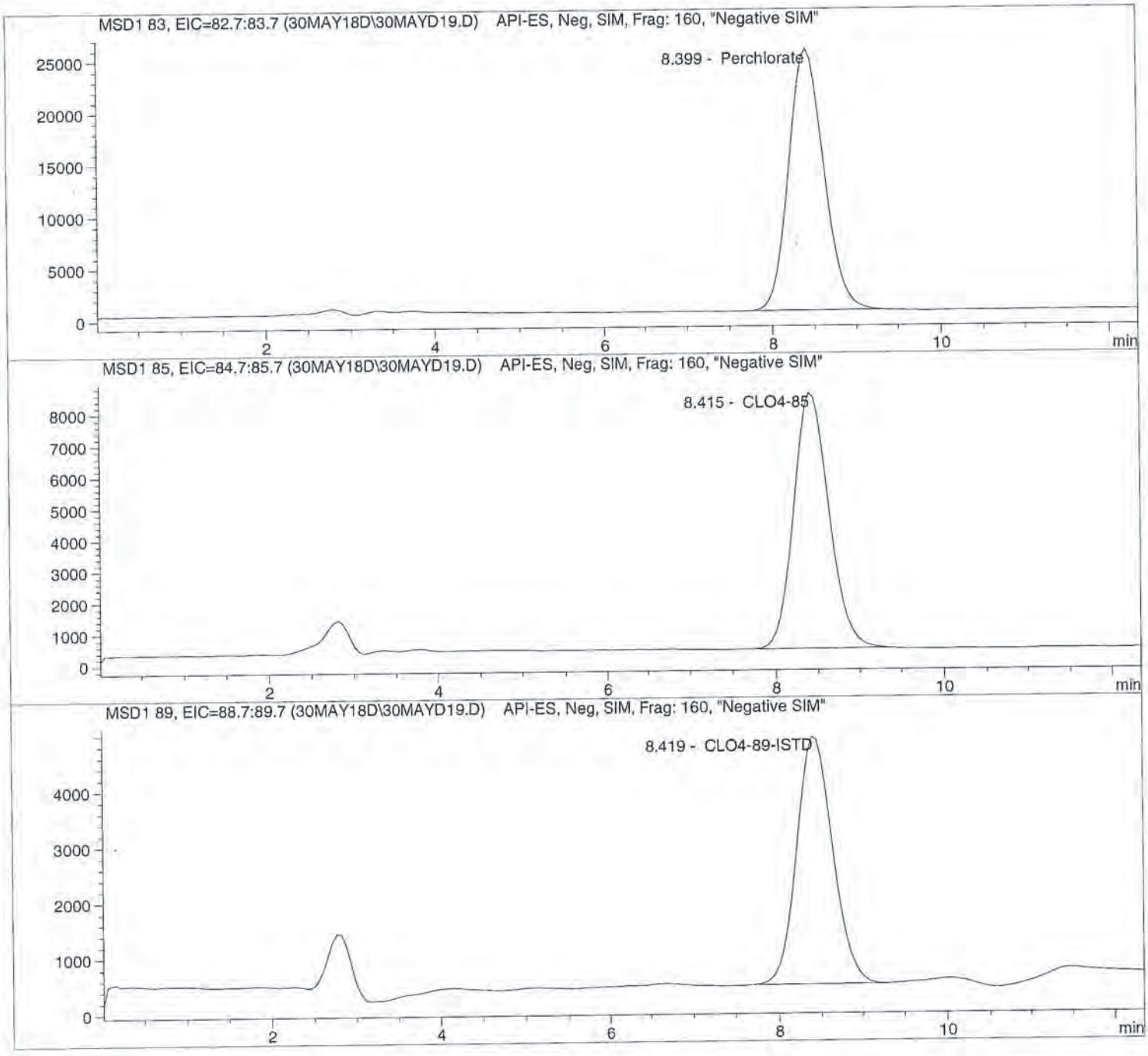
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD19.D Sample Name: 1814935001

Injection Date:	5/30/2018 12:50:38	Seq Line:	19
Sample Name:	1814935001	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD19.D Sample Name: 1814935001

Injection Date:	5/30/2018 12:50:38	Seq Line:	19
Sample Name:	1814935001	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.399	PBA	725810.6	22.7469	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.415	BBA	236380.5	23.6499	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.419	PBA	132221.0	5.0000	CLO4-89-ISTD

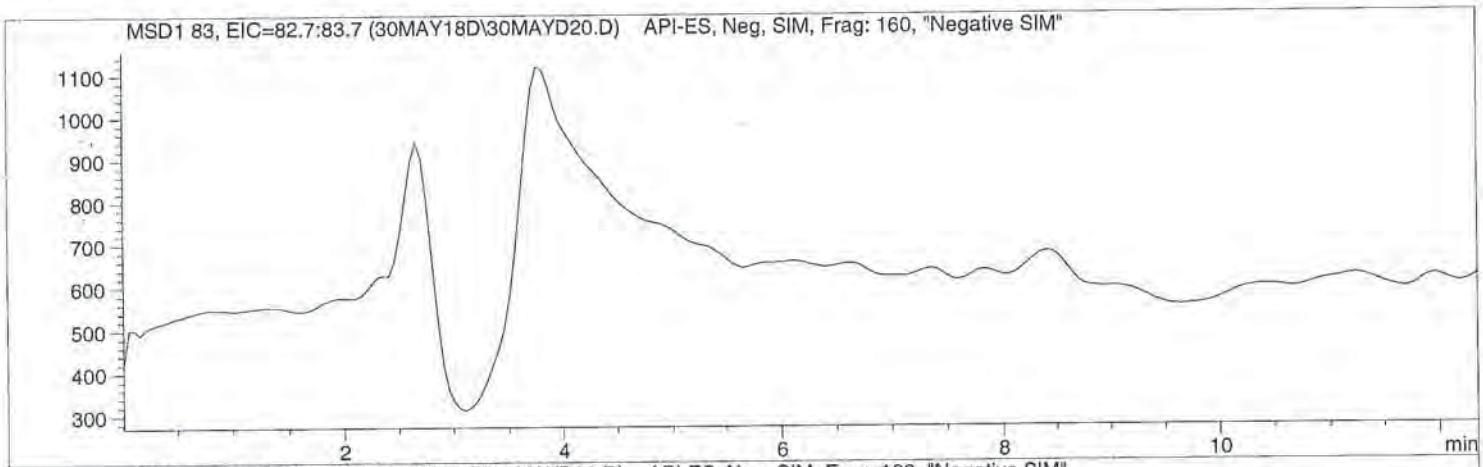
*** End of Report ***

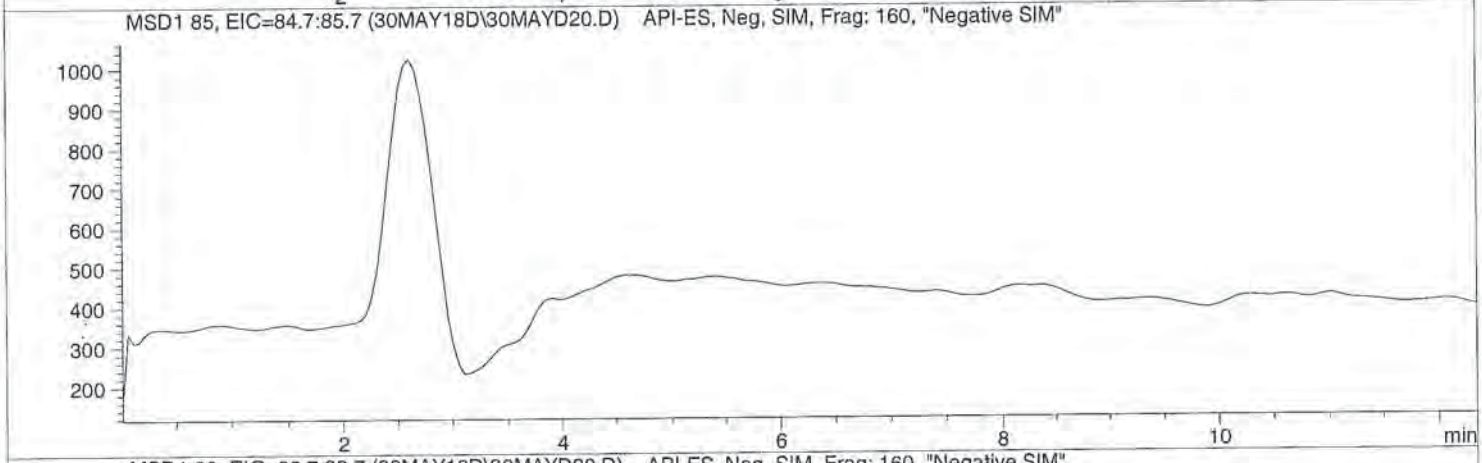
Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD20.D Sample Name: 1813746005 RE

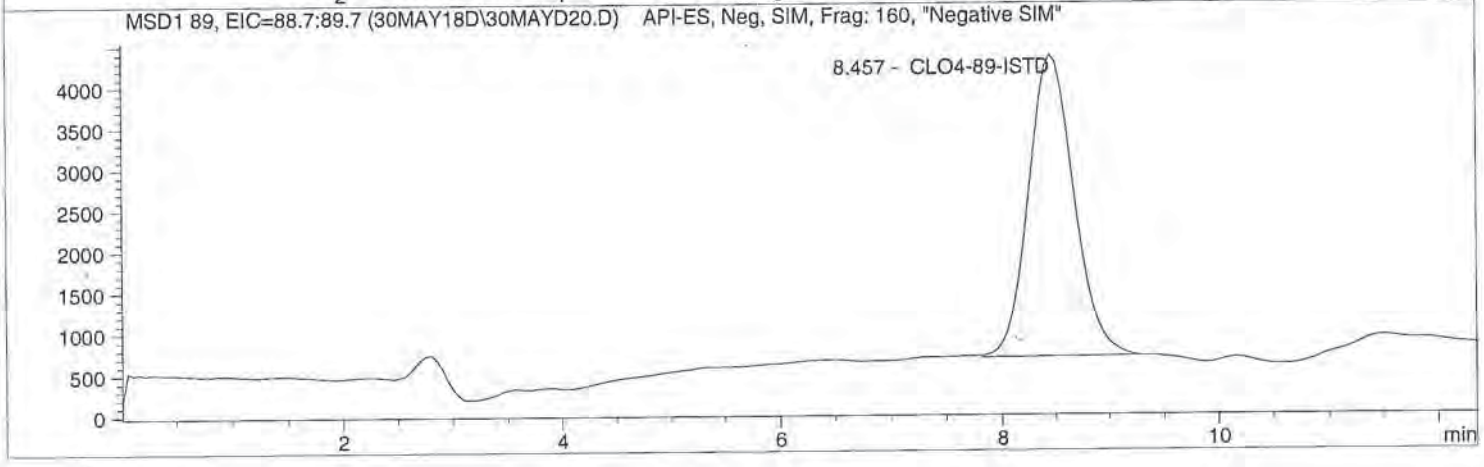
Injection Date:	5/30/2018 13:04:47	Seq Line:	20
Sample Name:	1813746005 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD20.D Sample Name: 1813746005 RE

Injection Date:	5/30/2018 13:04:47	Seq Line:	20
Sample Name:	1813746005 RE	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.457	BBA	107709.2	5.0000	CLO4-89-ISTD

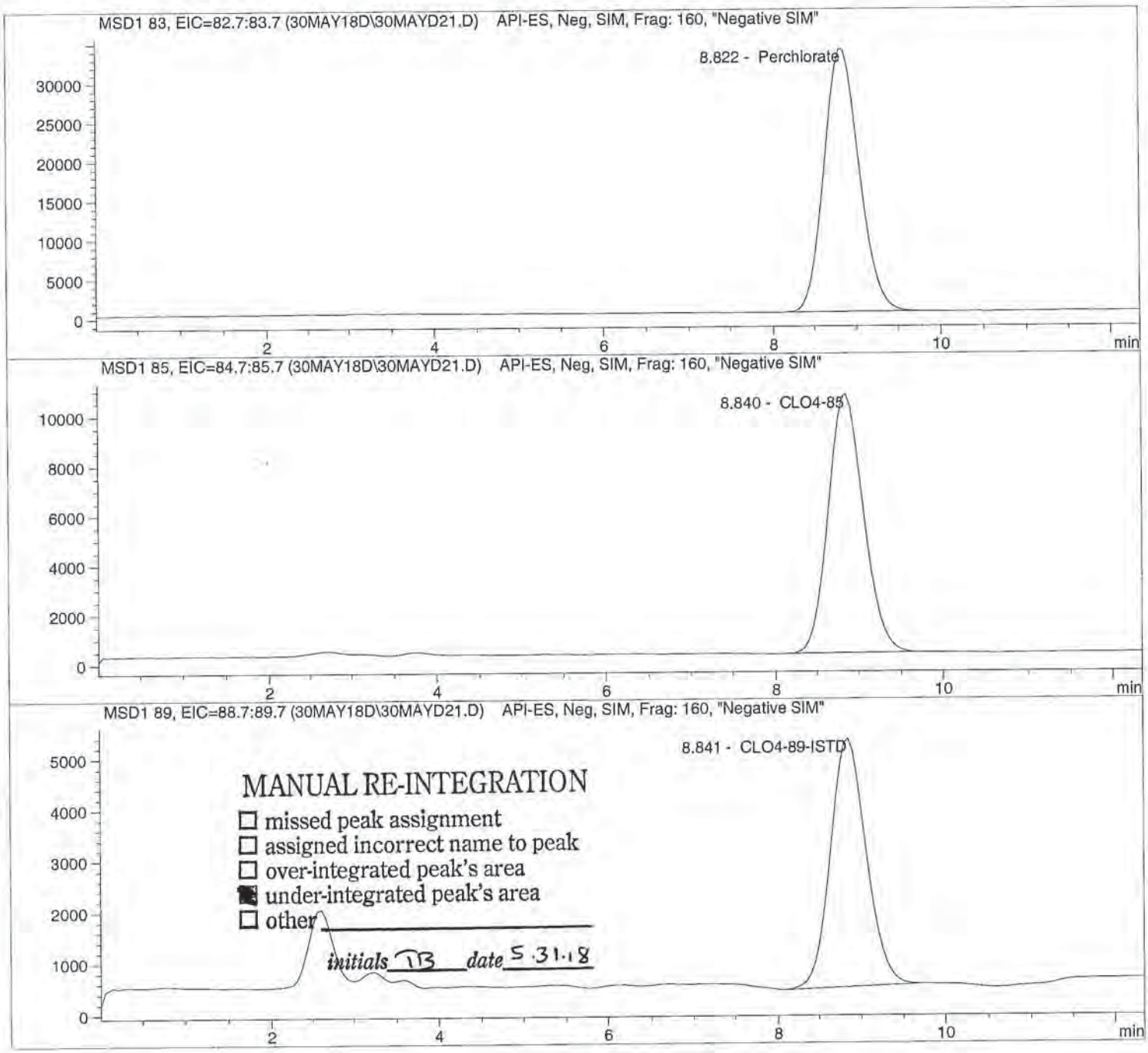
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD21.D Sample Name: 603231 CCV@25

Injection Date:	5/30/2018 13:18:56	Seq Line:	21
Sample Name:	603231 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD21.D Sample Name: 603231 CCV@25

Injection Date:	5/30/2018 13:18:56	Seq Line:	21
Sample Name:	603231 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.822	PBA	974747.6	27.3937	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.840	PBA	303819.0	27.5173	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.841	MM	143821.2	5.0000	CLO4-89-ISTD

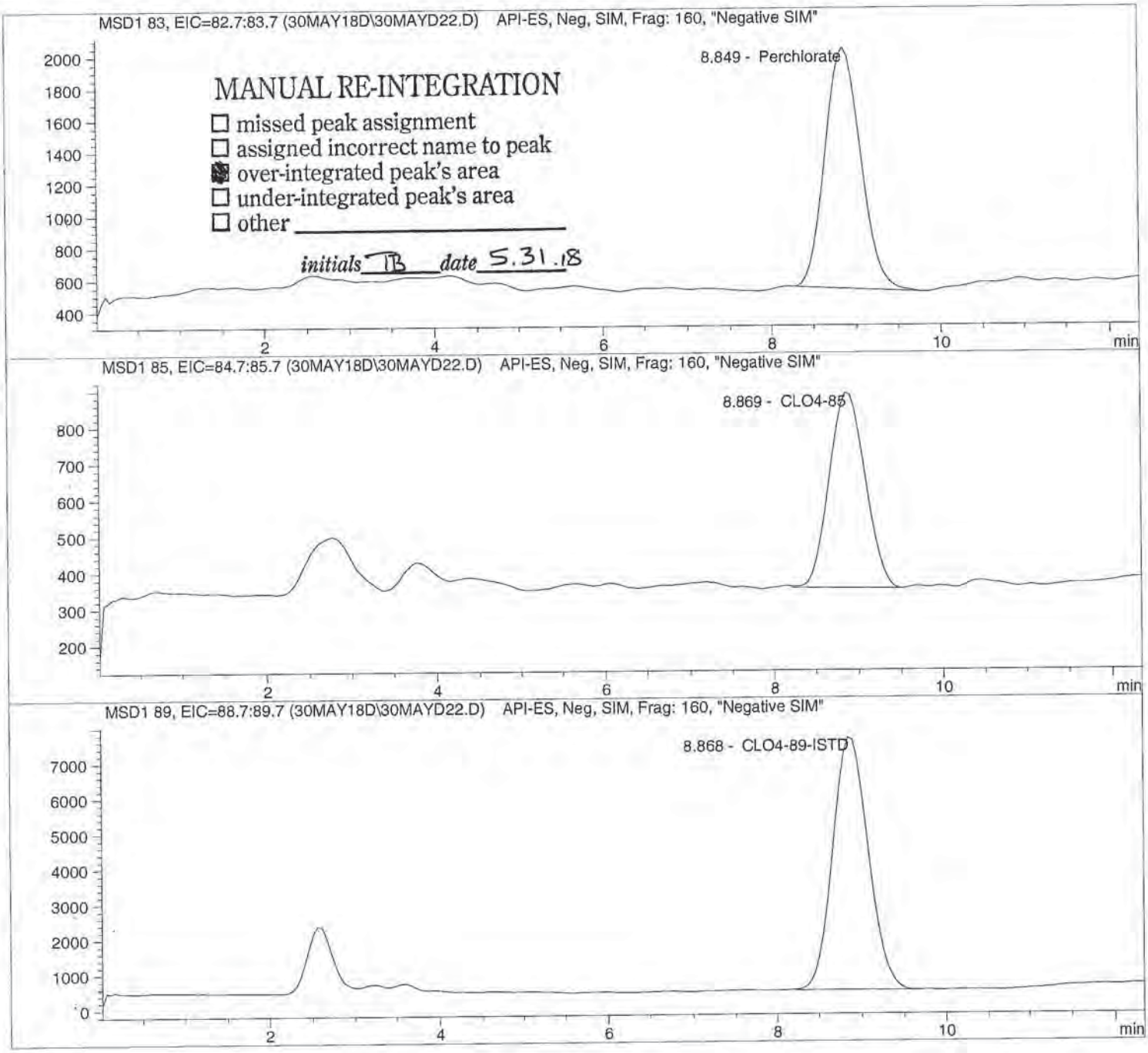
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD22.D Sample Name: 603232 LODV@1.

Injection Date:	5/30/2018 13:33:11	Seq Line:	22
Sample Name:	603232 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD22.D Sample Name: 603232 LODV@1.

Injection Date:	5/30/2018 13:33:11	Seq Line:	22
Sample Name:	603232 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.849	MM	43833.2	0.9482	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.869	BBA	15702.2	0.9449	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.868	BBA	208034.0	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Batch Report: C:\HPCHEM\1\DATA\02APR18D\02APR18I.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#	Sample Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
*	ICAL1@ 1.0ug/L Vial 71	1	Control	1	4.75217e4	8.805	1.04383
*	ICAL2@ 2.0ug/L Vial 72	1	Control	2	7.57673e4	8.842	1.88584
*	ICAL3@ 5.0ug/L Vial 73	1	Control	3	1.87507e5	8.869	5.06681
*	ICAL4@ 10.ug/L Vial 74	1	Control	4	4.00349e5	8.838	9.89695
*	ICAL5@ 25.ug/L Vial 75	1	Control	5	1.13339e6	8.844	25.44483
*	ICAL6@ 50.ug/L Vial 76	1	Control	6	2.22347e6	8.787	49.47140
*	ICAL7@ 75.ug/L Vial 77	1	Control	7	3.56432e6	8.816	75.20096
*	ICAL Verf@10ug/L Vial 78	1	Control	8	3.99588e5	8.826	10.16984

#	Sample Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	ICAL1@ 1.0ug/L Vial 71	1	Control	1	1.48071e4	8.787	8.93940e-1
*	ICAL2@ 2.0ug/L Vial 72	1	Control	2	2.78914e4	8.863	2.05665
*	ICAL3@ 5.0ug/L Vial 73	1	Control	3	6.40466e4	8.880	5.32040
*	ICAL4@ 10.ug/L Vial 74	1	Control	4	1.32002e5	8.855	10.20400
*	ICAL5@ 25.ug/L Vial 75	1	Control	5	3.49808e5	8.856	25.27336
*	ICAL6@ 50.ug/L Vial 76	1	Control	6	6.58628e5	8.801	48.60374
*	ICAL7@ 75.ug/L Vial 77	1	Control	7	1.06294e6	8.833	75.70015
*	ICAL Verf@10ug/L Vial 78	1	Control	8	1.27530e5	8.845	10.16575

#	Sample Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	ICAL1@ 1.0ug/L Vial 71	1	Control	1	2.05633e5	8.818	5.00000
*	ICAL2@ 2.0ug/L Vial 72	1	Control	2	1.83981e5	8.862	5.00000
*	ICAL3@ 5.0ug/L Vial 73	1	Control	3	1.68695e5	8.888	5.00000
*	ICAL4@ 10.ug/L Vial 74	1	Control	4	1.79911e5	8.861	5.00000
*	ICAL5@ 25.ug/L Vial 75	1	Control	5	1.81917e5	8.865	5.00000
*	ICAL6@ 50.ug/L Vial 76	1	Control	6	1.62538e5	8.808	5.00000
*	ICAL7@ 75.ug/L Vial 77	1	Control	7	1.52621e5	8.841	5.00000
*	ICAL Verf@10ug/L Vial 78	1	Control	8	1.74490e5	8.846	5.00000

*** End of Report ***

Method C:\HPCHEM\1\METHODS\CLO4-DPR.M

Calibration Table

Perchlorate

Calib. Data Modified : 4/2/2018 11:32:41 AM

Calculate : Internal Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : No recalibration if peaks missing

Curve Type : Quadratic (some peaks differ, see below)
Origin : Ignored (some peaks differ, see below)
Weight : Linear (Amnt) (some peaks differ, see below)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

Default Sample ISTD Information (if not set in sample table):

ISTD #	ISTD Amount	Name
1	5.00000	CLO4-89-ISTD

Signal 1: MSD1 83, EIC=82.7:83.7
Signal 2: MSD1 85, EIC=84.7:85.7
Signal 3: MSD1 89, EIC=88.7:89.7

RetTime [min]	Sig	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
8.740	1	1	1.00000	4.75217e4	2.10430e-5		1	Perchlorate
		2	2.00000	7.57673e4	2.63966e-5			
		3	5.00000	1.87507e5	2.66656e-5			
		4	10.00000	4.00349e5	2.49782e-5			
		5	25.00000	1.13339e6	2.20577e-5			
		6	50.00000	2.22347e6	2.24874e-5			
		7	75.00000	3.56432e6	2.10419e-5			
8.787	2	1	1.00000	1.48071e4	6.75351e-5		1	CLO4-85
		2	2.00000	2.78914e4	7.17068e-5			
		3	5.00000	6.40466e4	7.80681e-5			
		4	10.00000	1.32002e5	7.57564e-5			
		5	25.00000	3.49808e5	7.14678e-5			
		6	50.00000	6.58628e5	7.59154e-5			
		7	75.00000	1.06294e6	7.05587e-5			
8.818	3	1	5.00000	2.05633e5	2.43151e-5	+I1		CLO4-89-ISTD
		2	5.00000	1.83981e5	2.71766e-5			
		3	5.00000	1.68695e5	2.96393e-5			
		4	5.00000	1.79911e5	2.77915e-5			
		5	5.00000	1.81917e5	2.74851e-5			
		6	5.00000	1.62538e5	3.07621e-5			

Method C:\HPCHEM\1\METHODS\CLO4-DPR.M

RetTime [min]	Sig	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
		7	5.00000	1.52621e5	3.27608e-5			

More compound-specific settings:

Compound: Perchlorate
- Time Window : From 6.650 min To 10.650 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 0.5
  - Level 3 : 0.2
  - Level 4 : 0.1
  - Level 5 : 0.04
  - Level 6 : 0.02
  - Level 7 : 0.013333

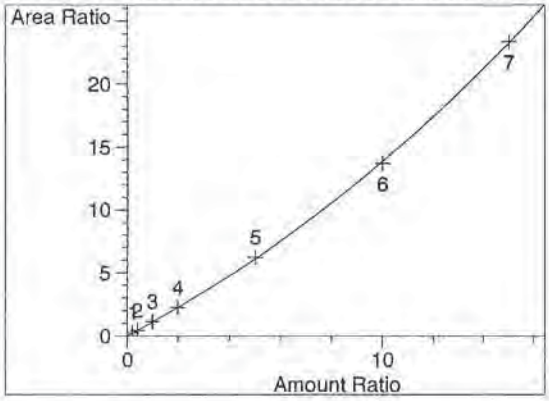
Compound: CLO4-85
- Time Window : From 6.682 min To 10.682 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 0.5
  - Level 3 : 0.2
  - Level 4 : 0.1
  - Level 5 : 0.04
  - Level 6 : 0.02
  - Level 7 : 0.013333

Compound: CLO4-89-ISTD
- Time Window : From 6.711 min To 10.711 min
- Curve Type : Linear
- Origin : Included
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 1
  - Level 3 : 1
  - Level 4 : 1
  - Level 5 : 1
  - Level 6 : 1
  - Level 7 : 1

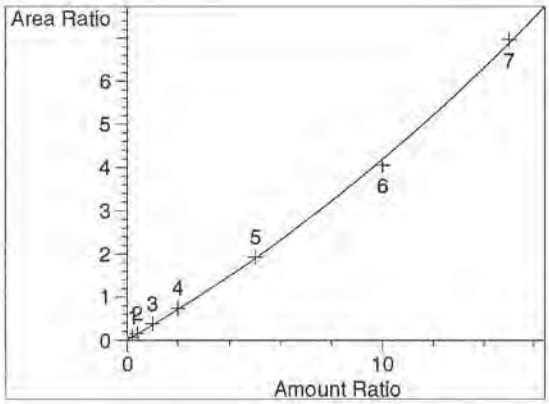
Peak Sum Table

No Entries in table

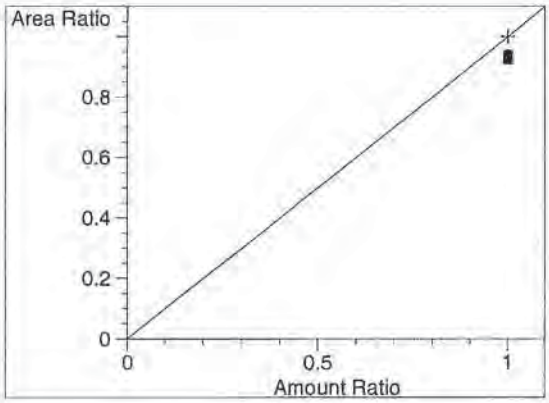
Calibration Curves



Perchlorate at exp. RT: 8.740
MSD1 83, EIC=82.7:83.7
Correlation: 0.99992
Residual Std. Dev.: 0.10616
Formula: $y = ax^2 + bx + c$
a: 3.31374e-2
b: 1.05374
c: 9.66975e-3
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333



CLO4-85 at exp. RT: 8.787
MSD1 85, EIC=84.7:85.7
Correlation: 0.99968
Residual Std. Dev.: 0.07365
Formula: $y = ax^2 + bx + c$
a: 8.04074e-3
b: 3.37521e-1
c: 1.14057e-2
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333



CLO4-89-ISTD at exp. RT: 8.818
MSD1 89, EIC=88.7:89.7
Correlation: 1.00000
Residual Std. Dev.: 0.00000
Formula: $y = mx + b$
m: 1.00000
b: 0.00000
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 1
Level 3 : 1
Level 4 : 1
Level 5 : 1
Level 6 : 1
Level 7 : 1

Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\APR\02APR18D.S

Sequence Table:

Method and Injection Info Part:

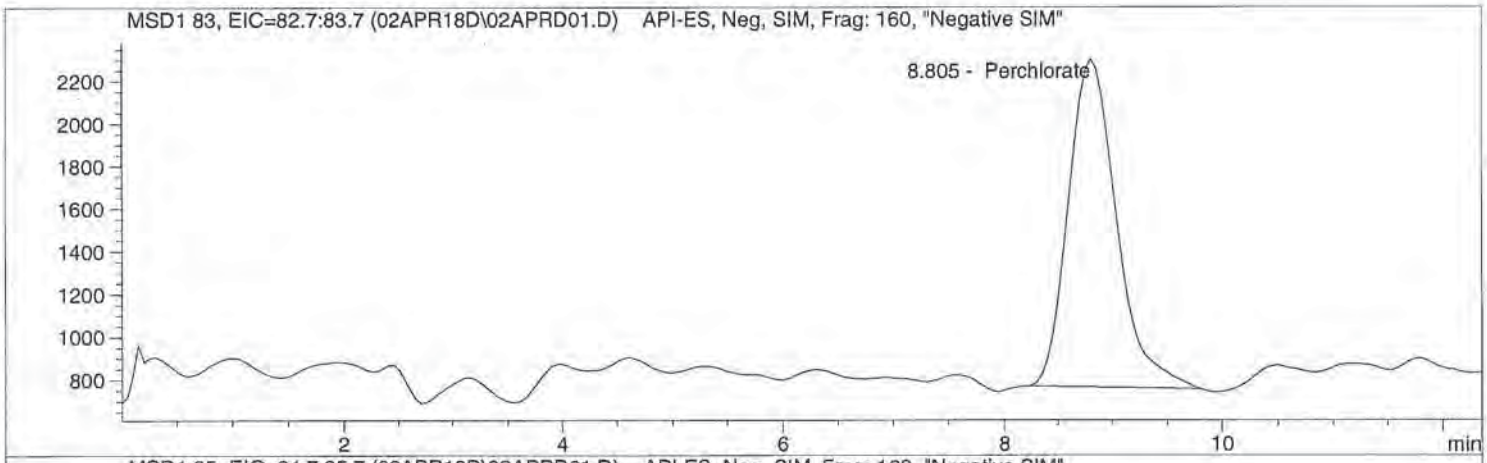
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	ICAL1@ 1.0ug/L	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	ICAL2@ 2.0ug/L	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	ICAL3@ 5.0ug/L	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	ICAL4@ 10.ug/L	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	ICAL5@ 25.ug/L	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	ICAL6@ 50.ug/L	CLO4-DOD	1	Ctrl Samp		
7	Vial 77	ICAL7@ 75.ug/L	CLO4-DOD	1	Ctrl Samp		
8	Vial 78	ICAL Verf@10ug/L	CLO4-DOD	1	Ctrl Samp		

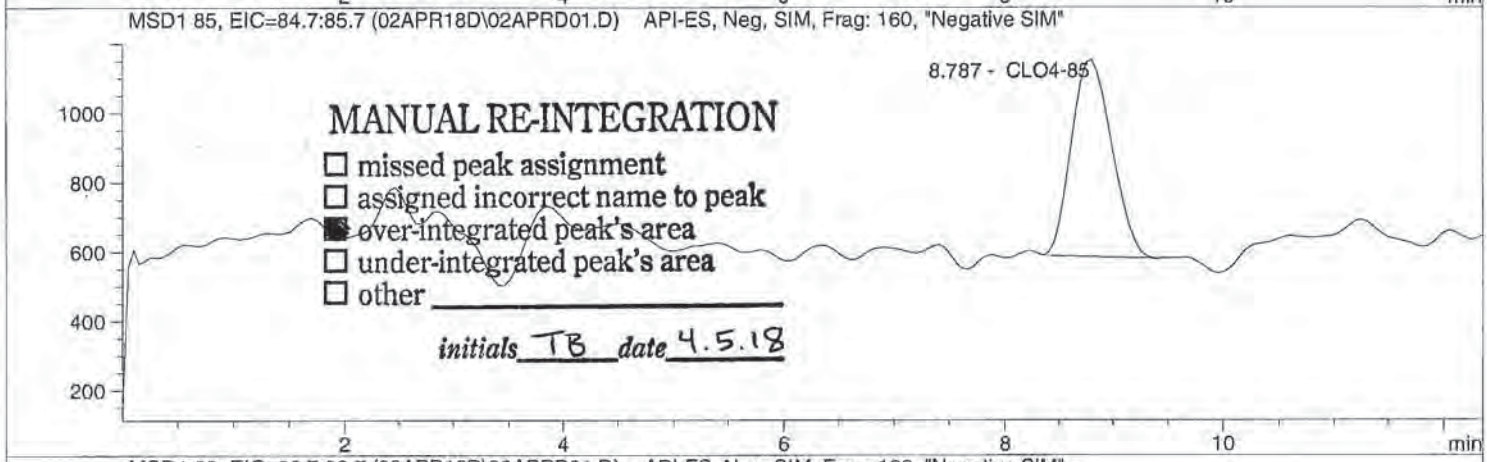
Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

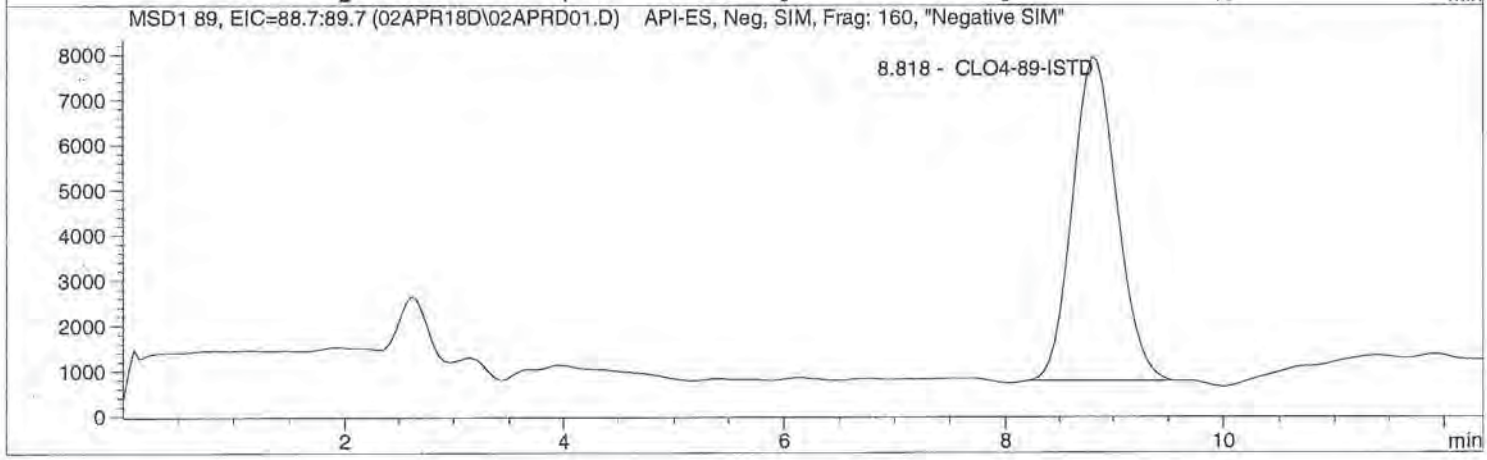
Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis





MANUAL RE-INTEGRATION
☐ missed peak assignment
☐ assigned incorrect name to peak
■ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____
initials TB *date* 4.5.18



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.805	PBA	47521.7	1.0438	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	MM	14807.1	0.8939	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.818	PBA	205633.2	5.0000	CLO4-89-ISTD

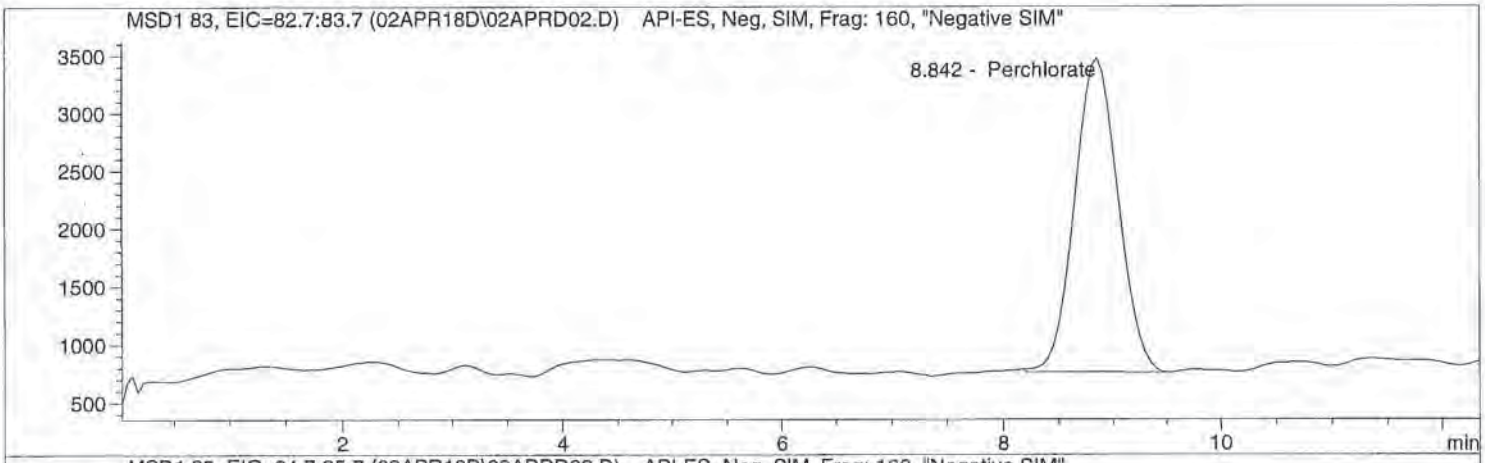
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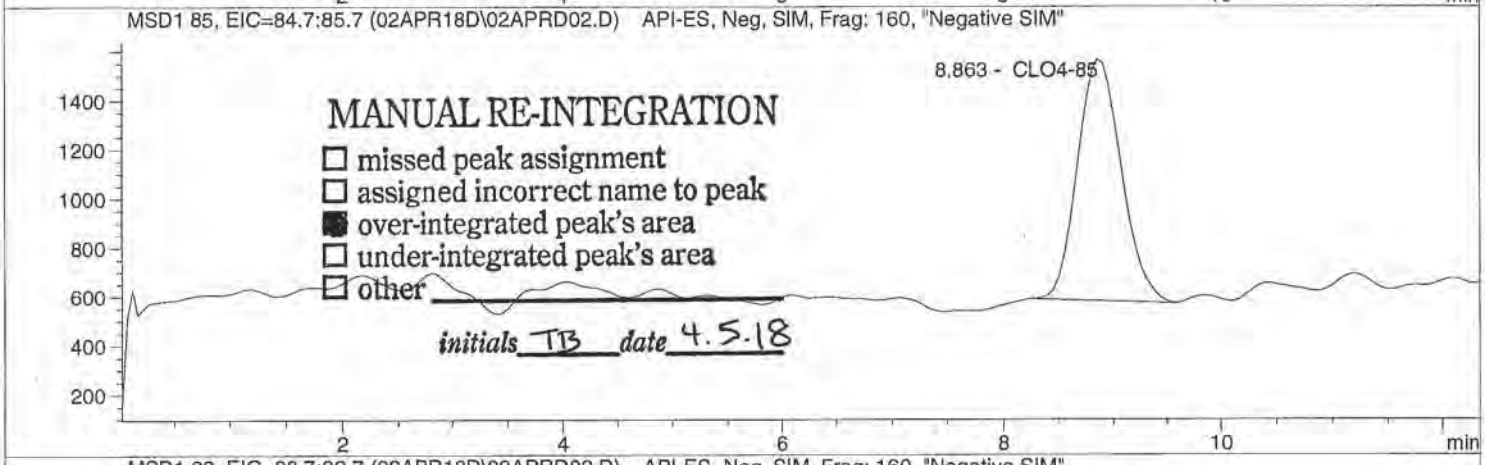
Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

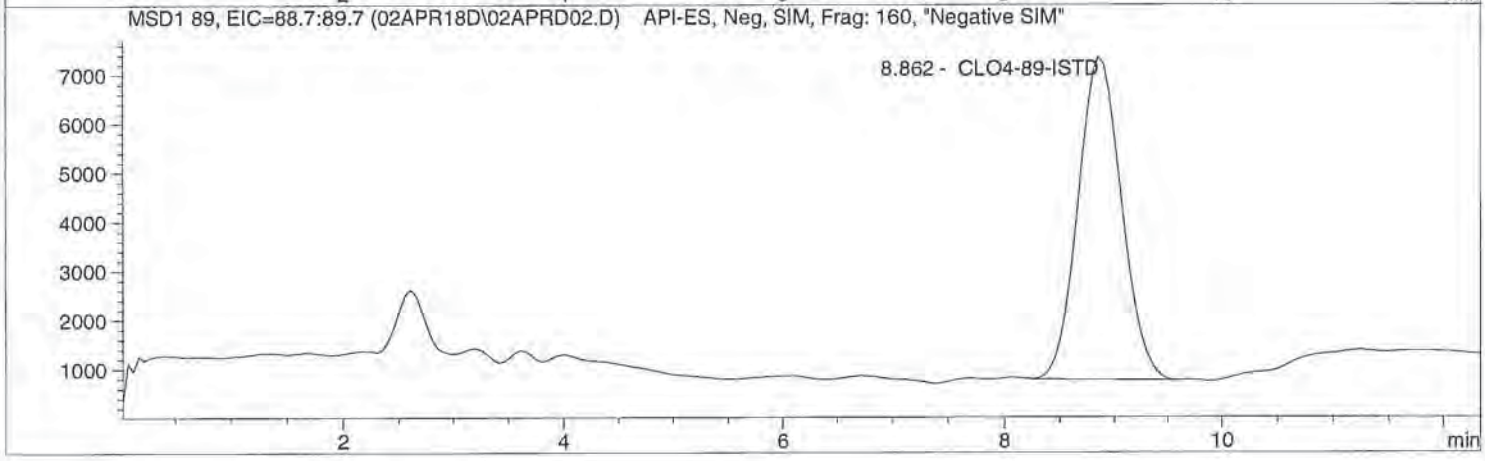
Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis





MANUAL RE-INTEGRATION
☐ missed peak assignment
☐ assigned incorrect name to peak
■ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____
initials TB *date* 4.5.18



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.842	BBA	75767.3	1.8858	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.863	MM	27891.4	2.0567	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.862	BBA	183981.5	5.0000	CLO4-89-ISTD

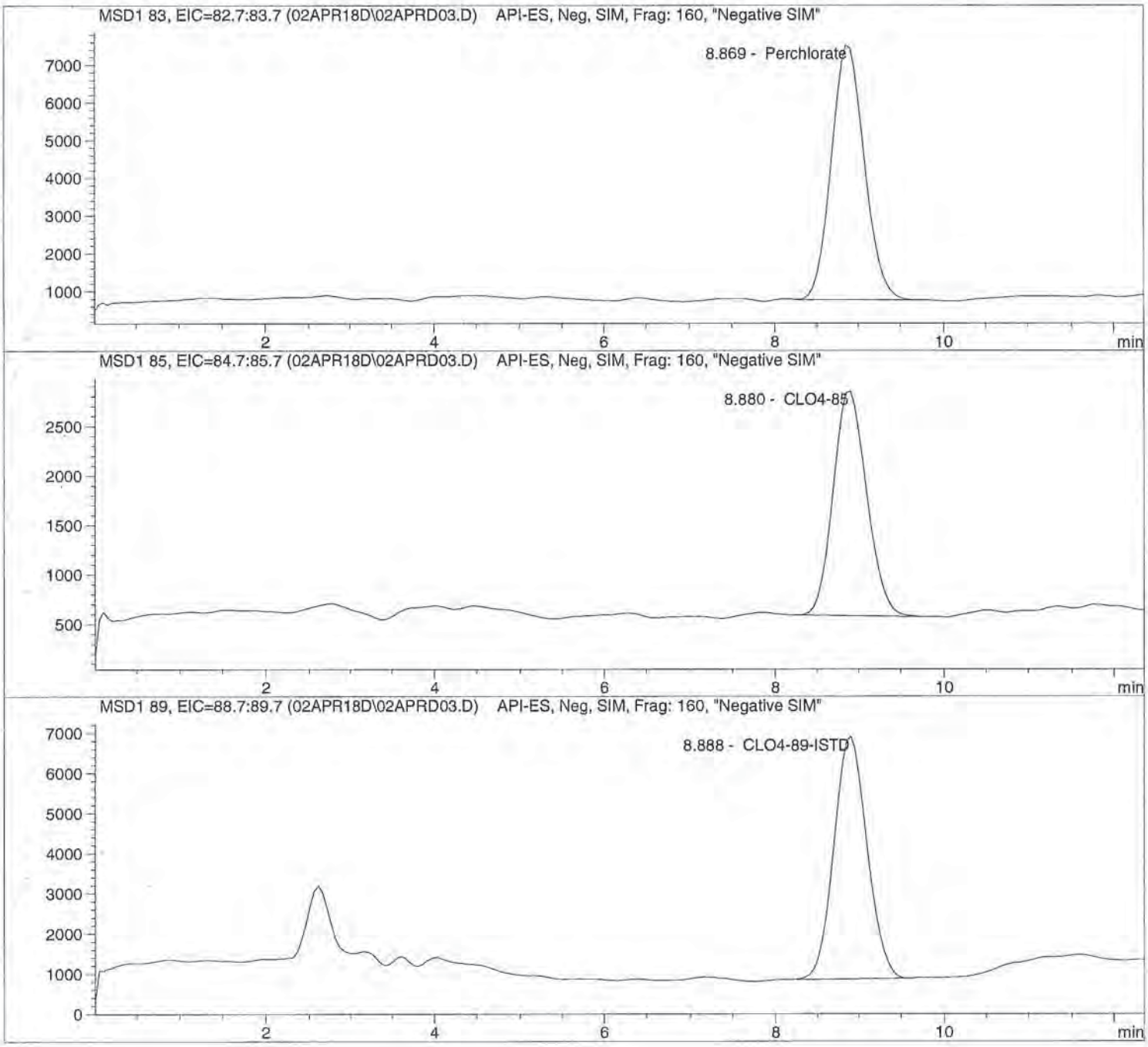
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	4/02/2018 09:36:38	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	4/02/2018 09:36:38	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.869	BBA	187507.2	5.0668	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.880	PBA	64046.6	5.3204	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.888	BBA	168695.0	5.0000	CLO4-89-ISTD

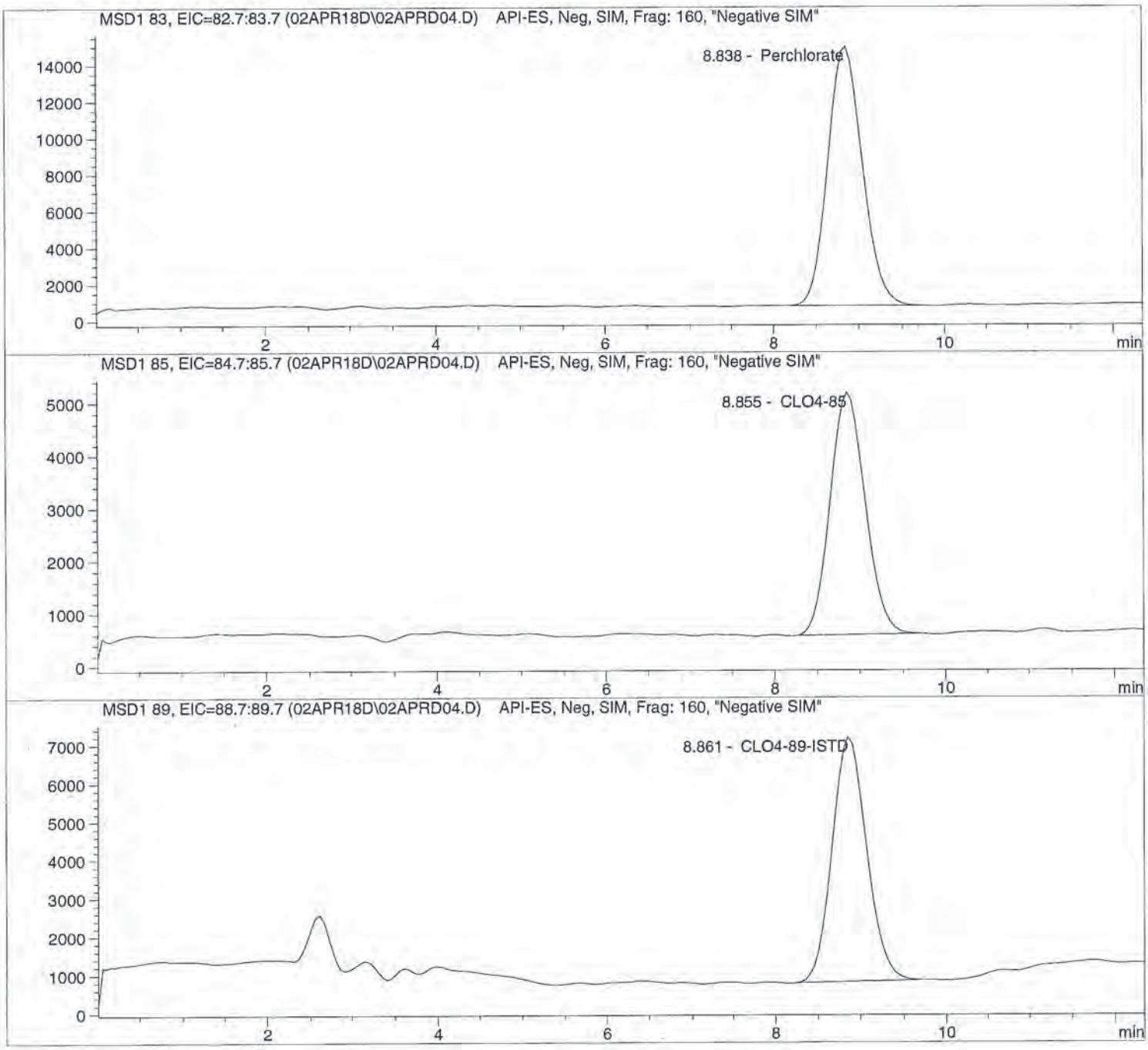
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	4/02/2018 09:50:54	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	4/02/2018 09:50:54	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.838	BBA	400349.0	9.8969	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.855	PBA	132002.1	10.2040	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.861	PBA	179911.2	5.0000	CLO4-89-ISTD

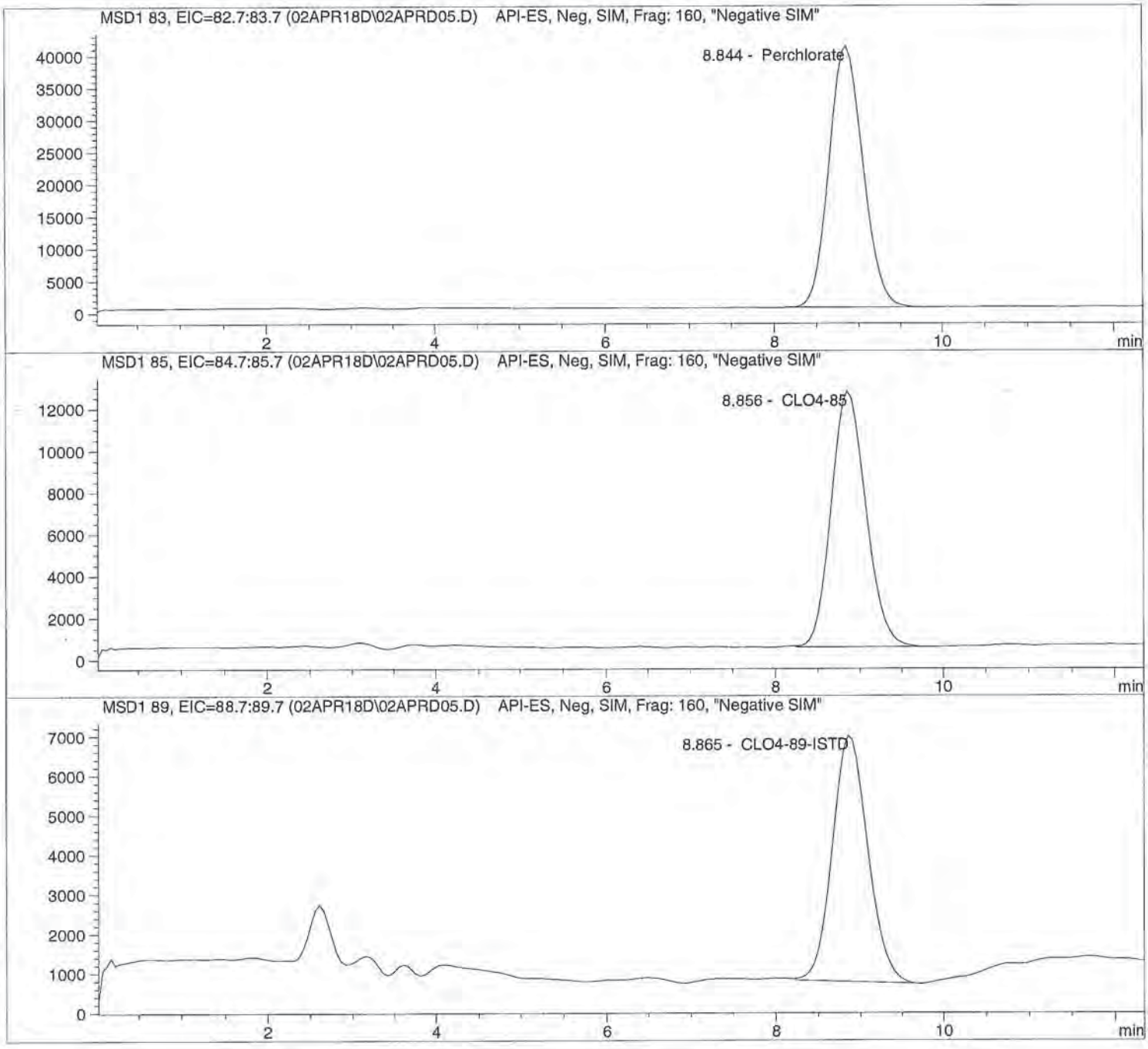
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	4/02/2018 10:05:03	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	4/02/2018 10:05:03	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.844	BBA	1133393.5	25.4448	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.856	BBA	349808.1	25.2734	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.865	BBA	181916.8	5.0000	CLO4-89-ISTD

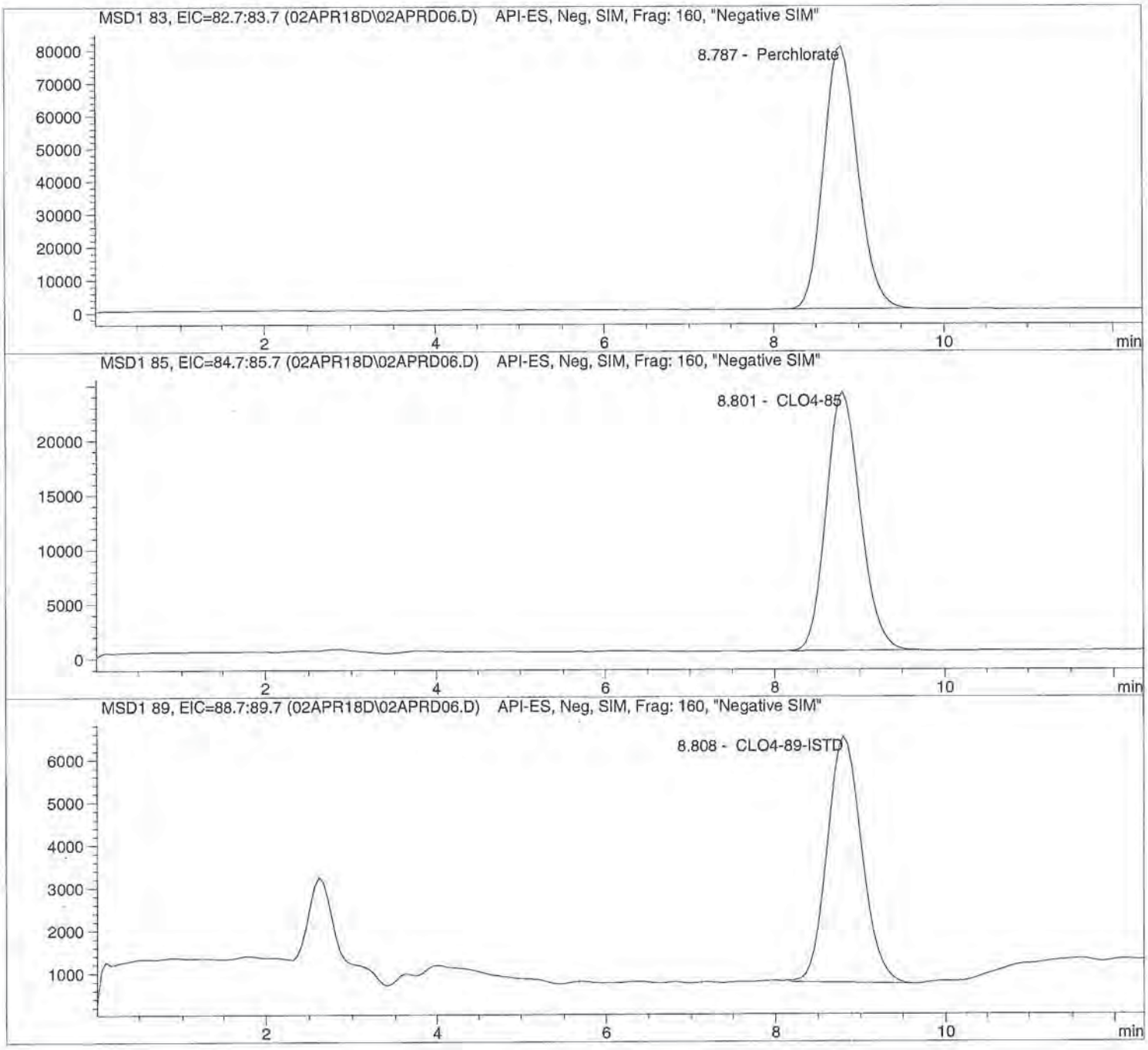
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	4/02/2018 10:19:12	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	4/02/2018 10:19:12	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	50.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	BBA	2223467.0	49.4714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.801	BBA	658628.2	48.6037	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.808	BBA	162537.8	5.0000	CLO4-89-ISTD

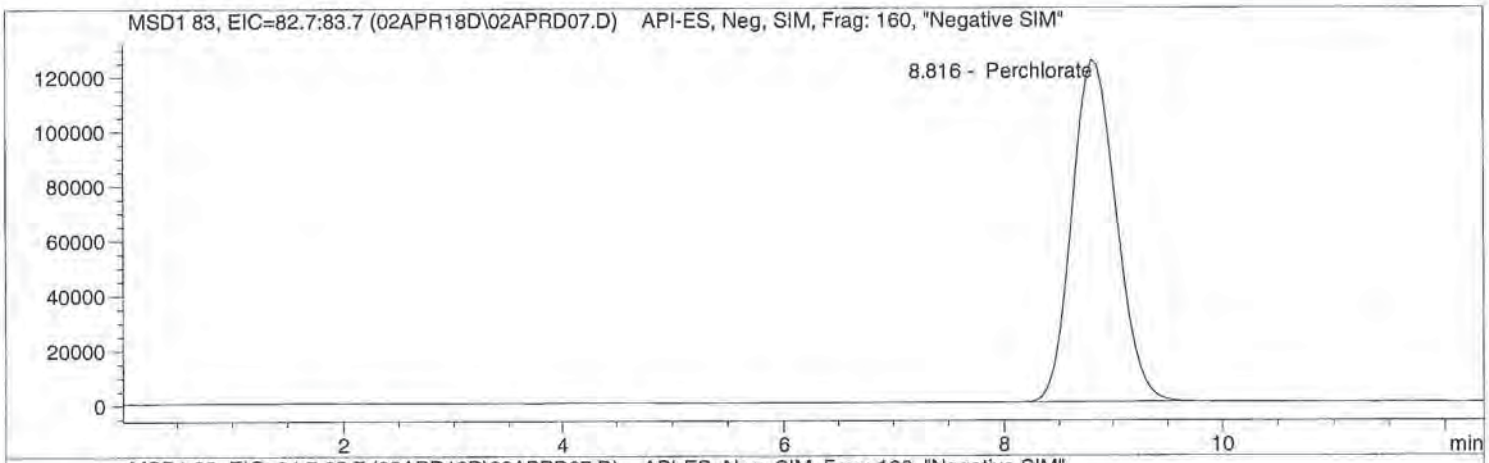
*** End of Report ***

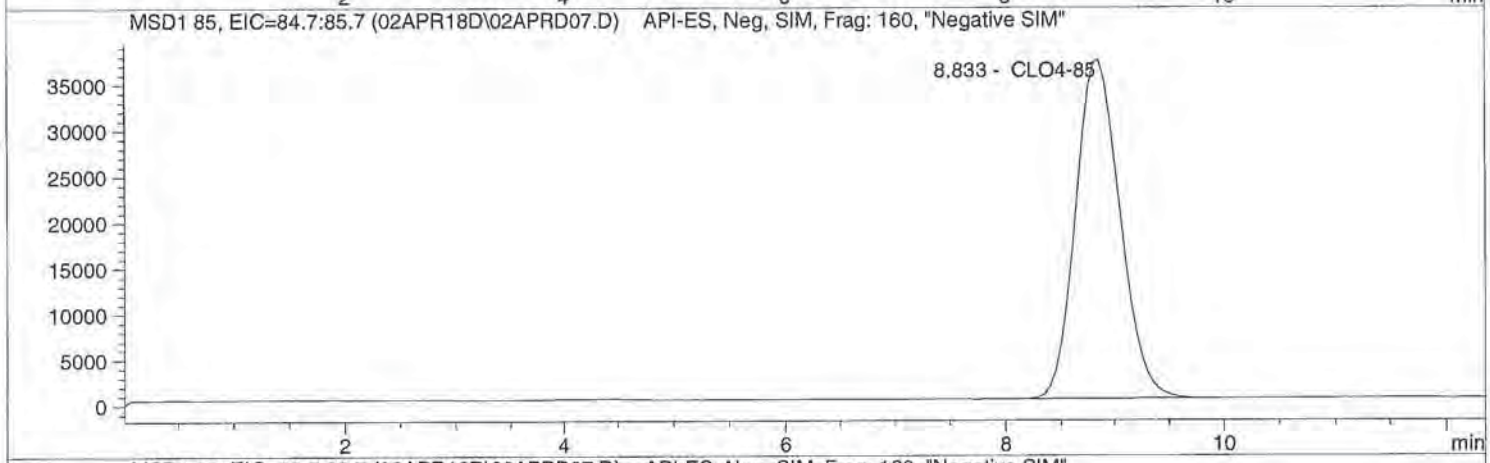
Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD07.D Sample Name: ICAL7@ 75.ug/L

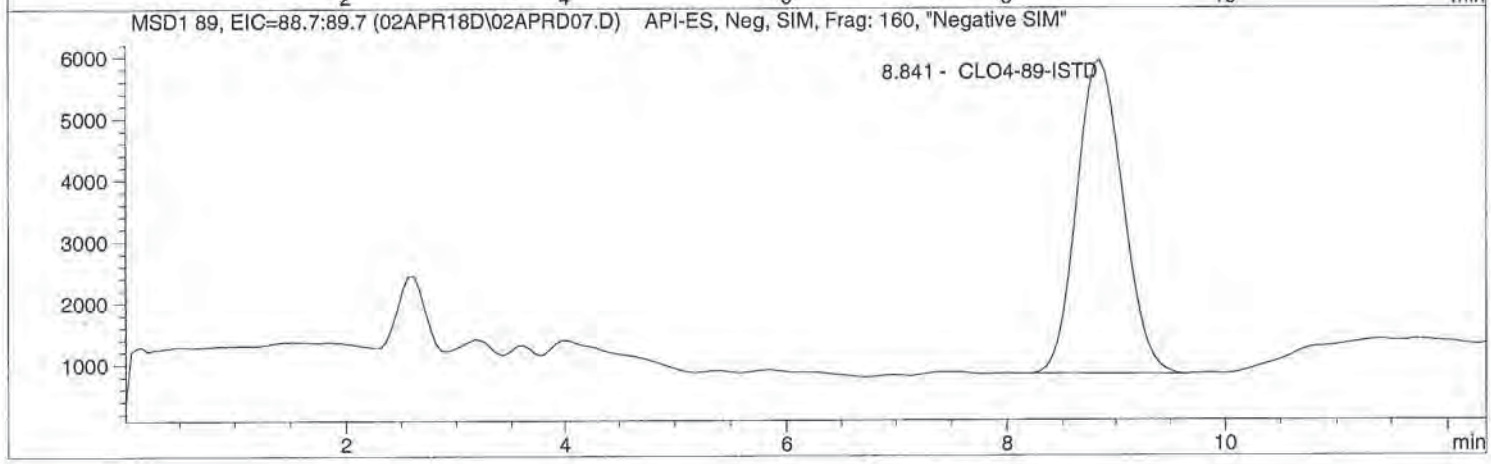
Injection Date:	4/02/2018 10:33:24	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD07.D Sample Name: ICAL7@ 75.ug/L

Injection Date:	4/02/2018 10:33:24	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	75.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.816	PBA	3564322.2	75.2010	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.833	BBA	1062944.2	75.7001	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.841	PBA	152621.4	5.0000	CLO4-89-ISTD

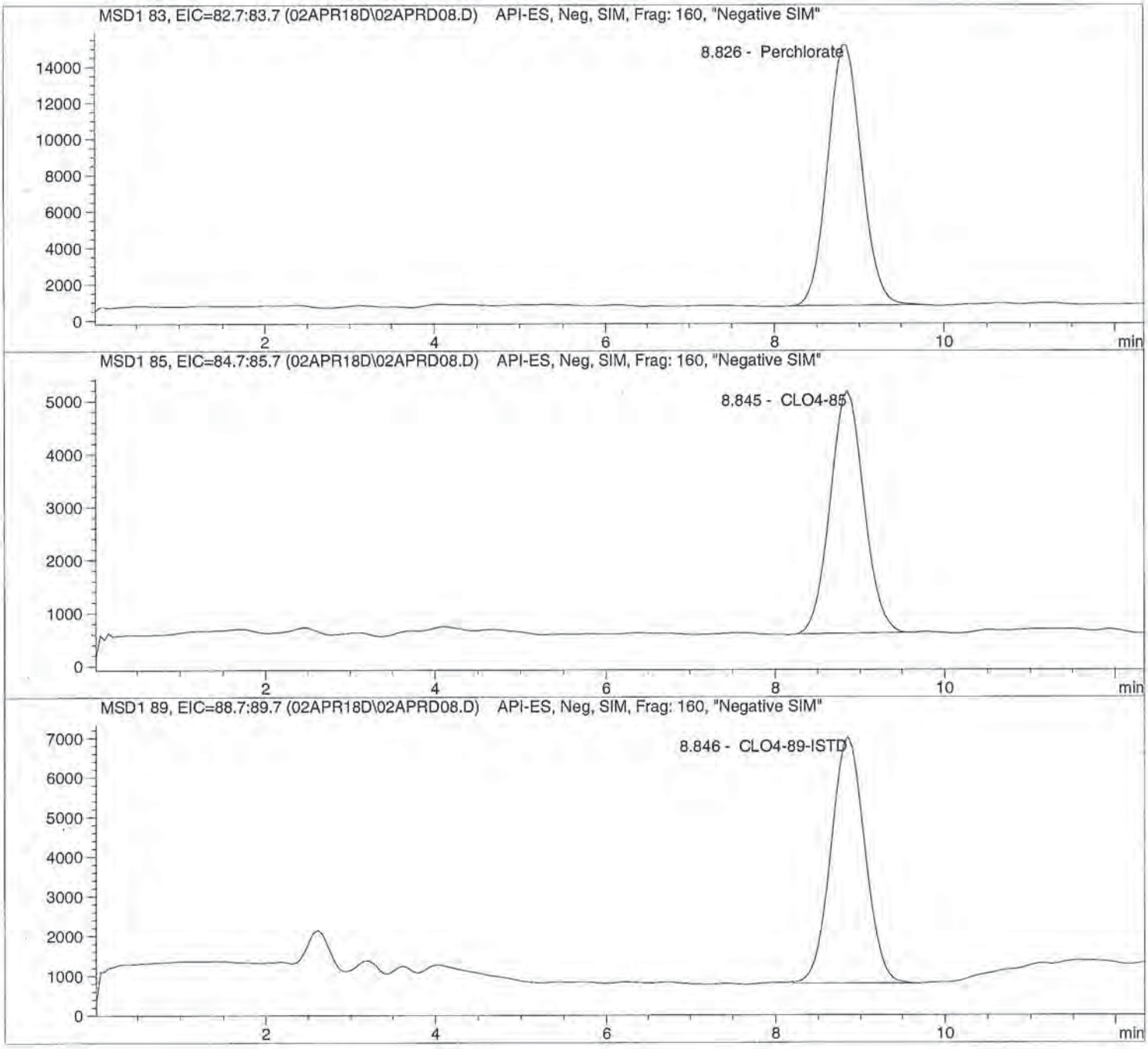
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD08.D Sample Name: ICAL Verf@10ug/L

Injection Date:	4/02/2018 10:47:33	Seq Line:	8
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD08.D Sample Name: ICAL Verf@10ug/L

Injection Date:	4/02/2018 10:47:33	Seq Line:	8
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.826	BBA	399587.8	10.1698	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.845	PBA	127530.4	10.1657	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.846	BBA	174490.2	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

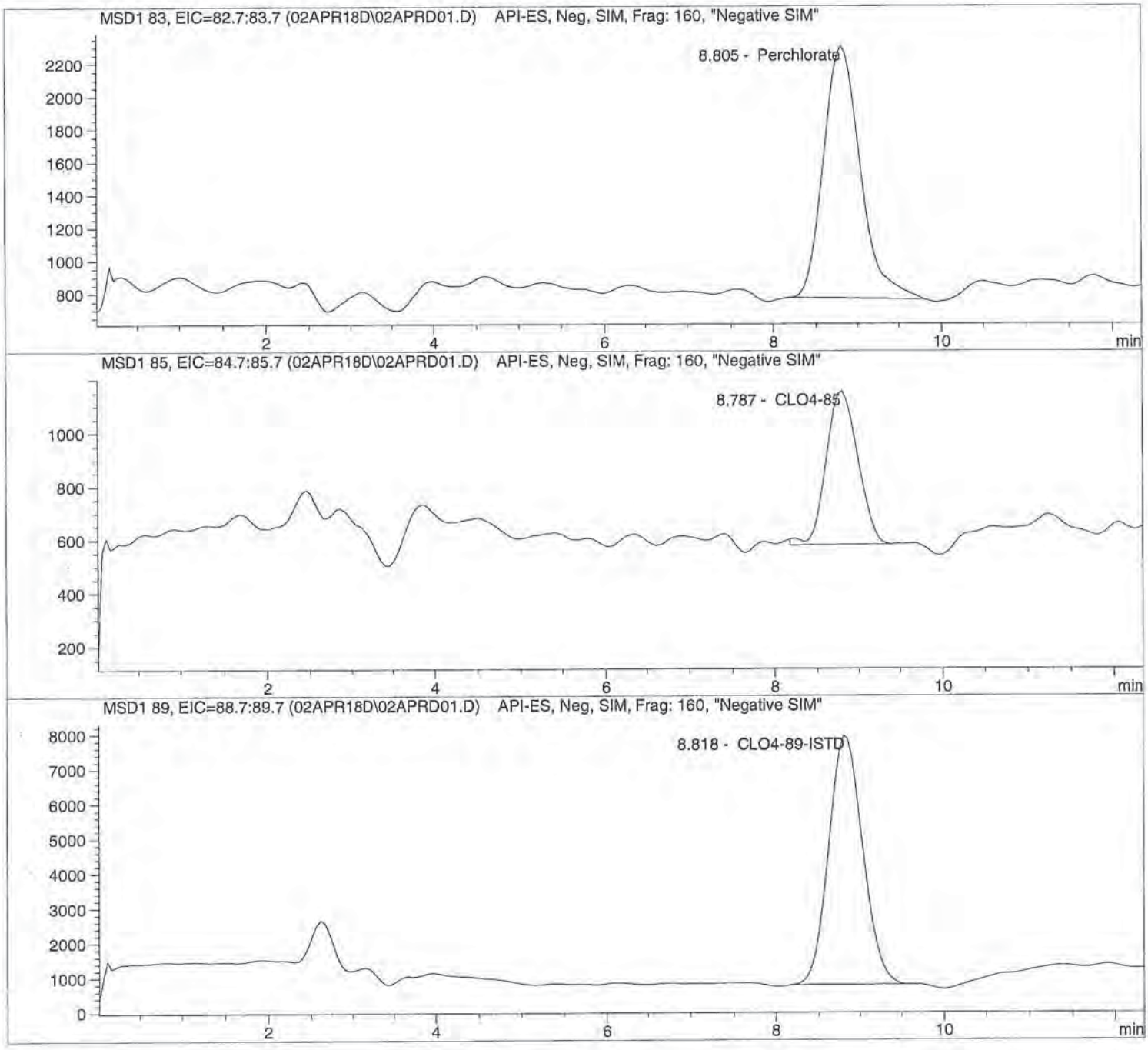
Unmodified

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.805	PBA	47521.7	1.0438	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	BBA	15364.8	0.9338	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.818	PBA	205633.2	5.0000	CLO4-89-ISTD

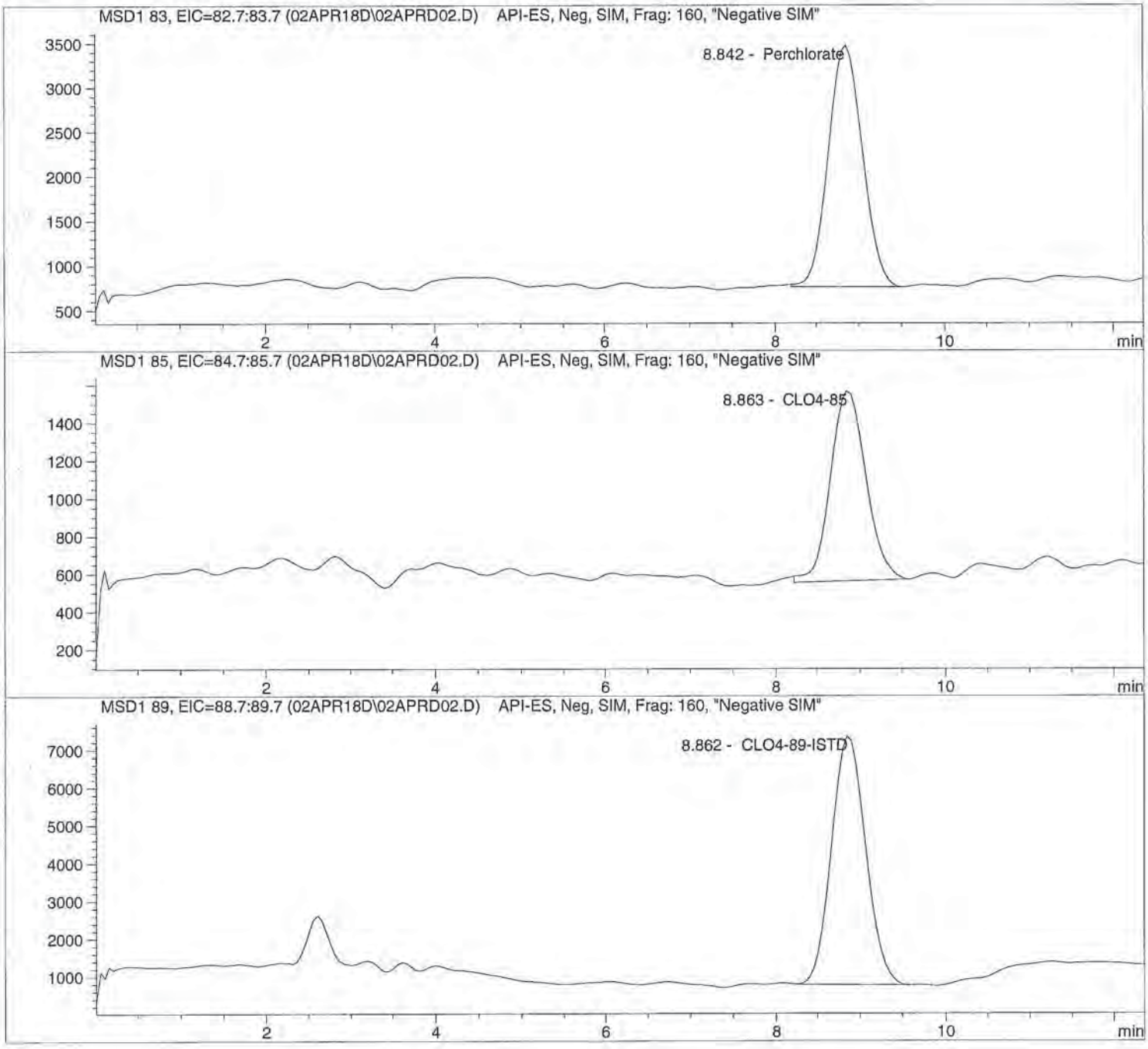
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.842	BBA	75767.3	1.8858	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.863	BBA	29265.6	2.1651	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.862	BBA	183981.5	5.0000	CLO4-89-ISTD

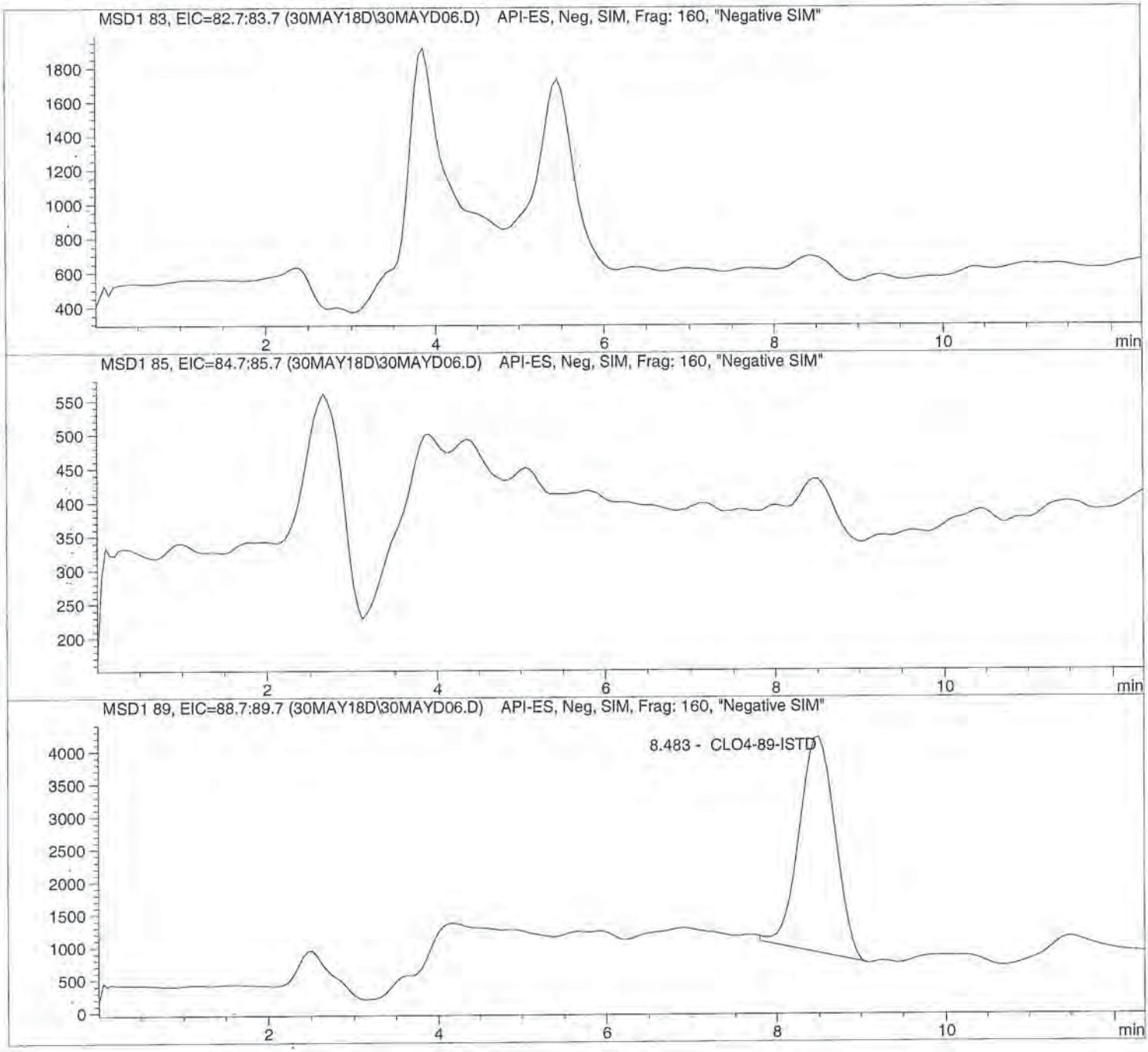
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD06.D Sample Name: 1813746001

Injection Date:	5/30/2018 09:46:40	Seq Line:	6
Sample Name:	1813746001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD06.D Sample Name: 1813746001

Injection Date:	5/30/2018 09:46:40	Seq Line:	6
Sample Name:	1813746001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.483	BBA	96934.4	5.0000	CLO4-89-ISTD

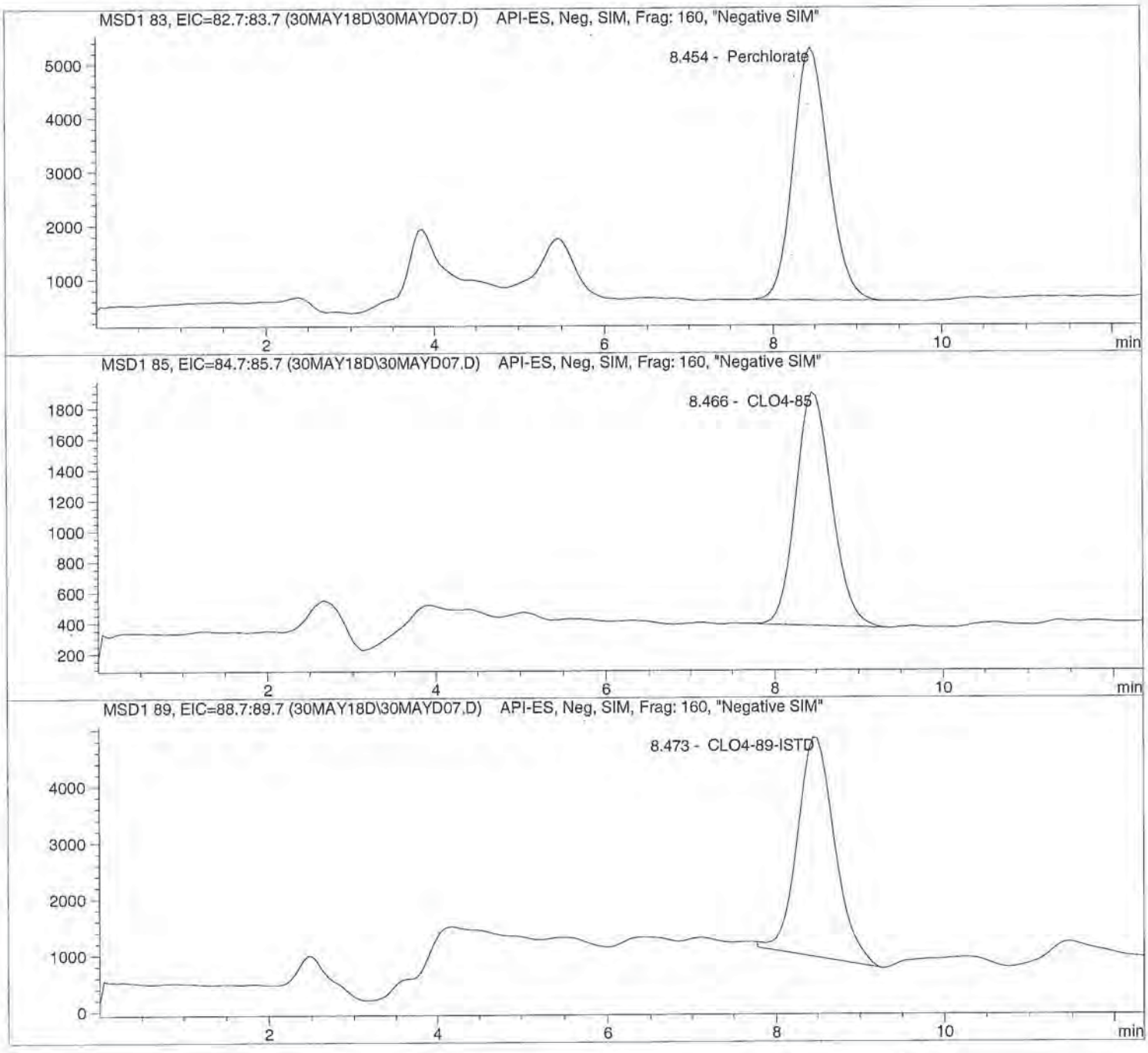
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD07.D Sample Name: 603142 137461S

Injection Date:	5/30/2018 10:00:51	Seq Line:	7
Sample Name:	603142 137461S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD07.D Sample Name: 603142 137461S

Injection Date:	5/30/2018 10:00:51	Seq Line:	7
Sample Name:	603142 137461S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.454	BBA	137244.7	5.1733	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.466	BBA	45610.3	5.2876	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.473	BBA	120876.2	5.0000	CLO4-89-ISTD

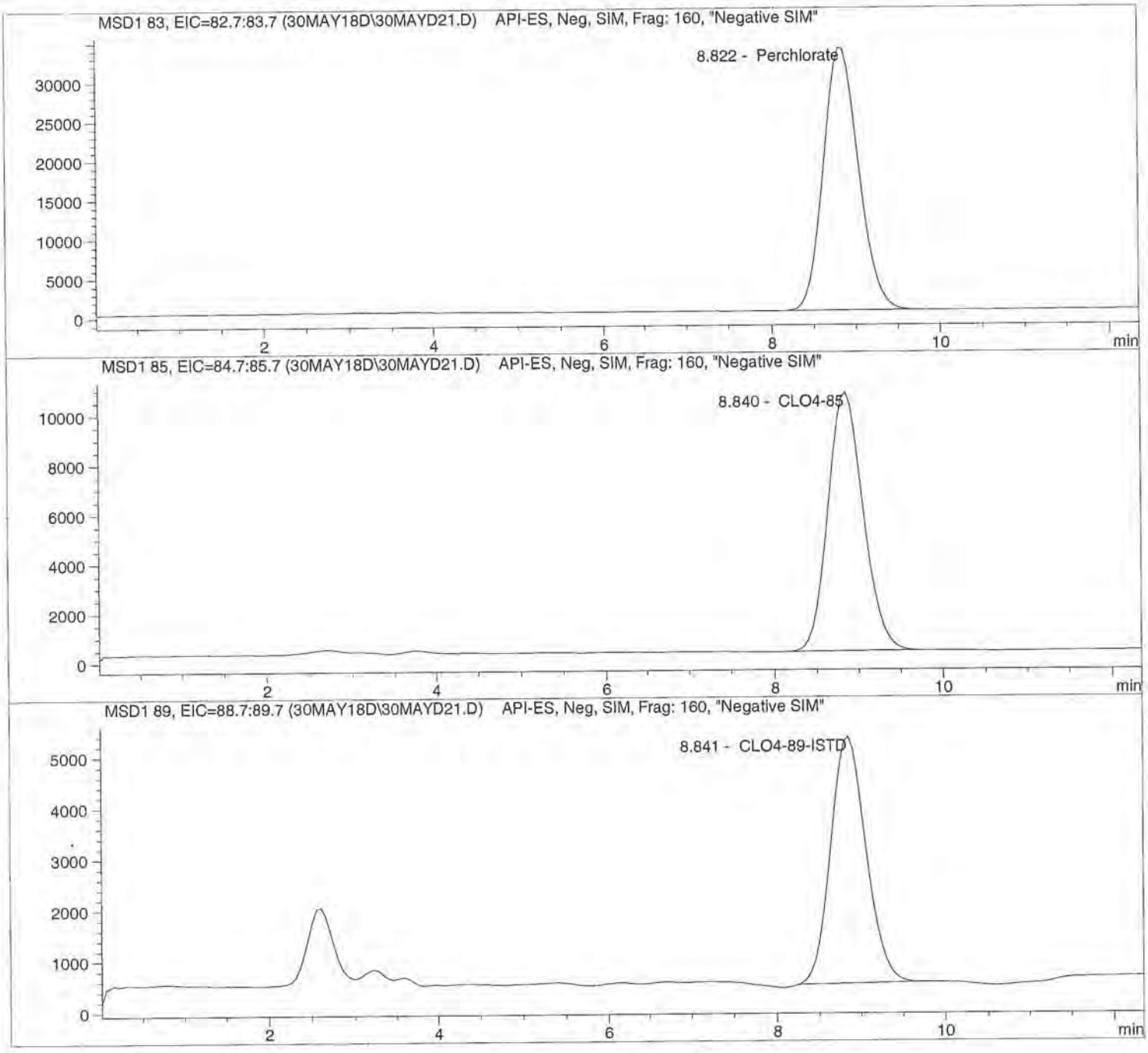
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD21.D Sample Name: 603231 CCV@25

Injection Date:	5/30/2018 13:18:56	Seq Line:	21
Sample Name:	603231 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD21.D Sample Name: 603231 CCV@25

Injection Date:	5/30/2018 13:18:56	Seq Line:	21
Sample Name:	603231 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.822	PBA	974747.6	27.7972	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.840	PBA	303819.0	27.9357	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.841	PBA	141430.9	5.0000	CLO4-89-ISTD

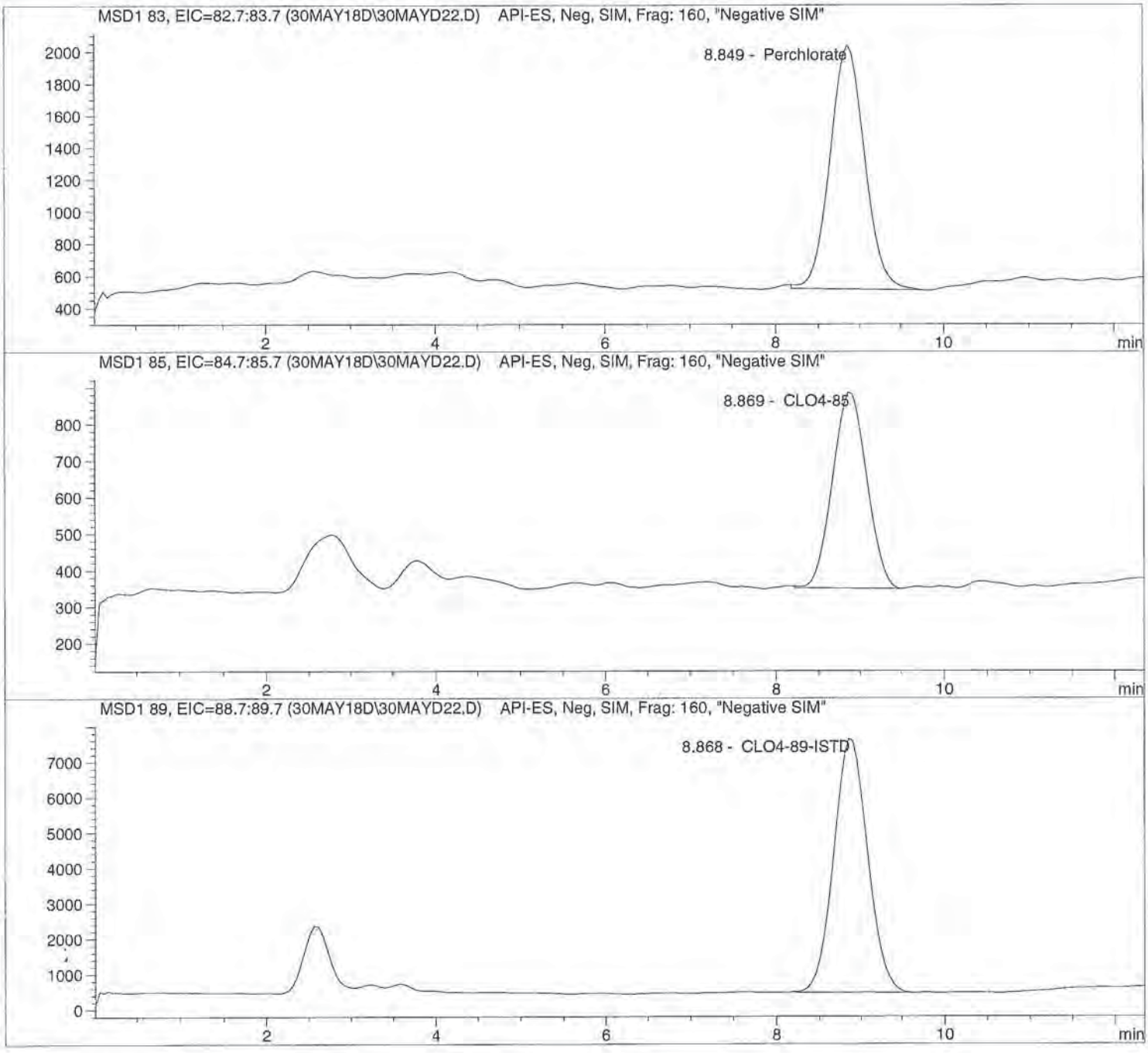
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD22.D Sample Name: 603232 LODV@1.

Injection Date:	5/30/2018 13:33:11	Seq Line:	22
Sample Name:	603232 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\30MAY18D\30MAYD22.D Sample Name: 603232 LODV@1.

Injection Date:	5/30/2018 13:33:11	Seq Line:	22
Sample Name:	603232 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.849	BBA	44908.3	0.9725	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.869	BBA	15702.2	0.9449	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.868	BBA	208034.0	5.0000	CLO4-89-ISTD

*** End of Report ***

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

WorkOrder: HS18051472

Longhorn GW Treatment Plant

Bhate Environmental Associates, Inc.

Marcia Olive
445 Union Blvd Ste 129
Lakewood CO 80228

22-Jun-2018

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

June 11, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18051472**

Laboratory Results for: **Longhorn GW Treatment Plant**

Dear Marcia,

ALS Environmental received 2 sample(s) on May 31, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS18051472

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18051472-01	LH18/24-SPA650_0530218	Water		30-May-2018 14:00	31-May-2018 09:00	☐
HS18051472-02	Trip Blank	Water	ALS-041918-39	30-May-2018 00:00	31-May-2018 09:00	☐

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS18051472

CASE NARRATIVE

GCMS Volatiles by Method SW8260

Batch ID: R317575

Sample ID: LH18/24-SPA650_0530218 (HS18051472-01)

- Lowest practical dilution for sample HS18051472-01 due to matrix. Sample is very pungent.

WetChemistry by Method SW9056

Batch ID: R317713

Sample ID: CCB

- All reported samples bracketed by this CCB are 10 times greater than the Chloride and Sulfate content in this CCB.

Sample ID: HS18060305-01MS

- MS and MSD were performed on unrelated sample.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SPA650_0530218
Collection Date: 30-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051472
Lab ID:HS18051472-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,1,1-Trichloroethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,1,2,2-Tetrachloroethane	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,1,2-Trichloroethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,1-Dichloroethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,1-Dichloroethene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,1-Dichloropropene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2,3-Trichlorobenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2,3-Trichloropropane	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2,4-Trichlorobenzene	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2,4-Trimethylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2-Dibromo-3-chloropropane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2-Dibromoethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2-Dichlorobenzene	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2-Dichloroethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,2-Dichloropropane	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,3,5-Trimethylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,3-Dichlorobenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,3-Dichloropropane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
1,4-Dichlorobenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
2,2-Dichloropropane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
2-Butanone	5.0	U	2.5	5.0	10	ug/L	5	07-Jun-2018 14:40
2-Chlorotoluene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
2-Hexanone	5.0	U	5.0	5.0	10	ug/L	5	07-Jun-2018 14:40
4-Chlorotoluene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
4-Isopropyltoluene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
4-Methyl-2-pentanone	5.0	U	3.5	5.0	10	ug/L	5	07-Jun-2018 14:40
Acetone	**35**		**2.0**	**5.0**	**10**	**ug/L**	5	07-Jun-2018 14:40
Benzene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Bromobenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Bromochloromethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Bromodichloromethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Bromoform	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Bromomethane	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Carbon disulfide	5.0	U	3.0	5.0	10	ug/L	5	07-Jun-2018 14:40
Carbon tetrachloride	2.5	U	2.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Chlorobenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Chloroethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SPA650_0530218
Collection Date: 30-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051472
Lab ID:HS18051472-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: PC
Chloroform	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Chloromethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
cis-1,2-Dichloroethene	**4.2**	J	**1.0**	**2.5**	**5.0**	**ug/L**	5	07-Jun-2018 14:40
cis-1,3-Dichloropropene	2.5	U	0.50	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Dibromochloromethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Dibromomethane	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Dichlorodifluoromethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Ethylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Hexachlorobutadiene	2.5	U	5.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Isopropylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
m,p-Xylene	5.0	U	2.5	5.0	10	ug/L	5	07-Jun-2018 14:40
Methylene chloride	5.0	U	2.0	5.0	10	ug/L	5	07-Jun-2018 14:40
n-Butylbenzene	2.5	U	2.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
n-Propylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Naphthalene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
o-Xylene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
sec-Butylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Styrene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
tert-Butylbenzene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Tetrachloroethene	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Toluene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
trans-1,2-Dichloroethene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
trans-1,3-Dichloropropene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Trichloroethene	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Trichlorofluoromethane	2.5	U	1.5	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Vinyl chloride	2.5	U	1.0	2.5	5.0	ug/L	5	07-Jun-2018 14:40
Surr: 1,2-Dichloroethane-d4	*104*			**0**	*81-118*	*%REC*	*5*	*07-Jun-2018 14:40*
Surr: 4-Bromofluorobenzene	*101*			**0**	*85-114*	*%REC*	*5*	*07-Jun-2018 14:40*
Surr: Dibromofluoromethane	*104*			**0**	*80-119*	*%REC*	*5*	*07-Jun-2018 14:40*
Surr: Toluene-d8	*95.5*			**0**	*89-112*	*%REC*	*5*	*07-Jun-2018 14:40*
ANIONS BY SW9056A		**Method:SW9056**						Analyst: KMU
Chloride	**634**		**2.00**	**5.00**	**5.00**	**mg/L**	10	08-Jun-2018 10:03
Sulfate	**87.9**		**2.00**	**5.00**	**5.00**	**mg/L**	10	08-Jun-2018 10:03

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: Trip Blank
Collection Date: 30-May-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18051472
Lab ID:HS18051472-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 13:02
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	07-Jun-2018 13:02
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	07-Jun-2018 13:02
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 13:02
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	07-Jun-2018 13:02
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	07-Jun-2018 13:02
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	07-Jun-2018 13:02
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: Trip Blank
Collection Date: 30-May-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18051472
Lab ID:HS18051472-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	07-Jun-2018 13:02
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	07-Jun-2018 13:02
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	07-Jun-2018 13:02
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	07-Jun-2018 13:02
Surr: 1,2-Dichloroethane-d4	*104*			**0**	*81-118*	*%REC*	*1*	*07-Jun-2018 13:02*
Surr: 4-Bromofluorobenzene	*101*			**0**	*85-114*	*%REC*	*1*	*07-Jun-2018 13:02*
Surr: Dibromofluoromethane	*103*			**0**	*80-119*	*%REC*	*1*	*07-Jun-2018 13:02*
Surr: Toluene-d8	*97.0*			**0**	*89-112*	*%REC*	*1*	*07-Jun-2018 13:02*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R317575	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18051472-01	LH18/24-SPA650_0530218	30 May 2018 14:00			07 Jun 2018 14:40	5
HS18051472-02	Trip Blank	30 May 2018 00:00			07 Jun 2018 13:02	1
Batch ID R317713	**Test Name :** ANIONS BY SW9056A			**Matrix:** Water		
HS18051472-01	LH18/24-SPA650_0530218	30 May 2018 14:00			08 Jun 2018 10:03	10

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **VBLKW-180607** Units: **ug/L** Analysis Date: **07-Jun-2018 12:13**
Client ID: Run ID: **VOA6_317575** SeqNo: **4591238** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **VBLKW-180607** Units: **ug/L** Analysis Date: **07-Jun-2018 12:13**
Client ID: Run ID: **VOA6_317575** SeqNo: **4591238** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*51.76*	*1.0*	*50*	*0*	*104*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.14*	*1.0*	*50*	*0*	*102*	*85 - 114*				
Surr: Dibromofluoromethane	*51.32*	*1.0*	*50*	*0*	*103*	*80 - 119*				
Surr: Toluene-d8	*48.27*	*1.0*	*50*	*0*	*96.5*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-180607** Units: **ug/L** Analysis Date: **07-Jun-2018 10:58**
Client ID: Run ID: **VOA6_317575** SeqNo: **4591237** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	44.85	1.0	50	0	89.7	78 - 124				
1,1,1-Trichloroethane	50.23	1.0	50	0	100	74 - 131				
1,1,2,2-Tetrachloroethane	53.45	1.0	50	0	107	71 - 121				
1,1,2-Trichloroethane	47.57	1.0	50	0	95.1	80 - 119				
1,1-Dichloroethane	53.49	1.0	50	0	107	77 - 125				
1,1-Dichloroethene	48.1	1.0	50	0	96.2	71 - 131				
1,1-Dichloropropene	45.9	1.0	50	0	91.8	78 - 125				
1,2,3-Trichlorobenzene	49.7	1.0	50	0	99.4	69 - 129				
1,2,3-Trichloropropane	51.48	1.0	50	0	103	73 - 122				
1,2,4-Trichlorobenzene	47.95	1.0	50	0	95.9	69 - 130				
1,2,4-Trimethylbenzene	44.6	1.0	50	0	89.2	76 - 124				
1,2-Dibromo-3-chloropropane	56.9	1.0	50	0	114	62 - 128				
1,2-Dibromoethane	47.86	1.0	50	0	95.7	77 - 121				
1,2-Dichlorobenzene	47.74	1.0	50	0	95.5	80 - 119				
1,2-Dichloroethane	50.58	1.0	50	0	101	73 - 128				
1,2-Dichloropropane	50.02	1.0	50	0	100	78 - 122				
1,3,5-Trimethylbenzene	43.86	1.0	50	0	87.7	75 - 124				
1,3-Dichlorobenzene	45.8	1.0	50	0	91.6	80 - 119				
1,3-Dichloropropane	51.76	1.0	50	0	104	80 - 119				
1,4-Dichlorobenzene	46.42	1.0	50	0	92.8	79 - 118				
2,2-Dichloropropane	55.17	1.0	50	0	110	60 - 139				
2-Butanone	122.8	2.0	100	0	123	56 - 143				
2-Chlorotoluene	45.1	1.0	50	0	90.2	79 - 122				
2-Hexanone	108.3	2.0	100	0	108	57 - 139				
4-Chlorotoluene	46.19	1.0	50	0	92.4	78 - 122				
4-Isopropyltoluene	40.66	1.0	50	0	81.3	77 - 127				
4-Methyl-2-pentanone	104.2	2.0	100	0	104	67 - 130				
Acetone	120.5	2.0	100	0	121	39 - 160				
Benzene	47.43	1.0	50	0	94.9	79 - 120				
Bromobenzene	47.97	1.0	50	0	95.9	80 - 120				
Bromochloromethane	50.81	1.0	50	0	102	78 - 123				
Bromodichloromethane	49.19	1.0	50	0	98.4	79 - 125				
Bromoform	51.92	1.0	50	0	104	66 - 130				
Bromomethane	53.82	1.0	50	0	108	53 - 141				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-180607** Units: **ug/L** Analysis Date: **07-Jun-2018 10:58**
Client ID: Run ID: **VOA6_317575** SeqNo: **4591237** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	95.32	2.0	100	0	95.3	64 - 133				
Carbon tetrachloride	43.91	1.0	50	0	87.8	72 - 136				
Chlorobenzene	45.02	1.0	50	0	90.0	82 - 118				
Chloroethane	57.77	1.0	50	0	116	60 - 138				
Chloroform	49.91	1.0	50	0	99.8	79 - 124				
Chloromethane	57.22	1.0	50	0	114	50 - 139				
cis-1,2-Dichloroethene	50.32	1.0	50	0	101	78 - 123				
cis-1,3-Dichloropropene	50.31	1.0	50	0	101	75 - 124				
Dibromochloromethane	50.5	1.0	50	0	101	74 - 126				
Dibromomethane	54.16	1.0	50	0	108	79 - 123				
Dichlorodifluoromethane	44.7	1.0	50	0	89.4	32 - 152				
Ethylbenzene	43.11	1.0	50	0	86.2	79 - 121				
Hexachlorobutadiene	53.02	1.0	50	0	106	66 - 134				
Isopropylbenzene	40.5	1.0	50	0	81.0	72 - 131				
m,p-Xylene	84.99	2.0	100	0	85.0	80 - 121				
Methylene chloride	54.44	2.0	50	0	109	74 - 124				
Naphthalene	57.71	1.0	50	0	115	61 - 128				
n-Butylbenzene	45.55	1.0	50	0	91.1	75 - 128				
n-Propylbenzene	39.86	1.0	50	0	79.7	76 - 126				
o-Xylene	43.58	1.0	50	0	87.2	78 - 122				
sec-Butylbenzene	43.1	1.0	50	0	86.2	77 - 126				
Styrene	45.31	1.0	50	0	90.6	78 - 123				
tert-Butylbenzene	42.73	1.0	50	0	85.5	78 - 124				
Tetrachloroethene	40.68	1.0	50	0	81.4	74 - 129				
Toluene	44.32	1.0	50	0	88.6	80 - 121				
trans-1,2-Dichloroethene	49.5	1.0	50	0	99.0	75 - 124				
trans-1,3-Dichloropropene	52.82	1.0	50	0	106	73 - 127				
Trichloroethene	46.79	1.0	50	0	93.6	79 - 123				
Trichlorofluoromethane	48.68	1.0	50	0	97.4	65 - 141				
Vinyl chloride	51.14	1.0	50	0	102	58 - 137				
Surr: 1,2-Dichloroethane-d4	*50.8*	*1.0*	*50*	*0*	*102*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.45*	*1.0*	*50*	*0*	*98.9*	*85 - 114*				
Surr: Dibromofluoromethane	*51.6*	*1.0*	*50*	*0*	*103*	*80 - 119*				
Surr: Toluene-d8	*48.29*	*1.0*	*50*	*0*	*96.6*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS18051491-01MS** Units: **ug/L** Analysis Date: **07-Jun-2018 15:29**
Client ID: Run ID: **VOA6_317575** SeqNo: **4592155** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.73	1.0	50	0	87.5	78 - 124				
1,1,1-Trichloroethane	47.34	1.0	50	0	94.7	74 - 131				
1,1,2,2-Tetrachloroethane	54.04	1.0	50	0	108	71 - 121				
1,1,2-Trichloroethane	47.32	1.0	50	0	94.6	80 - 119				
1,1-Dichloroethane	52.03	1.0	50	0	104	77 - 125				
1,1-Dichloroethene	43.18	1.0	50	0	86.4	71 - 131				
1,1-Dichloropropene	41.84	1.0	50	0	83.7	78 - 125				
1,2,3-Trichlorobenzene	40.32	1.0	50	0	80.6	69 - 129				
1,2,3-Trichloropropane	52.15	1.0	50	0	104	73 - 122				
1,2,4-Trichlorobenzene	39.98	1.0	50	0	80.0	69 - 130				
1,2,4-Trimethylbenzene	42.6	1.0	50	0	85.2	76 - 124				
1,2-Dibromo-3-chloropropane	55.19	1.0	50	0	110	62 - 128				
1,2-Dibromoethane	48.26	1.0	50	0	96.5	77 - 121				
1,2-Dichlorobenzene	45.39	1.0	50	0	90.8	80 - 119				
1,2-Dichloroethane	49.65	1.0	50	0	99.3	73 - 128				
1,2-Dichloropropane	47.67	1.0	50	0	95.3	78 - 122				
1,3,5-Trimethylbenzene	41.42	1.0	50	0	82.8	75 - 124				
1,3-Dichlorobenzene	44.37	1.0	50	0	88.7	80 - 119				
1,3-Dichloropropane	50.98	1.0	50	0	102	80 - 119				
1,4-Dichlorobenzene	44.51	1.0	50	0	89.0	79 - 118				
2,2-Dichloropropane	49.28	1.0	50	0	98.6	60 - 139				
2-Butanone	126	2.0	100	0	126	56 - 143				
2-Chlorotoluene	43.27	1.0	50	0	86.5	79 - 122				
2-Hexanone	114.8	2.0	100	0	115	57 - 139				
4-Chlorotoluene	44.26	1.0	50	0	88.5	78 - 122				
4-Isopropyltoluene	36.15	1.0	50	0	72.3	77 - 127				S
4-Methyl-2-pentanone	109.3	2.0	100	0	109	67 - 130				
Acetone	120.3	2.0	100	0	120	39 - 160				
Benzene	44.6	1.0	50	0	89.2	79 - 120				
Bromobenzene	46.75	1.0	50	0	93.5	80 - 120				
Bromochloromethane	46.69	1.0	50	0	93.4	78 - 123				
Bromodichloromethane	47.15	1.0	50	0	94.3	79 - 125				
Bromoform	51.88	1.0	50	0	104	66 - 130				
Bromomethane	21.14	1.0	50	0	42.3	53 - 141				S

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS18051491-01MS** Units: **ug/L** Analysis Date: **07-Jun-2018 15:29**
Client ID: Run ID: **VOA6_317575** SeqNo: **4592155** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	82.13	2.0	100	0	82.1	64 - 133				
Carbon tetrachloride	41.81	1.0	50	0	83.6	72 - 136				
Chlorobenzene	43.45	1.0	50	0	86.9	82 - 118				
Chloroethane	57.3	1.0	50	0	115	60 - 138				
Chloroform	48.5	1.0	50	0	97.0	79 - 124				
Chloromethane	38.29	1.0	50	0	76.6	50 - 139				
cis-1,2-Dichloroethene	48.56	1.0	50	0	97.1	78 - 123				
cis-1,3-Dichloropropene	47.93	1.0	50	0	95.9	75 - 124				
Dibromochloromethane	49.85	1.0	50	0	99.7	74 - 126				
Dibromomethane	53.05	1.0	50	0	106	79 - 123				
Dichlorodifluoromethane	29.15	1.0	50	0	58.3	32 - 152				
Ethylbenzene	42.3	1.0	50	0	84.6	79 - 121				
Hexachlorobutadiene	32.27	1.0	50	0	64.5	66 - 134				S
Isopropylbenzene	38.3	1.0	50	0	76.6	72 - 131				
m,p-Xylene	81.78	2.0	100	0	81.8	80 - 121				
Methylene chloride	52.94	2.0	50	0	106	74 - 124				
Naphthalene	49.37	1.0	50	0	98.7	61 - 128				
n-Butylbenzene	37.74	1.0	50	0	75.5	75 - 128				
n-Propylbenzene	37.6	1.0	50	0	75.2	76 - 126				S
o-Xylene	42.11	1.0	50	0	84.2	78 - 122				
sec-Butylbenzene	37.99	1.0	50	0	76.0	77 - 126				S
Styrene	43.9	1.0	50	0	87.8	78 - 123				
tert-Butylbenzene	39.62	1.0	50	0	79.2	78 - 124				
Tetrachloroethene	38.68	1.0	50	0	77.4	74 - 129				
Toluene	42.48	1.0	50	0	85.0	80 - 121				
trans-1,2-Dichloroethene	46.27	1.0	50	0	92.5	75 - 124				
trans-1,3-Dichloropropene	51.12	1.0	50	0	102	73 - 127				
Trichloroethene	43.57	1.0	50	0	87.1	79 - 123				
Trichlorofluoromethane	37.73	1.0	50	0	75.5	65 - 141				
Vinyl chloride	41.82	1.0	50	0	83.6	58 - 137				
Surr: 1,2-Dichloroethane-d4	*50.06*	*1.0*	*50*	*0*	*100*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.65*	*1.0*	*50*	*0*	*99.3*	*85 - 114*				
Surr: Dibromofluoromethane	*50.77*	*1.0*	*50*	*0*	*102*	*80 - 119*				
Surr: Toluene-d8	*47.94*	*1.0*	*50*	*0*	*95.9*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS18051491-01MSD** Units: **ug/L** Analysis Date: **07-Jun-2018 15:54**
Client ID: Run ID: **VOA6_317575** SeqNo: **4592156** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.48	1.0	50	0	87.0	78 - 124	43.73	0.567	20	
1,1,1-Trichloroethane	48.73	1.0	50	0	97.5	74 - 131	47.34	2.9	20	
1,1,2,2-Tetrachloroethane	52.95	1.0	50	0	106	71 - 121	54.04	2.04	20	
1,1,2-Trichloroethane	46.92	1.0	50	0	93.8	80 - 119	47.32	0.842	20	
1,1-Dichloroethane	51.59	1.0	50	0	103	77 - 125	52.03	0.849	20	
1,1-Dichloroethene	44.95	1.0	50	0	89.9	71 - 131	43.18	4.03	20	
1,1-Dichloropropene	43.19	1.0	50	0	86.4	78 - 125	41.84	3.18	20	
1,2,3-Trichlorobenzene	45.93	1.0	50	0	91.9	69 - 129	40.32	13	20	
1,2,3-Trichloropropane	51.26	1.0	50	0	103	73 - 122	52.15	1.72	20	
1,2,4-Trichlorobenzene	44.69	1.0	50	0	89.4	69 - 130	39.98	11.1	20	
1,2,4-Trimethylbenzene	43.26	1.0	50	0	86.5	76 - 124	42.6	1.53	20	
1,2-Dibromo-3-chloropropane	56.89	1.0	50	0	114	62 - 128	55.19	3.03	20	
1,2-Dibromoethane	48.11	1.0	50	0	96.2	77 - 121	48.26	0.308	20	
1,2-Dichlorobenzene	45.53	1.0	50	0	91.1	80 - 119	45.39	0.311	20	
1,2-Dichloroethane	47.98	1.0	50	0	96.0	73 - 128	49.65	3.41	20	
1,2-Dichloropropane	47.17	1.0	50	0	94.3	78 - 122	47.67	1.05	20	
1,3,5-Trimethylbenzene	42.21	1.0	50	0	84.4	75 - 124	41.42	1.9	20	
1,3-Dichlorobenzene	43.97	1.0	50	0	87.9	80 - 119	44.37	0.907	20	
1,3-Dichloropropane	50.66	1.0	50	0	101	80 - 119	50.98	0.63	20	
1,4-Dichlorobenzene	44.23	1.0	50	0	88.5	79 - 118	44.51	0.632	20	
2,2-Dichloropropane	50.08	1.0	50	0	100	60 - 139	49.28	1.61	20	
2-Butanone	127.8	2.0	100	0	128	56 - 143	126	1.43	20	
2-Chlorotoluene	42.97	1.0	50	0	85.9	79 - 122	43.27	0.678	20	
2-Hexanone	117.4	2.0	100	0	117	57 - 139	114.8	2.29	20	
4-Chlorotoluene	44.2	1.0	50	0	88.4	78 - 122	44.26	0.149	20	
4-Isopropyltoluene	38.09	1.0	50	0	76.2	77 - 127	36.15	5.24	20	S
4-Methyl-2-pentanone	110.1	2.0	100	0	110	67 - 130	109.3	0.737	20	
Acetone	119	2.0	100	0	119	39 - 160	120.3	1.06	20	
Benzene	44.43	1.0	50	0	88.9	79 - 120	44.6	0.385	20	
Bromobenzene	45.27	1.0	50	0	90.5	80 - 120	46.75	3.23	20	
Bromochloromethane	45.35	1.0	50	0	90.7	78 - 123	46.69	2.92	20	
Bromodichloromethane	47.22	1.0	50	0	94.4	79 - 125	47.15	0.143	20	
Bromoform	52.35	1.0	50	0	105	66 - 130	51.88	0.913	20	
Bromomethane	31.9	1.0	50	0	63.8	53 - 141	21.14	40.6	20	R

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317575 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS18051491-01MSD** Units: **ug/L** Analysis Date: **07-Jun-2018 15:54**
Client ID: Run ID: **VOA6_317575** SeqNo: **4592156** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	83.9	2.0	100	0	83.9	64 - 133	82.13	2.13	20	
Carbon tetrachloride	41.98	1.0	50	0	84.0	72 - 136	41.81	0.399	20	
Chlorobenzene	43.16	1.0	50	0	86.3	82 - 118	43.45	0.661	20	
Chloroethane	51.2	1.0	50	0	102	60 - 138	57.3	11.2	20	
Chloroform	47.83	1.0	50	0	95.7	79 - 124	48.5	1.39	20	
Chloromethane	37.81	1.0	50	0	75.6	50 - 139	38.29	1.25	20	
cis-1,2-Dichloroethene	48.4	1.0	50	0	96.8	78 - 123	48.56	0.32	20	
cis-1,3-Dichloropropene	47.65	1.0	50	0	95.3	75 - 124	47.93	0.582	20	
Dibromochloromethane	49.58	1.0	50	0	99.2	74 - 126	49.85	0.551	20	
Dibromomethane	52.96	1.0	50	0	106	79 - 123	53.05	0.177	20	
Dichlorodifluoromethane	30.01	1.0	50	0	60.0	32 - 152	29.15	2.92	20	
Ethylbenzene	42.83	1.0	50	0	85.7	79 - 121	42.3	1.25	20	
Hexachlorobutadiene	35.31	1.0	50	0	70.6	66 - 134	32.27	9.01	20	
Isopropylbenzene	40.55	1.0	50	0	81.1	72 - 131	38.3	5.7	20	
m,p-Xylene	84.03	2.0	100	0	84.0	80 - 121	81.78	2.71	20	
Methylene chloride	52	2.0	50	0	104	74 - 124	52.94	1.78	20	
Naphthalene	56.53	1.0	50	0	113	61 - 128	49.37	13.5	20	
n-Butylbenzene	40.09	1.0	50	0	80.2	75 - 128	37.74	6.04	20	
n-Propylbenzene	38.57	1.0	50	0	77.1	76 - 126	37.6	2.56	20	
o-Xylene	43.24	1.0	50	0	86.5	78 - 122	42.11	2.66	20	
sec-Butylbenzene	39.99	1.0	50	0	80.0	77 - 126	37.99	5.13	20	
Styrene	44.46	1.0	50	0	88.9	78 - 123	43.9	1.28	20	
tert-Butylbenzene	41.74	1.0	50	0	83.5	78 - 124	39.62	5.21	20	
Tetrachloroethene	39.87	1.0	50	0	79.7	74 - 129	38.68	3.04	20	
Toluene	42.86	1.0	50	0	85.7	80 - 121	42.48	0.892	20	
trans-1,2-Dichloroethene	46.86	1.0	50	0	93.7	75 - 124	46.27	1.27	20	
trans-1,3-Dichloropropene	50.01	1.0	50	0	100	73 - 127	51.12	2.2	20	
Trichloroethene	44.34	1.0	50	0	88.7	79 - 123	43.57	1.74	20	
Trichlorofluoromethane	39.56	1.0	50	0	79.1	65 - 141	37.73	4.72	20	
Vinyl chloride	42.55	1.0	50	0	85.1	58 - 137	41.82	1.73	20	
Surr: 1,2-Dichloroethane-d4	*50.78*	*1.0*	*50*	*0*	*102*	*81 - 118*	*50.06*	*1.43*	*20*	
Surr: 4-Bromofluorobenzene	*50.57*	*1.0*	*50*	*0*	*101*	*85 - 114*	*49.65*	*1.84*	*20*	
Surr: Dibromofluoromethane	*51.5*	*1.0*	*50*	*0*	*103*	*80 - 119*	*50.77*	*1.43*	*20*	
Surr: Toluene-d8	*47.95*	*1.0*	*50*	*0*	*95.9*	*89 - 112*	*47.94*	*0.0161*	*20*	

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client:	Bhate Environmental Associates, Inc.
Project:	Longhorn GW Treatment Plant
WorkOrder:	HS18051472

QC BATCH REPORT

Batch ID:	**R317575**	**Instrument:**	**VOA6**	**Method:**	**SW8260**

The following samples were analyzed in this batch: HS18051472-01 HS18051472-02

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051472

QC BATCH REPORT

Batch ID: R317713 **Instrument: ICS2100** **Method: SW9056**

MBLK Sample ID: **WBLKW1-060818** Units: **mg/L** Analysis Date: **08-Jun-2018 19:13**
Client ID: Run ID: **ICS2100_317713** SeqNo: **4594998** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.500	0.500								U
Sulfate	0.500	0.500								U

LCS Sample ID: **WLCSW1-060818** Units: **mg/L** Analysis Date: **08-Jun-2018 19:28**
Client ID: Run ID: **ICS2100_317713** SeqNo: **4594999** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.73	0.500	20	0	98.7	80 - 120				
Sulfate	19.69	0.500	20	0	98.5	80 - 120				

LCSD Sample ID: **WLCSDW1-060818** Units: **mg/L** Analysis Date: **08-Jun-2018 19:43**
Client ID: Run ID: **ICS2100_317713** SeqNo: **4595000** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.49	0.500	20	0	97.4	80 - 120	19.73	1.23	20	
Sulfate	19.45	0.500	20	0	97.3	80 - 120	19.69	1.22	20	

MS Sample ID: **HS18060305-01MS** Units: **mg/L** Analysis Date: **08-Jun-2018 05:41**
Client ID: Run ID: **ICS2100_317713** SeqNo: **4594962** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	67.37	0.500	10	58.4	89.6	80 - 120				O
Sulfate	68.06	0.500	10	59.19	88.7	80 - 120				O

MSD Sample ID: **HS18060305-01MSD** Units: **mg/L** Analysis Date: **08-Jun-2018 05:56**
Client ID: Run ID: **ICS2100_317713** SeqNo: **4594963** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	66.97	0.500	10	58.4	85.6	80 - 120	67.37	0.596	20	O
Sulfate	67.66	0.500	10	59.19	84.7	80 - 120	68.06	0.594	20	O

The following samples were analyzed in this batch: HS18051472-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 11-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: **HS18051472**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Oklahoma	2017-088	31-Aug-2018
North Carolina	624-2018	31-Dec-2018
Louisiana	03087 2017-2018	30-Jun-2018
Arkansas	88-0356	27-Mar-2019
Kansas	E-10352 2017-218	31-Jul-2018
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193	30-Apr-2019

Date: 11-Jun-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18051472
Date/Time Received: **31-May-2018 09:00**
Received by: **NDR**

Checklist completed by: *Paresh M. Giga* eSignature — 31-May-2018 Date
Reviewed by: *RJ Modashia* eSignature — 31-May-2018 Date

Matrices: **water**
Carrier name: **FedEx**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.0c/2.6c U/c	IR 30	
Cooler(s)/Kit(s):	43622		
Date/Time sample(s) sent to storage:	05/31/2018 11:10		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210, Houston, Tx. 77099 ATTN: SONIA WEST

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No. NWO1312.0150.0 16.0001

Job:
GROUNDWATER TREATMENT PLANT
BI-WEEKLY SAMPLES

Prepared By: Scott Beesinger

P.O Number

HS18051472
Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: VOC	Analyses: CHLORIDE, SULFATE	Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_053018	Water	05/30/18 / 14:00		3	3		HCL	
LH18/24-SP650_053018	Water	05/30/18 / 14:00		1		1	NONE	
Trip Blank	Water	05/30/18		2	2		HCL	

Additional Remarks: **STANDARD TAT ON ALL PARAMETERS.**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	05/30/18	14:30	NA	5/31/18	0930						

For Lab Use Only

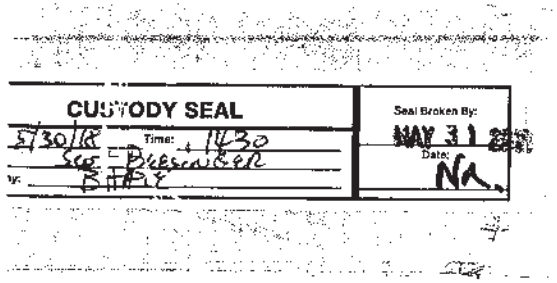
Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
							4/C 3.3		

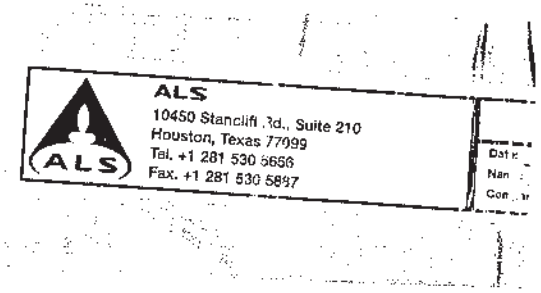
Remarks: 7376 9752 9454

IR# 30
CF -0.1C

43622

(Word) S:\1-ccs\Forms\Chain of Custody - BiWeekly





FedEx
TRK# 0221 7376 9752 9454

THU - 31 MAY 10:30A
PRIORITY OVERNIGHT

77099
TX-US

AD SCDA

Volatile Organics Raw Data

Bhate Environmental Associates, Inc.
Project: LONGHORN GW TREATMENT PLANT
ALS WO# HS18051472

FORM 2
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

	CLIENT SAMPLE NO.	SMC1 #	SMC2 (DCE)#	SMC3 (TOL)#	OTHER #	TOT OUT
01	VLCSW-180607	103	102	96	99	0
02	VBLKW-180607	103	104	96	102	0
03	HS18051472-02	103	104	97	101	0
04	HS18051472-01	104	104	96	101	0
05	HS18051491-01	102	100	96	99	0
06	HS18051491-01	103	102	96	101	0
07						
08						
09						
10						
11						
12						
13						
14						
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16						
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19						
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24						
25						
26						
27						
28						

		QC LIMITS
SMC1	= Dibromofluoromethane	(74-125)
SMC2 (DCE)	= 1,2-Dichloroethane-d4	(71-125)
SMC3 (TOL)	= Toluene-d8	(78-123)
OTHER	= 4-Bromofluorobenzene	(70-125)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

FORM 3
WATER VOLATILE METHOD SPIKE RECOVERY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Matrix Spike - Sample No.: VSTD050

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE AMOUNT ()	% REC #	QC. LIMITS REC.
Bromochloromethane	50.00	47.24	94	80-120
Vinyl Chloride	50.00	44.53	89	80-120
Chloromethane	50.00	54.37	109	80-120
Bromomethane	50.00	49.54	99	80-120
Chloroethane	50.00	49.07	98	80-120
Methylene Chloride	50.00	49.69	99	80-120
Acetone	100.00	104.71	105	80-120
1,1-Dichloroethene	50.00	44.77	90	80-120
trans-1,2-Dichloroethen	50.00	46.50	93	80-120
Carbon Tetrachloride	50.00	44.11	88	80-120
1,1-Dichloroethane	50.00	49.36	99	80-120
Bromodichloromethane	50.00	46.37	93	80-120
1,2-Dichloropropane	50.00	46.00	92	80-120
cis-1,3-Dichloropropene	50.00	47.24	94	80-120
2-Butanone	100.00	102.16	102	80-120
Dibromochloromethane	50.00	51.04	102	80-120
cis-1,2-Dichloroethene	50.00	46.69	93	80-120
1,1,2-Trichloroethane	50.00	47.12	94	80-120
Chloroform	50.00	45.93	92	80-120
Benzene	50.00	45.38	91	80-120
trans-1,3-Dichloroprope	50.00	48.66	97	80-120
Bromoform	50.00	50.86	102	80-120
4-Methyl-2-Pentanone	100.00	95.00	95	80-120
1,1,1-Trichloroethane	50.00	48.25	96	80-120
2-Hexanone	100.00	97.67	98	80-120
1,2-Dichloroethane	50.00	47.42	95	80-120
1,1,2,2-Tetrachloroetha	50.00	52.18	104	80-120
Trichloroethene	50.00	45.32	91	80-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

FORM III VOA

FORM 3
WATER VOLATILE METHOD SPIKE RECOVERY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Matrix Spike - Sample No.: VSTD050

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE AMOUNT ()	% REC #	QC. LIMITS REC.
Toluene	50.00	46.45	93	80-120
Dichlorodifluoromethane	50.00	45.02	90	80-120
Trichlorofluoromethane	50.00	45.47	91	80-120
Tetrachloroethene	50.00	44.35	89	80-120
1,2-Dibromoethane	50.00	47.38	95	80-120
Chlorobenzene	50.00	46.50	93	80-120
1,3-Dichlorobenzene	50.00	50.28	100	80-120
1,4-Dichlorobenzene	50.00	50.34	101	80-120
1,2-Dichlorobenzene	50.00	51.45	103	80-120
Ethylbenzene	50.00	46.71	93	80-120
m,p-Xylenes	100.00	91.89	92	80-120
o-Xylene	50.00	46.37	93	80-120
Styrene	50.00	47.01	94	80-120
Carbon Disulfide	100.00	90.23	90	80-120
2,2-Dichloropropane	50.00	51.25	102	80-120
1,1-Dichloropropene	50.00	45.14	90	80-120
Dibromomethane	50.00	50.27	100	80-120
1,3-Dichloropropane	50.00	51.46	103	80-120
1,1,1,2-Tetrachloroetha	50.00	46.20	92	80-120
Isopropylbenzene	50.00	45.21	90	80-120
Bromobenzene	50.00	49.93	100	80-120
1,2,3-Trichloropropane	50.00	47.16	94	80-120
n-Propylbenzene	50.00	45.76	92	80-120
2-Chlorotoluene	50.00	50.14	100	80-120
1,3,5-Trimethylbenzene	50.00	50.24	100	80-120
4-Chlorotoluene	50.00	50.56	101	80-120
tert-Butylbenzene	50.00	48.82	98	80-120
1,2,4-Trimethylbenzene	50.00	49.85	100	80-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

FORM III VOA

FORM 3
WATER VOLATILE METHOD SPIKE RECOVERY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Matrix Spike - Sample No.: VSTD050

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE AMOUNT ()	% REC #	QC. LIMITS REC.
sec-Butylbenzene	50.00	48.34	97	80-120
p-Isopropyltoluene	50.00	47.12	94	80-120
n-Butylbenzene	50.00	51.62	103	80-120
1,2-Dibromo-3-Chloropro	50.00	54.52	109	80-120
1,2,4-Trichlorobenzene	50.00	51.72	103	80-120
Hexachlorobutadiene	50.00	54.00	108	80-120
Naphthalene	50.00	57.14	114	80-120
1,2,3-Trichlorobenzene	50.00	52.65	105	80-120
Freon TF	50.00	45.22	90	80-120

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

_____

FORM III VOA

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Lab File ID: X052301 BFB Injection Date: 05/23/18

Instrument ID: VOA6 BFB Injection Time: 1025

GC Column: DB624 ID: 0.25 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	17.5
75	30.0 - 60.0% of mass 95	45.8
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.0
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	77.4
175	5.0 - 9.0% of mass 174	6.2 (8.0)1
176	95.0 - 101.0% of mass 174	73.7 (95.3)1
177	5.0 - 9.0% of mass 176	5.5 (7.4)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD000.5	VSTD000.5	X052303	05/23/18	1129
02	VSTD001	VSTD001	X052304	05/23/18	1153
03	VSTD002	VSTD002	X052305	05/23/18	1218
04	VSTD005	VSTD005	X052306	05/23/18	1242
05	VSTD020	VSTD020	X052307	05/23/18	1307
06	VSTD050	VSTD050	X052308X	05/23/18	1331
07	VSTD100	VSTD100	X052309	05/23/18	1356
08	VSTD150	VSTD150	X052310	05/23/18	1420
09	VSTD200	VSTD200	X052311	05/23/18	1444
10	VSTD050	VSTD050	X052315	05/23/18	1711
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Instrument ID: VOA6 Calibration Date(s): 05/23/18 05/23/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1040 1444

LAB FILE ID: RF0.25: X052302 RF0.5: X052303 RF1: X052304
RF2: X052305 RF5: X052306 RF20: X052307

COMPOUND	RF0.25	RF0.5	RF1	RF2	RF5	RF20
Bromochloromethane		0.362	0.336	0.281	0.300	0.293
Vinyl Chloride		0.781	0.681	0.562	0.582	0.540
Chloromethane		2384	3940	7093	17320	63348
Bromomethane		1060	1834	3303	7908	28918
Chloroethane		1782	2842	4820	11005	41096
Methylene Chloride		3240	4517	8148	19719	72992
Acetone		2768	3600	5461	11495	38225
1,1-Dichloroethene		0.607	0.514	0.430	0.433	0.402
trans-1,2-Dichloroethene		0.686	0.607	0.525	0.550	0.505
Carbon Tetrachloride		0.507	0.585	0.448	0.438	0.390
1,1-Dichloroethane		4213	6590	12414	30945	116312
Bromodichloromethane		0.607	0.526	0.445	0.492	0.452
1,2-Dichloropropane		0.393	0.445	0.389	0.380	0.362
cis-1,3-Dichloropropene		0.823	0.704	0.591	0.626	0.597
2-Butanone		0.266	0.211	0.200	0.217	0.212
Dibromochloromethane		2869	4536	8033	21474	78896
cis-1,2-Dichloroethene		0.766	0.658	0.591	0.610	0.577
1,1,2-Trichloroethane		0.378	0.353	0.291	0.315	0.292
Chloroform		1.174	0.997	0.853	0.892	0.848
Benzene		2.005	1.612	1.396	1.431	1.375
trans-1,3-Dichloropropene		0.620	0.565	0.487	0.512	0.499
Bromoform		2252	3390	6006	16187	60616
4-Methyl-2-Pentanone		0.494	0.399	0.345	0.366	0.347
1,1,1-Trichloroethane		3505	5267	9461	24593	88986
2-Hexanone		0.291	0.268	0.227	0.249	0.238
1,2-Dichloroethane		0.511	0.476	0.385	0.434	0.418
1,1,2,2-Tetrachloroethane		3469	5015	9293	23541	88686
Trichloroethene		0.558	0.445	0.399	0.389	0.372
Toluene		2.078	1.720	1.523	1.569	1.504
Dichlorodifluoromethane		0.694	0.588	0.507	0.519	0.463
Trichlorofluoromethane		0.803	0.736	0.602	0.600	0.528
Tetrachloroethene		0.445	0.372	0.317	0.321	0.289
1,2-Dibromoethane		0.482	0.431	0.366	0.394	0.371
Chlorobenzene		1.372	1.193	1.015	1.077	1.009
1,3-Dichlorobenzene		5334	8391	15018	37874	146285
1,4-Dichlorobenzene		5651	8528	15543	39414	148957
1,2-Dichlorobenzene		5456	8002	15336	36903	143274
Ethylbenzene		0.630	0.599	0.512	0.532	0.507
m,p-Xylenes		0.899	0.742	0.634	0.656	0.621
o-Xylene		0.836	0.724	0.654	0.662	0.619
Styrene		1.411	1.257	1.042	1.153	1.089
Carbon Disulfide		2.248	1.818	1.526	1.608	1.478
2,2-Dichloropropane		2935	5551	9316	22528	83001
1,1-Dichloropropene		0.518	0.596	0.448	0.470	0.421

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS1805147

Instrument ID: VOA6 Calibration Date(s): 05/23/18 05/23/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1040 1444

LAB FILE ID: RF0.25: X052302 RF0.5: X052303 RF1: X052304
RF2: X052305 RF5: X052306 RF20: X052307

COMPOUND	RF0.25	RF0.5	RF1	RF2	RF5	RF20
Dibromomethane		1720	2507	4609	12246	45114
1,3-Dichloropropane		4101	6587	12479	31006	113952
1,1,1,2-Tetrachloroethane		0.498	0.453	0.378	0.385	0.363
Isopropylbenzene		2.068	1.714	1.417	1.462	1.382
Bromobenzene		3046	5075	8939	22798	86345
1,2,3-Trichloropropane		0.876	0.806	0.702	0.782	0.725
n-Propylbenzene		4.596	3.803	3.192	3.289	3.122
2-Chlorotoluene		6978	11177	20945	51173	193794
1,3,5-Trimethylbenzene		8246	12924	24173	58557	222585
4-Chlorotoluene		8011	12715	24173	58554	223115
tert-Butylbenzene		6793	10837	20078	47921	180037
1,2,4-Trimethylbenzene		8569	13348	24089	60429	232530
sec-Butylbenzene		9027	14244	26555	62263	234541
p-Isopropyltoluene		3.123	2.662	2.213	2.228	2.094
n-Butylbenzene		6470	9737	18275	42977	163366
1,2-Dibromo-3-Chloropropane		524	930	1401	4024	14177
1,2,4-Trichlorobenzene		1.150	0.852	0.804	0.848	0.834
Hexachlorobutadiene		1233	1837	3333	7352	28620
Naphthalene		2.216	1.704	1.653	1.942	1.826
1,2,3-Trichlorobenzene		1.040	0.805	0.698	0.781	0.734
Freon TF		1848	3133	5380	12270	44260
Dibromofluoromethane		2016	3615	7070	15923	63516
1,2-Dichloroethane-d4		2618	3876	7478	17872	63319
Toluene-d8		8160	13113	25928	59497	226236
4-Bromofluorobenzene		3273	4348	9740	22395	82009

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS1805147

Instrument ID: VOA6 Calibration Date(s): 05/23/18 05/23/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1040 1444

LAB FILE ID: RF50: X052308X RF100: X052309 RF150: X052310
RF200: X052311

COMPOUND	RF50	RF100	RF150	RF200
Bromochloromethane	0.279	0.255	0.253	0.245
Vinyl Chloride	0.570	0.572	0.600	0.605
Chloromethane	155142	311716	495070	680961
Bromomethane	84434	190970	303649	378520
Chloroethane	102822	198462	290271	373107
Methylene Chloride	175074	340682	493039	638403
Acetone	89975	170357	249436	335811
1,1-Dichloroethene	0.432	0.426	0.447	0.442
trans-1,2-Dichloroethene	0.512	0.506	0.516	0.511
Carbon Tetrachloride	0.429	0.419	0.436	0.440
1,1-Dichloroethane	281067	541181	791414	1021515
Bromodichloromethane	0.453	0.438	0.449	0.454
1,2-Dichloropropane	0.355	0.349	0.356	0.358
cis-1,3-Dichloropropene	0.589	0.582	0.602	0.606
2-Butanone	0.214	0.201	0.204	0.205
Dibromochloromethane	189810	366119	530022	689666
cis-1,2-Dichloroethene	0.569	0.552	0.569	0.565
1,1,2-Trichloroethane	0.282	0.274	0.278	0.280
Chloroform	0.820	0.801	0.818	0.815
Benzene	1.351	1.345	1.375	1.382
trans-1,3-Dichloropropene	0.501	0.485	0.501	0.509
Bromoform	141935	276292	406804	526813
4-Methyl-2-Pentanone	0.350	0.337	0.342	0.345
1,1,1-Trichloroethane	228684	445835	650060	843142
2-Hexanone	0.237	0.230	0.236	0.240
1,2-Dichloroethane	0.409	0.397	0.410	0.411
1,1,2,2-Tetrachloroethane	209416	391990	572166	742020
Trichloroethene	0.377	0.376	0.388	0.395
Toluene	1.471	1.441	1.463	1.470
Dichlorodifluoromethane	0.538	0.527	0.555	0.559
Trichlorofluoromethane	0.635	0.630	0.663	0.657
Tetrachloroethene	0.309	0.303	0.308	0.316
1,2-Dibromoethane	0.360	0.351	0.352	0.358
Chlorobenzene	0.989	0.973	0.989	0.994
1,3-Dichlorobenzene	346604	674489	994233	1301958
1,4-Dichlorobenzene	355039	689080	1020272	1318822
1,2-Dichlorobenzene	333314	645313	935852	1207407
Ethylbenzene	0.504	0.509	0.514	0.518
m,p-Xylenes	0.618	0.610	0.622	0.623
o-Xylene	0.612	0.605	0.616	0.615
Styrene	1.075	1.044	1.073	1.071
Carbon Disulfide	1.553	1.546	1.613	1.598
2,2-Dichloropropane	208085	402987	588540	757851
1,1-Dichloropropene	0.456	0.446	0.468	0.470

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS1805147

Instrument ID: VOA6 Calibration Date(s): 05/23/18 05/23/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1040 1444

LAB FILE ID: RF50: X052308X RF100: X052309 RF150: X052310
RF200: X052311

COMPOUND	RF50	RF100	RF150	RF200
Dibromomethane	107870	207663	302802	388482
1,3-Dichloropropane	266047	510996	745246	956650
1,1,1,2-Tetrachloroethane	0.356	0.356	0.364	0.368
Isopropylbenzene	1.409	1.405	1.416	1.427
Bromobenzene	206013	404144	587266	758703
1,2,3-Trichloropropane	1.029	0.686	0.684	0.689
n-Propylbenzene	3.119	3.147	3.187	3.203
2-Chlorotoluene	463538	917852	1337140	1698159
1,3,5-Trimethylbenzene	536629	1039980	1521433	1968337
4-Chlorotoluene	535882	1026533	1505903	1947711
tert-Butylbenzene	451307	870422	1279900	1661699
1,2,4-Trimethylbenzene	557665	1075932	1576975	2058598
sec-Butylbenzene	599351	1170652	1716869	2215755
p-Isopropyltoluene	1.819	2.122	2.151	2.194
n-Butylbenzene	414965	770803	1152516	1477352
1,2-Dibromo-3-Chloropropane	35762	68003	100945	131878
1,2,4-Trichlorobenzene	0.843	0.838	0.863	0.889
Hexachlorobutadiene	73498	144683	219528	289931
Naphthalene	1.927	1.911	2.012	2.084
1,2,3-Trichlorobenzene	0.739	0.729	0.753	0.786
Freon TF	126560	248451	376478	479358
Dibromofluoromethane	152034	303385	436133	566962
1,2-Dichloroethane-d4	155767	306591	442660	573216
Toluene-d8	543229	1111689	1588145	2063089
4-Bromofluorobenzene	194880	387334	564276	730911

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS1805147

Instrument ID: VOA6 Calibration Date(s): 05/23/18 05/23/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1040 1444

COMPOUND	CURVE	COEFFICENTS A0	A1	A2	%RSD OR R^2	MAX %RSD OR R^2
Bromochloromethane	AVRG		0.28939762		13.546	15.000
Vinyl Chloride	AVRG		0.61055637		12.346	15.000
Chloromethane	2ORDR	-8.06e-003	2.25084531	-0.2163660	0.9996619	0.9900000
Bromomethane	LINR	6.235e-002	3.11050925		0.9962668	0.9900000
Chloroethane	2ORDR	-5.37e-003	3.26043959	-3.75e-002	0.9998436	0.9900000
Methylene Chloride	LINR	-5.1e-003	1.88607269		0.9999220	0.9900000
Acetone	LINR	-1.15e-002	7.30486204		0.9989832	0.9900000
1,1-Dichloroethene	AVRG		0.45919239		13.758	15.000
trans-1,2-Dichloroethene	AVRG		0.54643101		11.302	15.000
Carbon Tetrachloride	AVRG		0.45464897		12.735	15.000
1,1-Dichloroethane	LINR	-2.38e-003	1.17743987		0.9998394	0.9900000
Bromodichloromethane	AVRG		0.47969269		11.517	15.000
1,2-Dichloropropane	AVRG		0.37640939		8.056	15.000
cis-1,3-Dichloropropene	AVRG		0.63549312		12.500	15.000
2-Butanone	AVRG		0.21455834		9.498	15.000
Dibromochloromethane	LINR	-1.72e-003	2.43819731		0.9998590	0.9900000
cis-1,2-Dichloroethene	AVRG		0.60648482		11.168	15.000
1,1,2-Trichloroethane	AVRG		0.30472727		12.173	15.000
Chloroform	AVRG		0.89095000		13.679	15.000
Benzene	AVRG		1.47458667		14.557	15.000
trans-1,3-Dichloropropene	AVRG		0.51970554		8.507	15.000
Bromoform	LINR	2.534e-003	3.18965824		0.9997668	0.9900000
4-Methyl-2-Pentanone	AVRG		0.36946224		13.618	15.000
1,1,1-Trichloroethane	LINR	5.736e-003	1.42618269		0.9998452	0.9900000
2-Hexanone	AVRG		0.24608896		8.455	15.000
1,2-Dichloroethane	AVRG		0.42790017		9.481	15.000
1,1,2,2-Tetrachloroethane	LINR	-9.7e-003	1.21496379		0.9998383	0.9900000
Trichloroethene	AVRG		0.41117085		14.432	15.000
Toluene	AVRG		1.58194854		12.911	15.000
Dichlorodifluoromethane	AVRG		0.54999418		11.717	15.000
Trichlorofluoromethane	AVRG		0.65033770		12.348	15.000
Tetrachloroethene	AVRG		0.33121752		14.638	15.000
1,2-Dibromoethane	AVRG		0.38507621		11.550	15.000
Chlorobenzene	AVRG		1.06802342		12.456	15.000
1,3-Dichlorobenzene	LINR	6.775e-003	0.69369518		0.9996090	0.9900000
1,4-Dichlorobenzene	LINR	3.457e-003	0.68203843		0.9997982	0.9900000
1,2-Dichlorobenzene	LINR	-6.86e-003	0.74427878		0.9999437	0.9900000
Ethylbenzene	AVRG		0.53620589		8.523	15.000
m,p-Xylenes	AVRG		0.66962105		14.193	15.000
o-Xylene	AVRG		0.66048133		11.526	15.000
Styrene	AVRG		1.13510110		10.874	15.000
Carbon Disulfide	AVRG		1.66545517		14.326	15.000
2,2-Dichloropropane	LINR	-1.14e-004	1.58438161		0.9998494	0.9900000
1,1-Dichloropropene	AVRG		0.47694670		10.821	15.000

FORM VI VOA

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS1805147

Instrument ID: VOA6 Calibration Date(s): 05/23/18 05/23/18

Column: DB624 ID: 0.18 (mm) Calibration Time(s): 1040 1444

COMPOUND	CURVE	COEFFICENTS A0	A1	A2	%RSD OR R^2	MAX %RSD OR R^2
Dibromomethane	LINR	1.457e-004	4.41422618		0.9998380	0.9900000
1,3-Dichloropropane	LINR	-8.1e-003	1.75218907		0.9999219	0.9900000
1,1,1,2-Tetrachloroethane	AVRG		0.39129814		12.780	15.000
Isopropylbenzene	AVRG		1.52220721		14.972	15.000
Bromobenzene	LINR	-4.42e-004	1.18371114		0.9999313	0.9900000
1,2,3-Trichloropropane	AVRG		0.77554184		14.914	15.000
n-Propylbenzene	AVRG		3.40643058		14.501	15.000
2-Chlorotoluene	LINR	-2.82e-003	0.52549670		0.9999556	0.9900000
1,3,5-Trimethylbenzene	LINR	2.417e-004	0.45678343		0.9999003	0.9900000
4-Chlorotoluene	LINR	-1.64e-003	0.46186132		0.9998895	0.9900000
tert-Butylbenzene	LINR	5.24e-003	0.54147253		0.9998219	0.9900000
1,2,4-Trimethylbenzene	LINR	2.923e-003	0.43818659		0.9997538	0.9900000
sec-Butylbenzene	LINR	6.919e-003	0.40478584		0.9998909	0.9900000
p-Isopropyltoluene	AVRG		2.28964762		16.629	15.000
n-Butylbenzene	LINR	3.804e-005	0.60739561		0.9997994	0.9900000
1,2-Dibromo-3-Chloropropane	LINR	7.284e-003	6.84396297		0.9996041	0.9900000
1,2,4-Trichlorobenzene	AVRG		0.88023330		11.789	15.000
Hexachlorobutadiene	LINR	2.772e-002	3.12023526		0.9987662	0.9900000
Naphthalene	AVRG		1.91957592		9.207	15.000
1,2,3-Trichlorobenzene	AVRG		0.78492089		12.916	15.000
Freon TF	LINR	2.237e-002	2.48908625		0.9991178	0.9900000
Dibromofluoromethane	2ORDR	-3.18e-003	2.16544207	-2.52e-002	0.9999758	0.9900000
1,2-Dichloroethane-d4	2ORDR	-6.19e-003	2.13420198	-2.04e-002	0.9999529	0.9900000
Toluene-d8	2ORDR	-2.66e-003	0.83950395	-6.05e-003	0.9999483	0.9900000
4-Bromofluorobenzene	LINR	3.212e-003	2.29668654		0.9998473	0.9900000

FORM VI VOA

MSVOA06 -Logbook

Batch: 31901
Date: 05-23-2018
Method: 8260
Comments:

Analyst: Presenta Cabascango
Reviewer:
Laboratory: Houston

#	Samp ID	Type	Analyzed	DF	Init Wt/Vol	Final Vol	File ID	Matrix	Status	pH
1	BFB	TUNE	05-23-2018 10:25 am	1.00	50 mL	50 mL	X052301.D	Liquid	Y	NA
2	*auto find/ purged* VSTD000.25	ICAL1	05-23-2018 10:40 am	1.00	50 mL	50 mL	X052302.D	Liquid	Y	NA
3	*0.1µL cal STD/100mL DI* VSTD000.5	ICAL2	05-23-2018 11:29 am	1.00	50 mL	50 mL	X052303.D	Liquid	Y	NA
4	*0.1µL cal STD/50mL DI* VSTD001	ICAL3	05-23-2018 11:53 am	1.00	50 mL	50 mL	X052304.D	Liquid	Y	NA
5	*0.2µL cal STD/50mL DI* VSTD002	ICAL4	05-23-2018 12:18 pm	1.00	50 mL	50 mL	X052305.D	Liquid	Y	NA
6	*0.4µL cal STD/50mL DI* VSTD005	ICAL5	05-23-2018 12:42 pm	1.00	50 mL	50 mL	X052306.D	Liquid	Y	NA
7	*1.0µL cal STD/50mL DI* VSTD020	ICAL6	05-23-2018 01:07 pm	1.00	50 mL	50 mL	X052307.D	Liquid	Y	NA
8	*4.0µL cal STD/50mL DI* VSTD050	ICAL7	05-23-2018 01:31 pm	1.00	50 mL	50 mL	X052308x.D	Liquid	Y	NA
9	*not used* VSTD100	ICAL8	05-23-2018 01:56 pm	1.00	50 mL	50 mL	X052309.D	Liquid	Y	NA
10	*20µL cal STD/50mL DI* VSTD150	ICAL9	05-23-2018 02:20 pm	1.00	50 mL	50 mL	X052310.D	Liquid	Y	NA
11	*30µL cal STD/50mL DI* VSTD200	ICAL	05-23-2018 02:44 pm	1.00	50 mL	50 mL	X052311.D	Liquid	Y	NA
12	*40µL cal STD/50mL DI* BLANK	SAMP	05-23-2018 03:09 pm	1.00	50 mL	50 mL	X052312.D	Liquid	Y	NA
13	*clean up blank* BLANK	SAMP	05-23-2018 03:33 pm	1.00	50 mL	50 mL	X052313.D	Liquid	Y	NA
14	*clean up blank* VSTD050	ICAL7	05-23-2018 04:47 pm	1.00	50 mL	50 mL	X052314.D	Liquid	Y	NA
15	*10µL cal STD/50mL DI* VSTD050	ICV	05-23-2018 05:11 pm	1.00	50 mL	50 mL	X052315.D	Liquid	Y	NA
16	*10µL cal STD/50mL DI* VLCSW-180523	LCS	05-23-2018 05:36 pm	1.00	50 mL	50 mL	X052316.D	Liquid	Y	NA
17	*10µL cal STD/50mL DI* VLCSDW-180523	LCSD	05-23-2018 06:01 pm	1.00	50 mL	50 mL	X052317.D	Liquid	Y	NA
18	*10µL cal STD/50mL DI* BLANKW	SAMP	05-23-2018 06:49 pm	1.00	50 mL	50 mL	X052318.D	Liquid	Y	NA
19	*clean up blank* BLANKW	SAMP	05-23-2018 07:14 pm	1.00	50 mL	50 mL	X052319.D	Liquid	Y	NA
20	*clean up blank* VBLKW-180523	MBLK	05-23-2018 07:39 pm	1.00	50 mL	50 mL	X052320.D	Liquid	Y	NA
21	VBLKW-180523	MBLK	05-23-2018 08:03 pm	1.00	50 mL	50 mL	X052321.D	Liquid	Y	NA
22	HS18010516-23	SAMP	05-23-2018 08:28 pm	1.00	50 mL	50 mL	X052322.D	Liquid	Y	NA
23	HS18010516-24	SAMP	05-23-2018 08:52 pm	1.00	50 mL	50 mL	X052323.D	Liquid	Y	NA
24	HS18010516-25	SAMP	05-23-2018 09:17 pm	1.00	50 mL	50 mL	X052324.D	Liquid	Y	NA

MSVOA06 -Logbook

Chemical	Value
SURR SPK ID	30502-26-03
IS ID	30502-26-04
ICV STD ID	30603-18-01
LCS/MS ID	30502-26-01/02
CAL STD ID	30502-26-01/02
BFB ID	30502-26-03
pH Paper	N/A

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052301.D

Date : 23-MAY-2018 10:25

Client ID: BFB

Instrument: voa6.i

Sample Info: BFB;BFB;3;;BFB

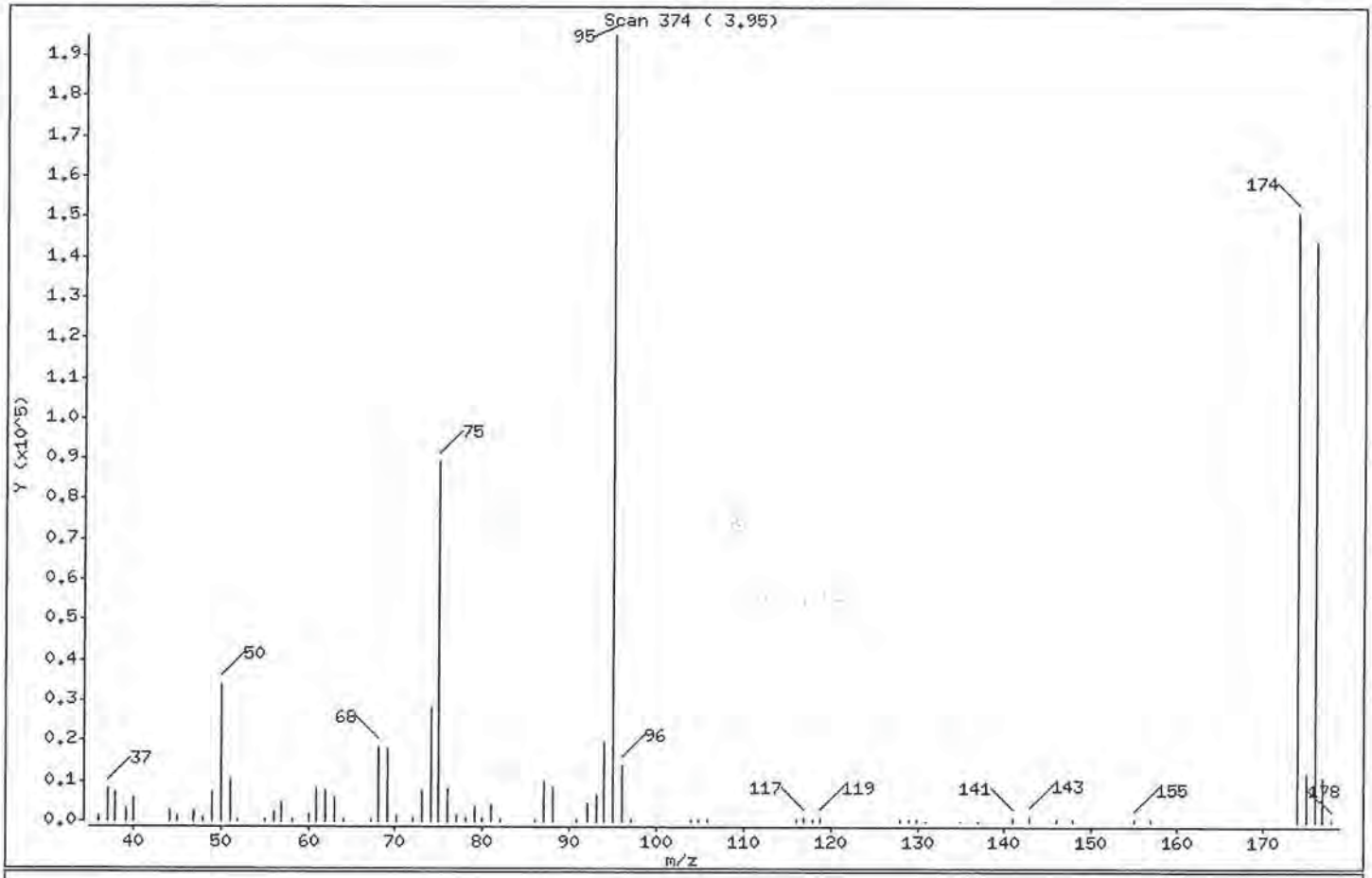
Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25

1 bfb



m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	17.48
75	30.00 - 60.00% of mass 95	45.79
96	5.00 - 9.00% of mass 95	7.01
173	Less than 2.00% of mass 174	0.00 (0.00)
174	Greater than 50.00% of mass 95	77.41
175	5.00 - 9.00% of mass 174	6.20 (8.01)
176	95.00 - 101.00% of mass 174	73.74 (95.25)
177	5.00 - 9.00% of mass 176	5.47 (7.42)

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052301.D

Date : 23-MAY-2018 10:25

Client ID: BFB

Instrument: voa6.i

Sample Info: BFB;BFB;3;;BFB

Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25

Data File: X052301.D
Spectrum: Scan 374 (-3.95)
Location of Maximum: 95.00
Number of points: 71

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	1459	61.00	8165	82.00	587	127.90	536
37.10	8206	62.00	7470	86.10	260	129.10	336
38.00	7250	63.00	5800	87.00	9782	129.90	652
39.10	2985	64.00	381	88.00	8618	130.90	204
40.00	5794	67.10	483	90.90	635	134.90	213
44.10	2679	68.00	18552	92.00	4506	136.90	205
45.10	1443	69.10	17800	93.00	6775	140.90	1103
47.00	2611	70.10	1195	94.00	19560	142.90	1184
48.00	954	72.00	775	95.00	194944	145.90	225
49.00	7266	73.10	7641	96.00	13674	147.80	270
50.00	34072	74.10	28224	97.00	401	155.00	329
51.00	10351	75.00	89256	103.90	658	156.90	284
52.00	519	76.00	7854	104.90	262	174.00	150912
55.00	518	77.00	1341	105.90	620	175.00	12085
56.10	2276	78.00	1062	116.00	479	176.00	143744
57.00	4506	79.00	3637	116.90	817	177.00	10662
58.10	300	80.00	1010	117.90	487	178.00	330
60.00	1701	80.90	3810	118.90	675		

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052301.D

Date : 23-MAY-2018 10:25

Client ID: BFB

Instrument: voa6.i

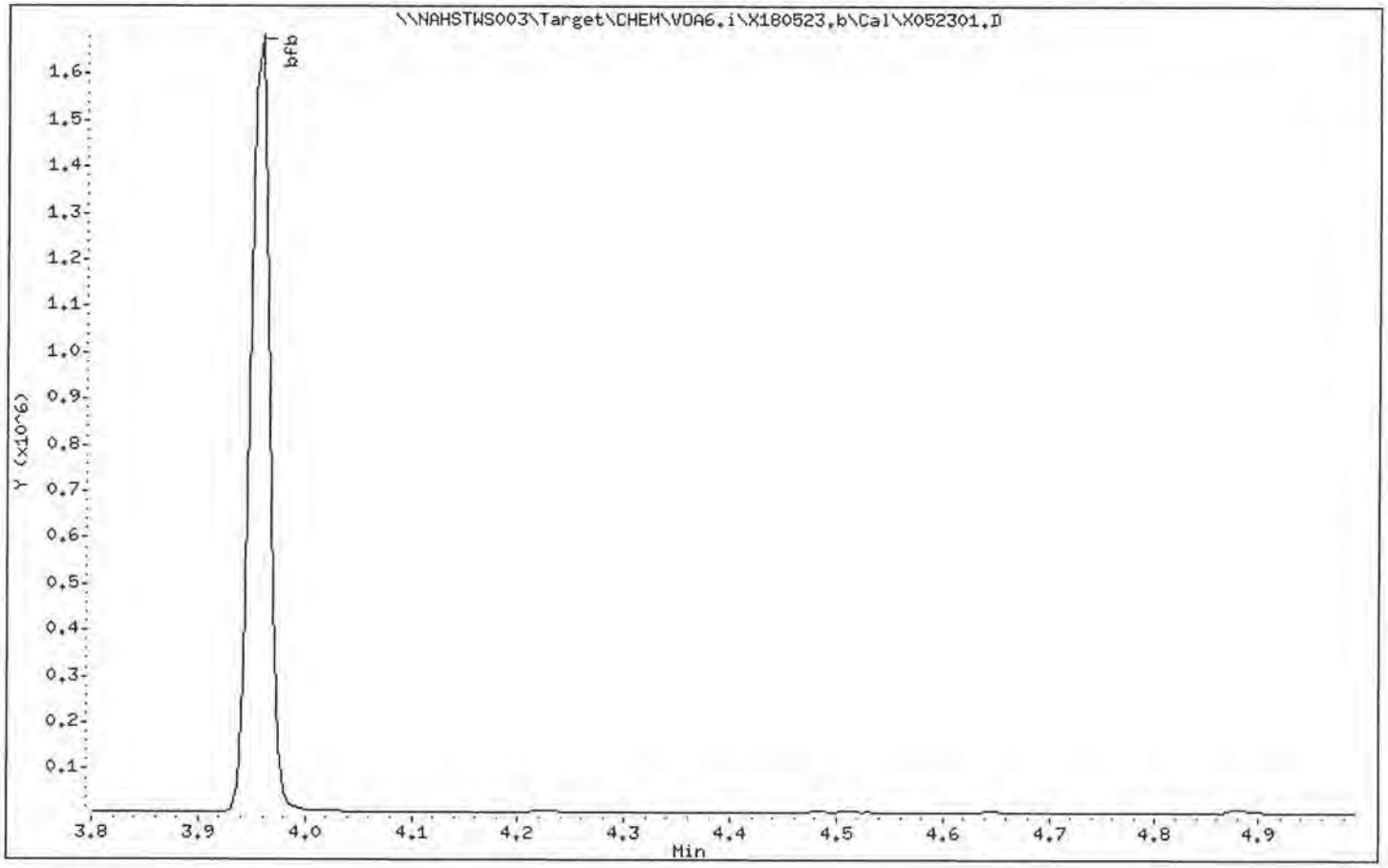
Sample Info: BFB;BFB;3;;BFB

Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052302.D
Report Date: 12-Jun-2018 15:17

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052302.D
Lab Smp Id: VSTD000.25 Client Smp ID: VSTD000.25
Inj Date : 23-MAY-2018 10:40
Operator : PC Inst ID: voa6.i
Smp Info : VSTD000.25;VSTD000.25;1;1;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:17 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 14:44 Cal File: X052311.D
Als bottle: 2 Calibration Sample, Level: 1
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

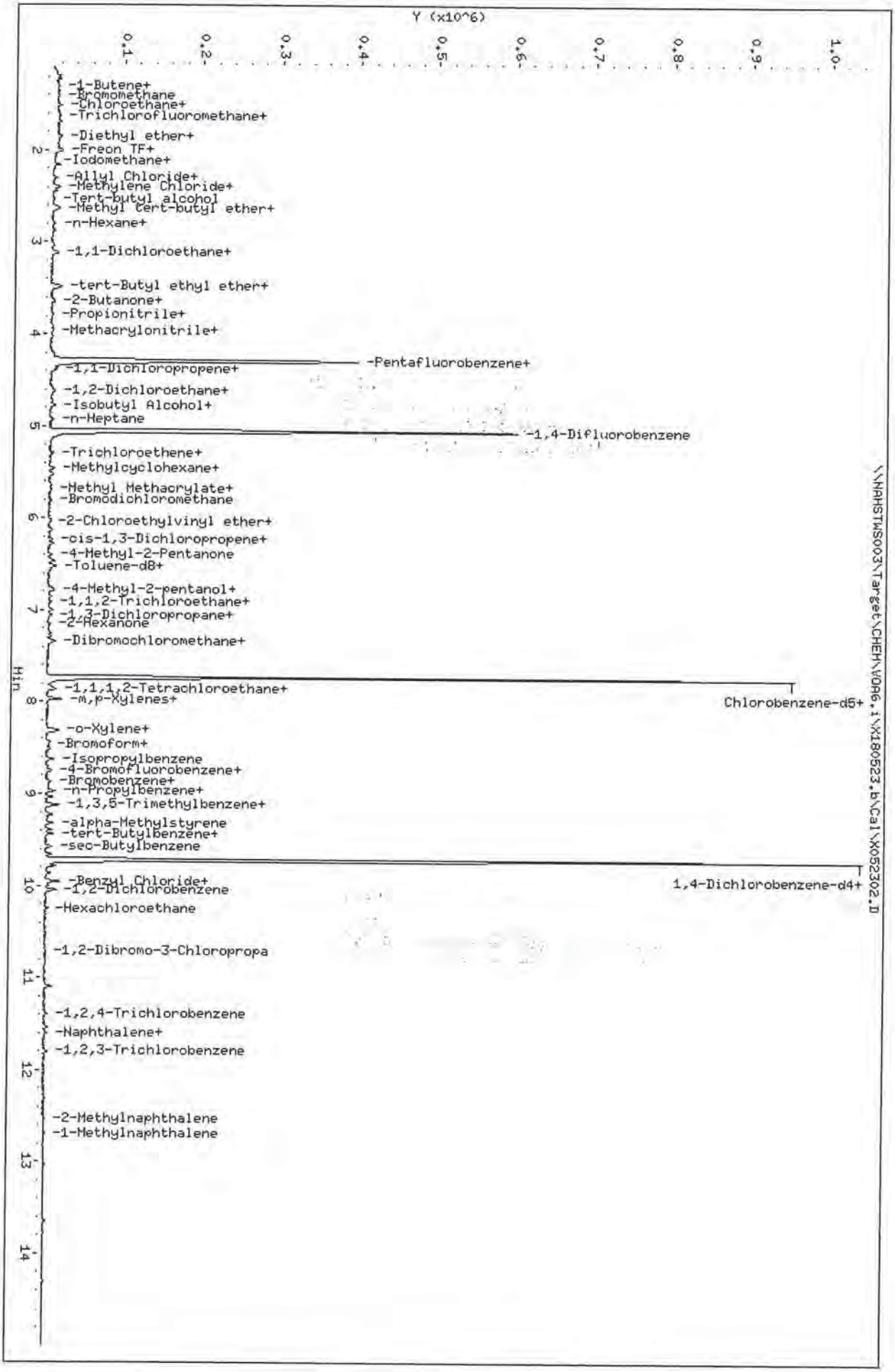
	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
*	1 Pentafluorobenzene	168	4.297	4.297	(1.000)	336586	50.0000	
*	36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	494907	50.0000	
*	47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	470245	50.0000	
*	70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	244404	50.0000	
$	30 Dibromofluoromethane	113	4.218	4.218	(0.982)	1281	0.25000	0.25(a)
$	35 1,2-Dichloroethane-d4	65	4.576	4.576	(1.065)	1660	0.25000	0.21(Ta)
$	48 Toluene-d8	98	6.467	6.467	(0.836)	4923	0.25000	0.30(Ta)
$	69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	2242	0.25000	0.70(a)
	60 1,1,1,2-Tetrachloroethane	131	7.835	7.835	(1.013)	1293	0.25000	0.35(a)
	31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	1642	0.25000	0.63(aM)
	138 Freon TF	101	2.005	2.005	(0.467)	1134	0.25000	1.53(a)
	53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	1075	0.25000	0.37(a)
	22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	2133	0.25000	0.25(TaM)
	11 1,1-Dichloroethene	96	1.998	1.998	(0.465)	1299	0.25000	0.42(aM)
	32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	1615	0.25000	0.34(aM)
	93 1,2,3-Trichlorobenzene	180	11.804	11.804	(1.214)	1249	0.25000	0.32(aM)
	71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	1222	0.25000	0.32(aM)
	90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	1486	0.25000	0.34(aM)
	79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	4835	0.25000	0.57(a)
	89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	266	0.25000	0.73(aM)
	57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	1358	0.25000	0.37(a)
	33 1,2-Dichloroethane	62	4.662	4.662	(0.921)	1748	0.25000	0.41(a)

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052302.D
Report Date: 12-Jun-2018 15:17

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
42	1,2-Dichloropropane	63	5.529	5.529	(1.092)	1347	0.25000	0.36(aM)
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	4437	0.25000	0.42(a)
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	2773	0.25000	0.73(a)
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	2331	0.25000	0.02(a)
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	3170	0.25000	0.61(a)
26	2,2-Dichloropropane	77	3.631	3.631	(0.845)	2002	0.25000	0.46(aM)
24	2-Butanone	43	3.710	3.710	(0.863)	756	0.50000	0.52(aM)
76	2-Chlorotoluene	91	9.039	9.039	(0.930)	4343	0.25000	0.32(a)
52	2-Hexanone	43	7.155	7.155	(0.925)	1664	0.50000	0.71(aM)
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	4441	0.25000	0.33(a)
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	4665	0.25000	0.41(aH)
45	4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	2312	0.50000	0.66(aM)
10	Acetone	43	2.062	2.062	(0.480)	1885	0.50000	1.47(aM)
37	Benzene	78	4.619	4.619	(0.912)	4995	0.25000	0.34(aM)
74	Bromobenzene	156	8.867	8.867	(0.912)	1658	0.25000	0.37(a)
29	Bromochloromethane	128	3.917	3.917	(0.912)	651	0.25000	0.33(aM)
39	Bromodichloromethane	83	5.808	5.808	(1.147)	1806	0.25000	0.38(aM)
66	Bromoform	173	8.473	8.473	(1.095)	1278	0.25000	0.56(aM)
6	Bromomethane	94	1.410	1.410	(0.328)	633	0.25000	3.41(aM)
19	Carbon Disulfide	76	2.162	2.162	(0.503)	8329	0.50000	0.74(aM)
34	Carbon Tetrachloride	117	4.376	4.376	(0.864)	1455	0.25000	0.32(aM)
59	Chlorobenzene	112	7.764	7.764	(1.004)	4016	0.25000	0.39(a)
28	Chloroform	83	4.025	4.025	(0.937)	2068	0.25000	0.34(aM)
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	1514	0.25000	0.37(aM)
46	cis-1,3-Dichloropropene	75	6.238	6.238	(1.232)	2340	0.25000	0.37(a)
55	Dibromochloromethane	129	7.248	7.248	(0.937)	1682	0.25000	0.35(a)
44	Dibromomethane	93	5.644	5.644	(1.115)	875	0.25000	0.39(aM)
2	Dichlorodifluoromethane	85	1.031	1.031	(0.240)	1250	0.25000	0.33(aM)
61	Ethylbenzene	106	7.864	7.864	(1.017)	1993	0.25000	0.39(a)
91	Hexachlorobutadiene	225	11.539	11.539	(1.107)	555	0.25000	1.74(aM)
67	Isopropylbenzene	105	8.623	8.623	(1.115)	5670	0.25000	0.39(aM)
62	m,p-Xylenes	106	7.964	7.964	(1.030)	4351	0.50000	0.69(aM)
87	n-Butylbenzene	91	10.049	10.049	(1.034)	3779	0.25000	0.47(a)
73	n-Propylbenzene	91	8.974	8.974	(0.923)	6660	0.25000	0.39(a)
92	Naphthalene	128	11.603	11.603	(1.194)	3253	0.25000	0.34(a)
63	o-Xylene	106	8.301	8.301	(1.073)	2203	0.25000	0.35(a)
81	sec-Butylbenzene	105	9.583	9.583	(0.986)	5017	0.25000	0.76(a)
64	Styrene	104	8.323	8.323	(1.076)	4097	0.25000	0.38(a)
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	3507	0.25000	0.65(a)
56	Tetrachloroethene	164	7.005	7.005	(0.906)	1187	0.25000	0.38(a)
50	Toluene	91	6.525	6.525	(0.844)	5972	0.25000	0.40(a)
20	trans-1,2-Dichloroethene	96	2.635	2.635	(0.613)	1427	0.25000	0.38(aM)
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	1890	0.25000	0.36(aM)
38	Trichloroethene	130	5.300	5.300	(1.047)	1484	0.25000	0.36(a)
8	Trichlorofluoromethane	101	1.639	1.639	(0.382)	1636	0.25000	0.37(a)
5	Vinyl Chloride	62	1.202	1.202	(0.280)	1390	0.25000	0.33(aM)

QC Flag Legend

T - Target compound detected outside RT window.
a - Target compound detected but, quantitated amount Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052302.D
Date : 23-MAY-2018 10:40
Client ID: VSTD000.25
Sample Info: VSTD000.25;VSTD000.25;1;1;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18

\\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052302.D

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052303.D
Report Date: 12-Jun-2018 15:17

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052303.D
Lab Smp Id: VSTD000.5 Client Smp ID: VSTD000.5
Inj Date : 23-MAY-2018 11:29
Operator : PC Inst ID: voa6.i
Smp Info : VSTD000.5;VSTD000.5;1;2;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:17 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 10:40 Cal File: X052302.D
Als bottle: 4 Calibration Sample, Level: 2
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	336924	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	493297	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	465867	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	244121	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	2016	0.50000	0.48(a)
$ 35 1,2-Dichloroethane-d4	65	4.583	4.583	(1.067)	2618	0.50000	0.51(Ta)
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	8160	0.50000	0.60(a)
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	3273	0.50000	0.96(a)
60 1,1,1,2-Tetrachloroethane	131	7.843	7.843	(1.014)	2321	0.50000	0.63(aM)
31 1,1,1-Trichloroethane	97	4.197	4.197	(0.977)	3505	0.50000	1.02(M)
68 1,1,2,2-Tetrachloroethane	83	8.896	8.896	(0.915)	3469	0.50000	0.37(aM)
138 Freon TF	101	2.005	2.005	(0.467)	1848	0.50000	1.80(a)
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	1763	0.50000	0.62(aM)
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	4213	0.50000	0.61(aM)
11 1,1-Dichloroethene	96	1.998	1.998	(0.465)	2045	0.50000	0.66(aM)
32 1,1-Dichloropropene	75	4.397	4.397	(0.868)	2557	0.50000	0.54(aM)
93 1,2,3-Trichlorobenzene	180	11.804	11.804	(1.214)	2540	0.50000	0.66(a)
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	2139	0.50000	0.56(aM)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	2808	0.50000	0.65(aM)
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	8569	0.50000	0.91(a)
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	524	0.50000	1.09(aM)
57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	2247	0.50000	0.62(aM)

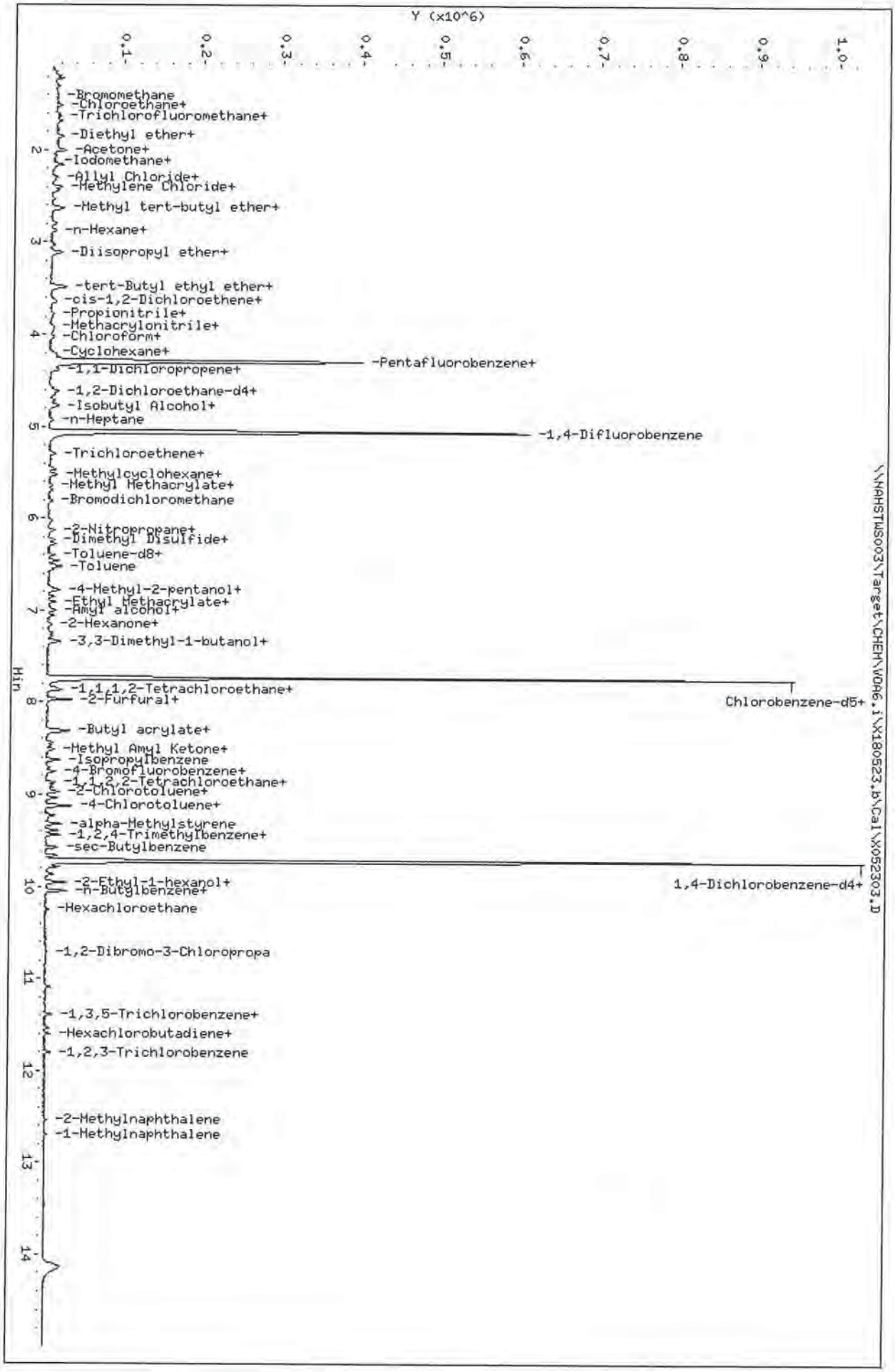
Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052303.D
Report Date: 12-Jun-2018 15:17

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	5456	0.50000	0.48(a)
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	2523	0.50000	0.59(aM)
42	1,2-Dichloropropane	63	5.522	5.522	(1.091)	1940	0.50000	0.52(aM)
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	8246	0.50000	0.78(aM)
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	5334	0.50000	1.09(aM)
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	4101	0.50000	0.36(aM)
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	5651	0.50000	0.96(aM)
26	2,2-Dichloropropane	77	3.624	3.624	(0.843)	2935	0.50000	0.68(aM)
24	2-Butanone	43	3.710	3.710	(0.863)	1795	1.00000	1.24(aM)
76	2-Chlorotoluene	91	9.039	9.039	(0.930)	6978	0.50000	0.60(aM)
52	2-Hexanone	43	7.155	7.155	(0.925)	2714	1.00000	1.18(a)
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	8011	0.50000	0.67(aM)
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	7624	0.50000	0.68(aMH)
45	4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	4602	1.00000	1.33(aM)
10	Acetone	43	2.062	2.062	(0.480)	2768	1.00000	2.42(a)
37	Benzene	78	4.619	4.619	(0.912)	9890	0.50000	0.67(aM)
74	Bromobenzene	156	8.867	8.867	(0.912)	3046	0.50000	0.71(aM)
29	Bromochloromethane	128	3.917	3.917	(0.912)	1221	0.50000	0.62(aM)
39	Bromodichloromethane	83	5.808	5.808	(1.147)	2993	0.50000	0.63(aM)
66	Bromoform	173	8.473	8.473	(1.095)	2252	0.50000	0.89(TaM)
6	Bromomethane	94	1.410	1.410	(0.328)	1060	0.50000	3.60(a)
19	Carbon Disulfide	76	2.162	2.162	(0.503)	15151	1.00000	1.35(a)
34	Carbon Tetrachloride	117	4.383	4.383	(0.866)	2500	0.50000	0.55(aM)
59	Chlorobenzene	112	7.757	7.757	(1.003)	6394	0.50000	0.64(aM)
7	Chloroethane	64	1.475	1.475	(0.343)	1782	0.50000	0.59(aM)
28	Chloroform	83	4.025	4.025	(0.937)	3956	0.50000	0.65(aM)
3	Chloromethane	50	1.138	1.138	(0.265)	2384	0.50000	0.39(aM)
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	2582	0.50000	0.63(aM)
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.451)	4059	0.50000	0.64(aM)
55	Dibromochloromethane	129	7.248	7.248	(0.937)	2869	0.50000	0.66(aM)
44	Dibromomethane	93	5.644	5.644	(1.115)	1720	0.50000	0.77(aM)
2	Dichlorodifluoromethane	85	1.031	1.031	(0.240)	2337	0.50000	0.63(aM)
61	Ethylbenzene	106	7.864	7.864	(1.017)	2935	0.50000	0.58(aM)
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	1233	0.50000	2.17(a)
67	Isopropylbenzene	105	8.623	8.623	(1.115)	9633	0.50000	0.67(aM)
62	m,p-Xylenes	106	7.964	7.964	(1.030)	8377	1.00000	1.34(aM)
17	Methylene Chloride	84	2.399	2.399	(0.558)	3240	0.50000	0.65(a)
87	n-Butylbenzene	91	10.049	10.049	(1.034)	6470	0.50000	0.80(a)
73	n-Propylbenzene	91	8.974	8.974	(0.923)	11219	0.50000	0.67(aM)
92	Naphthalene	128	11.603	11.603	(1.194)	5410	0.50000	0.57(a)
63	o-Xylene	106	8.308	8.308	(1.074)	3897	0.50000	0.63(aM)
81	sec-Butylbenzene	105	9.576	9.576	(0.985)	9027	0.50000	1.09(aM)
64	Styrene	104	8.323	8.323	(1.076)	6573	0.50000	0.62(aM)
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	6793	0.50000	1.01(aM)
56	Tetrachloroethene	164	7.005	7.005	(0.906)	2074	0.50000	0.67(aM)
50	Toluene	91	6.525	6.525	(0.844)	9680	0.50000	0.65(aM)
20	trans-1,2-Dichloroethene	96	2.635	2.635	(0.613)	2313	0.50000	0.62(aM)
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	3057	0.50000	0.59(aM)
38	Trichloroethene	130	5.300	5.300	(1.047)	2755	0.50000	0.67(a)
8	Trichlorofluoromethane	101	1.632	1.632	(0.380)	2707	0.50000	0.61(a)
5	Vinyl Chloride	62	1.202	1.202	(0.280)	2632	0.50000	0.63(aM)

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052303.D
Report Date: 12-Jun-2018 15:17

QC Flag Legend

T - Target compound detected outside RT window.
a - Target compound detected but, quantitated amount
    Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052303.D
Date : 23-MAY-2018 11:29
Client ID: VSTD000.5
Sample Info: VSTD000.5;VSTD000.5;1;2;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052304.D
Report Date: 12-Jun-2018 15:17

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052304.D
Lab Smp Id: VSTD001 Client Smp ID: VSTD001
Inj Date : 23-MAY-2018 11:53
Operator : PC Inst ID: voa6.i
Smp Info : VSTD001;VSTD001;1;3;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:17 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 11:29 Cal File: X052303.D
Als bottle: 5 Calibration Sample, Level: 3
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1	Pentafluorobenzene	168	4.290	4.290	(1.000)	320786	50.0000	
* 36	1,4-Difluorobenzene	114	5.063	5.063	(1.000)	469688	50.0000	
* 47	Chlorobenzene-d5	117	7.735	7.735	(1.000)	451072	50.0000	
* 70	1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	240350	50.0000	
$ 30	Dibromofluoromethane	113	4.218	4.218	(0.983)	3615	1.00000	1.06
$ 35	1,2-Dichloroethane-d4	65	4.583	4.583	(1.068)	3876	1.00000	0.97(a)
$ 48	Toluene-d8	98	6.460	6.460	(0.835)	13113	1.00000	1.08
$ 69	4-Bromofluorobenzene	95	8.752	8.752	(1.131)	4348	1.00000	1.26
60	1,1,1,2-Tetrachloroethane	131	7.843	7.843	(1.014)	4087	1.00000	1.15(a)
31	1,1,1-Trichloroethane	97	4.204	4.204	(0.980)	5267	1.00000	1.45
68	1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.915)	5015	1.00000	0.78(aM)
138	Freon TF	101	1.997	1.997	(0.466)	3133	1.00000	2.33(a)
53	1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	3182	1.00000	1.15(a)
22	1,1-Dichloroethane	63	3.029	3.029	(0.706)	6590	1.00000	1.09(M)
11	1,1-Dichloroethene	96	1.997	1.997	(0.466)	3296	1.00000	1.11(a)
32	1,1-Dichloropropene	75	4.390	4.390	(0.867)	5594	1.00000	1.24(a)
93	1,2,3-Trichlorobenzene	180	11.804	11.804	(1.214)	3871	1.00000	1.02(a)
71	1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	3877	1.00000	1.03(aM)
90	1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	4097	1.00000	0.96(a)
79	1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	13348	1.00000	1.36(a)
89	1,2-Dibromo-3-Chloropropane	155	10.722	10.722	(1.103)	930	1.00000	1.68(a)
57	1,2-Dibromoethane	107	7.334	7.334	(0.948)	3890	1.00000	1.11

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052304.D
Report Date: 12-Jun-2018 15:17

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	8002	1.00000	0.89(a)
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	4467	1.00000	1.11
42	1,2-Dichloropropane	63	5.529	5.529	(1.092)	4182	1.00000	1.18(aM)
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	12924	1.00000	1.24(a)
83	1,3-Dichlorobenzene	146	9.669	9.669	(0.995)	8391	1.00000	1.54(a)
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	6587	1.00000	0.87(a)
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	8528	1.00000	1.38(a)
26	2,2-Dichloropropane	77	3.623	3.623	(0.845)	5551	1.00000	1.36(a)
24	2-Butanone	43	3.702	3.702	(0.863)	2713	2.00000	1.97(a)
76	2-Chlorotoluene	91	9.032	9.032	(0.929)	11177	1.00000	1.08(a)
52	2-Hexanone	43	7.155	7.155	(0.925)	4834	2.00000	2.17(a)
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	12715	1.00000	1.13(a)
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	12799	1.00000	1.16(aH)
45	4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	7197	2.00000	2.15(a)
10	Acetone	43	2.062	2.062	(0.481)	3600	2.00000	3.52(a)
37	Benzene	78	4.619	4.619	(0.912)	15140	1.00000	1.09
74	Bromobenzene	156	8.867	8.867	(0.912)	5075	1.00000	1.22(a)
29	Bromochloromethane	128	3.917	3.917	(0.913)	2156	1.00000	1.16(a)
39	Bromodichloromethane	83	5.808	5.808	(1.147)	4945	1.00000	1.09(aM)
66	Bromoform	173	8.473	8.473	(1.095)	3390	1.00000	1.32(aM)
6	Bromomethane	94	1.410	1.410	(0.329)	1834	1.00000	4.00(a)
19	Carbon Disulfide	76	2.155	2.155	(0.502)	23335	2.00000	2.18(a)
34	Carbon Tetrachloride	117	4.376	4.376	(0.864)	5500	1.00000	1.28(a)
59	Chlorobenzene	112	7.764	7.764	(1.004)	10761	1.00000	1.11
7	Chloroethane	64	1.475	1.475	(0.344)	2842	1.00000	1.17(a)
28	Chloroform	83	4.032	4.032	(0.940)	6396	1.00000	1.11
3	Chloromethane	50	1.138	1.138	(0.265)	3940	1.00000	0.97(a)
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.850)	4219	1.00000	1.08(a)
46	cis-1,3-Dichloropropene	75	6.238	6.238	(1.232)	6618	1.00000	1.10(a)
55	Dibromochloromethane	129	7.248	7.248	(0.937)	4536	1.00000	1.13(a)
44	Dibromomethane	93	5.636	5.636	(1.113)	2507	1.00000	1.18(a)
2	Dichlorodifluoromethane	85	1.030	1.030	(0.240)	3771	1.00000	1.06(a)
61	Ethylbenzene	106	7.864	7.864	(1.017)	5401	1.00000	1.11
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	1837	1.00000	2.57(a)
67	Isopropylbenzene	105	8.623	8.623	(1.115)	15461	1.00000	1.12(a)
62	m,p-Xylenes	106	7.964	7.964	(1.030)	13391	2.00000	2.21
17	Methylene Chloride	84	2.399	2.399	(0.559)	4517	1.00000	1.07(a)
87	n-Butylbenzene	91	10.049	10.049	(1.034)	9737	1.00000	1.23(a)
73	n-Propylbenzene	91	8.974	8.974	(0.923)	18283	1.00000	1.11(a)
92	Naphthalene	128	11.603	11.603	(1.194)	8192	1.00000	0.88(a)
63	o-Xylene	106	8.308	8.308	(1.074)	6536	1.00000	1.09
81	sec-Butylbenzene	105	9.576	9.576	(0.985)	14244	1.00000	1.54(a)
64	Styrene	104	8.322	8.322	(1.076)	11341	1.00000	1.10
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	10837	1.00000	1.48(a)
56	Tetrachloroethene	164	6.997	6.997	(0.905)	3358	1.00000	1.12
50	Toluene	91	6.525	6.525	(0.844)	15515	1.00000	1.08
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.613)	3894	1.00000	1.11(a)
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	5304	1.00000	1.08(a)
38	Trichloroethene	130	5.300	5.300	(1.047)	4180	1.00000	1.08
8	Trichlorofluoromethane	101	1.632	1.632	(0.381)	4720	1.00000	1.13(a)
5	Vinyl Chloride	62	1.202	1.202	(0.280)	4371	1.00000	1.11(a)

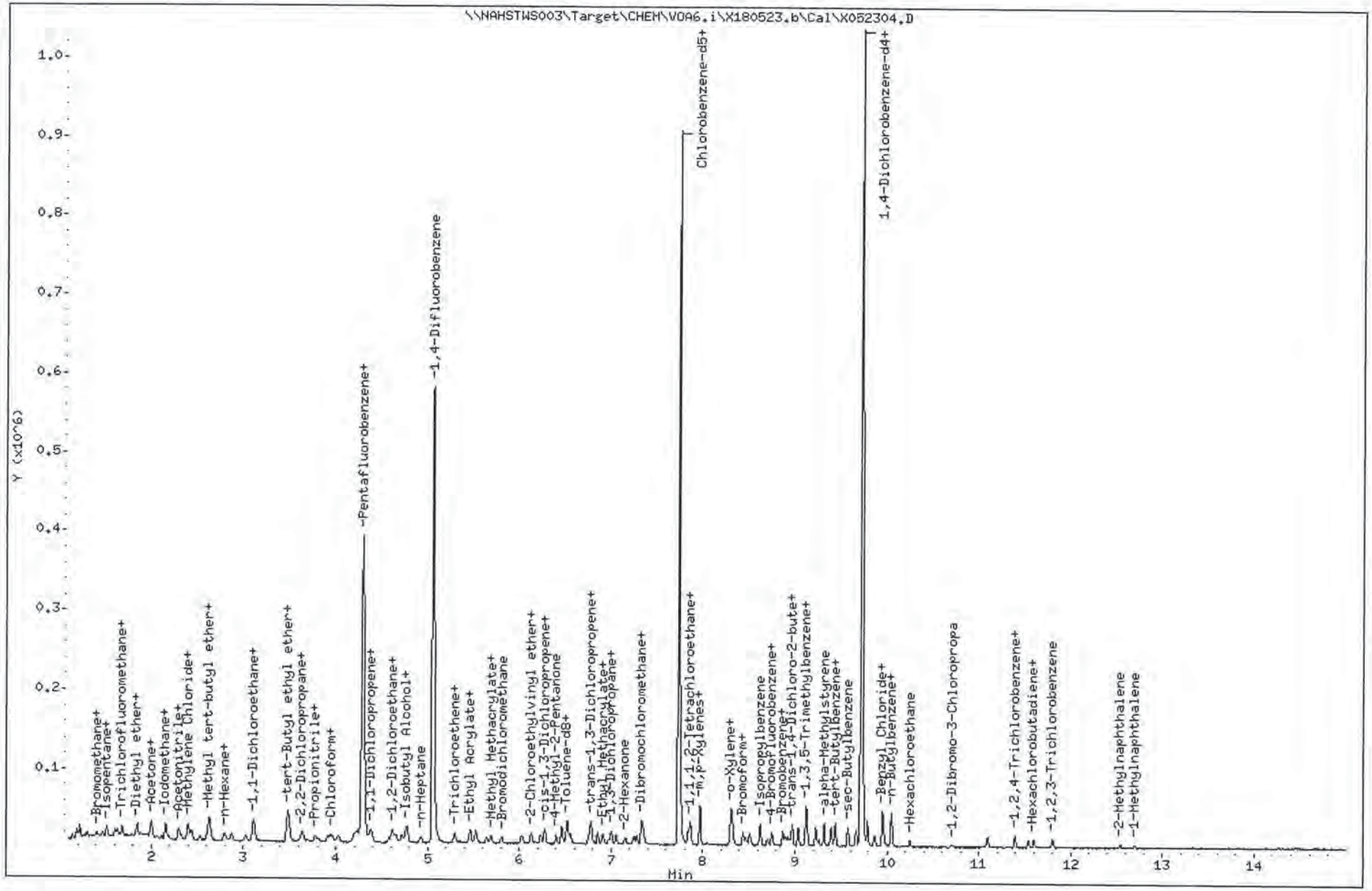
Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052304.D
Report Date: 12-Jun-2018 15:17

QC Flag Legend

a - Target compound detected but, quantitated amount
    Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052304.D
Date : 23-MAY-2018 11:53
Client ID: VSTD001
Sample Info: VSTD001;VSTD001;1;3;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052305.D
Report Date: 12-Jun-2018 15:17

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052305.D
Lab Smp Id: VSTD002 Client Smp ID: VSTD002
Inj Date : 23-MAY-2018 12:18
Operator : PC Inst ID: voa6.i
Smp Info : VSTD002;VSTD002;1;4;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:17 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 11:53 Cal File: X052304.D
Als bottle: 6 Calibration Sample, Level: 4
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	345553	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	509563	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	488613	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	260596	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	7070	2.00000	2.05
$ 35 1,2-Dichloroethane-d4	65	4.583	4.583	(1.067)	7478	2.00000	1.99
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	25928	2.00000	2.09
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	9740	2.00000	2.44
60 1,1,1,2-Tetrachloroethane	131	7.843	7.843	(1.014)	7389	2.00000	1.93(a)
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	9461	2.00000	2.23
68 1,1,2,2-Tetrachloroethane	83	8.896	8.896	(0.915)	9293	2.00000	1.68(a)
138 Freon TF	101	2.005	2.005	(0.467)	5380	2.00000	3.05(a)
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	5688	2.00000	1.91(a)
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	12414	2.00000	1.99
11 1,1-Dichloroethene	96	2.005	2.005	(0.467)	5937	2.00000	1.87(a)
32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	9129	2.00000	1.87(a)
93 1,2,3-Trichlorobenzene	180	11.797	11.797	(1.214)	7276	2.00000	1.77(a)
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	7322	2.00000	1.81(aM)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	8383	2.00000	1.82(a)
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	24089	2.00000	2.17(a)
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	1401	2.00000	2.20(a)
57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	7146	2.00000	1.89

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052305.D
Report Date: 12-Jun-2018 15:17

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	15336	2.00000	1.84(a)
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	7850	2.00000	1.80
42	1,2-Dichloropropane	63	5.529	5.529	(1.092)	7932	2.00000	2.06(aM)
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	24173	2.00000	2.13(a)
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	15018	2.00000	2.33(a)
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	12479	2.00000	1.83(a)
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	15543	2.00000	2.20(a)
26	2,2-Dichloropropane	77	3.631	3.631	(0.845)	9316	2.00000	2.13(a)
24	2-Butanone	43	3.702	3.702	(0.862)	5527	4.00000	3.72
76	2-Chlorotoluene	91	9.032	9.032	(0.929)	20945	2.00000	1.97(a)
52	2-Hexanone	43	7.155	7.155	(0.925)	8865	4.00000	3.68(a)
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	24173	2.00000	2.06(a)
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	23073	2.00000	1.93(aH)
45	4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	13495	4.00000	3.73(a)
10	Acetone	43	2.062	2.062	(0.480)	5461	4.00000	5.19
37	Benzene	78	4.619	4.619	(0.912)	28455	2.00000	1.89
74	Bromobenzene	156	8.867	8.867	(0.912)	8939	2.00000	2.00(a)
29	Bromochloromethane	128	3.917	3.917	(0.912)	3890	2.00000	1.94(a)
39	Bromodichloromethane	83	5.808	5.808	(1.147)	9071	2.00000	1.85(a)
66	Bromoform	173	8.473	8.473	(1.095)	6006	2.00000	2.08(a)
6	Bromomethane	94	1.410	1.410	(0.328)	3303	2.00000	4.60(a)
19	Carbon Disulfide	76	2.162	2.162	(0.503)	42196	4.00000	3.66(a)
34	Carbon Tetrachloride	117	4.383	4.383	(0.866)	9123	2.00000	1.96(a)
59	Chlorobenzene	112	7.764	7.764	(1.004)	19846	2.00000	1.90
7	Chloroethane	64	1.475	1.475	(0.343)	4820	2.00000	2.00(a)
28	Chloroform	83	4.032	4.032	(0.938)	11791	2.00000	1.91
3	Chloromethane	50	1.145	1.145	(0.267)	7093	2.00000	1.90(a)
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	8171	2.00000	1.94(a)
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	12045	2.00000	1.85(a)
55	Dibromochloromethane	129	7.248	7.248	(0.937)	8033	2.00000	1.91(a)
44	Dibromomethane	93	5.644	5.644	(1.115)	4609	2.00000	2.00(a)
2	Dichlorodifluoromethane	85	1.031	1.031	(0.240)	7009	2.00000	1.84(a)
61	Ethylbenzene	106	7.864	7.864	(1.017)	10018	2.00000	1.91
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	3333	2.00000	3.38(a)
67	Isopropylbenzene	105	8.623	8.623	(1.115)	27704	2.00000	1.86(a)
62	m,p-Xylenes	106	7.972	7.972	(1.031)	24798	4.00000	3.78
17	Methylene Chloride	84	2.406	2.406	(0.560)	8148	2.00000	1.96(a)
87	n-Butylbenzene	91	10.049	10.049	(1.034)	18275	2.00000	2.13(a)
73	n-Propylbenzene	91	8.974	8.974	(0.923)	33275	2.00000	1.87(a)
92	Naphthalene	128	11.603	11.603	(1.194)	17235	2.00000	1.72(a)
63	o-Xylene	106	8.308	8.308	(1.074)	12792	2.00000	1.98
81	sec-Butylbenzene	105	9.576	9.576	(0.985)	26555	2.00000	2.40(a)
64	Styrene	104	8.323	8.323	(1.076)	20357	2.00000	1.83
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	20078	2.00000	2.34(a)
56	Tetrachloroethene	164	6.997	6.997	(0.905)	6199	2.00000	1.91
50	Toluene	91	6.525	6.525	(0.844)	29759	2.00000	1.92
20	trans-1,2-Dichloroethene	96	2.635	2.635	(0.613)	7263	2.00000	1.92(a)
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	9927	2.00000	1.87(a)
38	Trichloroethene	130	5.300	5.300	(1.047)	8139	2.00000	1.94
8	Trichlorofluoromethane	101	1.639	1.639	(0.382)	8315	2.00000	1.85(a)
5	Vinyl Chloride	62	1.210	1.210	(0.282)	7762	2.00000	1.83(a)

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052305.D
Report Date: 12-Jun-2018 15:17

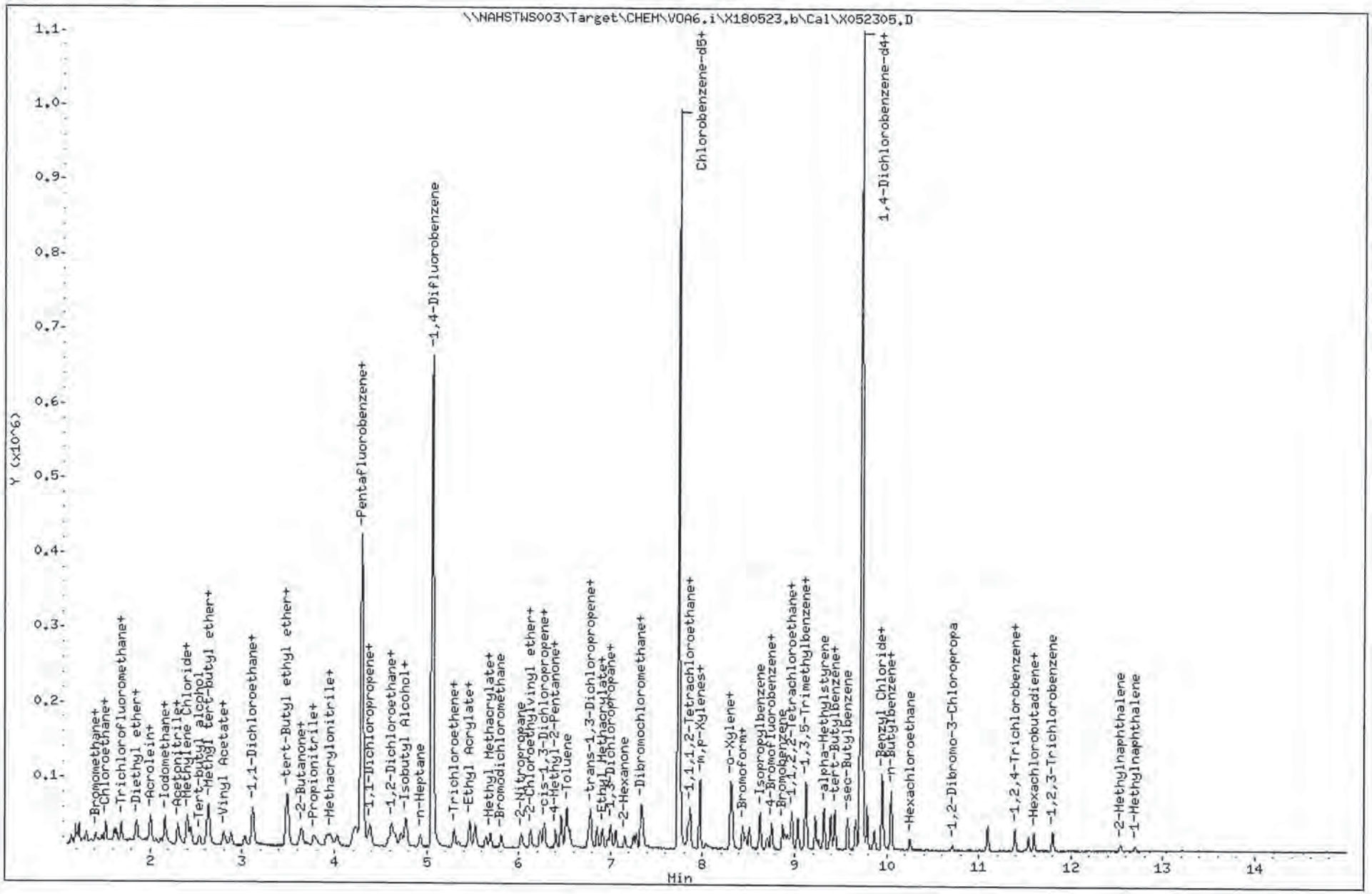
QC Flag Legend

a - Target compound detected but, quantitated amount
    Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052305.D
Date : 23-MAY-2018 12:18
Client ID: VSTD002
Sample Info: VSTD002;VSTD002;1;4;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i

Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052306.D
Report Date: 12-Jun-2018 15:18

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052306.D
Lab Smp Id: VSTD005 Client Smp ID: VSTD005
Inj Date : 23-MAY-2018 12:42
Operator : PC Inst ID: voa6.i
Smp Info : VSTD005;VSTD005;1;5;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:18 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 12:18 Cal File: X052305.D
Als bottle: 7 Calibration Sample, Level: 5
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	338010	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	500429	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	476471	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	248701	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	15923	5.00000	4.93
$ 35 1,2-Dichloroethane-d4	65	4.583	4.583	(1.067)	17872	5.00000	5.33
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	59497	5.00000	5.10
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	22395	5.00000	5.55
60 1,1,1,2-Tetrachloroethane	131	7.843	7.843	(1.014)	18339	5.00000	4.91(a)
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	24593	5.00000	5.47
68 1,1,2,2-Tetrachloroethane	83	8.896	8.896	(0.915)	23541	5.00000	5.26
138 Freon TF	101	2.005	2.005	(0.467)	12270	5.00000	5.63
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	15013	5.00000	5.16
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	30945	5.00000	5.27
11 1,1-Dichloroethene	96	2.005	2.005	(0.467)	14637	5.00000	4.71(a)
32 1,1-Dichloropropene	75	4.397	4.397	(0.868)	23538	5.00000	4.93(a)
93 1,2,3-Trichlorobenzene	180	11.797	11.797	(1.214)	19414	5.00000	4.97(a)
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	19442	5.00000	5.03(M)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	21103	5.00000	4.81(a)
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	60429	5.00000	5.46
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	4024	5.00000	5.90
57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	18783	5.00000	5.11

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052306.D
Report Date: 12-Jun-2018 15:18

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	36903	5.00000	5.17
33 1,2-Dichloroethane	62	4.662	4.662	(0.921)	21744	5.00000	5.07
42 1,2-Dichloropropane	63	5.529	5.529	(1.092)	19004	5.00000	5.04
75 1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	58557	5.00000	5.38
83 1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	37874	5.00000	5.62
54 1,3-Dichloropropane	76	7.055	7.055	(0.912)	31006	5.00000	5.29
84 1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	39414	5.00000	5.57
26 2,2-Dichloropropane	77	3.631	3.631	(0.845)	22528	5.00000	5.27
24 2-Butanone	43	3.702	3.702	(0.862)	14667	10.0000	10.11
76 2-Chlorotoluene	91	9.032	9.032	(0.929)	51173	5.00000	5.26
52 2-Hexanone	43	7.155	7.155	(0.925)	23692	10.0000	10.10
77 4-Chlorotoluene	91	9.132	9.132	(0.940)	58554	5.00000	5.35
82 p-Isopropyltoluene	119	9.705	9.705	(0.999)	55407	5.00000	4.86(aH)
45 4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	34909	10.0000	9.91
10 Acetone	43	2.062	2.062	(0.480)	11495	10.0000	11.84
37 Benzene	78	4.619	4.619	(0.912)	71600	5.00000	4.85
74 Bromobenzene	156	8.867	8.867	(0.912)	22798	5.00000	5.40
29 Bromochloromethane	128	3.917	3.917	(0.912)	10144	5.00000	5.18
39 Bromodichloromethane	83	5.808	5.808	(1.147)	24613	5.00000	5.12
66 Bromoform	173	8.473	8.473	(1.095)	16187	5.00000	5.54
6 Bromomethane	94	1.410	1.410	(0.328)	7908	5.00000	6.75
19 Carbon Disulfide	76	2.162	2.162	(0.503)	108732	10.0000	9.65
34 Carbon Tetrachloride	117	4.376	4.376	(0.864)	21894	5.00000	4.81(a)
59 Chlorobenzene	112	7.757	7.757	(1.003)	51325	5.00000	5.04
7 Chloroethane	64	1.475	1.475	(0.343)	11005	5.00000	5.03
28 Chloroform	83	4.032	4.032	(0.938)	30139	5.00000	5.00
3 Chloromethane	50	1.145	1.145	(0.267)	17320	5.00000	5.33
27 cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	20633	5.00000	5.03
46 cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	31326	5.00000	4.92(a)
55 Dibromochloromethane	129	7.248	7.248	(0.937)	21474	5.00000	5.40
44 Dibromomethane	93	5.644	5.644	(1.115)	12246	5.00000	5.40
2 Dichlorodifluoromethane	85	1.031	1.031	(0.240)	17530	5.00000	4.71(a)
61 Ethylbenzene	106	7.864	7.864	(1.017)	25369	5.00000	4.96
91 Hexachlorobutadiene	225	11.539	11.539	(1.187)	7352	5.00000	5.99
67 Isopropylbenzene	105	8.623	8.623	(1.115)	69652	5.00000	4.80(a)
62 m,p-Xylenes	106	7.972	7.972	(1.031)	62514	10.0000	9.79
17 Methylene Chloride	84	2.406	2.406	(0.560)	19719	5.00000	5.24
87 n-Butylbenzene	91	10.049	10.049	(1.034)	42977	5.00000	5.24
73 n-Propylbenzene	91	8.974	8.974	(0.923)	81792	5.00000	4.82(a)
92 Naphthalene	128	11.596	11.596	(1.193)	48305	5.00000	5.05
63 o-Xylene	106	8.301	8.301	(1.073)	31560	5.00000	5.01
81 sec-Butylbenzene	105	9.583	9.583	(0.986)	62263	5.00000	5.41
64 Styrene	104	8.323	8.323	(1.076)	54949	5.00000	5.07
78 tert-Butylbenzene	119	9.397	9.397	(0.967)	47921	5.00000	5.47
56 Tetrachloroethene	164	6.997	6.997	(0.905)	15312	5.00000	4.85
50 Toluene	91	6.525	6.525	(0.844)	74769	5.00000	4.95
20 trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	18581	5.00000	5.03
51 trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	25621	5.00000	4.92(a)
38 Trichloroethene	130	5.300	5.300	(1.047)	19458	5.00000	4.72
8 Trichlorofluoromethane	101	1.639	1.639	(0.382)	20279	5.00000	4.61(a)
5 Vinyl Chloride	62	1.210	1.210	(0.282)	19681	5.00000	4.76(a)

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052306.D
Report Date: 12-Jun-2018 15:18

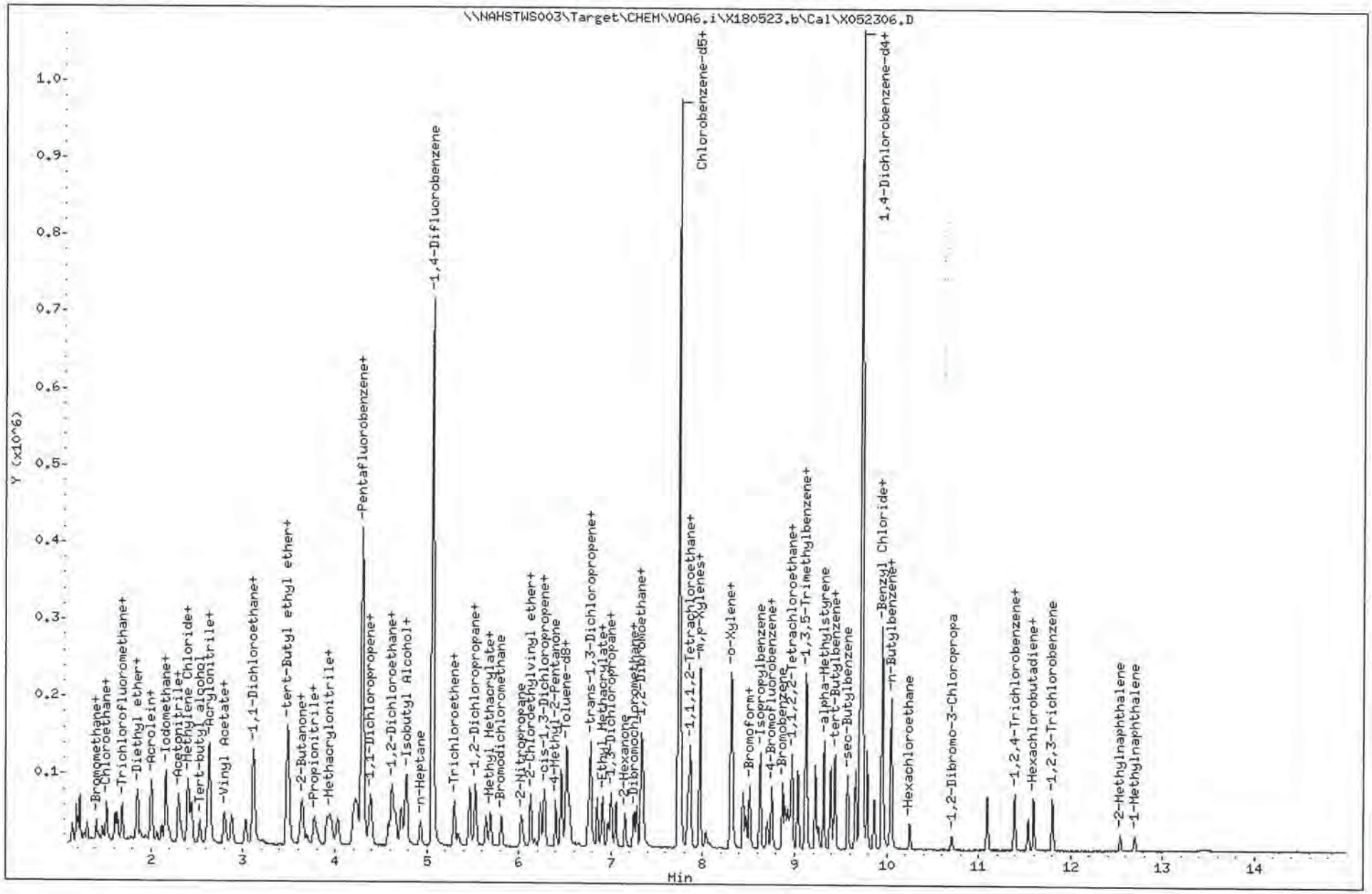
QC Flag Legend

a - Target compound detected but, quantitated amount
    Below Limit Of Quantitation(BLOQ).
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052306.D
Date : 23-MAY-2018 12:42
Client ID: VSTD005
Sample Info: VSTD005;VSTD005;1;5;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i

Operator: PC
Column diameter: 0.18



ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052307.D
Lab Smp Id: VSTD020 Client Smp ID: VSTD020
Inj Date : 23-MAY-2018 13:07
Operator : PC Inst ID: voa6.i
Smp Info : VSTD020;VSTD020;1;6;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:18 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 12:42 Cal File: X052306.D
Als bottle: 8 Calibration Sample, Level: 6
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	335773	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	492054	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	473101	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	250935	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	63516	20.0000	20.27
$ 35 1,2-Dichloroethane-d4	65	4.583	4.583	(1.067)	63319	20.0000	19.77
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	226236	20.0000	19.87
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	82009	20.0000	20.06
60 1,1,1,2-Tetrachloroethane	131	7.842	7.842	(1.014)	68713	20.0000	18.55
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	88986	20.0000	19.18
68 1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.915)	88686	20.0000	20.98
138 Freon TF	101	2.005	2.005	(0.467)	44260	20.0000	17.52
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	55182	20.0000	19.13
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	116312	20.0000	20.27
11 1,1-Dichloroethene	96	2.005	2.005	(0.467)	53990	20.0000	17.50
32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	82902	20.0000	17.66
93 1,2,3-Trichlorobenzene	180	11.796	11.796	(1.214)	73631	20.0000	18.69
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	72763	20.0000	18.69(M)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	83750	20.0000	18.95
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	232530	20.0000	20.44
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	14177	20.0000	19.69
57 1,2-Dibromoethane	107	7.327	7.327	(0.947)	70147	20.0000	19.25

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052307.D

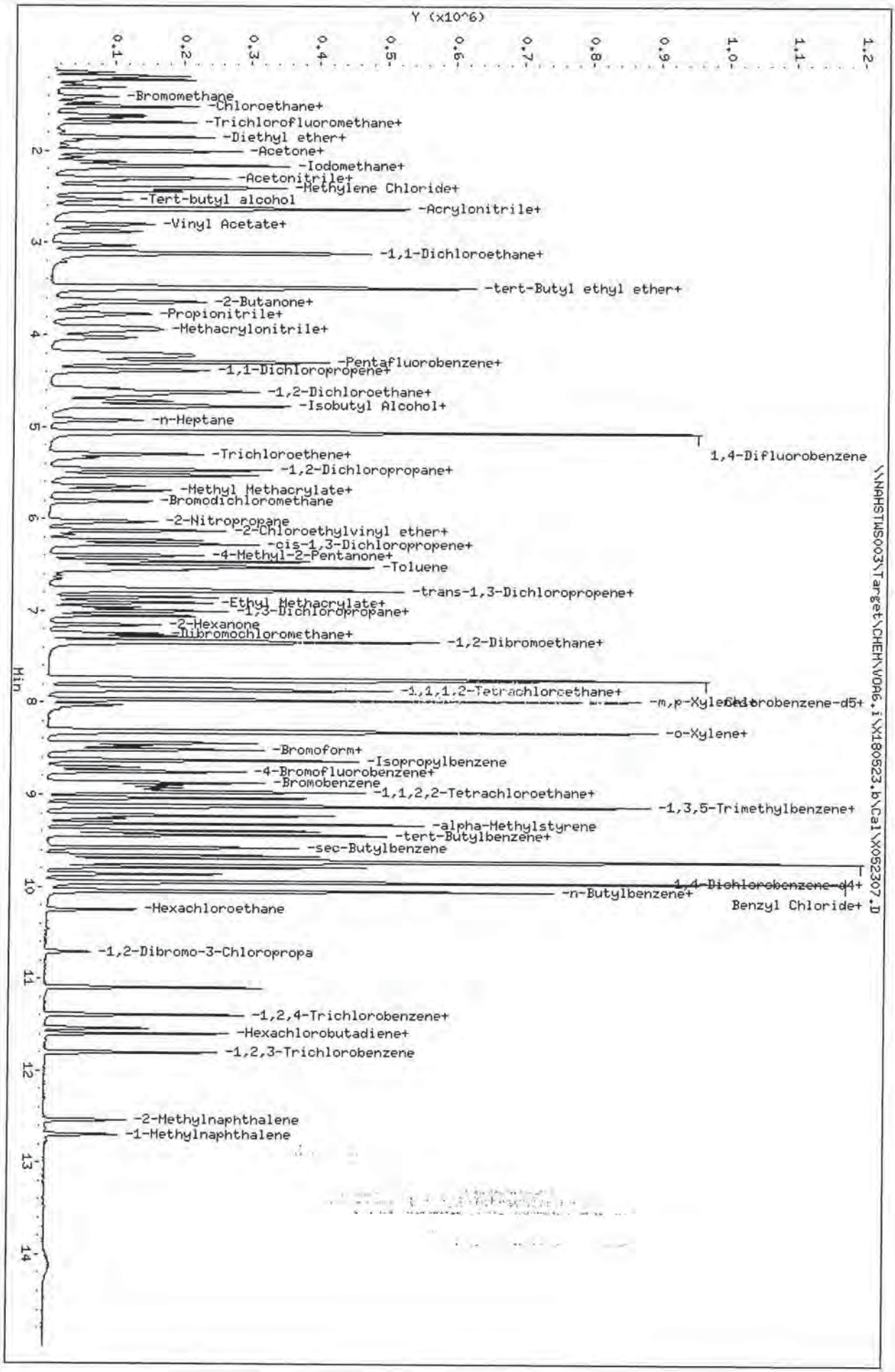
Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052307.D
Report Date: 12-Jun-2018 15:18

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	143274	20.0000	20.90
33 1,2-Dichloroethane	62	4.662	4.662	(0.921)	82302	20.0000	19.54
42 1,2-Dichloropropane	63	5.529	5.529	(1.092)	71264	20.0000	19.23
75 1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	222585	20.0000	20.27
83 1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	146285	20.0000	20.55
54 1,3-Dichloropropane	76	7.055	7.055	(0.912)	113952	20.0000	20.69
84 1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	148957	20.0000	20.41
26 2,2-Dichloropropane	77	3.631	3.631	(0.845)	83001	20.0000	19.57
24 2-Butanone	43	3.695	3.695	(0.860)	57080	40.0000	39.61
76 2-Chlorotoluene	91	9.032	9.032	(0.929)	193794	20.0000	20.15
52 2-Hexanone	43	7.155	7.155	(0.925)	90154	40.0000	38.71
77 4-Chlorotoluene	91	9.132	9.132	(0.940)	223115	20.0000	20.45
82 p-Isopropyltoluene	119	9.705	9.705	(0.999)	210173	20.0000	18.29(H)
45 4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	131312	40.0000	37.56
10 Acetone	43	2.062	2.062	(0.480)	38225	40.0000	41.00
37 Benzene	78	4.619	4.619	(0.912)	270658	20.0000	18.65
74 Bromobenzene	156	8.867	8.867	(0.912)	86345	20.0000	20.34
29 Bromochloromethane	128	3.917	3.917	(0.912)	39310	20.0000	20.22
39 Bromodichloromethane	83	5.808	5.808	(1.147)	89078	20.0000	18.86
66 Bromoform	173	8.473	8.473	(1.095)	60616	20.0000	20.56
6 Bromomethane	94	1.410	1.410	(0.328)	28918	20.0000	16.51
19 Carbon Disulfide	76	2.162	2.162	(0.503)	397053	40.0000	35.50
34 Carbon Tetrachloride	117	4.376	4.376	(0.864)	76783	20.0000	17.16
59 Chlorobenzene	112	7.757	7.757	(1.003)	190980	20.0000	18.89
7 Chloroethane	64	1.475	1.475	(0.343)	41096	20.0000	19.65
28 Chloroform	83	4.032	4.032	(0.938)	113942	20.0000	19.04
3 Chloromethane	50	1.145	1.145	(0.267)	63348	20.0000	20.44
27 cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	77470	20.0000	19.02
46 cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	117453	20.0000	18.78
55 Dibromochloromethane	129	7.248	7.248	(0.937)	78896	20.0000	20.24
44 Dibromomethane	93	5.643	5.643	(1.115)	45114	20.0000	20.24
2 Dichlorodifluoromethane	85	1.030	1.030	(0.240)	62186	20.0000	16.83
61 Ethylbenzene	106	7.864	7.864	(1.017)	95954	20.0000	18.91
91 Hexachlorobutadiene	225	11.539	11.539	(1.187)	28620	20.0000	19.17
67 Isopropylbenzene	105	8.623	8.623	(1.115)	261485	20.0000	18.15
62 m,p-Xylenes	106	7.971	7.971	(1.031)	234959	40.0000	37.08
17 Methylene Chloride	84	2.399	2.399	(0.558)	72992	20.0000	20.24
87 n-Butylbenzene	91	10.049	10.049	(1.034)	163366	20.0000	19.77
73 n-Propylbenzene	91	8.974	8.974	(0.923)	313395	20.0000	18.33
92 Naphthalene	128	11.596	11.596	(1.193)	183343	20.0000	19.03
63 o-Xylene	106	8.301	8.301	(1.073)	117189	20.0000	18.75
81 sec-Butylbenzene	105	9.576	9.576	(0.985)	234541	20.0000	19.26
64 Styrene	104	8.322	8.322	(1.076)	206075	20.0000	19.18
78 tert-Butylbenzene	119	9.397	9.397	(0.967)	180037	20.0000	19.68
56 Tetrachloroethene	164	6.997	6.997	(0.905)	54687	20.0000	17.44
50 Toluene	91	6.524	6.524	(0.844)	284540	20.0000	19.00
20 trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	67819	20.0000	18.48
51 trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	98197	20.0000	19.19
38 Trichloroethene	130	5.300	5.300	(1.047)	73317	20.0000	18.11
8 Trichlorofluoromethane	101	1.639	1.639	(0.382)	70860	20.0000	16.22
5 Vinyl Chloride	62	1.210	1.210	(0.282)	72599	20.0000	17.70

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052307.D
Report Date: 12-Jun-2018 15:18

QC Flag Legend

M - Compound response manually integrated.
H - Operator selected an alternate compound hit.


Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052307.D
Date : 23-MAY-2018 13:07
Client ID: VSTD020
Sample Info: VSTD020;VSTD020;1;6;
Purge Volume: 5.0
Column phase: DB624
Instrument: voa6.i
Operator: PC
Column diameter: 0.18
Y (x10^6)
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
Min
2
3
4
5
6
7
8
9
10
11
12
13
14
-Bromomethane
-Chloroethane+
-Trichlorofluoromethane+
-Diethyl ether+
-Acetone+
-Iodomethane+
-Acetonitrile+
-Methylene Chloride+
-Tert-butyl alcohol
-Acrylonitrile+
-Vinyl Acetate+
-1,1-Dichloroethane+
-tert-Butyl ethyl ether+
-2-Butanone+
-Propionitrile+
-Methacrylonitrile+
-Pentafluorobenzene+
-1,1-Dichloropropene+
-1,2-Dichloroethane+
-Isobutyl Alcohol+
-n-Heptane
1,4-Difluorobenzene
-Trichloroethene+
-1,2-Dichloropropane+
-Methyl Methacrylate+
-Bromodichloromethane
-2-Nitropropane
-2-Chloroethylvinyl ether+
-cis-1,3-Dichloropropene+
-4-Methyl-2-Pentanone+
-Toluene
-trans-1,3-Dichloropropene+
-Ethyl Methacrylate+
-1,3-Dichloropropane+
-2-Hexanone
-Dibromochloromethane+
-1,2-Dibromoethane+
-1,1,1,2-Tetrachloroethane+
-m,p-Xylene+
Chlorobenzene-d5+
-o-Xylene+
-Bromoform+
-Isopropylbenzene
-4-Bromofluorobenzene+
-Bromobenzene
-1,1,2,2-Tetrachloroethane+
-1,3,5-Trimethylbenzene+
-alpha-Methylstyrene
-tert-Butylbenzene+
-sec-Butylbenzene
1,4-Dichlorobenzene-d4+
-n-Butylbenzene+
Benzyl Chloride+
-Hexachloroethane
-1,2-Dibromo-3-Chloropropa
-1,2,4-Trichlorobenzene+
-Hexachlorobutadiene+
-1,2,3-Trichlorobenzene
-2-Methylnaphthalene
-1-Methylnaphthalene
\\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052307.D

00905560

Data File: X052308x.D
Report Date: 12-Jun-2018 15:18

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052308x.D
Lab Smp Id: VSTD050 Client Smp ID: VSTD050
Inj Date : 23-MAY-2018 13:31
Operator : PC Inst ID: voa6.i
Smp Info : VSTD050;VSTD050;1;7;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:18 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 13:07 Cal File: X052307.D
Als bottle: 9 Calibration Sample, Level: 7
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

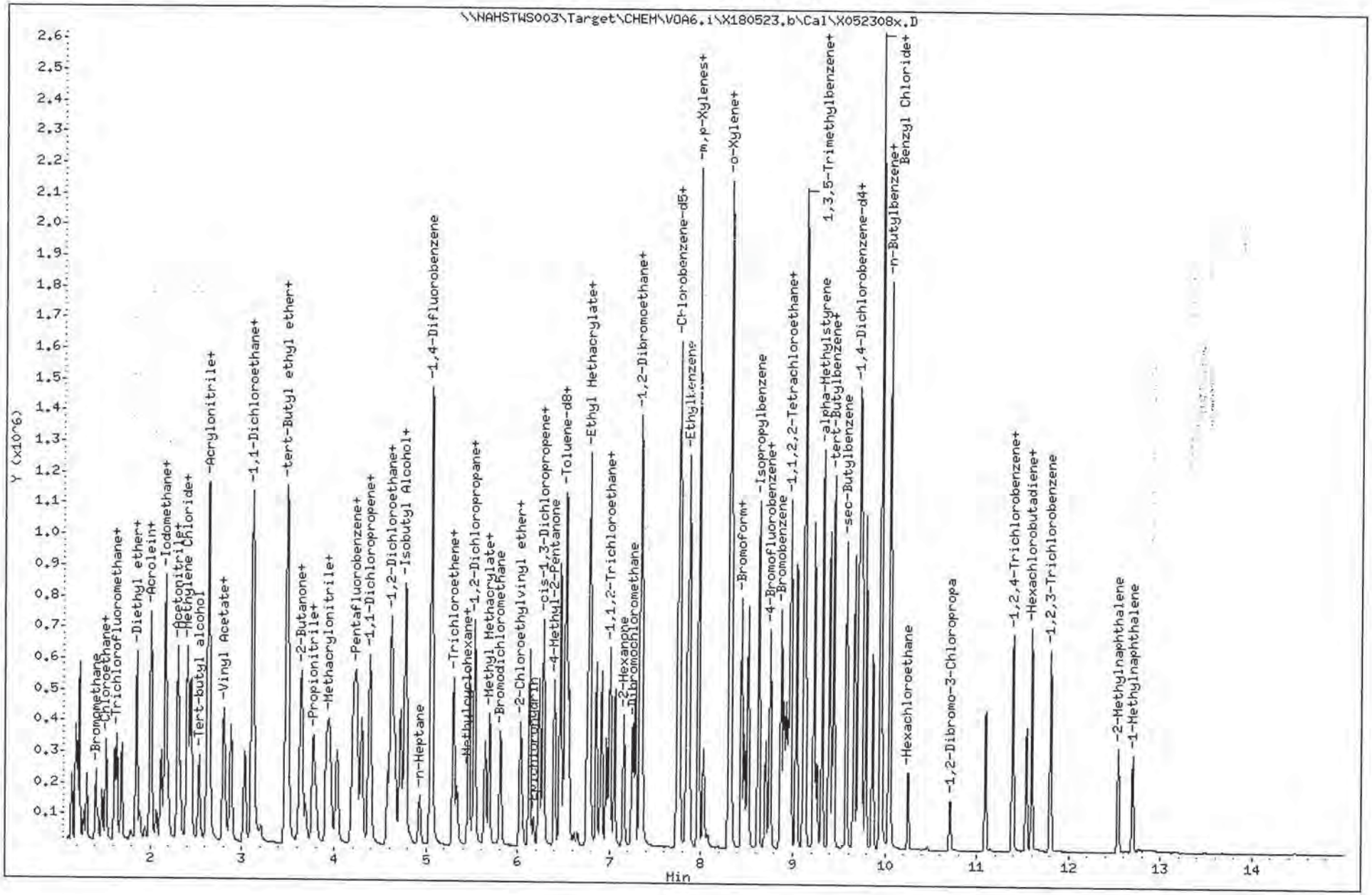
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	328914	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	476832	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	459017	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	248142	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	152034	50.0000	49.61
$ 35 1,2-Dichloroethane-d4	65	4.576	4.576	(1.065)	155767	50.0000	49.99
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	543229	50.0000	49.11
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	194880	50.0000	48.91
60 1,1,1,2-Tetrachloroethane	131	7.842	7.842	(1.014)	163651	50.0000	45.55
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	228684	50.0000	49.86
68 1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.915)	209416	50.0000	50.78
138 Freon TF	101	2.005	2.005	(0.467)	126560	50.0000	49.00
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	129515	50.0000	46.29
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	281067	50.0000	50.18
11 1,1-Dichloroethene	96	2.005	2.005	(0.467)	142061	50.0000	47.02
32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	217433	50.0000	47.80
93 1,2,3-Trichlorobenzene	180	11.796	11.796	(1.214)	183363	50.0000	47.07
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	255291	50.0000	66.32
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	209120	50.0000	47.87
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	557665	50.0000	49.38
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	35762	50.0000	49.68
57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	165295	50.0000	46.75

Data File: X052308x.D
Report Date: 12-Jun-2018 15:18

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	333314	50.0000	49.64
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	194955	50.0000	47.77
42	1,2-Dichloropropane	63	5.529	5.529	(1.092)	169214	50.0000	47.13
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	536629	50.0000	49.40
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	346604	50.0000	48.78
54	1,3-Dichloropropane	76	7.054	7.054	(0.912)	266047	50.0000	50.37
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	355039	50.0000	48.96
26	2,2-Dichloropropane	77	3.623	3.623	(0.843)	208085	50.0000	50.11
24	2-Butanone	43	3.688	3.688	(0.858)	141094	100.000	99.96
76	2-Chlorotoluene	91	9.031	9.031	(0.929)	463538	50.0000	48.94
52	2-Hexanone	43	7.155	7.155	(0.925)	217637	100.000	96.33
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	535882	50.0000	49.78
82	p-Isopropyltoluene	119	9.397	9.397	(0.967)	451307	50.0000	39.71
45	4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	321325	100.000	94.73
10	Acetone	43	2.062	2.062	(0.480)	89975	100.000	99.33
37	Benzene	78	4.619	4.619	(0.912)	644015	50.0000	45.79
74	Bromobenzene	156	8.867	8.867	(0.912)	206013	50.0000	49.11
29	Bromochloromethane	128	3.917	3.917	(0.912)	91768	50.0000	48.20
39	Bromodichloromethane	83	5.808	5.808	(1.147)	216104	50.0000	47.23
66	Bromoform	173	8.473	8.473	(1.095)	141935	50.0000	49.44
6	Bromomethane	94	1.410	1.410	(0.328)	84434	50.0000	43.04
19	Carbon Disulfide	76	2.162	2.162	(0.503)	1021426	100.000	93.23
34	Carbon Tetrachloride	117	4.375	4.375	(0.864)	204558	50.0000	47.17
59	Chlorobenzene	112	7.756	7.756	(1.003)	454148	50.0000	46.31
7	Chloroethane	64	1.474	1.474	(0.343)	102822	50.0000	50.51
28	Chloroform	83	4.032	4.032	(0.938)	269614	50.0000	46.00
3	Chloromethane	50	1.145	1.145	(0.267)	155142	50.0000	50.27
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	187287	50.0000	46.94
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	280789	50.0000	46.33
55	Dibromochloromethane	129	7.248	7.248	(0.937)	189810	50.0000	50.32
44	Dibromomethane	93	5.643	5.643	(1.115)	107870	50.0000	49.93
2	Dichlorodifluoromethane	85	1.030	1.030	(0.240)	177127	50.0000	48.95
61	Ethylbenzene	106	7.864	7.864	(1.017)	231560	50.0000	47.04
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	73498	50.0000	47.59
67	Isopropylbenzene	105	8.623	8.623	(1.115)	646931	50.0000	46.29
62	m,p-Xylenes	106	7.964	7.964	(1.030)	567477	100.000	92.31
17	Methylene Chloride	84	2.398	2.398	(0.558)	175074	50.0000	49.94
87	n-Butylbenzene	91	10.049	10.049	(1.034)	414965	50.0000	50.78
73	n-Propylbenzene	91	8.974	8.974	(0.923)	773880	50.0000	45.77
92	Naphthalene	128	11.596	11.596	(1.193)	478112	50.0000	50.18
63	o-Xylene	106	8.301	8.301	(1.073)	280837	50.0000	46.31
81	sec-Butylbenzene	105	9.576	9.576	(0.985)	599351	50.0000	49.23
64	Styrene	104	8.322	8.322	(1.076)	493622	50.0000	47.36
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	451307	50.0000	49.50
56	Tetrachloroethene	164	7.004	7.004	(0.906)	141947	50.0000	46.68
50	Toluene	91	6.524	6.524	(0.844)	675094	50.0000	46.48
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	168275	50.0000	46.81
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	238717	50.0000	48.16
38	Trichloroethene	130	5.300	5.300	(1.047)	179929	50.0000	45.88
8	Trichlorofluoromethane	101	1.639	1.639	(0.382)	208801	50.0000	48.80
5	Vinyl Chloride	62	1.209	1.209	(0.282)	187472	50.0000	46.67

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052308x.D
Date : 23-MAY-2018 13:31
Client ID: VSTD050
Sample Info: VSTD050;VSTD050;1;7;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052309.D
Report Date: 12-Jun-2018 15:18

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052309.D
Lab Smp Id: VSTD100 Client Smp ID: VSTD100
Inj Date : 23-MAY-2018 13:56
Operator : PC Inst ID: voa6.i
Smp Info : VSTD100;VSTD100;1;8;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:18 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 10 Calibration Sample, Level: 8
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	ON-COL (ug/l)
*	1 Pentafluorobenzene	168	4.297	4.297	(1.000)	325674	50.0000	
*	36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	459743	50.0000	
*	47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	452873	50.0000	
*	70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	240530	50.0000	
$	30 Dibromofluoromethane	113	4.218	4.218	(0.982)	303385	100.000	99.60
$	35 1,2-Dichloroethane-d4	65	4.583	4.583	(1.067)	306591	100.000	99.24
$	48 Toluene-d8	98	6.460	6.460	(0.835)	1111689	100.000	101.08
$	69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	387334	100.000	98.37
	60 1,1,1,2-Tetrachloroethane	131	7.842	7.842	(1.014)	322086	100.000	90.87
	31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	445835	100.000	97.90
	68 1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.915)	391990	100.000	98.51
	138 Freon TF	101	2.005	2.005	(0.467)	248451	100.000	96.06
	53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	248123	100.000	89.89
	22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	541181	100.000	97.71
	11 1,1-Dichloroethene	96	1.997	1.997	(0.465)	277359	100.000	92.73
	32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	418857	100.000	93.47
	93 1,2,3-Trichlorobenzene	180	11.796	11.796	(1.214)	350521	100.000	92.83
	71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	329992	100.000	88.45(M)
	90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	403137	100.000	95.20
	79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	1075932	100.000	98.15
	89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	68003	100.000	97.11
	57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	318368	100.000	91.28

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052309.D
Report Date: 12-Jun-2018 15:18

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	645313	100.000	99.49
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	372755	100.000	92.72
42	1,2-Dichloropropane	63	5.529	5.529	(1.092)	327613	100.000	92.64
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	1039980	100.000	98.76
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	674489	100.000	97.60
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	510996	100.000	98.44
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	689080	100.000	97.86
26	2,2-Dichloropropane	77	3.631	3.631	(0.845)	402987	100.000	98.01
24	2-Butanone	43	3.688	3.688	(0.858)	261448	200.000	187.07
76	2-Chlorotoluene	91	9.039	9.039	(0.930)	917852	100.000	100.12
52	2-Hexanone	43	7.155	7.155	(0.925)	415825	200.000	186.55
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	1026533	100.000	98.47
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	1020846	100.000	92.68(H)
45	4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	610564	200.000	182.45
10	Acetone	43	2.062	2.062	(0.480)	170357	200.000	190.48
37	Benzene	78	4.619	4.619	(0.912)	1263750	100.000	91.22
74	Bromobenzene	156	8.867	8.867	(0.912)	404144	100.000	99.42
29	Bromochloromethane	128	3.917	3.917	(0.912)	166005	100.000	88.06
39	Bromodichloromethane	83	5.808	5.808	(1.147)	411794	100.000	91.37
66	Bromoform	173	8.473	8.473	(1.095)	276292	100.000	97.42
6	Bromomethane	94	1.410	1.410	(0.328)	190970	100.000	94.31
19	Carbon Disulfide	76	2.162	2.162	(0.503)	2013365	200.000	185.59(A)
34	Carbon Tetrachloride	117	4.376	4.376	(0.864)	393902	100.000	92.21
59	Chlorobenzene	112	7.764	7.764	(1.004)	881032	100.000	91.07
7	Chloroethane	64	1.475	1.475	(0.343)	198462	100.000	98.37
28	Chloroform	83	4.032	4.032	(0.938)	521926	100.000	89.93
3	Chloromethane	50	1.145	1.145	(0.267)	311716	100.000	97.40
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	359864	100.000	91.09
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	546918	100.000	91.60
55	Dibromochloromethane	129	7.248	7.248	(0.937)	366119	100.000	98.47
44	Dibromomethane	93	5.643	5.643	(1.115)	207663	100.000	97.57
2	Dichlorodifluoromethane	85	1.030	1.030	(0.240)	343253	100.000	95.81
61	Ethylbenzene	106	7.864	7.864	(1.017)	461118	100.000	94.94
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	144683	100.000	95.22
67	Isopropylbenzene	105	8.623	8.623	(1.115)	1272248	100.000	92.27
62	m,p-Xylenes	106	7.971	7.971	(1.031)	1106021	200.000	182.35
17	Methylene Chloride	84	2.399	2.399	(0.558)	340682	100.000	98.39
87	n-Butylbenzene	91	10.049	10.049	(1.034)	770803	100.000	97.32
73	n-Propylbenzene	91	8.974	8.974	(0.923)	1513915	100.000	92.38
92	Naphthalene	128	11.596	11.596	(1.193)	919365	100.000	99.55
63	o-Xylene	106	8.308	8.308	(1.074)	548096	100.000	91.61
81	sec-Butylbenzene	105	9.583	9.583	(0.986)	1170652	100.000	98.84
64	Styrene	104	8.322	8.322	(1.076)	946023	100.000	92.01
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	870422	100.000	98.23
56	Tetrachloroethene	164	7.004	7.004	(0.906)	274356	100.000	91.45
50	Toluene	91	6.524	6.524	(0.844)	1304919	100.000	91.07
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	329276	100.000	92.51
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	455453	100.000	93.28
38	Trichloroethene	130	5.300	5.300	(1.047)	352879	100.000	91.35
8	Trichlorofluoromethane	101	1.639	1.639	(0.382)	410145	100.000	96.82
5	Vinyl Chloride	62	1.209	1.209	(0.282)	372851	100.000	93.75

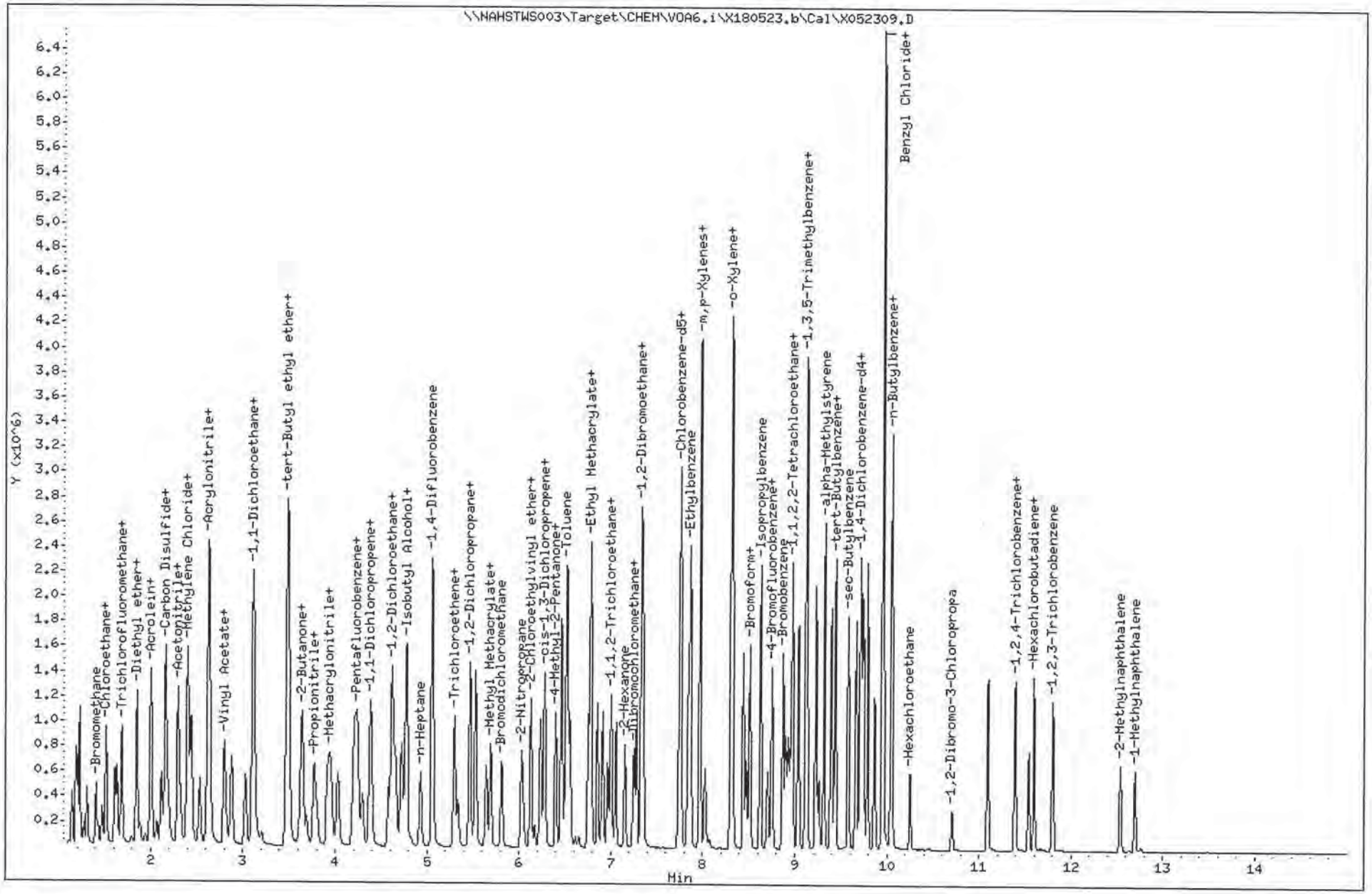
QC Flag Legend

A - Target compound detected but, quantitated amount exceeded maximum amount.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052309.D
Report Date: 12-Jun-2018 15:18

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052309.D
Date : 23-MAY-2018 13:56
Client ID: VSTD100
Sample Info: VSTD100;VSTD100;1;8;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052310.D
Report Date: 12-Jun-2018 15:18

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052310.D
Lab Smp Id: VSTD150 Client Smp ID: VSTD150
Inj Date : 23-MAY-2018 14:20
Operator : PC Inst ID: voa6.i
Smp Info : VSTD150;VSTD150;1;9;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:18 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 13:56 Cal File: X052309.D
Als bottle: 11 Calibration Sample, Level: 9
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	307714	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	443056	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	433859	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	232832	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	436133	150.000	150.76
$ 35 1,2-Dichloroethane-d4	65	4.583	4.583	(1.067)	442660	150.000	151.08
$ 48 Toluene-d8	98	6.467	6.467	(0.836)	1588145	150.000	149.46
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	564276	150.000	149.51
60 1,1,1,2-Tetrachloroethane	131	7.842	7.842	(1.014)	474487	150.000	139.74
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	650060	150.000	150.93(A)
68 1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.915)	572166	150.000	148.79
138 Freon TF	101	2.005	2.005	(0.467)	376478	150.000	153.38
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	361213	150.000	136.60
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	791414	150.000	151.29(A)
11 1,1-Dichloroethene	96	1.997	1.997	(0.465)	413063	150.000	146.16
32 1,1-Dichloropropene	75	4.397	4.397	(0.868)	621639	150.000	147.08
93 1,2,3-Trichlorobenzene	180	11.796	11.796	(1.214)	525974	150.000	143.90
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	477816	150.000	132.30(M)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	602631	150.000	147.02
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	1576975	150.000	148.53
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	100945	150.000	148.72
57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	458586	150.000	137.24(A)

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052310.D
Report Date: 12-Jun-2018 15:18

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	935852	150.000	149.23
33 1,2-Dichloroethane	62	4.662	4.662	(0.921)	544882	150.000	143.70(A)
42 1,2-Dichloropropane	63	5.529	5.529	(1.092)	473296	150.000	141.90
75 1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	1521433	150.000	149.25
83 1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	994233	150.000	148.44
54 1,3-Dichloropropane	76	7.055	7.055	(0.912)	745246	150.000	150.08
84 1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	1020272	150.000	149.60
26 2,2-Dichloropropane	77	3.631	3.631	(0.845)	588540	150.000	151.51
24 2-Butanone	43	3.688	3.688	(0.858)	375904	300.000	284.67(A)
76 2-Chlorotoluene	91	9.039	9.039	(0.930)	1337140	150.000	150.75
52 2-Hexanone	43	7.155	7.155	(0.925)	613874	300.000	287.48
77 4-Chlorotoluene	91	9.132	9.132	(0.940)	1505903	150.000	149.27
82 p-Isopropyltoluene	119	9.705	9.705	(0.999)	1502646	150.000	140.93(H)
45 4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	890472	300.000	277.76
10 Acetone	43	2.062	2.062	(0.480)	249436	300.000	295.49
37 Benzene	78	4.619	4.619	(0.912)	1827512	150.000	139.86(A)
74 Bromobenzene	156	8.867	8.867	(0.912)	587266	150.000	149.26
29 Bromochloromethane	128	3.917	3.917	(0.912)	233950	150.000	131.35
39 Bromodichloromethane	83	5.808	5.808	(1.147)	596732	150.000	140.38
66 Bromoform	173	8.473	8.473	(1.095)	406804	150.000	149.66
6 Bromomethane	94	1.403	1.403	(0.327)	303649	150.000	156.58
19 Carbon Disulfide	76	2.162	2.162	(0.503)	2978582	300.000	290.60(A)
34 Carbon Tetrachloride	117	4.376	4.376	(0.864)	579347	150.000	143.80
59 Chlorobenzene	112	7.764	7.764	(1.004)	1287362	150.000	138.91(A)
7 Chloroethane	64	1.474	1.474	(0.343)	290271	150.000	151.84
28 Chloroform	83	4.032	4.032	(0.938)	755296	150.000	137.74(A)
3 Chloromethane	50	1.138	1.138	(0.265)	495070	150.000	152.65
27 cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	525108	150.000	140.68(A)
46 cis-1,3-Dichloropropene	75	6.238	6.238	(1.232)	799896	150.000	142.04
55 Dibromochloromethane	129	7.248	7.248	(0.937)	530022	150.000	148.84
44 Dibromomethane	93	5.643	5.643	(1.115)	302802	150.000	150.85
2 Dichlorodifluoromethane	85	1.030	1.030	(0.240)	512255	150.000	151.33
61 Ethylbenzene	106	7.864	7.864	(1.017)	668797	150.000	143.74(A)
91 Hexachlorobutadiene	225	11.539	11.539	(1.187)	219528	150.000	148.48
67 Isopropylbenzene	105	8.623	8.623	(1.115)	1842987	150.000	139.53
62 m,p-Xylenes	106	7.971	7.971	(1.031)	1620449	300.000	278.88(A)
17 Methylene Chloride	84	2.399	2.399	(0.558)	493039	150.000	150.84
87 n-Butylbenzene	91	10.049	10.049	(1.034)	1152516	150.000	150.33
73 n-Propylbenzene	91	8.974	8.974	(0.923)	2226046	150.000	140.33
92 Naphthalene	128	11.596	11.596	(1.193)	1405458	150.000	157.23
63 o-Xylene	106	8.308	8.308	(1.074)	801161	150.000	139.79(A)
81 sec-Butylbenzene	105	9.583	9.583	(0.986)	1716869	150.000	149.58
64 Styrene	104	8.322	8.322	(1.076)	1396676	150.000	141.80(A)
78 tert-Butylbenzene	119	9.397	9.397	(0.967)	1279900	150.000	149.08
56 Tetrachloroethene	164	7.004	7.004	(0.906)	401261	150.000	139.61(A)
50 Toluene	91	6.524	6.524	(0.844)	1904451	150.000	138.73(A)
20 trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	476382	150.000	141.65
51 trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	665578	150.000	144.52
38 Trichloroethene	130	5.300	5.300	(1.047)	516011	150.000	141.62(A)
8 Trichlorofluoromethane	101	1.639	1.639	(0.382)	612075	150.000	152.92
5 Vinyl Chloride	62	1.209	1.209	(0.282)	554130	150.000	147.47

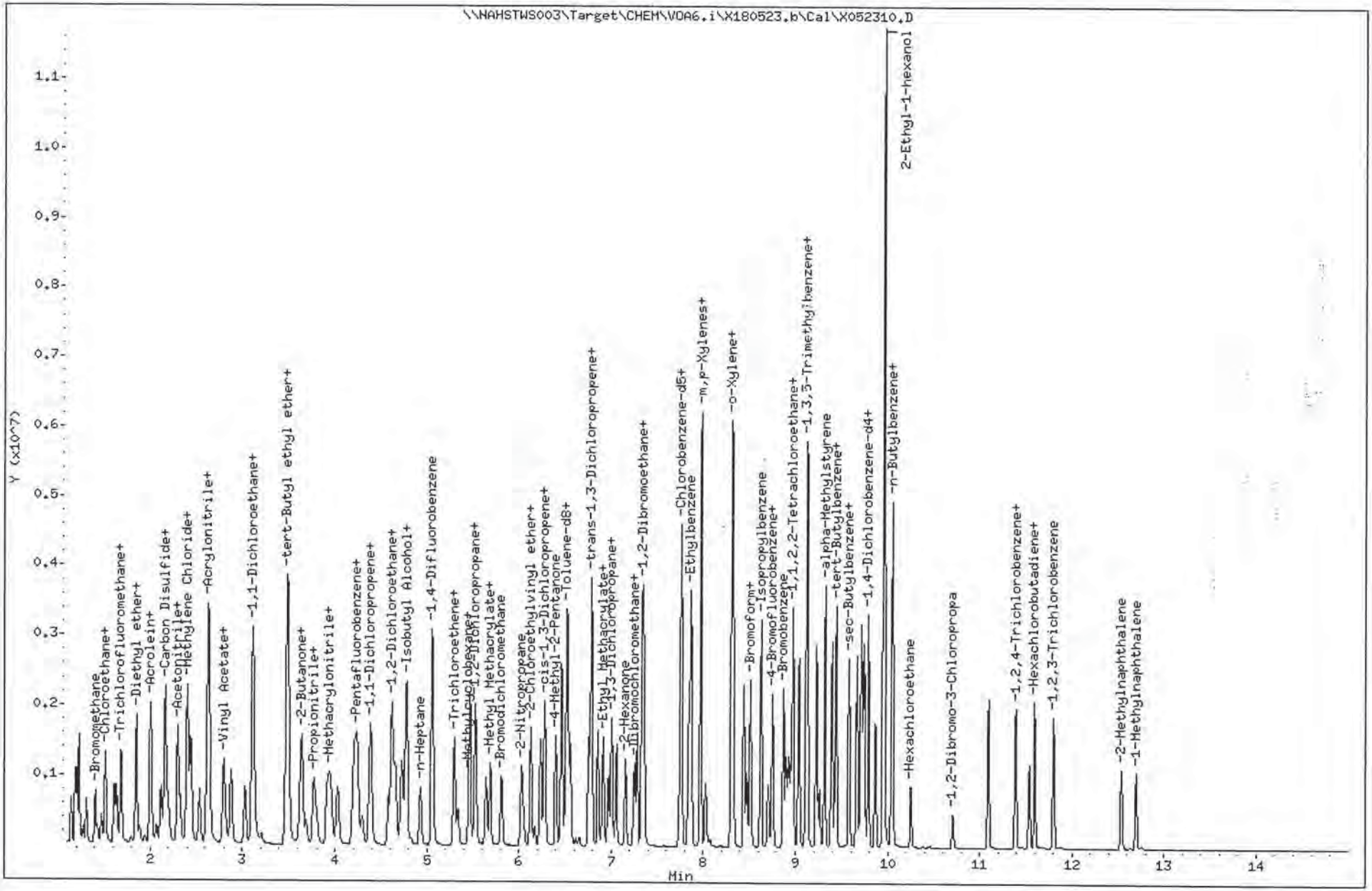
QC Flag Legend

A - Target compound detected but, quantitated amount exceeded maximum amount.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052310.D

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052310.D
Date : 23-MAY-2018 14:20
Client ID: VSTD150
Sample Info: VSTD150;VSTD150;1;9;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052311.D
Report Date: 12-Jun-2018 15:18

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052311.D
Lab Smp Id: VSTD200 Client Smp ID: VSTD200
Inj Date : 23-MAY-2018 14:44
Operator : PC Inst ID: voa6.i
Smp Info : VSTD200;VSTD200;1;10;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:18 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 14:20 Cal File: X052310.D
Als bottle: 12 Calibration Sample, Level: 10
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	ON-COL (ug/l)
*	1 Pentafluorobenzene	168	4.297	4.297	(1.000)	300431	50.0000	
*	36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	427623	50.0000	
*	47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	417112	50.0000	
*	70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	223376	50.0000	
$	30 Dibromofluoromethane	113	4.218	4.218	(0.982)	566962	200.000	199.68
$	35 1,2-Dichloroethane-d4	65	4.576	4.576	(1.065)	573216	200.000	199.57
$	48 Toluene-d8	98	6.467	6.467	(0.836)	2063089	200.000	200.07(A)
$	69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	730911	200.000	201.38(A)
	60 1,1,1,2-Tetrachloroethane	131	7.843	7.843	(1.014)	613511	200.000	187.94
	31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	843142	200.000	200.41(A)
	68 1,1,2,2-Tetrachloroethane	83	8.903	8.903	(0.916)	742020	200.000	201.31(A)
	138 Freon TF	101	1.998	1.998	(0.465)	479358	200.000	199.69
	53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	467271	200.000	183.81
	22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	1021515	200.000	200.05(A)
	11 1,1-Dichloroethene	96	2.005	2.005	(0.467)	531522	200.000	192.64
	32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	803425	200.000	196.96
	93 1,2,3-Trichlorobenzene	180	11.797	11.797	(1.214)	702064	200.000	200.20(A)
	71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	615810	200.000	177.73(M)
	90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	794247	200.000	201.97(A)
	79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	2058598	200.000	202.05(A)
	89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	131878	200.000	202.39(A)
	57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	596828	200.000	185.78(A)

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052311.D
Report Date: 12-Jun-2018 15:18

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88 1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	1207407	200.000	200.80(A)
33 1,2-Dichloroethane	62	4.662	4.662	(0.921)	702599	200.000	191.98(A)
42 1,2-Dichloropropane	63	5.529	5.529	(1.092)	613326	200.000	190.51
75 1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	1968337	200.000	201.26(A)
83 1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	1301958	200.000	202.50(A)
54 1,3-Dichloropropane	76	7.055	7.055	(0.912)	956650	200.000	200.52(A)
84 1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	1318822	200.000	201.51(A)
26 2,2-Dichloropropane	77	3.631	3.631	(0.845)	757851	200.000	199.82
24 2-Butanone	43	3.688	3.688	(0.858)	492801	400.000	382.25(A)
76 2-Chlorotoluene	91	9.039	9.039	(0.930)	1698159	200.000	199.60
52 2-Hexanone	43	7.155	7.155	(0.925)	799364	400.000	389.37
77 4-Chlorotoluene	91	9.132	9.132	(0.940)	1947711	200.000	201.27(A)
82 p-Isopropyltoluene	119	9.712	9.712	(0.999)	1960252	200.000	191.63(H)
45 4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	1150259	400.000	373.20
10 Acetone	43	2.062	2.062	(0.480)	335811	400.000	407.68(A)
37 Benzene	78	4.619	4.619	(0.912)	2363964	200.000	187.44(A)
74 Bromobenzene	156	8.867	8.867	(0.912)	758703	200.000	201.00(A)
29 Bromochloromethane	128	3.917	3.917	(0.912)	293957	200.000	169.04
39 Bromodichloromethane	83	5.808	5.808	(1.147)	776821	200.000	189.35
66 Bromoform	173	8.473	8.473	(1.095)	526813	200.000	201.55(A)
6 Bromomethane	94	1.403	1.403	(0.327)	378520	200.000	199.06
19 Carbon Disulfide	76	2.162	2.162	(0.503)	3839752	400.000	383.70(A)
34 Carbon Tetrachloride	117	4.383	4.383	(0.866)	752964	200.000	193.64
59 Chlorobenzene	112	7.764	7.764	(1.004)	1658266	200.000	186.11(A)
7 Chloroethane	64	1.468	1.468	(0.342)	373107	200.000	199.29
28 Chloroform	83	4.032	4.032	(0.938)	979660	200.000	182.99(A)
3 Chloromethane	50	1.138	1.138	(0.265)	680961	200.000	199.10
27 cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	679339	200.000	186.41(A)
46 cis-1,3-Dichloropropene	75	6.238	6.238	(1.232)	1035885	200.000	190.59
55 Dibromochloromethane	129	7.248	7.248	(0.937)	689666	200.000	201.48(A)
44 Dibromomethane	93	5.644	5.644	(1.115)	388482	200.000	200.51(A)
2 Dichlorodifluoromethane	85	1.031	1.031	(0.240)	672263	200.000	203.42(A)
61 Ethylbenzene	106	7.864	7.864	(1.017)	863747	200.000	193.09(A)
91 Hexachlorobutadiene	225	11.539	11.539	(1.187)	289931	200.000	203.88(A)
67 Isopropylbenzene	105	8.623	8.623	(1.115)	2381273	200.000	187.52
62 m,p-Xylenes	106	7.972	7.972	(1.031)	2078676	400.000	372.11(A)
17 Methylene Chloride	84	2.399	2.399	(0.558)	638403	200.000	200.13(A)
87 n-Butylbenzene	91	10.049	10.049	(1.034)	1477352	200.000	200.85(A)
73 n-Propylbenzene	91	8.974	8.974	(0.923)	2861802	200.000	188.05
92 Naphthalene	128	11.596	11.596	(1.193)	1861673	200.000	217.08(A)
63 o-Xylene	106	8.308	8.308	(1.074)	1025611	200.000	186.13(A)
81 sec-Butylbenzene	105	9.583	9.583	(0.986)	2215755	200.000	201.10(A)
64 Styrene	104	8.323	8.323	(1.076)	1787199	200.000	188.73(A)
78 tert-Butylbenzene	119	9.397	9.397	(0.967)	1661699	200.000	201.66(A)
56 Tetrachloroethene	164	7.005	7.005	(0.906)	526543	200.000	190.56(A)
50 Toluene	91	6.525	6.525	(0.844)	2452318	200.000	185.82(A)
20 trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	614224	200.000	187.07
51 trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	870493	200.000	195.84
38 Trichloroethene	130	5.300	5.300	(1.047)	676086	200.000	192.25(A)
8 Trichlorofluoromethane	101	1.639	1.639	(0.382)	789830	200.000	202.12(A)
5 Vinyl Chloride	62	1.202	1.202	(0.280)	727642	200.000	198.34

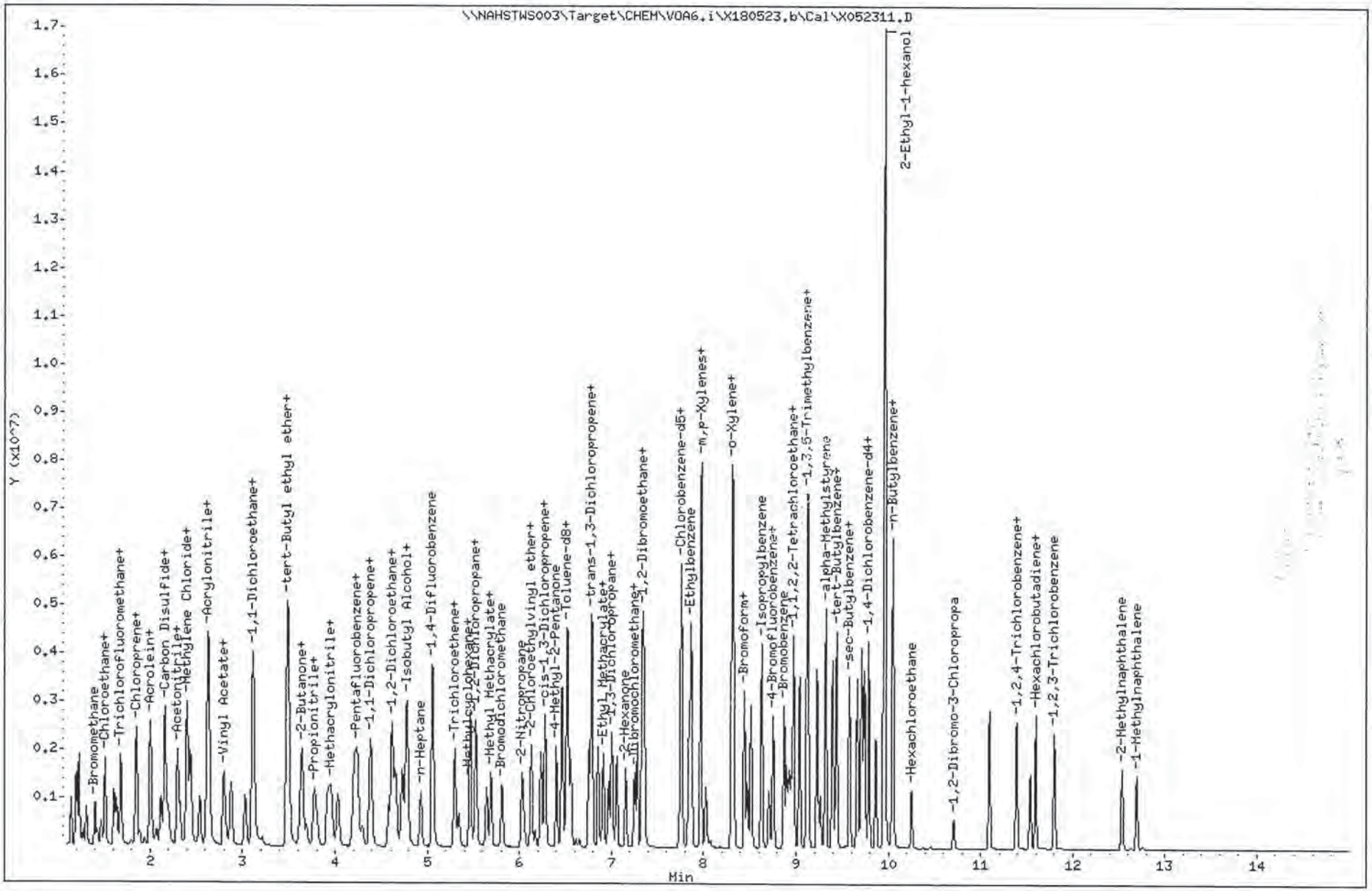
Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052311.D
Report Date: 12-Jun-2018 15:18

QC Flag Legend

A - Target compound detected but, quantitated amount exceeded maximum amount.
M - Compound response manually integrated.
H - Operator selected an alternate compound hit.

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052311.D
Date : 23-MAY-2018 14:44
Client ID: VSTD200
Sample Info: VSTD200;VSTD200;1;10;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052315.D
Lab Smp Id: VSTD050 Client Smp ID: VSTD050
Inj Date : 23-MAY-2018 17:11
Operator : PC Inst ID: voa6.i
Smp Info : VSTD050;VSTD050;2;;ICV
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\8260W.m
Meth Date : 12-Jun-2018 15:18 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 14:44 Cal File: X052311.D
Als bottle: 18 QC Sample: ICV
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	308271	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	450840	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	429149	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	228000	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	139668	48.6372	48.63
$ 35 1,2-Dichloroethane-d4	65	4.576	4.576	(1.065)	140809	48.2194	48.21
$ 48 Toluene-d8	98	6.460	6.467	(0.835)	520246	50.3077	50.30
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	184412	49.5067	49.50
60 1,1,1,2-Tetrachloroethane	131	7.843	7.843	(1.014)	155182	46.2057	46.20
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	207352	48.2514	48.25
68 1,1,2,2-Tetrachloroethane	83	8.895	8.903	(0.915)	197689	52.1871	52.18
138 Freon TF	101	2.005	1.998	(0.467)	109252	45.2257	45.22
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	123261	47.1277	47.12
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	259131	49.3687	49.36
11 1,1-Dichloroethene	96	2.005	2.005	(0.467)	126765	44.7757	44.77
32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	194141	45.1435	45.14
93 1,2,3-Trichlorobenzene	180	11.797	11.797	(1.214)	188450	52.6509	52.65
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	166815	47.1699	47.16(M)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	207617	51.7250	51.72
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	517261	49.8516	49.85
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	36087	54.5261	54.52
57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	156598	47.3807	47.38

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052315.D
Report Date: 12-Jun-2018 15:18

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	317345	51.4536	51.45
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	182973	47.4233	47.42
42	1,2-Dichloropropane	63	5.529	5.529	(1.092)	156142	46.0052	46.00
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	501469	50.2451	50.24
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	328334	50.2870	50.28
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	254098	51.4684	51.46
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	335466	50.3484	50.34
26	2,2-Dichloropropane	77	3.631	3.631	(0.845)	199470	51.2538	51.25
24	2-Butanone	43	3.688	3.688	(0.858)	135154	102.169	102.16
76	2-Chlorotoluene	91	9.032	9.039	(0.929)	436365	50.1457	50.14
52	2-Hexanone	43	7.155	7.155	(0.925)	206307	97.6751	97.67
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	500019	50.5626	50.56
82	p-Isopropyltoluene	119	9.705	9.712	(0.999)	492070	47.1296	47.12
45	4-Methyl-2-Pentanone	43	6.403	6.403	(0.828)	301284	95.0097	95.00
10	Acetone	43	2.062	2.062	(0.480)	88865	104.714	104.71
37	Benzene	78	4.619	4.619	(0.912)	603421	45.3835	45.38
74	Bromobenzene	156	8.867	8.867	(0.912)	192447	49.9344	49.93
29	Bromochloromethane	128	3.917	3.917	(0.912)	84303	47.2482	47.24
39	Bromodichloromethane	83	5.808	5.808	(1.147)	200594	46.3770	46.37
66	Bromoform	173	8.473	8.473	(1.095)	136525	50.8630	50.86
6	Bromomethane	94	1.410	1.403	(0.328)	92021	49.5431	49.54
19	Carbon Disulfide	76	2.162	2.162	(0.503)	926540	90.2337	90.23
34	Carbon Tetrachloride	117	4.376	4.383	(0.864)	180837	44.1122	44.11
59	Chlorobenzene	112	7.764	7.764	(1.004)	426321	46.5069	46.50
7	Chloroethane	64	1.475	1.468	(0.343)	93634	49.0749	49.07
28	Chloroform	83	4.032	4.032	(0.938)	252343	45.9383	45.93
3	Chloromethane	50	1.145	1.138	(0.267)	157816	54.3766	54.37
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	174615	46.6981	46.69
46	cis-1,3-Dichloropropene	75	6.231	6.238	(1.231)	270735	47.2477	47.24
55	Dibromochloromethane	129	7.248	7.248	(0.937)	180009	51.0498	51.04
44	Dibromomethane	93	5.636	5.644	(1.113)	102688	50.2788	50.27
2	Dichlorodifluoromethane	85	1.030	1.031	(0.240)	152673	45.0237	45.02
61	Ethylbenzene	106	7.864	7.864	(1.017)	215006	46.7176	46.71
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	76903	54.0076	54.00
67	Isopropylbenzene	105	8.623	8.623	(1.115)	590716	45.2134	45.21
62	m,p-Xylenes	106	7.971	7.972	(1.031)	528129	91.8910	91.89
17	Methylene Chloride	84	2.399	2.399	(0.558)	163277	49.6932	49.69
87	n-Butylbenzene	91	10.049	10.049	(1.034)	387573	51.6269	51.62
73	n-Propylbenzene	91	8.974	8.974	(0.923)	710891	45.7655	45.76
92	Naphthalene	128	11.596	11.596	(1.193)	500175	57.1415	57.14
63	o-Xylene	106	8.301	8.308	(1.073)	262907	46.3771	46.37
81	sec-Butylbenzene	105	9.576	9.583	(0.985)	540724	48.3454	48.34
64	Styrene	104	8.322	8.323	(1.076)	458071	47.0176	47.01
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	409003	48.8287	48.82
56	Tetrachloroethene	164	7.004	7.005	(0.906)	126092	44.3543	44.35
50	Toluene	91	6.525	6.525	(0.844)	630730	46.4529	46.45
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	156687	46.5088	46.50
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	228031	48.6613	48.66
38	Trichloroethene	130	5.300	5.300	(1.047)	168030	45.3223	45.32
8	Trichlorofluoromethane	101	1.639	1.639	(0.382)	182336	45.4748	45.47
5	Vinyl Chloride	62	1.202	1.202	(0.280)	167631	44.5314	44.53

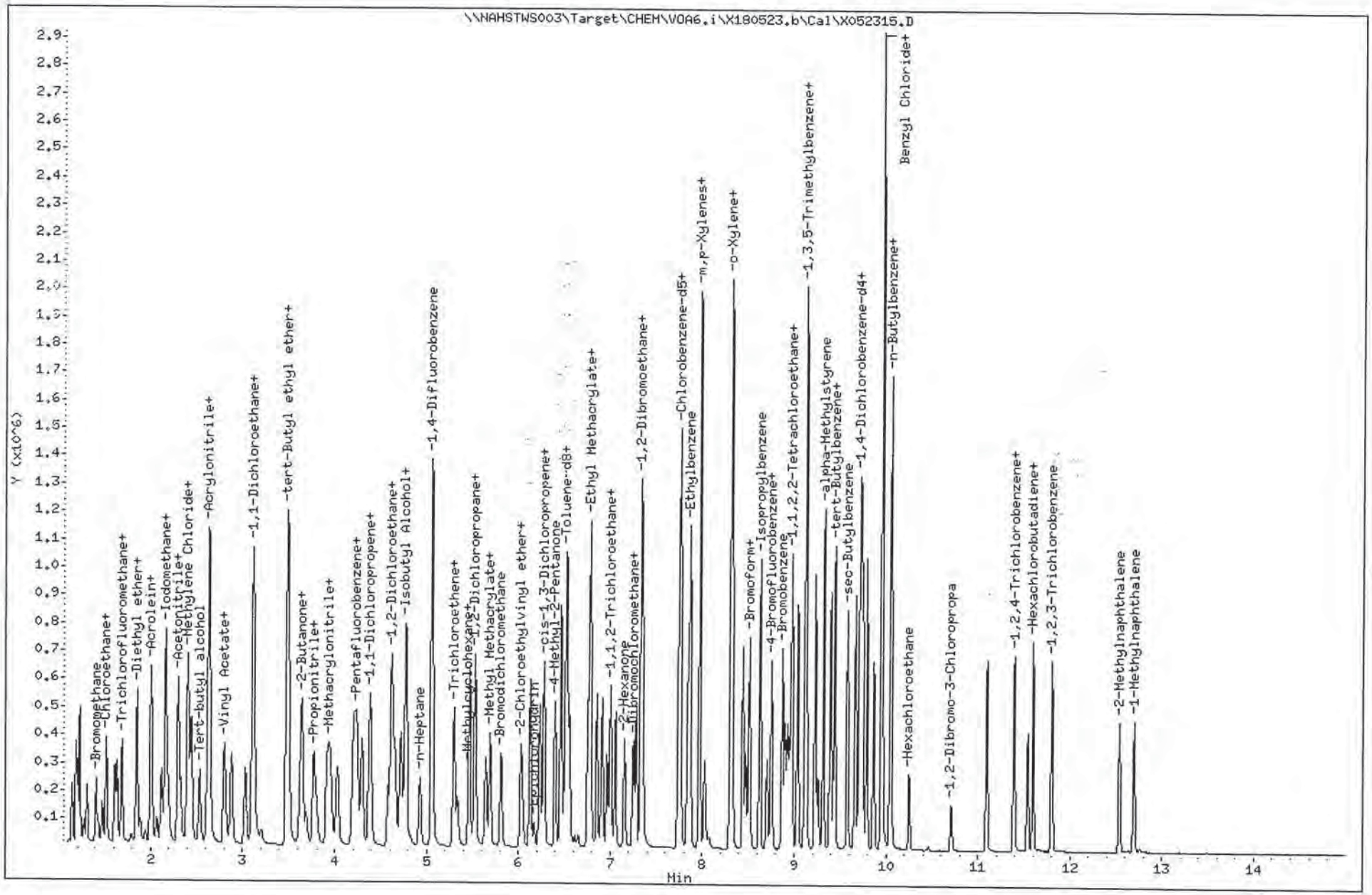
Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052315.D
Report Date: 12-Jun-2018 15:18

QC Flag Legend

M - Compound response manually integrated.

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180523.b\Cal\X052315.D
Date : 23-MAY-2018 17:11
Client ID: VSTD050
Sample Info: VSTD050;VSTD050;2;;ICV
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Lab File ID: X060701 BFB Injection Date: 06/07/18

Instrument ID: VOA6 BFB Injection Time: 1009

GC Column: DB624 ID: 0.25 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	15.3
75	30.0 - 60.0% of mass 95	43.6
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.0
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	86.5
175	5.0 - 9.0% of mass 174	6.3 (7.3)1
176	95.0 - 101.0% of mass 174	83.0 (96.0)1
177	5.0 - 9.0% of mass 176	5.6 (6.7)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD050	VSTD050	X060702	06/07/18	1034
02	VLCSW-180607	VLCSW-180607	X060703	06/07/18	1058
03	VBLKW-180607	VBLKW-180607	X060706	06/07/18	1213
04	HS18051472-0	HS18051472-02	X060708	06/07/18	1302
05	HS18051472-0	HS18051472-01	X060712	06/07/18	1440
06	HS18051491-0	HS18051491-01M	X060714	06/07/18	1529
07	HS18051491-0	HS18051491-01M	X060715	06/07/18	1554
08	VSTD050-END	VSTD050-END	X060729	06/07/18	2138
09					
10					
11					
12					
13					
14					
15					
16					
17					
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20					
21					
22					

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Instrument ID: VOA6 Calibration Date: 06/07/18 Time: 1034

Lab File ID: X060702 Init. Calib. Date(s): 05/23/18 05/23/18

Init. Calib. Times: 1040 1647

GC Column: DB624 ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Bromochloromethane	0.2890000	0.2882281	0.2882281	0.1	0.27	20.00	AVRG
Vinyl Chloride	0.6090000	0.6188310	0.6188310	0.1	-1.61	20.00	AVRG
Chloromethane	55.576946	50.000000	0.5306029	0.1	-11.15	20.00	2RDR
Bromomethane	53.435222	50.000000	0.3282515	0.1	-6.87	20.00	LINR
Chloroethane	57.124768	50.000000	0.3494071	0.1	-14.25	20.00	2RDR
Methylene Chloride	53.031484	50.000000	0.5636859	0.1	-6.06	20.00	LINR
Acetone	117.74663	100.00000	0.1620353	0.1	-17.75	20.00	LINR
1,1-Dichloroethene	0.4580000	0.4363241	0.4363241	0.1	4.73	20.00	AVRG
trans-1,2-Dichloroethene	0.5460000	0.5340915	0.5340915	0.1	2.18	20.00	AVRG
Carbon Tetrachloride	0.4520000	0.3971127	0.3971127	0.1	12.14	20.00	AVRG
1,1-Dichloroethane	53.504047	50.000000	0.9098185	0.2	-7.01	20.00	LINR
Bromodichloromethane	0.4780000	0.4636036	0.4636036	0.2	3.01	20.00	AVRG
1,2-Dichloropropane	0.3760000	0.3739829	0.3739829	0.1	0.54	20.00	AVRG
cis-1,3-Dichloropropene	0.6340000	0.6380602	0.6380602	0.2	-0.64	20.00	AVRG
2-Butanone	0.2130000	0.2545915	0.2545915	0.1	-19.53	20.00	AVRG
Dibromochloromethane	49.898798	50.000000	0.4093175	0.1	0.20	20.00	LINR
cis-1,2-Dichloroethene	0.6060000	0.6064520	0.6064520	0.1	-0.07	20.00	AVRG
1,1,2-Trichloroethane	0.3050000	0.2824962	0.2824962	0.1	7.38	20.00	AVRG
Chloroform	0.8900000	0.8773175	0.8773175	0.2	1.42	20.00	AVRG
Benzene	1.4710000	1.3896776	1.3896776	0.5	5.53	20.00	AVRG
trans-1,3-Dichloropropene	0.5190000	0.5435901	0.5435901	0.1	-4.74	20.00	AVRG
Bromoform	51.477886	50.000000	0.3217419	0.1	-2.96	20.00	LINR
4-Methyl-2-Pentanone	0.3690000	0.3779641	0.3779641	0.1	-2.43	20.00	AVRG
1,1,1-Trichloroethane	49.768125	50.000000	0.6921147	0.1	0.46	20.00	LINR
2-Hexanone	0.2460000	0.2622063	0.2622063	0.1	-6.59	20.00	AVRG
1,2-Dichloroethane	0.4260000	0.4297760	0.4297760	0.1	-0.89	20.00	AVRG
1,1,2,2-Tetrachloroethane	52.455833	50.000000	0.8723788	0.3	-4.91	20.00	LINR
Trichloroethene	0.4100000	0.3807229	0.3807229	0.2	7.14	20.00	AVRG
Toluene	1.5820000	1.4084201	1.4084201	0.4	10.97	20.00	AVRG
Dichlorodifluoromethane	0.5470000	0.4758324	0.4758324	0.1	13.01	20.00	AVRG
Trichlorofluoromethane	0.6480000	0.5719709	0.5719709	0.1	11.73	20.00	AVRG
Tetrachloroethene	0.3310000	0.2701356	0.2701356	0.2	18.39	20.00	AVRG
1,2-Dibromoethane	0.3850000	0.3660414	0.3660414	0.1	4.92	20.00	AVRG
Chlorobenzene	1.0680000	0.9566109	0.9566109	0.5	10.43	20.00	AVRG
1,3-Dichlorobenzene	46.868706	50.000000	1.3486139	0.6	6.26	20.00	LINR
1,4-Dichlorobenzene	46.732644	50.000000	1.3702031	0.4	6.53	20.00	LINR
1,2-Dichlorobenzene	47.694005	50.000000	1.2978429	0.4	4.61	20.00	LINR
Ethylbenzene	0.5360000	0.4704772	0.4704772	0.1	12.22	20.00	AVRG
m,p-Xylenes	0.6690000	0.5784610	0.5784610	0.1	13.53	20.00	AVRG
o-Xylene	0.6600000	0.5854181	0.5854181	0.3	11.30	20.00	AVRG
Styrene	1.1350000	1.0330752	1.0330752	0.3	8.98	20.00	AVRG
Carbon Disulfide	1.6620000	1.5634083	1.5634083	0.1	5.93	20.00	AVRG

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS1805147

Instrument ID: VOA6 Calibration Date: 06/07/18 Time: 1034

Lab File ID: X060702 Init. Calib. Date(s): 05/23/18 05/23/18

Init. Calib. Times: 1040 1647

GC Column: DB624 ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
2,2-Dichloropropane	53.649803	50.000000	0.6789397	0.1	-7.30	20.00	LINR
1,1-Dichloropropene	0.4750000	0.4360020	0.4360020	0.1	8.21	20.00	AVRG
Dibromomethane	54.012699	50.000000	0.2441723	0.1	-8.02	20.00	LINR
1,3-Dichloropropane	50.398556	50.000000	0.5801231	0.1	-0.80	20.00	LINR
1,1,1,2-Tetrachloroethane	0.3920000	0.3479492	0.3479492	0.1	11.24	20.00	AVRG
Isopropylbenzene	1.5220000	1.2489821	1.2489821	0.1	17.94	20.00	AVRG
Bromobenzene	47.136701	50.000000	0.7998524	0.1	5.73	20.00	LINR
1,2,3-Trichloropropane	0.7420000	0.7485360	0.7485360	0.1	-0.88	20.00	AVRG
n-Propylbenzene	3.4180000	2.8142237	2.8142237	0.1	17.66	20.00	AVRG
2-Chlorotoluene	45.431776	50.000000	1.7416090	0.1	9.14	20.00	LINR
1,3,5-Trimethylbenzene	44.498100	50.000000	1.9585706	0.1	11.00	20.00	LINR
4-Chlorotoluene	46.818093	50.000000	2.0390107	0.1	6.36	20.00	LINR
tert-Butylbenzene	43.413037	50.000000	1.6007757	0.1	13.17	20.00	LINR
1,2,4-Trimethylbenzene	45.489659	50.000000	2.0800951	0.1	9.02	20.00	LINR
sec-Butylbenzene	42.196631	50.000000	2.0764532	0.1	15.61	20.00	LINR
p-Isopropyltoluene	2.3330000	1.8725152	1.8725152	0.1	19.74	20.00	AVRG
n-Butylbenzene	43.942325	50.000000	1.4521932	0.5	12.12	20.00	LINR
1,2-Dibromo-3-Chloropropane	55.362817	50.000000	0.1616102	0.05	-10.72	20.00	LINR
1,2,4-Trichlorobenzene	0.8890000	0.8331756	0.8331756	0.2	6.28	20.00	AVRG
Hexachlorobutadiene	44.574427	50.000000	0.2802788	0.1	10.85	20.00	LINR
Naphthalene	1.9440000	2.2043310	2.2043310	0.2	-13.39	20.00	AVRG
1,2,3-Trichlorobenzene	0.7940000	0.7675841	0.7675841	0.1	3.33	20.00	AVRG
Freon TF	47.842985	50.000000	0.3748474	0.1	4.31	20.00	LINR
Dibromofluoromethane	50.202504	50.000000	0.4628648	0.1	-0.40	20.00	2RDR
1,2-Dichloroethane-d4	50.307893	50.000000	0.4686546	0.1	-0.62	20.00	2RDR
Toluene-d8	47.707843	50.000000	1.1514012	0.1	4.58	20.00	2RDR
4-Bromofluorobenzene	49.313638	50.000000	0.4269838	0.1	1.37	20.00	LINR

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Instrument ID: VOA6 Calibration Date: 06/07/18 Time: 2138

Lab File ID: X060729 Init. Calib. Date(s): 05/23/18 05/23/18

Init. Calib. Times: 1040 1647

GC Column: DB624 ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Bromochloromethane	0.2890000	0.2906120	0.2906120	0.1	-0.56	50.00	AVRG
Vinyl Chloride	0.6090000	0.6406086	0.6406086	0.1	-5.19	50.00	AVRG
Chloromethane	48.760845	50.000000	0.4631610	0.1	2.48	50.00	2RDR
Bromomethane	40.958828	50.000000	0.2482294	0.1	18.08	50.00	LINR
Chloroethane	58.885721	50.000000	0.3602392	0.1	-17.77	50.00	2RDR
Methylene Chloride	53.017973	50.000000	0.5635426	0.1	-6.04	50.00	LINR
Acetone	121.60867	100.00000	0.1673220	0.1	-21.61	50.00	LINR
1,1-Dichloroethene	0.4580000	0.4634611	0.4634611	0.1	-1.19	50.00	AVRG
trans-1,2-Dichloroethene	0.5460000	0.5440535	0.5440535	0.1	0.36	50.00	AVRG
Carbon Tetrachloride	0.4520000	0.4239697	0.4239697	0.1	6.20	50.00	AVRG
1,1-Dichloroethane	53.381298	50.000000	0.9077333	0.2	-6.76	50.00	LINR
Bromodichloromethane	0.4780000	0.4554860	0.4554860	0.2	4.71	50.00	AVRG
1,2-Dichloropropane	0.3760000	0.3642885	0.3642885	0.1	3.11	50.00	AVRG
cis-1,3-Dichloropropene	0.6340000	0.5863002	0.5863002	0.2	7.52	50.00	AVRG
2-Butanone	0.2130000	0.2456184	0.2456184	0.1	-15.31	50.00	AVRG
Dibromochloromethane	48.309945	50.000000	0.3962825	0.1	3.38	50.00	LINR
cis-1,2-Dichloroethene	0.6060000	0.6045563	0.6045563	0.1	0.24	50.00	AVRG
1,1,2-Trichloroethane	0.3050000	0.2775076	0.2775076	0.1	9.01	50.00	AVRG
Chloroform	0.8900000	0.8849751	0.8849751	0.2	0.56	50.00	AVRG
Benzene	1.4710000	1.3821028	1.3821028	0.5	6.04	50.00	AVRG
trans-1,3-Dichloropropene	0.5190000	0.4951638	0.4951638	0.1	4.59	50.00	AVRG
Bromoform	49.746425	50.000000	0.3108843	0.1	0.51	50.00	LINR
4-Methyl-2-Pentanone	0.3690000	0.3640312	0.3640312	0.1	1.35	50.00	AVRG
1,1,1-Trichloroethane	52.434346	50.000000	0.7295138	0.1	-4.87	50.00	LINR
2-Hexanone	0.2460000	0.2506099	0.2506099	0.1	-1.87	50.00	AVRG
1,2-Dichloroethane	0.4260000	0.4206576	0.4206576	0.1	1.25	50.00	AVRG
1,1,2,2-Tetrachloroethane	50.520719	50.000000	0.8405265	0.3	-1.04	50.00	LINR
Trichloroethene	0.4100000	0.3859928	0.3859928	0.2	5.86	50.00	AVRG
Toluene	1.5820000	1.4097006	1.4097006	0.4	10.89	50.00	AVRG
Dichlorodifluoromethane	0.5470000	0.5249767	0.5249767	0.1	4.03	50.00	AVRG
Trichlorofluoromethane	0.6480000	0.6384907	0.6384907	0.1	1.47	50.00	AVRG
Tetrachloroethene	0.3310000	0.2836836	0.2836836	0.2	14.29	50.00	AVRG
1,2-Dibromoethane	0.3850000	0.3564330	0.3564330	0.1	7.42	50.00	AVRG
Chlorobenzene	1.0680000	0.9403020	0.9403020	0.5	11.96	50.00	AVRG
1,3-Dichlorobenzene	44.722740	50.000000	1.2867913	0.6	10.55	50.00	LINR
1,4-Dichlorobenzene	44.953922	50.000000	1.3181507	0.4	10.09	50.00	LINR
1,2-Dichlorobenzene	46.059011	50.000000	1.2539248	0.4	7.88	50.00	LINR
Ethylbenzene	0.5360000	0.4770964	0.4770964	0.1	10.99	50.00	AVRG
m,p-Xylenes	0.6690000	0.5756085	0.5756085	0.1	13.96	50.00	AVRG
o-Xylene	0.6600000	0.5858041	0.5858041	0.3	11.24	50.00	AVRG
Styrene	1.1350000	1.0019923	1.0019923	0.3	11.72	50.00	AVRG
Carbon Disulfide	1.6620000	1.6276015	1.6276015	0.1	2.07	50.00	AVRG

FORM VII VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS1805147

Instrument ID: VOA6 Calibration Date: 06/07/18 Time: 2138

Lab File ID: X060729 Init. Calib. Date(s): 05/23/18 05/23/18

Init. Calib. Times: 1040 1647

GC Column: DB624 ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
2,2-Dichloropropane	44.000085	50.000000	0.5571529	0.1	12.00	50.00	LINR
1,1-Dichloropropene	0.4750000	0.4584798	0.4584798	0.1	3.48	50.00	AVRG
Dibromomethane	52.456055	50.000000	0.2371179	0.1	-4.91	50.00	LINR
1,3-Dichloropropane	49.818540	50.000000	0.5735029	0.1	0.36	50.00	LINR
1,1,1,2-Tetrachloroethane	0.3920000	0.3416585	0.3416585	0.1	12.84	50.00	AVRG
Isopropylbenzene	1.5220000	1.2911016	1.2911016	0.1	15.17	50.00	AVRG
Bromobenzene	45.723692	50.000000	0.7759860	0.1	8.55	50.00	LINR
1,2,3-Trichloropropane	0.7420000	0.7130029	0.7130029	0.1	3.91	50.00	AVRG
n-Propylbenzene	3.4180000	2.7992512	2.7992512	0.1	18.10	50.00	AVRG
2-Chlorotoluene	44.654882	50.000000	1.7120513	0.1	10.69	50.00	LINR
1,3,5-Trimethylbenzene	44.848866	50.000000	1.9739228	0.1	10.30	50.00	LINR
4-Chlorotoluene	45.355047	50.000000	1.9756745	0.1	9.29	50.00	LINR
tert-Butylbenzene	43.985322	50.000000	1.6219074	0.1	12.03	50.00	LINR
1,2,4-Trimethylbenzene	44.960013	50.000000	2.0559297	0.1	10.08	50.00	LINR
sec-Butylbenzene	43.160909	50.000000	2.1240824	0.1	13.68	50.00	LINR
p-Isopropyltoluene	2.3330000	1.9044301	1.9044301	0.1	18.37	50.00	AVRG
n-Butylbenzene	43.476618	50.000000	1.4368616	0.5	13.05	50.00	LINR
1,2-Dibromo-3-Chloropropane	50.893643	50.000000	0.1485555	0.05	-1.79	50.00	LINR
1,2,4-Trichlorobenzene	0.8890000	0.7592886	0.7592886	0.2	14.59	50.00	AVRG
Hexachlorobutadiene	39.289963	50.000000	0.2464403	0.1	21.42	50.00	LINR
Naphthalene	1.9440000	1.8368212	1.8368212	0.2	5.51	50.00	AVRG
1,2,3-Trichlorobenzene	0.7940000	0.6856167	0.6856167	0.1	13.65	50.00	AVRG
Freon TF	52.830575	50.000000	0.4149296	0.1	-5.66	50.00	LINR
Dibromofluoromethane	51.434828	50.000000	0.4743108	0.1	-2.87	50.00	2RDR
1,2-Dichloroethane-d4	50.925322	50.000000	0.4744428	0.1	-1.85	50.00	2RDR
Toluene-d8	47.587592	50.000000	1.1484951	0.1	4.82	50.00	2RDR
4-Bromofluorobenzene	49.776999	50.000000	0.4310200	0.1	0.45	50.00	LINR

FORM VII VOA

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Lab File ID (Standard): X060702 Date Analyzed: 06/07/18

Instrument ID: VOA6 Time Analyzed: 1034

GC Column: DB624 ID: 0.18 (mm) Heated Purge: (Y/N) N

		IS1 AREA #	IS1 RT #	IS2(DFB) AREA #	IS2(DFB) RT #	IS3(CBZ) AREA #	IS3(CBZ) RT #
	12 HOUR STD	298975	4.30	447475	5.06	460254	7.74
	UPPER LIMIT	597950	4.80	894950	5.56	920508	8.24
	LOWER LIMIT	149488	3.80	223738	4.56	230127	7.24
	CLIENT SAMPLE NO.						
01	VLCSW-180607	289942	4.30	436764	5.06	450131	7.74
02	VBLKW-180607	307968	4.30	469798	5.06	474908	7.74
03	HS18051472-02	309593	4.30	479597	5.06	483561	7.74
04	HS18051472-01	309438	4.30	473189	5.06	485367	7.74
05	HS18051491-01	304929	4.30	463178	5.06	471691	7.74
06	HS18051491-01	300706	4.30	460835	5.06	467409	7.74
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS1 = Pentafluorobenzene
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: Contract:

Lab Code: Case No.: SAS No.: SDG No.: HS18051472

Lab File ID (Standard): X060702 Date Analyzed: 06/07/18

Instrument ID: VOA6 Time Analyzed: 1034

GC Column: DB624 ID: 0.18 (mm) Heated Purge: (Y/N) N

		IS4 (DCB) AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	249316	9.72				
	UPPER LIMIT	498632	10.22				
	LOWER LIMIT	124658	9.22				
	CLIENT SAMPLE NO.						
01	VLCSW-180607	243281	9.72				
02	VBLKW-180607	253611	9.72				
03	HS18051472-02	263345	9.72				
04	HS18051472-01	267309	9.72				
05	HS18051491-01	254389	9.72				
06	HS18051491-01	262587	9.72				
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS4 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM VIII VOA

MSVOA06 -Logbook

Batch: 32082
Date: 06-07-2018
Method: 8260
Comments:

Analyst: Presenia Cabascango
Reviewer:
Laboratory: Houston

#	Samp ID	Type	Analyzed	DF	Init Wt/Vol	Final Vol	File ID	Matrix	Status	pH
1	BFB	TUNE	06-07-2018 10:09 am	1.00	50 mL	50 mL	X060701.D	Liquid	Y	na
	auto find/ purged									
2	VSTD050	CCV	06-07-2018 10:34 am	1.00	50 mL	50 mL	X060702.D	Liquid	Y	na
	10µL cal STD/50mL DI									
3	VLCSW-180607	LCS	06-07-2018 10:58 am	1.00	50 mL	50 mL	X060703.D	Liquid	Y	na
	10µL cal STD/50mL DI									
4	BLANKW	SAMP	06-07-2018 11:23 am	1.00	50 mL	50 mL	X060704.D	Liquid	Y	na
5	VBLKW-180607	MBLK	06-07-2018 11:48 am	1.00	50 mL	50 mL	X060705.D	Liquid	Y	na
6	VBLKW-180607	MBLK	06-07-2018 12:13 pm	1.00	50 mL	50 mL	X060706.D	Liquid	Y	na
7	HS18051257-02	SAMP	06-07-2018 12:37 pm	1.00	50 mL	50 mL	X060707.D	Liquid	Y	>2
8	HS18051472-02	SAMP	06-07-2018 01:02 pm	1.00	50 mL	50 mL	X060708.D	Liquid	Y	>2
9	HS18060074-01	SAMP	06-07-2018 01:26 pm	1.00	50 mL	50 mL	X060709.D	Liquid	Y	>2
10	HS18051491-01	SAMP	06-07-2018 01:50 pm	1.00	50 mL	50 mL	X060710.D	Liquid	Y	>2
11	HS18051257-01	SAMP	06-07-2018 02:15 pm	5.00	10 mL	50 mL	X060711.D	Liquid	Y	>2
12	HS18051472-01	SAMP	06-07-2018 02:40 pm	5.00	10 mL	50 mL	X060712.D	Liquid	Y	>2
13	HS18060054-01	SAMP	06-07-2018 03:05 pm	1.00	50 mL	50 mL	X060713.D	Liquid	Y	>2
14	HS18051491-01MS	MS	06-07-2018 03:29 pm	1.00	50 mL	50 mL	X060714.D	Liquid	Y	>2
	5µL cal STD/25mL samp									
15	HS18051491-01MSD	MSD	06-07-2018 03:54 pm	1.00	50 mL	50 mL	X060715.D	Liquid	Y	>2
	5µL cal STD/25mL samp									
16	BLANK	SAMP	06-07-2018 04:18 pm	1.00	50 mL	50 mL	X060716.D	Liquid	Y	na
17	HS18051491-02	SAMP	06-07-2018 04:43 pm	1.00	50 mL	50 mL	X060717.D	Liquid	Y	>2
18	HS18060278-21	SAMP	06-07-2018 05:08 pm	1.00	50 mL	50 mL	X060718.D	Liquid	Y	>2
19	HS18060123-15	SAMP	06-07-2018 05:32 pm	1.00	50 mL	50 mL	X060719.D	Liquid	Y	>2
20	HS18060123-02	SAMP	06-07-2018 05:57 pm	1.00	50 mL	50 mL	X060720.D	Liquid	Y	>2
21	HS18060123-07	SAMP	06-07-2018 06:21 pm	1.00	50 mL	50 mL	X060721.D	Liquid	Y	>2
22	HS18060123-08	SAMP	06-07-2018 06:46 pm	1.00	50 mL	50 mL	X060722.D	Liquid	Y	>2
23	HS18060123-09	SAMP	06-07-2018 07:10 pm	1.00	50 mL	50 mL	X060723.D	Liquid	Y	>2
24	HS18060123-10	SAMP	06-07-2018 07:35 pm	1.00	50 mL	50 mL	X060724.D	Liquid	Y	>2
25	HS18060123-11	SAMP	06-07-2018 08:00 pm	1.00	50 mL	50 mL	X060725.D	Liquid	Y	>2
26	HS18060123-12	SAMP	06-07-2018 08:24 pm	1.00	50 mL	50 mL	X060726.D	Liquid	Y	>2
27	HS18060123-13	SAMP	06-07-2018 08:49 pm	1.00	50 mL	50 mL	X060727.D	Liquid	Y	>2
28	HS18060123-14	SAMP	06-07-2018 09:13 pm	1.00	50 mL	50 mL	X060728.D	Liquid	Y	>2
29	VSTD050-END	CCV	06-07-2018 09:38 pm	1.00	50 mL	50 mL	X060729.D	Liquid	Y	na
	10µL cal STD/50mL DI									

Chemical	Value
SURR SPK ID	30502-26-03
IS ID	30502-26-04
LCS/MS ID	30502-28-01/02
BFB ID	30502-26-03
pH Paper	634-37-03

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060701.D

Date : 07-JUN-2018 10:09

Client ID: BFB

Instrument: voa6.i

Sample Info: BFB;BFB;3;;BFB

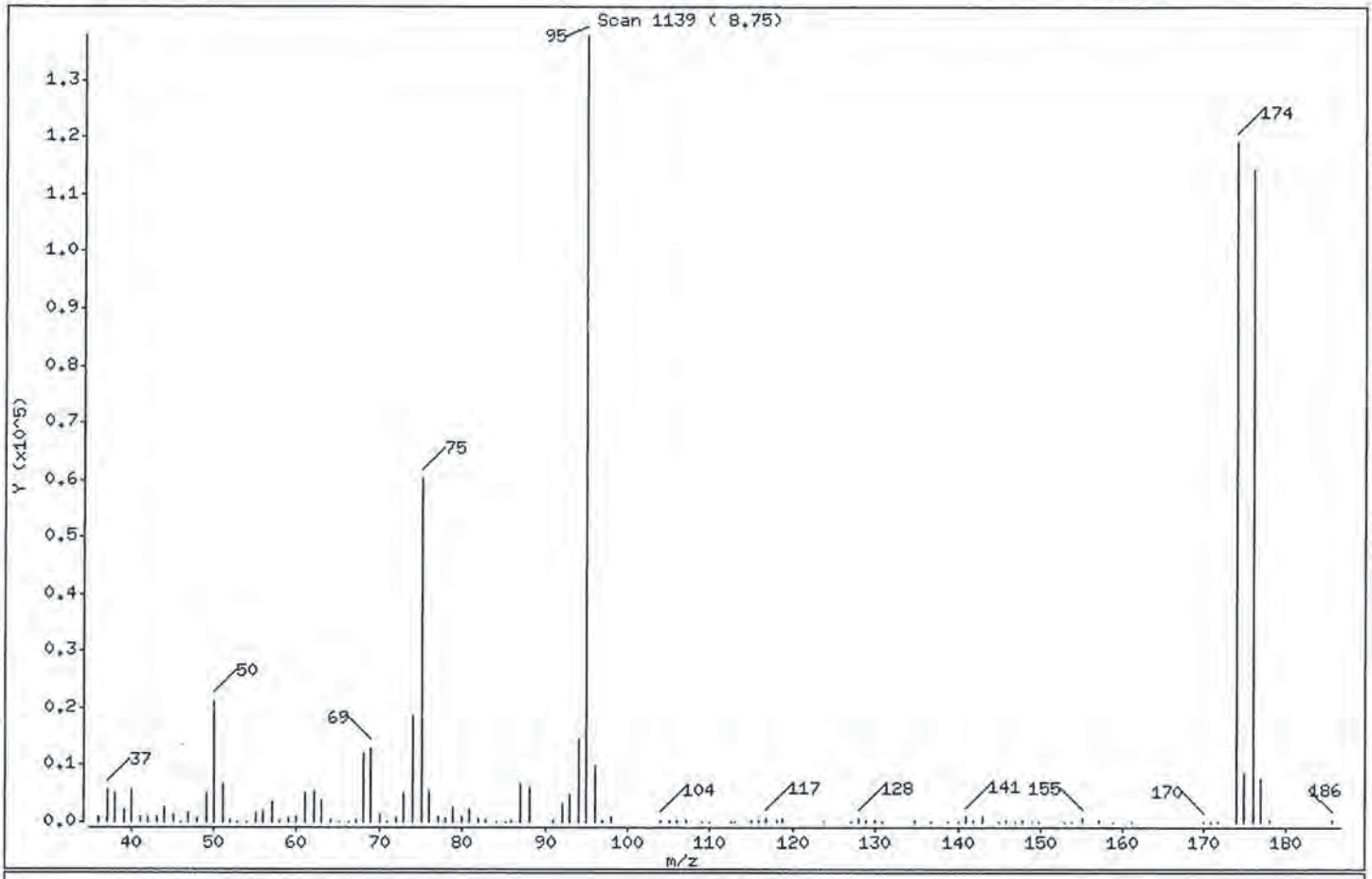
Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25

1 bfb



m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	15.32
75	30.00 - 60.00% of mass 95	43.60
96	5.00 - 9.00% of mass 95	7.04
173	Less than 2.00% of mass 174	0.00 (0.00)
174	Greater than 50.00% of mass 95	86.46
175	5.00 - 9.00% of mass 174	6.28 (7.26)
176	95.00 - 101.00% of mass 174	82.96 (95.95)
177	5.00 - 9.00% of mass 176	5.57 (6.72)

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060701.D

Date : 07-JUN-2018 10:09

Client ID: BFB Instrument: voa6.i

Sample Info: BFB;BFB;3;;BFB

Volume Injected (uL): 2.0 Operator: PC

Column phase: DB624 Column diameter: 0.25

Data File: X060701.D
Spectrum: Scan 1139 (8.75)
Location of Maximum: 95.00
Number of points: 108

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	1068	64.00	330	94.00	14477	140.90	1038
37.10	5761	65.10	89	95.00	137856	141.80	209
38.10	5024	66.20	55	96.00	9705	142.90	862
39.10	2296	67.10	442	97.00	307	145.00	94
40.00	5752	68.00	12148	98.00	820	145.80	271
41.10	803	69.00	13125	104.00	399	147.00	67
42.10	985	70.00	1301	105.00	273	147.80	296
43.10	808	70.90	115	105.90	342	148.90	92
44.00	2531	72.00	683	107.00	177	149.80	123
45.10	1306	73.00	5152	109.00	110	152.90	130
46.00	77	74.00	18760	109.80	69	153.80	87
47.00	1737	75.00	60104	112.60	50	155.00	528
48.00	753	76.00	5334	113.10	61	157.00	250
49.00	4936	77.00	1006	114.90	214	158.80	129
50.00	21120	78.00	681	115.90	452	161.00	125
51.00	6745	78.90	2616	116.80	594	170.00	148
52.00	360	80.00	865	118.00	422	170.90	109
52.90	133	80.90	2270	118.80	578	171.90	135
54.00	122	81.90	561	123.80	67	174.00	119192
55.00	1725	82.90	289	127.00	122	175.00	8655
56.00	1807	84.20	156	128.00	524	175.90	114368
57.00	3469	85.20	68	128.90	254	176.90	7682
57.90	272	86.00	223	130.00	420	177.90	216
59.00	549	87.00	6571	130.90	127	185.80	216
60.00	1018	88.00	6142	134.90	236		
61.00	5212	90.90	377	136.80	118		
62.00	5381	92.00	3119	138.80	73		
63.00	3823	93.00	4624	140.00	73		

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060701.D

Date : 07-JUN-2018 10:09

Client ID: BFB

Instrument: voa6.i

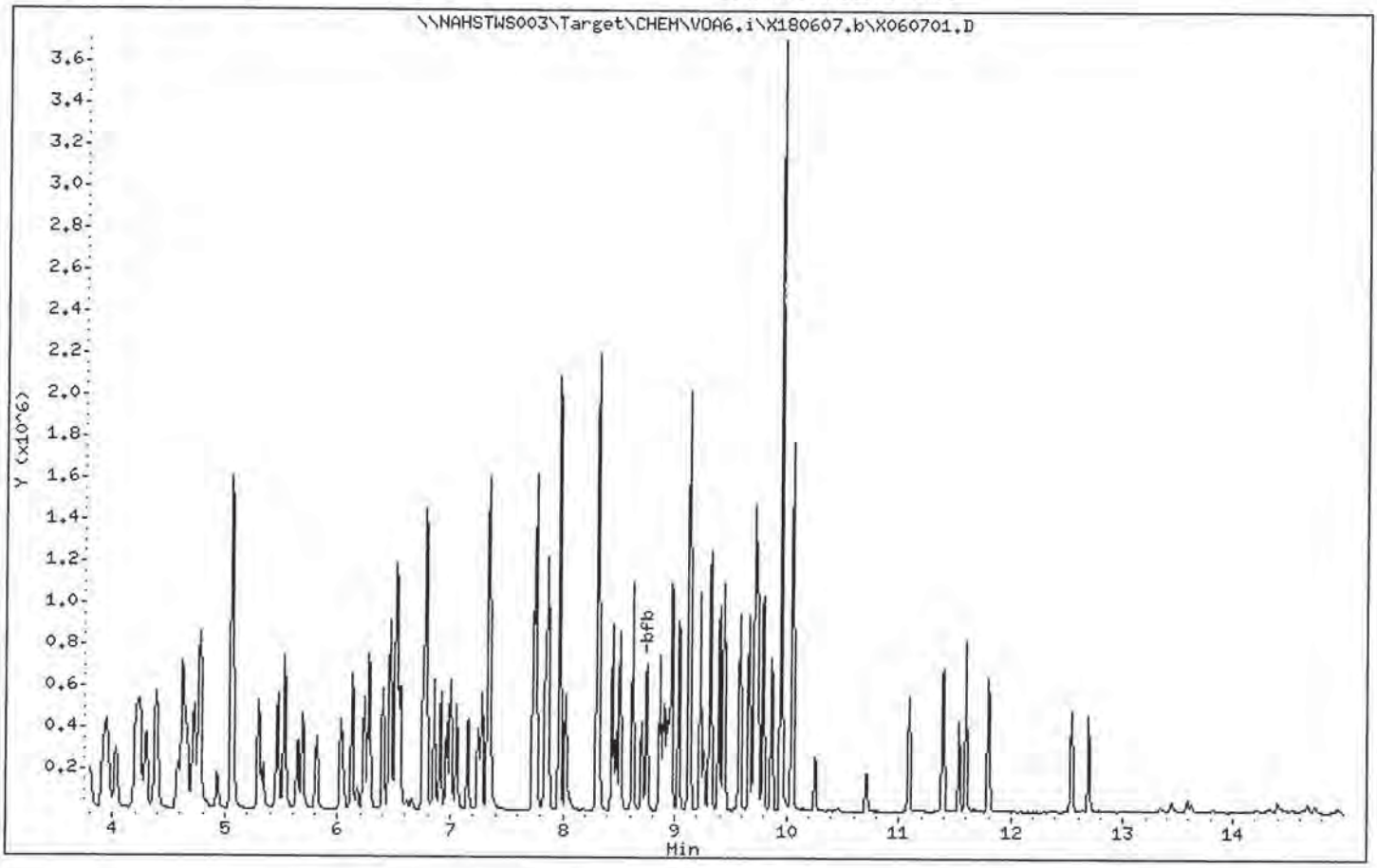
Sample Info: BFB;BFB;3;;BFB

Volume Injected (uL): 2.0

Operator: PC

Column phase: DB624

Column diameter: 0.25



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060702.D
Report Date: 12-Jun-2018 15:11

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060702.D
Lab Smp Id: VSTD050 Client Smp ID: VSTD050
Inj Date : 07-JUN-2018 10:34
Operator : PC Inst ID: voa6.i
Smp Info : VSTD050;VSTD050;2;;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\8260W.m
Meth Date : 12-Jun-2018 15:11 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 3 Continuing Calibration Sample
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	298975	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	447475	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	460254	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	249316	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	138385	50.0000	50.20
$ 35 1,2-Dichloroethane-d4	65	4.576	4.576	(1.065)	140116	50.0000	50.30
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	529937	50.0000	47.70
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	196521	50.0000	49.31
60 1,1,1,2-Tetrachloroethane	131	7.843	7.843	(1.014)	160145	50.0000	44.43
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	206925	50.0000	49.76
68 1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.915)	217498	50.0000	52.45
138 Freon TF	101	1.997	1.997	(0.465)	112070	50.0000	47.84
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	130020	50.0000	46.30
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	272013	50.0000	53.50
11 1,1-Dichloroethene	96	1.997	1.997	(0.465)	130450	50.0000	47.60
32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	195100	50.0000	45.89
93 1,2,3-Trichlorobenzene	180	11.797	11.797	(1.214)	191371	50.0000	48.32
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	186622	50.0000	50.44(M)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	207724	50.0000	46.85
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	518601	50.0000	45.48
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	40292	50.0000	55.36
57 1,2-Dibromoethane	107	7.327	7.327	(0.947)	168472	50.0000	47.52

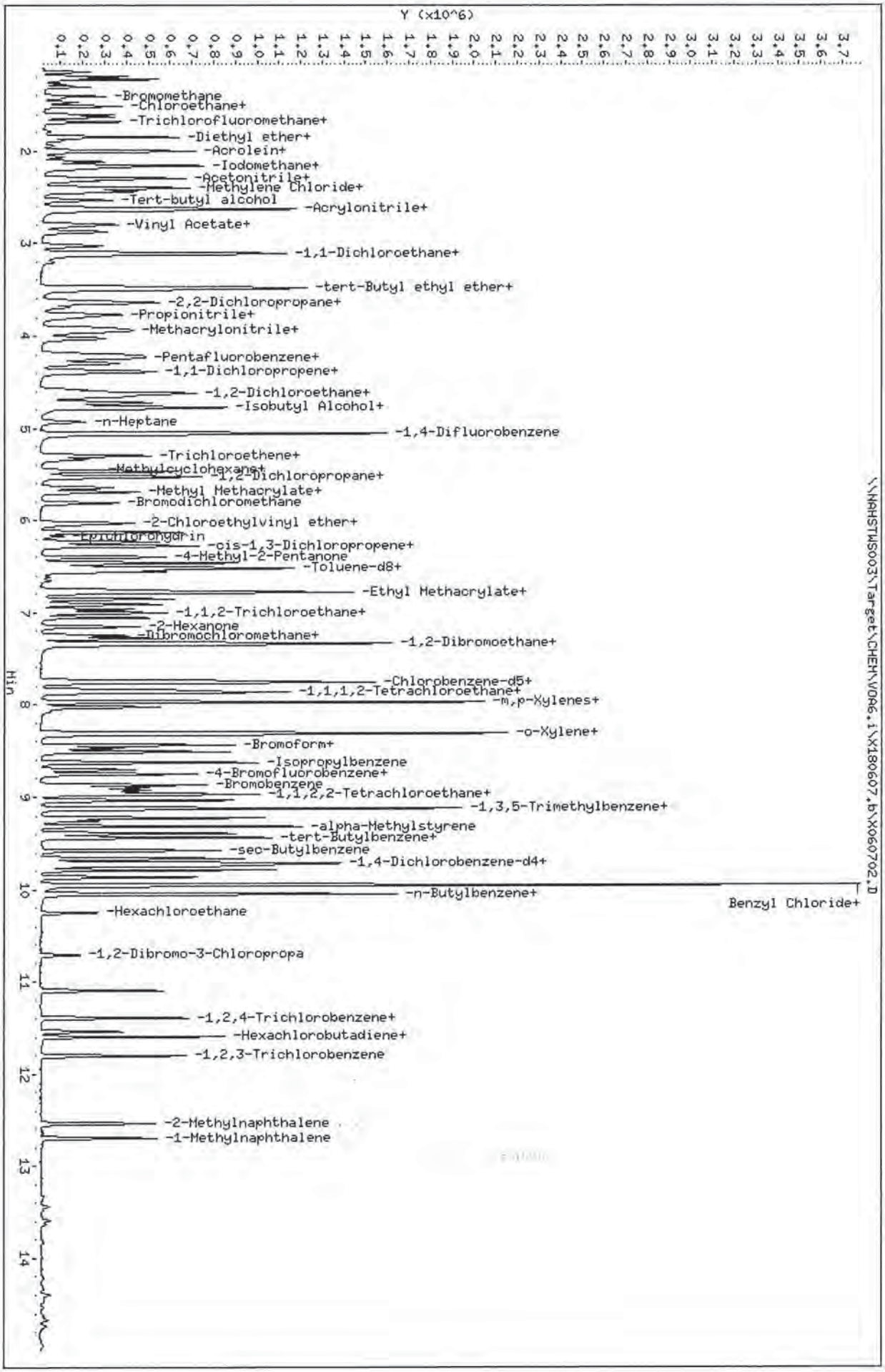
Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060702.D
Report Date: 12-Jun-2018 15:11

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	323573	50.0000	47.69
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	192314	50.0000	50.40
42	1,2-Dichloropropane	63	5.522	5.522	(1.091)	167348	50.0000	49.69
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	488303	50.0000	44.49
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	336236	50.0000	46.86
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	267004	50.0000	50.39
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	341636	50.0000	46.73
26	2,2-Dichloropropane	77	3.623	3.623	(0.843)	202986	50.0000	53.64
24	2-Butanone	43	3.688	3.688	(0.858)	152233	100.000	119.31(M)
76	2-Chlorotoluene	91	9.032	9.032	(0.929)	434211	50.0000	45.43
52	2-Hexanone	43	7.155	7.155	(0.925)	241363	100.000	106.83
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	508358	50.0000	46.81
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	466848	50.0000	40.12
45	4-Methyl-2-Pentanone	43	6.396	6.396	(0.827)	347919	100.000	102.46
10	Acetone	43	2.062	2.062	(0.480)	96889	100.000	117.74
37	Benzene	78	4.619	4.619	(0.912)	621846	50.0000	47.23
74	Bromobenzene	156	8.867	8.867	(0.912)	199416	50.0000	47.13
29	Bromochloromethane	128	3.917	3.917	(0.912)	86173	50.0000	49.84
39	Bromodichloromethane	83	5.808	5.808	(1.147)	207451	50.0000	48.50
66	Bromoform	173	8.473	8.473	(1.095)	148083	50.0000	51.47
6	Bromomethane	94	1.410	1.410	(0.328)	98139	50.0000	53.43
19	Carbon Disulfide	76	2.162	2.162	(0.503)	934840	100.000	94.06
34	Carbon Tetrachloride	117	4.376	4.376	(0.864)	177698	50.0000	43.87
59	Chlorobenzene	112	7.757	7.757	(1.003)	440284	50.0000	44.75
7	Chloroethane	64	1.475	1.475	(0.343)	104464	50.0000	57.12
28	Chloroform	83	4.032	4.032	(0.936)	262296	50.0000	49.25
3	Chloromethane	50	1.138	1.138	(0.265)	158637	50.0000	55.57
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	181314	50.0000	50.04
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	285516	50.0000	50.27
55	Dibromochloromethane	129	7.248	7.248	(0.937)	188390	50.0000	49.89
44	Dibromomethane	93	5.643	5.643	(1.115)	109261	50.0000	54.01
2	Dichlorodifluoromethane	85	1.030	1.030	(0.240)	142262	50.0000	43.47
61	Ethylbenzene	106	7.864	7.864	(1.017)	216539	50.0000	43.88
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	69878	50.0000	44.57
67	Isopropylbenzene	105	8.623	8.623	(1.115)	574849	50.0000	41.02
62	m,p-Xylenes	106	7.964	7.964	(1.030)	532478	100.000	86.41
17	Methylene Chloride	84	2.399	2.399	(0.558)	168528	50.0000	53.03
87	n-Butylbenzene	91	10.049	10.049	(1.034)	362055	50.0000	43.94
73	n-Propylbenzene	91	8.974	8.974	(0.923)	701631	50.0000	41.16(M)
92	Naphthalene	128	11.596	11.596	(1.193)	549575	50.0000	56.69
63	o-Xylene	106	8.301	8.301	(1.073)	269441	50.0000	44.31
81	sec-Butylbenzene	105	9.576	9.576	(0.985)	517693	50.0000	42.19
64	Styrene	104	8.322	8.322	(1.076)	475477	50.0000	45.49
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	399099	50.0000	43.41
56	Tetrachloroethene	164	6.997	6.997	(0.905)	124331	50.0000	40.82
50	Toluene	91	6.525	6.525	(0.844)	648231	50.0000	44.50
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	159680	50.0000	48.87
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	243243	50.0000	52.37
38	Trichloroethene	130	5.300	5.300	(1.047)	170364	50.0000	46.35
8	Trichlorofluoromethane	101	1.632	1.632	(0.380)	171005	50.0000	44.13
5	Vinyl Chloride	62	1.202	1.202	(0.280)	185015	50.0000	50.78

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060702.D
Report Date: 12-Jun-2018 15:11

QC Flag Legend

M - Compound response manually integrated.



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060702.D
Date : 07-JUN-2018 10:34
Client ID: VSTD050
Sample Info: VSTD050;VSTD050;2;;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18

\\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060702.D

00905596

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060703.D
Report Date: 12-Jun-2018 15:11

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060703.D
Lab Smp Id: VLCSW-180607 Client Smp ID: VLCSW-180607
Inj Date : 07-JUN-2018 10:58
Operator : PC Inst ID: voa6.i
Smp Info : VLCSW-180607;VLCSW-180607;3;;LCS
Misc Info : HS16030331;WATER;0;1;
Comment :
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Meth Date : 12-Jun-2018 15:11 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 4 QC Sample: LCS
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	289942	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	436764	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	450131	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	243281	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	137957	51.5961	51.59
$ 35 1,2-Dichloroethane-d4	65	4.576	4.576	(1.065)	137221	50.8003	50.80
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	524679	48.2939	48.29
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	192745	49.4530	49.45
60 1,1,1,2-Tetrachloroethane	131	7.842	7.843	(1.014)	158086	44.8470	44.84
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	202562	50.2326	50.23
68 1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.915)	216217	53.4507	53.45
138 Freon TF	101	1.997	1.997	(0.465)	110623	48.6751	48.67
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	130625	47.5675	47.56
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	263712	53.4873	53.48
11 1,1-Dichloroethene	96	1.997	1.997	(0.465)	127812	48.0954	48.09
32 1,1-Dichloropropene	75	4.390	4.390	(0.857)	190439	45.8957	45.89
93 1,2,3-Trichlorobenzene	180	11.796	11.797	(1.214)	192049	49.6962	49.69
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	185833	51.4811	51.48(M)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	207425	47.9531	47.95
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	496154	44.5983	44.59
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	40406	56.8957	56.89
57 1,2-Dibromoethane	107	7.327	7.327	(0.947)	165913	47.8553	47.85

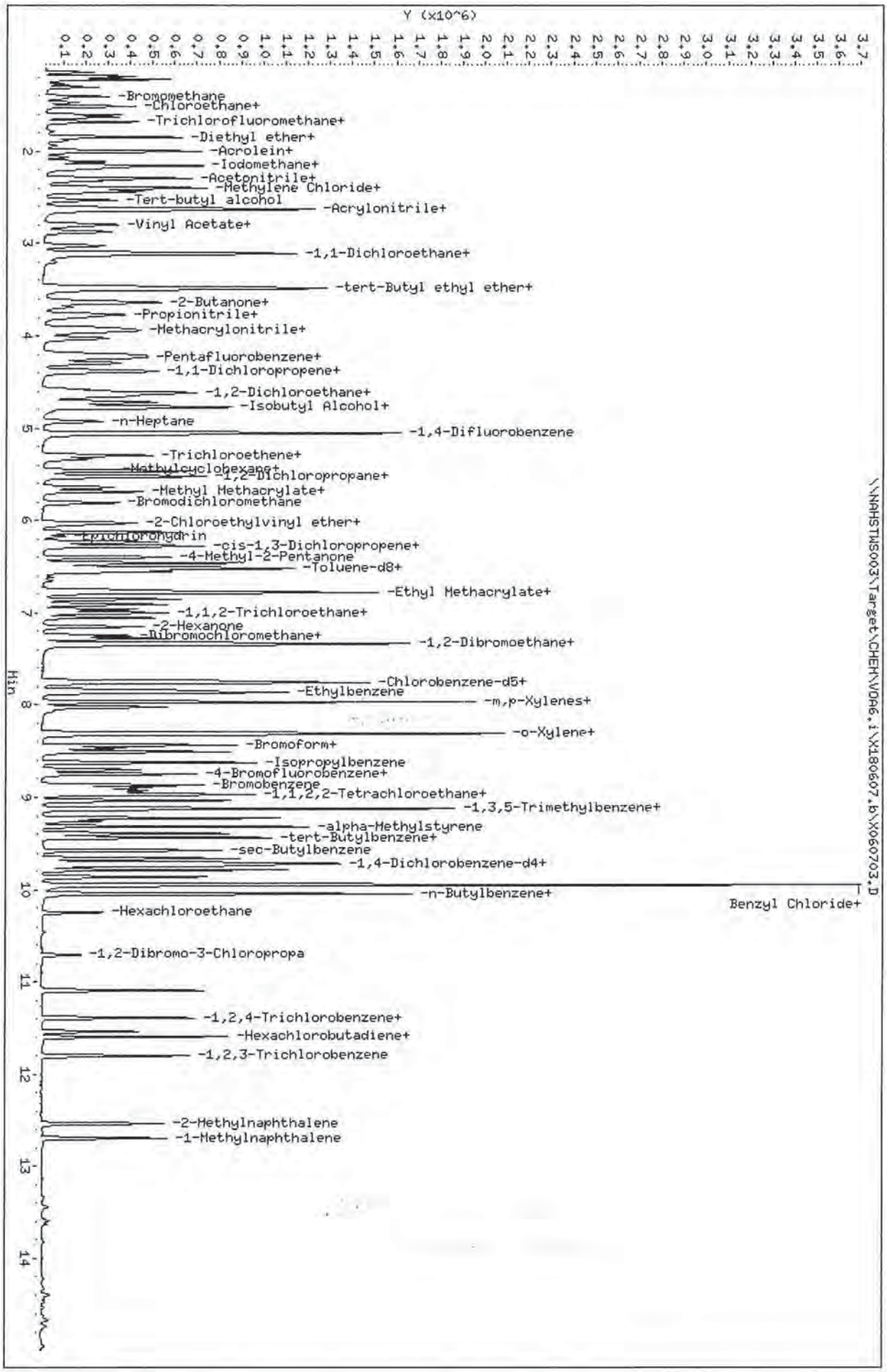
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Report Date: 12-Jun-2018 15:11

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	316038	47.7395	47.73
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	188384	50.5814	50.58
42	1,2-Dichloropropane	63	5.522	5.522	(1.091)	164434	50.0234	50.02
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	469695	43.8606	43.86
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	320603	45.7998	45.79
54	1,3-Dichloropropane	76	7.054	7.055	(0.912)	268117	51.7582	51.75
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	331137	46.4201	46.42
26	2,2-Dichloropropane	77	3.623	3.623	(0.843)	202427	55.1730	55.17
24	2-Butanone	43	3.688	3.688	(0.858)	151928	122.781	122.78
76	2-Chlorotoluene	91	9.031	9.032	(0.929)	420596	45.0964	45.09
52	2-Hexanone	43	7.155	7.155	(0.925)	239222	108.272	108.27
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	489477	46.1937	46.19
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	461593	40.6598	40.65
45	4-Methyl-2-Pentanone	43	6.403	6.396	(0.828)	346087	104.221	104.22
10	Acetone	43	2.062	2.062	(0.480)	96162	120.519	120.51
37	Benzene	78	4.619	4.619	(0.912)	609380	47.4281	47.42
74	Bromobenzene	156	8.867	8.867	(0.912)	198006	47.9683	47.96
29	Bromochloromethane	128	3.917	3.917	(0.912)	85200	50.8146	50.81
39	Bromodichloromethane	83	5.808	5.808	(1.147)	205322	49.1874	49.18
66	Bromoform	173	8.473	8.473	(1.095)	146081	51.9225	51.92
6	Bromomethane	94	1.403	1.410	(0.327)	95881	53.8155	53.81
19	Carbon Disulfide	76	2.162	2.162	(0.503)	918774	95.3249	95.32
34	Carbon Tetrachloride	117	4.375	4.376	(0.864)	173593	43.9082	43.90
59	Chlorobenzene	112	7.756	7.757	(1.003)	433105	45.0199	45.01
7	Chloroethane	64	1.474	1.475	(0.343)	102460	57.7709	57.77
28	Chloroform	83	4.024	4.032	(0.937)	257785	49.9144	49.91
3	Chloromethane	50	1.138	1.138	(0.265)	158584	57.2153	57.21
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	176812	50.3250	50.32
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	278855	50.3068	50.30
55	Dibromochloromethane	129	7.248	7.248	(0.937)	186451	50.4958	50.49
44	Dibromomethane	93	5.636	5.643	(1.113)	106946	54.1644	54.16
2	Dichlorodifluoromethane	85	1.030	1.030	(0.240)	141841	44.6974	44.69
61	Ethylbenzene	106	7.864	7.864	(1.017)	208021	43.1109	43.11
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	81337	53.0160	53.01
67	Isopropylbenzene	105	8.623	8.623	(1.115)	555068	40.5031	40.50
62	m,p-Xylenes	106	7.964	7.964	(1.030)	512184	84.9888	84.98
17	Methylene Chloride	84	2.398	2.399	(0.558)	167762	54.4381	54.43
87	n-Butylbenzene	91	10.049	10.049	(1.034)	366141	45.5467	45.54
73	n-Propylbenzene	91	8.974	8.974	(0.923)	663006	39.8634	39.86
92	Naphthalene	128	11.596	11.596	(1.193)	545835	57.7083	57.70
63	o-Xylene	106	8.301	8.301	(1.073)	259160	43.5820	43.58
81	sec-Butylbenzene	105	9.576	9.576	(0.985)	515986	43.0974	43.09
64	Styrene	104	8.322	8.322	(1.076)	463058	45.3062	45.30
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	383278	42.7273	42.72
56	Tetrachloroethene	164	6.997	6.997	(0.905)	121175	40.6844	40.68
50	Toluene	91	6.524	6.525	(0.844)	631279	44.3151	44.31
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	156852	49.5039	49.50
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	239403	52.8165	52.81
38	Trichloroethene	130	5.300	5.300	(1.047)	167854	46.7905	46.79
8	Trichlorofluoromethane	101	1.632	1.632	(0.380)	182919	48.6837	48.68
5	Vinyl Chloride	62	1.202	1.202	(0.280)	180651	51.1360	51.13

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060703.D
Report Date: 12-Jun-2018 15:11

QC Flag Legend

M - Compound response manually integrated.



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060703.D
Date : 07-JUN-2018 10:58
Client ID: VLCSW-180607
Sample Info: VLCSW-180607;VLCSW-180607;3;;LCS
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18

00905600

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060706.D
Report Date: 12-Jun-2018 15:11

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060706.D
Lab Smp Id: VBLKW-180607 Client Smp ID: VBLKW-180607
Inj Date : 07-JUN-2018 12:13
Operator : PC Inst ID: voa6.i
Smp Info : VBLKW-180607;VBLKW-180607;3;;BLANK
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\8260W.m
Meth Date : 12-Jun-2018 15:11 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 6 QC Sample: BLANK
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

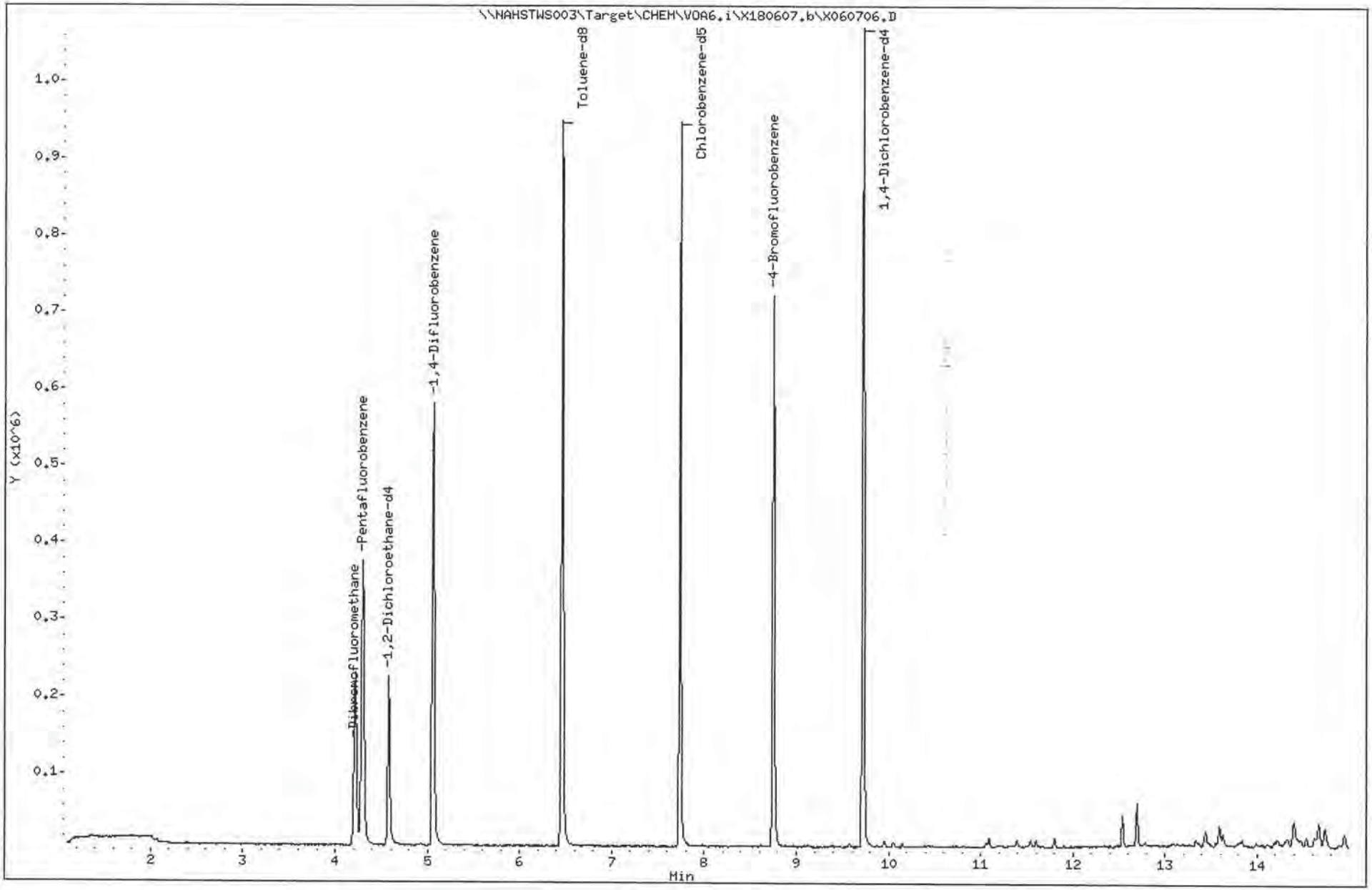
Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	307968	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	469798	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	474908	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	253611	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	145748	51.3214	51.32
$ 35 1,2-Dichloroethane-d4	65	4.583	4.576	(1.067)	148520	51.7587	51.75
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	553295	48.2709	48.27
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	210320	51.1368	51.13

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060706.D
Date : 07-JUN-2018 12:13
Client ID: VBLKW-180607
Sample Info: VBLKW-180607;VBLKW-180607;3;;BLANK
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060708.D
Report Date: 12-Jun-2018 15:11

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060708.D
Lab Smp Id: HS18051472-02 Client Smp ID: HS18051472-02
Inj Date : 07-JUN-2018 13:02
Operator : PC Inst ID: voa6.i
Smp Info : HS18051472-02;HS18051472-02;;;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\8260W.m
Meth Date : 12-Jun-2018 15:11 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 8
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

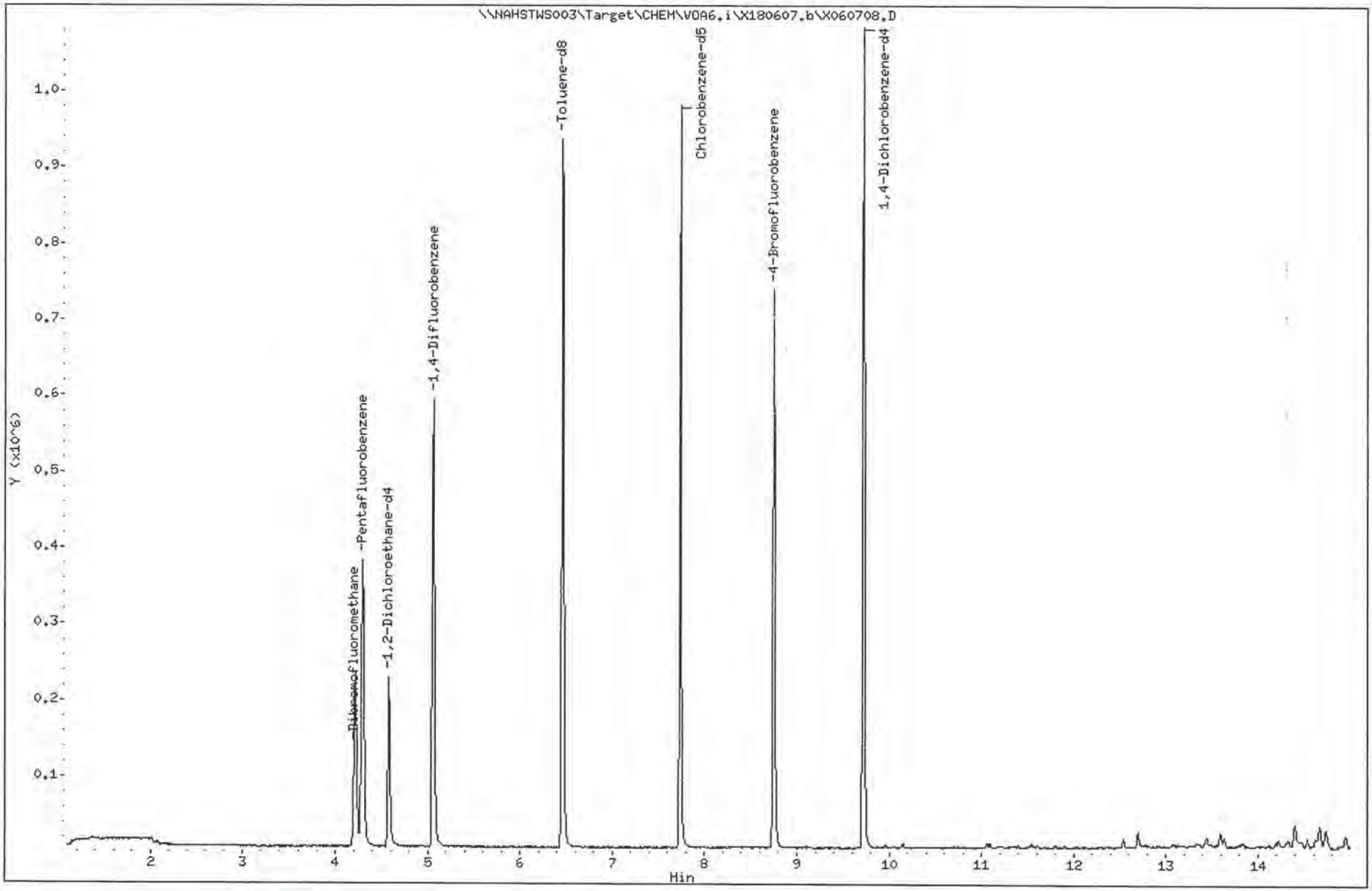
Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
*	1 Pentafluorobenzene	168	4.297	4.297	(1.000)	309593	50.0000	
*	36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	479597	50.0000	
*	47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	483561	50.0000	
*	70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	263345	50.0000	
$	30 Dibromofluoromethane	113	4.218	4.218	(0.982)	147470	51.6527	51.65
$	35 1,2-Dichloroethane-d4	65	4.583	4.576	(1.067)	149446	51.8077	51.80
$	48 Toluene-d8	98	6.460	6.460	(0.835)	566200	48.5117	48.51
$	69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	212279	50.6921	50.69

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060708.D
Date : 07-JUN-2018 13:02
Client ID: HS18051472-02
Sample Info: HS18051472-02;HS18051472-02;;;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060712.D
Report Date: 12-Jun-2018 15:11

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060712.D
Lab Smp Id: HS18051472-01 Client Smp ID: HS18051472-01
Inj Date : 07-JUN-2018 14:40
Operator : PC Inst ID: voa6.i
Smp Info : HS18051472-01;HS18051472-01;;;
Misc Info : HS16030331;WATER;0;5;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\8260W.m
Meth Date : 12-Jun-2018 15:11 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 12
Dil Factor: 5.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	5.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

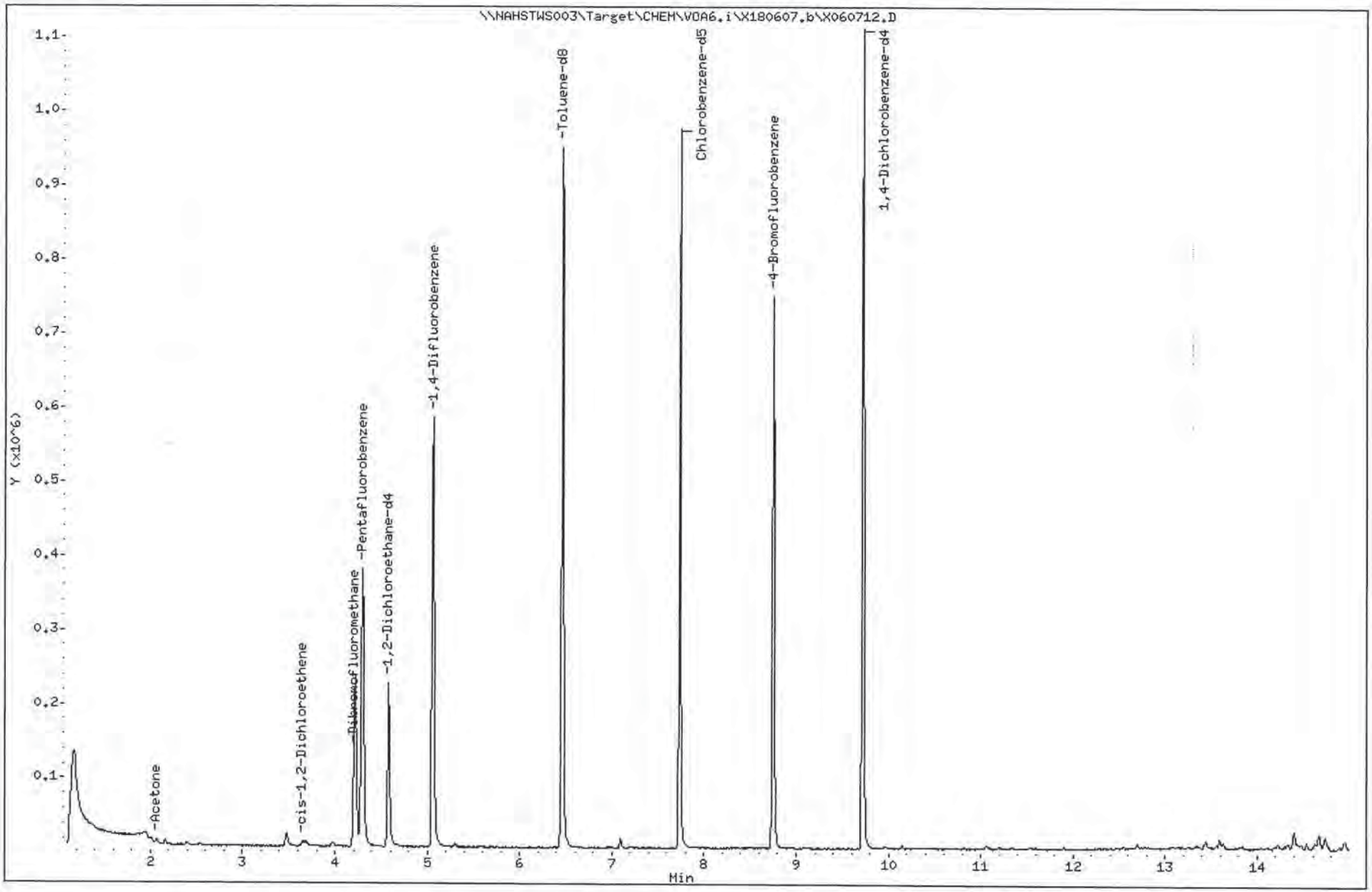
	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
*	1 Pentafluorobenzene	168	4.297	4.297	(1.000)	309438	50.0000	
*	36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	473189	50.0000	
*	47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	485367	50.0000	
*	70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	267309	50.0000	
$	30 Dibromofluoromethane	113	4.218	4.218	(0.982)	148020	51.8697	51.86
$	35 1,2-Dichloroethane-d4	65	4.583	4.576	(1.067)	150244	52.1085	52.10
$	48 Toluene-d8	98	6.460	6.460	(0.835)	559580	47.7697	47.76
$	69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	211973	50.4322	50.43
	10 Acetone	43	2.062	2.062	(0.480)	6413	6.94708	34.73
	27 cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	3165	0.84408	4.22(a)

QC Flag Legend

a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060712.D
Date : 07-JUN-2018 14:40
Client ID: HS18051472-01
Sample Info: HS18051472-01;HS18051472-01;;;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060712.D

Date : 07-JUN-2018 14:40

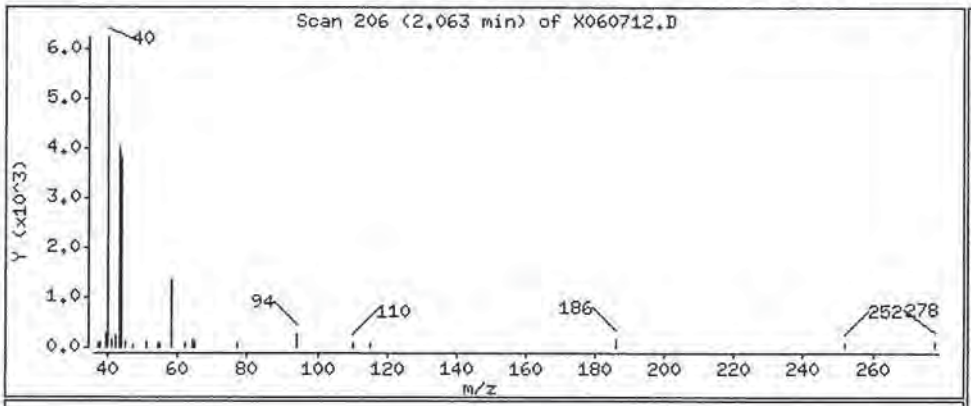
Client ID: HS18051472-01 Instrument: voa6.i

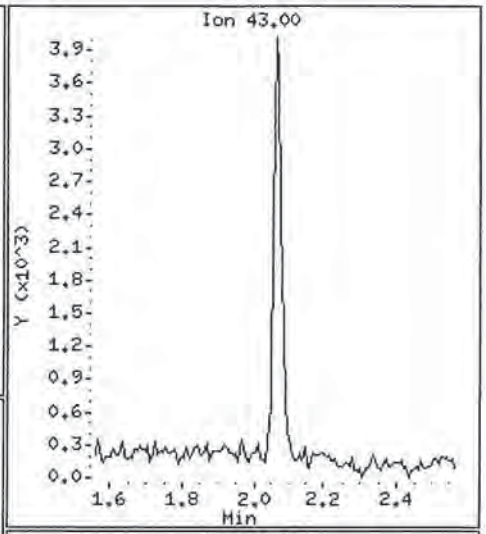
Sample Info: HS18051472-01;HS18051472-01;;;

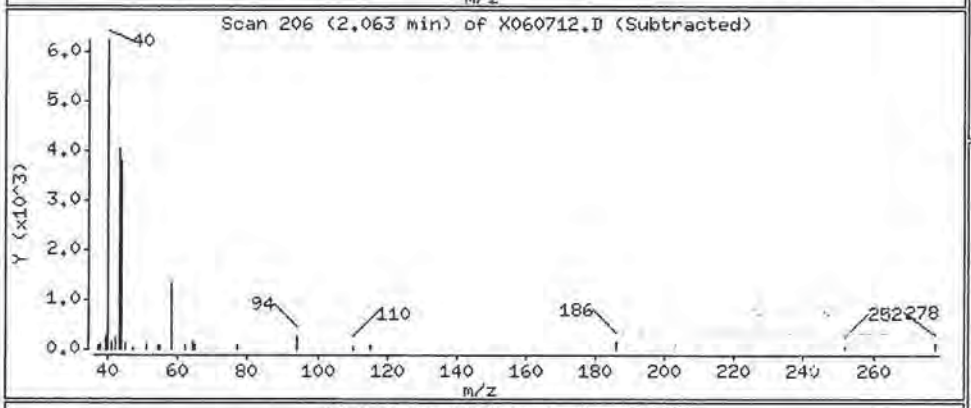
Purge Volume: 5.0 Operator: PC

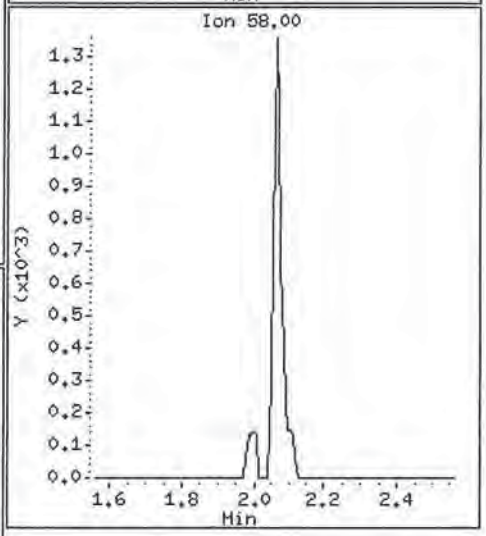
Column phase: DB624 Column diameter: 0.18

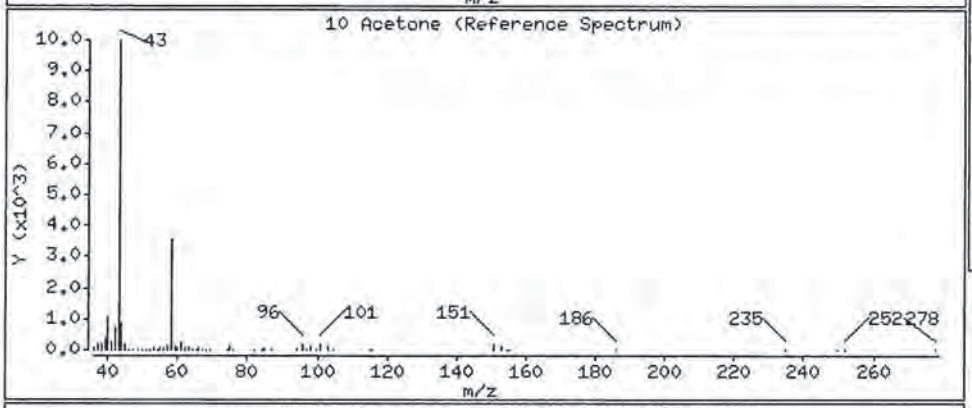
10 Acetone Concentration: 34.73 ug/l Review Code:

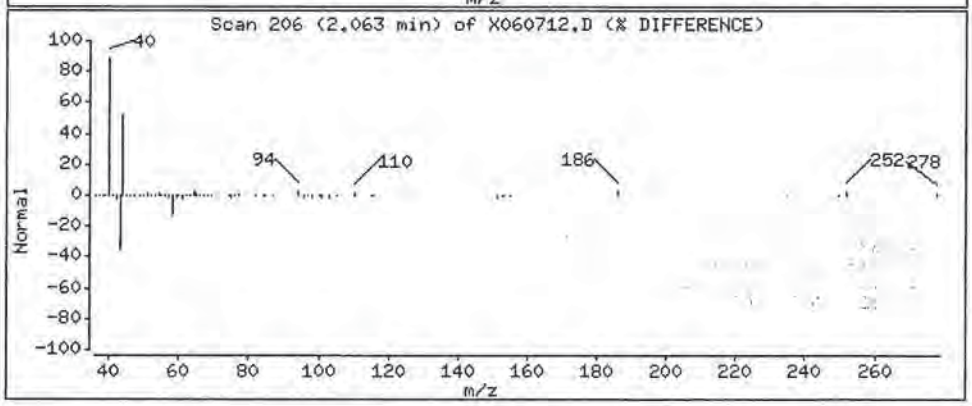












Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060712.D

Date : 07-JUN-2018 14:40

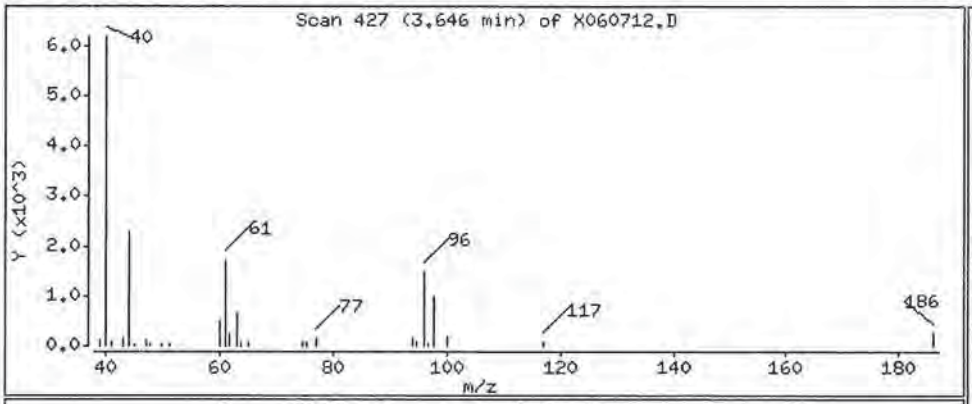
Client ID: HS18051472-01 Instrument: voa6.i

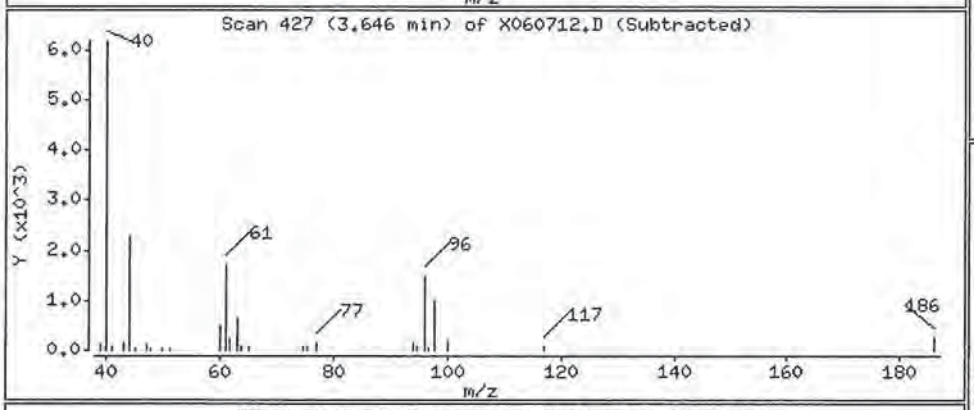
Sample Info: HS18051472-01;HS18051472-01;;;

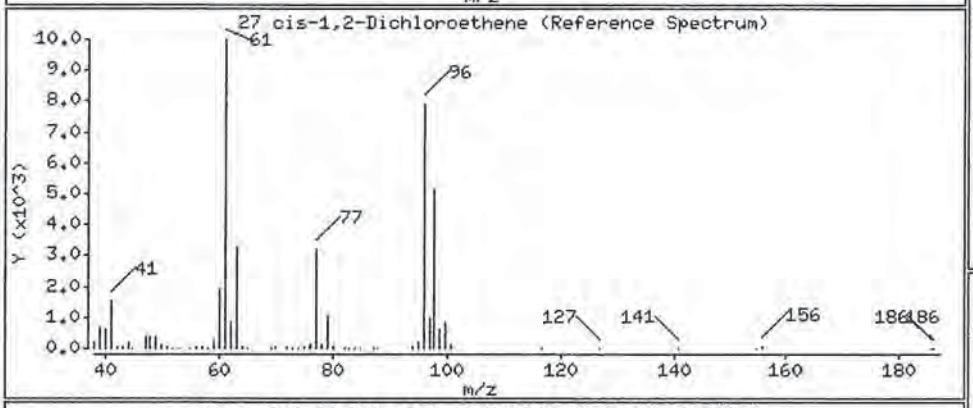
Purge Volume: 5.0 Operator: PC

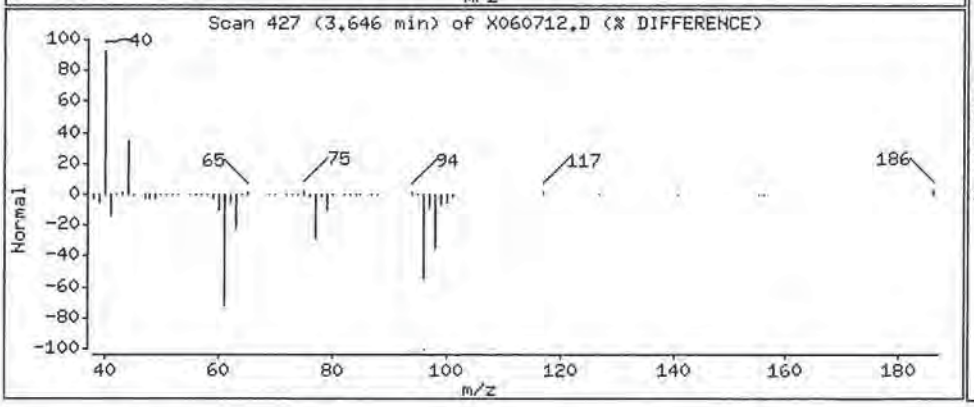
Column phase: DB624 Column diameter: 0.18

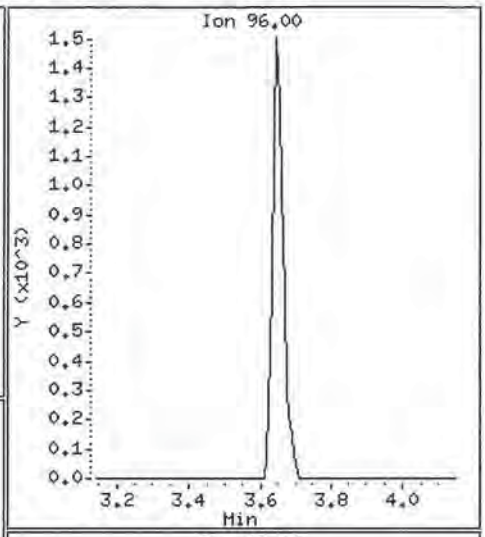
27 cis-1,2-Dichloroethene Concentration: 4.22 ug/l Review Code:

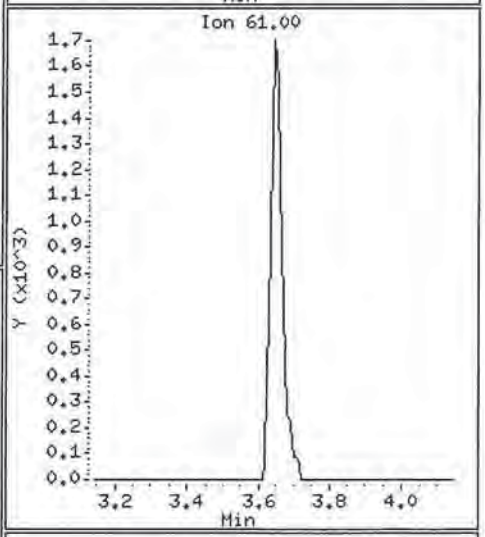


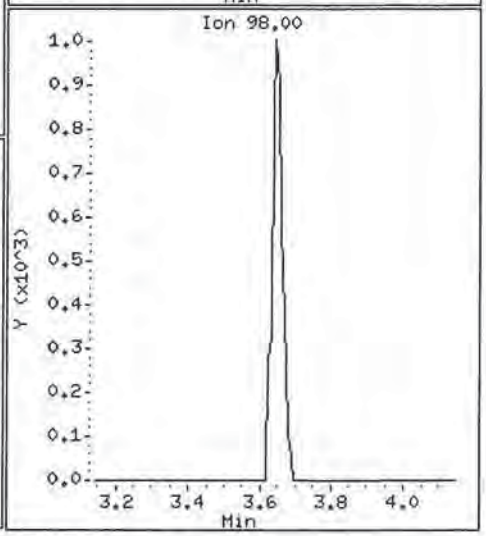












Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060714.D
Report Date: 12-Jun-2018 15:11

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060714.D
Lab Smp Id: HS18051491-01MS Client Smp ID: HS18051491-01MS
Inj Date : 07-JUN-2018 15:29
Operator : PC Inst ID: voa6.i
Smp Info : HS18051491-01MS;HS18051491-01MS;3;;MS
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\8260W.m
Meth Date : 12-Jun-2018 15:11 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 14 QC Sample: MS
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo) * 1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	304929	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	463178	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	471691	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	254389	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	142752	50.7714	50.77
$ 35 1,2-Dichloroethane-d4	65	4.583	4.576	(1.067)	142187	50.0562	50.05
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	545783	47.9419	47.94
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	202784	49.6494	49.64
60 1,1,1,2-Tetrachloroethane	131	7.842	7.843	(1.014)	161519	43.7266	43.72
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.979)	200662	47.3404	47.34
68 1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.935)	228550	54.0383	54.03
138 Freon TF	101	2.005	1.997	(0.467)	100791	42.3295	42.32
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	136168	47.3195	47.31
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	269777	52.0266	52.02
11 1,1-Dichloroethene	96	1.997	1.997	(0.465)	120674	43.1775	43.17
32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	184121	41.8426	41.84
93 1,2,3-Trichlorobenzene	180	11.796	11.797	(1.214)	162927	40.3194	40.31
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	196842	52.1498	52.14(M)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	180842	39.9820	39.98
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	495631	42.6015	42.60
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	40983	55.1894	55.18
57 1,2-Dibromoethane	107	7.334	7.327	(0.948)	175336	48.2616	48.26

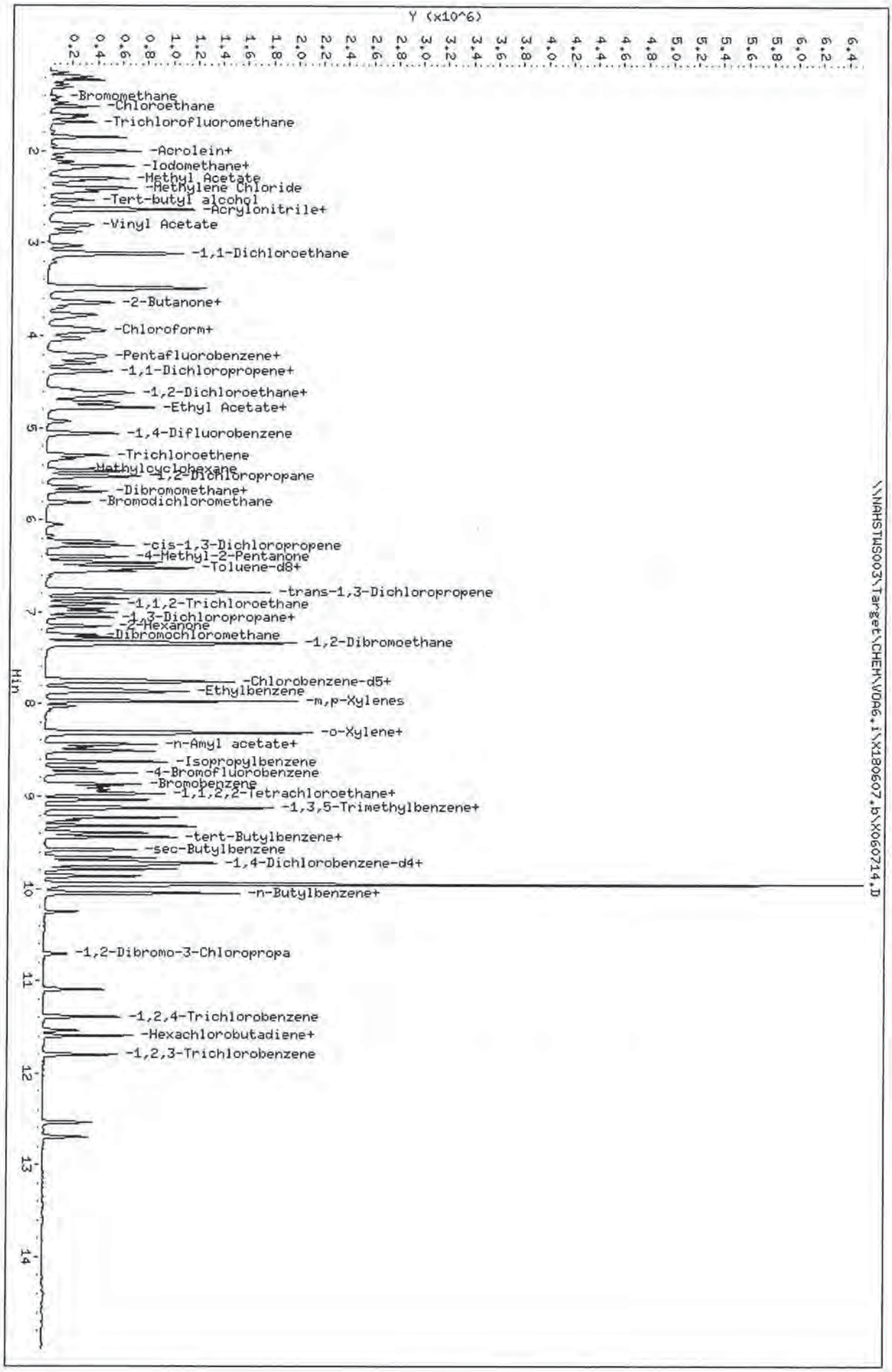
Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060714.D
Report Date: 12-Jun-2018 15:11

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	314405	45.3888	45.38
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	196091	49.6482	49.64
42	1,2-Dichloropropane	63	5.529	5.522	(1.092)	166158	47.6653	47.66
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	463917	41.4155	41.41
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	324777	44.3724	44.37
54	1,3-Dichloropropane	76	7.054	7.055	(0.912)	276796	50.9850	50.98
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	332012	44.5099	44.50
26	2,2-Dichloropropane	77	3.631	3.623	(0.845)	190212	49.2801	49.28
24	2-Butanone	43	3.695	3.688	(0.860)	163924	125.964	125.96
76	2-Chlorotoluene	91	9.031	9.032	(0.929)	422077	43.2652	43.26
52	2-Hexanone	43	7.155	7.155	(0.925)	265688	114.754	114.75
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	490575	44.2640	44.26
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	429100	36.1472	36.14
45	4-Methyl-2-Pentanone	43	6.403	6.396	(0.828)	380450	109.332	109.33
10	Acetone	43	2.062	2.062	(0.480)	100913	120.255	120.25
37	Benzene	78	4.619	4.619	(0.912)	607667	44.5977	44.59
74	Bromobenzene	156	8.867	8.867	(0.912)	201826	46.7532	46.75
29	Bromochloromethane	128	3.917	3.917	(0.912)	82334	46.6918	46.69
39	Bromodichloromethane	83	5.808	5.808	(1.147)	208714	47.1486	47.14
66	Bromoform	173	8.473	8.473	(1.095)	152942	51.8766	51.87
6	Bromomethane	94	1.410	1.410	(0.328)	36934	21.1415	21.14
19	Carbon Disulfide	76	2.162	2.162	(0.503)	832536	82.1321	82.13
34	Carbon Tetrachloride	117	4.375	4.376	(0.864)	175299	41.8111	41.81
59	Chlorobenzene	112	7.764	7.757	(1.004)	438031	43.4508	43.45
7	Chloroethane	64	1.474	1.475	(0.343)	106867	57.2968	57.29
28	Chloroform	83	4.032	4.032	(0.938)	263415	48.4977	48.49
3	Chloromethane	50	1.145	1.138	(0.267)	110152	38.2858	38.28
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	179421	48.5576	48.55
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	281721	47.9255	47.92
55	Dibromochloromethane	129	7.248	7.248	(0.937)	192895	49.8532	49.85
44	Dibromomethane	93	5.643	5.643	(1.115)	111079	53.0521	53.05
2	Dichlorodifluoromethane	85	1.030	1.030	(0.240)	97287	29.1506	29.15
61	Ethylbenzene	106	7.864	7.864	(1.017)	213881	42.2994	42.29
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	51254	32.2685	32.26
67	Isopropylbenzene	105	8.623	8.623	(1.115)	550081	38.3045	38.30
62	m,p-Xylenes	106	7.964	7.964	(1.030)	516468	81.7825	81.78
17	Methylene Chloride	84	2.398	2.399	(0.558)	171579	52.9371	52.93
87	n-Butylbenzene	91	10.049	10.049	(1.034)	317498	37.7423	37.74
73	n-Propylbenzene	91	8.974	8.974	(0.923)	653909	37.5997	37.59
92	Naphthalene	128	11.596	11.596	(1.193)	488283	49.3694	49.36
63	o-Xylene	106	8.301	8.301	(1.073)	262393	42.1088	42.10
81	sec-Butylbenzene	105	9.583	9.576	(0.986)	475358	37.9891	37.98
64	Styrene	104	8.322	8.322	(1.076)	470125	43.8952	43.89
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	371574	39.6182	39.61
56	Tetrachloroethene	164	7.004	6.997	(0.906)	120719	38.6787	38.67
50	Toluene	91	6.524	6.525	(0.844)	634092	42.4780	42.47
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	154189	46.2716	46.27
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	245732	51.1212	51.12
38	Trichloroethene	130	5.300	5.300	(1.047)	165770	43.5744	43.57
8	Trichlorofluoromethane	101	1.639	1.632	(0.382)	149100	37.7324	37.73
5	Vinyl Chloride	62	1.202	1.202	(0.280)	155364	41.8166	41.81

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060714.D
Report Date: 12-Jun-2018 15:11

QC Flag Legend

M - Compound response manually integrated.


Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060714.D
Date : 07-JUN-2018 15:29
Client ID: HS18051491-01MS
Sample Info: HS18051491-01MS;HS18051491-01MS;3;;MS
Purge Volume: 5.0
Column phase: DB624
Instrument: voa6.i
Operator: PC
Column diameter: 0.18
\\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060714.D
Y (x10^6)
Min
-Bromomethane
-Chloroethane
-Trichlorofluoromethane
-Acrolein+
-Iodomethane+
-Methyl Acetate
-Methylene Chloride
-Tert-butyl alcohol
-Acrylonitrile+
-Vinyl Acetate
-1,1-Dichloroethane
-2-Butanone+
-Chloroform+
-Pentafluorobenzene+
-1,1-Dichloropropene+
-1,2-Dichloroethane+
-Ethyl Acetate+
-1,4-Difluorobenzene
-Trichloroethene
-Methylcyclohexane
-1,2-Dichloropropane
-Dibromomethane+
-Bromodichloromethane
-cis-1,3-Dichloropropene
-4-Methyl-2-Pentanone
-Toluene-d8+
-trans-1,3-Dichloropropene
-1,1,2-Trichloroethane
-1,3-Dichloropropane+
-2-Hexanone
-Dibromochloromethane
-1,2-Dibromoethane
-Chlorobenzene-d5+
-Ethylbenzene
-m,p-Xylenes
-o-Xylene+
-n-Amyl acetate+
-Isopropylbenzene
-4-Bromofluorobenzene
-Bromobenzene
-1,1,2,2-Tetrachloroethane+
-1,3,5-Trimethylbenzene+
-tert-Butylbenzene+
-sec-Butylbenzene
-1,4-Dichlorobenzene-d4+
-n-Butylbenzene+
-1,2-Dibromo-3-Chloropropa
-1,2,4-Trichlorobenzene
-Hexachlorobutadiene+
-1,2,3-Trichlorobenzene

00905612

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060715.D
Report Date: 12-Jun-2018 15:11

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060715.D
Lab Smp Id: HS18051491-01MSD Client Smp ID: HS18051491-01MSD
Inj Date : 07-JUN-2018 15:54
Operator : PC Inst ID: voa6.i
Smp Info : HS18051491-01MSD;HS18051491-01MSD;3;;MSD
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\8260W.m
Meth Date : 12-Jun-2018 15:11 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 15 QC Sample: MSD
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
*	1 Pentafluorobenzene	168	4.297	4.297	(1.000)	300706	50.0000	
*	36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	460835	50.0000	
*	47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	467409	50.0000	
*	70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	262587	50.0000	
$	30 Dibromofluoromethane	113	4.218	4.218	(0.982)	142811	51.5003	51.50
$	35 1,2-Dichloroethane-d4	65	4.583	4.576	(1.067)	142247	50.7761	50.77
$	48 Toluene-d8	98	6.460	6.460	(0.835)	540916	47.9496	47.94
$	69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	204687	50.5689	50.56
	60 1,1,1,2-Tetrachloroethane	131	7.843	7.843	(1.014)	159148	43.4794	43.47
	31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	203758	48.7333	48.73
	68 1,1,2,2-Tetrachloroethane	83	8.896	8.895	(0.915)	231194	52.9460	52.94
	138 Freon TF	101	2.005	1.997	(0.467)	105708	44.9418	44.94
	53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	133801	46.9229	46.92
	22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	263794	51.5868	51.58
	11 1,1-Dichloroethene	96	1.998	1.997	(0.465)	123899	44.9540	44.95
	32 1,1-Dichloropropene	75	4.397	4.390	(0.868)	189108	43.1944	43.19
	93 1,2,3-Trichlorobenzene	180	11.797	11.797	(1.214)	191582	45.9305	45.93
	71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	199714	51.2588	51.25(M)
	90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	208660	44.6920	44.69
	79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	519466	43.2577	43.25
	89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	43605	56.8859	56.88
	57 1,2-Dibromoethane	107	7.334	7.327	(0.948)	173210	48.1132	48.11

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060715.D
Report Date: 12-Jun-2018 15:11

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS ON-COLUMN (ug/l)	CONCENTRATIONS FINAL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	325535	45.5303	45.53
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	188557	47.9834	47.98
42	1,2-Dichloropropane	63	5.529	5.522	(1.092)	163594	47.1683	47.16
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	488017	42.2116	42.21
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	332213	43.9719	43.97
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	272574	50.6646	50.66
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	340554	44.2296	44.22
26	2,2-Dichloropropane	77	3.631	3.623	(0.845)	190609	50.0789	50.07
24	2-Butanone	43	3.695	3.688	(0.860)	163981	127.778	127.77
76	2-Chlorotoluene	91	9.032	9.032	(0.929)	432757	42.9727	42.97
52	2-Hexanone	43	7.155	7.155	(0.925)	269364	117.408	117.40
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	505634	44.1980	44.19
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	466776	38.0934	38.09
45	4-Methyl-2-Pentanone	43	6.396	6.396	(0.827)	379785	110.141	110.14
10	Acetone	43	2.062	2.062	(0.480)	98474	118.990	118.99
37	Benzene	78	4.619	4.619	(0.912)	602267	44.4261	44.42
74	Bromobenzene	156	8.867	8.867	(0.912)	201748	45.2692	45.26
29	Bromochloromethane	128	3.917	3.917	(0.912)	78860	45.3497	45.34
39	Bromodichloromethane	83	5.808	5.808	(1.147)	207955	47.2160	47.21
66	Bromoform	173	8.473	8.473	(1.095)	152948	52.3523	52.35
6	Bromomethane	94	1.410	1.410	(0.328)	57173	31.9003	31.90
19	Carbon Disulfide	76	2.162	2.162	(0.503)	838659	83.8981	83.89
34	Carbon Tetrachloride	117	4.383	4.376	(0.866)	175110	41.9784	41.97
59	Chlorobenzene	112	7.757	7.757	(1.003)	431193	43.1643	43.16
7	Chloroethane	64	1.475	1.475	(0.343)	94126	51.2018	51.20
28	Chloroform	83	4.032	4.032	(0.938)	256188	47.8295	47.82
3	Chloromethane	50	1.145	1.138	(0.267)	107245	37.8087	37.80
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	176371	48.4025	48.40
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	278668	47.6471	47.64
55	Dibromochloromethane	129	7.248	7.248	(0.937)	190094	49.5794	49.57
44	Dibromomethane	93	5.644	5.643	(1.115)	110321	52.9582	52.95
2	Dichlorodifluoromethane	85	1.031	1.030	(0.240)	98783	30.0145	30.01
61	Ethylbenzene	106	7.864	7.864	(1.017)	214597	42.8298	42.82
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	58026	35.3136	35.31
67	Isopropylbenzene	105	8.623	8.623	(1.115)	577062	40.5515	40.55
62	m,p-Xylenes	106	7.964	7.964	(1.030)	525863	84.0331	84.03
17	Methylene Chloride	84	2.399	2.399	(0.558)	166216	52.0007	52.00
87	n-Butylbenzene	91	10.049	10.049	(1.034)	348059	40.0939	40.09
73	n-Propylbenzene	91	8.974	8.974	(0.923)	692461	38.5734	38.57
92	Naphthalene	128	11.596	11.596	(1.193)	577087	56.5266	56.52
63	o-Xylene	106	8.301	8.301	(1.073)	267022	43.2442	43.24
81	sec-Butylbenzene	105	9.576	9.576	(0.985)	516627	39.9898	39.98
64	Styrene	104	8.323	8.322	(1.076)	471841	44.4590	44.45
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	404079	41.7357	41.73
56	Tetrachloroethene	164	7.005	6.997	(0.906)	123315	39.8724	39.87
50	Toluene	91	6.525	6.525	(0.844)	633968	42.8588	42.85
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	153990	46.8609	46.86
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	239171	50.0092	50.00
38	Trichloroethene	130	5.300	5.300	(1.047)	167829	44.3399	44.33
8	Trichlorofluoromethane	101	1.639	1.632	(0.382)	154144	39.5567	39.55
5	Vinyl Chloride	62	1.202	1.202	(0.280)	155884	42.5458	42.54

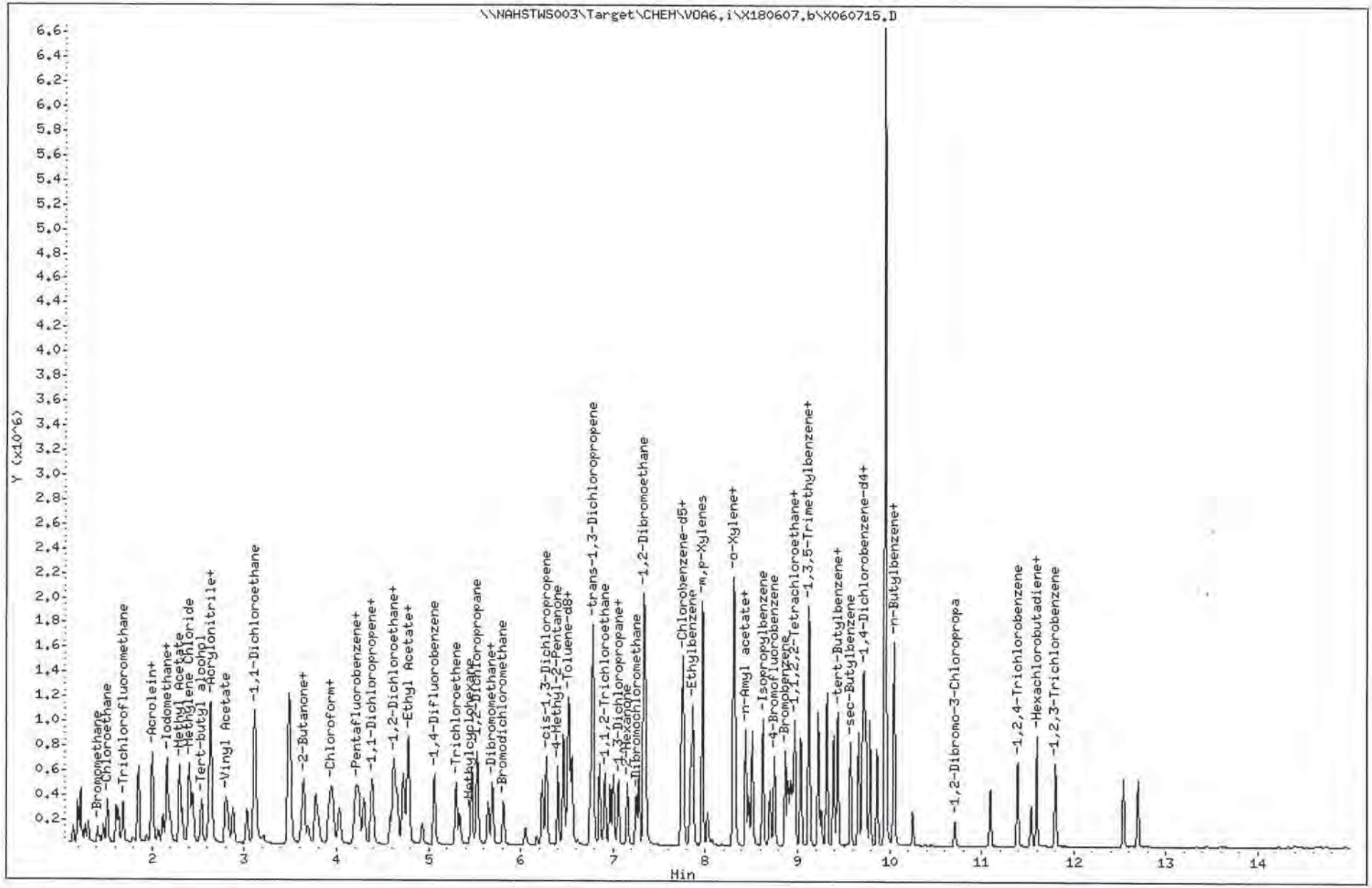
Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060715.D
Report Date: 12-Jun-2018 15:11

QC Flag Legend

M - Compound response manually integrated.

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060715.D
Date : 07-JUN-2018 15:54
Client ID: HS18051491-01MSD
Sample Info: HS18051491-01MSD;HS18051491-01MSD;3;;MSD
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060729.D
Report Date: 12-Jun-2018 15:11

ALS Laboratory Group

Data file : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060729.D
Lab Smp Id: VSTD050-END Client Smp ID: VSTD050-END
Inj Date : 07-JUN-2018 21:38
Operator : PC Inst ID: voa6.i
Smp Info : VSTD050-END;VSTD050-END;2;;
Misc Info : HS16030331;WATER;0;1;
Comment :
Method : \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\8260W.m
Meth Date : 12-Jun-2018 15:11 voa6.i Quant Type: ISTD
Cal Date : 23-MAY-2018 16:47 Cal File: X052314.D
Als bottle: 29 Continuing Calibration Sample
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: 00000000_URS.sub
Target Version: 4.14
Processing Host: ALSHSW7085

Concentration Formula: Amt * DF * (Uf/Vo)*1 * CpndVariable

Name	Value	Description
DF	1.000	Dilution Factor
Uf	5.000	ng unit correction factor
Vo	5.000	sample purged
Cpnd Variable		Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
* 1 Pentafluorobenzene	168	4.297	4.297	(1.000)	303143	50.0000	
* 36 1,4-Difluorobenzene	114	5.063	5.063	(1.000)	458620	50.0000	
* 47 Chlorobenzene-d5	117	7.735	7.735	(1.000)	471825	50.0000	
* 70 1,4-Dichlorobenzene-d4	152	9.719	9.719	(1.000)	257466	50.0000	
$ 30 Dibromofluoromethane	113	4.218	4.218	(0.982)	143784	50.0000	51.43
$ 35 1,2-Dichloroethane-d4	65	4.583	4.583	(1.067)	143824	50.0000	50.92
$ 48 Toluene-d8	98	6.460	6.460	(0.835)	541884	50.0000	47.58
$ 69 4-Bromofluorobenzene	95	8.752	8.752	(1.131)	203366	50.0000	49.77
60 1,1,1,2-Tetrachloroethane	131	7.842	7.842	(1.014)	161203	50.0000	43.62
31 1,1,1-Trichloroethane	97	4.204	4.204	(0.978)	221147	50.0000	52.43
68 1,1,2,2-Tetrachloroethane	83	8.895	8.895	(0.915)	216407	50.0000	50.52
138 Freon TF	101	2.005	2.005	(0.467)	125783	50.0000	52.83
53 1,1,2-Trichloroethane	83	6.911	6.911	(0.894)	130935	50.0000	45.48
22 1,1-Dichloroethane	63	3.029	3.029	(0.705)	275173	50.0000	53.38
11 1,1-Dichloroethene	96	1.997	1.997	(0.465)	140495	50.0000	50.56
32 1,1-Dichloropropene	75	4.390	4.390	(0.867)	210268	50.0000	48.25
93 1,2,3-Trichlorobenzene	180	11.796	11.796	(1.214)	176523	50.0000	43.16
71 1,2,3-Trichloropropane	75	8.924	8.924	(0.918)	183574	50.0000	48.05(M)
90 1,2,4-Trichlorobenzene	180	11.395	11.395	(1.172)	195491	50.0000	42.70
79 1,2,4-Trimethylbenzene	105	9.440	9.440	(0.971)	529332	50.0000	44.96
89 1,2-Dibromo-3-Chloropropane	155	10.715	10.715	(1.102)	38248	50.0000	50.89
57 1,2-Dibromoethane	107	7.334	7.334	(0.948)	168174	50.0000	46.27

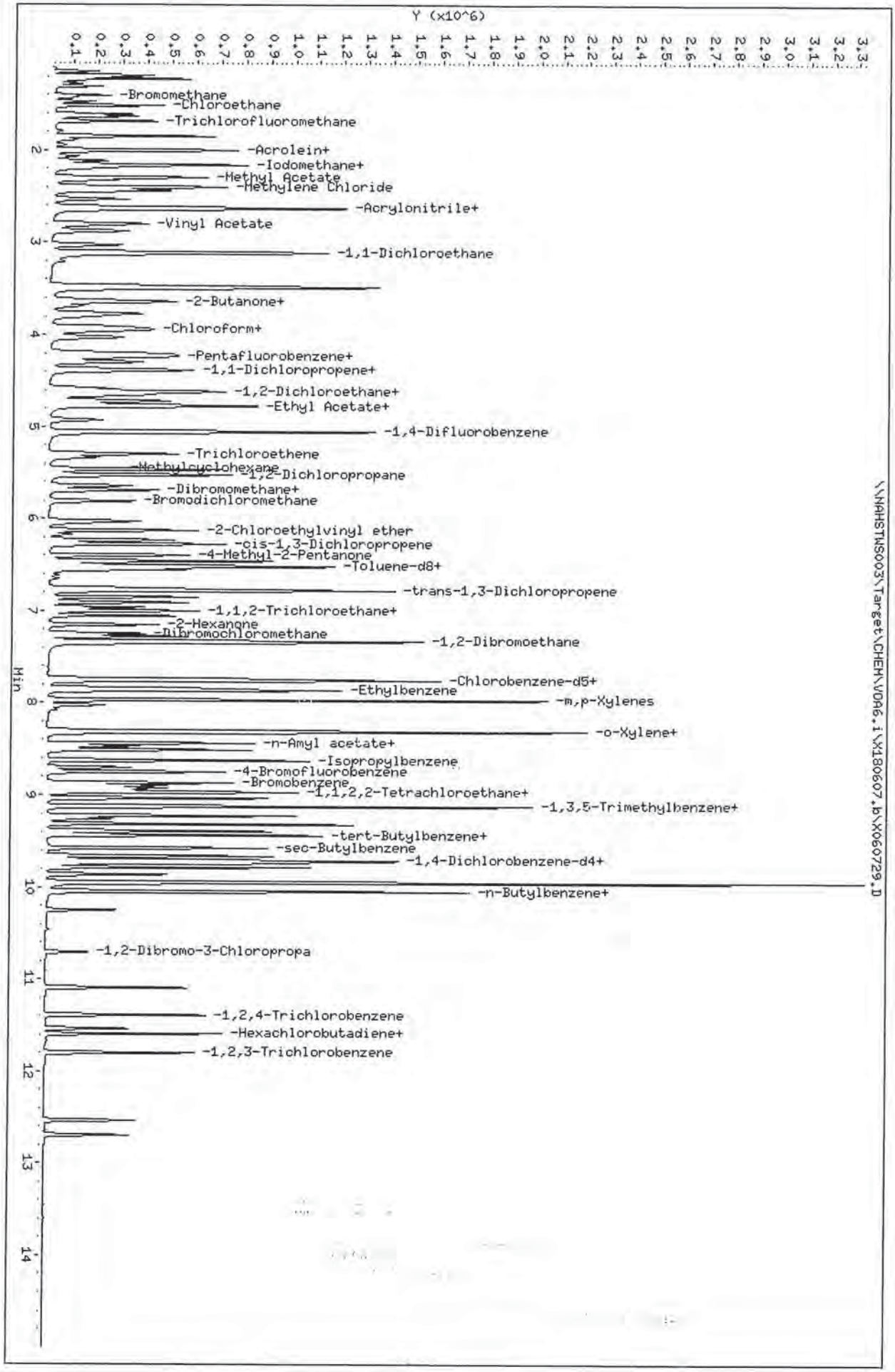
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Report Date: 12-Jun-2018 15:11

	Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	AMOUNTS CAL-AMT (ug/l)	AMOUNTS ON-COL (ug/l)
88	1,2-Dichlorobenzene	146	10.049	10.049	(1.034)	322843	50.0000	46.05
33	1,2-Dichloroethane	62	4.662	4.662	(0.921)	192922	50.0000	49.33
42	1,2-Dichloropropane	63	5.529	5.529	(1.092)	167070	50.0000	48.40
75	1,3,5-Trimethylbenzene	105	9.125	9.125	(0.939)	508218	50.0000	44.84
83	1,3-Dichlorobenzene	146	9.662	9.662	(0.994)	331305	50.0000	44.72
54	1,3-Dichloropropane	76	7.055	7.055	(0.912)	270593	50.0000	49.81
84	1,4-Dichlorobenzene	146	9.741	9.741	(1.002)	339379	50.0000	44.95
26	2,2-Dichloropropane	77	3.631	3.631	(0.845)	168897	50.0000	44.00
24	2-Butanone	43	3.688	3.688	(0.858)	148915	100.000	115.10
76	2-Chlorotoluene	91	9.032	9.032	(0.929)	440795	50.0000	44.65
52	2-Hexanone	43	7.155	7.155	(0.925)	236488	100.000	102.11
77	4-Chlorotoluene	91	9.132	9.132	(0.940)	508669	50.0000	45.35
82	p-Isopropyltoluene	119	9.705	9.705	(0.999)	490326	50.0000	40.81
45	4-Methyl-2-Pentanone	43	6.396	6.396	(0.827)	343518	100.000	98.69
10	Acetone	43	2.062	2.062	(0.480)	101445	100.000	121.60
37	Benzene	78	4.619	4.619	(0.912)	633860	50.0000	46.98
74	Bromobenzene	156	8.867	8.867	(0.912)	199790	50.0000	45.72
29	Bromochloromethane	128	3.917	3.917	(0.912)	88097	50.0000	50.25
39	Bromodichloromethane	83	5.808	5.808	(1.147)	208895	50.0000	47.65
66	Bromoform	173	8.473	8.473	(1.095)	146683	50.0000	49.74
6	Bromomethane	94	1.410	1.410	(0.328)	75249	50.0000	40.95
19	Carbon Disulfide	76	2.162	2.162	(0.503)	986792	100.000	97.92
34	Carbon Tetrachloride	117	4.383	4.383	(0.866)	194441	50.0000	46.83
59	Chlorobenzene	112	7.757	7.757	(1.003)	443658	50.0000	43.99
7	Chloroethane	64	1.475	1.475	(0.343)	109204	50.0000	58.88
28	Chloroform	83	4.032	4.032	(0.938)	268274	50.0000	49.68
3	Chloromethane	50	1.145	1.145	(0.267)	140404	50.0000	48.76
27	cis-1,2-Dichloroethene	96	3.645	3.645	(0.848)	183267	50.0000	49.89
46	cis-1,3-Dichloropropene	75	6.231	6.231	(1.231)	268889	50.0000	46.19
55	Dibromochloromethane	129	7.248	7.248	(0.937)	186976	50.0000	48.30
44	Dibromomethane	93	5.643	5.643	(1.115)	108747	50.0000	52.45
2	Dichlorodifluoromethane	85	1.030	1.030	(0.240)	159143	50.0000	47.96
61	Ethylbenzene	106	7.864	7.864	(1.017)	225106	50.0000	44.50
91	Hexachlorobutadiene	225	11.539	11.539	(1.187)	63450	50.0000	39.28
67	Isopropylbenzene	105	8.623	8.623	(1.115)	609174	50.0000	42.40
62	m,p-Xylenes	106	7.964	7.964	(1.030)	543173	100.000	85.98
17	Methylene Chloride	84	2.399	2.399	(0.558)	170834	50.0000	53.01
87	n-Butylbenzene	91	10.049	10.049	(1.034)	369943	50.0000	43.47
73	n-Propylbenzene	91	8.974	8.974	(0.923)	720712	50.0000	40.94
92	Naphthalene	128	11.596	11.596	(1.193)	472919	50.0000	47.24
63	o-Xylene	106	8.301	8.301	(1.073)	276397	50.0000	44.34
81	sec-Butylbenzene	105	9.576	9.576	(0.985)	546879	50.0000	43.16
64	Styrene	104	8.322	8.322	(1.076)	472765	50.0000	44.12
78	tert-Butylbenzene	119	9.397	9.397	(0.967)	417586	50.0000	43.98
56	Tetrachloroethene	164	6.997	6.997	(0.905)	133849	50.0000	42.87
50	Toluene	91	6.524	6.524	(0.844)	665132	50.0000	44.54
20	trans-1,2-Dichloroethene	96	2.628	2.628	(0.612)	164926	50.0000	49.78
51	trans-1,3-Dichloropropene	75	6.754	6.754	(1.334)	227092	50.0000	47.71
38	Trichloroethene	130	5.300	5.300	(1.047)	177024	50.0000	46.99
8	Trichlorofluoromethane	101	1.639	1.639	(0.382)	193554	50.0000	49.27
5	Vinyl Chloride	62	1.202	1.202	(0.280)	194196	50.0000	52.57

Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060729.D
Report Date: 12-Jun-2018 15:11

QC Flag Legend

M - Compound response manually integrated.



Data File: \\NAHSTWS003\Target\CHEM\VOA6.i\X180607.b\X060729.D
Date : 07-JUN-2018 21:38
Client ID: VSTD050-END
Sample Info: VSTD050-END;VSTD050-END;2;;
Purge Volume: 5.0
Column phase: DB624

Instrument: voa6.i
Operator: PC
Column diameter: 0.18

00905620

Anions Raw Data

Bhate Environmental Associates, Inc.
Project: LONGHORN GW TREATMENT PLANT
ALS WO# HS18051472

HS18051472

Sequence: 060818
Operator: ALSHS.NoUser

Printed: 6/20/2018 2:40:56 PM

Title:
Datasource: DB7CGHK1_local
Location: ICS2100\Sequences and Data\01-2018
Timebase: ICS2100
#Samples: 107

Created: 6/8/2018 5:25:52 PM by ALSHS.NoUser
(Modified, not saved)

No.	Name	Comment	Type	Pos.	Dil. Factor	Inj. Vol.	*Initial_Vol_Wt	*Final_Volume
1	STD1		Standard	1	1.0000	10.0	1.00	1.00
2	STD2		Standard	2	1.0000	10.0	1.00	1.00
3	STD3		Standard	3	1.0000	10.0	1.00	1.00
4	STD4		Standard	4	1.0000	10.0	1.00	1.00
5	STD5		Standard	5	1.0000	10.0	1.00	1.00
6	STD6		Standard	6	1.0000	10.0	1.00	1.00
7	ICV		Unknown	7	1.0000	10.0	1.00	1.00
8	ICB		Unknown	8	1.0000	10.0	1.00	1.00
9	CCV		Unknown	1	1.0000	10.0	1.00	1.00
10	CCB		Unknown	2	1.0000	10.0	1.00	1.00
11	HS18060301-25	9056_W 6.08.18	Unknown	58	1.0000	10.0	1.00	1.00
12	HS18060301-25DF20		Unknown	59	20.0000	10.0	1.00	1.00
13	HS18060305-01		Unknown	60	1.0000	10.0	1.00	1.00
14	HS18060305-01MS		Unknown	61	1.0000	10.0	1.00	1.00
15	HS18060305-01MSD		Unknown	62	1.0000	10.0	1.00	1.00
16	HS18060305-01DF10		Unknown	63	10.0000	10.0	1.00	1.00
17	HS18060305-02		Unknown	64	1.0000	10.0	1.00	1.00
18	HS18060305-02DF50		Unknown	65	50.0000	10.0	1.00	1.00
19	HS18060305-02DF200		Unknown	66	200.0000	10.0	1.00	1.00
20	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
21	CCV1		Unknown	3	1.0000	10.0	1.00	1.00
22	CCB		Unknown	4	1.0000	10.0	1.00	1.00
23	DI H2O		Unknown	55	1.0000	10.0	1.00	1.00
24	DI H2O		Unknown	56	1.0000	10.0	1.00	1.00
25	DI H2O		Unknown	57	1.0000	10.0	1.00	1.00
26	HS18060305-03	9056_W 6.08.18	Unknown	67	1.0000	10.0	1.00	1.00
27	HS18060305-03DF10		Unknown	68	10.0000	10.0	1.00	1.00
28	HS18060305-04		Unknown	69	1.0000	10.0	1.00	1.00
29	HS18060305-04DF10		Unknown	70	10.0000	10.0	1.00	1.00
30	HS18060305-05		Unknown	71	1.0000	10.0	1.00	1.00
31	HS18060305-05DF10		Unknown	72	10.0000	10.0	1.00	1.00
32	HS18051472-01DF10		Unknown	75	10.0000	10.0	1.00	1.00
33	CCV		Unknown	1	1.0000	10.0	1.00	1.00
34	CCB		Unknown	2	1.0000	10.0	1.00	1.00
35	HS18060305-06		Unknown	73	1.0000	10.0	1.00	1.00
36	HS18060305-06DF10		Unknown	74	10.0000	10.0	1.00	1.00
37	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
38	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
39	HS18060098-09		Unknown	76	1.0000	10.0	1.00	1.00
40	HS18060098-01DF200		Unknown	77	200.0000	10.0	1.00	1.00
41	HS18060098-02DF500		Unknown	78	500.0000	10.0	1.00	1.00
42	HS18060098-03DF200		Unknown	79	200.0000	10.0	1.00	1.00

Chromeleon © Dionex Corporation, Version 6.80 SR8 Build 2623 (156243)

Title:
Datasource: DB7CGHK1_local
Location: ICS2100\Sequences and Data\01-2018
Timebase: ICS2100
#Samples: 107
Created: 6/8/2018 5:25:52 PM by ALSHS.NoUser
(Modified, not saved)

No.	Name	Method	Status	Inj. Date/Time	Program
1	STD1	042618	Finished	4/26/2018 1:23:55 PM	Anions Gradient Program
2	STD2	042618	Finished	4/26/2018 1:38:28 PM	Anions Gradient Program
3	STD3	042618	Finished	4/26/2018 1:53:01 PM	Anions Gradient Program
4	STD4	042618	Finished	4/26/2018 2:07:34 PM	Anions Gradient Program
5	STD5	042618	Finished	4/26/2018 2:22:07 PM	Anions Gradient Program
6	STD6	042618	Finished	4/26/2018 2:36:39 PM	Anions Gradient Program
7	ICV	042618	Finished	4/26/2018 3:55:05 PM	Anions Gradient Program
8	ICB	042618	Finished	4/26/2018 4:09:38 PM	Anions Gradient Program
9	CCV	042618	Finished	6/8/2018 4:29:09 AM	Anions Gradient Program
10	CCB	042618	Finished	6/8/2018 4:43:42 AM	Anions Gradient Program
11	HS18060301-25	042618	Finished	6/8/2018 4:58:15 AM	Anions Gradient Program
12	HS18060301-25DF20	042618	Finished	6/8/2018 5:12:48 AM	Anions Gradient Program
13	HS18060305-01	042618	Finished	6/8/2018 5:27:21 AM	Anions Gradient Program
14	HS18060305-01MS	042618	Finished	6/8/2018 5:41:54 AM	Anions Gradient Program
15	HS18060305-01MSD	042618	Finished	6/8/2018 5:56:27 AM	Anions Gradient Program
16	HS18060305-01DF10	042618	Finished	6/8/2018 6:10:59 AM	Anions Gradient Program
17	HS18060305-02	042618	Finished	6/8/2018 6:25:32 AM	Anions Gradient Program
18	HS18060305-02DF50	042618	Finished	6/8/2018 6:40:05 AM	Anions Gradient Program
19	HS18060305-02DF200	042618	Finished	6/8/2018 6:54:37 AM	Anions Gradient Program
20	DI H2O	042618	Finished	6/8/2018 7:09:09 AM	Anions Gradient Program
21	CCV1	042618	Finished	6/8/2018 7:23:42 AM	Anions Gradient Program
22	CCB	042618	Finished	6/8/2018 7:38:15 AM	Anions Gradient Program
23	DI H2O	042618	Finished	6/8/2018 7:52:48 AM	Anions Gradient Program
24	DI H2O	042618	Finished	6/8/2018 8:07:21 AM	Anions Gradient Program
25	DI H2O	042618	Finished	6/8/2018 8:21:54 AM	Anions Gradient Program
26	HS18060305-03	042618	Finished	6/8/2018 8:36:27 AM	Anions Gradient Program
27	HS18060305-03DF10	042618	Finished	6/8/2018 8:51:00 AM	Anions Gradient Program
28	HS18060305-04	042618	Finished	6/8/2018 9:05:33 AM	Anions Gradient Program
29	HS18060305-04DF10	042618	Finished	6/8/2018 9:20:05 AM	Anions Gradient Program
30	HS18060305-05	042618	Finished	6/8/2018 9:34:37 AM	Anions Gradient Program
31	HS18060305-05DF10	042618	Finished	6/8/2018 9:49:11 AM	Anions Gradient Program
32	HS18051472-01DF10	042618	Finished	6/8/2018 10:03:43 AM	Anions Gradient Program
33	CCV	042618	Finished	6/8/2018 10:18:16 AM	Anions Gradient Program
34	CCB	042618	Finished	6/8/2018 10:32:49 AM	Anions Gradient Program
35	HS18060305-06	042618	Finished	6/8/2018 10:47:22 AM	Anions Gradient Program
36	HS18060305-06DF10	042618	Finished	6/8/2018 11:01:54 AM	Anions Gradient Program
37	DI H2O	042618	Finished	6/8/2018 11:16:27 AM	Anions Gradient Program
38	DI H2O	042618	Finished	6/8/2018 11:31:00 AM	Anions Gradient Program
39	HS18060098-09	042618	Finished	6/8/2018 11:45:33 AM	Anions Gradient Program
40	HS18060098-01DF200	042618	Finished	6/8/2018 12:00:06 PM	Anions Gradient Program
41	HS18060098-02DF500	042618	Finished	6/8/2018 12:14:38 PM	Anions Gradient Program
42	HS18060098-03DF200	042618	Finished	6/8/2018 12:29:11 PM	Anions Gradient Program

Sequence:	060818		Page 3 of 9
Operator:	ALSHS.NoUser		Printed: 6/20/2018 2:40:56 PM
Title:			
Datasource:	DB7CGHK1_local		
Location:	ICS2100\Sequences and Data\01-2018		
Timebase:	ICS2100	Created:	6/8/2018 5:25:52 PM by ALSHS.NoUser
#Samples:	107		(Modified, not saved)

No.	Name	GUID
1	STD1	d92b3a74-497e-11e8-b6d9-ac2a724b15e4
2	STD2	e1774668-4980-11e8-b6d9-ac2a724b15e4
3	STD3	e9df5050-4982-11e8-b6d9-ac2a724b15e4
4	STD4	f22134e8-4984-11e8-b6d9-ac2a724b15e4
5	STD5	fa2ea632-4986-11e8-b6d9-ac2a724b15e4
6	STD6	026e2875-4989-11e8-b6d9-ac2a724b15e4
7	ICV	7a1849cd-4993-11e8-b6d9-ac2a724b15e4
8	ICB	ff9ed68c-4995-11e8-b6d9-ac2a724b15e4
9	CCV	44290fcd-6afe-11e8-b6d9-ac2a724b15e4
10	CCB	4c794263-6b00-11e8-b6d9-ac2a724b15e4
11	HS18060301-25	54b19da7-6b02-11e8-b6d9-ac2a724b15e4
12	HS18060301-25DF20	5cfd0b93-6b04-11e8-b6d9-ac2a724b15e4
13	HS18060305-01	6556c77d-6b06-11e8-b6d9-ac2a724b15e4
14	HS18060305-01MS	6dae2112-6b08-11e8-b6d9-ac2a724b15e4
15	HS18060305-01MSD	75f72ca9-6b0a-11e8-b6d9-ac2a724b15e4
16	HS18060305-01DF10	7ddc164e-6b0c-11e8-b6d9-ac2a724b15e4
17	HS18060305-02	862521e5-6b0e-11e8-b6d9-ac2a724b15e4
18	HS18060305-02DF50	8e6e2d7c-6b10-11e8-b6d9-ac2a724b15e4
19	HS18060305-02DF200	96531721-6b12-11e8-b6d9-ac2a724b15e4
20	DI H2O	9e48b119-6b14-11e8-b6d9-ac2a724b15e4
21	CCV1	a6b31d56-6b16-11e8-b6d9-ac2a724b15e4
22	CCB	aefc28ed-6b18-11e8-b6d9-ac2a724b15e4
23	DI H2O	b7453484-6b1a-11e8-b6d9-ac2a724b15e4
24	DI H2O	bf90a270-6b1c-11e8-b6d9-ac2a724b15e4
25	DI H2O	c7e7fc05-6b1e-11e8-b6d9-ac2a724b15e4
26	HS18060305-03	d031079c-6b20-11e8-b6d9-ac2a724b15e4
27	HS18060305-03DF10	d88ac386-6b22-11e8-b6d9-ac2a724b15e4
28	HS18060305-04	e0c31eca-6b24-11e8-b6d9-ac2a724b15e4
29	HS18060305-04DF10	e8a8086f-6b26-11e8-b6d9-ac2a724b15e4
30	HS18060305-05	f09da267-6b28-11e8-b6d9-ac2a724b15e4
31	HS18060305-05DF10	f9467329-6b2a-11e8-b6d9-ac2a724b15e4
32	HS18051472-01DF10	013847f2-6b2d-11e8-b6d9-ac2a724b15e4
33	CCV	098d5c35-6b2f-11e8-b6d9-ac2a724b15e4
34	CCB	11d8ca21-6b31-11e8-b6d9-ac2a724b15e4
35	HS18060305-06	1a3023b6-6b33-11e8-b6d9-ac2a724b15e4
36	HS18060305-06DF10	22176fb0-6b35-11e8-b6d9-ac2a724b15e4
37	DI H2O	2a5e18f2-6b37-11e8-b6d9-ac2a724b15e4
38	DI H2O	32a72489-6b39-11e8-b6d9-ac2a724b15e4
39	HS18060098-09	3b00e073-6b3b-11e8-b6d9-ac2a724b15e4
40	HS18060098-01DF200	4349ec0a-6b3d-11e8-b6d9-ac2a724b15e4
41	HS18060098-02DF500	4b503655-6b3f-11e8-b6d9-ac2a724b15e4
42	HS18060098-03DF200	538af3ee-6b41-11e8-b6d9-ac2a724b15e4

Sequence: 060818
Operator: ALSHS.NoUser

Title:
Datasource: DB7CGHK1_local
Location: ICS2100\Sequences and Data\01-2018
Timebase: ICS2100
#Samples: 107

Created: 6/8/2018 5:25:52 PM by ALSHS.NoUser
(Modified, not saved)

No.	Name	Comment	Type	Pos.	Dil. Factor	Inj. Vol.	*Initial_Vol_Wt	*Final_Volume
43	HS18060098-04DF200		Unknown	80	200.0000	10.0	1.00	1.00
44	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
45	CCV1		Unknown	3	1.0000	10.0	1.00	1.00
46	CCB		Unknown	4	1.0000	10.0	1.00	1.00
47	HS18060098-01DF50		Unknown	81	50.0000	10.0	1.00	1.00
48	HS18060098-05DF100		Unknown	82	100.0000	10.0	1.00	1.00
49	HS18060098-05DF500		Unknown	83	500.0000	10.0	1.00	1.00
50	HS18060098-06DF200		Unknown	84	200.0000	10.0	1.00	1.00
51	HS18060098-07DF200		Unknown	85	200.0000	10.0	1.00	1.00
52	HS18060098-08DF200		Unknown	86	200.0000	10.0	1.00	1.00
53	HS18060098-10DF200		Unknown	87	200.0000	10.0	1.00	1.00
54	HS18060098-10DF500		Unknown	88	500.0000	10.0	1.00	1.00
55	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
56	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
57	CCV		Unknown	1	1.0000	10.0	1.00	1.00
58	CCB		Unknown	2	1.0000	10.0	1.00	1.00
59	WBLKW1-060818	9056_W 6.08.18	Unknown	55	1.0000	10.0	1.00	1.00
60	WLCSW1-060818		Unknown	56	1.0000	10.0	1.00	1.00
61	WLCSDW1-060818		Unknown	57	1.0000	10.0	1.00	1.00
62	HS18060400-10		Unknown	31	1.0000	10.0	1.00	1.00
63	HS18060400-07		Unknown	23	1.0000	10.0	1.00	1.00
64	HS18060400-10DF10		Unknown	32	10.0000	10.0	1.00	1.00
65	HS18060400-07DF10	END R#1	Unknown	24	10.0000	10.0	1.00	1.00
66	WBLKW2-060818	9056_W #2 6.08.18	Unknown	5	1.0000	10.0	1.00	1.00
67	WLCSW2-060818		Unknown	6	1.0000	10.0	1.00	1.00
68	WLCSDW2-060818		Unknown	7	1.0000	10.0	1.00	1.00
69	CCV1		Unknown	3	1.0000	10.0	1.00	1.00
70	CCB		Unknown	4	1.0000	10.0	1.00	1.00
71	HS18060420-01		Unknown	41	1.0000	10.0	1.00	1.00
72	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
73	HS18060400-08		Unknown	25	1.0000	10.0	1.00	1.00
74	HS18060400-08MS		Unknown	26	1.0000	10.0	1.00	1.00
75	HS18060400-08MSD		Unknown	27	1.0000	10.0	1.00	1.00
76	HS18060400-08DF10		Unknown	28	10.0000	10.0	1.00	1.00
77	HS18060400-08MSDF10		Unknown	29	10.0000	10.0	1.00	1.00
78	HS18060400-08MSDDF10		Unknown	30	10.0000	10.0	1.00	1.00
79	HS18060400-05		Unknown	19	1.0000	10.0	1.00	1.00
80	HS18060400-05DF20		Unknown	20	20.0000	10.0	1.00	1.00
81	CCV		Unknown	1	1.0000	10.0	1.00	1.00
82	CCB		Unknown	2	1.0000	10.0	1.00	1.00
83	HS18060400-04		Unknown	17	1.0000	10.0	1.00	1.00
84	HS18060400-04DF20		Unknown	18	20.0000	10.0	1.00	1.00

Sequence: 060818
Operator: ALSHS.NoUser

Printed: 6/20/2018 2:40:56 PM

Title:
Datasource: DB7CGHK1_local
Location: ICS2100\Sequences and Data\01-2018
Timebase: ICS2100
#Samples: 107

Created: 6/8/2018 5:25:52 PM by ALSHS.NoUser
(Modified, not saved)

No.	Name	Method	Status	Inj. Date/Time	Program
43	HS18060098-04DF200	042618	Finished	6/8/2018 12:43:44 PM	Anions Gradient Program
44	DI H2O	042618	Finished	6/8/2018 12:58:17 PM	Anions Gradient Program
45	CCV1	042618	Finished	6/8/2018 1:12:50 PM	Anions Gradient Program
46	CCB	042618	Finished	6/8/2018 1:27:22 PM	Anions Gradient Program
47	HS18060098-01DF50	042618	Finished	6/8/2018 1:41:54 PM	Anions Gradient Program
48	HS18060098-05DF100	042618	Finished	6/8/2018 1:56:27 PM	Anions Gradient Program
49	HS18060098-05DF500	042618	Finished	6/8/2018 2:11:00 PM	Anions Gradient Program
50	HS18060098-06DF200	042618	Finished	6/8/2018 2:25:32 PM	Anions Gradient Program
51	HS18060098-07DF200	042618	Finished	6/8/2018 3:49:52 PM	Anions Gradient Program
52	HS18060098-08DF200	042618	Finished	6/8/2018 4:04:24 PM	Anions Gradient Program
53	HS18060098-10DF200	042618	Finished	6/8/2018 4:18:57 PM	Anions Gradient Program
54	HS18060098-10DF500	042618	Finished	6/8/2018 4:33:28 PM	Anions Gradient Program
55	DI H2O	042618	Finished	6/8/2018 4:48:01 PM	Anions Gradient Program
56	DI H2O	042618	Finished	6/8/2018 5:02:34 PM	Anions Gradient Program
57	CCV	042618	Finished	6/8/2018 6:44:49 PM	Anions Gradient Program
58	CCB	042618	Finished	6/8/2018 6:59:23 PM	Anions Gradient Program
59	WBLKW1-060818	042618	Finished	6/8/2018 7:13:56 PM	Anions Gradient Program
60	WLCSW1-060818	042618	Finished	6/8/2018 7:28:28 PM	Anions Gradient Program
61	WLCSDW1-060818	042618	Finished	6/8/2018 7:43:01 PM	Anions Gradient Program
62	HS18060400-10	042618	Finished	6/8/2018 7:57:33 PM	Anions Gradient Program
63	HS18060400-07	042618	Finished	6/8/2018 8:12:06 PM	Anions Gradient Program
64	HS18060400-10DF10	042618	Finished	6/8/2018 8:26:39 PM	Anions Gradient Program
65	HS18060400-07DF10	042618	Finished	6/8/2018 8:41:12 PM	Anions Gradient Program
66	WBLKW2-060818	042618	Finished	6/8/2018 8:55:45 PM	Anions Gradient Program
67	WLCSW2-060818	042618	Finished	6/8/2018 9:10:17 PM	Anions Gradient Program
68	WLCSDW2-060818	042618	Finished	6/8/2018 9:24:50 PM	Anions Gradient Program
69	CCV1	042618	Finished	6/8/2018 9:39:23 PM	Anions Gradient Program
70	CCB	042618	Finished	6/8/2018 9:53:55 PM	Anions Gradient Program
71	HS18060420-01	042618	Finished	6/8/2018 10:08:28 PM	Anions Gradient Program
72	DI H2O	042618	Finished	6/8/2018 10:23:01 PM	Anions Gradient Program
73	HS18060400-08	042618	Finished	6/8/2018 10:37:34 PM	Anions Gradient Program
74	HS18060400-08MS	042618	Finished	6/8/2018 10:52:06 PM	Anions Gradient Program
75	HS18060400-08MSD	042618	Finished	6/8/2018 11:06:39 PM	Anions Gradient Program
76	HS18060400-08DF10	042618	Finished	6/8/2018 11:21:12 PM	Anions Gradient Program
77	HS18060400-08MSDF10	042618	Finished	6/8/2018 11:35:45 PM	Anions Gradient Program
78	HS18060400-08MSDDF10	042618	Finished	6/8/2018 11:50:18 PM	Anions Gradient Program
79	HS18060400-05	042618	Finished	6/9/2018 12:04:51 AM	Anions Gradient Program
80	HS18060400-05DF20	042618	Finished	6/9/2018 12:19:24 AM	Anions Gradient Program
81	CCV	042618	Finished	6/9/2018 12:33:56 AM	Anions Gradient Program
82	CCB	042618	Finished	6/9/2018 12:48:29 AM	Anions Gradient Program
83	HS18060400-04	042618	Finished	6/9/2018 1:03:02 AM	Anions Gradient Program
84	HS18060400-04DF20	042618	Finished	6/9/2018 1:17:35 AM	Anions Gradient Program

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Title:
Datasource: DB7CGHK1_local
Location: ICS2100\Sequences and Data\01-2018
Timebase: ICS2100 Created: 6/8/2018 5:25:52 PM by ALSHS.NoUser
#Samples: 107 (Modified, not saved)

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43	HS18060098-04DF200	5be4afd8-6b43-11e8-b6d9-ac2a724b15e4
44	DI H2O	63ed5c78-6b45-11e8-b6d9-ac2a724b15e4
45	CCV1	6c3405ba-6b47-11e8-b6d9-ac2a724b15e4
46	CCB	740aa161-6b49-11e8-b6d9-ac2a724b15e4
47	HS18060098-01DF50	7c003b59-6b4b-11e8-b6d9-ac2a724b15e4
48	HS18060098-05DF100	846aa796-6b4d-11e8-b6d9-ac2a724b15e4
49	HS18060098-05DF500	8cb3b32d-6b4f-11e8-b6d9-ac2a724b15e4
50	HS18060098-06DF200	94773c2c-6b51-11e8-b6d9-ac2a724b15e4
51	HS18060098-07DF200	df39f9ab-6b5c-11e8-b6d9-ac2a724b15e4
52	HS18060098-08DF200	64258ed5-6b5f-11e8-b6d9-ac2a724b15e4
53	HS18060098-10DF200	6c3c8973-6b61-11e8-b6d9-ac2a724b15e4
54	HS18060098-10DF500	7410c2c5-6b63-11e8-b6d9-ac2a724b15e4
55	DI H2O	7bc39b71-6b65-11e8-b6d9-ac2a724b15e4
56	DI H2O	841d575b-6b67-11e8-b6d9-ac2a724b15e4
57	CCV	504b3d2c-6b75-11e8-b6d9-ac2a724b15e4
58	CCB	d5be583b-6b77-11e8-b6d9-ac2a724b15e4
59	WBLKW1-060818	de0c339e-6b79-11e8-b6d9-ac2a724b15e4
60	WLCSW1-060818	e6661a79-6b7b-11e8-b6d9-ac2a724b15e4
61	WLCSDW1-060818	eeacc3bb-6b7d-11e8-b6d9-ac2a724b15e4
62	HS18060400-10	f680fd0d-6b7f-11e8-b6d9-ac2a724b15e4
63	HS18060400-07	fe9a5a00-6b81-11e8-b6d9-ac2a724b15e4
64	HS18060400-10DF10	06d2b544-6b84-11e8-b6d9-ac2a724b15e4
65	HS18060400-07DF10	0f2ed383-6b86-11e8-b6d9-ac2a724b15e4
66	WBLKW2-060818	17731a70-6b88-11e8-b6d9-ac2a724b15e4
67	WLCSW2-060818	1f7bc710-6b8a-11e8-b6d9-ac2a724b15e4
68	WLCSDW2-060818	27c27052-6b8c-11e8-b6d9-ac2a724b15e4
69	CCV1	300b7be9-6b8e-11e8-b6d9-ac2a724b15e4
70	CCB	380115e1-6b90-11e8-b6d9-ac2a724b15e4
71	HS18060420-01	404a2178-6b92-11e8-b6d9-ac2a724b15e4
72	DI H2O	48a3dd62-6b94-11e8-b6d9-ac2a724b15e4
73	HS18060400-08	50f6724d-6b96-11e8-b6d9-ac2a724b15e4
74	HS18060400-08MS	58e282f1-6b98-11e8-b6d9-ac2a724b15e4
75	HS18060400-08MSD	611ade35-6b9a-11e8-b6d9-ac2a724b15e4
76	HS18060400-08DF10	696b10cb-6b9c-11e8-b6d9-ac2a724b15e4
77	HS18060400-08MSDF10	71acf563-6b9e-11e8-b6d9-ac2a724b15e4
78	HS18060400-08MSDDF10	7a0b75f7-6ba0-11e8-b6d9-ac2a724b15e4
79	HS18060400-05	82521f39-6ba2-11e8-b6d9-ac2a724b15e4
80	HS18060400-05DF20	8aa4b424-6ba4-11e8-b6d9-ac2a724b15e4
81	CCV	92b487c3-6ba6-11e8-b6d9-ac2a724b15e4
82	CCB	9ae5bc08-6ba8-11e8-b6d9-ac2a724b15e4
83	HS18060400-04	a33850f3-6baa-11e8-b6d9-ac2a724b15e4
84	HS18060400-04DF20	ab6be78d-6bac-11e8-b6d9-ac2a724b15e4

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Timebase: ICS2100
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Created: 6/8/2018 5:25:52 PM by ALSHS.NoUser
(Modified, not saved)

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85	HS18060400-06		Unknown	21	1.0000	10.0	1.00	1.00
86	HS18060400-06DF10		Unknown	22	10.0000	10.0	1.00	1.00
87	HS18060198-01		Unknown	35	1.0000	10.0	1.00	1.00
88	HS18060198-01DF10		Unknown	36	10.0000	10.0	1.00	1.00
89	HS18060198-02		Unknown	37	1.0000	10.0	1.00	1.00
90	HS18060198-02MS		Unknown	38	1.0000	10.0	1.00	1.00
91	HS18060198-02MSD		Unknown	39	1.0000	10.0	1.00	1.00
92	HS18060198-02DF10		Unknown	40	10.0000	10.0	1.00	1.00
93	CCV1		Unknown	3	1.0000	10.0	1.00	1.00
94	CCB		Unknown	4	1.0000	10.0	1.00	1.00
95	HS18060400-02		Unknown	13	1.0000	10.0	1.00	1.00
96	HS18060400-02DF20		Unknown	14	20.0000	10.0	1.00	1.00
97	HS18060400-03		Unknown	15	1.0000	10.0	1.00	1.00
98	HS18060400-03DF20		Unknown	16	20.0000	10.0	1.00	1.00
99	HS18060400-11		Unknown	33	1.0000	10.0	1.00	1.00
100	HS18060400-11DF20		Unknown	34	20.0000	10.0	1.00	1.00
101	HS18060400-01		Unknown	11	1.0000	10.0	1.00	1.00
102	HS18060400-01DF20		Unknown	12	20.0000	10.0	1.00	1.00
103	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
104	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00
105	CCV		Unknown	1	1.0000	10.0	1.00	1.00
106	CCB		Unknown	2	1.0000	10.0	1.00	1.00
107	DI H2O		Unknown	10	1.0000	10.0	1.00	1.00

Title:
Datasource: DB7CGHK1_local
Location: ICS2100\Sequences and Data\01-2018
Timebase: ICS2100
#Samples: 107
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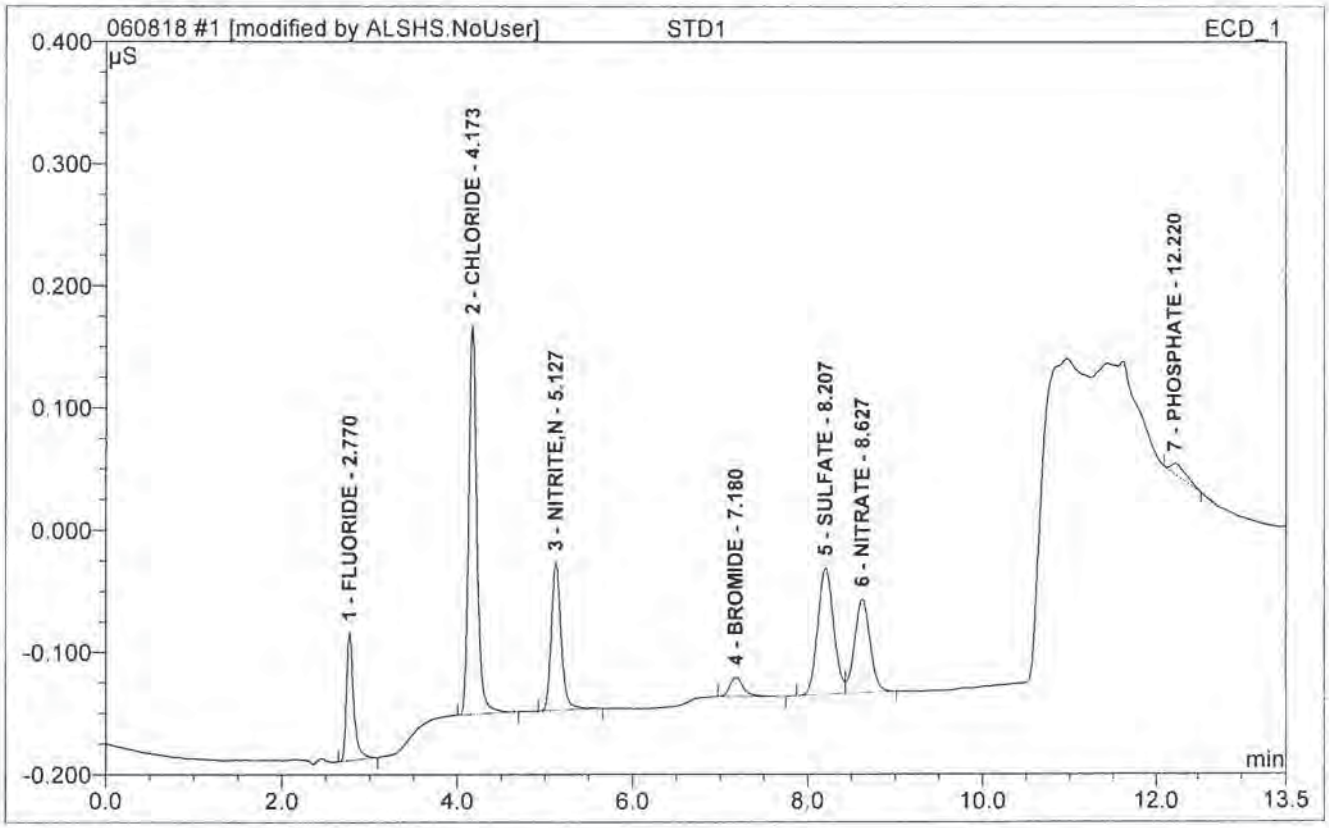
No.	Name	Method	Status	Inj. Date/Time	Program
85	HS18060400-06	042618	Finished	6/9/2018 1:32:08 AM	Anions Gradient Program
86	HS18060400-06DF10	042618	Finished	6/9/2018 1:46:41 AM	Anions Gradient Program
87	HS18060198-01	042618	Finished	6/9/2018 2:01:14 AM	Anions Gradient Program
88	HS18060198-01DF10	042618	Finished	6/9/2018 2:15:45 AM	Anions Gradient Program
89	HS18060198-02	042618	Finished	6/9/2018 2:30:18 AM	Anions Gradient Program
90	HS18060198-02MS	042618	Finished	6/9/2018 2:44:51 AM	Anions Gradient Program
91	HS18060198-02MSD	042618	Finished	6/9/2018 2:59:24 AM	Anions Gradient Program
92	HS18060198-02DF10	042618	Finished	6/9/2018 3:13:57 AM	Anions Gradient Program
93	CCV1	042618	Finished	6/9/2018 3:28:30 AM	Anions Gradient Program
94	CCB	042618	Finished	6/9/2018 3:43:03 AM	Anions Gradient Program
95	HS18060400-02	042618	Finished	6/9/2018 3:57:36 AM	Anions Gradient Program
96	HS18060400-02DF20	042618	Finished	6/9/2018 4:12:09 AM	Anions Gradient Program
97	HS18060400-03	042618	Finished	6/9/2018 4:26:41 AM	Anions Gradient Program
98	HS18060400-03DF20	042618	Finished	6/9/2018 4:41:14 AM	Anions Gradient Program
99	HS18060400-11	042618	Finished	6/9/2018 4:55:47 AM	Anions Gradient Program
100	HS18060400-11DF20	042618	Finished	6/9/2018 5:10:20 AM	Anions Gradient Program
101	HS18060400-01	042618	Finished	6/9/2018 5:24:53 AM	Anions Gradient Program
102	HS18060400-01DF20	042618	Finished	6/9/2018 5:39:26 AM	Anions Gradient Program
103	DI H2O	042618	Finished	6/9/2018 5:53:59 AM	Anions Gradient Program
104	DI H2O	042618	Finished	6/9/2018 6:08:32 AM	Anions Gradient Program
105	CCV	042618	Finished	6/9/2018 6:23:04 AM	Anions Gradient Program
106	CCB	042618	Finished	6/9/2018 6:37:37 AM	Anions Gradient Program
107	DI H2O	042618	Finished	6/9/2018 6:52:10 AM	Anions Gradient Program

Title:
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Location: ICS2100\Sequences and Data\01-2018
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No.	Name	GUID
85	HS18060400-06	b3c0decd-6bae-11e8-b6d9-ac2a724b15e4
86	HS18060400-06DF10	bc15d60d-6bb0-11e8-b6d9-ac2a724b15e4
87	HS18060198-01	c4496ca7-6bb2-11e8-b6d9-ac2a724b15e4
88	HS18060198-01DF10	cc2991a2-6bb4-11e8-b6d9-ac2a724b15e4
89	HS18060198-02	d4396541-6bb6-11e8-b6d9-ac2a724b15e4
90	HS18060198-02MS	dc7dac2e-6bb8-11e8-b6d9-ac2a724b15e4
91	HS18060198-02MSD	e4e353c1-6bba-11e8-b6d9-ac2a724b15e4
92	HS18060198-02DF10	ed1baf05-6bbc-11e8-b6d9-ac2a724b15e4
93	CCV1	f55ff5f2-6bbe-11e8-b6d9-ac2a724b15e4
94	CCB	fda90189-6bc0-11e8-b6d9-ac2a724b15e4
95	HS18060400-02	063c868a-6bc3-11e8-b6d9-ac2a724b15e4
96	HS18060400-02DF20	0e38ab0b-6bc5-11e8-b6d9-ac2a724b15e4
97	HS18060400-03	1686e959-6bc7-11e8-b6d9-ac2a724b15e4
98	HS18060400-03DF20	1ecff4f0-6bc9-11e8-b6d9-ac2a724b15e4
99	HS18060400-11	27202786-6bcb-11e8-b6d9-ac2a724b15e4
100	HS18060400-11DF20	2f66d0c8-6bcd-11e8-b6d9-ac2a724b15e4
101	HS18060400-01	37b23eb4-6bcf-11e8-b6d9-ac2a724b15e4
102	HS18060400-01DF20	400e5cf3-6bd1-11e8-b6d9-ac2a724b15e4
103	DI H2O	4852a3e0-6bd3-11e8-b6d9-ac2a724b15e4
104	DI H2O	50948878-6bd5-11e8-b6d9-ac2a724b15e4
105	CCV	5874ad73-6bd7-11e8-b6d9-ac2a724b15e4
106	CCB	607fbc68-6bd9-11e8-b6d9-ac2a724b15e4
107	DI H2O	6923609d-6bdb-11e8-b6d9-ac2a724b15e4

1 STD1

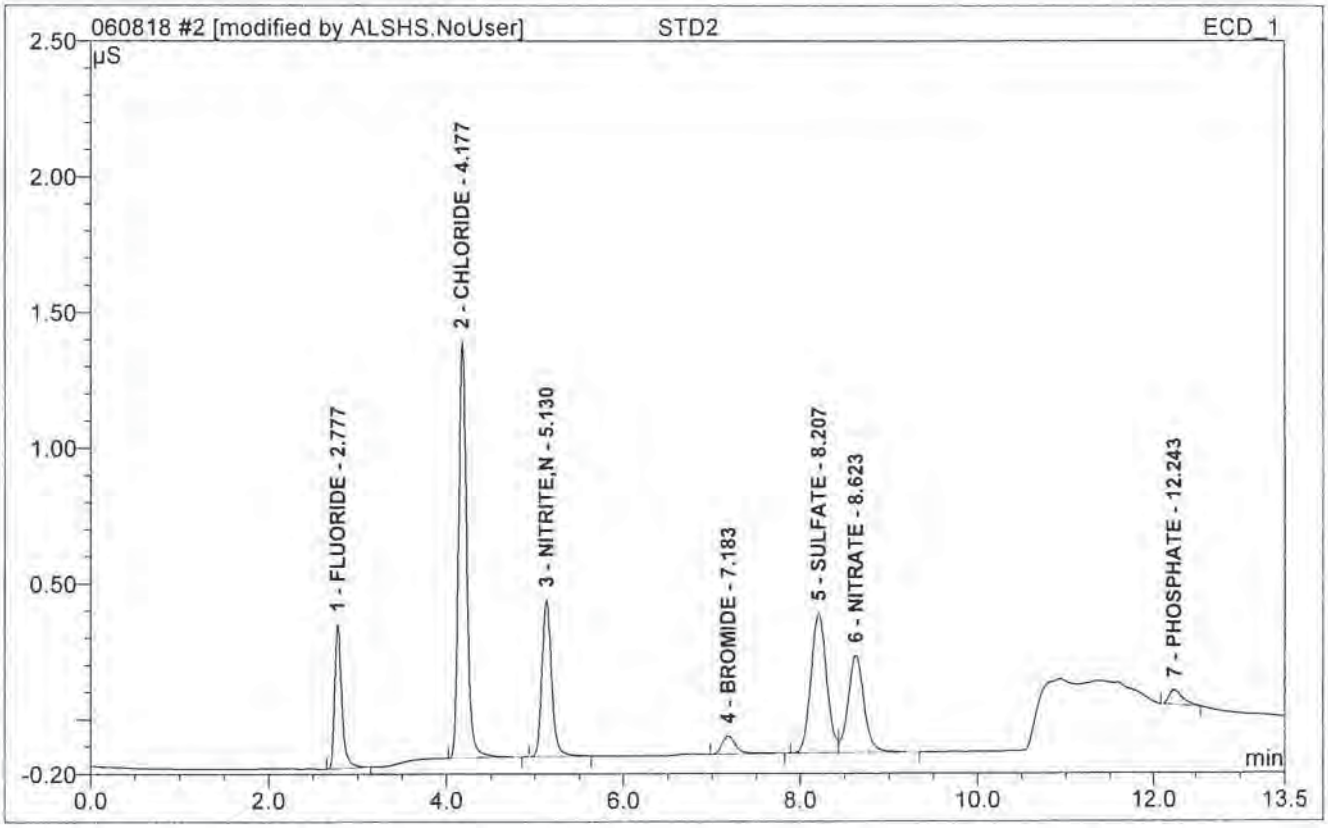
Sample Name:	**STD1**	*Injection Volume:*	**10.0**
Vial Number:	**1**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 13:23**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	0.105	0.010	9.73	0.100	1.
2	4.17	CHLORIDE	0.317	0.034	33.44	0.521	1.
3	5.13	NITRITE,N	0.121	0.016	15.45	0.092	1.
4	7.18	BROMIDE	0.016	0.003	2.80	0.122	1.
5	8.21	SULFATE	0.104	0.022	21.24	0.558	1.
6	8.63	NITRATE	0.077	0.016	15.45	0.113	1.
7	12.22	PHOSPHATE	0.008	0.002	1.90	0.438	1.
Total:			0.749	0.103	100.00	1.944	

2 STD2

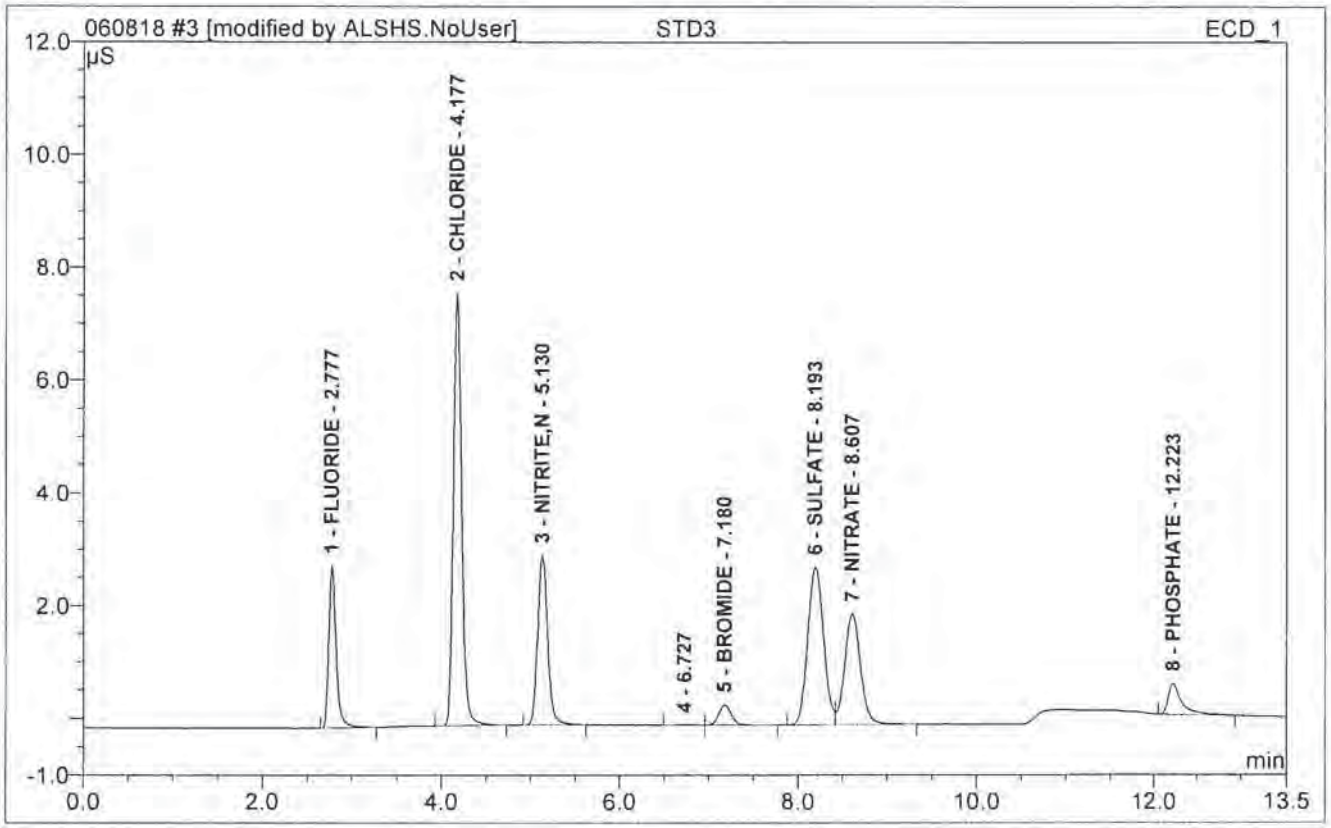
Sample Name:	**STD2**	*Injection Volume:*	**10.0**
Vial Number:	**2**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 13:38**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.78	FLUORIDE	0.534	0.049	10.06	0.381	1.
2	4.18	CHLORIDE	1.536	0.164	33.45	1.989	1.
3	5.13	NITRITE,N	0.580	0.074	15.04	0.394	1.
4	7.18	BROMIDE	0.068	0.013	2.57	0.391	1.
5	8.21	SULFATE	0.515	0.105	21.54	1.884	1.
6	8.62	NITRATE	0.360	0.075	15.27	0.377	1.
7	12.24	PHOSPHATE	0.056	0.010	2.07	0.544	1.
Total:			3.649	0.489	100.00	5.961	

3 STD3

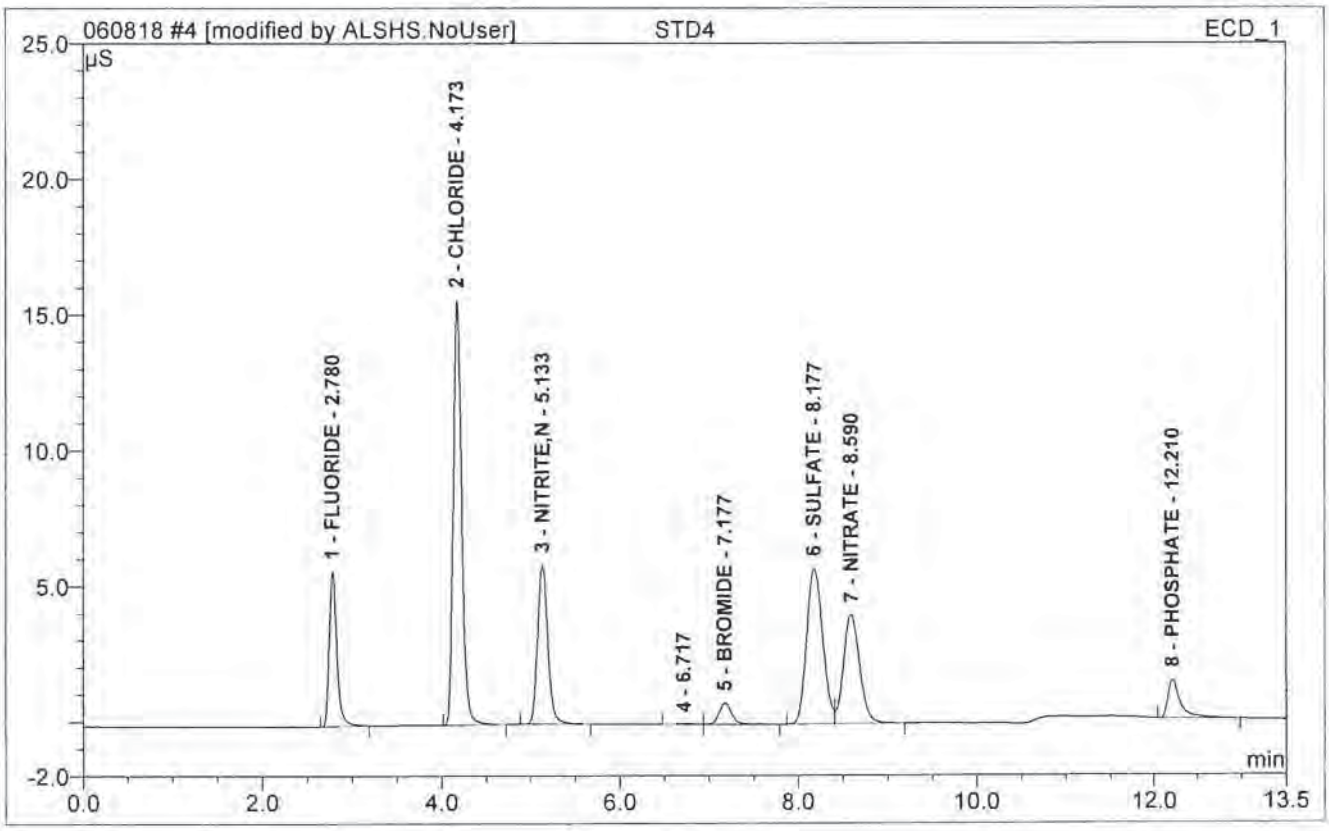
Sample Name:	**STD3**	*Injection Volume:*	**10.0**
Vial Number:	**3**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 13:53**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.78	FLUORIDE	2.881	0.275	10.41	1.999	1.
2	4.18	CHLORIDE	7.667	0.832	31.46	9.575	1.
3	5.13	NITRITE,N	3.010	0.392	14.82	2.060	1.
5	7.18	BROMIDE	0.358	0.059	2.24	1.688	1.
6	8.19	SULFATE	2.797	0.578	21.84	9.384	1.
7	8.61	NITRATE	1.972	0.405	15.32	1.863	1.
8	12.22	PHOSPHATE	0.550	0.101	3.82	1.731	1.
Total:			19.234	2.642	99.91	28.299	

4 STD4

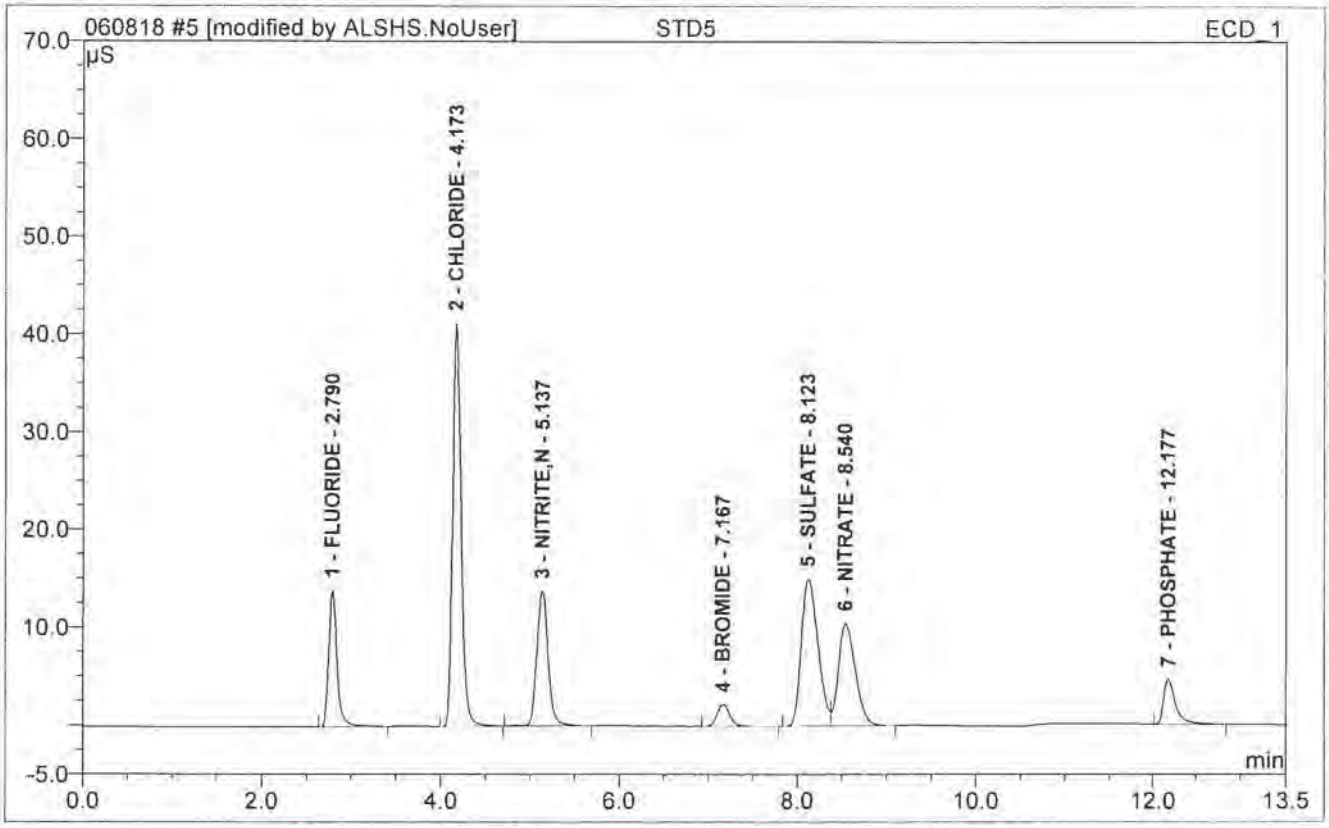
Sample Name:	**STD4**	*Injection Volume:*	**10.0**
Vial Number:	**4**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 14:07**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.78	FLUORIDE	5.716	0.561	10.17	4.043	1.
2	4.17	CHLORIDE	15.662	1.714	31.10	19.593	1.
3	5.13	NITRITE,N	5.891	0.798	14.49	4.187	1.
5	7.18	BROMIDE	0.787	0.129	2.34	3.626	1.
6	8.18	SULFATE	5.753	1.209	21.94	19.413	1.
7	8.59	NITRATE	4.059	0.851	15.44	3.866	1.
8	12.21	PHOSPHATE	1.441	0.245	4.44	3.606	1.
Total:			39.309	5.507	99.92	58.334	

5 STD5

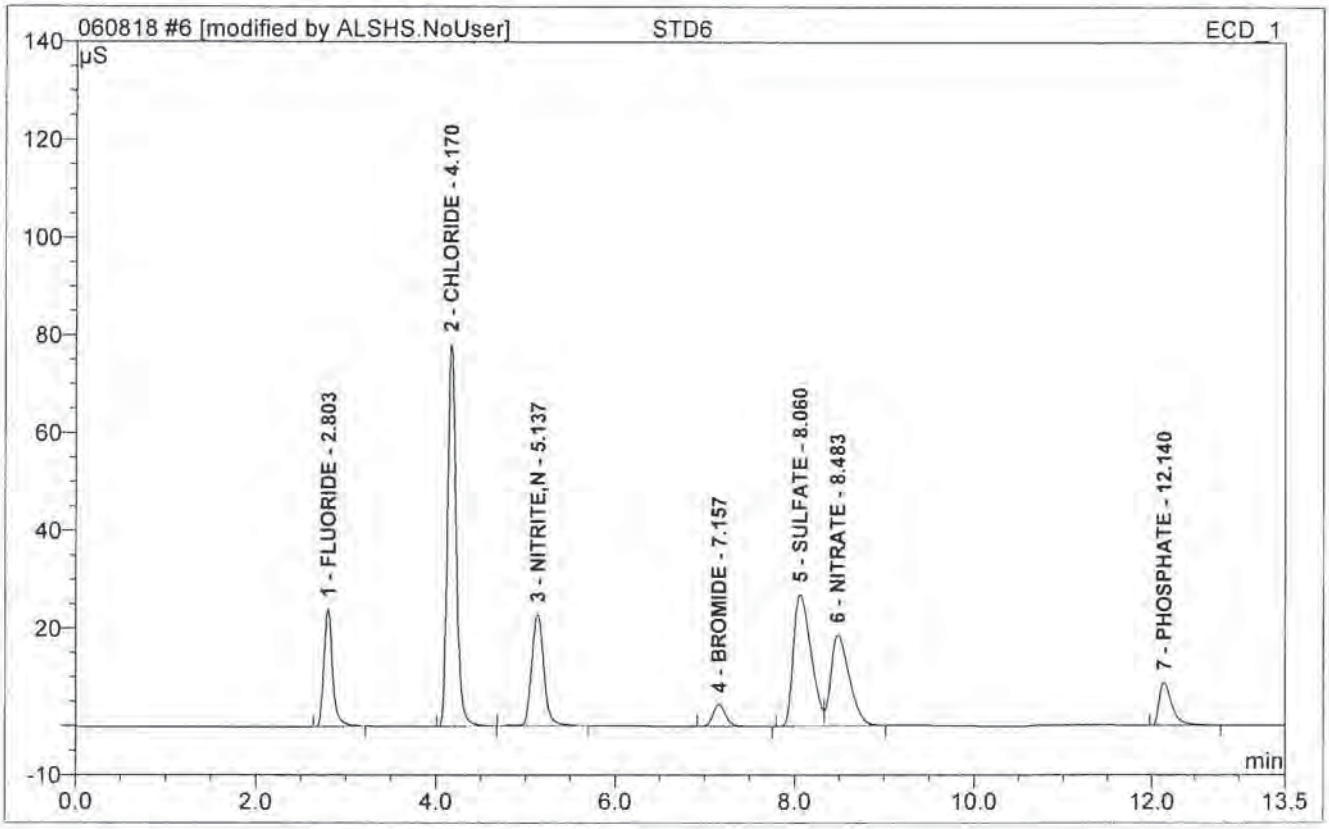
Sample Name:	**STD5**	*Injection Volume:*	**10.0**
Vial Number:	**5**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 14:22**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.79	FLUORIDE	13.977	1.484	10.07	10.657	1.
2	4.17	CHLORIDE	41.234	4.552	30.87	51.811	1.
3	5.14	NITRITE,N	13.797	2.034	13.79	10.652	1.
4	7.17	BROMIDE	2.258	0.369	2.50	10.267	1.
5	8.12	SULFATE	15.028	3.268	22.16	52.102	1.
6	8.54	NITRATE	10.425	2.293	15.55	10.352	1.
7	12.18	PHOSPHATE	4.602	0.746	5.06	10.160	1.
Total:			101.321	14.745	100.00	156.002	

6 STD6

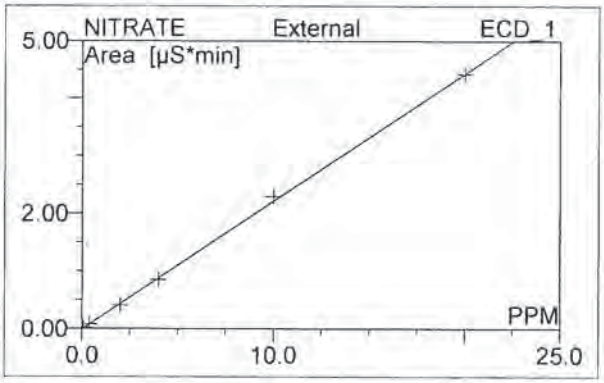
Sample Name:	**STD6**	*Injection Volume:*	**10.0**
Vial Number:	**6**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 14:36**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**

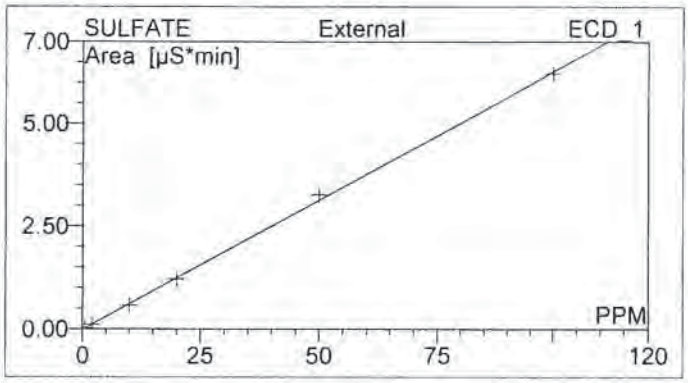


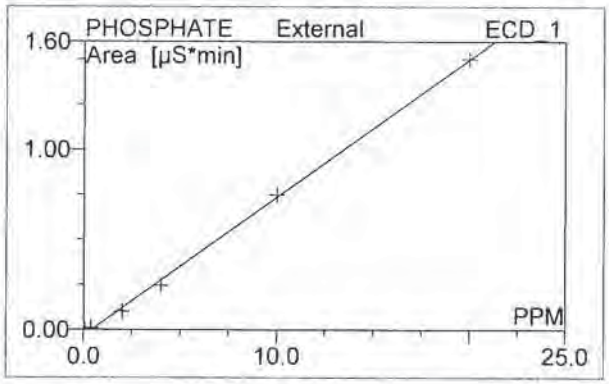
No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.80	FLUORIDE	24.122	2.694	9.64	19.319	1.
2	4.17	CHLORIDE	78.319	8.708	31.17	99.011	1.
3	5.14	NITRITE,N	23.018	3.651	13.07	19.116	1.
4	7.16	BROMIDE	4.472	0.734	2.63	20.405	1.
5	8.06	SULFATE	27.203	6.231	22.30	99.159	1.
6	8.48	NITRATE	18.761	4.423	15.83	19.929	1.
7	12.14	PHOSPHATE	8.892	1.501	5.37	20.021	1.
Total:			184.787	27.943	100.00	296.960	

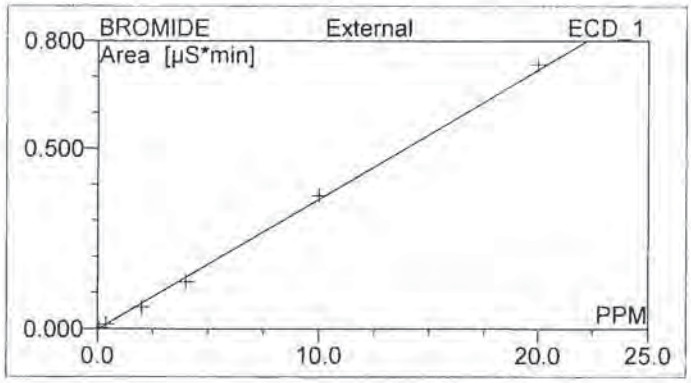
6 STD6

Sample Name:	**STD6**	*Injection Volume:*	**10.0**
Vial Number:	**6**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 14:36**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**









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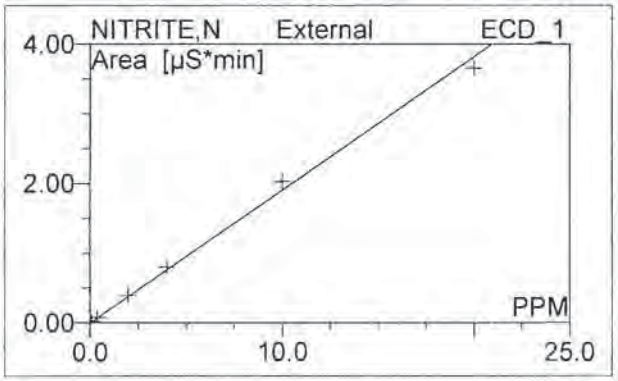
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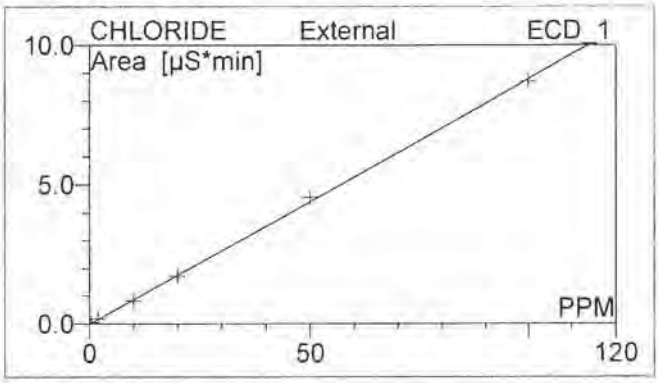
No.	Ret.Time min	Peak Name	Cal.Type	Points	Coeff.Det. %	Offset	Slope	Curve
1	2.80	FLUORIDE	XLOff	6	99.800	-0.0040	0.1397	0.000
2	4.17	CHLORIDE	XLOff	6	99.939	-0.0114	0.0881	0.000
3	5.14	NITRITE,N	XLOff	6	99.726	-0.0016	0.1911	0.000
4	7.16	BROMIDE	XLOff	6	99.692	-0.0015	0.0361	0.000
5	8.06	SULFATE	XLOff	6	99.903	-0.0132	0.0630	0.000
6	8.48	NITRATE	XLOff	6	99.913	-0.0092	0.2224	0.000
7	12.14	PHOSPHATE	LOff	6	99.870	-0.0316	0.0766	0.000
Average:					99.8348	-0.0104	0.1167	0.0000

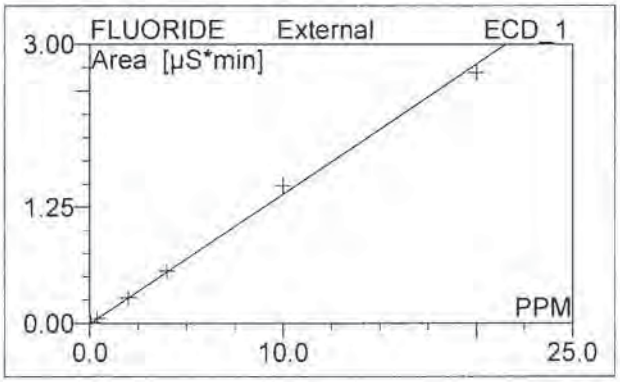
No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. %	RF-Value	Std.Dev.	RSD %
1	2.80	FLUORIDE	XLOff	6	99.900	7.160	0.012	20.786
2	4.17	CHLORIDE	XLOff	6	99.970	11.355	0.021	11.367
3	5.14	NITRITE,N	XLOff	6	99.863	5.233	0.019	23.207
4	7.16	BROMIDE	XLOff	6	99.846	27.732	0.004	26.659
5	8.06	SULFATE	XLOff	6	99.952	15.881	0.019	14.933
6	8.48	NITRATE	XLOff	6	99.956	4.497	0.013	14.121
7	12.14	PHOSPHATE	LOff	6	99.935	13.062	0.024	5.493
Average:					99.9174	12.1314	0.0160	16.6523

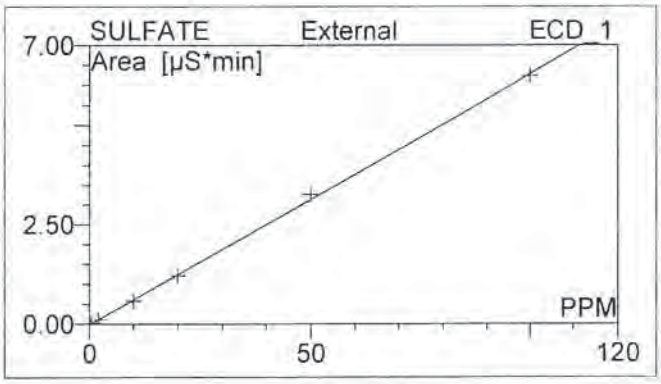
6 STD6

Sample Name:	**STD6**	*Injection Volume:*	**10.0**
Vial Number:	**6**	*Channel:*	**ECD_1**
Sample Type:	**standard**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.000**
Recording Time:	**4/26/2018 14:36**	*Sample Weight/Volume:*	**1.000**
Run Time (min):	**13.50**	*Final Volume:*	**1.000**









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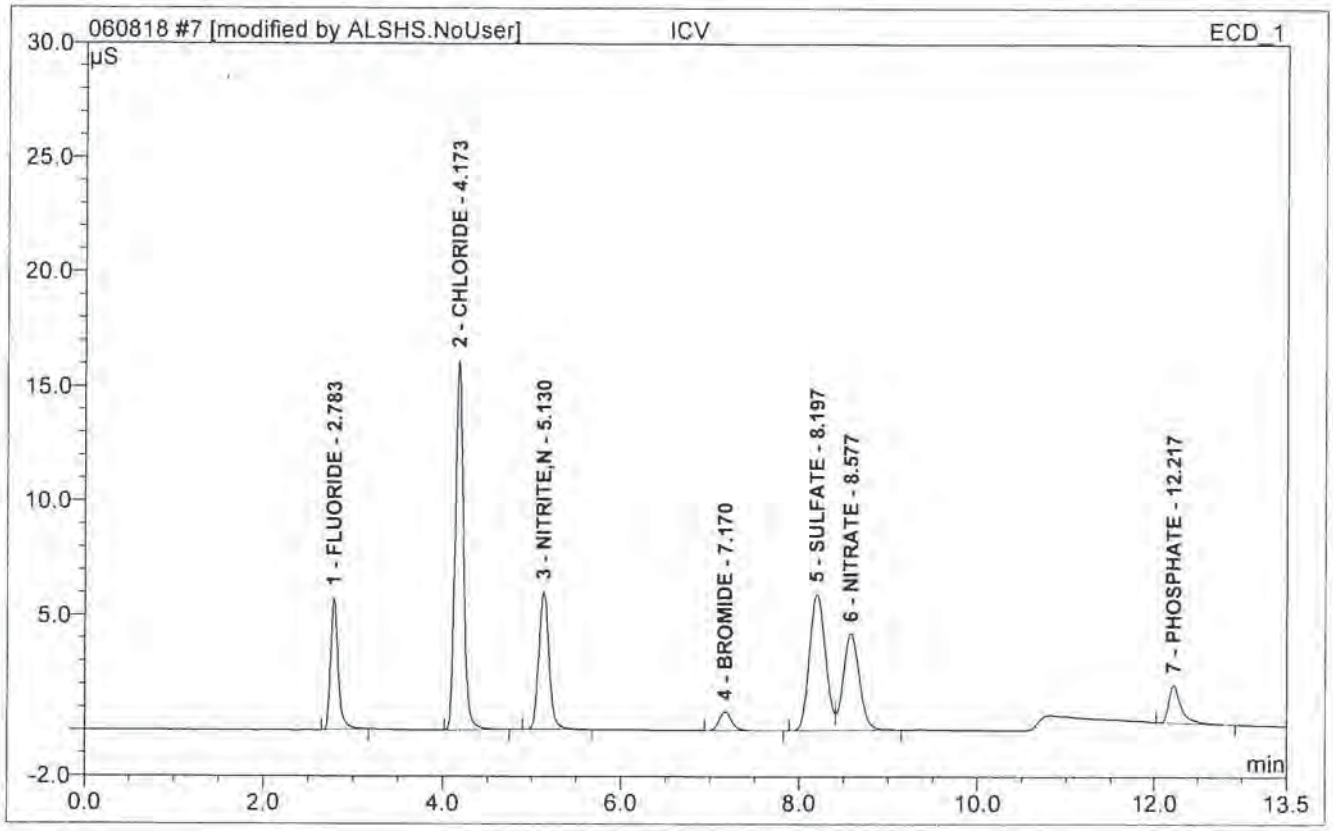
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No.	Ret.Time min	Peak Name	Cal.Type	Points	Coeff.Det. %	Offset	Slope	Curve
1	2.80	FLUORIDE	XLOff	6	99.7999	-0.0040	0.1397	0.000
2	4.17	CHLORIDE	XLOff	6	99.9393	-0.0114	0.0881	0.000
3	5.14	NITRITE,N	XLOff	6	99.7262	-0.0016	0.1911	0.000
4	7.16	BROMIDE	XLOff	6	99.6924	-0.0015	0.0361	0.000
5	8.06	SULFATE	XLOff	6	99.9031	-0.0132	0.0630	0.000
6	8.48	NITRATE	XLOff	6	99.9130	-0.0092	0.2224	0.000
7	12.14	PHOSPHATE	LOff	6	99.8700	-0.0316	0.0766	0.000
Average:					99.8348	-0.0104	0.1167	0.000

No.	Ret.Time min	Peak Name	Cal.Type	Points	Corr.Coeff. %	RF-Value	Std.Dev.	RSD %
1	2.80	FLUORIDE	XLOff	6	99.900	7.160	0.012	20.786
2	4.17	CHLORIDE	XLOff	6	99.970	11.355	0.021	11.367
3	5.14	NITRITE,N	XLOff	6	99.863	5.233	0.019	23.207
4	7.16	BROMIDE	XLOff	6	99.846	27.732	0.004	26.659
5	8.06	SULFATE	XLOff	6	99.952	15.881	0.019	14.933
6	8.48	NITRATE	XLOff	6	99.956	4.497	0.013	14.121
7	12.14	PHOSPHATE	LOff	6	99.935	13.062	0.024	5.493
Average:					99.9174	12.131	0.016	16.652

7 ICV

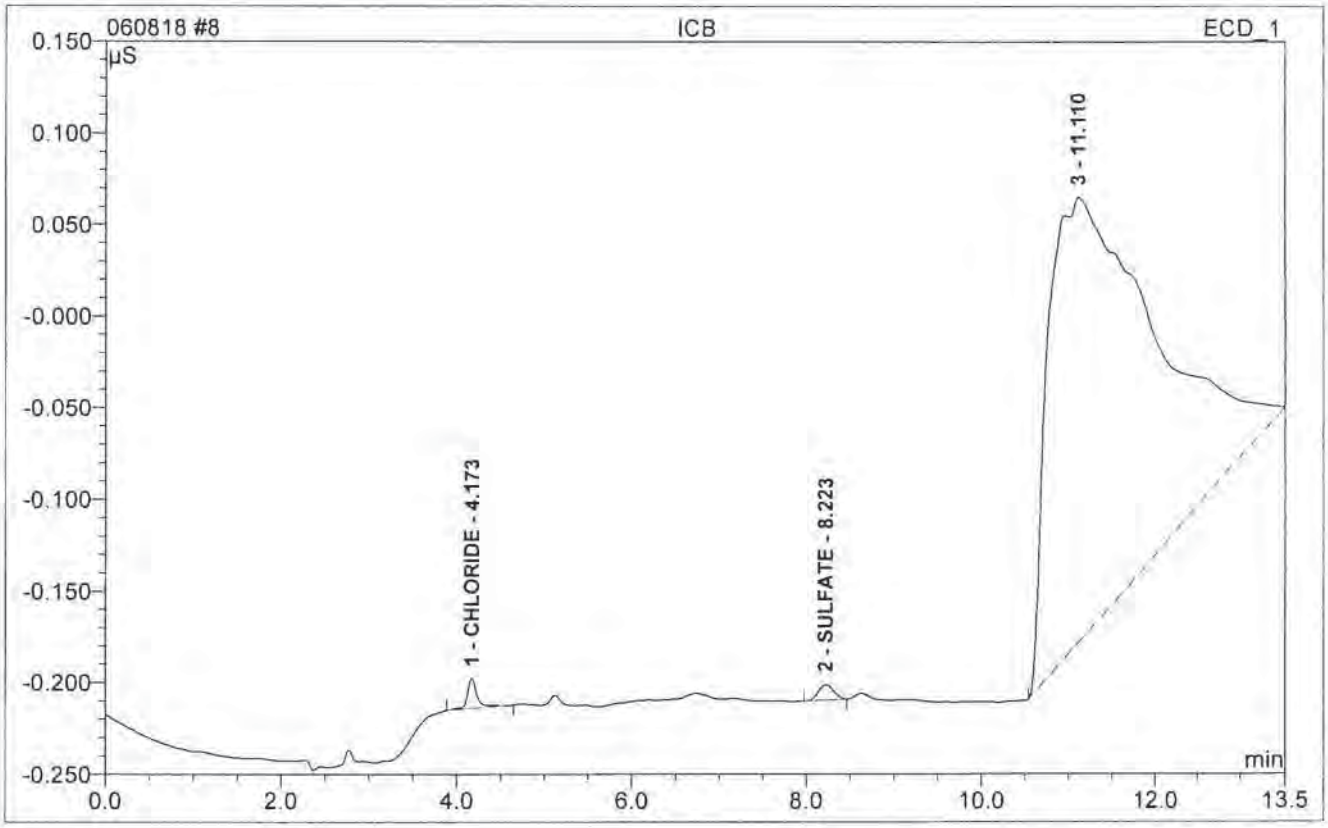
Sample Name:	**ICV**	*Injection Volume:*	**10.0**
Vial Number:	**7**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 15:55**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.78	FLUORIDE	5.746	0.560	9.87	4.039	1.
2	4.17	CHLORIDE	16.161	1.756	30.96	20.069	1.
3	5.13	NITRITE,N	6.016	0.813	14.33	4.261	1.
4	7.17	BROMIDE	0.819	0.134	2.36	3.749	1.
5	8.20	SULFATE	5.960	1.248	22.01	20.035	1.
6	8.58	NITRATE	4.210	0.883	15.57	4.012	1.
7	12.22	PHOSPHATE	1.654	0.279	4.91	4.053	1.
Total:			40.567	5.673	100.00	60.220	

8 ICB

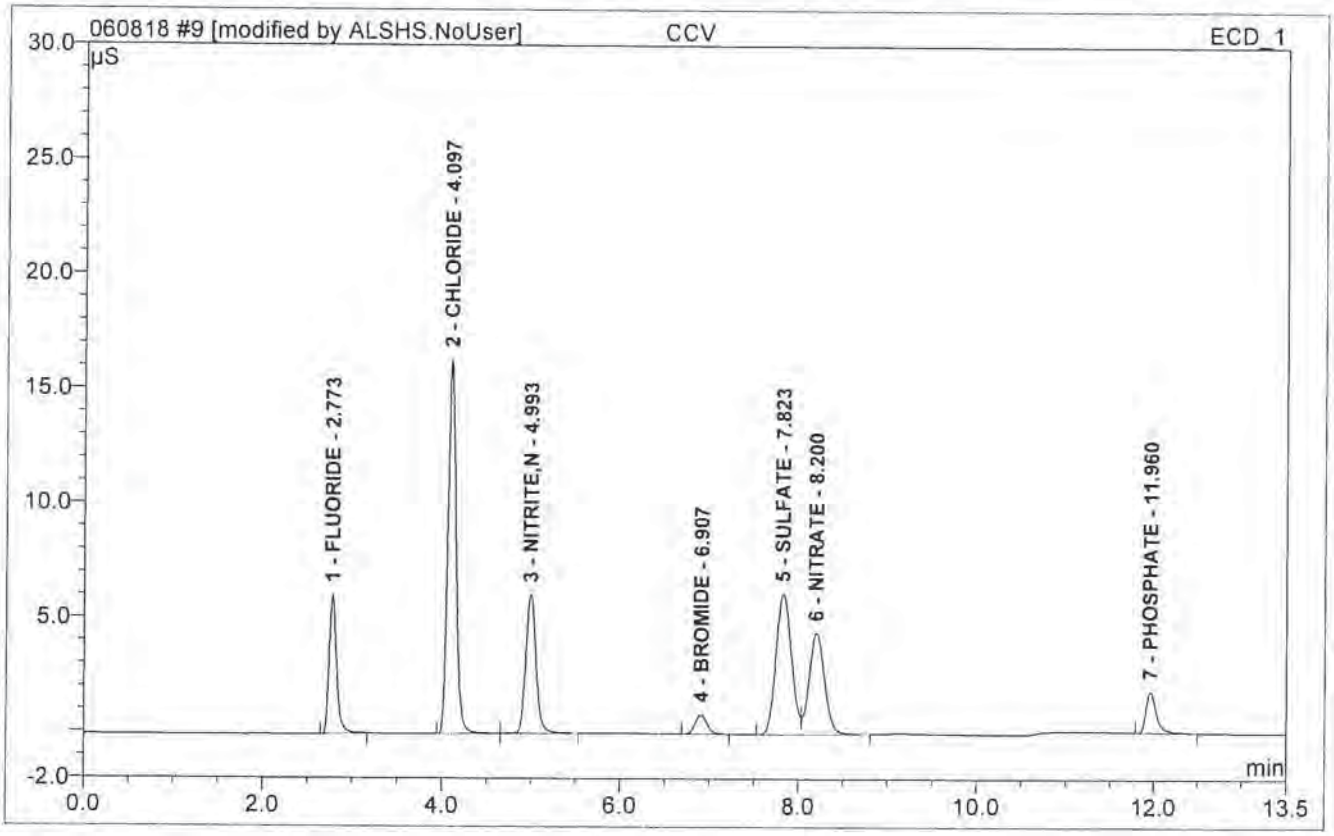
Sample Name:	**ICB**	*Injection Volume:*	**10.0**
Vial Number:	**8**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**4/26/2018 16:09**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	4.17	CHLORIDE	0.016	0.002	0.60	0.153	1.
2	8.22	SULFATE	0.008	0.002	0.50	0.237	1.
Total:			0.025	0.004	1.10	0.391	

9 CCV

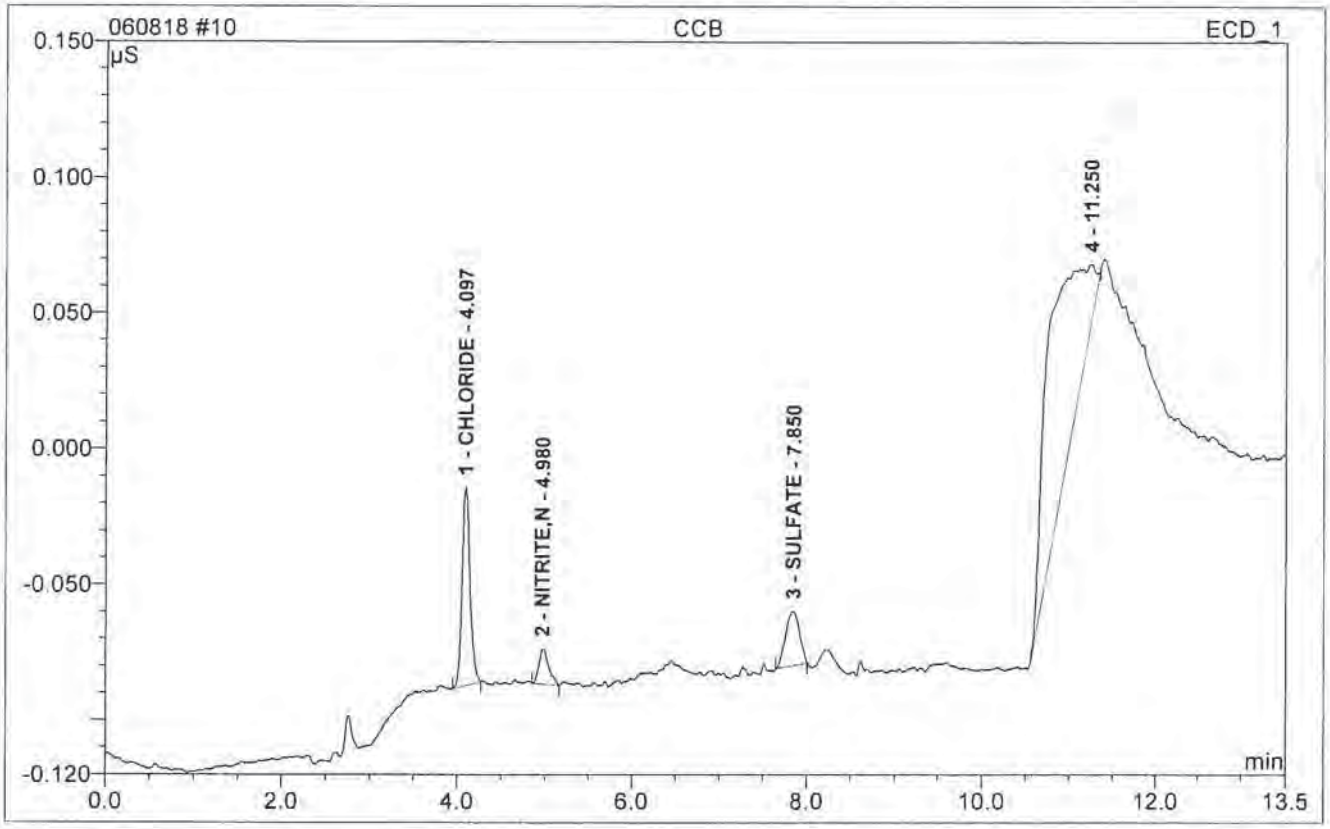
Sample Name:	**CCV**	*Injection Volume:*	**10.0**
Vial Number:	**1**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 4:29**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	6.093	0.583	10.24	4.205	1.
2	4.10	CHLORIDE	16.337	1.760	30.90	20.118	1.
3	4.99	NITRITE,N	6.075	0.823	14.44	4.314	1.
4	6.91	BROMIDE	0.860	0.133	2.34	3.732	1.
5	7.82	SULFATE	6.155	1.248	21.90	20.023	1.
6	8.20	NITRATE	4.444	0.895	15.72	4.067	1.
7	11.96	PHOSPHATE	1.829	0.254	4.46	3.730	1.
Total:			41.792	5.696	100.00	60.189	

10 CCB

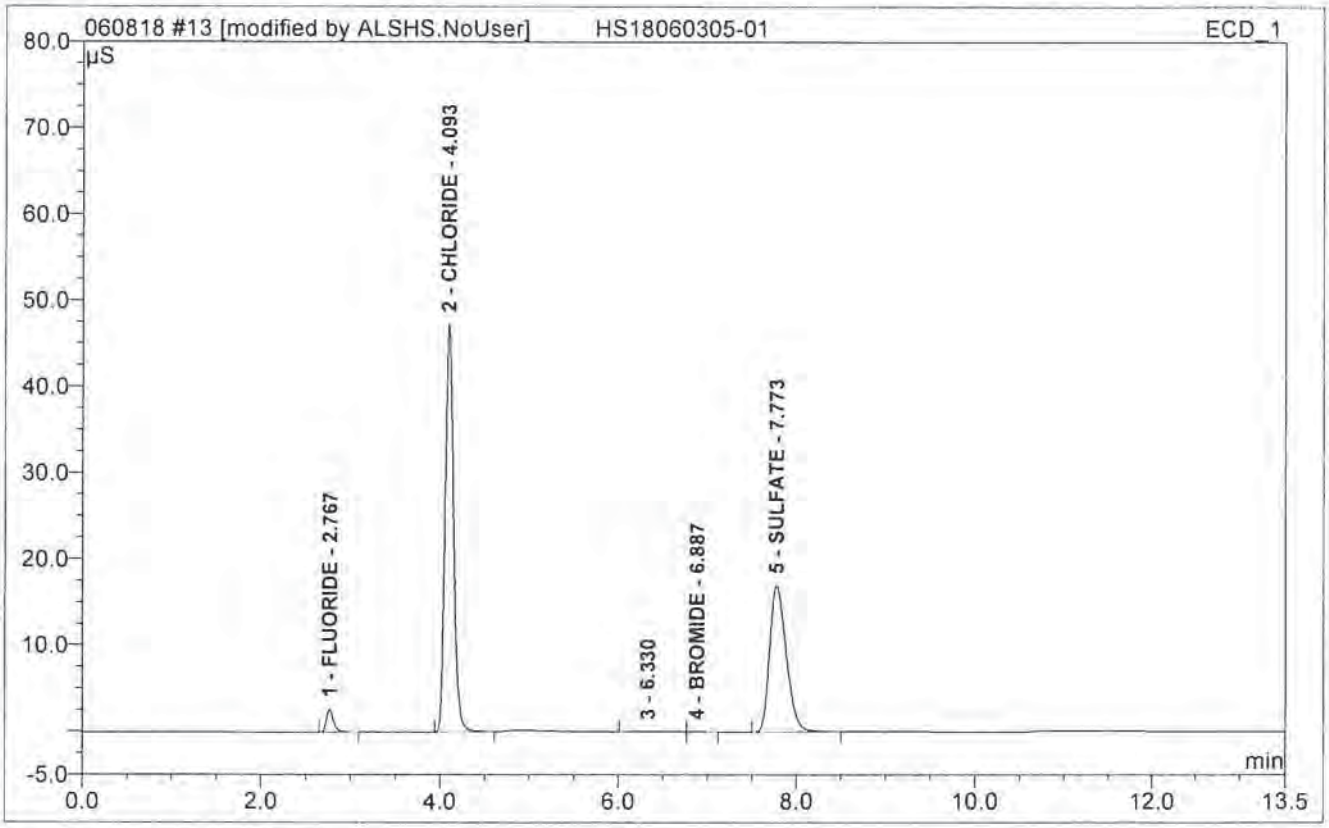
Sample Name:	**CCB**	*Injection Volume:*	**10.0**
Vial Number:	**2**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 4:43**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	4.10	CHLORIDE	0.073	0.008	15.07	0.218	1.
2	4.98	NITRITE,N	0.013	0.002	3.29	0.017	1.
3	7.85	SULFATE	0.020	0.004	7.27	0.269	1.
Total:			0.107	0.013	25.63	0.505	

13 HS18060305-01

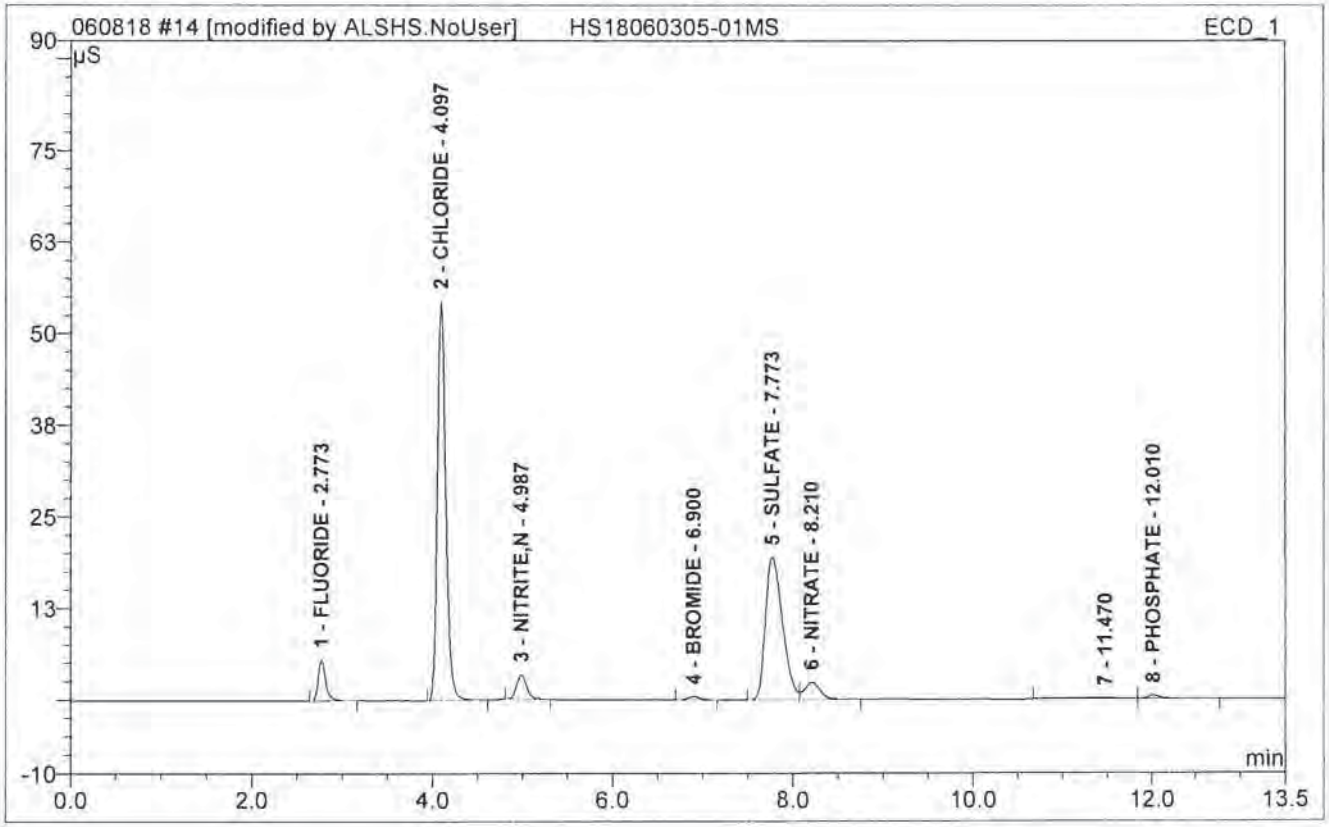
Sample Name:	**HS18060305-01**	*Injection Volume:*	**10.0**
Vial Number:	**60**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 5:27**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	2.654	0.243	2.67	1.772	1.
2	4.09	CHLORIDE	47.355	5.132	56.21	58.404	1.
4	6.89	BROMIDE	0.050	0.009	0.10	0.292	1.
5	7.77	SULFATE	16.994	3.714	40.67	59.187	1.
Total:			67.053	9.098	99.64	119.655	

14 HS18060305-01MS

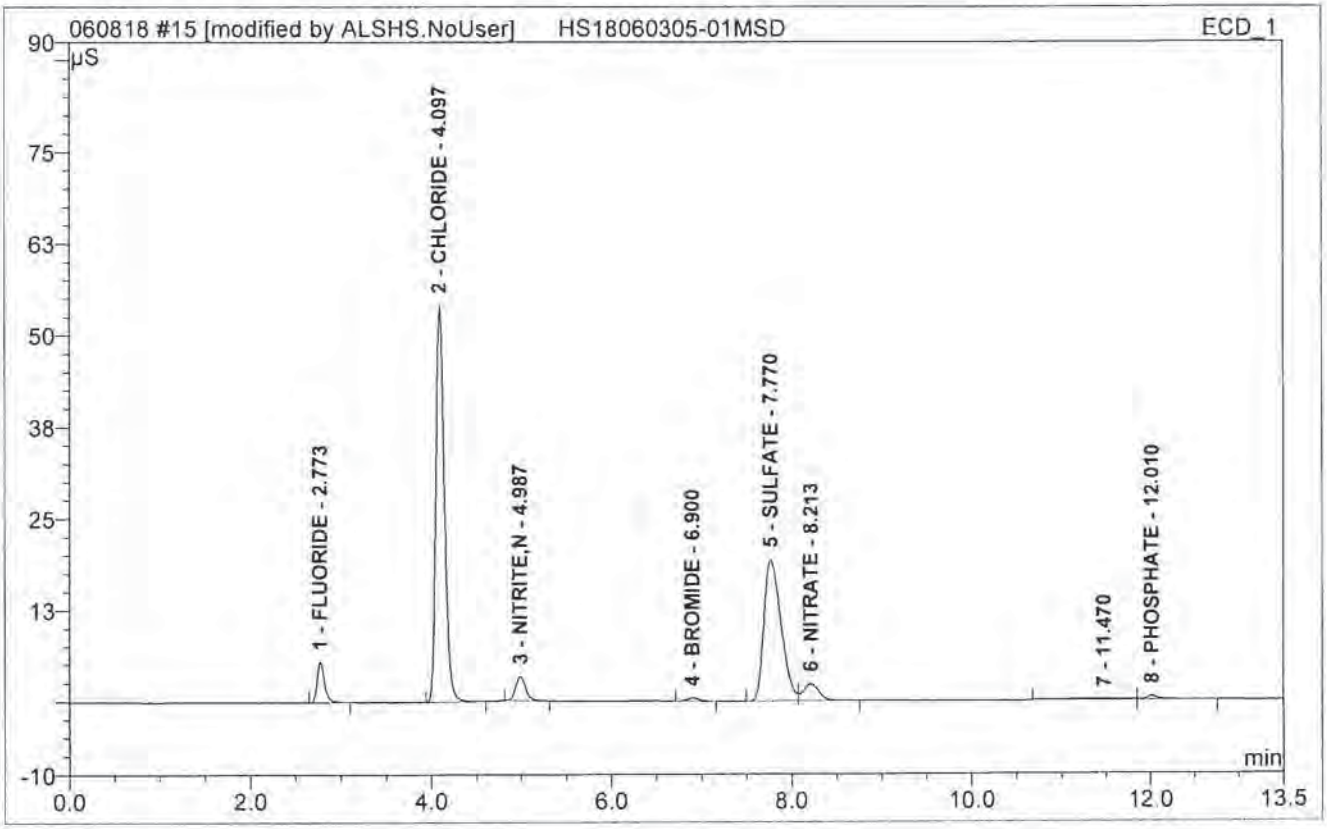
Sample Name:	**HS18060305-01MS**	*Injection Volume:*	**10.0**
Vial Number:	**61**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 5:41**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	5.578	0.539	4.54	3.886	1.
2	4.10	CHLORIDE	54.434	5.921	49.88	67.366	1.
3	4.99	NITRITE,N	3.334	0.432	3.64	2.268	1.
4	6.90	BROMIDE	0.441	0.068	0.57	1.920	1.
5	7.77	SULFATE	19.427	4.272	35.99	68.059	1.
6	8.21	NITRATE	2.338	0.472	3.98	2.165	1.
8	12.01	PHOSPHATE	0.493	0.087	0.73	1.549	1.
Total:			86.044	11.791	99.32	147.213	

15 HS18060305-01MSD

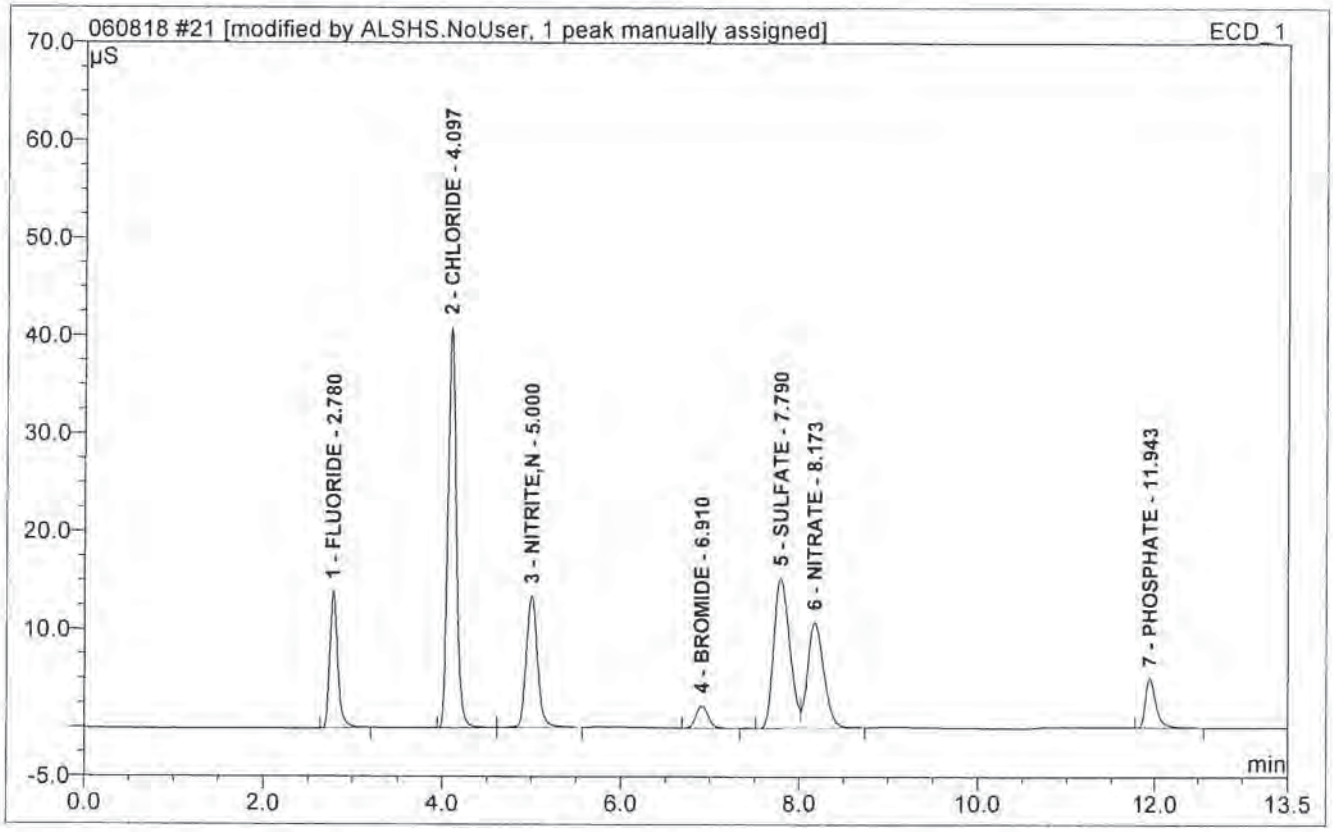
Sample Name:	**HS18060305-01MSD**	*Injection Volume:*	**10.0**
Vial Number:	**62**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 5:56**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	5.546	0.532	4.51	3.841	1.
2	4.10	CHLORIDE	54.170	5.886	49.89	66.966	1.
3	4.99	NITRITE,N	3.315	0.430	3.64	2.258	1.
4	6.90	BROMIDE	0.439	0.067	0.57	1.910	1.
5	7.77	SULFATE	19.324	4.247	35.99	67.656	1.
6	8.21	NITRATE	2.326	0.469	3.97	2.149	1.
8	12.01	PHOSPHATE	0.501	0.087	0.74	1.550	1.
Total:			85.622	11.719	99.32	146.331	

21 CCV1

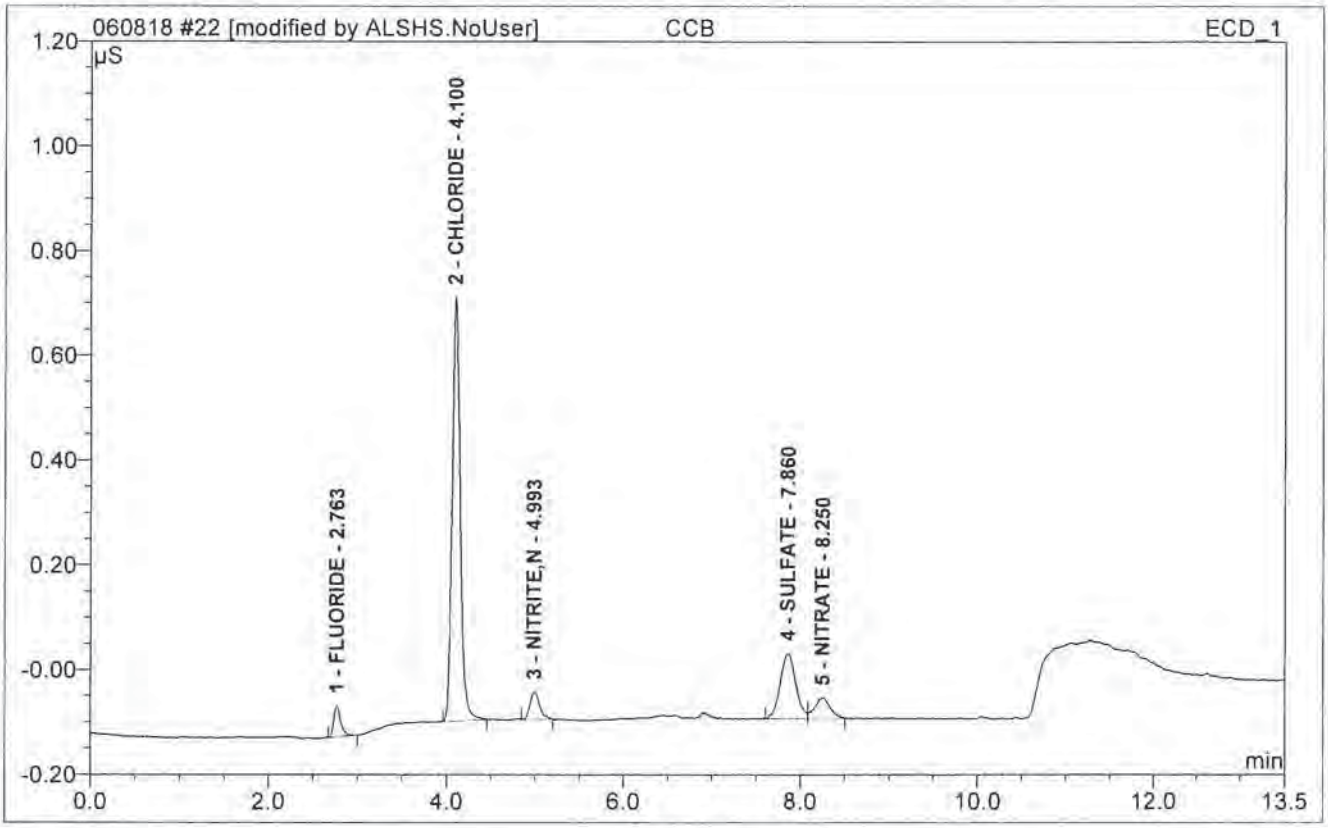
Sample Name:	**CCV1**	*Injection Volume:*	**10.0**
Vial Number:	**3**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 7:23**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.78	FLUORIDE	13.993	1.447	9.99	10.386	1.
2	4.10	CHLORIDE	40.942	4.482	30.95	51.026	1.
3	5.00	NITRITE,N	13.477	1.984	13.70	10.391	1.
4	6.91	BROMIDE	2.314	0.365	2.52	10.151	1.
5	7.79	SULFATE	15.383	3.191	22.03	50.880	1.
6	8.17	NITRATE	10.859	2.291	15.82	10.345	1.
7	11.94	PHOSPHATE	5.059	0.725	5.01	9.885	1.
Total:			102.028	14.485	100.00	153.064	

22 CCB

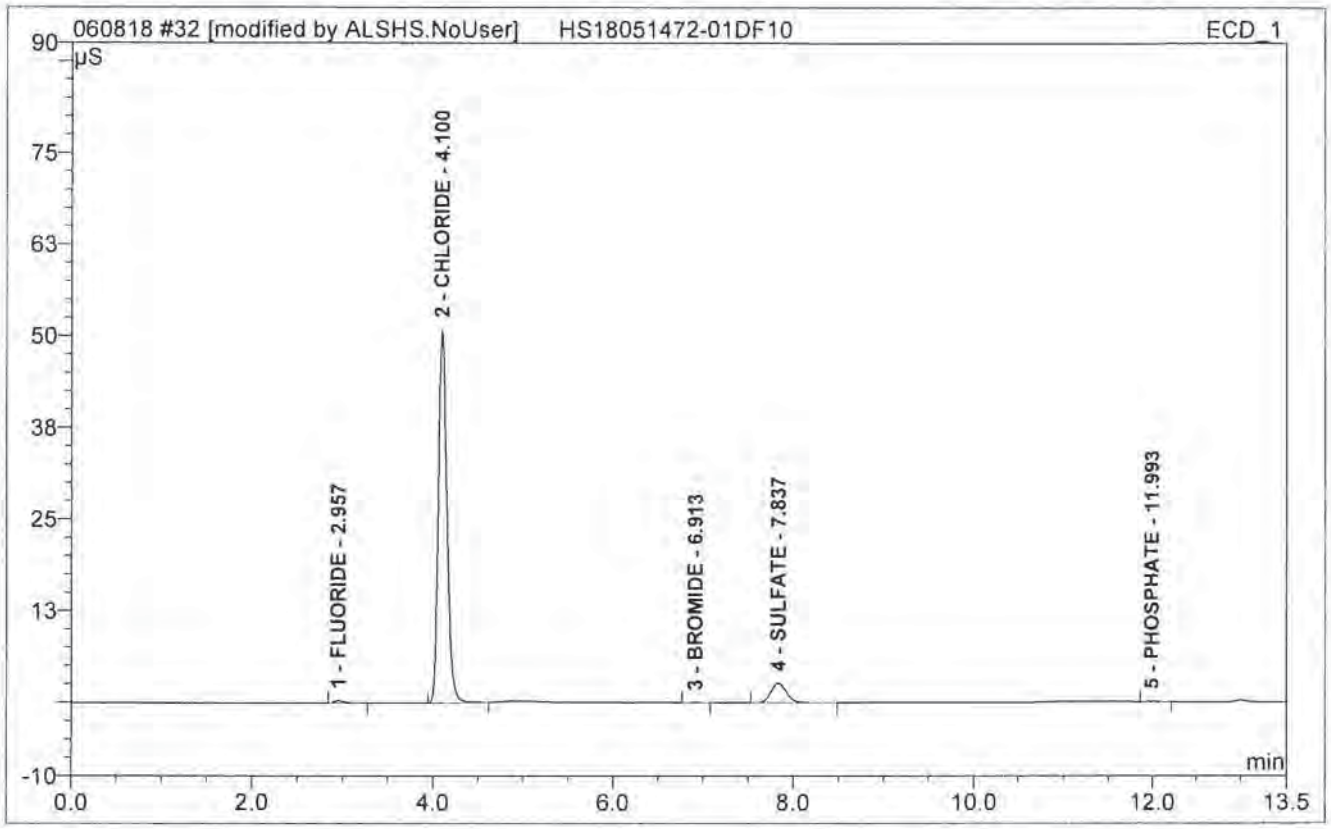
Sample Name:	**CCB**	*Injection Volume:*	**10.0**
Vial Number:	**4**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 7:38**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.76	FLUORIDE	0.060	0.005	4.18	0.068	1.
2	4.10	CHLORIDE	0.810	0.085	65.21	1.093	1.
3	4.99	NITRITE,N	0.053	0.007	5.09	0.043	1.
4	7.86	SULFATE	0.125	0.025	19.48	0.612	1.
5	8.25	NITRATE	0.040	0.008	6.05	0.077	1.
Total:			1.088	0.130	100.00	1.893	

32 HS18051472-01DF10

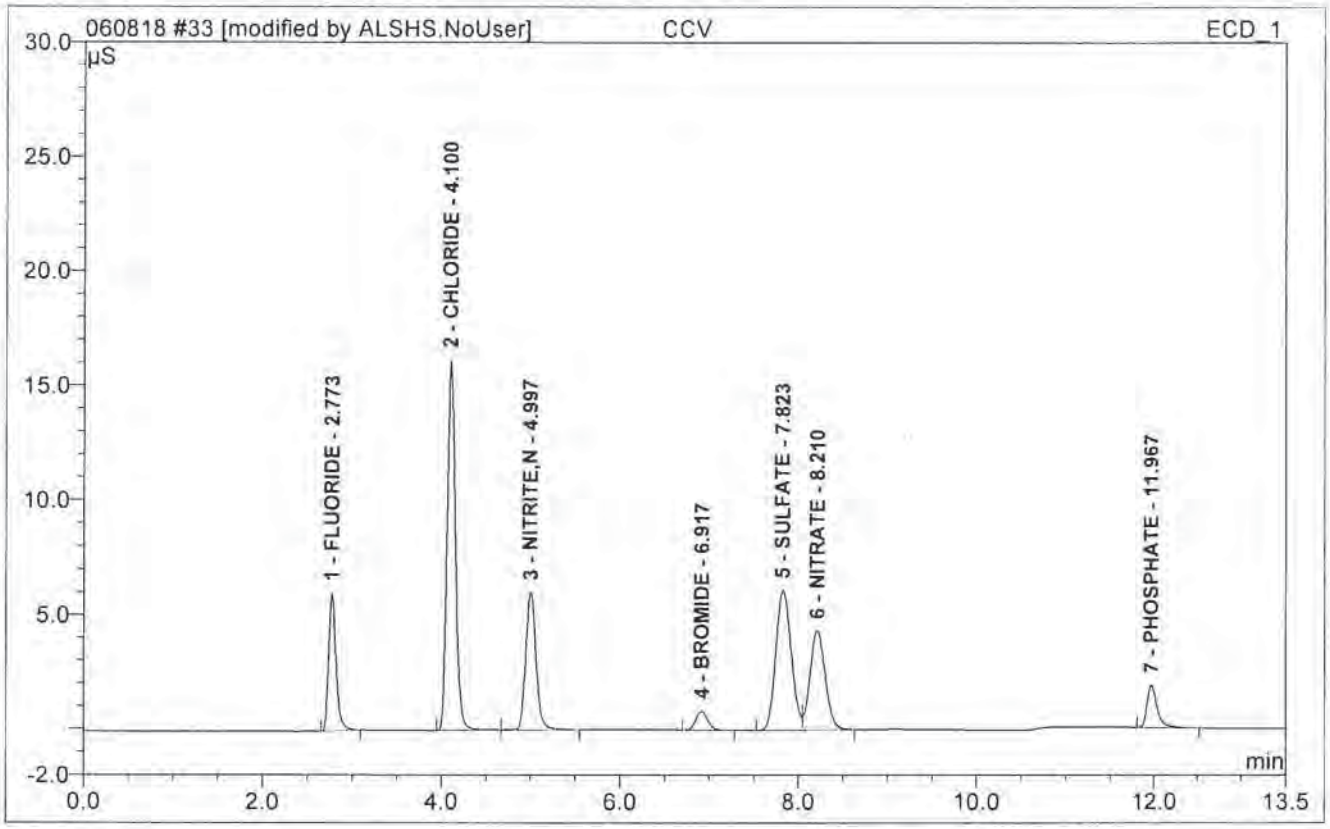
Sample Name:	**HS18051472-01DF10**	*Injection Volume:*	**10.0**
Vial Number:	**75**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**10.**
Recording Time:	**6/8/2018 10:03**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.96	FLUORIDE	0.343	0.038	0.62	3.041	10.
2	4.10	CHLORIDE	50.897	5.575	90.42	634.352	10.
3	6.91	BROMIDE	0.025	0.004	0.06	1.401	10.
4	7.84	SULFATE	2.670	0.540	8.76	87.890	10.
5	11.99	PHOSPHATE	0.064	0.009	0.14	5.249	10.
Total:			53.999	6.166	100.00	731.933	

33 CCV

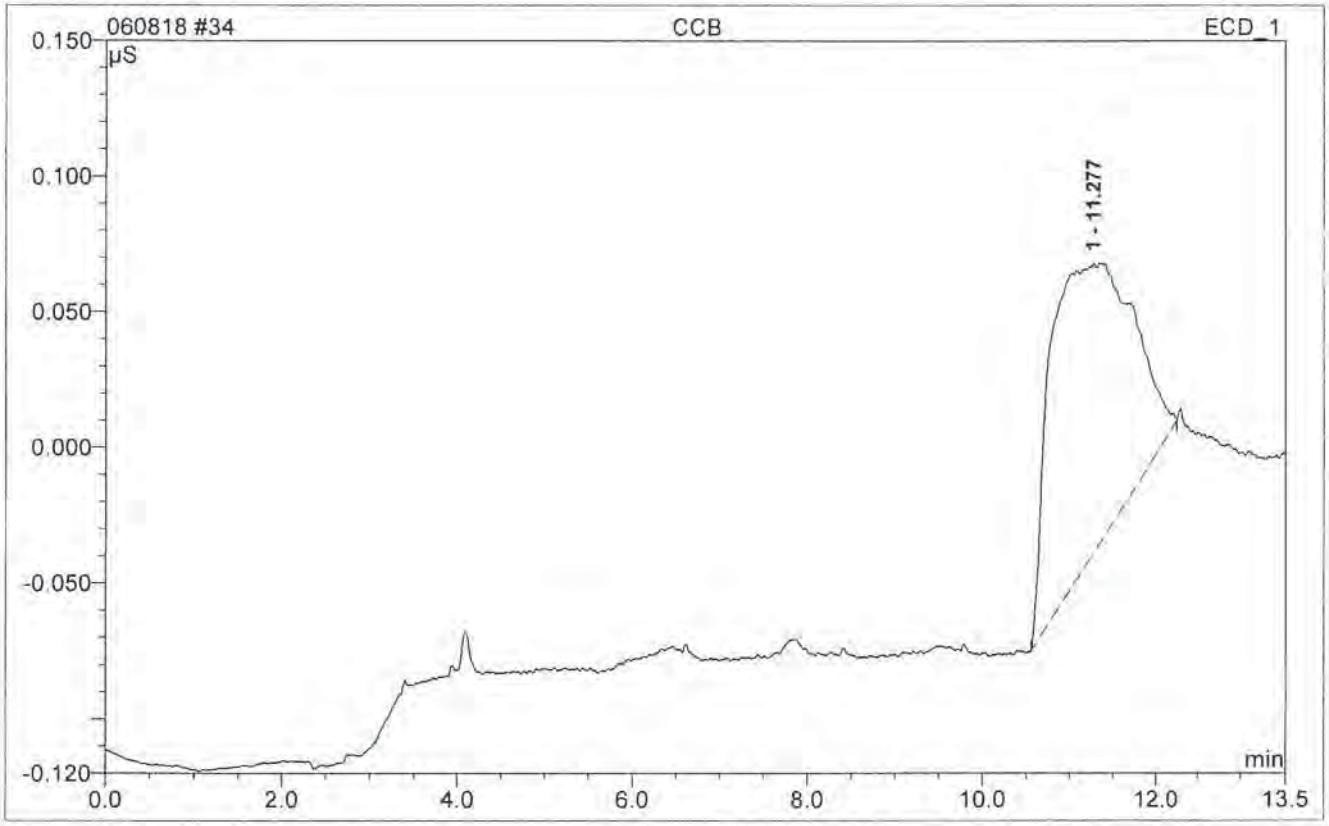
Sample Name:	**CCV**	*Injection Volume:*	**10.0**
Vial Number:	**1**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 10:18**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	6.043	0.574	10.20	4.140	1.
2	4.10	CHLORIDE	16.136	1.745	31.00	19.946	1.
3	5.00	NITRITE,N	6.049	0.820	14.57	4.300	1.
4	6.92	BROMIDE	0.834	0.129	2.30	3.628	1.
5	7.82	SULFATE	6.129	1.238	21.99	19.869	1.
6	8.21	NITRATE	4.357	0.867	15.40	3.940	1.
7	11.97	PHOSPHATE	1.871	0.256	4.54	3.751	1.
Total:			41.419	5.629	100.00	59.573	

34 CCB

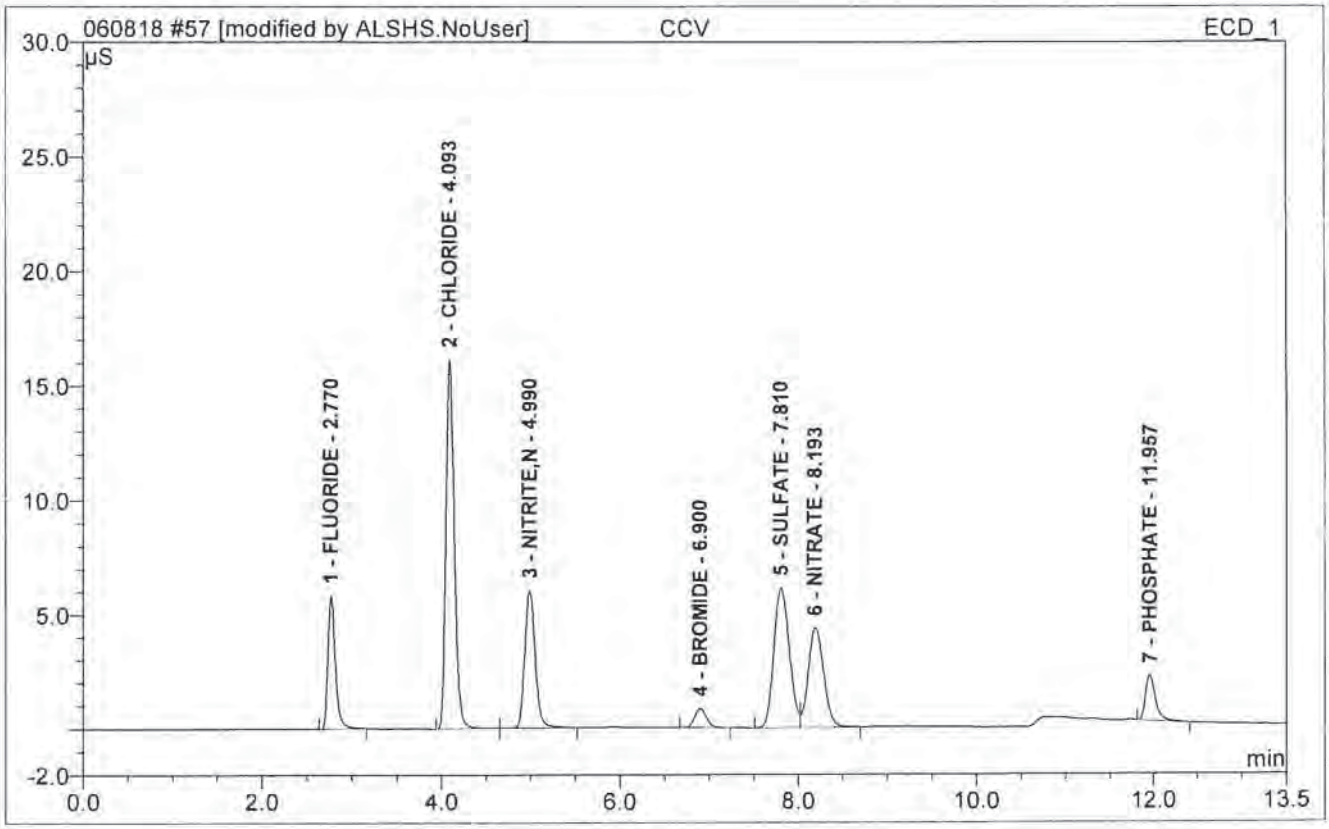
Sample Name:	**CCB**	*Injection Volume:*	**10.0**
Vial Number:	**2**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 10:32**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
Total:			0.000	0.000	0.00	0.000	

57 CCV

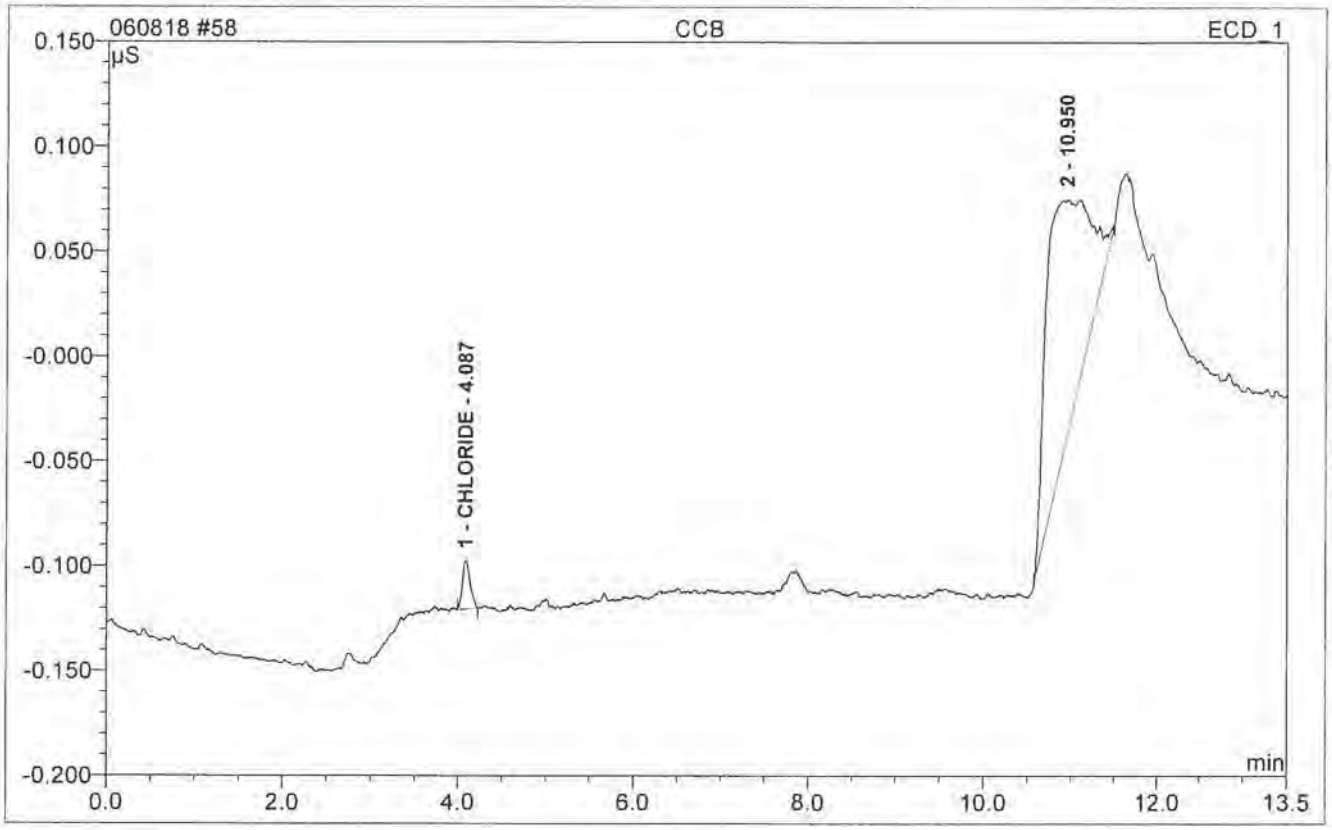
Sample Name:	**CCV**	*Injection Volume:*	**10.0**
Vial Number:	**1**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 18:44**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	5.850	0.559	9.95	4.031	1.
2	4.09	CHLORIDE	16.128	1.740	30.97	19.891	1.
3	4.99	NITRITE,N	6.020	0.819	14.57	4.294	1.
4	6.90	BROMIDE	0.842	0.131	2.33	3.669	1.
5	7.81	SULFATE	6.126	1.236	22.00	19.843	1.
6	8.19	NITRATE	4.358	0.870	15.47	3.951	1.
7	11.96	PHOSPHATE	1.990	0.265	4.72	3.880	1.
Total:			41.314	5.620	100.00	59.559	

58 CCB

Sample Name:	**CCB**	*Injection Volume:*	**10.0**
Vial Number:	**2**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 18:59**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**

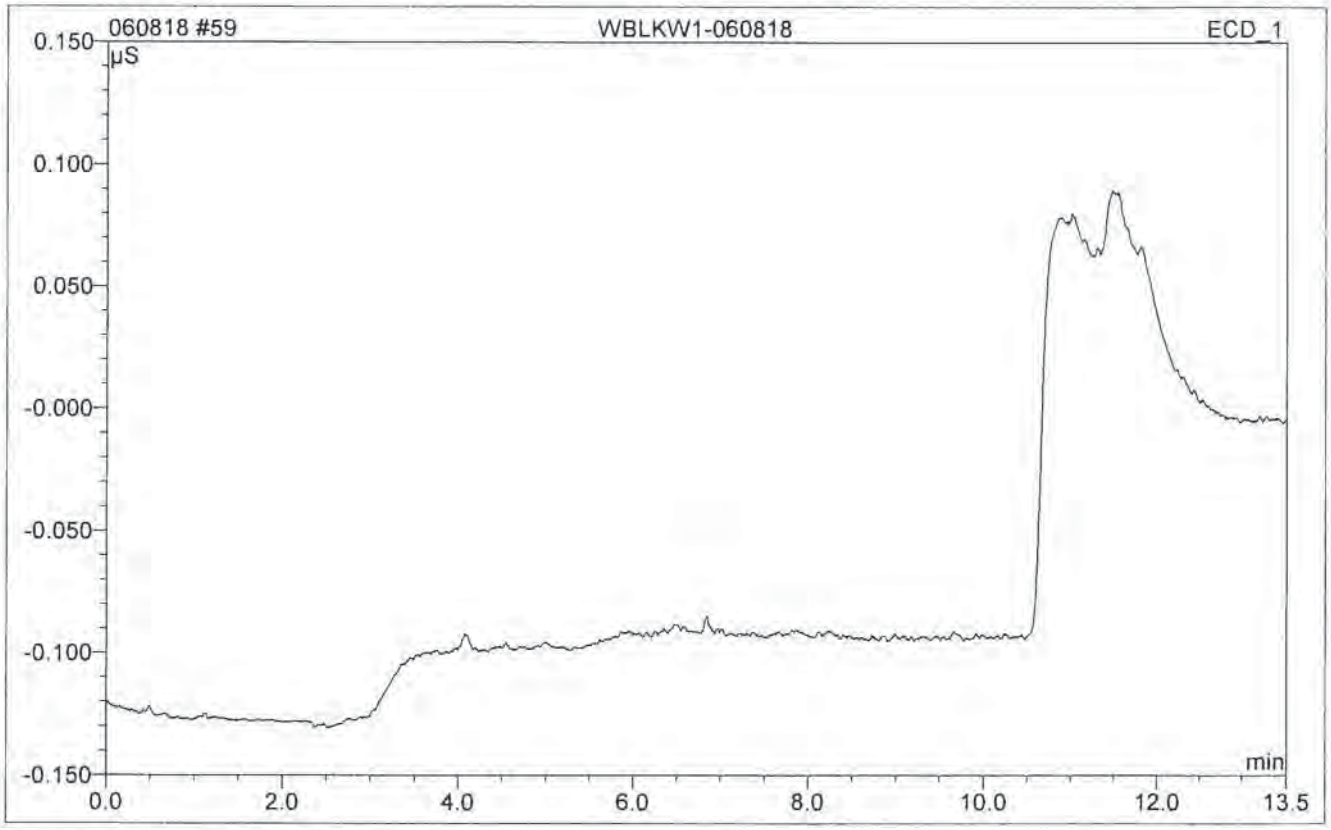


No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	4.09	CHLORIDE	0.023	0.002	3.46	0.156	1.
Total:			0.023	0.002	3.46	0.156	

59 WBLKW1-060818

9056_W 6.08.18

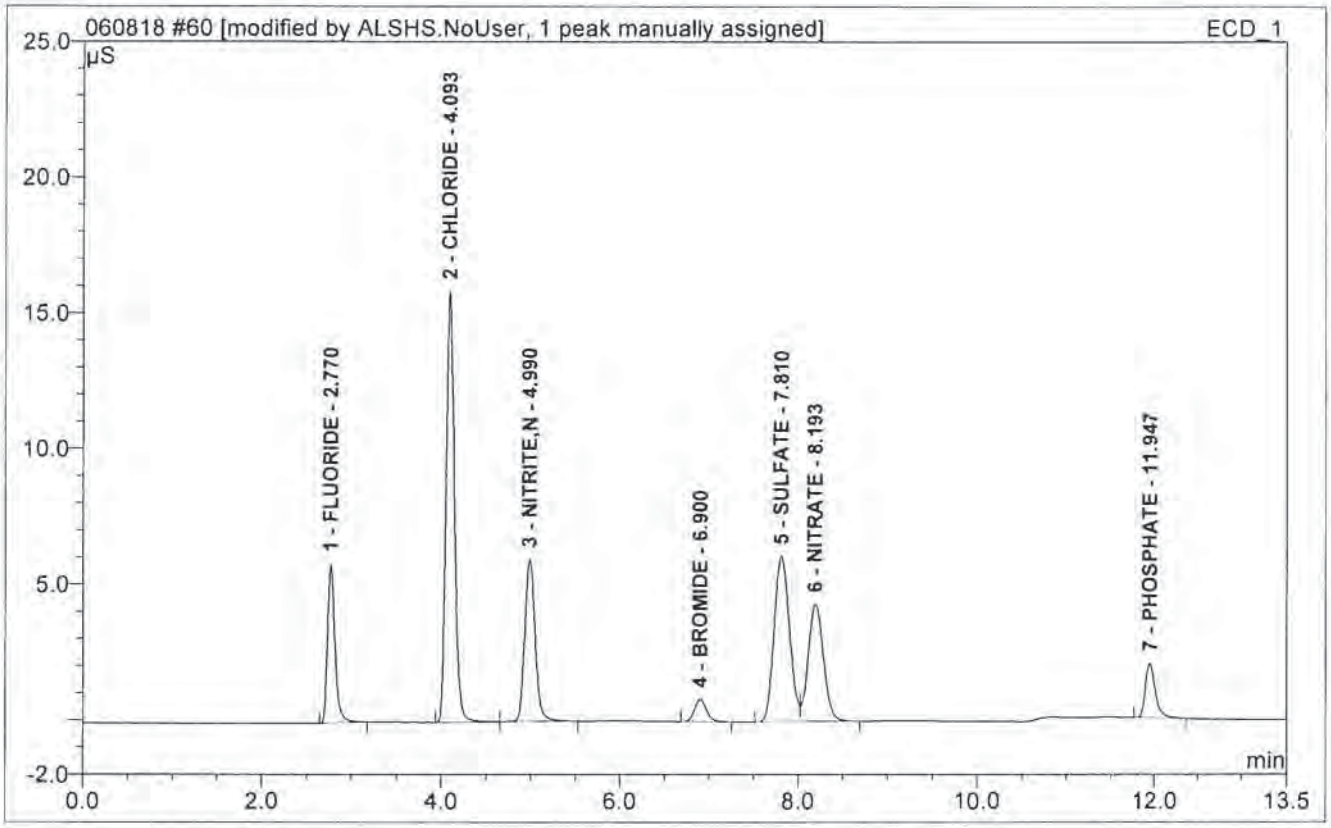
Sample Name:	**WBLKW1-060818**	*Injection Volume:*	**10.0**
Vial Number:	**55**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 19:13**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
Total:			0.000	0.000	0.00	0.000	

60 WLCSW1-060818

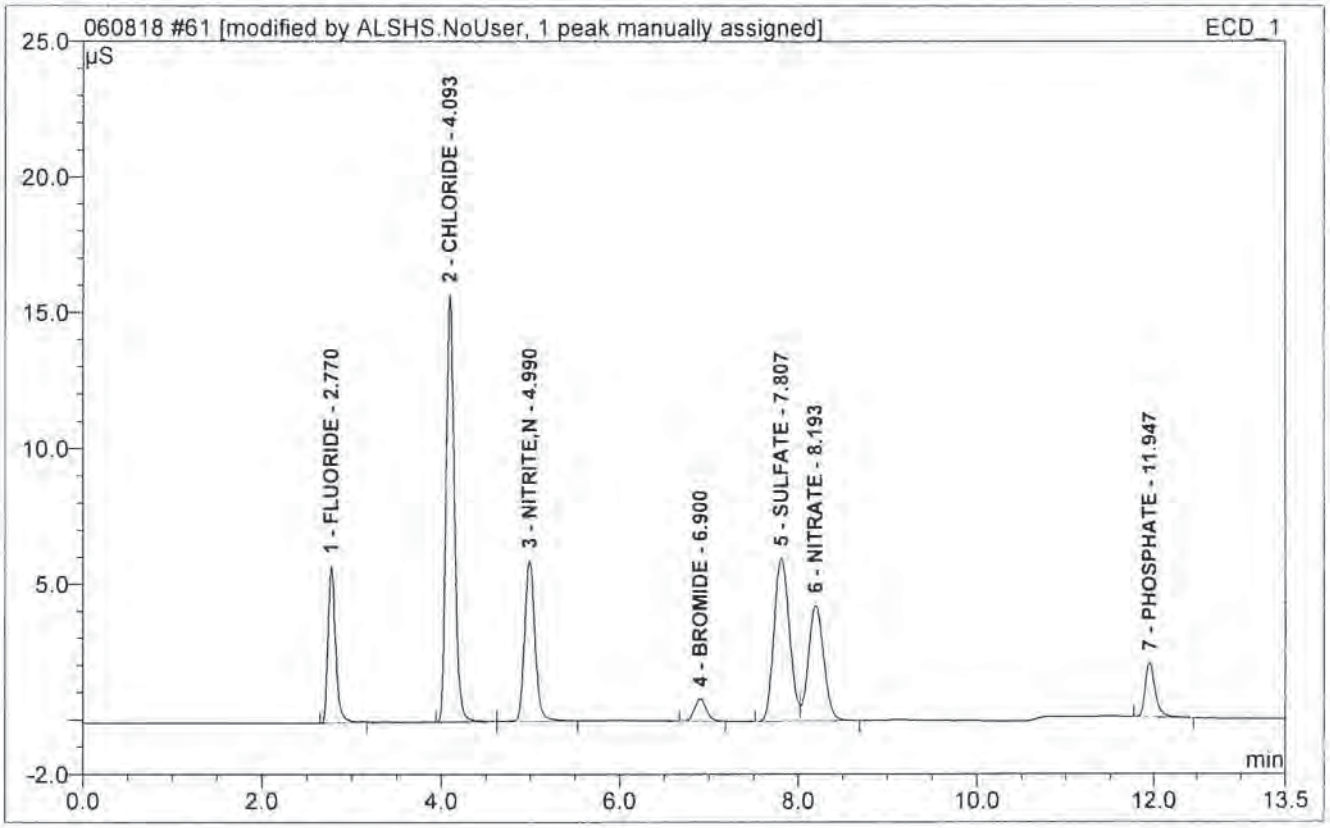
Sample Name:	**WLCSW1-060818**	*Injection Volume:*	**10.0**
Vial Number:	**56**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 19:28**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	5.849	0.566	10.12	4.082	1.
2	4.09	CHLORIDE	15.877	1.726	30.87	19.731	1.
3	4.99	NITRITE,N	5.973	0.814	14.55	4.266	1.
4	6.90	BROMIDE	0.832	0.130	2.32	3.639	1.
5	7.81	SULFATE	6.091	1.227	21.94	19.693	1.
6	8.19	NITRATE	4.325	0.861	15.39	3.911	1.
7	11.95	PHOSPHATE	2.006	0.268	4.80	3.918	1.
Total:			40.954	5.591	100.00	59.241	

61 WLCSDW1-060818

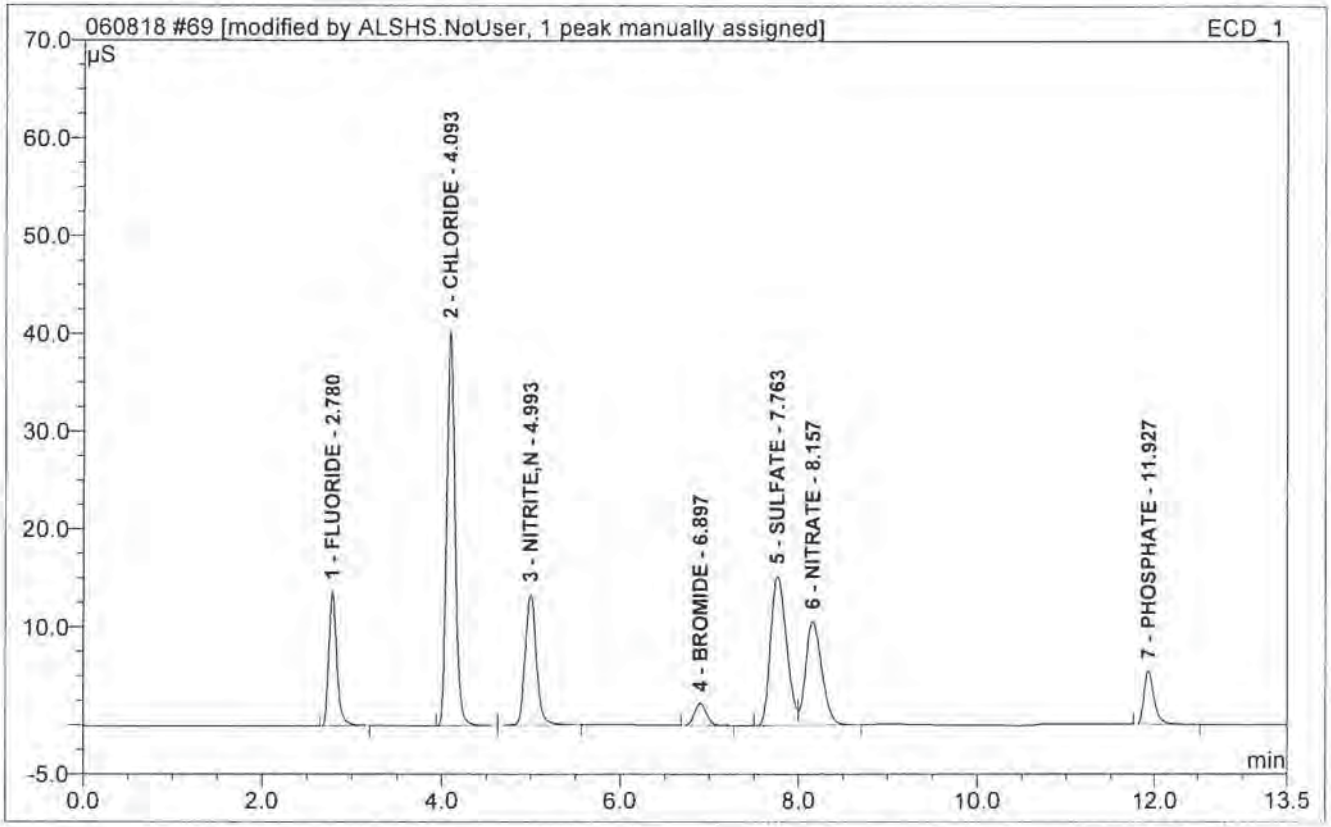
Sample Name:	**WLCSDW1-060818**	*Injection Volume:*	**10.0**
Vial Number:	**57**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 19:43**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.77	FLUORIDE	5.801	0.561	10.14	4.045	1.
2	4.09	CHLORIDE	15.727	1.705	30.83	19.490	1.
3	4.99	NITRITE,N	5.927	0.805	14.56	4.224	1.
4	6.90	BROMIDE	0.820	0.126	2.29	3.547	1.
5	7.81	SULFATE	6.012	1.212	21.91	19.454	1.
6	8.19	NITRATE	4.273	0.851	15.39	3.868	1.
7	11.95	PHOSPHATE	2.007	0.270	4.87	3.933	1.
Total:			40.565	5.530	100.00	58.560	

69 CCV1

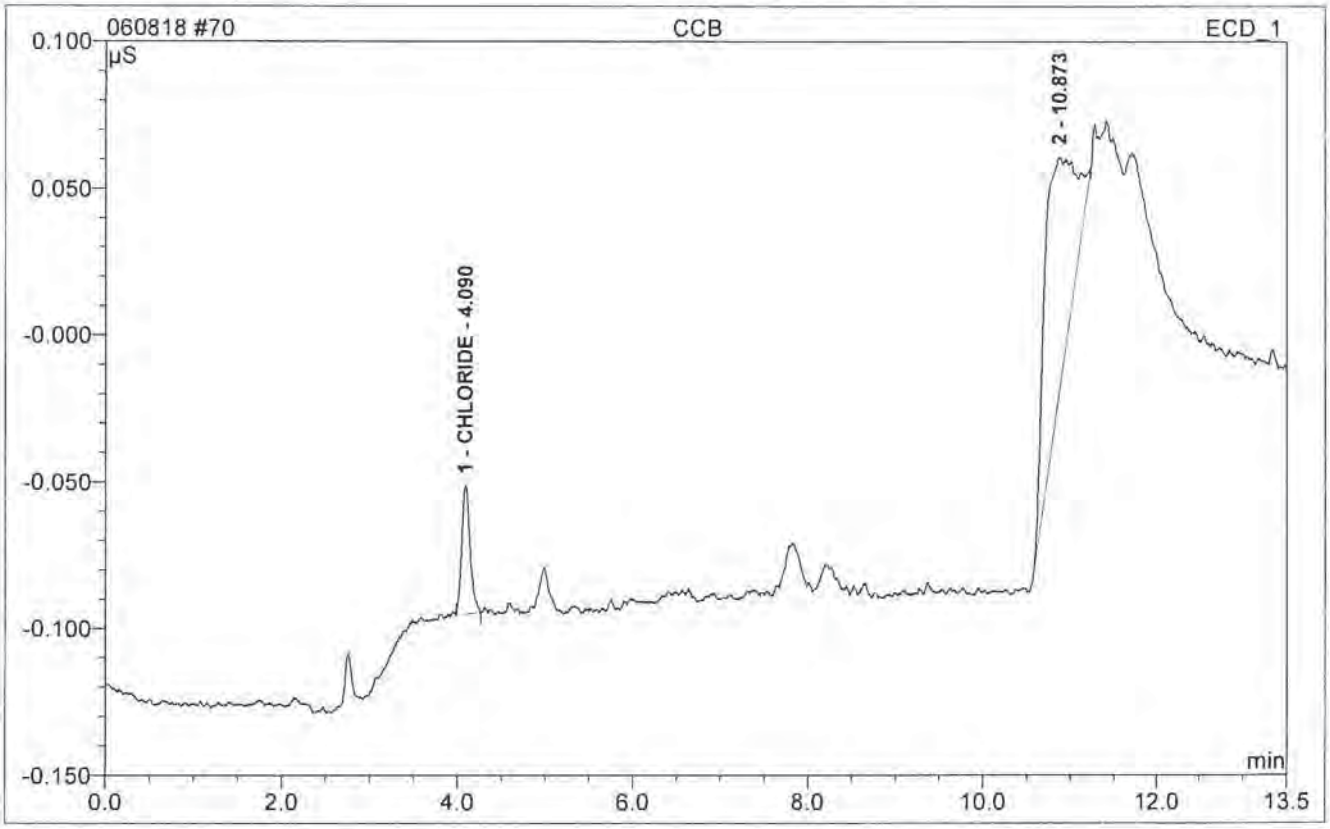
Sample Name:	**CCV1**	*Injection Volume:*	**10.0**
Vial Number:	**3**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 21:39**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	2.78	FLUORIDE	13.763	1.428	9.96	10.256	1.
2	4.09	CHLORIDE	40.394	4.413	30.78	50.242	1.
3	4.99	NITRITE,N	13.397	1.974	13.77	10.340	1.
4	6.90	BROMIDE	2.287	0.358	2.49	9.963	1.
5	7.76	SULFATE	15.278	3.168	22.09	50.519	1.
6	8.16	NITRATE	10.691	2.240	15.62	10.113	1.
7	11.93	PHOSPHATE	5.490	0.758	5.29	10.319	1.
Total:			101.299	14.340	100.00	151.753	

70 CCB

Sample Name:	**CCB**	*Injection Volume:*	**10.0**
Vial Number:	**4**	*Channel:*	**ECD_1**
Sample Type:	**unknown**	*Wavelength:*	**n.a.**
Control Program:	**Anions Gradient Program**	*Bandwidth:*	**n.a.**
Quantif. Method:	**042618**	*Dilution Factor:*	**1.**
Recording Time:	**6/8/2018 21:53**	*Sample Weight:*	**1.0000**
Run Time (min):	**13.50**	*Sample Amount:*	**1.0000**



No.	Ret.Time min	Peak Name	Height µS	Area µS*min	Rel.Area %	Amount PPM	Dil.Fac.
1	4.09	CHLORIDE	0.044	0.005	13.01	0.184	1.
Total:			0.044	0.005	13.01	0.184	

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

WorkOrder: HS18051489

Longhorn GW Treatment Plant

Bhate Environmental Associates, Inc.

Marcia Olive
445 Union Blvd Ste 129
Lakewood CO 80228

22-Jun-2018

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

June 08, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18051489**

Laboratory Results for: **Longhorn GW Treatment Plant**

Dear Marcia,

ALS Environmental received 3 sample(s) on May 31, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order: HS18051489

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18051489-01	LH18/24-SP650_053018	Water		30-May-2018 14:00	31-May-2018 09:00	☐
HS18051489-02	LH18/24-SP650_053018_Before IX	Water		30-May-2018 14:00	31-May-2018 09:00	☐
HS18051489-03	LH18/24-SP650_053018_After IX	Water		30-May-2018 14:00	31-May-2018 09:00	☐

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Work Order:

CASE NARRATIVE

Work Order Comments

• The analysis for Perchlorate was subcontracted to ALS Salt Lake City, UT. Final report attached.

WetChemistry by Method E350.3

Batch ID: R317612

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E415.1

Batch ID: R317488

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: R317483

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_053018
Collection Date: 30-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051489
Lab ID:HS18051489-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
AMMONIA AS N BY E350.3(ISE)		**Method:E350.3**						Analyst: MZD
Nitrogen, Ammonia (As N)	**18**		**0.20**	**0.20**	**0.20**	**mg/L**	1	08-Jun-2018 11:20
ORTHO PHOSPHATE (PO4) AS P BY E365.3		**Method:E365.3**						Analyst: MZD
Phosphorus, Total Orthophosphate (As P)	**3.00**		**0.100**	**0.100**	**0.250**	**mg/L**	10	01-Jun-2018 12:05
TOTAL ORGANIC CARBON BY E415.1		**Method:E415.1**						Analyst: AJH
Organic Carbon, Total	**150**		**2.50**	**3.00**	**5.00**	**mg/L**	5	06-Jun-2018 06:21

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_053018_Before IX
Collection Date: 30-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051489
Lab ID:HS18051489-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	07-Jun-2018 17:31

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
Sample ID: LH18/24-SP650_053018_After IX
Collection Date: 30-May-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18051489
Lab ID:HS18051489-03
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	07-Jun-2018 17:31

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051489

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R317483	**Test Name :** ORTHO PHOSPHATE (PO4) AS P BY E365.3			**Matrix:** Water		
HS18051489-01	LH18/24-SP650_053018	30 May 2018 14:00			01 Jun 2018 12:05	10
Batch ID R317488	**Test Name :** TOTAL ORGANIC CARBON BY E415.1			**Matrix:** Water		
HS18051489-01	LH18/24-SP650_053018	30 May 2018 14:00			06 Jun 2018 06:21	5
Batch ID R317588	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)			**Matrix:** Water		
HS18051489-02	LH18/24-SP650_053018_Before IX	30 May 2018 14:00			07 Jun 2018 17:31	1
HS18051489-03	LH18/24-SP650_053018_After IX	30 May 2018 14:00			07 Jun 2018 17:31	1
Batch ID R317612	**Test Name :** AMMONIA AS N BY E350.3(ISE)			**Matrix:** Water		
HS18051489-01	LH18/24-SP650_053018	30 May 2018 14:00			08 Jun 2018 11:20	1

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051489

QC BATCH REPORT

Batch ID: R317483 **Instrument: UV-2450** **Method: E365.3**

MBLK Sample ID: **MBLK-317483** Units: **mg/L** Analysis Date: **01-Jun-2018 12:05**
Client ID: Run ID: **UV-2450_317483** SeqNo: **4592323** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.0100	0.0250								U

LCS Sample ID: **LCS-317483** Units: **mg/L** Analysis Date: **01-Jun-2018 12:05**
Client ID: Run ID: **UV-2450_317483** SeqNo: **4592324** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	0.227	0.0250	0.25	0	90.8	85 - 115				

MS Sample ID: **HS18051489-01MS** Units: **mg/L** Analysis Date: **01-Jun-2018 12:05**
Client ID: **LH18/24-SP650_053018** Run ID: **UV-2450_317483** SeqNo: **4592326** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	5.33	0.250	2.5	3	93.2	80 - 120				

MSD Sample ID: **HS18051489-01MSD** Units: **mg/L** Analysis Date: **01-Jun-2018 12:05**
Client ID: **LH18/24-SP650_053018** Run ID: **UV-2450_317483** SeqNo: **4592327** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Phosphorus, Total Orthophosphate (As P)	5.19	0.250	2.5	3	87.6	80 - 120	5.33	2.66	20	

The following samples were analyzed in this batch: HS18051489-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051489

QC BATCH REPORT

Batch ID: R317488 **Instrument: TOC_02** **Method: E415.1**

MBLK Sample ID: **WBLKW3-180605** Units: **mg/L** Analysis Date: **06-Jun-2018 05:13**
Client ID: Run ID: **TOC_02_317488** SeqNo: **4589306** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	0.600	1.00								U

LCS Sample ID: **WLCSW3-180605** Units: **mg/L** Analysis Date: **06-Jun-2018 05:28**
Client ID: Run ID: **TOC_02_317488** SeqNo: **4589307** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	9.903	1.00	10	0	99.0	80 - 120				

LCSD Sample ID: **WLCSDW3-180605** Units: **mg/L** Analysis Date: **06-Jun-2018 05:42**
Client ID: Run ID: **TOC_02_317488** SeqNo: **4589308** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	9.666	1.00	10	0	96.7	80 - 120	9.903	2.42	20	

MS Sample ID: **HS18051515-01MS** Units: **mg/L** Analysis Date: **06-Jun-2018 06:48**
Client ID: Run ID: **TOC_02_317488** SeqNo: **4589313** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	22.68	1.00	10	14.14	85.4	80 - 120				

The following samples were analyzed in this batch: HS18051489-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: HS18051489

QC BATCH REPORT

Batch ID: R317612 **Instrument: WetChem_HS** **Method: E350.3**

MBLK Sample ID: **MBLK-317612** Units: **mg/L** Analysis Date: **08-Jun-2018 11:20**
Client ID: Run ID: **WetChem_HS_317612** SeqNo: **4592220** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	0.20	0.20								U

LCS Sample ID: **LCS-317612** Units: **mg/L** Analysis Date: **08-Jun-2018 11:20**
Client ID: Run ID: **WetChem_HS_317612** SeqNo: **4592221** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	9.968	0.20	10	0	99.7	80 - 120				

MS Sample ID: **HS18060043-01MS** Units: **mg/L** Analysis Date: **08-Jun-2018 11:20**
Client ID: Run ID: **WetChem_HS_317612** SeqNo: **4592224** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.78	0.20	10	0.047	107	80 - 120				

MSD Sample ID: **HS18060043-01MSD** Units: **mg/L** Analysis Date: **08-Jun-2018 11:20**
Client ID: Run ID: **WetChem_HS_317612** SeqNo: **4592225** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Nitrogen, Ammonia (As N)	10.8	0.20	10	0.047	108	80 - 120	10.78	0.185	20	

The following samples were analyzed in this batch: HS18051489-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 08-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: Longhorn GW Treatment Plant
WorkOrder: **HS18051489**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Oklahoma	2017-088	31-Aug-2018
North Carolina	624-2018	31-Dec-2018
Louisiana	03087 2017-2018	30-Jun-2018
Arkansas	88-0356	27-Mar-2019
Kansas	E-10352 2017-218	31-Jul-2018
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193	30-Apr-2019

Date: 08-Jun-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18051489
Date/Time Received: **31-May-2018 09:00**
Received by: **NDR**

Checklist completed by: *Paresh M. Giga* eSignature — 31-May-2018 Date
Reviewed by: *RJ Modashia* eSignature — 31-May-2018 Date

Matrices: **Water**
Carrier name: **FedEx**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.0c/2.6c U/c	IR30	
Cooler(s)/Kit(s):	43622		
Date/Time sample(s) sent to storage:	5/31/18 10:55		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210 Houston, TX. 77099 (281) 530-5656 ATTN: SONIA WEST

HS18051489

Bhate Environmental Associates, Inc.
Longhorn GW Treatment Plant

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No.: NWO1312.0150.0 16.0001

Job: **GROUNDWATER TREATMENT PLANT WEEKLY SAMPLES**

Prepared By: Scott Beesinger

P.O. Number:

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: AMMONIA-N	TOTAL ORGANIC CARBON	ORTHO-PHOSPHATE	PERCHLORATE							Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_053018	Water	05/30/18 / 14:00		2	X	X									H2SO4	
LH18/24-SP650_053018	Water	05/30/18 / 14:00		1			X								NONE	
LH18/24-SP650_053018_Before IX	Water	05/30/18 / 14:00		1				X							NONE	
LH18/24-SP650_053018_After IX	Water	05/30/18 / 14:00		1				X							NONE	

Additional Remarks: **Standard TAT on all parameters**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	05/30/18	14:30	NIL	5/31/18	0900						

For Lab Use Only

Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
							4/C 2.0		

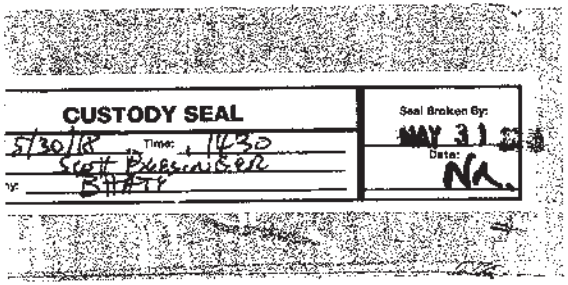
Remarks:

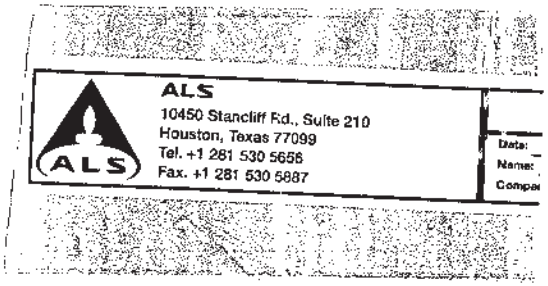
773769 752 9454

IR # 30
C/F - 0.4

43622

(Word) S:\L-ces\Forms\Chain of Custody - BiWeekly





FedEx
7376 9752 9454

THU - 31 MAY 10:30A
PRIORITY OVERNIGHT

77099
TX-US

Wet Chemistry Raw Data

Bhate Environmental Associates, Inc.
Project: LONGHORN GW TREATMENT
PLANT ALS WO# HS18051489

HS18051489

	T	Analys	Sample Name	Sample ID	Origin	Result	Status	Date / Time	Vial
1	U	NPOC	CCV	306.060.101	05-08-2018_	NPOC:25.41mg/L	Completed	6/5/2018 7:31:02 PM	1
2	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.05135mg/	Completed	6/5/2018 7:46:20 PM	2
3	U	NPOC	HS18050599-01	2/2	05-08-2018_	NPOC:2.449mg/L	Completed	6/5/2018 8:01:33 PM	3
4	U	NPOC	HS18050600-01	2/2	05-08-2018_	NPOC:2.524mg/L	Completed	6/5/2018 8:14:58 PM	4
5	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:25.47mg/L	Completed	6/5/2018 8:28:12 PM	5
6	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.06772mg/	Completed	6/5/2018 8:43:30 PM	6
7	U	NPOC	WBLKW1-180605	TOC_W 5310	05-08-2018_	NPOC:0.1751mg/L	Completed	6/5/2018 8:58:43 PM	7
8	U	NPOC	WLCSW1-180605	Untitled	05-08-2018_	NPOC:9.835mg/L	Completed	6/5/2018 9:11:51 PM	8
9	U	NPOC	WLCSDW1-180605	Untitled	05-08-2018_	NPOC:9.941mg/L	Completed	6/5/2018 9:25:11 PM	9
10	U	NPOC	HS18051455-01	1/2	05-08-2018_	NPOC:19.36mg/L	Completed	6/5/2018 9:38:24 PM	10
11	U	NPOC	HS18051455-02	1/2	05-08-2018_	NPOC:10.43mg/L	Completed	6/5/2018 9:51:37 PM	11
12	U	NPOC	HS18051455-03	1/2	05-08-2018_	NPOC:30.97mg/L	Completed	6/5/2018 10:04:51 PM	12
13	U	NPOC	HS18060068-01	1/2	05-08-2018_	NPOC:10.39mg/L	Completed	6/5/2018 10:18:04 PM	13
14	U	NPOC	HS18060068-02	1/2	05-08-2018_	NPOC:4.458mg/L	Completed	6/5/2018 10:33:22 PM	14
15	U	NPOC	HS18060068-03	1/2	05-08-2018_	NPOC:6.144mg/L	Completed	6/5/2018 10:48:42 PM	15
16	U	NPOC	HS18051531-01	1/2	05-08-2018_	NPOC:0.5053mg/L	Completed	6/5/2018 11:03:55 PM	16
17	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:25.60mg/L	Completed	6/5/2018 11:17:20 PM	17
18	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.2139mg/L	Completed	6/5/2018 11:32:38 PM	18
19	U	NPOC	HS18060046-01	1/2	05-08-2018_	NPOC:14.52mg/L	Completed	6/5/2018 11:45:46 PM	19
20	U	NPOC	HS18060046-01MS	1/2	05-08-2018_	NPOC:24.67mg/L	Completed	6/5/2018 11:58:59 PM	20
21	U	NPOC	HS18060060-01	1/2	05-08-2018_	NPOC:11.86mg/L	Completed	6/6/2018 12:12:12 AM	21
22	U	NPOC	HS18060061-01	1/2	05-08-2018_	NPOC:7.932mg/L	Completed	6/6/2018 12:25:25 AM	22
23	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:24.77mg/L	Completed	6/6/2018 12:38:39 AM	23
24	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.1221mg/L	Completed	6/6/2018 12:53:57 AM	24
25	U	NPOC	WBLKW2-180605	TOC_W 5310	05-08-2018_	NPOC:0.2019mg/L	Completed	6/6/2018 1:07:05 AM	25
26	U	NPOC	WLCSW2-180605	Untitled	05-08-2018_	NPOC:9.925mg/L	Completed	6/6/2018 1:20:18 AM	26
27	U	NPOC	WLCSDW2-180605	Untitled	05-08-2018_	NPOC:9.975mg/L	Completed	6/6/2018 1:33:32 AM	27
28	U	NPOC	HS18060175-01	1/2	05-08-2018_	NPOC:0.05980mg/	Completed	6/6/2018 1:46:46 AM	28
29	U	NPOC	HS18060179-01	1/2	05-08-2018_	NPOC:0.04946mg/	Completed	6/6/2018 2:02:05 AM	29
30	U	NPOC	HS18060185-01	1/2	05-08-2018_	NPOC:0.08160mg/	Completed	6/6/2018 2:17:19 AM	30
31	U	NPOC	HS18060151-01	1/2	05-08-2018_	NPOC:1.256mg/L	Completed	6/6/2018 2:32:33 AM	31
32	U	NPOC	HS18060151-02	1/2	05-08-2018_	NPOC:3.502mg/L	Completed	6/6/2018 2:45:42 AM	32
33	U	NPOC	HS18060151-03	1/2	05-08-2018_	NPOC:4.540mg/L	Completed	6/6/2018 3:01:01 AM	33
34	U	NPOC	HS18051348-01	1/2	05-08-2018_	NPOC:10.82mg/L	Completed	6/6/2018 3:14:10 AM	34
35	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:24.94mg/L	Completed	6/6/2018 3:27:54 AM	35
36	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.08712mg/	Completed	6/6/2018 3:43:13 AM	36
37	U	NPOC	HS18051348-02	1/2	05-08-2018_	NPOC:17.91mg/L	Completed	6/6/2018 3:56:22 AM	37
38	U	NPOC	HS18051348-02MS	1/2	05-08-2018_	NPOC:25.00mg/L	Completed	6/6/2018 4:09:36 AM	38
39	U	NPOC	HS18051348-03	1/2	05-08-2018_	NPOC:10.25mg/L	Completed	6/6/2018 4:22:50 AM	39
40	U	NPOC	HS18051348-04	1/2	05-08-2018_	NPOC:10.27mg/L	Completed	6/6/2018 4:36:04 AM	40
41	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:24.63mg/L	Completed	6/6/2018 4:49:18 AM	41
42	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.1030mg/L	Completed	6/6/2018 5:04:37 AM	42
43	U	NPOC	WBLKW3-180605	TOC_W	05-08-2018_	NPOC:0.1916mg/L	Completed	6/6/2018 5:19:51 AM	43
44	U	NPOC	WLCSW3-180605	Untitled	05-08-2018_	NPOC:9.903mg/L	Completed	6/6/2018 5:33:00 AM	44
45	U	NPOC	WLCSDW3-180605	Untitled	05-08-2018_	NPOC:9.666mg/L	Completed	6/6/2018 5:46:14 AM	45
46	U	NPOC	HS18051400-01	1/2	05-08-2018_	NPOC:10.37mg/L	Completed	6/6/2018 5:59:28 AM	46
47	U	NPOC	HS18051489-01	1/2	05-08-2018_	NPOC:152.6mg/L	Completed	6/6/2018 6:12:53 AM	47
48	U	NPOC	HS18051489-01DF5	1/2	05-08-2018_	NPOC:30.04mg/L	Completed	6/6/2018 6:26:08 AM	48
49	U	NPOC	HS18051515-01	1/2	05-08-2018_	NPOC:14.14mg/L	Completed	6/6/2018 6:39:23 AM	49
50	U	NPOC	HS18051515-01MS	1/2	05-08-2018_	NPOC:22.68mg/L	Completed	6/6/2018 6:52:38 AM	50
51	U	NPOC	HS18060047-01	1/2	05-08-2018_	NPOC:3.586mg/L	Completed	6/6/2018 7:07:58 AM	51

	T	Analys	Sample Name	Sample ID	Origin	Result	Status	Date / Time	Vial
52	U	NPOC	HS18060052-01	1/2	05-08-2018_	NPOC:4.935mg/L	Completed	6/6/2018 7:21:08 AM	52
53	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:24.66mg/L	Completed	6/6/2018 7:34:26 AM	53
54	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.2202mg/L	Completed	6/6/2018 7:49:46 AM	54
55	U	NPOC	WBLKW4-180605	TOC_W_DISS	05-08-2018_	NPOC:0.1830mg/L	Completed	6/6/2018 8:02:56 AM	55
56	U	NPOC	WLCSW4-180605	Untitled	05-08-2018_	NPOC:9.909mg/L	Completed	6/6/2018 8:16:11 AM	56
57	U	NPOC	WLCSDW4-180605	Untitled	05-08-2018_	NPOC:9.546mg/L	Completed	6/6/2018 8:29:26 AM	57
58	U	NPOC	HS18060068-01	1/2	05-08-2018_	NPOC:9.829mg/L	Completed	6/6/2018 8:42:41 AM	58
59	U	NPOC	HS18060068-01MS	1/2	05-08-2018_	NPOC:19.47mg/L	Completed	6/6/2018 8:55:56 AM	59
60	U	NPOC	HS18060068-02	1/2	05-08-2018_	NPOC:4.147mg/L	Completed	6/6/2018 9:11:16 AM	60
61	U	NPOC	HS18060068-03	1/2	05-08-2018_	NPOC:6.280mg/L	Completed	6/6/2018 9:26:32 AM	61
62	U	NPOC	HS18060151-01	1/2	05-08-2018_	NPOC:1.669mg/L	Completed	6/6/2018 9:41:48 AM	62
63	U	NPOC	HS18060151-02	1/2	05-08-2018_	NPOC:3.664mg/L	Completed	6/6/2018 9:57:04 AM	63
64	U	NPOC	HS18060151-01	1/2	05-08-2018_	NPOC:4.888mg/L	Completed	6/6/2018 10:12:25 AM	64
65	U	NPOC	CCV	Untitled	05-08-2018_	NPOC:25.00mg/L	Completed	6/6/2018 10:25:36 AM	65
66	U	NPOC	CCB	Untitled	05-08-2018_	NPOC:0.1764mg/L	Completed	6/6/2018 10:40:57 AM	66

Instr.Information

System	TOC csh with asi
Instrument Options	TOC/ASI/IC Unit/
Catalyst	Regular Sensitivity

Cal. Curve

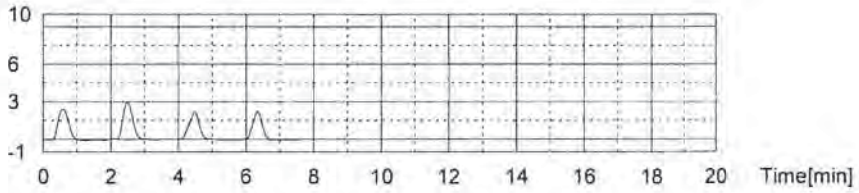
Sample Name:	CAL
Sample ID:	306.067:504-509
Cal. Curve:	05-08-2018_W.2018_05_08_16_59_08.cal
Status	Completed

Type	Anal.
Standard	NPOC

Conc: 1.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	5.281	50uL	1	*******		5/8/2018 5:07:52 PM
2	5.767	50uL	1	*******	E	5/8/2018 5:09:57 PM
3	4.377	50uL	1	*******		5/8/2018 5:12:02 PM
4	4.321	50uL	1	*******		5/8/2018 5:14:07 PM

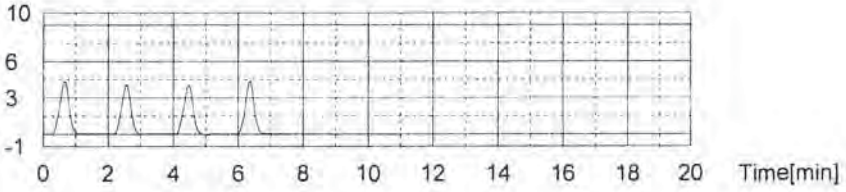
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 4.660



Conc: 2.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	8.552	50uL	1	*******	E	5/8/2018 5:23:05 PM
2	7.956	50uL	1	*******		5/8/2018 5:25:10 PM
3	7.917	50uL	1	*******		5/8/2018 5:27:15 PM
4	7.981	50uL	1	*******		5/8/2018 5:29:20 PM

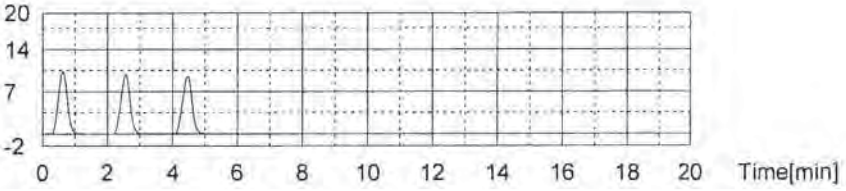
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 7.951



Conc: 5.000mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	19.68	50uL	1	*******		5/8/2018 5:38:18 PM
2	19.11	50uL	1	*******		5/8/2018 5:40:23 PM
3	19.32	50uL	1	*******		5/8/2018 5:42:28 PM

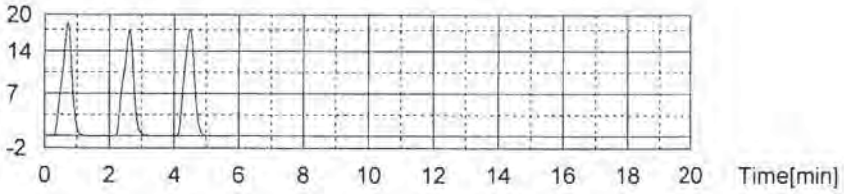
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 19.37



Conc: 10.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	38.73	50uL	1	*******		5/8/2018 5:51:31 PM
2	37.61	50uL	1	*******		5/8/2018 5:53:36 PM
3	38.22	50uL	1	*******		5/8/2018 5:55:41 PM

Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 38.19



Conc: 25.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	97.00	50uL	1	*******		5/8/2018 6:04:44 PM
2	96.71	50uL	1	*******		5/8/2018 6:06:49 PM
3	96.75	50uL	1	*******		5/8/2018 6:08:54 PM

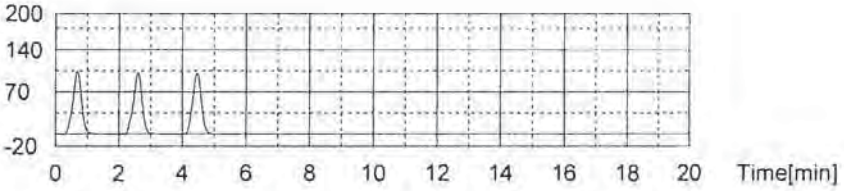
Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 96.82



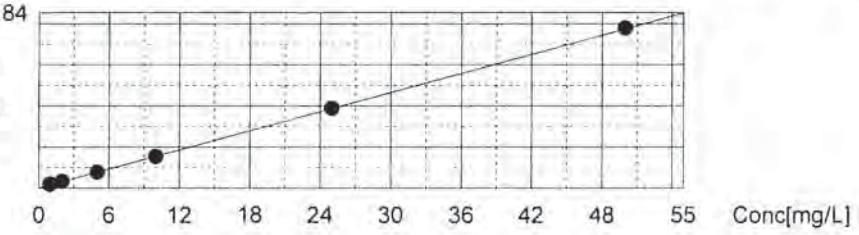
Conc: 50.00mg/L

No.	Area	Inj. Vol.	Aut. Dil.	Rem.	Ex.	Date / Time
1	195.4	50uL	1	*******		5/8/2018 6:17:57 PM
2	193.7	50uL	1	*******		5/8/2018 6:20:02 PM
3	194.1	50uL	1	*******		5/8/2018 6:22:07 PM

Acid Add. 0.000%
Sp. Time 180.0sec
Mean Area 194.4



Slope: 3.881
Intercept 0.07512
r^2 1.0000
r 1.0000
Zero Shift No



Sample

Sample Name: ICV
Sample ID: 306.067.601
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

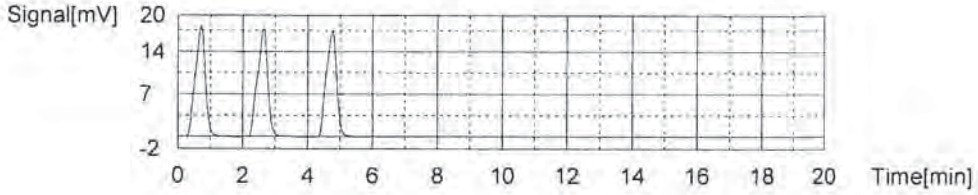
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:9.923mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	38.63	9.934mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:31:10 PM
2	38.67	9.944mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:33:30 PM
3	38.46	9.890mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:35:35 PM

Mean Area 38.59
Mean Conc. 9.923mg/L



Sample

Sample Name: ICB
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

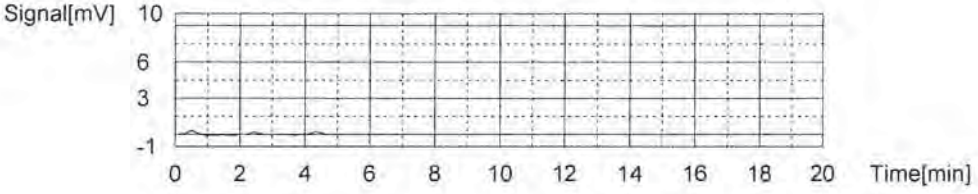
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:0.09481mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	0.4983	0.1090mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:44:38 PM
2	0.3330	0.06645mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:46:43 PM
3	0.4980	0.1090mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	5/8/2018 6:48:48 PM

Mean Area 0.4431
Mean Conc. 0.09481mg/L



Instr.Information

System TOC csh with asi
Instrument Options TOC/ASI/IC Unit/
Catalyst Regular Sensitivity

Sample

Sample Name: CCV
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

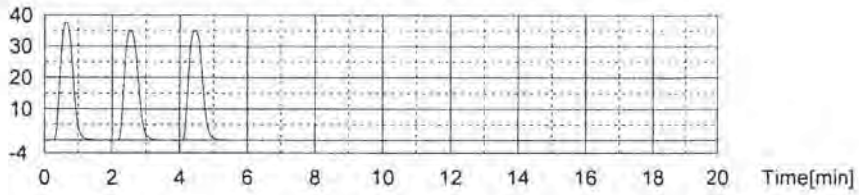
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:24.63mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	95.75	24.65mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 4:45:08 AM
2	95.35	24.55mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 4:47:13 AM
3	95.92	24.70mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 4:49:18 AM

Mean Area 95.67
Mean Conc. 24.63mg/L



Sample

Sample Name: CCB
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

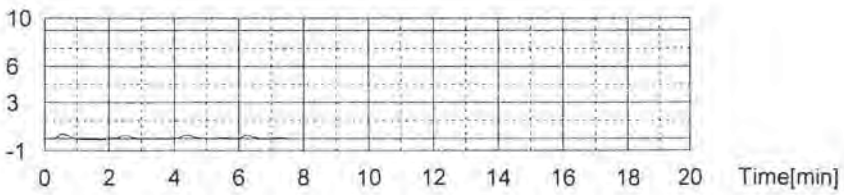
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:0.1030mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	0.8393	0.1969mg/L	50uL	1	E	05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 4:58:22 AM
2	0.5296	0.1171mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:00:27 AM
3	0.4999	0.1094mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:02:32 AM
4	0.3948	0.08237mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:04:37 AM

Mean Area 0.4748
Mean Conc. 0.1030mg/L



Sample

Sample Name: WBLKW3-180605
Sample ID: TOC_W
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:0.1916mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1.117	0.2685mg/L	50uL	1	E	05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:13:36 AM
2	0.7933	0.1850mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:15:41 AM
3	0.8196	0.1918mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:17:46 AM
4	0.8431	0.1979mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:19:51 AM

Mean Area 0.8187
Mean Conc. 0.1916mg/L



Sample

Sample Name: WLCSW3-180605
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

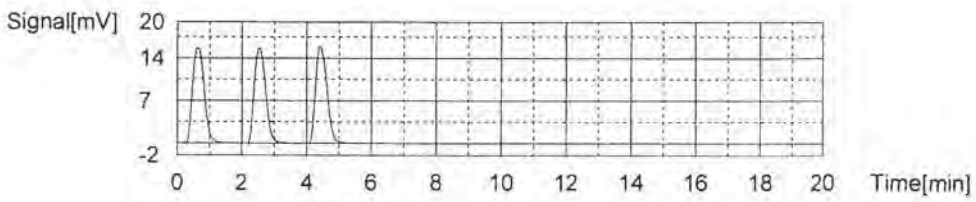
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:9.903mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	38.72	9.957mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:28:50 AM
2	38.11	9.800mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:30:55 AM
3	38.70	9.952mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:33:00 AM

Mean Area 38.51
Mean Conc. 9.903mg/L



Sample

Sample Name: WLCSDW3-180605
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

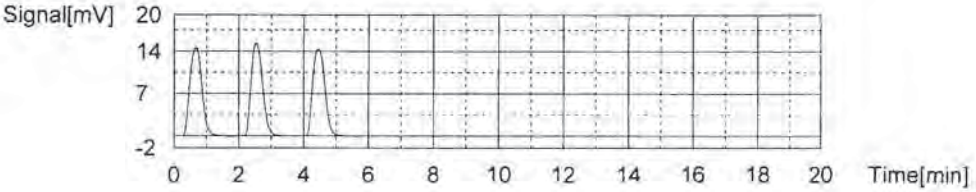
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:9.666mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	37.67	9.687mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:42:04 AM
2	37.77	9.713mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:44:09 AM
3	37.33	9.599mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 5:46:14 AM

Mean Area 37.59
Mean Conc. 9.666mg/L



Sample

Sample Name: HS18051489-01
Sample ID: 1/2
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

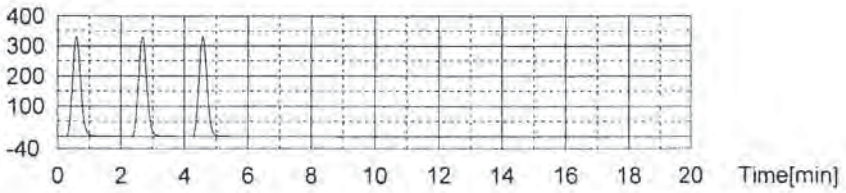
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:152.6mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	591.3	152.3mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:08:43 AM
2	595.0	153.3mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:10:48 AM
3	591.0	152.3mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:12:53 AM

Mean Area 592.4
Mean Conc. 152.6mg/L



Sample

Sample Name: HS18051489-01DF5
Sample ID: 1/2
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

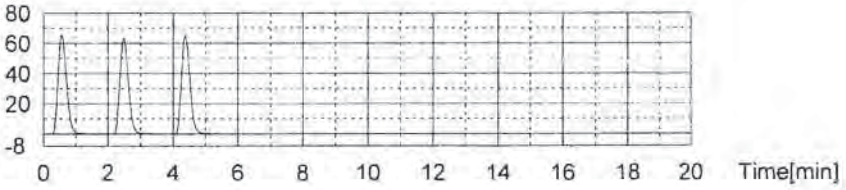
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:30.04mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	118.1	30.41mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:21:58 AM
2	115.5	29.74mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:24:03 AM
3	116.4	29.97mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:26:08 AM

Mean Area 116.7
Mean Conc. 30.04mg/L



Sample

Sample Name: HS18051515-01
Sample ID: 1/2
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

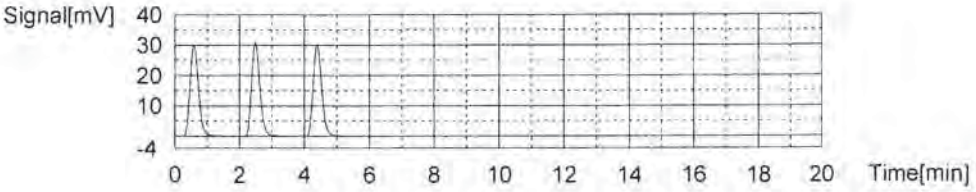
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:14.14mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	54.37	13.99mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:35:13 AM
2	55.30	14.23mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:37:18 AM
3	55.18	14.20mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:39:23 AM

Mean Area 54.95
Mean Conc. 14.14mg/L



Sample

Sample Name: HS18051515-01MS
Sample ID: 1/2
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

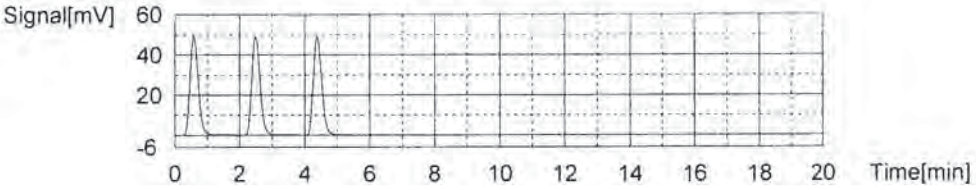
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:22.68mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	88.07	22.67mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:48:28 AM
2	87.59	22.55mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:50:33 AM
3	88.65	22.82mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 6:52:38 AM

Mean Area 88.10
Mean Conc. 22.68mg/L



Sample

Sample Name: CCV
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

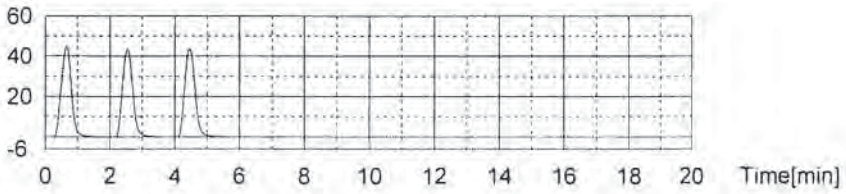
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:24.66mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	96.45	24.83mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 7:30:13 AM
2	94.78	24.40mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 7:32:19 AM
3	96.09	24.74mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 7:34:26 AM

Mean Area 95.77
Mean Conc. 24.66mg/L



Sample

Sample Name: CCB
Sample ID: Untitled
Origin: 05-08-2018_W.cal
Status Completed
Chk. Result

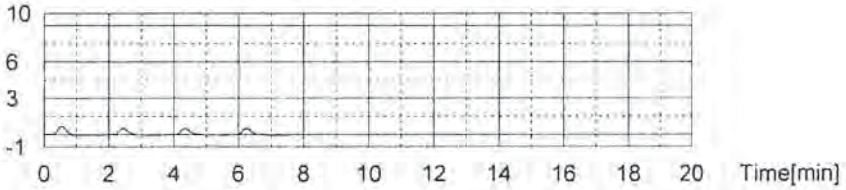
Type	Anal.	Manual Dilution	Result
Unknown	NPOC	1.000	NPOC:0.2202mg/L

1. Det

Anal.: NPOC

No.	Area	Conc.	Inj. Vol.	Aut. Dil.	Ex.	Cal. Curve	Date / Time
1	1.189	0.2870mg/L	50uL	1	E	05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 7:43:31 AM
2	0.8644	0.2034mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 7:45:36 AM
3	0.9163	0.2167mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 7:47:41 AM
4	1.008	0.2404mg/L	50uL	1		05-08-2018_W.2018_05_08_16_59_08.cal	6/6/2018 7:49:46 AM

Mean Area 0.9296
Mean Conc. 0.2202mg/L

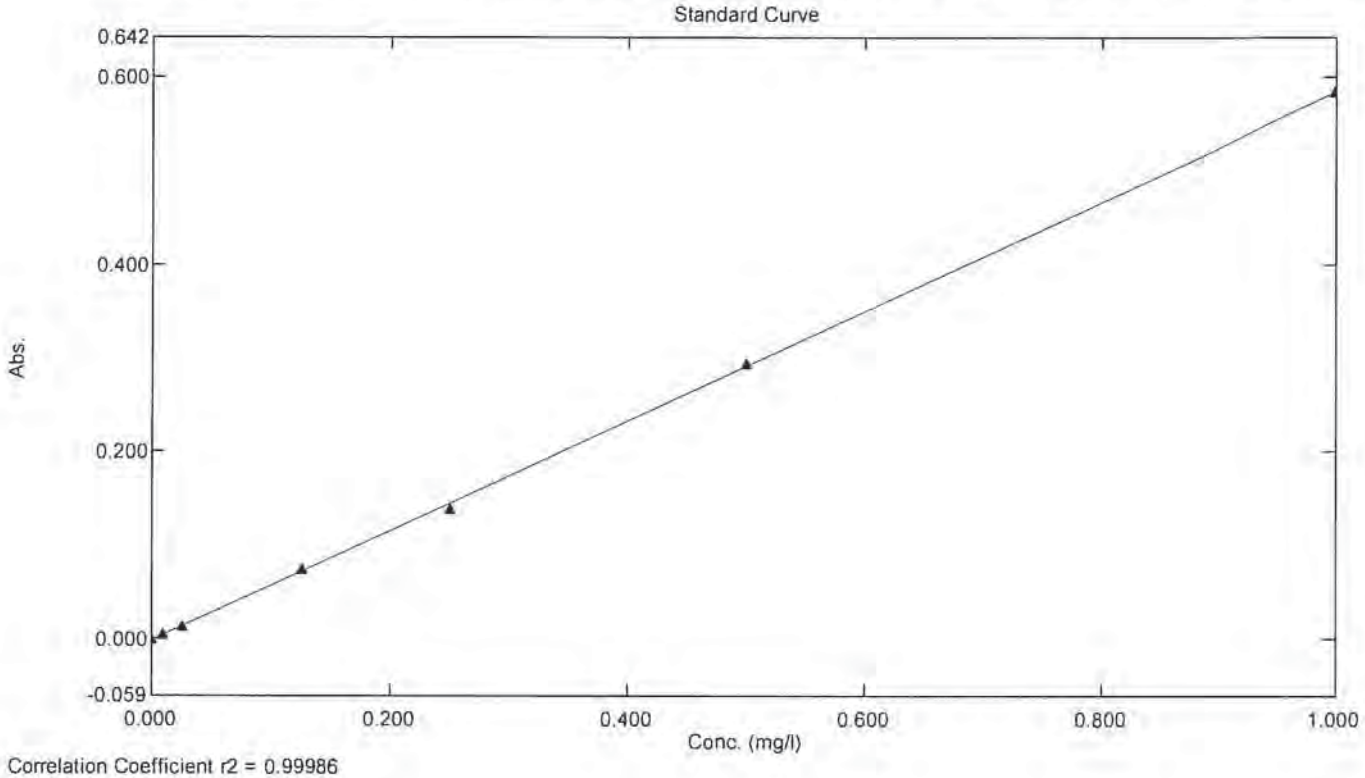


HS1805 1489

Standard Table Report

06/20/2018 11:49:18 AM

File Name: C:\Program Files (x86)\Shimadzu\UVProbe\Data\O_PO4_UNKNOWN\ORTHO_2018\180601_P_ORTH



Correlation Coefficient r2 = 0.99986

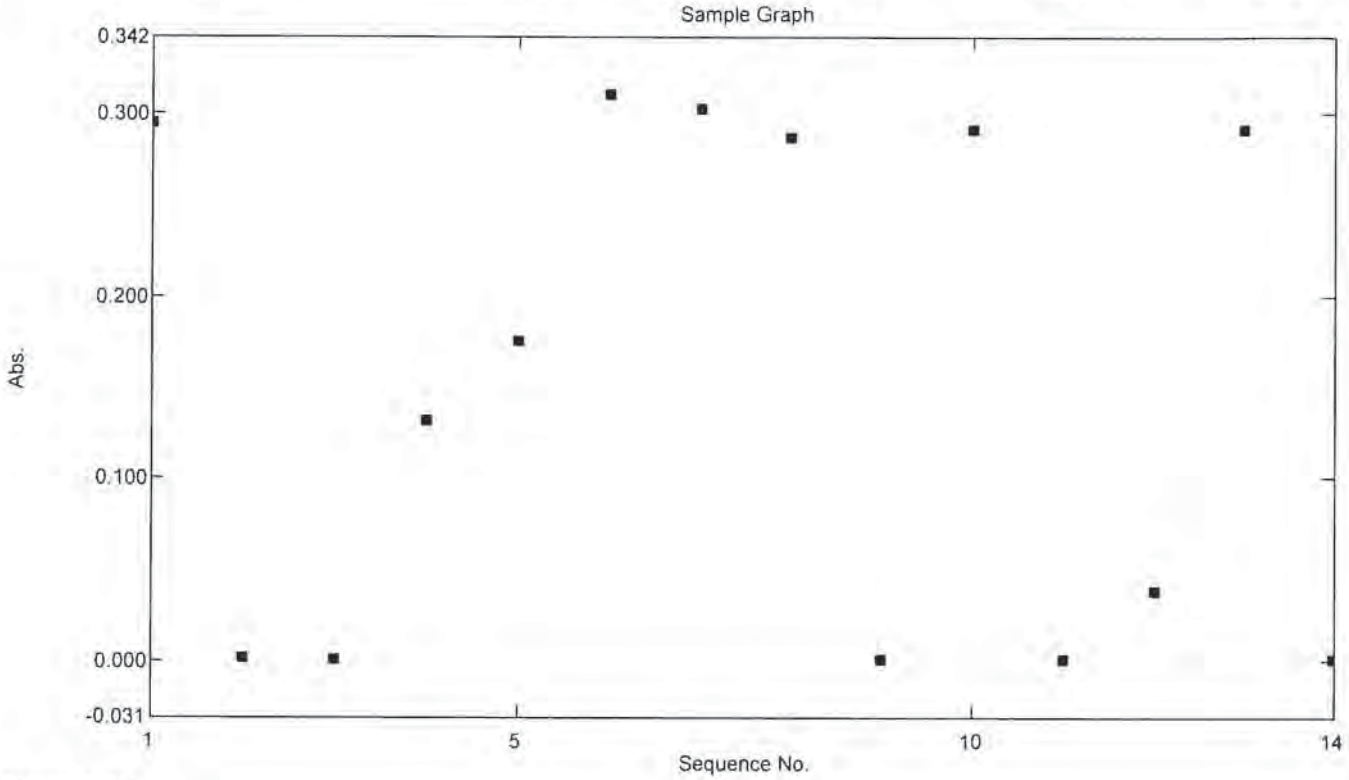
Standard Table

	Sample ID	Type	Ex	Conc	WL880.0	Wgt.Facto	Comments
1	STD1	Standard		0.000	-0.000	1.000	
2	STD2	Standard		0.010	0.006	1.000	
3	STD3	Standard		0.025	0.014	1.000	
4	STD4	Standard		0.125	0.075	1.000	
5	STD5	Standard		0.250	0.140	1.000	
6	STD6	Standard		0.500	0.294	1.000	
7	STD7	Standard		1.000	0.584	1.000	
8							

Sample Table Report

06/20/2018 11:49:22 AM

File Name: C:\Program Files (x86)\Shimadzu\UVProbe\Data\O_PO4_UNKNOWN\ORTHO_2018\180601_P_ORT



Sample Table

	Sample ID	Type	Ex	Conc	WL880.0	Comments
1	CCV	Unknown		0.506	0.295	
2	CCB	Unknown		0.003	0.001	
3	MBLK	Unknown		0.002	0.001	
4	LCS	Unknown		0.227	0.132	
5	18051489.01	Unknown		0.300	0.175	PF:10X,FILTER,12:05P M
6	18051489.01MS	Unknown		0.533	0.311	PF:10X
7	18051489.01MSD	Unknown		0.519	0.303	PF:10X
8	CCV2	Unknown		0.492	0.287	
9	CCB2	Unknown		0.001	0.000	
10	CCV3	Unknown		0.500	0.292	
11	CCB3	Unknown		0.001	0.000	
12	18060042.01	Unknown		0.066	0.038	PF:25X
13	CCV4	Unknown		0.500	0.291	
14	CCB4	Unknown		0.002	0.000	
15						

HS180 51489
NIT- AMN- W-ISE (350.3)

00005690

ALS Laboratory Group

Logbook 306

Ion Selective Electrode Logbook

Analyst: MD				Date: 06/08/2018	
Method: SM4500NH3-D/EPA 350.3 or SM4500 NH3 B-F					
Probe Calibration Date: 06/08/2018		Cal Std ID: 30606(03-07)		Probe ID: SR15190	
Std Level		mV	Conc., mg/L:	Sodium Thiosulfate ID:	
STD 1 (mg/L):	0.2	115.1	0.2010	Std Level / mV / Conc., mg/L:	
STD 2 (mg/L):	1	73.4	1.000	STD 4 (mg/L): 10 / 17.4 / 10.00	
STD 3 (mg/L):	5	33.4	5.000	STD 5 (mg/L): 52 / -20.9 / 50.07	
LSC / MS Spike ID: 2490206404				ICAL Date & Slope: 98.6% / -55.2 mV	
ICV Cal STD ID: 30606 9704					
DPD Reagent ID: 2490204302					

WO # / SX #	Bottle #	Initial g or ml	Final Vol. ml	Dilution Factor	Initial Conc. mg/L	Final Conc. mg/L	Chlorine Check (+/-)	Comments
ICV		50ml	50ml		10.39			
CCB					0.02748			
MBLK					0.02750			
LCS					9.968			
HS1805 1489-01					17.97		-ve	
HS180600 43-01					0.07400		-ve	
HS180 60153-01					0.07259		-ve	
HS1806 0164-01					0.03258		-ve	
HS180 6 0310-01					19.80		-ve	
HS180600 43-01MS					10.75			
L MSD					10.80			
CCV		50ml	50ml		10.01			
CCB		"	"		0.02501			

Batch ID: 3303	Reported By	Reviewed By:
317617 / 317614	MD	MD

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Sub Contract Data

Bhate Environmental Associates, Inc.
Project: LONGHORN GW TREATMENT
PLANT ALS WO# HS18051489

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1815312

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2097 (216174)

General Set Information: There were two field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: NA

Method QC data: The method blank (LMB 604060) was less than 1/2 the CRDL. The recovery for the LCS (604061) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1815312002 (Client ID: LH18/24-SP650_053018_After IX). The Matrix Spike and duplicate (MS/MSD – 604062/63) failed QC acceptance criteria for percent recoveries, biased high. This is due to the fact that the unspiked sample result of 2.2µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected. The MS/MSD relative percent difference (RPD) was within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): NA

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations was performed for datafile 02APRD01/02 along with datafiles 06JUND03/07/08/12.

Thomas Bosch June 7, 2018
Analyst Date

ANALYTICAL REPORT

Report Date: June 07, 2018

RJ Masahisa
ALS Environmental (Houston)
10450 Stancliff Road
Suite 210
Houston, TX 77099

Phone: 281 530-5656

E-mail: RJ.Modashia@ALSGlobal.com

Workorder: **34-1815312**
Project ID: HS18051489 053018
Purchase Order: HS18051489
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
LH18/24-SP650_053018_Before IX	1815312001	05/30/18	06/01/18	
LH18/24-SP650_053018_After IX	1815312002	05/30/18	06/01/18	

ANALYTICAL REPORT

Workorder: 34-1815312
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **LH18/24-SP650_053018_Before IX**
Lab ID: 1815312001
Matrix: Water
Sampling Site: NA
Media: 125 mL Nalgene
Sampling Parameter: NA
Collected: 05/30/2018
Received: 06/01/2018

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water
Batch: ELMS/2097 (HBN: 216174)
Analyzed: 06/06/2018 10:16
Instrument ID: LCMS04
Percent Solid: NA
Report Basis: Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	**18**	1.0	2.0	4.0	1	

Sample ID: **LH18/24-SP650_053018_After IX**
Lab ID: 1815312002
Matrix: Water
Sampling Site: NA
Media: 125 mL Nalgene
Sampling Parameter: NA
Collected: 05/30/2018
Received: 06/01/2018

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable
Analysis: EPA 6850, DoD QSM Water
Batch: ELMS/2097 (HBN: 216174)
Analyzed: 06/06/2018 10:46
Instrument ID: LCMS04
Percent Solid: NA
Report Basis: Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	2.2	1.0	2.0	4.0	1	J

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 06/07/2018 09:24	/S/ Stephen Brose 06/07/2018 15:47

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1815312
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body	Certificate Number	Website
Environmental	PJLA (DoD ELAP)		
	Utah (TNI)		
	Nevada		
	Oklahoma		
	Iowa		

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1815312

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2097 (HBN: 216174)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

Blank

LMB: 604060
Analyzed: 06/06/2018 09:48
Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 604061
Analyzed: 06/06/2018 10:02
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	4.24	5.00	84.8	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

	Sample	MS	MSD
	1815312002	604062	604063
Analyzed:	06/06/2018 10:46	06/06/2018 11:00	06/06/2018 11:14
Dilution:	1	1	1
Units:	ug/L	ug/L	ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	2.20	6.8	5	# 136	78.8	123.8	7.05	# 141	3.64	0.0	20.0

Continuing Calibration Verification

	CCV	CCV
	604057	604064
Analyzed:	06/06/2018 09:04	06/06/2018 11:33
Units:	ug/L	ug/L
Criteria:	± 15%	± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	23.7	25.0	94.6	22.7	25.0	91.0

Interference Check Sample

ICSA: 604059
Analyzed: 06/06/2018 09:34
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	1.01	1.00	101

Limit of Detection Verification

	LODV	LODV
	604058	604065
Analyzed:	06/06/2018 10:30	06/06/2018 11:47
Units:	ug/L	ug/L
Criteria:	± 50%	± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	0.881	1.00	88.1	0.954	1.00	95.4

Quality Control Sample
Batch Report

Analysis Information

Workorder: 1815312

Limits:	Client SOW/Contract Specified	**Preparation:**	NA
Basis:	DoD QSM	**Batch:**	NA
		Prepared By:	NA
Analysis:	EPA 6850		
Batch:	ELMS/2097 (HBN: 216174)		
Analyzed By:	Thomas Bosch		

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch	/S/ Stephen Brose
06/07/2018 09:25	06/07/2018 15:47

Symbols and Definitions

* - Analyte above reporting limit or outside of control limits
▲ - Sample result is greater than 4 times the spike added
◓ - Sample and Matrix Duplicate less than 5 times the reporting limit
● - Result is above the calibration range
- The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)
ND - Not Detected (U - Qualifier also flags analyte as not detected)
NA - Not Applicable
QC results are not adjusted for moisture correction, where applicable

18698/#3





10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

COC ID: 9198

1815312

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	RJ Modashia
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	RJ.Modashia@alsglobal.com
Alternate Contact:	
Email:	

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS18051489
TSR:	Danielle Winnings

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS18051489-02**	**LH18/24-SP650_053018_Before IX**	**Water**	**30 May 2018 14:00**
	SUB_Perch-6850			08 Jun 2018
2.	**HS18051489-03**	**LH18/24-SP650_053018_After IX**	**Water**	**30 May 2018 14:00**
	SUB_Perch-6850			08 Jun 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 5/31/18 1800.

Received By: _____ Date/Time: 6/1/18 1025

Cooler ID(s): 5570 Temperature(s): 2

00905700

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS18051489	Split:	Workorder ID: 1815312	Level: ENV_LVL4	Requested Analysis
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly	
Comments:			Preservatives	
			COOL	

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	EPA 6850, DoD QSM
1	05/30/2018 14:00	LH18/24-SP650_053018_Before IX	1815312001		Water	A	1	A
2	05/30/2018 14:00	LH18/24-SP650_053018_After IX	1815312002		Water	A	1	A
3								
4								
5								
6								
7								
8								
9								
10								

41 of 120

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Warath, Julie	06/01/2018 10:25	ALS Sample Receiving	Sample Login
Julie Warath	6/1/18 1440	SB	Storage
R.33.1	6.6.18/08:00	T. Bush	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: _____ Lab Notebook No.: _____

Prepared / Analyzed by: _____ Date / Time: _____

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

Fri, 06/01/18 2:38 PM

ALSCOCV3.1

ALS-SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Houston

Project/Task/Site: 1815312

Date/Time of Receipt: 6/11/18/1025

Number of Coolers Received: 1

Condition of Coolers:	Acceptable/Unacceptable	Temperature Control:	Present/Not Included
Cooler Custody Seals:	Present/Absent/NA Intact/Broken/NA	Location Temp Taken:	Control/Between Samples
Container Custody Seals:	Present/Absent/NA Intact/Broken/NA	Are all temperatures within project specific guidelines?	Yes/No/NA
Ice Present:	Yes/No/NA Frozen/Melted/NA	VOA Headspace Present?	Yes/No/NA

pH Check Performed:							
	Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
	Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
	Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
	Ammonia	Yes/No/NA	TKN	Yes/No/NA	Gross A.B, Gamma Spec	Yes/No/NA

Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.	Cooler Received	DCL Cooler No.	Temp.
1	C18 8510	2 °C	4	C18	°C	7	C18	°C
2	C18	°C	5	C18	°C	8	C18	°C
3	C18	°C	6	C18	°C	9	C18	°C

Taken By: Meredith Eddy (Signature) Meredith Eddy (Printed Name) 6/11/18 (Date)

CLIENT-RELATED INFORMATION

☐ Missing Cooler	☐ Missing Samples/Bottles	☐ Incorrect Preservation	☐ Insufficient Sample Volume
☐ Cooler Conditions	☐ Broken/Leaking Samples	☐ pH Criteria Not Met	☐ Chain of Custody Problems
☐ Missing Paperwork	☐ Incorrect Bottle Type	☐ Residual Chlorine Present	☐ Other:
☐ Missing/Incorrect Bottle Labels	☐ Cooler Temperatures Out of Range	☐ Head Space in Bottles	

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

Client Notified? YES ☐ NO ☐

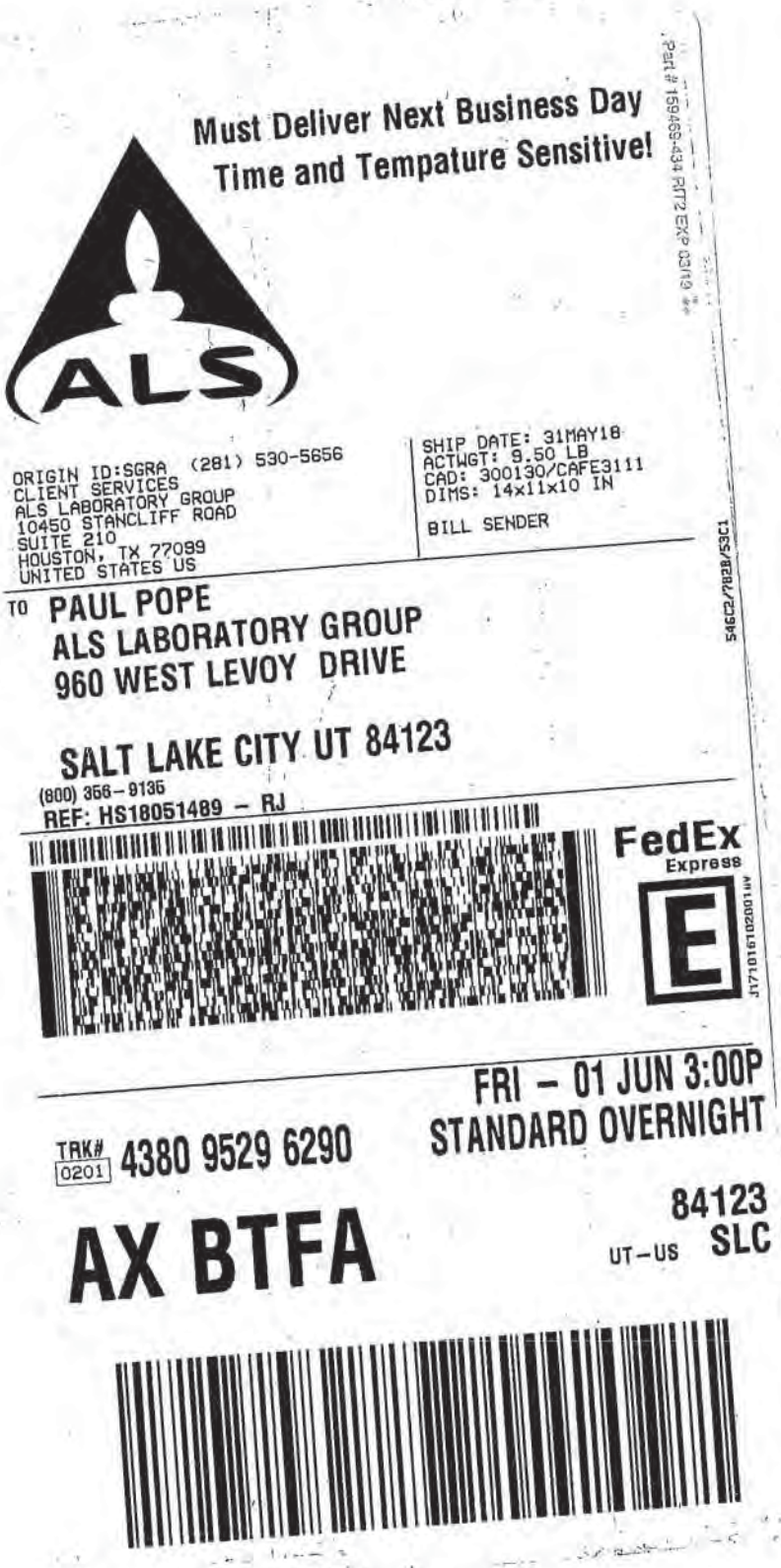
Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: _____ (Printed Name) Returned to Sample Receipt by: _____ (Signature) Date: _____

CRIR.doc Revised 01/01/2018



Must Deliver Next Business Day
Time and Tempature Sensitive!

Part # 159469-434 RIT2 EXP 03/19 **

ORIGIN ID:SGRA (281) 530-5656
CLIENT SERVICES
ALS LABORATORY GROUP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 31MAY18
ACTWGT: 9.50 LB
CAD: 300130/CAFE3111
DIMS: 14x11x10 IN

BILL SENDER

TO PAUL POPE
ALS LABORATORY GROUP
960 WEST LEVOY DRIVE

SALT LAKE CITY UT 84123
(800) 356-9135
REF: HS18051489 - RJ

546C2/7828/S3C1

FedEx Express

J17101602001uw

FRI - 01 JUN 3:00P
STANDARD OVERNIGHT

TRK# 0201 4380 9529 6290

AX BTFA

84123
UT-US SLC

Batch Worklist

Batch: ELMS/ 2097 **Created:** 6/6/2018 08:55 **Instrument:** HBN: 216174

Rule: EPA 6850, DoD QSM Water **Analyst:** T. Bosch **Status:** WP

Workorder: 1815312 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	604057	CCV for HBN 216174 [ELMS/2097]				CCV	3		E685041C3Q	5311		6/8/2018	
2	604058	LODV for HBN 216174 [ELMS/2097				LODV	3		E6850..D3Q	5311		6/8/2018	
3	604059	ICS for HBN 216174 [ELMS/2097]				ICS	3		E6850..D3Q	5311		6/8/2018	
4	604060	LMB for HBN 216174 [ELMS/2097]				LMB	3		E6850Q413Q	5311		6/8/2018	
5	604061	LCS for HBN 216174 [ELMS/2097]				LCS	3		E6850Q413Q	5311		6/8/2018	
6	1815312001	LH18/24-SP650_053018_Before IX				SAMPLE	3	1815312001-A	E6850Q41.3	5480	6/27/2018	6/8/2018	
7	1815312002	LH18/24-SP650_053018_After IX				SAMPLE	3	1815312002-A	E6850Q41.3	5480	6/27/2018	6/8/2018	
8	604062	LH18/24-SP650...(1815312002MS)				MS	3		E6850Q413Q	5311		6/8/2018	
9	604063	LH18/24-SP65...(1815312002MSD)				MSD	3		E6850Q413Q	5311		6/8/2018	
10	604064	CCV for HBN 216174 [ELMS/2097]				CCV	3		E685041C3Q	5311		6/8/2018	
11	604065	LODV for HBN 216174 [ELMS/2097				LODV	3		E6850..D3Q	5311		6/8/2018	

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1815312 (001,02)
ELMS Batch/HBN ID: 2097 (216174)
Prep Date: 06/06/2018 Analysis Date: 06/06/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\JUN\06JUN18D.s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 41827. Dilutions of Working Standard Solution ID 41829 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 04/02/2018, sequence 02APR18D.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: LCMS04 Online Acquisition Method: CLO4-DOD.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.80
4.0	0.80
5.0	0.25
10.0	0.25
10.5	0.80
13.0	0.80

QC DATA: 5.0µL of QC Solution Horizon ID 41830 was used for LCS 604061; Target = 5.0µg/L. ASTM type II water was used for LMB 604060.

MS/MSD: MS/MSD was performed on sample 1815312002 (Client ID: LH18/24-SP650_053018_After IX). 5.0µl of Working Standard Solution Horizon ID 41828 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:
1) Results reported in µg/L.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters, except for the following. The Matrix Spike and duplicate (MS/MSD – 604062/63) failed QC acceptance criteria for percent recoveries, biased high. This is due to the fact that the unspiked sample result of 2.2µg/L was not subtracted from the MS/MSD results. The Matrix Spike and Matrix Spike duplicate is reported for the clients' information only. The sample matrix may be inappropriate for the method selected.
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\JUN\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, some of the chromatographic peaks require manual integration. Manual Integrations was performed for datafiles 02APRD01/02 along with datafiles 06JUND03/07/08/12.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\216174-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — **Description - 6850 WKG Std 100.ug/L**

Standard: 41829
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 WRK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41828	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	10/04/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK	Description - 6850 Stock AccStd 1,000ug/mL

Standard: 36733
MFG: AccuStandard
MFG Lot: 216095148
Part ID: IC-PER-10X-1

Created By: Thomas Bosch
Create Date: 05/10/2017 11:05AM

Amount: 100 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT — **Description - 6850 Intermdt AccStd 10.ug/mL**

Standard: 41828
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 10/04/2018
Usable: Yes
Lab Lot: CLO4 INT

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK — **Description - Perchlorate ISTD Wrk 1,000ug/L**

Standard: 41827
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM
Verified By: Thomas Bosch
Verify Date:

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK — **Description - 6850 QC WKG STD 100ug/L**

Standard: 41831
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC WRK 100.ug/L

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
41830	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/09/2019

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT — **Description - 6850 QC Intrmdt Std-QC 10ug/mL**

Standard: 41830
MFG: ALS/SLC
MFG Lot: TNB: 05/09/2018
Pipette ID: Not Provided

Created By: Thomas Bosch
Create Date: 05/09/2018 10:05AM

Amount: 10 mL
Expires: 05/09/2019
Usable: Yes
Lab Lot: CLO4 QC INT 10.ug/mL

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/06/2005 09:10AM	Expires: 11/07/2025
MFG Lot: Not Provided		Usable: Yes
Part ID: Not Provided		Lab Lot: LAB 109

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK — **Description - 6850 QC Stock STD 1,000ug/mL**

Standard: 36748
MFG: Ultra Scientific
MFG Lot: CP-0860
Part ID: ICC-013

Created By: Thomas Bosch
Create Date: 05/11/2017 01:05PM

Amount: 100 mL
Expires: 03/31/2020
Usable: Yes
Lab Lot: CLO4 QC STOCK

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED ACCEPTANCE MATERIAL PRODUCER
ANAB ACCREDITED TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Peter A. King, Ph.D.
VP, Technical Operations

Daniel J. Lamendola
Director of QA/RA

125 Market Street
New Haven, CT 06513
USA

AccuStandard,® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.
The final solution was checked against an independent standard to verify its concentration.
We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.
All solutions are filtered through a 0.2 µm filter prior to being bottled.
All glassware used in preparation is Class A and calibrated regularly.
All weights are traceable through NIST, Test No. 822-275872-11
All bottles are triple rinsed with deionized water prior to use.
Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.
We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

AccuStandard is accredited to ISO Guide 34, ISO/IEC 17025 and certified to ISO 9001

OR-ORG/IND-001
Rev. 5/16

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT (18O4, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Batch Report: C:\HPCHEM\1\DATA\06JUN18D\06JUN18D.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
*	604057 CCV@25	Vial 71	1	Control	1	5.88679e5	9.096	23.66195
*	604059 ICS@1.0	Vial 73	1	Control	3	2.60612e4	8.826	1.00944
*	604060 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	604061 QC@5	Vial 75	1	Control	5	1.19384e5	8.867	4.23970
*	1815312001	Vial 76	1	Sample	6	3.44244e5	8.680	18.28264
*	604058 LODV@1.	Vial 72	1	Control	7	2.28922e4	9.049	8.81145e-1
*	1815312002	Vial 77	1	Sample	8	3.96494e4	9.780	2.20406
*	604062 153122S	Vial 78	1	Sample	9	1.21791e5	9.774	6.79737
*	604063 153122D	Vial 79	1	Sample	10	1.12038e5	9.794	7.04912
*	604064 CCV@25	Vial 71	1	Control	11	5.33206e5	9.033	22.74371
*	604065 LODV@1.	Vial 72	1	Control	12	2.50688e4	9.059	9.54437e-1

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	604057 CCV@25	Vial 71	1	Control	1	2.04831e5	9.113	26.15162
*	604059 ICS@1.0	Vial 73	1	Control	3	9884.85449	8.860	1.08270
*	604060 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	604061 QC@5	Vial 75	1	Control	5	4.45128e4	8.886	4.83967
*	1815312001	Vial 76	1	Sample	6	1.19127e5	8.695	19.99851
*	604058 LODV@1.	Vial 72	1	Control	7	9158.75391	9.081	9.90373e-1
*	1815312002	Vial 77	1	Sample	8	1.55913e4	9.814	2.59853
*	604062 153122S	Vial 78	1	Sample	9	4.47717e4	9.806	7.73345
*	604063 153122D	Vial 79	1	Sample	10	4.17261e4	9.812	8.12908
*	604064 CCV@25	Vial 71	1	Control	11	1.90763e5	9.047	25.75835
*	604065 LODV@1.	Vial 72	1	Control	12	9028.82422	9.082	9.57893e-1

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	604057 CCV@25	Vial 71	1	Control	1	1.02584e5	9.113	5.00000
*	604059 ICS@1.0	Vial 73	1	Control	3	1.16471e5	8.854	5.00000
*	604060 LMB	Vial 74	1	Control	4	1.46179e5	8.848	5.00000
*	604061 QC@5	Vial 75	1	Control	5	1.28785e5	8.891	5.00000
*	1815312001	Vial 76	1	Sample	6	7.99499e4	8.701	5.00000
*	604058 LODV@1.	Vial 72	1	Control	7	1.16560e5	9.075	5.00000
*	1815312002	Vial 77	1	Sample	8	8.24984e4	9.812	5.00000
*	604062 153122S	Vial 78	1	Sample	9	8.10083e4	9.809	5.00000
*	604063 153122D	Vial 79	1	Sample	10	7.17676e4	9.814	5.00000
*	604064 CCV@25	Vial 71	1	Control	11	9.71498e4	9.059	5.00000
*	604065 LODV@1.	Vial 72	1	Control	12	1.18236e5	9.086	5.00000

*** End of Report ***

Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\JUN\06JUN18D.S

Sequence Table:

Method and Injection Info Part:

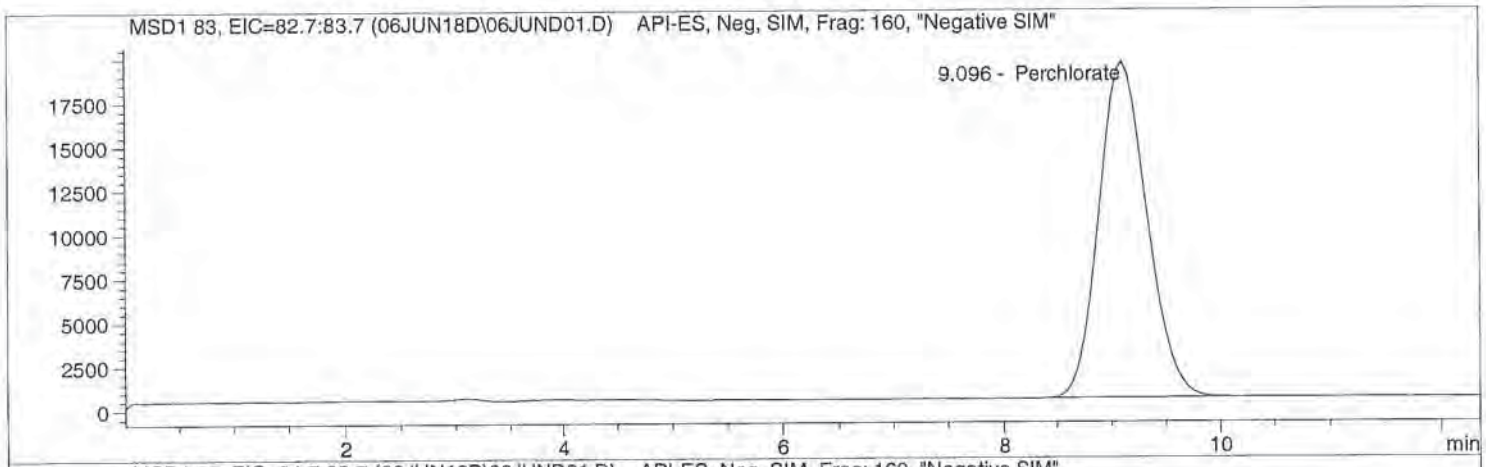
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	604057 CCV@25	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	604058 LODV@1.	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	604059 ICS@1.0	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	604060 LMB	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	604061 QC@5	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	1815312001	CLO4-DOD	1	Sample		
7	Vial 72	604058 LODV@1.	CLO4-DOD	1	Ctrl Samp		
8	Vial 77	1815312002	CLO4-DOD	1	Sample		
9	Vial 78	604062 153122S	CLO4-DOD	1	Sample		
10	Vial 79	604063 153122D	CLO4-DOD	1	Sample		
11	Vial 71	604064 CCV@25	CLO4-DOD	1	Ctrl Samp		
12	Vial 72	604065 LODV@1.	CLO4-DOD	1	Ctrl Samp		

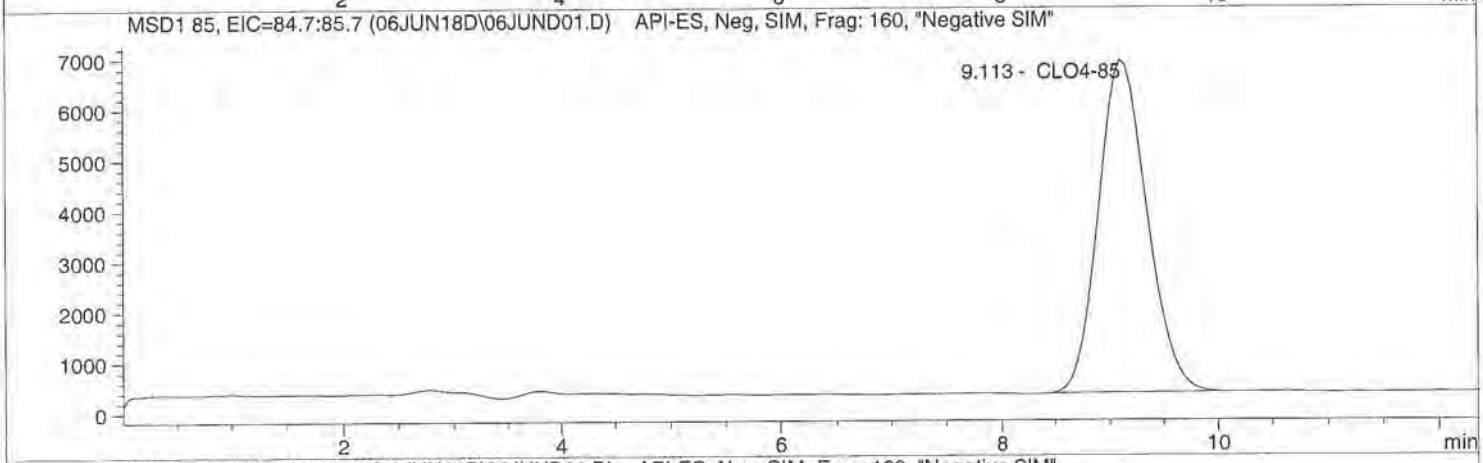
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND01.D Sample Name: 604057 CCV@25

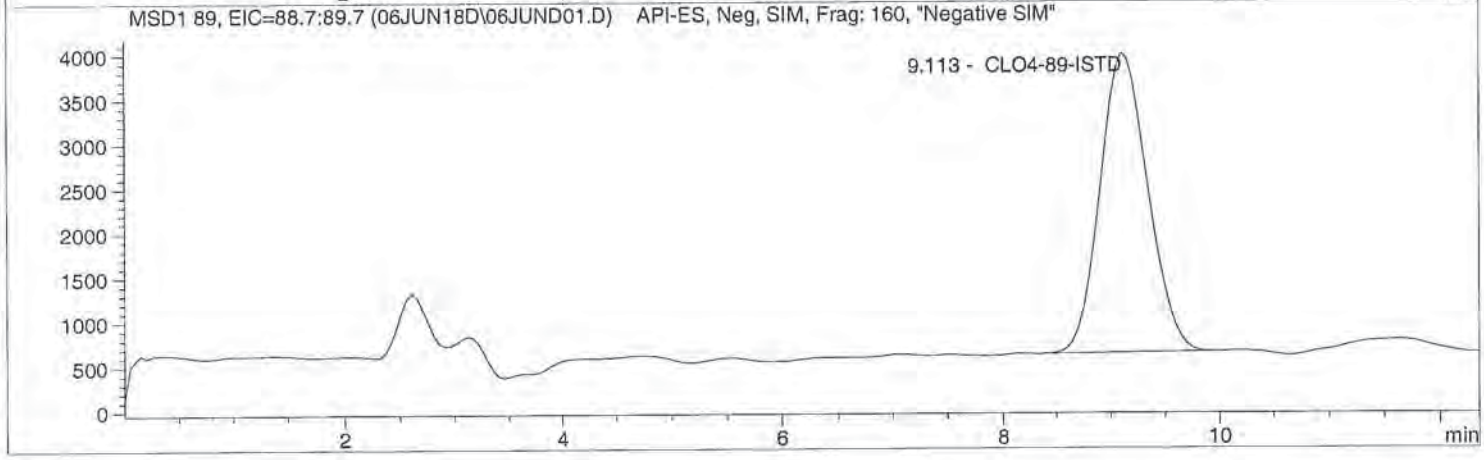
Injection Date:	6/06/2018 09:04:40	Seq Line:	1
Sample Name:	604057 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND01.D Sample Name: 604057 CCV@25

Injection Date:	6/06/2018 09:04:40	Seq Line:	1
Sample Name:	604057 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.096	BBA	588678.9	23.6620	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.113	PBA	204831.2	26.1516	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.113	BBA	102584.1	5.0000	CLO4-89-ISTD

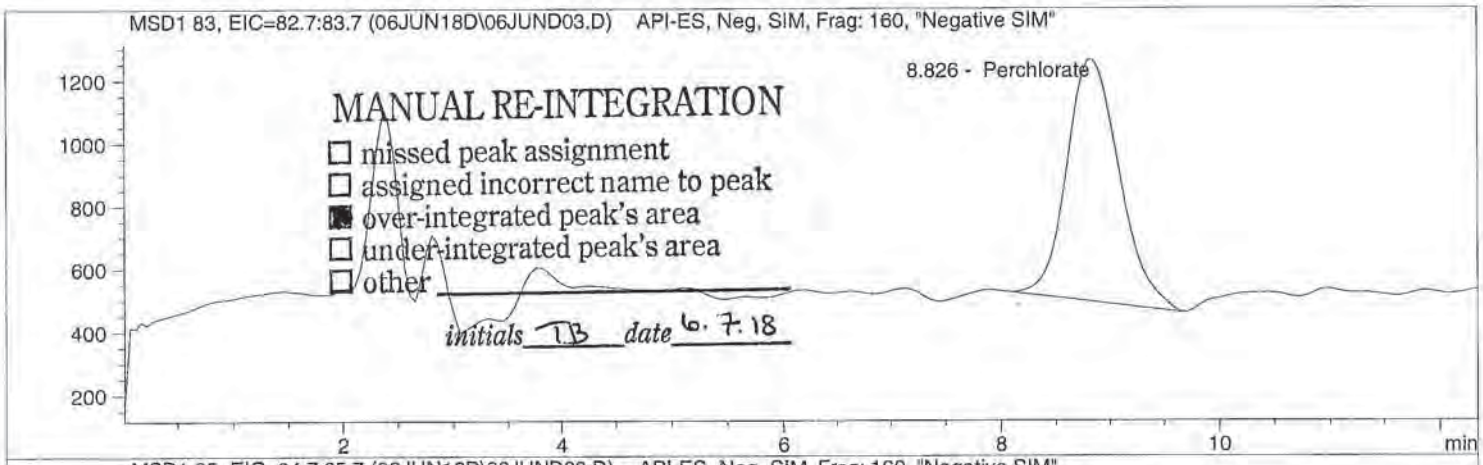
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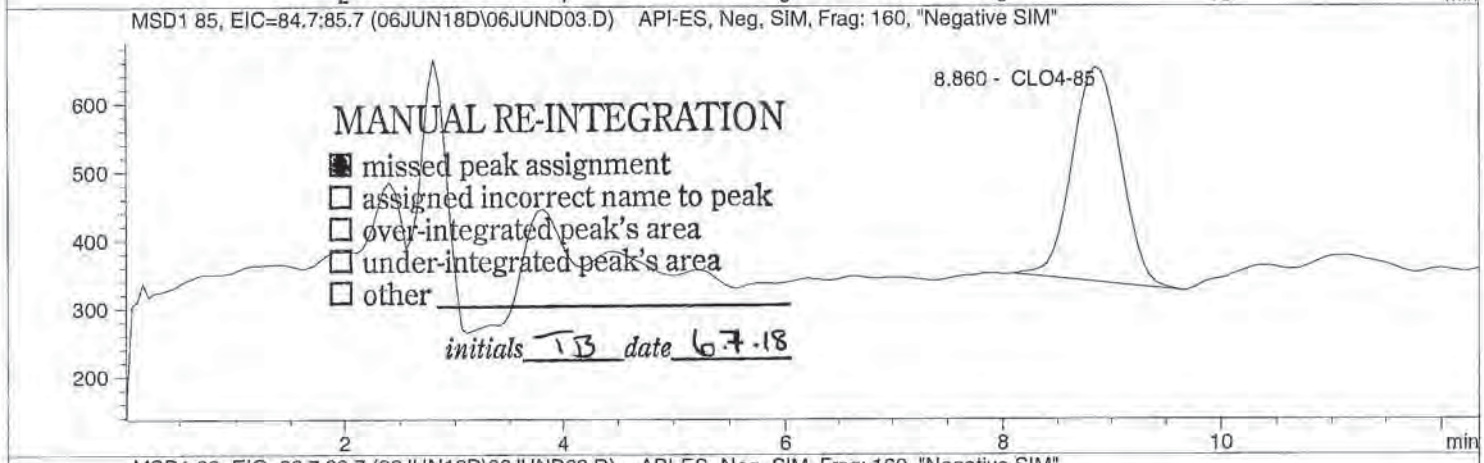
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND03.D Sample Name: 604059 ICS@1.0

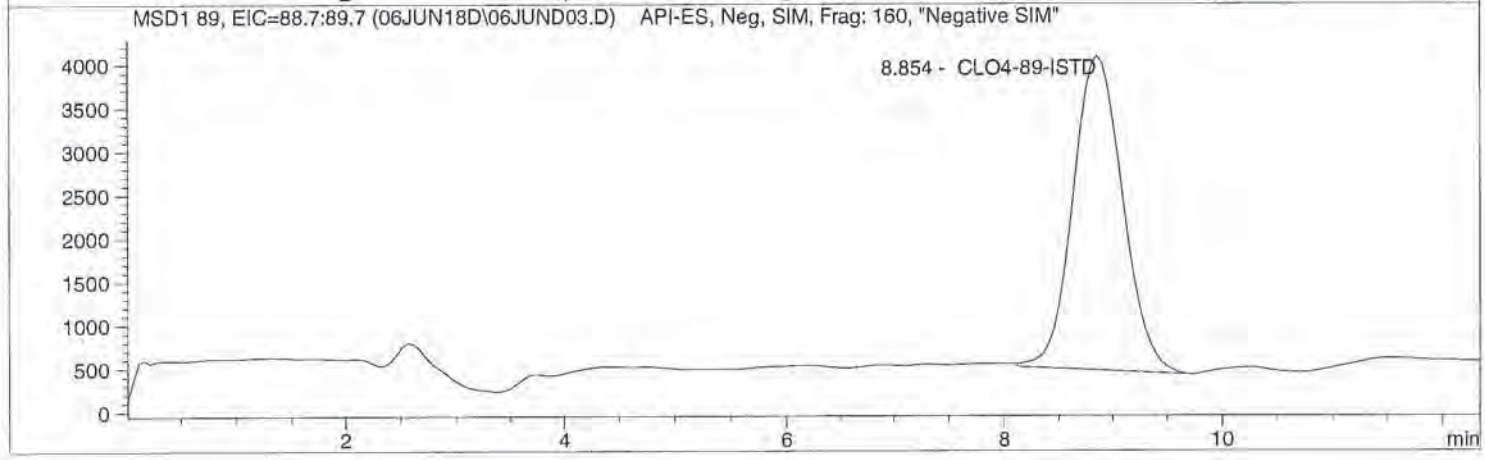
Injection Date:	6/06/2018 09:34:11	Seq Line:	3
Sample Name:	604059 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND03.D Sample Name: 604059 ICS@1.0

Injection Date:	6/06/2018 09:34:11	Seq Line:	3
Sample Name:	604059 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.826	MM	26061.2	1.0094	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.860	MM	9884.9	1.0827	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.854	BBA	116471.1	5.0000	CLO4-89-ISTD

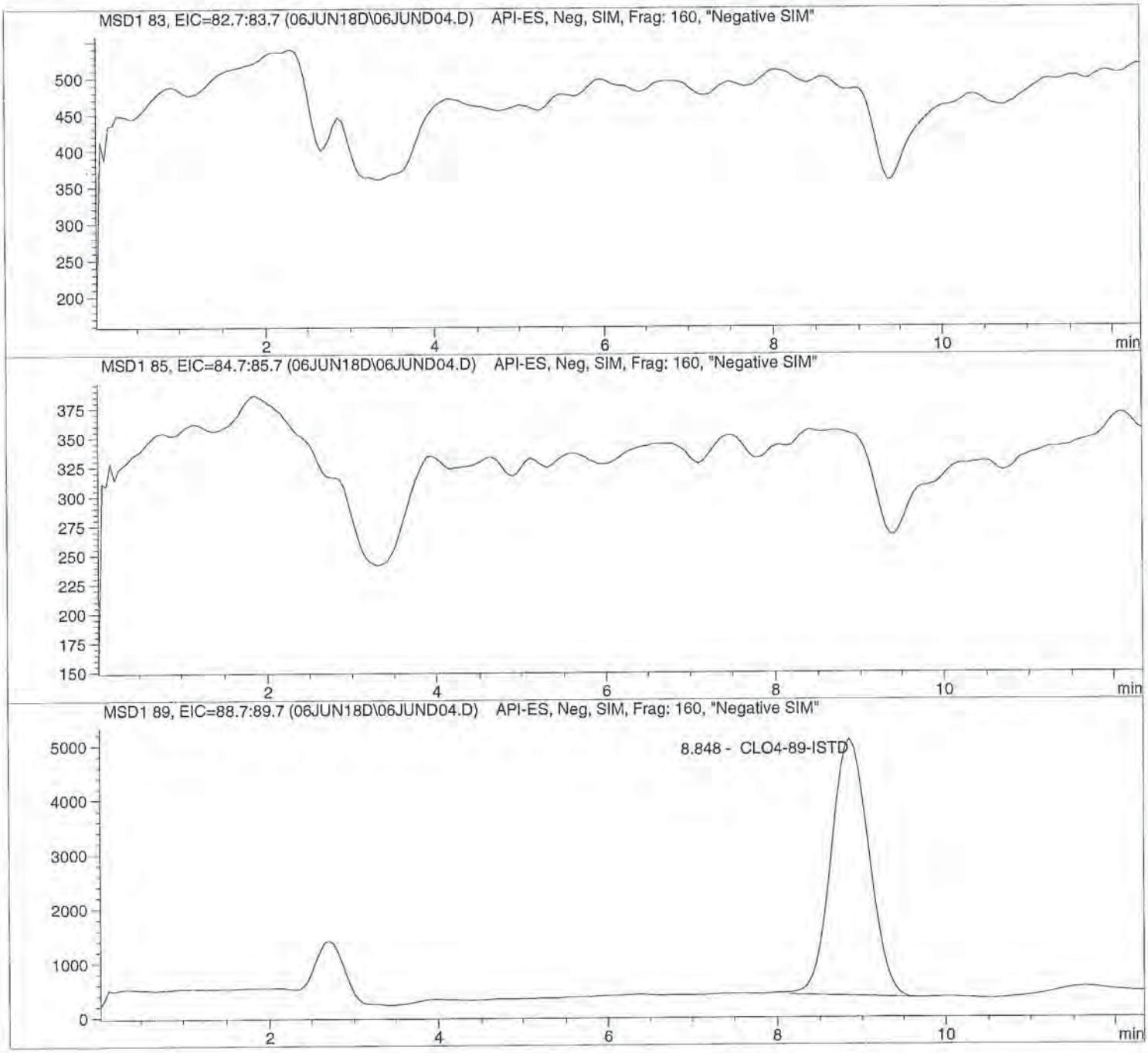
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Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND04.D Sample Name: 604060 LMB

Injection Date:	6/06/2018 09:48:24	Seq Line:	4
Sample Name:	604060 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND04.D Sample Name: 604060 LMB

Injection Date:	6/06/2018 09:48:24	Seq Line:	4
Sample Name:	604060 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.848	BBA	146179.4	5.0000	CLO4-89-ISTD

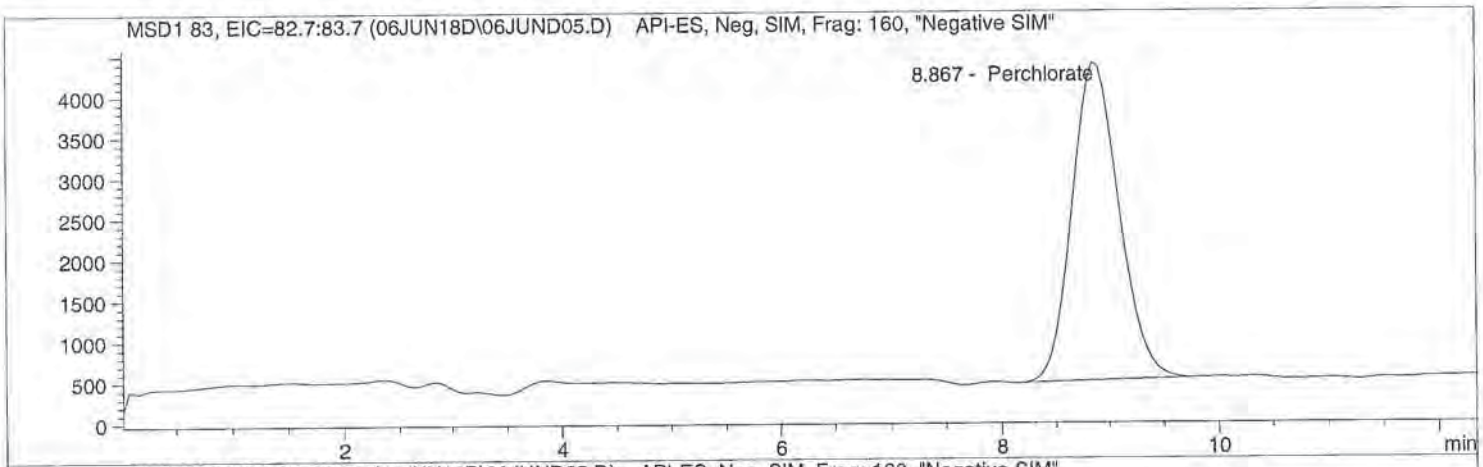
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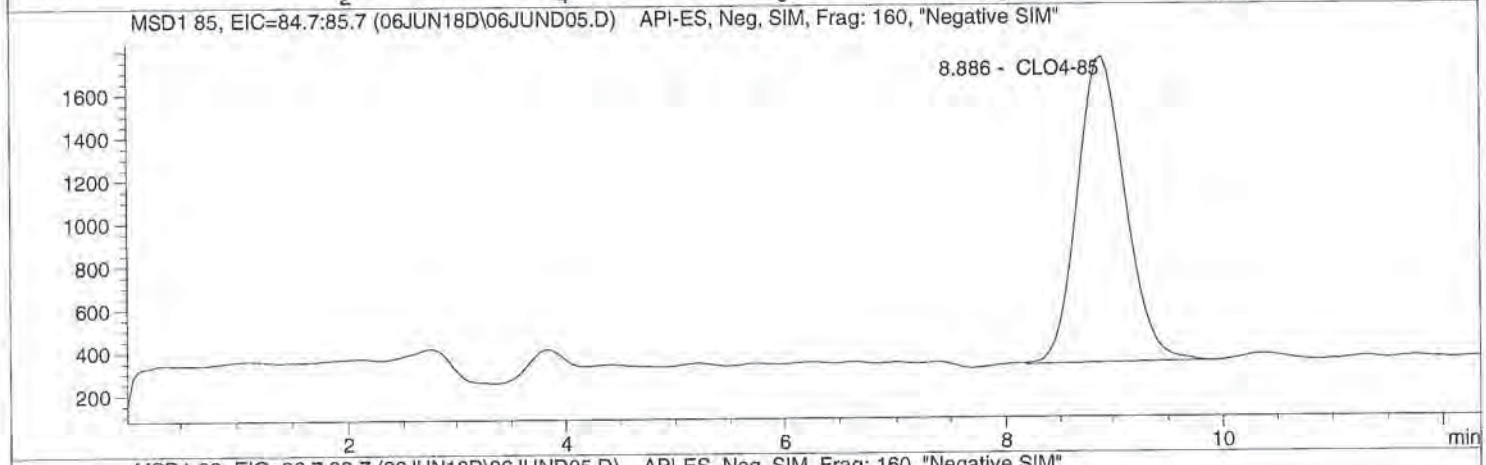
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND05.D Sample Name: 604061 QC@5

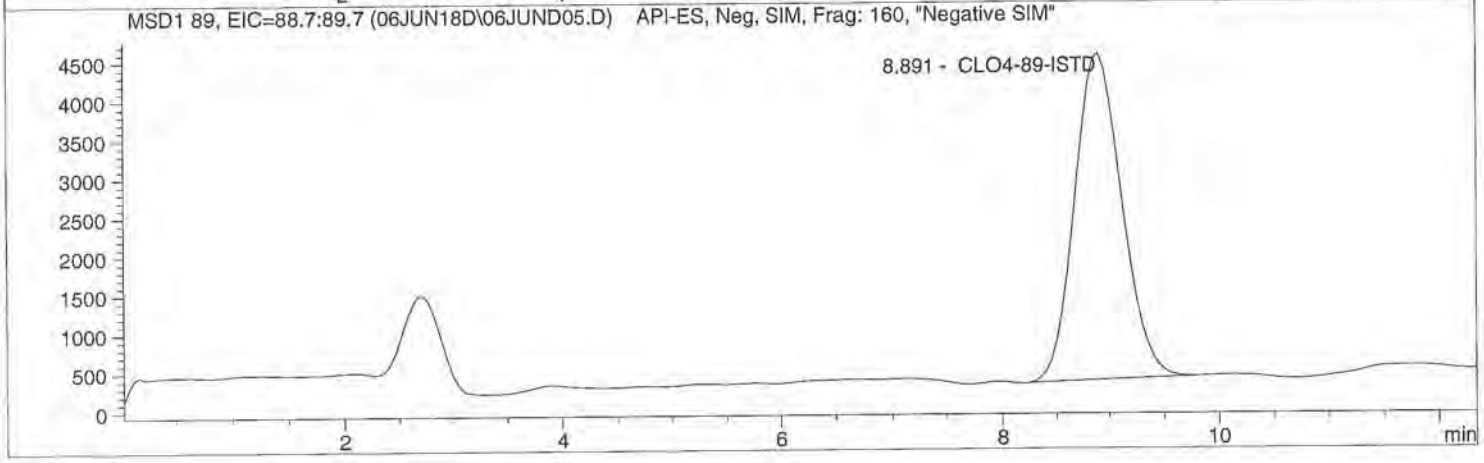
Injection Date:	6/06/2018 10:02:32	Seq Line:	5
Sample Name:	604061 QC@5	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND05.D Sample Name: 604061 QC@5

Injection Date:	6/06/2018 10:02:32	Seq Line:	5
Sample Name:	604061 QC@5	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.867	PBA	119383.9	4.2397	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.886	BBA	44512.8	4.8397	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.891	PBA	128784.9	5.0000	CLO4-89-ISTD

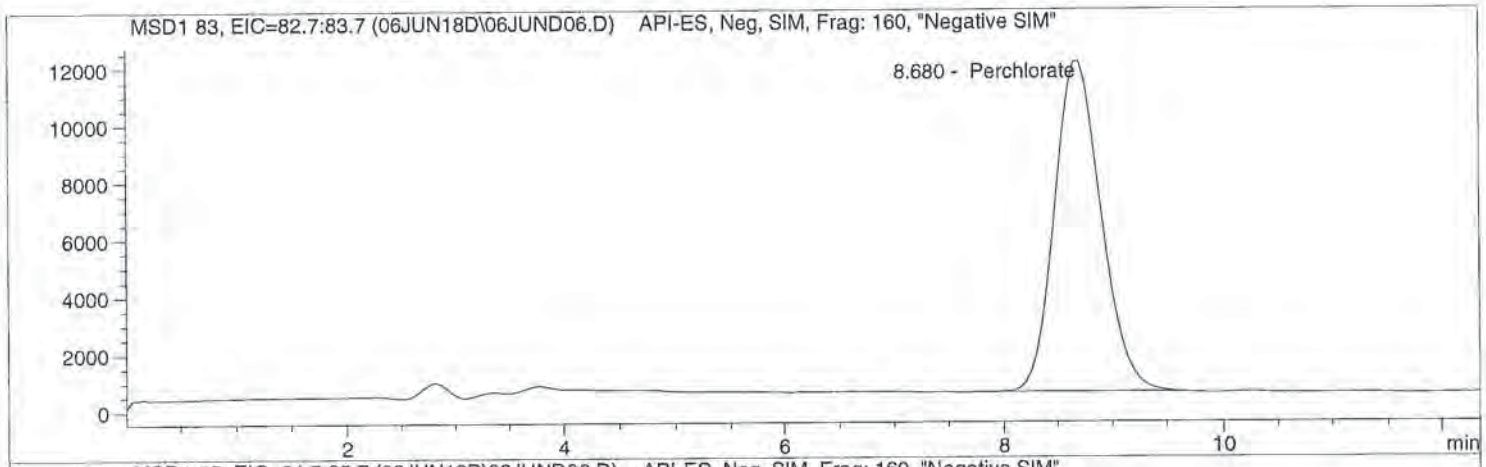
*** End of Report ***

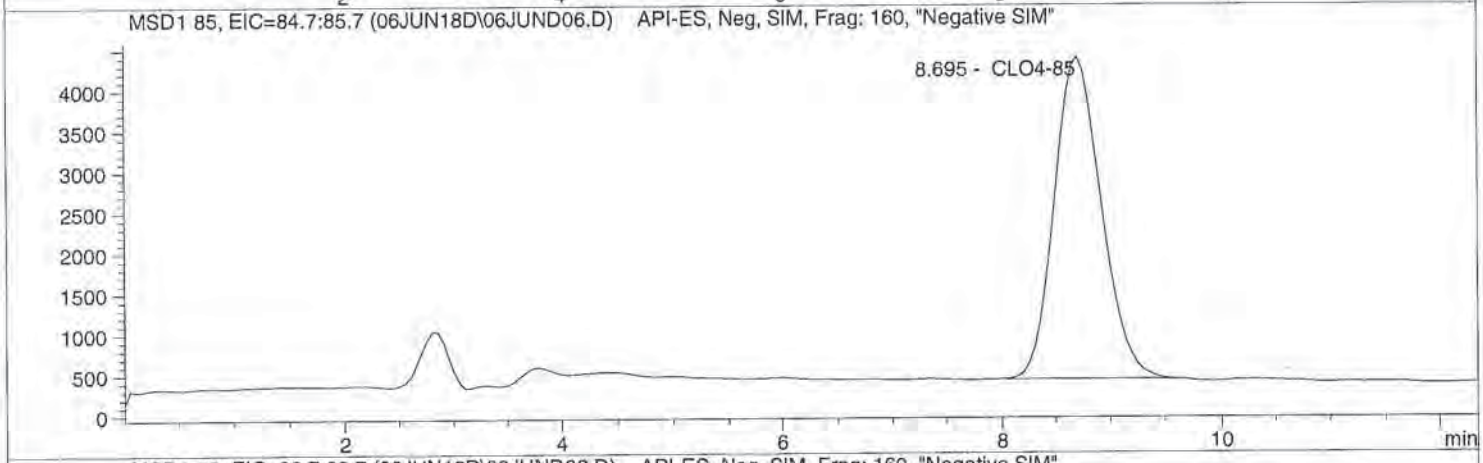
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND06.D Sample Name: 1815312001

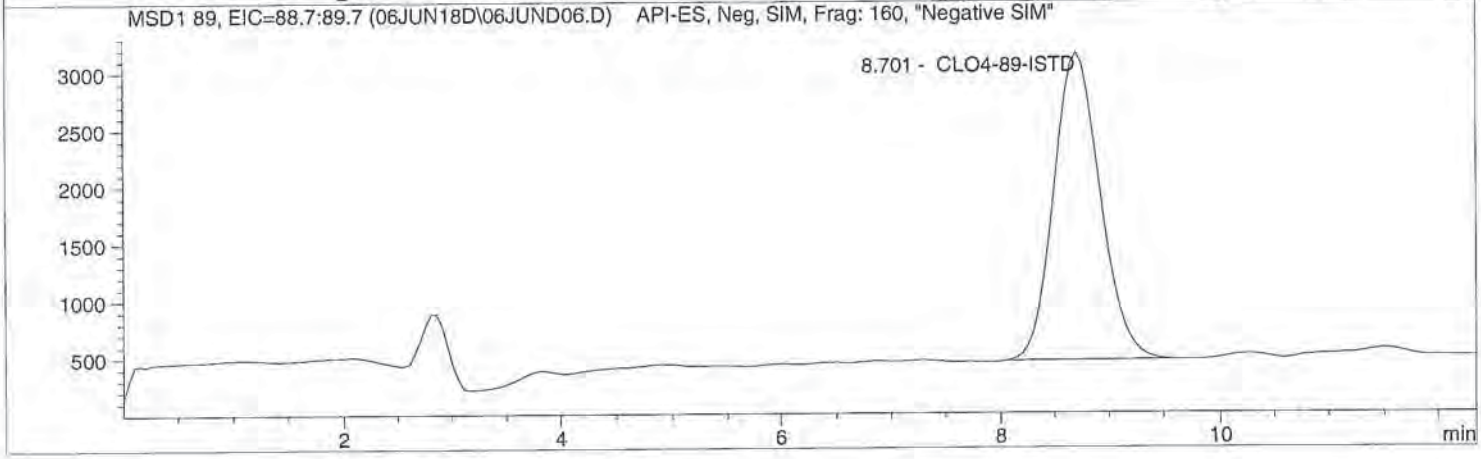
Injection Date:	6/06/2018 10:16:42	Seq Line:	6
Sample Name:	1815312001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND06.D Sample Name: 1815312001

Injection Date:	6/06/2018 10:16:42	Seq Line:	6
Sample Name:	1815312001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.680	BBA	344243.9	18.2826	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.695	BBA	119127.1	19.9985	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.701	BBA	79949.9	5.0000	CLO4-89-ISTD

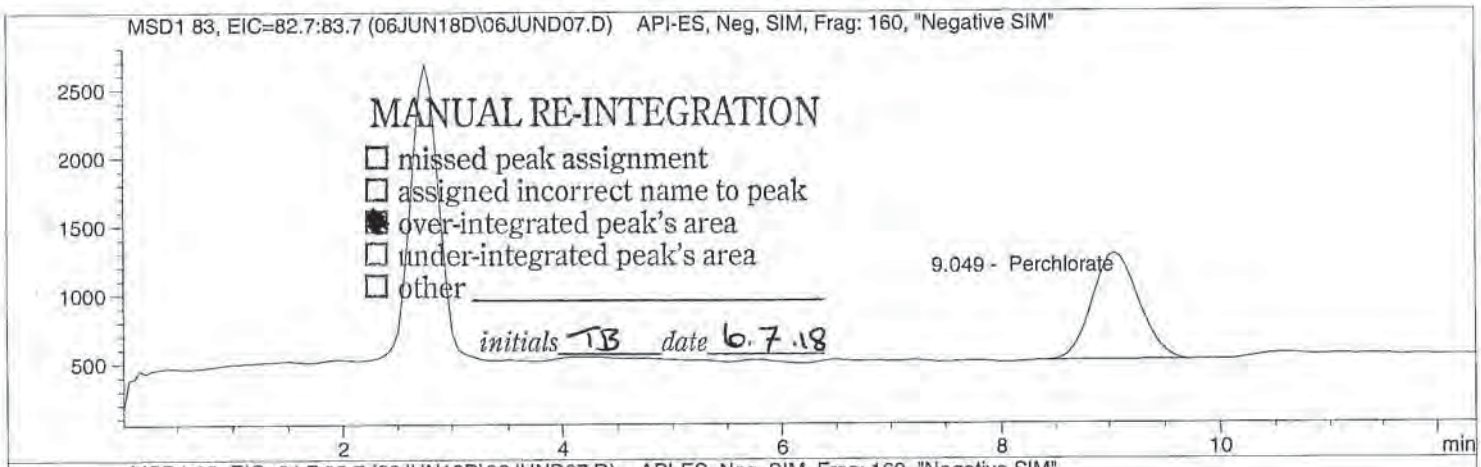
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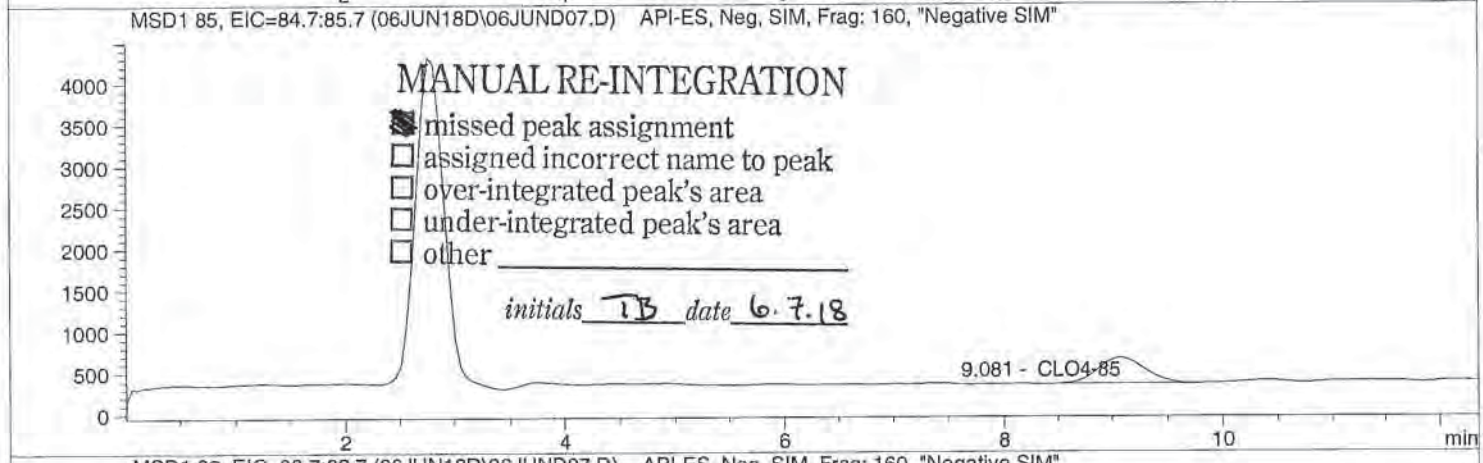
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND07.D Sample Name: 604058 LODV@1.

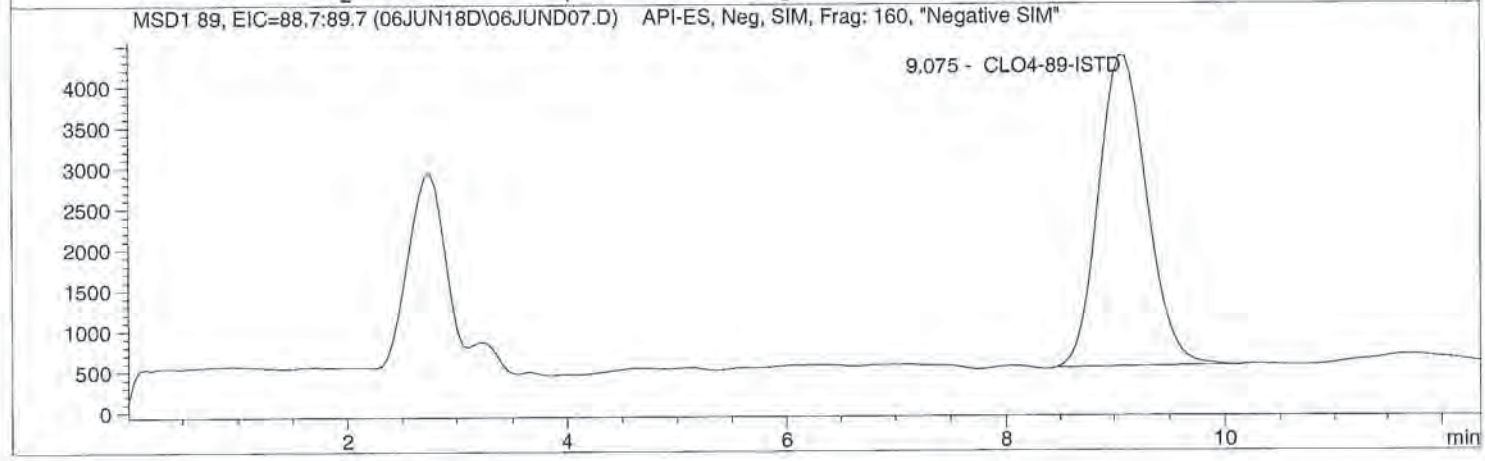
Injection Date:	6/06/2018 10:30:53	Seq Line:	7
Sample Name:	604058 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND07.D Sample Name: 604058 LODV@1.

Injection Date:	6/06/2018 10:30:53	Seq Line:	7
Sample Name:	604058 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.049	MM	22892.2	0.8811	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.081	MM	9158.8	0.9904	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.075	PBA	116560.0	5.0000	CLO4-89-ISTD

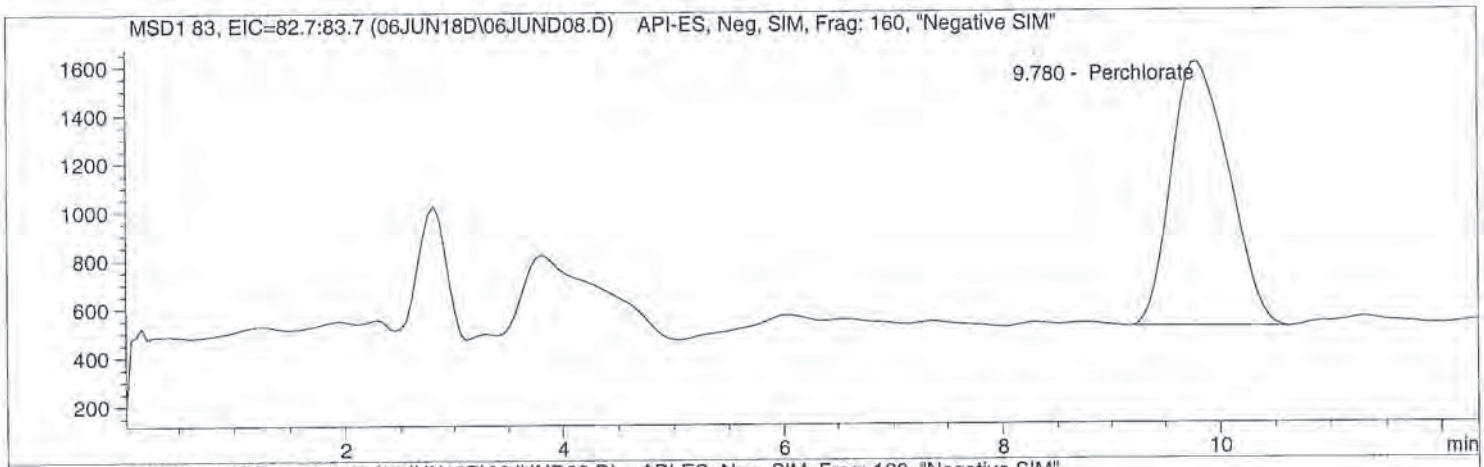
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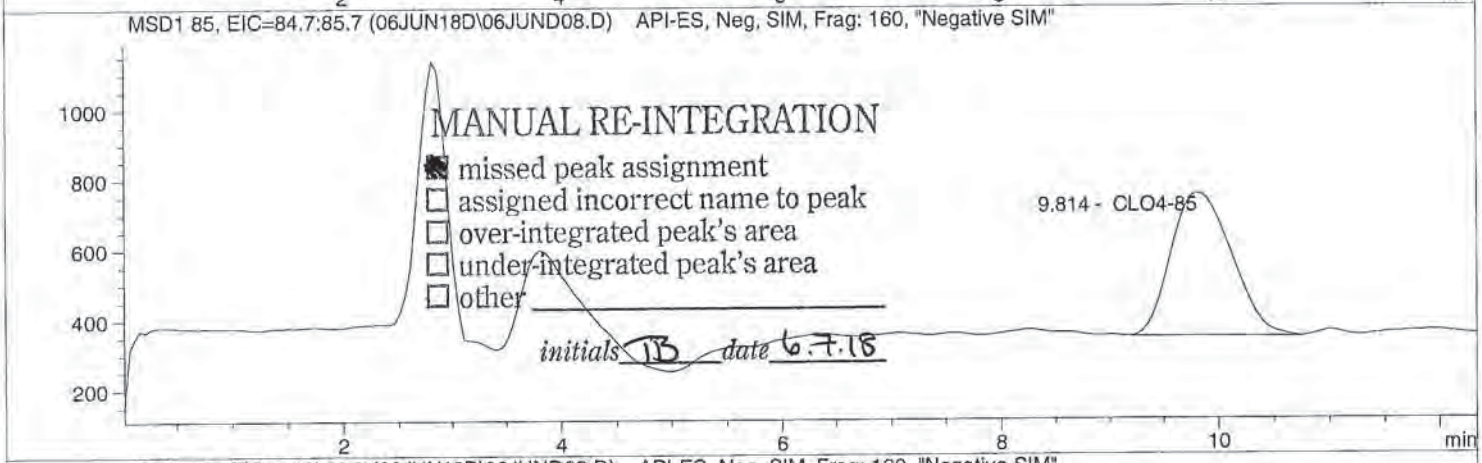
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND08.D Sample Name: 1815312002

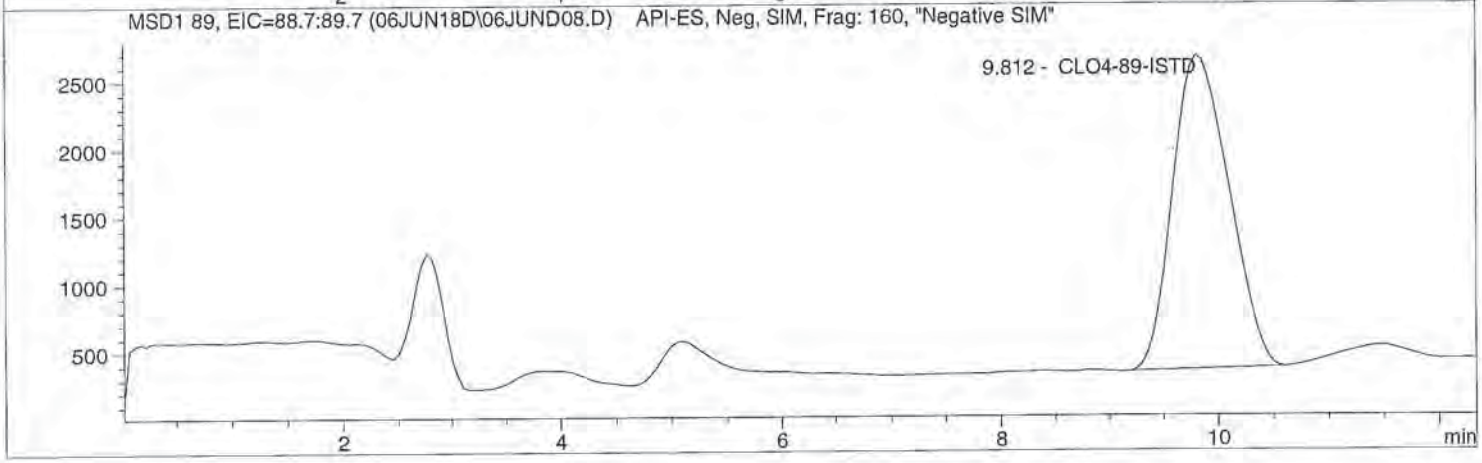
Injection Date:	6/06/2018 10:46:38	Seq Line:	8
Sample Name:	1815312002	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND08.D Sample Name: 1815312002

Injection Date:	6/06/2018 10:46:38	Seq Line:	8
Sample Name:	1815312002	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.780	PBA	39649.4	2.2041	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.814	MM	15591.3	2.5985	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.812	PBA	82498.4	5.0000	CLO4-89-ISTD

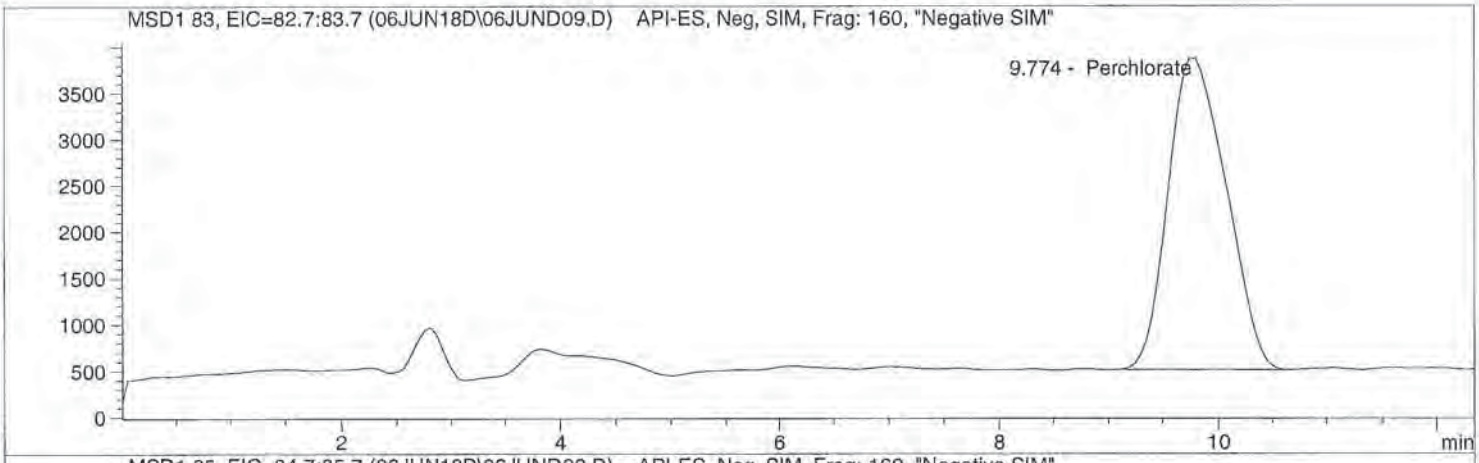
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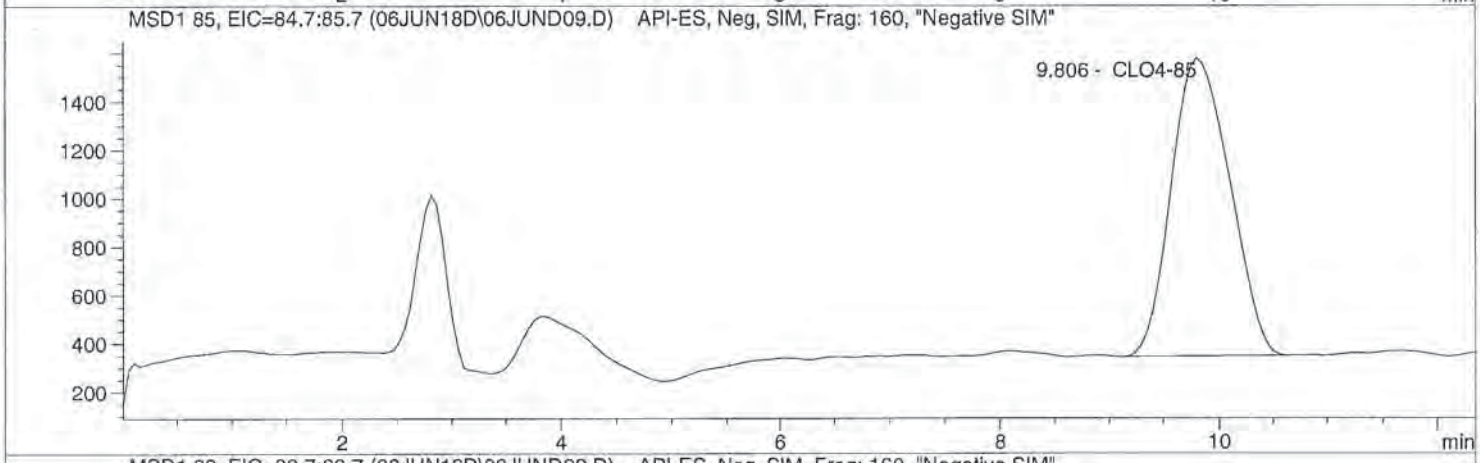
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND09.D Sample Name: 604062 153122S

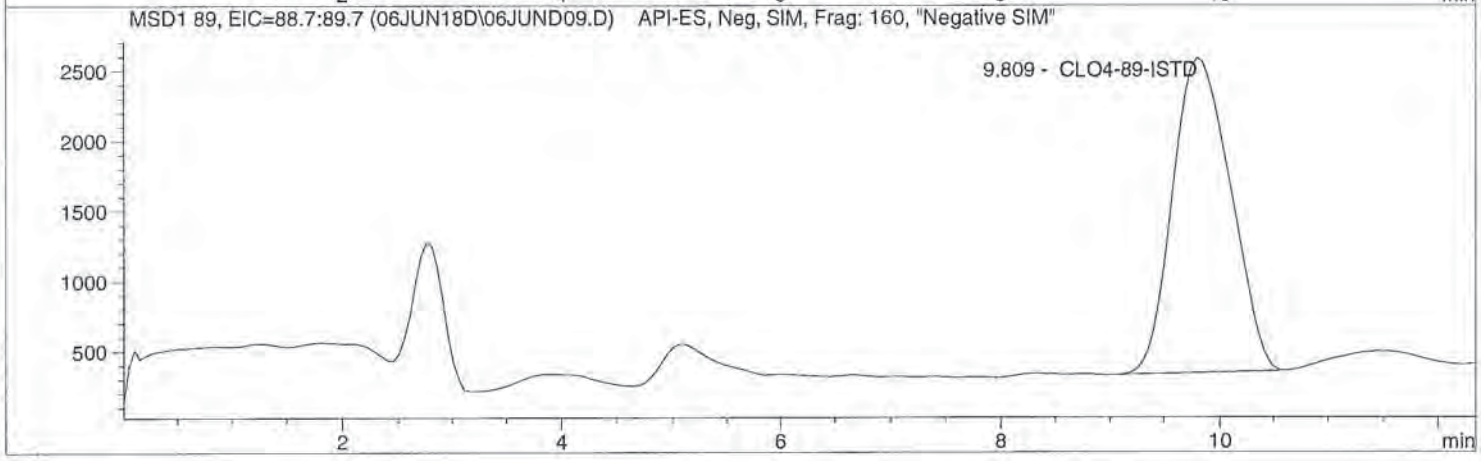
Injection Date:	6/06/2018 11:00:47	Seq Line:	9
Sample Name:	604062 153122S	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND09.D Sample Name: 604062 153122S

Injection Date:	6/06/2018 11:00:47	Seq Line:	9
Sample Name:	604062 153122S	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.774	PBA	121791.2	6.7974	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.806	PBA	44771.7	7.7334	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.809	PBA	81008.3	5.0000	CLO4-89-ISTD

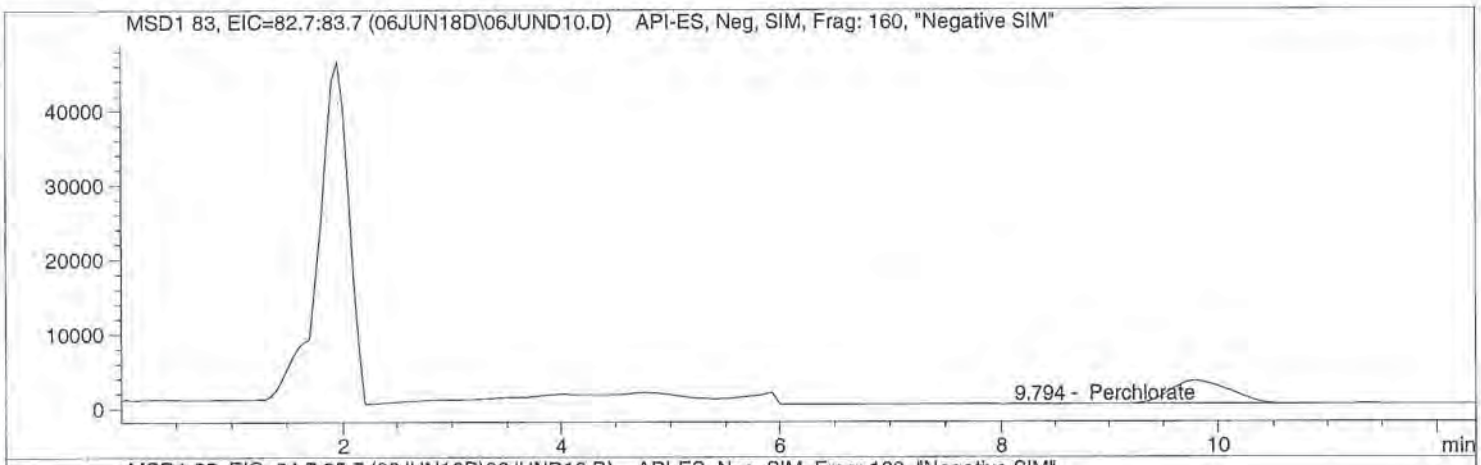
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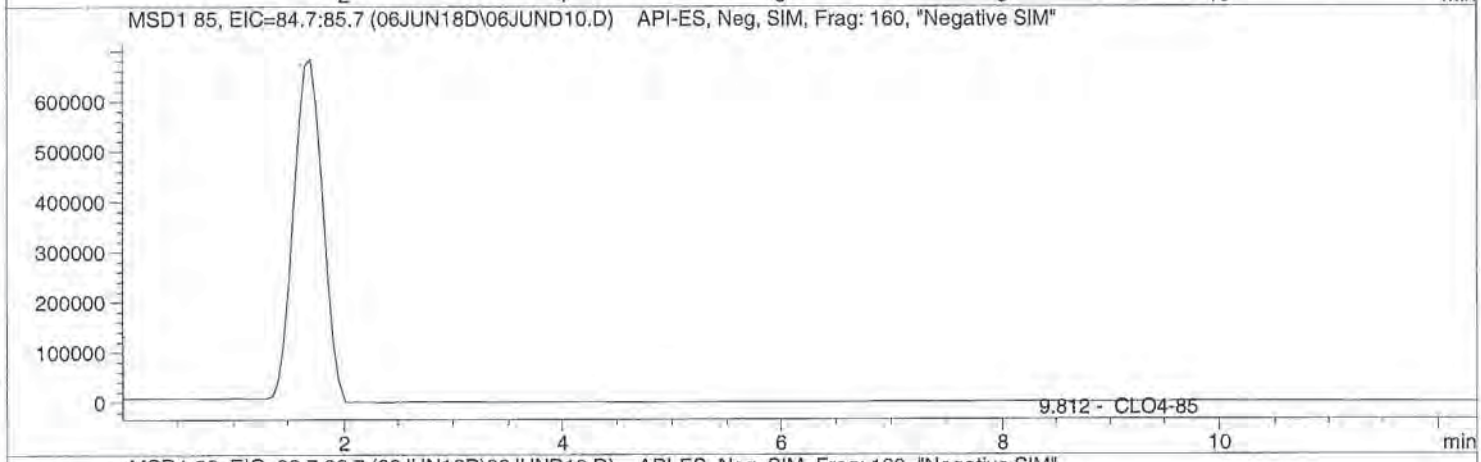
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND10.D Sample Name: 604063 153122D

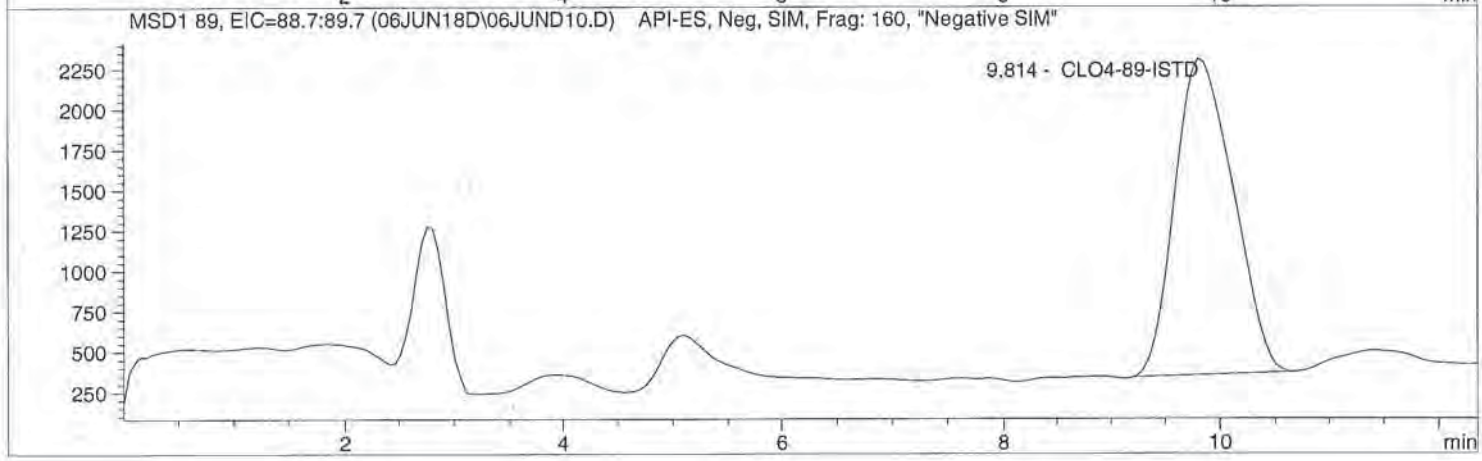
Injection Date:	6/06/2018 11:14:57	Seq Line:	10
Sample Name:	604063 153122D	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND10.D Sample Name: 604063 153122D

Injection Date:	6/06/2018 11:14:57	Seq Line:	10
Sample Name:	604063 153122D	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.794	PBA	112037.7	7.0491	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.812	PBA	41726.1	8.1291	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.814	PBA	71767.6	5.0000	CLO4-89-ISTD

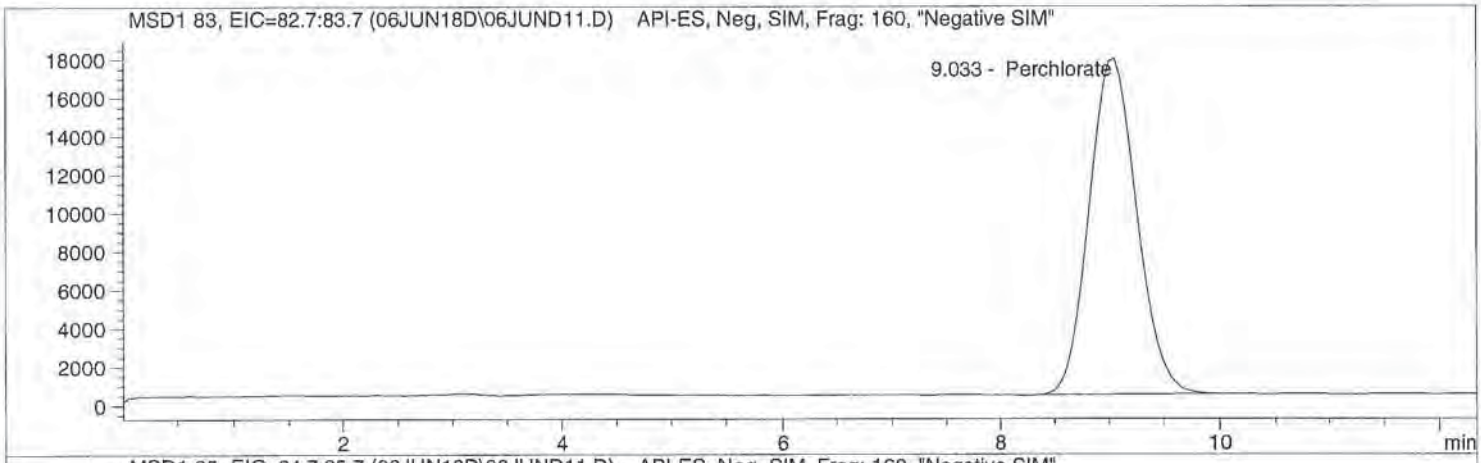
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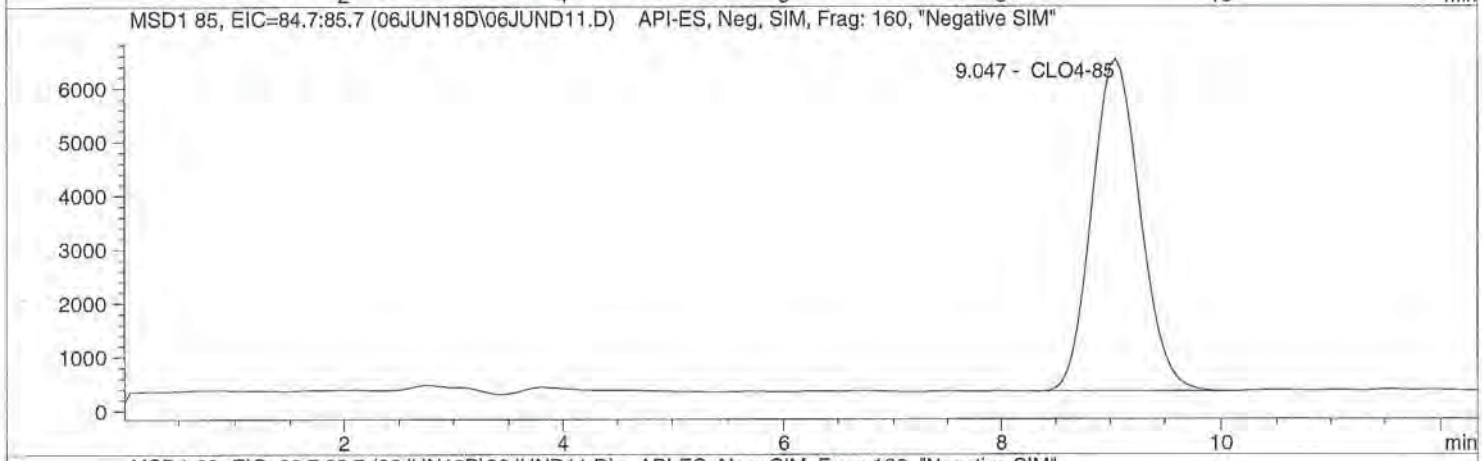
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND11.D Sample Name: 604064 CCV@25

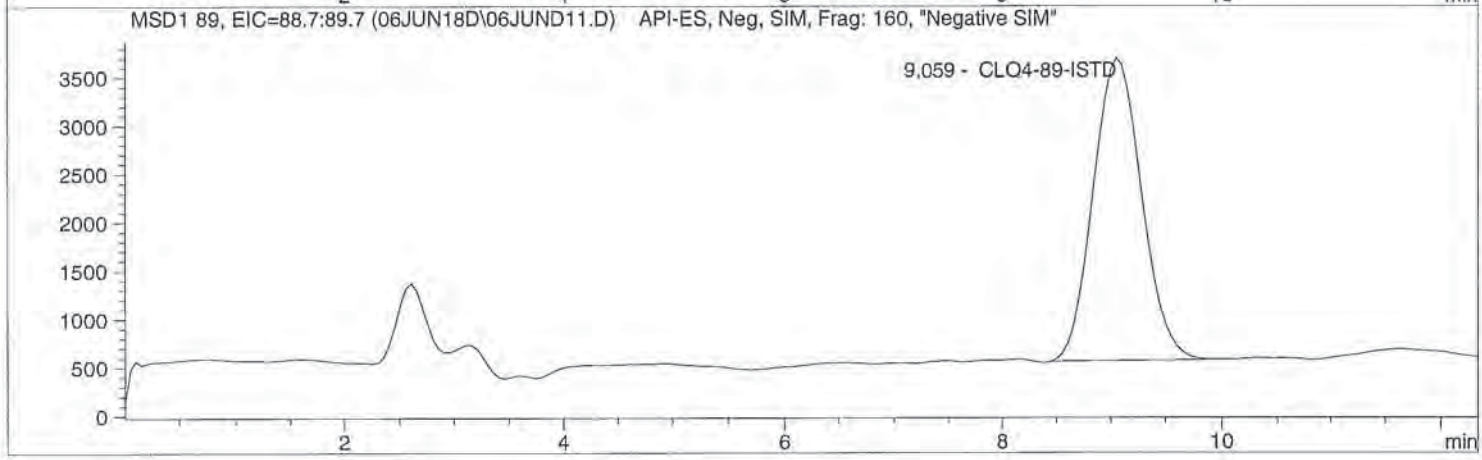
Injection Date:	6/06/2018 11:33:36	Seq Line:	11
Sample Name:	604064 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND11.D Sample Name: 604064 CCV@25

Injection Date:	6/06/2018 11:33:36	Seq Line:	11
Sample Name:	604064 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.033	PBA	533206.3	22.7437	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.047	BBA	190763.3	25.7583	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.059	PBA	97149.8	5.0000	CLO4-89-ISTD

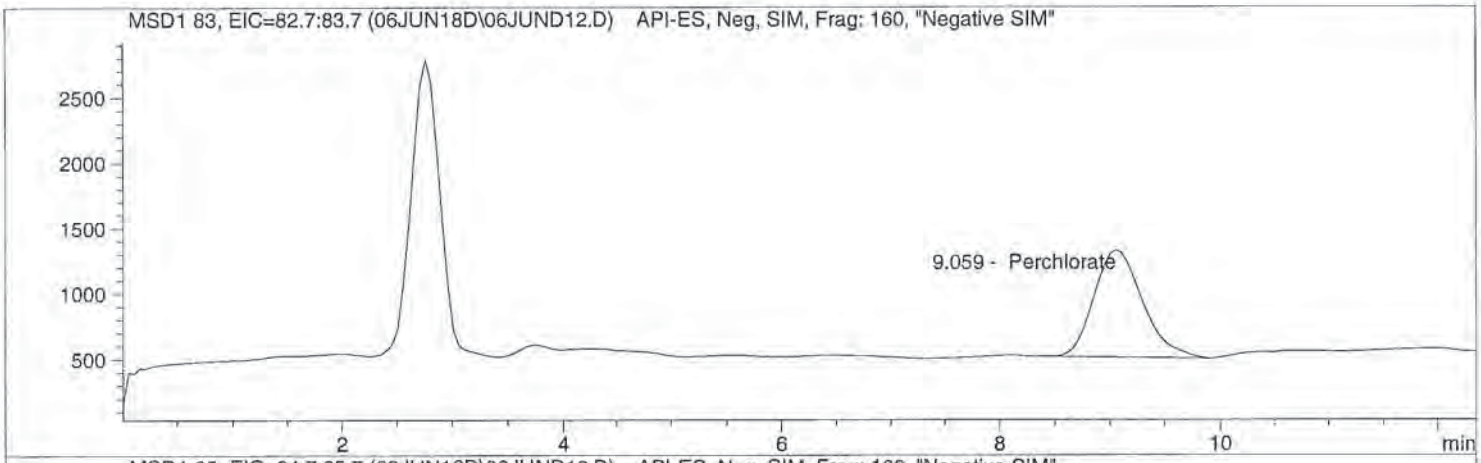
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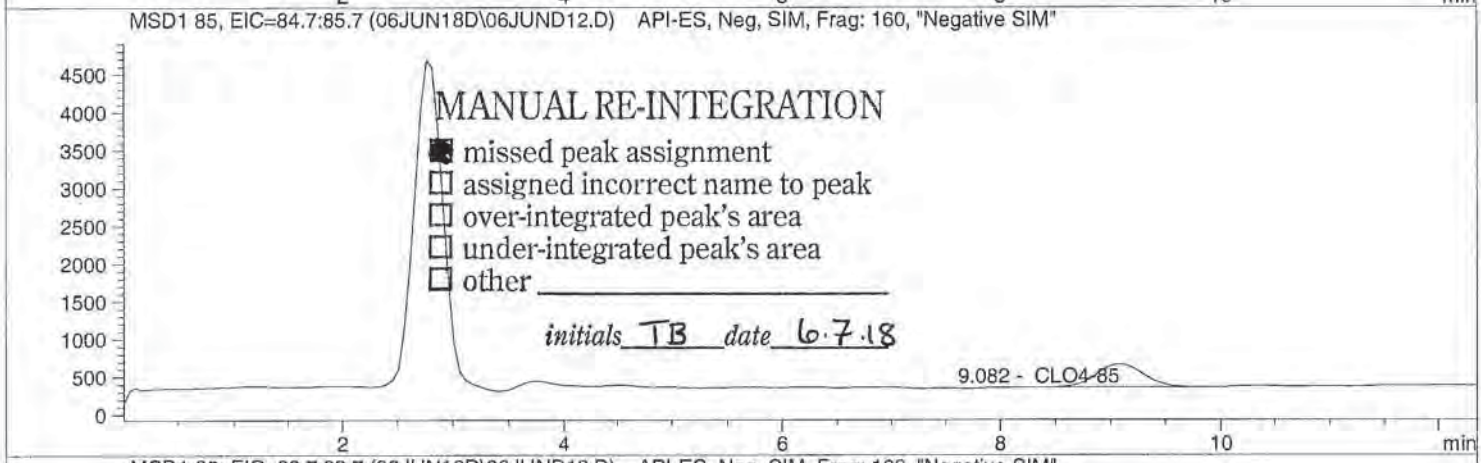
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND12.D Sample Name: 604065 LODV@1.

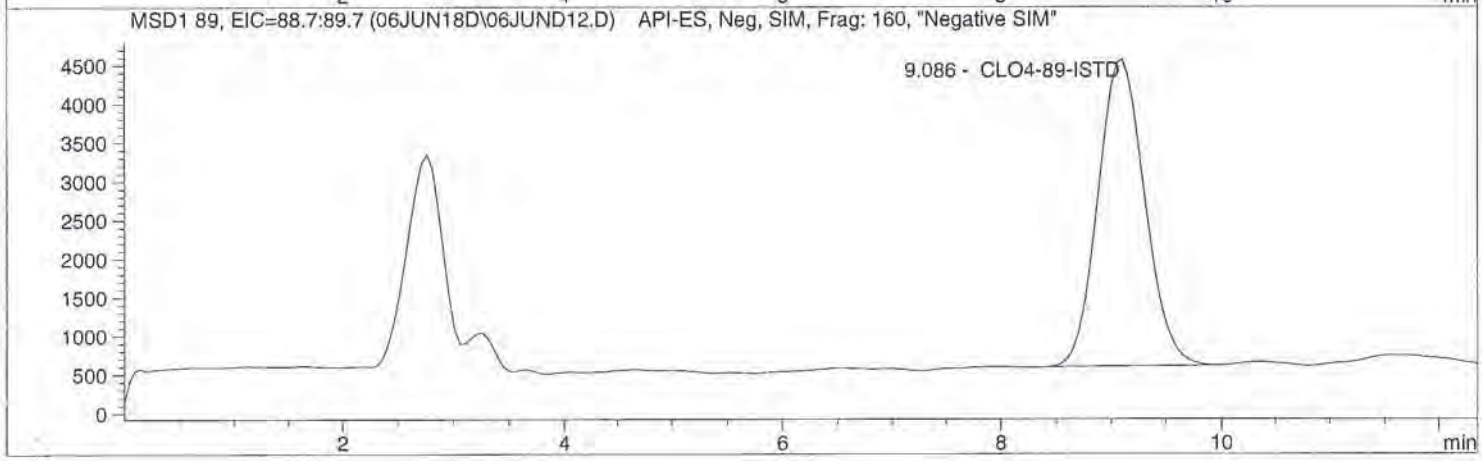
Injection Date:	6/06/2018 11:47:43	Seq Line:	12
Sample Name:	604065 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND12.D Sample Name: 604065 LODV@1.

Injection Date:	6/06/2018 11:47:43	Seq Line:	12
Sample Name:	604065 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.059	BBA	25068.8	0.9544	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.082	MM	9028.8	0.9579	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.086	BBA	118236.3	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

Batch Report: C:\HPCHEM\1\DATA\02APR18D\02APR18I.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	4.75217e4	8.805	1.04383
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	7.57673e4	8.842	1.88584
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	1.87507e5	8.869	5.06681
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	4.00349e5	8.838	9.89695
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	1.13339e6	8.844	25.44483
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	2.22347e6	8.787	49.47140
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	3.56432e6	8.816	75.20096
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	3.99588e5	8.826	10.16984

#	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	1.48071e4	8.787	8.93940e-1
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	2.78914e4	8.863	2.05665
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	6.40466e4	8.880	5.32040
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	1.32002e5	8.855	10.20400
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	3.49808e5	8.856	25.27336
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	6.58628e5	8.801	48.60374
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	1.06294e6	8.833	75.70015
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	1.27530e5	8.845	10.16575

#	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	2.05633e5	8.818	5.00000
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	1.83981e5	8.862	5.00000
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	1.68695e5	8.888	5.00000
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	1.79911e5	8.861	5.00000
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	1.81917e5	8.865	5.00000
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	1.62538e5	8.808	5.00000
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	1.52621e5	8.841	5.00000
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	1.74490e5	8.846	5.00000

*** End of Report ***

Method C:\HPCHEM\1\METHODS\CLO4-DPR.M

Calibration Table

Perchlorate

Calib. Data Modified : 4/2/2018 11:32:41 AM

Calculate : Internal Standard
Based on : Peak Area

Rel. Reference Window : 20.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 20.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : No recalibration if peaks missing

Curve Type : Quadratic (some peaks differ, see below)
Origin : Ignored (some peaks differ, see below)
Weight : Linear (Amnt) (some peaks differ, see below)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
Printout of recalibrations within a sequence:
Calibration Table after Recalibration
Normal Report after Recalibration
If the sequence is done with bracketing:
Results of first cycle (ending previous bracket)

Default Sample ISTD Information (if not set in sample table):

ISTD #	ISTD Amount	Name
1	5.00000	CLO4-89-ISTD

Signal 1: MSD1 83, EIC=82.7:83.7
Signal 2: MSD1 85, EIC=84.7:85.7
Signal 3: MSD1 89, EIC=88.7:89.7

RetTime [min]	Sig	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
8.740	1	1	1.00000	4.75217e4	2.10430e-5		1	Perchlorate
		2	2.00000	7.57673e4	2.63966e-5			
		3	5.00000	1.87507e5	2.66656e-5			
		4	10.00000	4.00349e5	2.49782e-5			
		5	25.00000	1.13339e6	2.20577e-5			
		6	50.00000	2.22347e6	2.24874e-5			
		7	75.00000	3.56432e6	2.10419e-5			
8.787	2	1	1.00000	1.48071e4	6.75351e-5		1	CLO4-85
		2	2.00000	2.78914e4	7.17068e-5			
		3	5.00000	6.40466e4	7.80681e-5			
		4	10.00000	1.32002e5	7.57564e-5			
		5	25.00000	3.49808e5	7.14678e-5			
		6	50.00000	6.58628e5	7.59154e-5			
		7	75.00000	1.06294e6	7.05587e-5			
8.818	3	1	5.00000	2.05633e5	2.43151e-5	+I1		CLO4-89-ISTD
		2	5.00000	1.83981e5	2.71766e-5			
		3	5.00000	1.68695e5	2.96393e-5			
		4	5.00000	1.79911e5	2.77915e-5			
		5	5.00000	1.81917e5	2.74851e-5			
		6	5.00000	1.62538e5	3.07621e-5			

Method C:\HPCHEM\1\METHODS\CLO4-DPR.M

RetTime [min]	Sig	Lvl	Amount	Area	Amt/Area	Ref	Grp	Name
		7	5.00000	1.52621e5	3.27608e-5			

More compound-specific settings:

Compound: Perchlorate
- Time Window : From 6.650 min To 10.650 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 0.5
  - Level 3 : 0.2
  - Level 4 : 0.1
  - Level 5 : 0.04
  - Level 6 : 0.02
  - Level 7 : 0.013333

Compound: CLO4-85
- Time Window : From 6.682 min To 10.682 min
- Curve Type : Quadratic
- Origin : Ignored
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 0.5
  - Level 3 : 0.2
  - Level 4 : 0.1
  - Level 5 : 0.04
  - Level 6 : 0.02
  - Level 7 : 0.013333

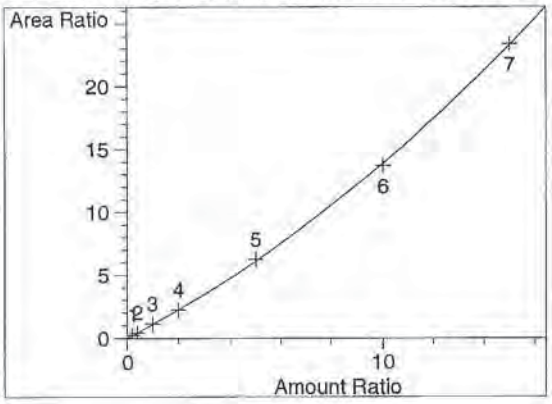
Compound: CLO4-89-ISTD
- Time Window : From 6.711 min To 10.711 min
- Curve Type : Linear
- Origin : Included
- Calibration Level Weights:/
  - Level 1 : 1
  - Level 2 : 1
  - Level 3 : 1
  - Level 4 : 1
  - Level 5 : 1
  - Level 6 : 1
  - Level 7 : 1

Peak Sum Table

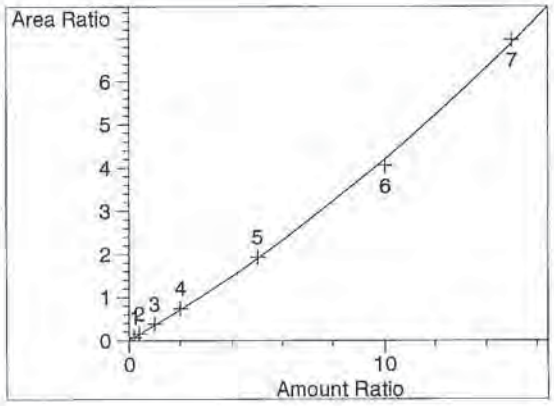
No Entries in table

Method C:\HPCHEM\1\METHODS\CLO4-DPR.M

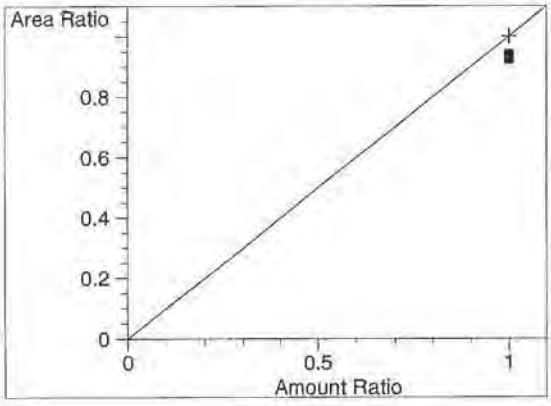
Calibration Curves



Perchlorate at exp. RT: 8.740
MSD1 83, EIC=82.7:83.7
Correlation: 0.99992
Residual Std. Dev.: 0.10616
Formula: $y = ax^2 + bx + c$
a: 3.31374e-2
b: 1.05374
c: 9.66975e-3
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333



CLO4-85 at exp. RT: 8.787
MSD1 85, EIC=84.7:85.7
Correlation: 0.99968
Residual Std. Dev.: 0.07365
Formula: $y = ax^2 + bx + c$
a: 8.04074e-3
b: 3.37521e-1
c: 1.14057e-2
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333



CLO4-89-ISTD at exp. RT: 8.818
MSD1 89, EIC=88.7:89.7
Correlation: 1.00000
Residual Std. Dev.: 0.00000
Formula: $y = mx + b$
m: 1.00000
b: 0.00000
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 1
Level 3 : 1
Level 4 : 1
Level 5 : 1
Level 6 : 1
Level 7 : 1

Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2018\APR\02APR18D.S

Sequence Table:

Method and Injection Info Part:

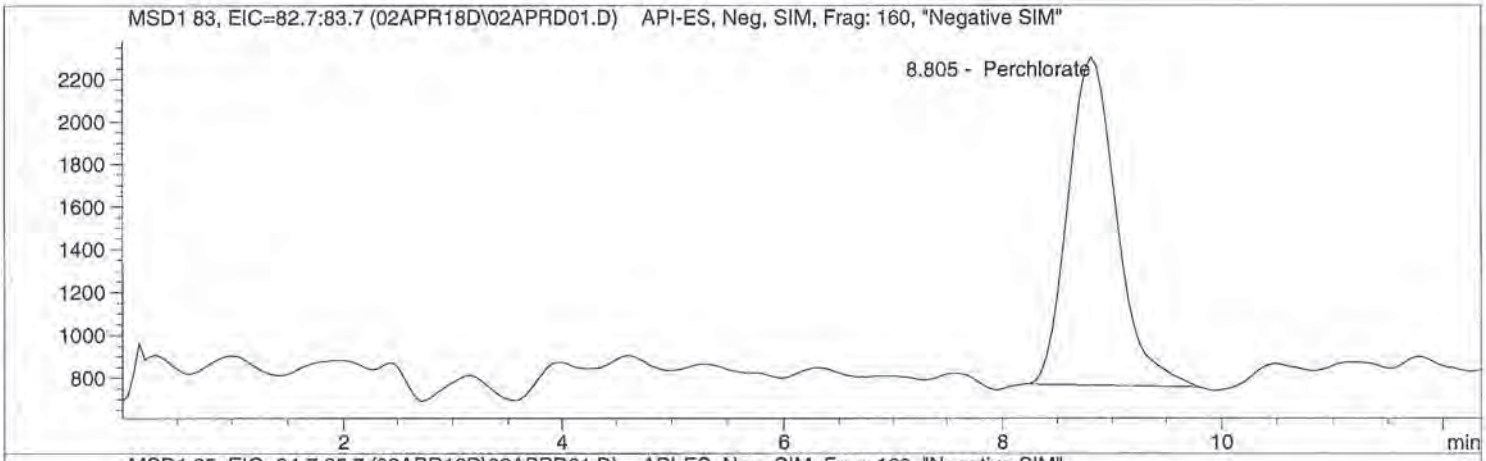
Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	ICAL1@ 1.0ug/L	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	ICAL2@ 2.0ug/L	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	ICAL3@ 5.0ug/L	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	ICAL4@ 10.ug/L	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	ICAL5@ 25.ug/L	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	ICAL6@ 50.ug/L	CLO4-DOD	1	Ctrl Samp		
7	Vial 77	ICAL7@ 75.ug/L	CLO4-DOD	1	Ctrl Samp		
8	Vial 78	ICAL Verf@10ug/L	CLO4-DOD	1	Ctrl Samp		

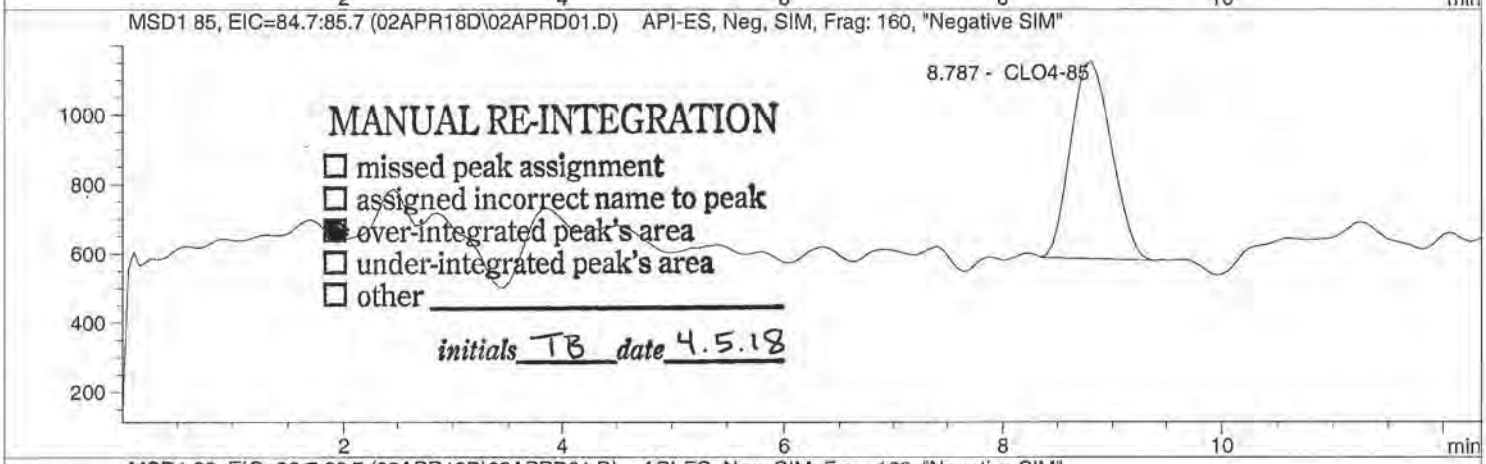
Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

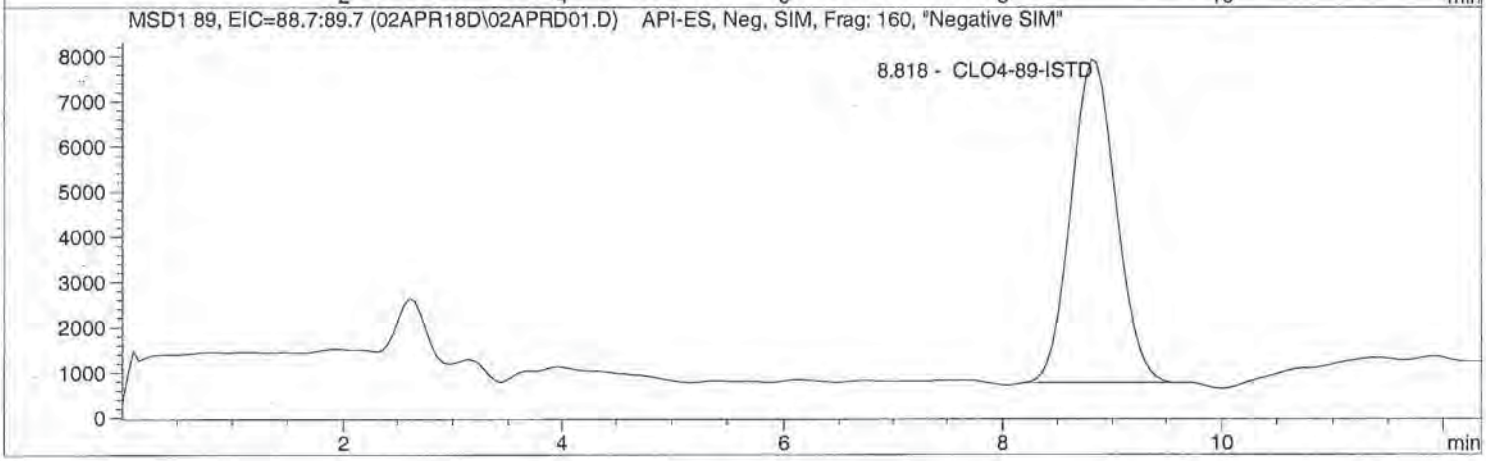
Perchlorate analysis





MANUAL RE-INTEGRATION
☐ missed peak assignment
☐ assigned incorrect name to peak
■ over-integrated peak's area
☐ under-integrated peak's area
☐ other _____

initials TB *date* 4.5.18



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.805	PBA	47521.7	1.0438	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	MM	14807.1	0.8939	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.818	PBA	205633.2	5.0000	CLO4-89-ISTD

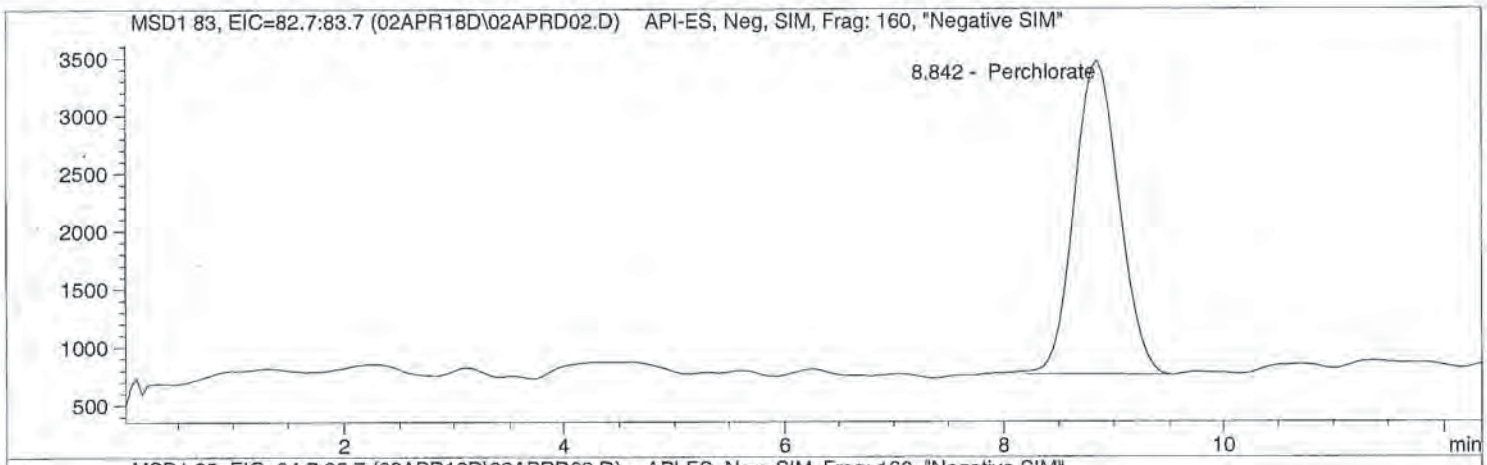
*** End of Report ***

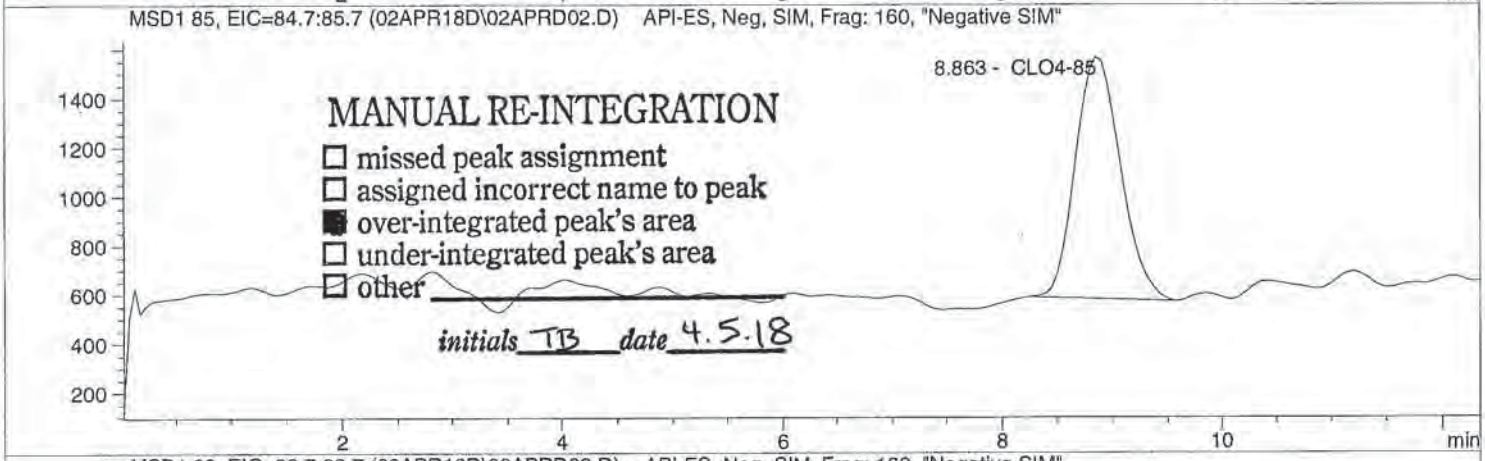
Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

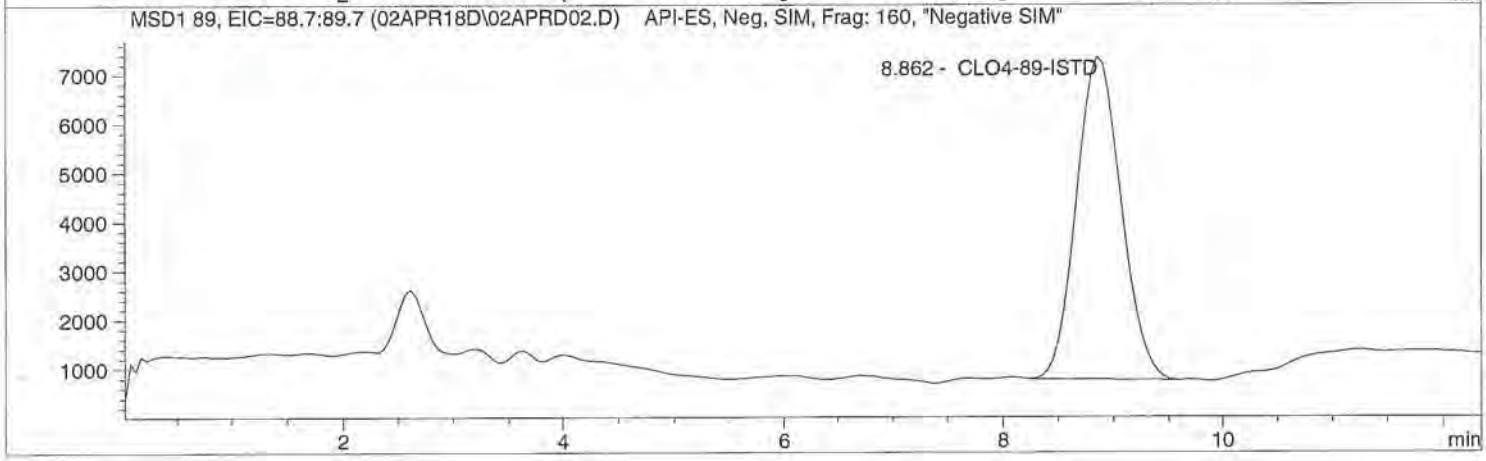
Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis





MANUAL RE-INTEGRATION
☐ missed peak assignment
☐ assigned incorrect name to peak
■ over-integrated peak's area
☐ under-integrated peak's area
☑ other _____
initials TB *date* 4.5.18



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.842	BBA	75767.3	1.8858	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.863	MM	27891.4	2.0567	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.862	BBA	183981.5	5.0000	CLO4-89-ISTD

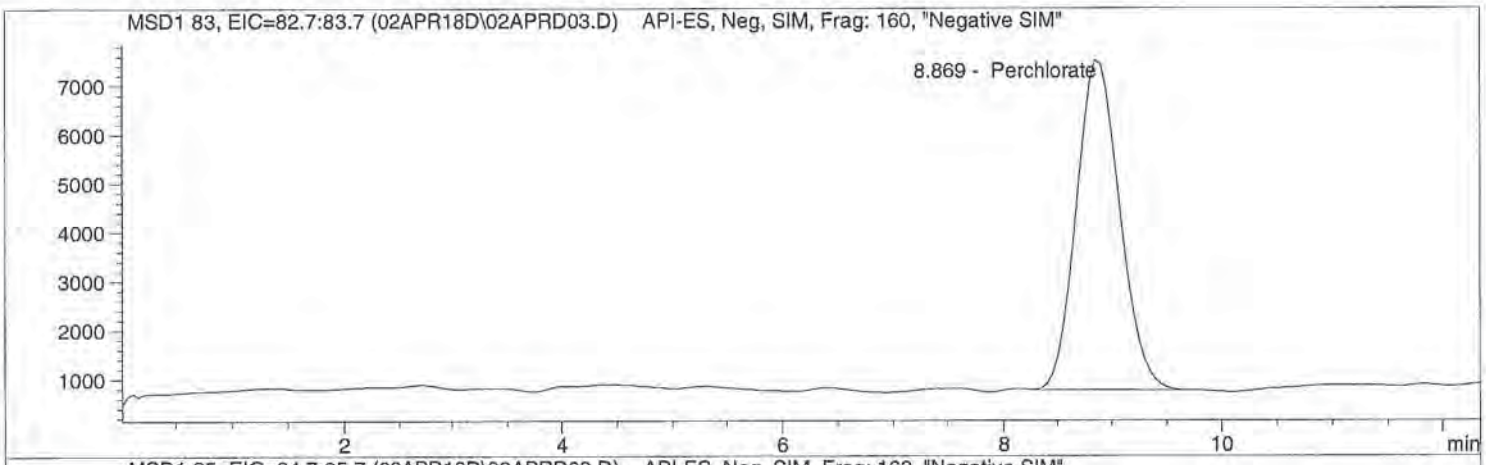
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD03.D Sample Name: ICAL3@ 5.0ug/L

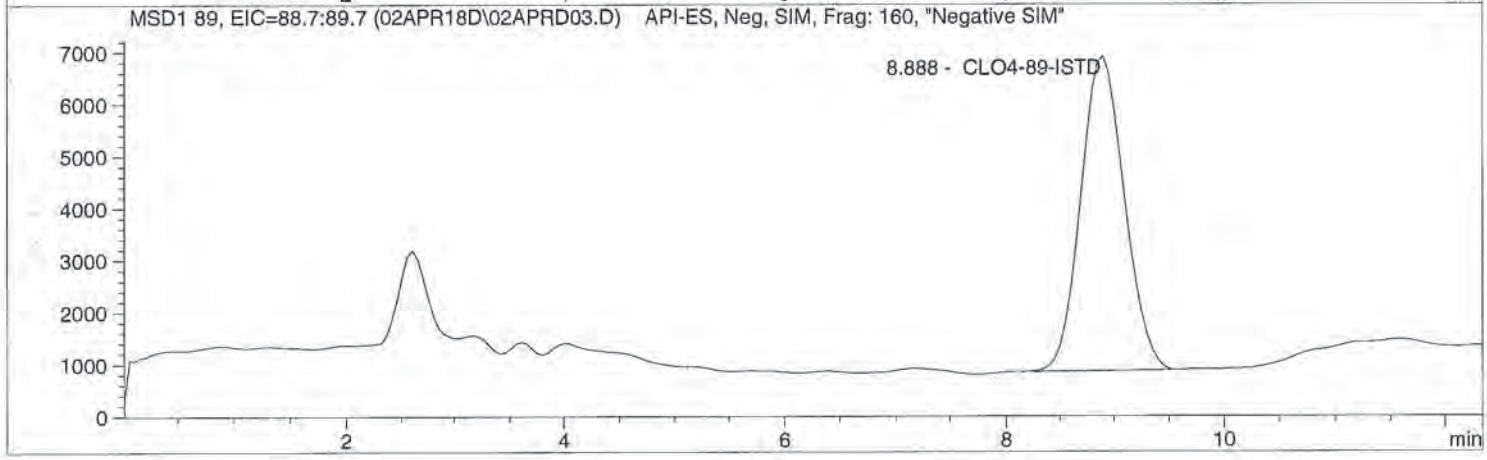
Injection Date:	4/02/2018 09:36:38	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD03.D Sample Name: ICAL3@ 5.0ug/L

Injection Date:	4/02/2018 09:36:38	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.869	BBA	187507.2	5.0668	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.880	PBA	64046.6	5.3204	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.888	BBA	168695.0	5.0000	CLO4-89-ISTD

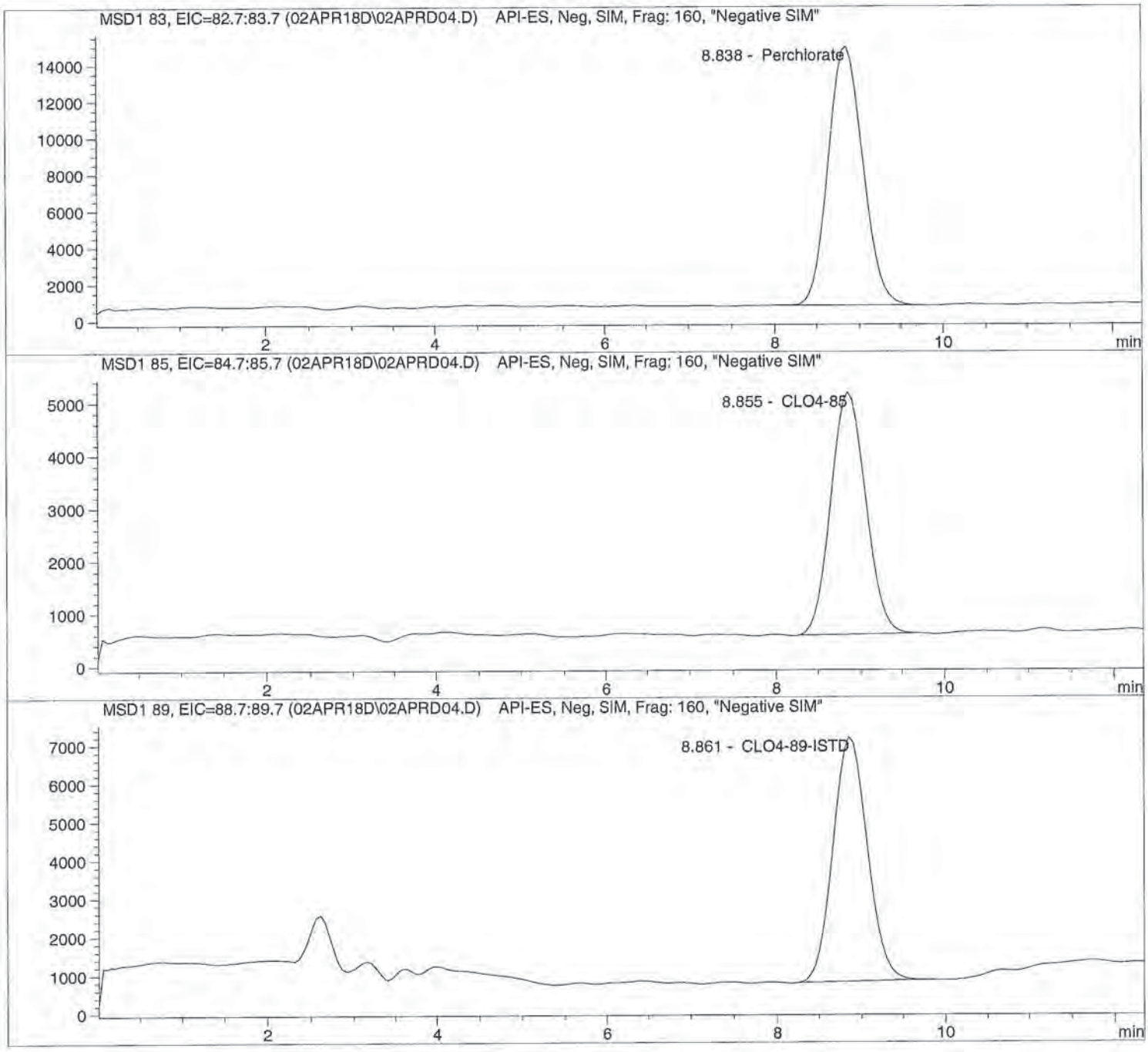
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	4/02/2018 09:50:54	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	4/02/2018 09:50:54	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.838	BBA	400349.0	9.8969	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.855	PBA	132002.1	10.2040	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.861	PBA	179911.2	5.0000	CLO4-89-ISTD

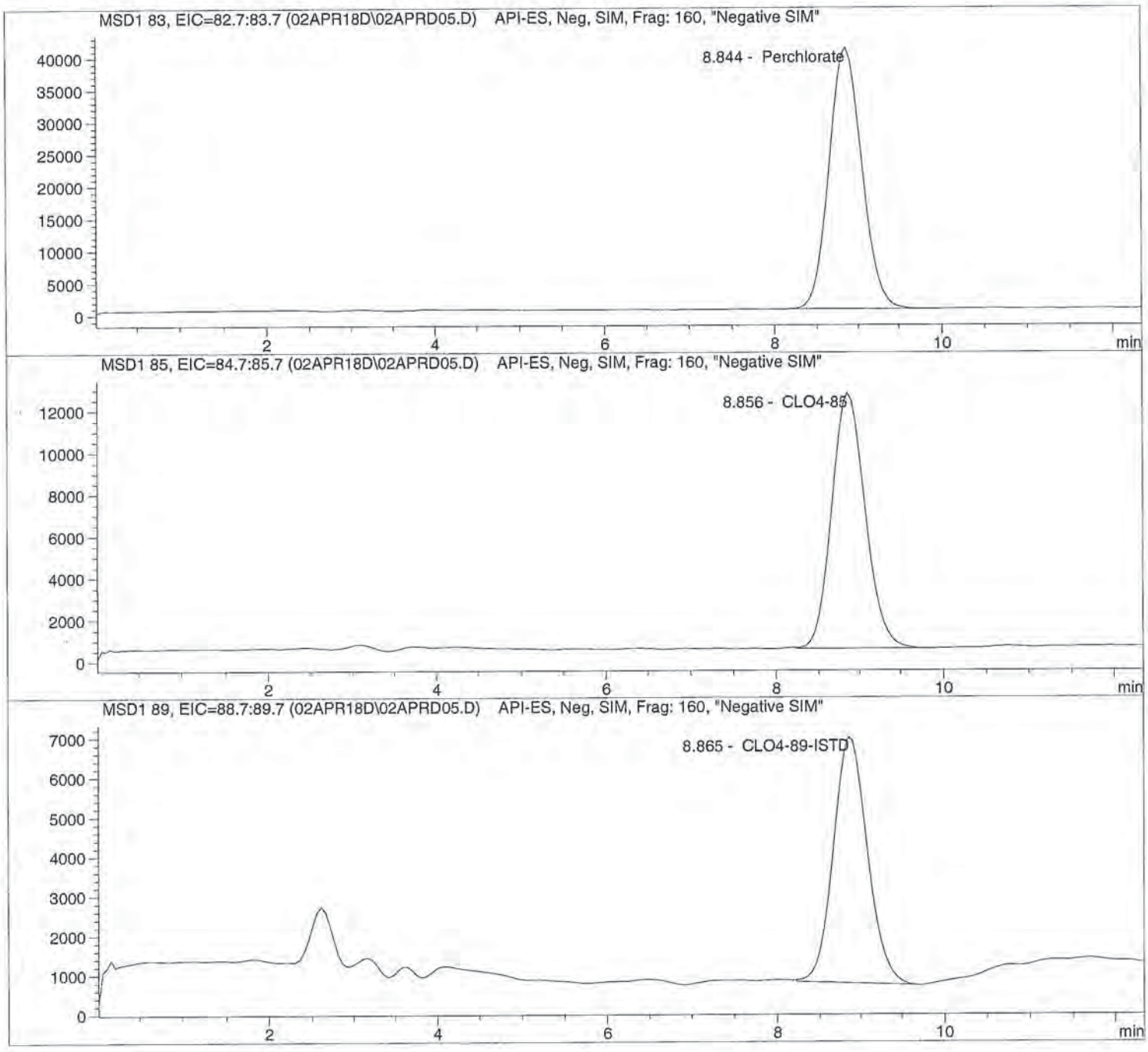
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	4/02/2018 10:05:03	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	4/02/2018 10:05:03	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.844	BBA	1133393.5	25.4448	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.856	BBA	349808.1	25.2734	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.865	BBA	181916.8	5.0000	CLO4-89-ISTD

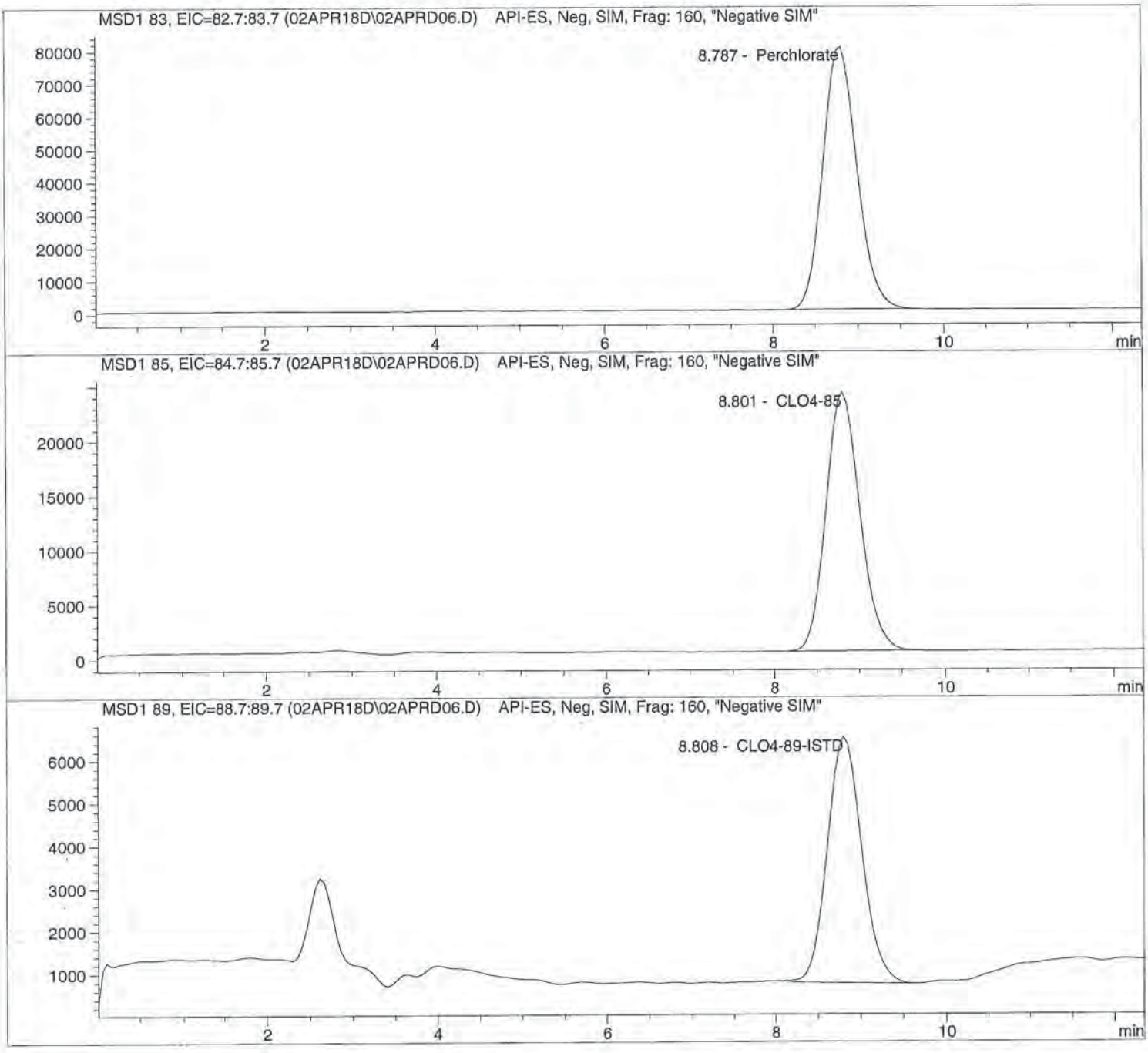
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	4/02/2018 10:19:12	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	4/02/2018 10:19:12	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	50.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	BBA	2223467.0	49.4714	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.801	BBA	658628.2	48.6037	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.808	BBA	162537.8	5.0000	CLO4-89-ISTD

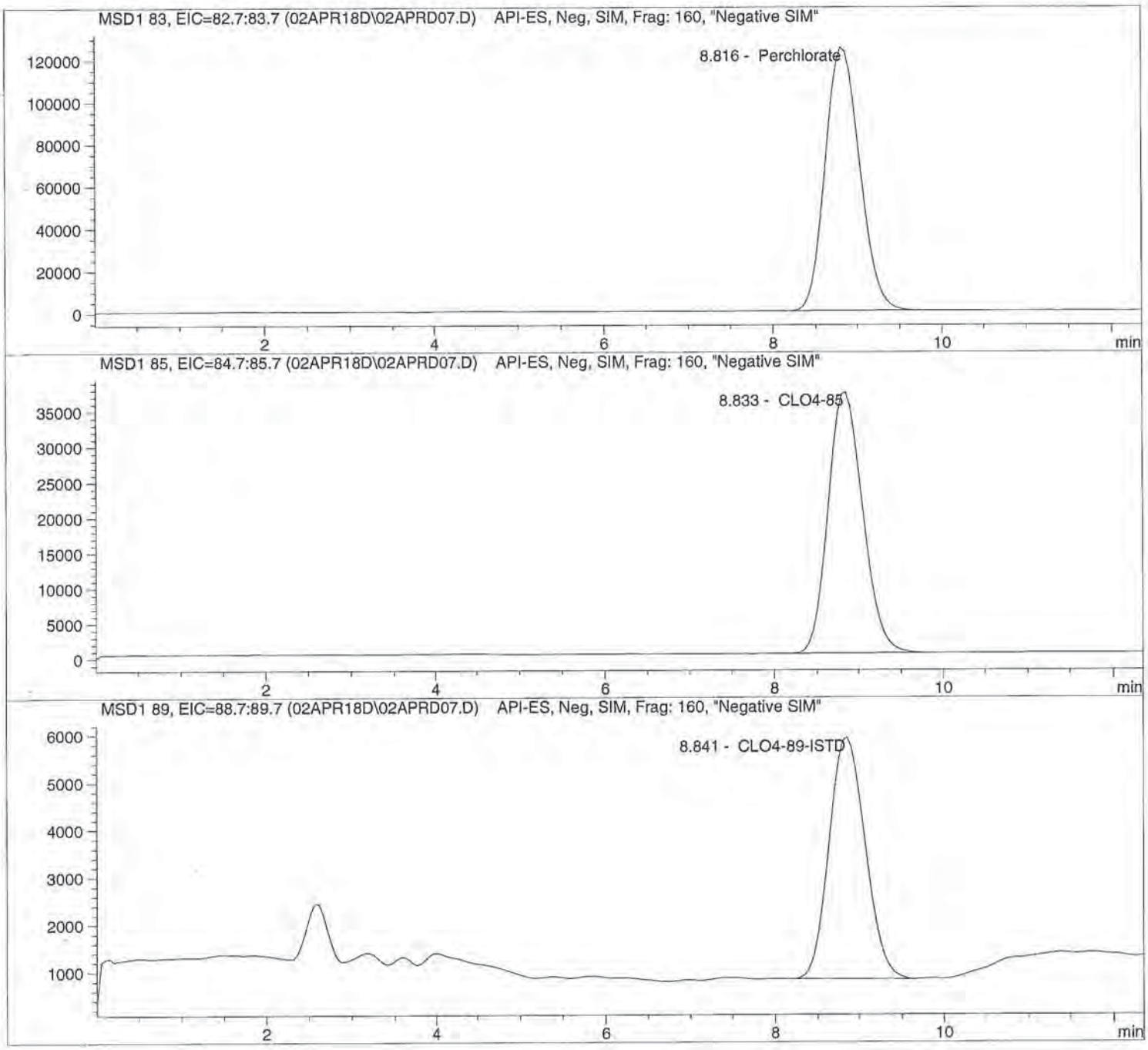
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD07.D Sample Name: ICAL7@ 75.ug/L

Injection Date:	4/02/2018 10:33:24	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD07.D Sample Name: ICAL7@ 75.ug/L

Injection Date:	4/02/2018 10:33:24	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	75.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.816	PBA	3564322.2	75.2010	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.833	BBA	1062944.2	75.7001	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.841	PBA	152621.4	5.0000	CLO4-89-ISTD

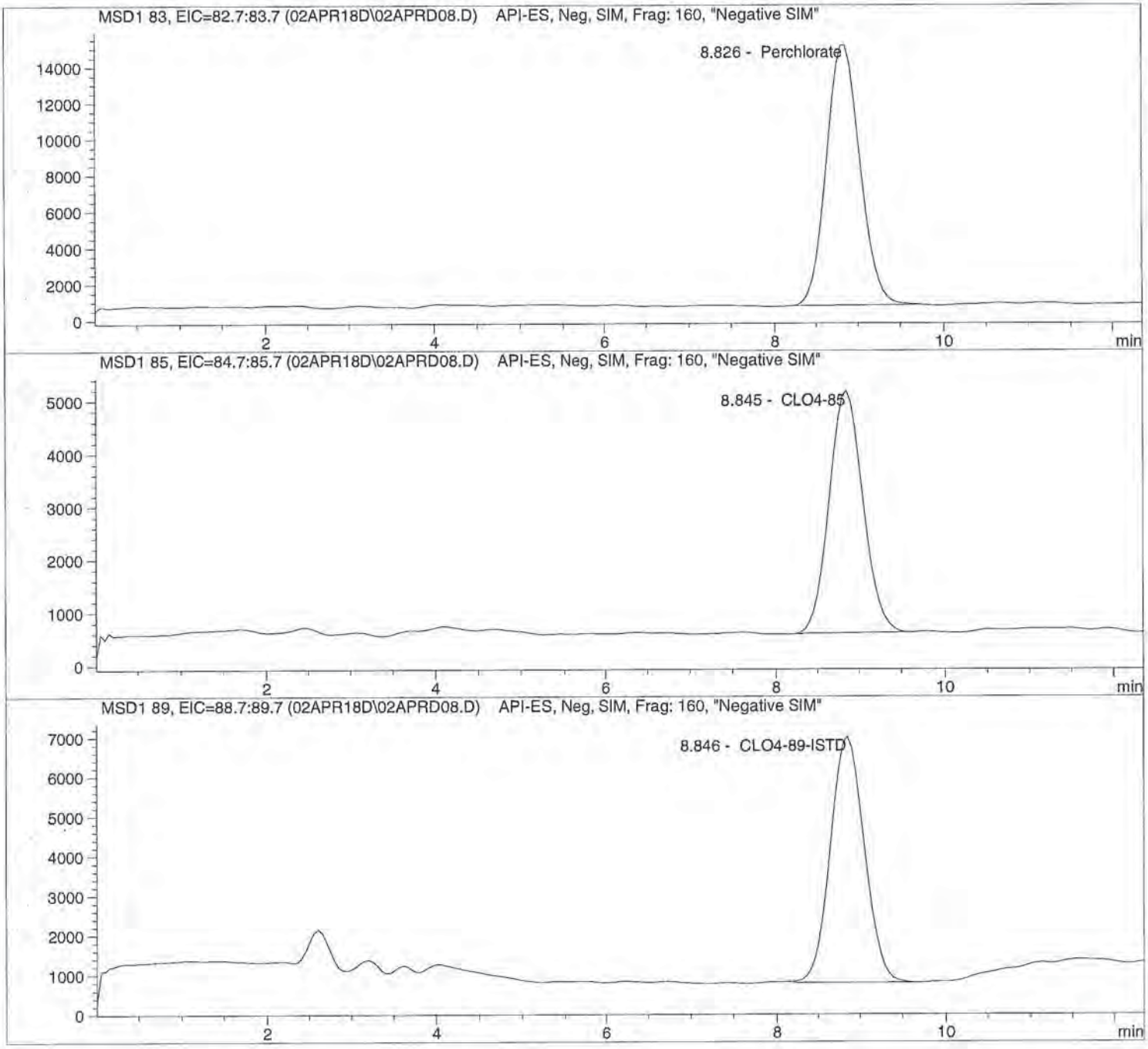
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD08.D Sample Name: ICAL Verf@10ug/L

Injection Date:	4/02/2018 10:47:33	Seq Line:	8
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD08.D Sample Name: ICAL Verf@10ug/L

Injection Date:	4/02/2018 10:47:33	Seq Line:	8
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.826	BBA	399587.8	10.1698	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.845	PBA	127530.4	10.1657	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.846	BBA	174490.2	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

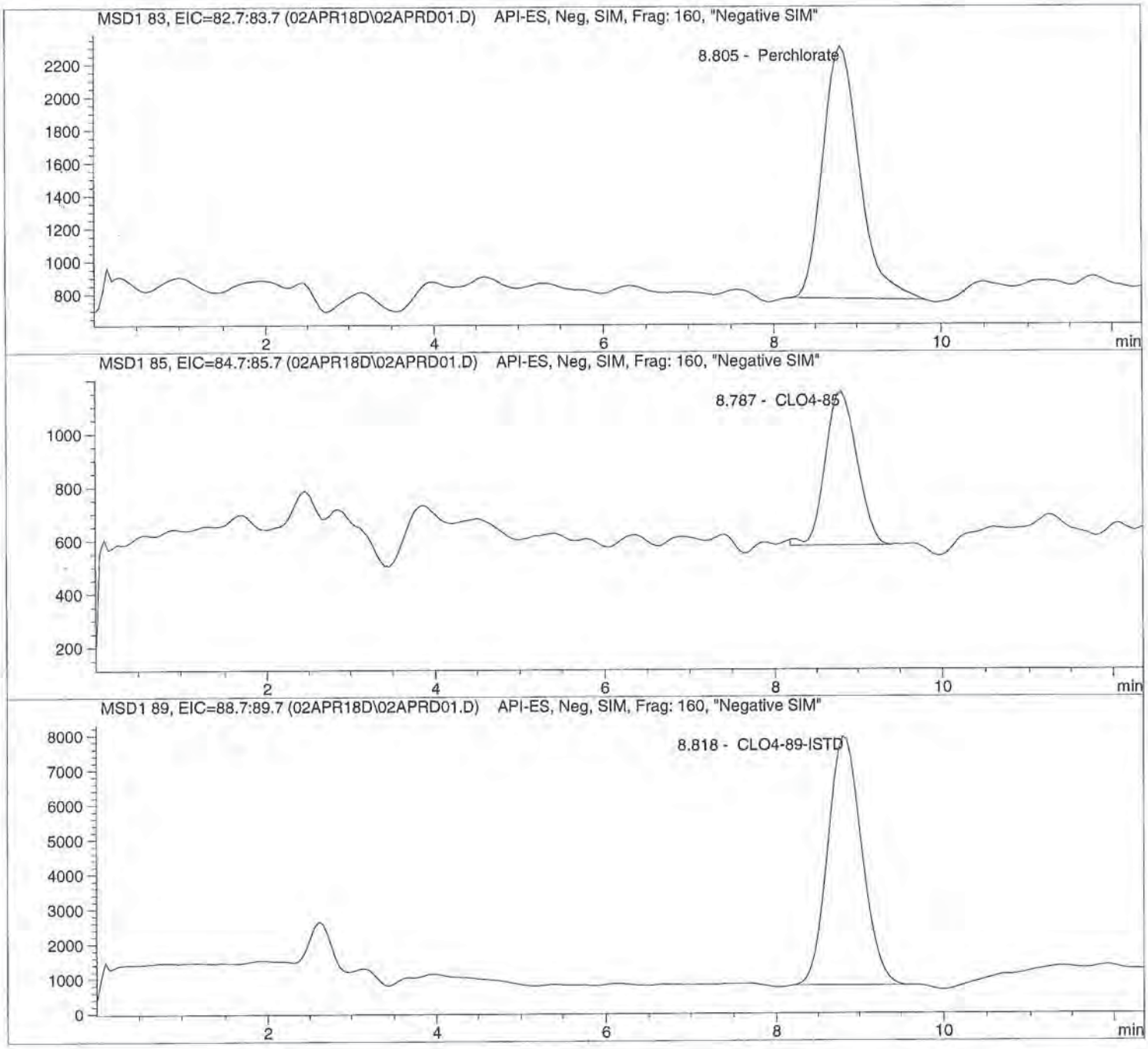
Unmodified

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	4/02/2018 09:08:19	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.805	PBA	47521.7	1.0438	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.787	BBA	15364.8	0.9338	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.818	PBA	205633.2	5.0000	CLO4-89-ISTD

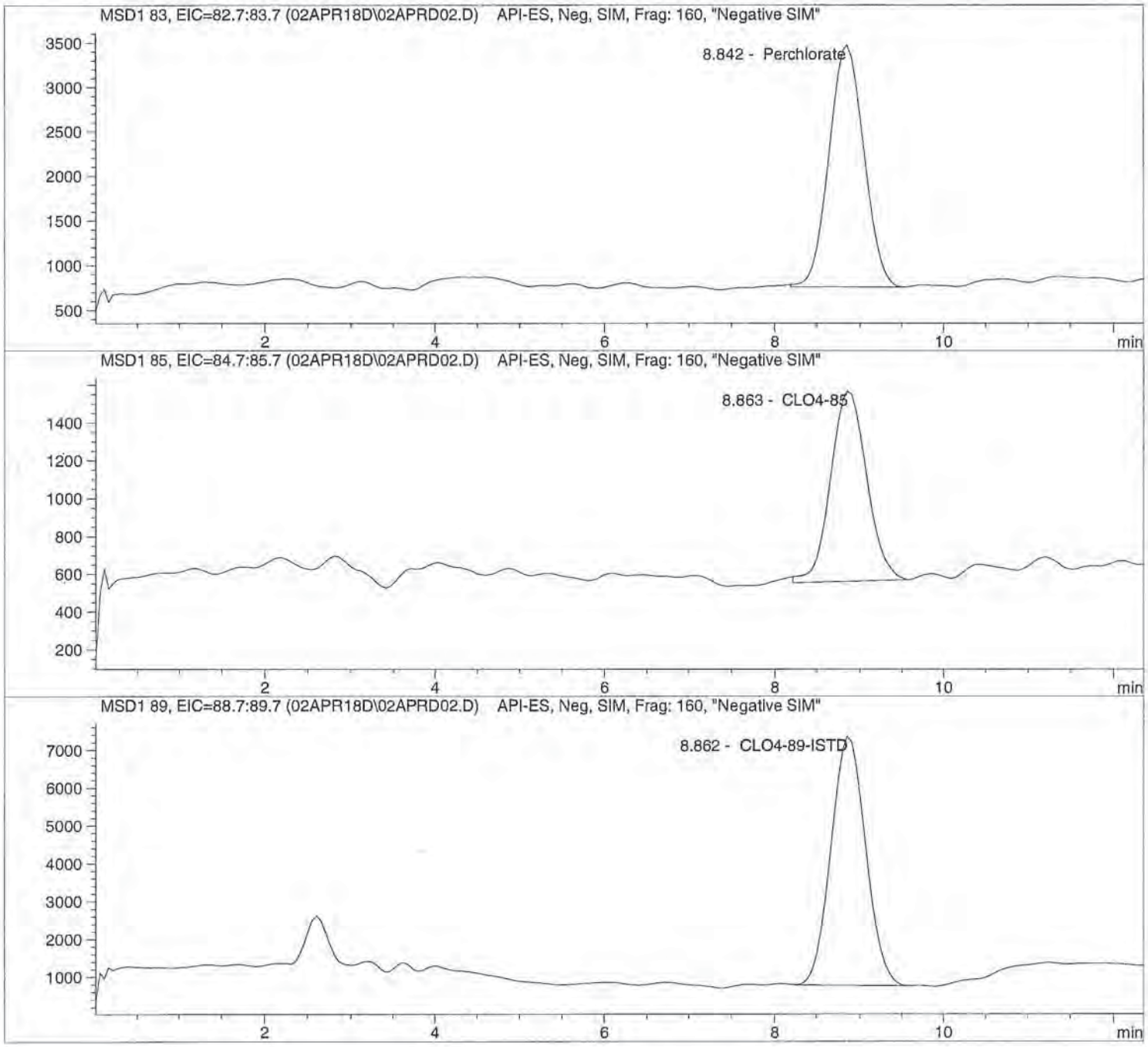
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\02APR18D\02APRD02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	4/02/2018 09:22:28	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.842	BBA	75767.3	1.8858	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.863	BBA	29265.6	2.1651	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.862	BBA	183981.5	5.0000	CLO4-89-ISTD

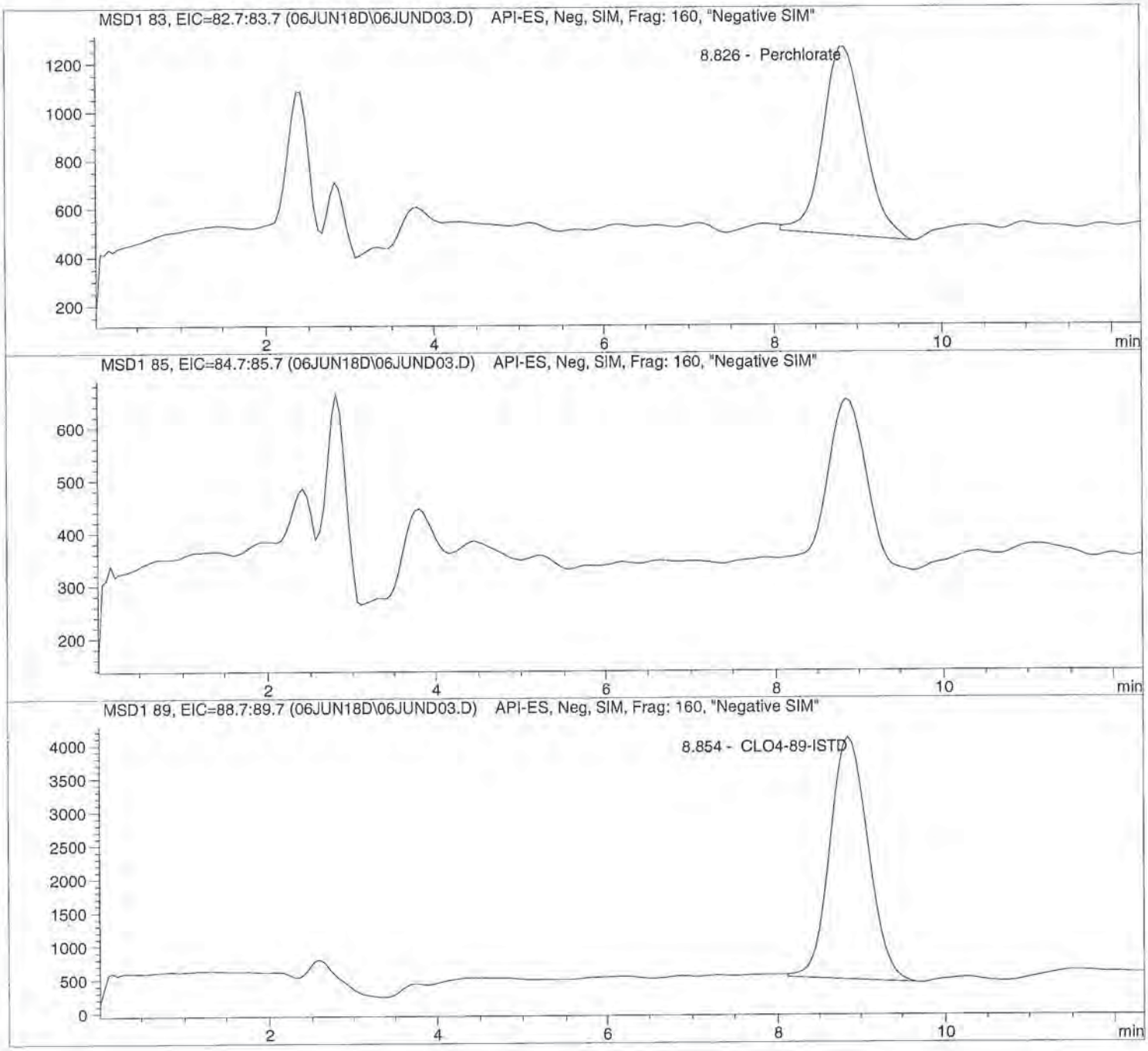
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND03.D Sample Name: 604059 ICS@1.0

Injection Date:	6/06/2018 09:34:11	Seq Line:	3
Sample Name:	604059 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND03.D Sample Name: 604059 ICS@1.0

Injection Date:	6/06/2018 09:34:11	Seq Line:	3
Sample Name:	604059 ICS@1.0	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.826	BBA	27058.4	1.0495	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
8.854	BBA	116471.1	5.0000	CLO4-89-ISTD

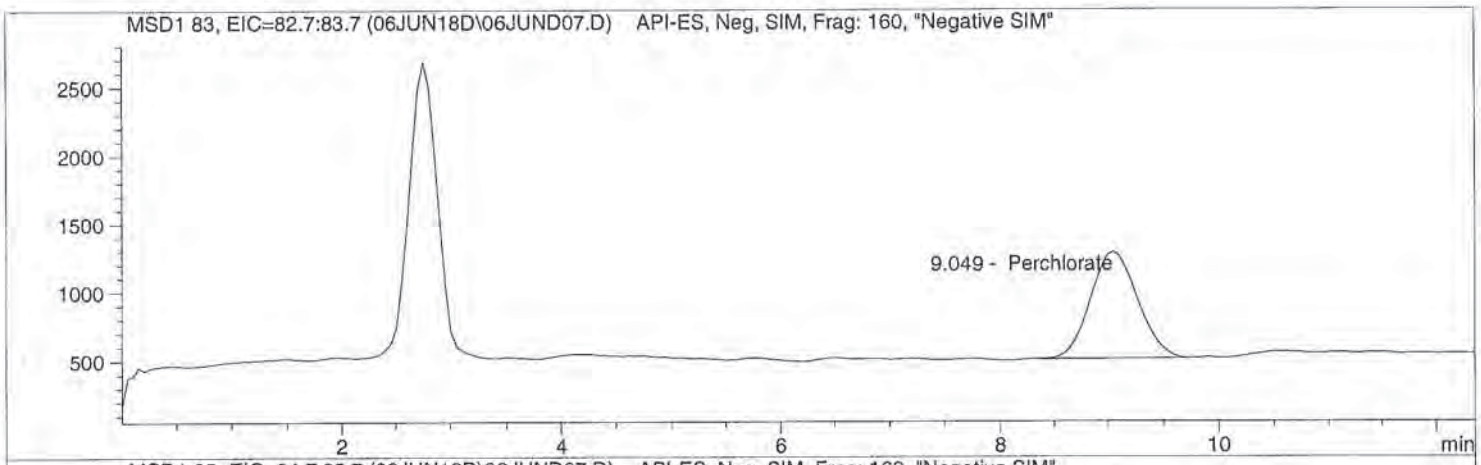
*** End of Report ***

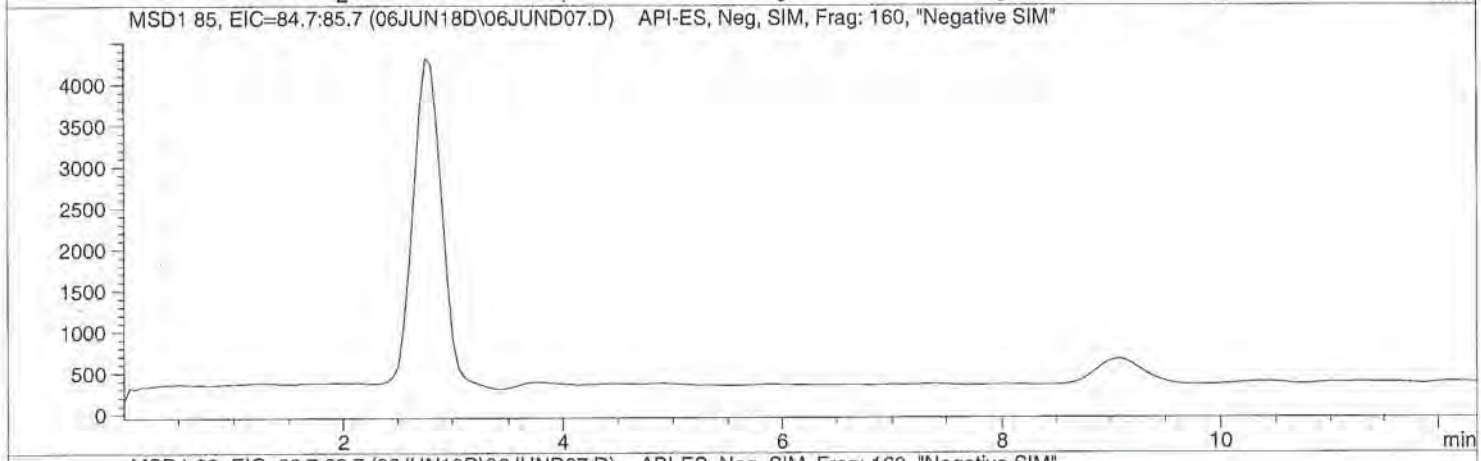
Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND07.D Sample Name: 604058 LODV@1.

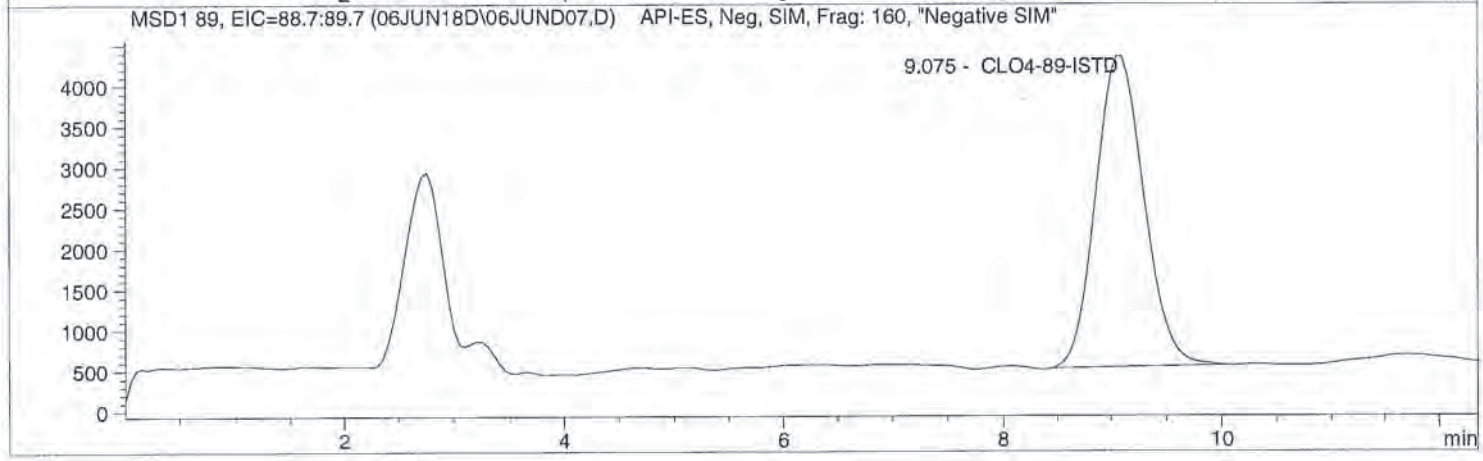
Injection Date:	6/06/2018 10:30:53	Seq Line:	7
Sample Name:	604058 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND07.D Sample Name: 604058 LODV@1.

Injection Date:	6/06/2018 10:30:53	Seq Line:	7
Sample Name:	604058 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.049	BBA	23066.1	0.8881	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.075	PBA	116560.0	5.0000	CLO4-89-ISTD

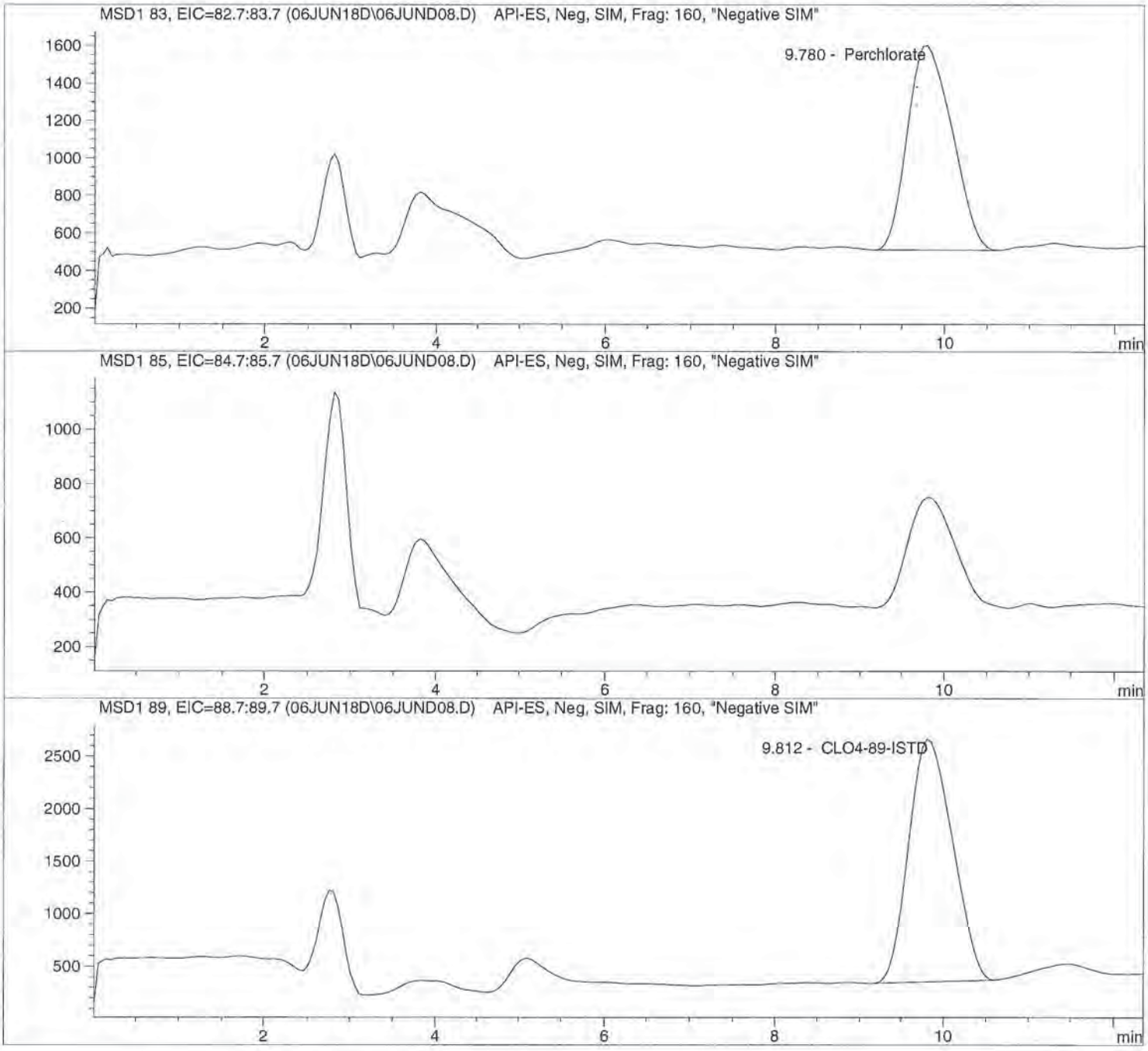
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND08.D Sample Name: 1815312002

Injection Date:	6/06/2018 10:46:38	Seq Line:	8
Sample Name:	1815312002	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND08.D Sample Name: 1815312002

Injection Date:	6/06/2018 10:46:38	Seq Line:	8
Sample Name:	1815312002	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.780	PBA	39649.4	2.2041	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.812	PBA	82498.4	5.0000	CLO4-89-ISTD

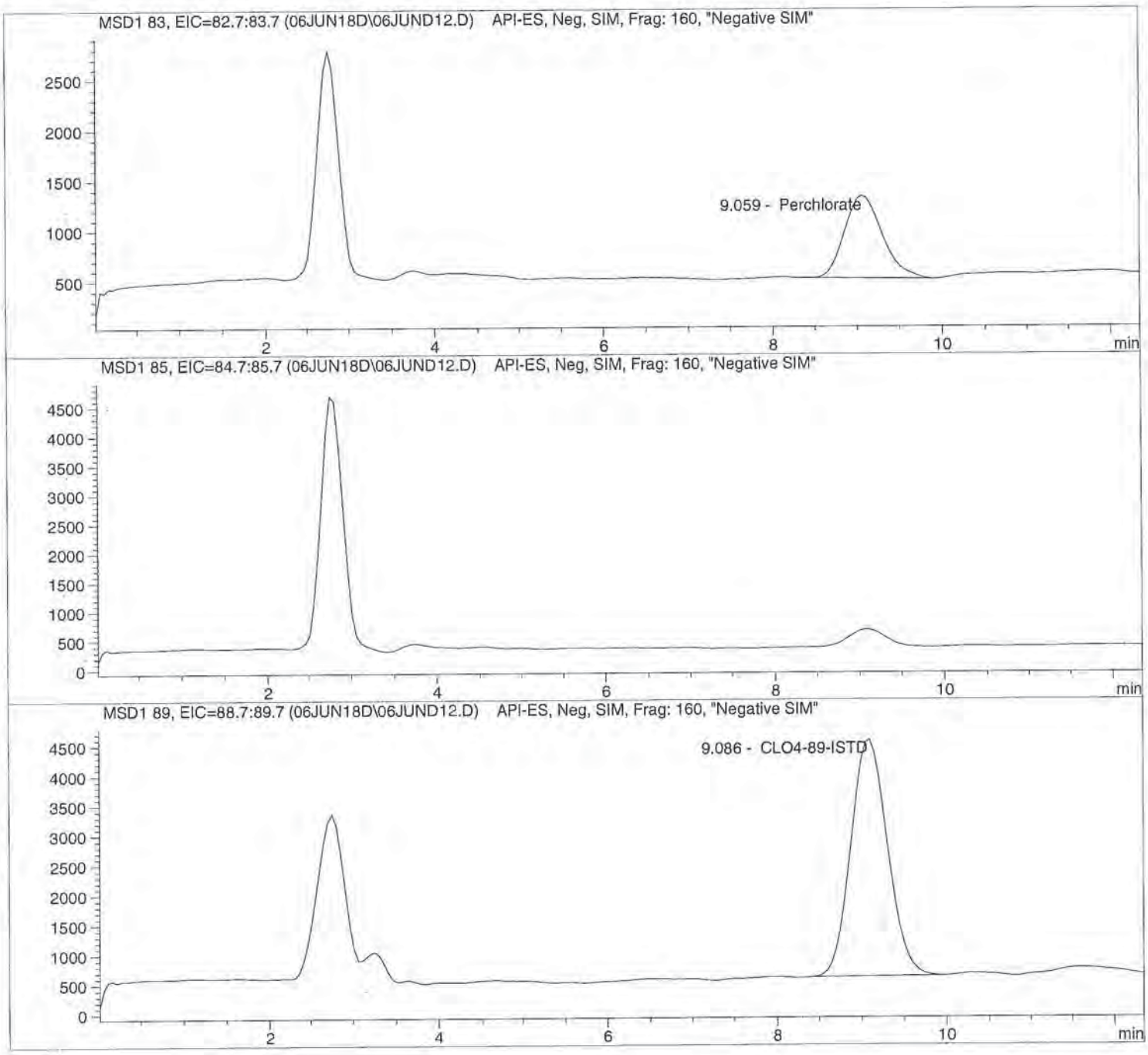
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND12.D Sample Name: 604065 LODV@1.

Injection Date:	6/06/2018 11:47:43	Seq Line:	12
Sample Name:	604065 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 4/2/2018 11:32:43

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\06JUN18D\06JUND12.D Sample Name: 604065 LODV@1.

Injection Date:	6/06/2018 11:47:43	Seq Line:	12
Sample Name:	604065 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	4/2/2018 11:32:43

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Mon, 2. Apr. 2018, 11:32:41 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.059	BBA	25068.8	0.9544	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
9.086	BBA	118236.3	5.0000	CLO4-89-ISTD

*** End of Report ***

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

June 27, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18060751**

Laboratory Results for: **LHAAP 18 24**

Dear Marcia,

ALS Environmental received 2 sample(s) on Jun 15, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Work Order: HS18060751

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18060751-01	LH 18/24-SP650_061318	Water		13-Jun-2018 14:00	15-Jun-2018 08:20	☐
HS18060751-02	Trip Blank	Water	ALS 051618-56	13-Jun-2018 00:00	15-Jun-2018 08:20	☐

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Work Order: HS18060751

CASE NARRATIVE

GCMS Volatiles by Method SW8260

Batch ID: R318368

Sample ID: HS18060825-01MS

- MS and MSD are for an unrelated sample

WetChemistry by Method E300

Batch ID: R318750

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Sample ID: LH 18/24-SP650_061318
Collection Date: 13-Jun-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18060751
Lab ID:HS18060751-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 18:14
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
2-Butanone	**4.1**		**0.50**	**1.0**	**2.0**	**ug/L**	1	20-Jun-2018 18:14
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Jun-2018 18:14
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 18:14
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Jun-2018 18:14
Acetone	**7.7**		**0.40**	**1.0**	**2.0**	**ug/L**	1	20-Jun-2018 18:14
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Jun-2018 18:14
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Sample ID: LH 18/24-SP650_061318
Collection Date: 13-Jun-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18060751
Lab ID:HS18060751-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
cis-1,2-Dichloroethene	**4.4**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Jun-2018 18:14
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Jun-2018 18:14
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Jun-2018 18:14
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 18:14
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Toluene	**0.40**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Jun-2018 18:14
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Trichloroethene	**1.2**		**0.20**	**0.50**	**1.0**	**ug/L**	1	20-Jun-2018 18:14
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 18:14
Surr: 1,2-Dichloroethane-d4	*90.0*			**0**	*81-118*	*%REC*	*1*	*20-Jun-2018 18:14*
Surr: 4-Bromofluorobenzene	*102*			**0**	*85-114*	*%REC*	*1*	*20-Jun-2018 18:14*
Surr: Dibromofluoromethane	*104*			**0**	*80-119*	*%REC*	*1*	*20-Jun-2018 18:14*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*20-Jun-2018 18:14*
ANIONS BY E300.0		**Method:E300**						Analyst: KMU
Chloride	**473**		**2.00**	**5.00**	**5.00**	**mg/L**	10	25-Jun-2018 15:55
Sulfate	**40.2**		**2.00**	**5.00**	**5.00**	**mg/L**	10	25-Jun-2018 15:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Sample ID: Trip Blank
Collection Date: 13-Jun-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18060751
Lab ID:HS18060751-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 13:40
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	20-Jun-2018 13:40
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	20-Jun-2018 13:40
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 13:40
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	20-Jun-2018 13:40
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	20-Jun-2018 13:40
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	20-Jun-2018 13:40
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Sample ID: Trip Blank
Collection Date: 13-Jun-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18060751
Lab ID:HS18060751-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: AKP
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	20-Jun-2018 13:40
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	20-Jun-2018 13:40
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	20-Jun-2018 13:40
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	20-Jun-2018 13:40
Surr: 1,2-Dichloroethane-d4	*86.5*			**0**	*81-118*	*%REC*	*1*	*20-Jun-2018 13:40*
Surr: 4-Bromofluorobenzene	*99.8*			**0**	*85-114*	*%REC*	*1*	*20-Jun-2018 13:40*
Surr: Dibromofluoromethane	*103*			**0**	*80-119*	*%REC*	*1*	*20-Jun-2018 13:40*
Surr: Toluene-d8	*107*			**0**	*89-112*	*%REC*	*1*	*20-Jun-2018 13:40*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R318368	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18060751-01	LH 18/24-SP650_061318	13 Jun 2018 14:00			20 Jun 2018 18:14	1
HS18060751-02	Trip Blank	13 Jun 2018 00:00			20 Jun 2018 13:40	1
Batch ID R318750	**Test Name :** ANIONS BY E300.0			**Matrix:** Water		
HS18060751-01	LH 18/24-SP650_061318	13 Jun 2018 14:00			25 Jun 2018 15:55	10

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180620** Units: **ug/L** Analysis Date: **20-Jun-2018 13:14**
Client ID: Run ID: **VOA2_318368** SeqNo: **4618346** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

MBLK Sample ID: **VBLKW-180620** Units: **ug/L** Analysis Date: **20-Jun-2018 13:14**
Client ID: Run ID: **VOA2_318368** SeqNo: **4618346** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*43.47*	*1.0*	*50*	*0*	*86.9*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.88*	*1.0*	*50*	*0*	*99.8*	*85 - 114*				
Surr: Dibromofluoromethane	*50.23*	*1.0*	*50*	*0*	*100*	*80 - 119*				
Surr: Toluene-d8	*52.69*	*1.0*	*50*	*0*	*105*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180620** Units: **ug/L** Analysis Date: **20-Jun-2018 12:24**
Client ID: Run ID: **VOA2_318368** SeqNo: **4618345** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	44.46	1.0	50	0	88.9	78 - 124				
1,1,1-Trichloroethane	43.15	1.0	50	0	86.3	74 - 131				
1,1,2,2-Tetrachloroethane	41.6	1.0	50	0	83.2	71 - 121				
1,1,2-Trichloroethane	43.2	1.0	50	0	86.4	80 - 119				
1,1-Dichloroethane	43.55	1.0	50	0	87.1	77 - 125				
1,1-Dichloroethene	43.62	1.0	50	0	87.2	71 - 131				
1,1-Dichloropropene	40.16	1.0	50	0	80.3	78 - 125				
1,2,3-Trichlorobenzene	43.4	1.0	50	0	86.8	69 - 129				
1,2,3-Trichloropropane	41.69	1.0	50	0	83.4	73 - 122				
1,2,4-Trichlorobenzene	40.49	1.0	50	0	81.0	69 - 130				
1,2,4-Trimethylbenzene	39.76	1.0	50	0	79.5	76 - 124				
1,2-Dibromo-3-chloropropane	39.39	1.0	50	0	78.8	62 - 128				
1,2-Dibromoethane	45.37	1.0	50	0	90.7	77 - 121				
1,2-Dichlorobenzene	41.84	1.0	50	0	83.7	80 - 119				
1,2-Dichloroethane	46	1.0	50	0	92.0	73 - 128				
1,2-Dichloropropane	42.79	1.0	50	0	85.6	78 - 122				
1,3,5-Trimethylbenzene	48.22	1.0	50	0	96.4	75 - 124				
1,3-Dichlorobenzene	41.37	1.0	50	0	82.7	80 - 119				
1,3-Dichloropropane	44.63	1.0	50	0	89.3	80 - 119				
1,4-Dichlorobenzene	41.7	1.0	50	0	83.4	79 - 118				
2,2-Dichloropropane	42.82	1.0	50	0	85.6	60 - 139				
2-Butanone	95.45	2.0	100	0	95.5	56 - 143				
2-Chlorotoluene	47.38	1.0	50	0	94.8	79 - 122				
2-Hexanone	98.15	2.0	100	0	98.1	57 - 139				
4-Chlorotoluene	47.08	1.0	50	0	94.2	78 - 122				
4-Isopropyltoluene	42.12	1.0	50	0	84.2	77 - 127				
4-Methyl-2-pentanone	92.24	2.0	100	0	92.2	67 - 130				
Acetone	94.07	2.0	100	0	94.1	39 - 160				
Benzene	42.17	1.0	50	0	84.3	79 - 120				
Bromobenzene	40.14	1.0	50	0	80.3	80 - 120				
Bromochloromethane	46.54	1.0	50	0	93.1	78 - 123				
Bromodichloromethane	45.23	1.0	50	0	90.5	79 - 125				
Bromoform	46.11	1.0	50	0	92.2	66 - 130				
Bromomethane	43.98	1.0	50	0	88.0	53 - 141				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

LCS Sample ID: **VLCSW-180620** Units: **ug/L** Analysis Date: **20-Jun-2018 12:24**
Client ID: Run ID: **VOA2_318368** SeqNo: **4618345** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	83.07	2.0	100	0	83.1	64 - 133				
Carbon tetrachloride	48.31	1.0	50	0	96.6	72 - 136				
Chlorobenzene	42.54	1.0	50	0	85.1	82 - 118				
Chloroethane	45.59	1.0	50	0	91.2	60 - 138				
Chloroform	42.39	1.0	50	0	84.8	79 - 124				
Chloromethane	39.45	1.0	50	0	78.9	50 - 139				
cis-1,2-Dichloroethene	42.41	1.0	50	0	84.8	78 - 123				
cis-1,3-Dichloropropene	46.88	1.0	50	0	93.8	75 - 124				
Dibromochloromethane	44.92	1.0	50	0	89.8	74 - 126				
Dibromomethane	47.47	1.0	50	0	94.9	79 - 123				
Dichlorodifluoromethane	40.96	1.0	50	0	81.9	32 - 152				
Ethylbenzene	42.27	1.0	50	0	84.5	79 - 121				
Hexachlorobutadiene	43.35	1.0	50	0	86.7	66 - 134				
Isopropylbenzene	43.38	1.0	50	0	86.8	72 - 131				
m,p-Xylene	82.6	2.0	100	0	82.6	80 - 121				
Methylene chloride	40.87	2.0	50	0	81.7	74 - 124				
Naphthalene	41.86	1.0	50	0	83.7	61 - 128				
n-Butylbenzene	45.04	1.0	50	0	90.1	75 - 128				
n-Propylbenzene	47.53	1.0	50	0	95.1	76 - 126				
o-Xylene	42.62	1.0	50	0	85.2	78 - 122				
sec-Butylbenzene	42.11	1.0	50	0	84.2	77 - 126				
Styrene	43.48	1.0	50	0	87.0	78 - 123				
tert-Butylbenzene	48.17	1.0	50	0	96.3	78 - 124				
Tetrachloroethene	42.25	1.0	50	0	84.5	74 - 129				
Toluene	41.05	1.0	50	0	82.1	80 - 121				
trans-1,2-Dichloroethene	42.88	1.0	50	0	85.8	75 - 124				
trans-1,3-Dichloropropene	48.24	1.0	50	0	96.5	73 - 127				
Trichloroethene	44.83	1.0	50	0	89.7	79 - 123				
Trichlorofluoromethane	38.78	1.0	50	0	77.6	65 - 141				
Vinyl chloride	41.4	1.0	50	0	82.8	58 - 137				
Surr: 1,2-Dichloroethane-d4	*43.84*	*1.0*	*50*	*0*	*87.7*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*52.17*	*1.0*	*50*	*0*	*104*	*85 - 114*				
Surr: Dibromofluoromethane	*47.62*	*1.0*	*50*	*0*	*95.2*	*80 - 119*				
Surr: Toluene-d8	*51.17*	*1.0*	*50*	*0*	*102*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18060825-01MS** Units: **ug/L** Analysis Date: **20-Jun-2018 14:55**
Client ID: Run ID: **VOA2_318368** SeqNo: **4618350** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	33.6	1.0	50	0	67.2	78 - 124				S
1,1,1-Trichloroethane	31.74	1.0	50	0	63.5	74 - 131				S
1,1,2,2-Tetrachloroethane	34.48	1.0	50	0	69.0	71 - 121				S
1,1,2-Trichloroethane	33.92	1.0	50	0	67.8	80 - 119				S
1,1-Dichloroethane	33.2	1.0	50	0	66.4	77 - 125				S
1,1-Dichloroethene	31.82	1.0	50	0	63.6	71 - 131				S
1,1-Dichloropropene	29.74	1.0	50	0	59.5	78 - 125				S
1,2,3-Trichlorobenzene	30.23	1.0	50	0	60.5	69 - 129				S
1,2,3-Trichloropropane	35.66	1.0	50	0	71.3	73 - 122				S
1,2,4-Trichlorobenzene	29.94	1.0	50	0	59.9	69 - 130				S
1,2,4-Trimethylbenzene	29.51	1.0	50	0	59.0	76 - 124				S
1,2-Dibromo-3-chloropropane	40.08	1.0	50	0	80.2	62 - 128				
1,2-Dibromoethane	35.47	1.0	50	0	70.9	77 - 121				S
1,2-Dichlorobenzene	30.91	1.0	50	0	61.8	80 - 119				S
1,2-Dichloroethane	35.41	1.0	50	0	70.8	73 - 128				S
1,2-Dichloropropane	32.45	1.0	50	0	64.9	78 - 122				S
1,3,5-Trimethylbenzene	35.03	1.0	50	0	70.1	75 - 124				S
1,3-Dichlorobenzene	30.45	1.0	50	0	60.9	80 - 119				S
1,3-Dichloropropane	34.42	1.0	50	0	68.8	80 - 119				S
1,4-Dichlorobenzene	30.44	1.0	50	0	60.9	79 - 118				S
2,2-Dichloropropane	31.28	1.0	50	0	62.6	60 - 139				
2-Butanone	87.99	2.0	100	0	88.0	56 - 143				
2-Chlorotoluene	34.85	1.0	50	0	69.7	79 - 122				S
2-Hexanone	89.87	2.0	100	0	89.9	57 - 139				
4-Chlorotoluene	34.4	1.0	50	0	68.8	78 - 122				S
4-Isopropyltoluene	29.66	1.0	50	0	59.3	77 - 127				S
4-Methyl-2-pentanone	81.95	2.0	100	0	81.9	67 - 130				
Acetone	88.36	2.0	100	0	88.4	39 - 160				
Benzene	31.85	1.0	50	0	63.7	79 - 120				S
Bromobenzene	29.91	1.0	50	0	59.8	80 - 120				S
Bromochloromethane	34.76	1.0	50	0	69.5	78 - 123				S
Bromodichloromethane	34.06	1.0	50	0	68.1	79 - 125				S
Bromoform	35.83	1.0	50	0	71.7	66 - 130				
Bromomethane	30.72	1.0	50	0	61.4	53 - 141				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

MS Sample ID: **HS18060825-01MS** Units: **ug/L** Analysis Date: **20-Jun-2018 14:55**
Client ID: Run ID: **VOA2_318368** SeqNo: **4618350** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	62.42	2.0	100	0	62.4	64 - 133				S
Carbon tetrachloride	34.84	1.0	50	0	69.7	72 - 136				S
Chlorobenzene	31.88	1.0	50	0	63.8	82 - 118				S
Chloroethane	31.04	1.0	50	0	62.1	60 - 138				
Chloroform	32.05	1.0	50	0	64.1	79 - 124				S
Chloromethane	27.4	1.0	50	0	54.8	50 - 139				
cis-1,2-Dichloroethene	32.82	1.0	50	0	65.6	78 - 123				S
cis-1,3-Dichloropropene	34.93	1.0	50	0	69.9	75 - 124				S
Dibromochloromethane	33.87	1.0	50	0	67.7	74 - 126				S
Dibromomethane	35.91	1.0	50	0	71.8	79 - 123				S
Dichlorodifluoromethane	23.14	1.0	50	0	46.3	32 - 152				
Ethylbenzene	31.48	1.0	50	0	63.0	79 - 121				S
Hexachlorobutadiene	27.23	1.0	50	0	54.5	66 - 134				S
Isopropylbenzene	31.85	1.0	50	0	63.7	72 - 131				S
m,p-Xylene	61.73	2.0	100	0	61.7	80 - 121				S
Methylene chloride	30.54	2.0	50	0	61.1	74 - 124				S
Naphthalene	35.74	1.0	50	0	71.5	61 - 128				
n-Butylbenzene	30.85	1.0	50	0	61.7	75 - 128				S
n-Propylbenzene	34.55	1.0	50	0	69.1	76 - 126				S
o-Xylene	31.85	1.0	50	0	63.7	78 - 122				S
sec-Butylbenzene	29.96	1.0	50	0	59.9	77 - 126				S
Styrene	32.42	1.0	50	0	64.8	78 - 123				S
tert-Butylbenzene	34.86	1.0	50	0	69.7	78 - 124				S
Tetrachloroethene	30.01	1.0	50	0	60.0	74 - 129				S
Toluene	31.25	1.0	50	0	62.5	80 - 121				S
trans-1,2-Dichloroethene	32.19	1.0	50	0	64.4	75 - 124				S
trans-1,3-Dichloropropene	35.88	1.0	50	0	71.8	73 - 127				S
Trichloroethene	33.83	1.0	50	1.964	63.7	79 - 123				S
Trichlorofluoromethane	27.2	1.0	50	0	54.4	65 - 141				S
Vinyl chloride	30.83	1.0	50	0	61.7	58 - 137				
Surr: 1,2-Dichloroethane-d4	*45.14*	*1.0*	*50*	*0*	*90.3*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.51*	*1.0*	*50*	*0*	*103*	*85 - 114*				
Surr: Dibromofluoromethane	*48.87*	*1.0*	*50*	*0*	*97.7*	*80 - 119*				
Surr: Toluene-d8	*51.87*	*1.0*	*50*	*0*	*104*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18060825-01MSD** Units: **ug/L** Analysis Date: **20-Jun-2018 15:19**
Client ID: Run ID: **VOA2_318368** SeqNo: **4618351** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	33.12	1.0	50	0	66.2	78 - 124	33.6	1.46	20	S
1,1,1-Trichloroethane	30.91	1.0	50	0	61.8	74 - 131	31.74	2.65	20	S
1,1,2,2-Tetrachloroethane	34.95	1.0	50	0	69.9	71 - 121	34.48	1.38	20	S
1,1,2-Trichloroethane	33.54	1.0	50	0	67.1	80 - 119	33.92	1.14	20	S
1,1-Dichloroethane	32.72	1.0	50	0	65.4	77 - 125	33.2	1.45	20	S
1,1-Dichloroethene	31.37	1.0	50	0	62.7	71 - 131	31.82	1.43	20	S
1,1-Dichloropropene	28.59	1.0	50	0	57.2	78 - 125	29.74	3.92	20	S
1,2,3-Trichlorobenzene	30.76	1.0	50	0	61.5	69 - 129	30.23	1.72	20	S
1,2,3-Trichloropropane	35.15	1.0	50	0	70.3	73 - 122	35.66	1.44	20	S
1,2,4-Trichlorobenzene	28.81	1.0	50	0	57.6	69 - 130	29.94	3.87	20	S
1,2,4-Trimethylbenzene	29.73	1.0	50	0	59.5	76 - 124	29.51	0.716	20	S
1,2-Dibromo-3-chloropropane	34.06	1.0	50	0	68.1	62 - 128	40.08	16.2	20	
1,2-Dibromoethane	35.14	1.0	50	0	70.3	77 - 121	35.47	0.931	20	S
1,2-Dichlorobenzene	31.23	1.0	50	0	62.5	80 - 119	30.91	1.03	20	S
1,2-Dichloroethane	35.1	1.0	50	0	70.2	73 - 128	35.41	0.875	20	S
1,2-Dichloropropane	31.21	1.0	50	0	62.4	78 - 122	32.45	3.92	20	S
1,3,5-Trimethylbenzene	34.97	1.0	50	0	69.9	75 - 124	35.03	0.169	20	S
1,3-Dichlorobenzene	30.1	1.0	50	0	60.2	80 - 119	30.45	1.13	20	S
1,3-Dichloropropane	34.25	1.0	50	0	68.5	80 - 119	34.42	0.503	20	S
1,4-Dichlorobenzene	30.11	1.0	50	0	60.2	79 - 118	30.44	1.07	20	S
2,2-Dichloropropane	29.7	1.0	50	0	59.4	60 - 139	31.28	5.2	20	S
2-Butanone	84.97	2.0	100	0	85.0	56 - 143	87.99	3.5	20	
2-Chlorotoluene	34.85	1.0	50	0	69.7	79 - 122	34.85	0.0249	20	S
2-Hexanone	85.17	2.0	100	0	85.2	57 - 139	89.87	5.37	20	
4-Chlorotoluene	34.56	1.0	50	0	69.1	78 - 122	34.4	0.477	20	S
4-Isopropyltoluene	29.66	1.0	50	0	59.3	77 - 127	29.66	0.0163	20	S
4-Methyl-2-pentanone	82.62	2.0	100	0	82.6	67 - 130	81.95	0.812	20	
Acetone	86.27	2.0	100	0	86.3	39 - 160	88.36	2.39	20	
Benzene	30.76	1.0	50	0	61.5	79 - 120	31.85	3.46	20	S
Bromobenzene	29.69	1.0	50	0	59.4	80 - 120	29.91	0.735	20	S
Bromochloromethane	33.74	1.0	50	0	67.5	78 - 123	34.76	2.97	20	S
Bromodichloromethane	32.7	1.0	50	0	65.4	79 - 125	34.06	4.09	20	S
Bromoform	35.68	1.0	50	0	71.4	66 - 130	35.83	0.415	20	
Bromomethane	30.27	1.0	50	0	60.5	53 - 141	30.72	1.47	20	

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

MSD Sample ID: **HS18060825-01MSD** Units: **ug/L** Analysis Date: **20-Jun-2018 15:19**
Client ID: Run ID: **VOA2_318368** SeqNo: **4618351** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	61.38	2.0	100	0	61.4	64 - 133	62.42	1.68	20	S
Carbon tetrachloride	33.22	1.0	50	0	66.4	72 - 136	34.84	4.76	20	S
Chlorobenzene	31.5	1.0	50	0	63.0	82 - 118	31.88	1.21	20	S
Chloroethane	33.32	1.0	50	0	66.6	60 - 138	31.04	7.1	20	
Chloroform	31.31	1.0	50	0	62.6	79 - 124	32.05	2.36	20	S
Chloromethane	27.87	1.0	50	0	55.7	50 - 139	27.4	1.69	20	
cis-1,2-Dichloroethene	32.06	1.0	50	0	64.1	78 - 123	32.82	2.35	20	S
cis-1,3-Dichloropropene	33.39	1.0	50	0	66.8	75 - 124	34.93	4.52	20	S
Dibromochloromethane	34.02	1.0	50	0	68.0	74 - 126	33.87	0.419	20	S
Dibromomethane	35	1.0	50	0	70.0	79 - 123	35.91	2.57	20	S
Dichlorodifluoromethane	22.39	1.0	50	0	44.8	32 - 152	23.14	3.33	20	
Ethylbenzene	30.88	1.0	50	0	61.8	79 - 121	31.48	1.91	20	S
Hexachlorobutadiene	25.48	1.0	50	0	51.0	66 - 134	27.23	6.65	20	S
Isopropylbenzene	31.45	1.0	50	0	62.9	72 - 131	31.85	1.27	20	S
m,p-Xylene	60.74	2.0	100	0	60.7	80 - 121	61.73	1.62	20	S
Methylene chloride	29.93	2.0	50	0	59.9	74 - 124	30.54	2	20	S
Naphthalene	34.05	1.0	50	0	68.1	61 - 128	35.74	4.83	20	
n-Butylbenzene	30.46	1.0	50	0	60.9	75 - 128	30.85	1.28	20	S
n-Propylbenzene	34.14	1.0	50	0	68.3	76 - 126	34.55	1.19	20	S
o-Xylene	31.35	1.0	50	0	62.7	78 - 122	31.85	1.59	20	S
sec-Butylbenzene	29.73	1.0	50	0	59.5	77 - 126	29.96	0.79	20	S
Styrene	32.29	1.0	50	0	64.6	78 - 123	32.42	0.386	20	S
tert-Butylbenzene	34.21	1.0	50	0	68.4	78 - 124	34.86	1.9	20	S
Tetrachloroethene	29.68	1.0	50	0	59.4	74 - 129	30.01	1.1	20	S
Toluene	30.4	1.0	50	0	60.8	80 - 121	31.25	2.76	20	S
trans-1,2-Dichloroethene	32.12	1.0	50	0	64.2	75 - 124	32.19	0.203	20	S
trans-1,3-Dichloropropene	33.79	1.0	50	0	67.6	73 - 127	35.88	6.01	20	S
Trichloroethene	32.63	1.0	50	1.964	61.3	79 - 123	33.83	3.62	20	S
Trichlorofluoromethane	25.57	1.0	50	0	51.1	65 - 141	27.2	6.16	20	S
Vinyl chloride	30.05	1.0	50	0	60.1	58 - 137	30.83	2.54	20	
Surr: 1,2-Dichloroethane-d4	*45.45*	*1.0*	*50*	*0*	*90.9*	*81 - 118*	*45.14*	*0.681*	*20*	
Surr: 4-Bromofluorobenzene	*51.21*	*1.0*	*50*	*0*	*102*	*85 - 114*	*51.51*	*0.596*	*20*	
Surr: Dibromofluoromethane	*49.24*	*1.0*	*50*	*0*	*98.5*	*80 - 119*	*48.87*	*0.756*	*20*	
Surr: Toluene-d8	*52.79*	*1.0*	*50*	*0*	*106*	*89 - 112*	*51.87*	*1.75*	*20*	

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318368 **Instrument: VOA2** **Method: SW8260**

The following samples were analyzed in this batch: HS18060751-01 HS18060751-02

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18060751

QC BATCH REPORT

Batch ID: R318750 **Instrument: ICS2100** **Method: E300**

MBLK Sample ID: **WBLKW1-062518** Units: **mg/L** Analysis Date: **25-Jun-2018 14:12**
Client ID: Run ID: **ICS2100_318750** SeqNo: **4627124** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.500	0.500								U
Sulfate	0.500	0.500								U

LCS Sample ID: **WLCSW1-062518** Units: **mg/L** Analysis Date: **25-Jun-2018 14:26**
Client ID: Run ID: **ICS2100_318750** SeqNo: **4627125** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.73	0.500	20	0	104	90 - 110				
Sulfate	20.76	0.500	20	0	104	90 - 110				

LCSD Sample ID: **WLCSDW1-062518** Units: **mg/L** Analysis Date: **25-Jun-2018 15:11**
Client ID: Run ID: **ICS2100_318750** SeqNo: **4627126** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	21.04	0.500	20	0	105	90 - 110	20.73	1.47	20	
Sulfate	21.25	0.500	20	0	106	90 - 110	20.76	2.35	20	

MS Sample ID: **HS18060751-01MS** Units: **mg/L** Analysis Date: **25-Jun-2018 16:09**
Client ID: **LH 18/24-SP650_061318** Run ID: **ICS2100_318750** SeqNo: **4627130** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	569.4	5.00	100	472.9	96.4	80 - 120				O
Sulfate	143.1	5.00	100	40.22	103	80 - 120				

MSD Sample ID: **HS18060751-01MSD** Units: **mg/L** Analysis Date: **25-Jun-2018 16:24**
Client ID: **LH 18/24-SP650_061318** Run ID: **ICS2100_318750** SeqNo: **4627131** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	573	5.00	100	472.9	100	80 - 120	569.4	0.641	20	O
Sulfate	143.3	5.00	100	40.22	103	80 - 120	143.1	0.111	20	

The following samples were analyzed in this batch: HS18060751-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Group Houston, Corp Date: 27-Jun-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: **HS18060751**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

ALS Group Houston, Corp Date: 27-Jun-18

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Oklahoma	2017-088	31-Aug-2018
North Carolina	624-2018	31-Dec-2018
Louisiana	03087 2017-2018	30-Jun-2018
Arkansas	88-0356	27-Mar-2019
Kansas	E-10352 2017-218	31-Jul-2018
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193	30-Apr-2019

Date: 27-Jun-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18060751
Date/Time Received: **15-Jun-2018 08:20**
Received by: **NDR**

Checklist completed by: *Jared R. Makan* eSignature — 15-Jun-2018 Date
Reviewed by: *RJ Modashia* eSignature — 18-Jun-2018 Date

Matrices:
Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.6c/3.2c UC/C	IR30	
Cooler(s)/Kit(s):	43884		
Date/Time sample(s) sent to storage:	06/15/2018 20:35		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

00905801

bhate

Page: of

Project/Phase No: NWO1312.0150

COC Number(1):

LIMS Number:

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205
Tel: 205-918-4000
Fax: 205-918-4050

Chain of Custody and Analytical Request

Facility/Base I.D.: LHAAP

Project/Site Name: LHAAP / GWTP Bi-WEEKLY

Client Name:

Collected by: Scott Beesinger

Sample Analysis Requested [5] | Quality Assurance Samples [6]

Field Sample ID (30 Characters Max)	ERPIMS LOCID (15 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (1)	Sample Matrix (4)	Number of containers	VOC	CHLORIDE, SULFATE											Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
LHB/24-SPWTP_061318		6/13/18	1400	-	N		W	4	X	X														
TRIP BLANK		6/13/18		-	TB		W	2	X															
				-																				
				-																				
				-																				
				-																				
				-																				
				-																				
				-																				

HS18060751
Bhate Environmental Associates, Inc.
LHAAP 18 24

COMMENTS:

Custody Transfers Prior to Receipt by Laboratory

	Relinquished By (Signed)	Date	Time	Received By (signed)	Date	Time
1.	Scott Beesinger	6/13/18	1430	[illegible]	6/14/18	08:57
2.						
3.				43884		3.60

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: Shipped No.:

Method of Shipment:

Fed Ex Airbill Number:

Analytical Lab: ALS 10450 Stanciff Rd. Suite 210 Houston, TX 77099 (281) 530-5656

ATTN: SONIA WEST Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

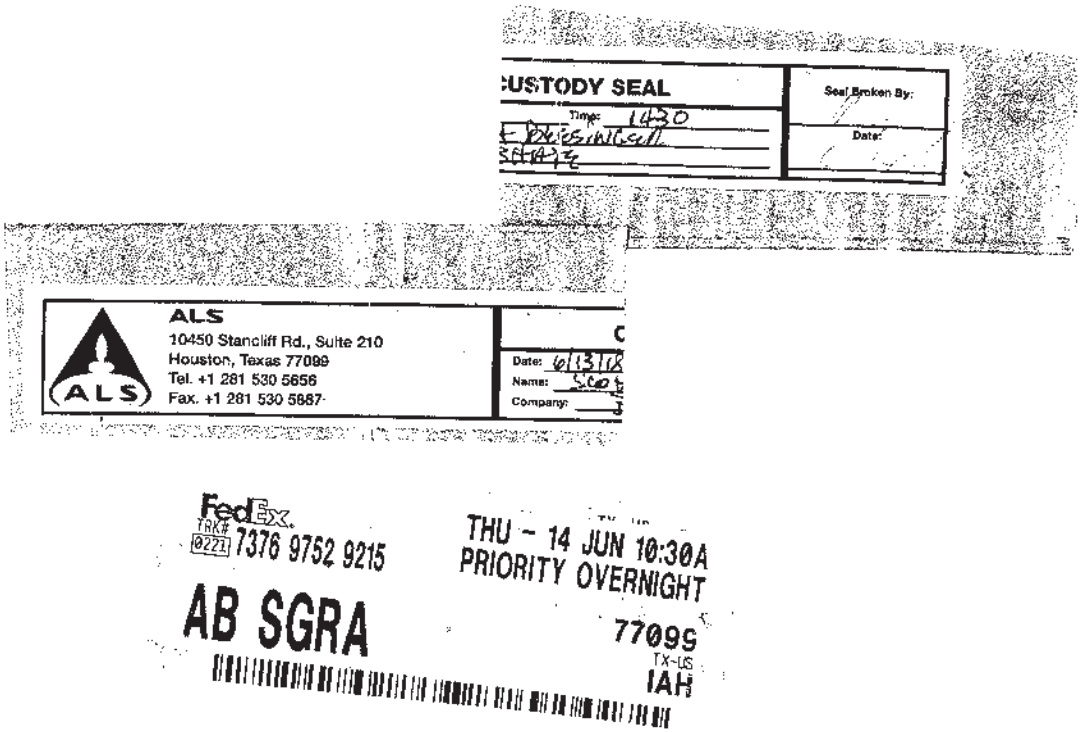
2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control


CUSTODY SEAL
Time: 1430
Seal Broken By:
Date:
ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5687
Date: 6/13/18
Name:
Company:
FedEx
TRK# 0221 7376 9752 9215
THU - 14 JUN 10:30A
PRIORITY OVERNIGHT
AB SGRA
77099
TX-US
IAH

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

July 06, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS18061470**

Laboratory Results for: **LHAAP 18 24**

Dear Marcia,

ALS Environmental received 2 sample(s) on Jun 28, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Work Order: HS18061470

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18061470-01	LH18/24-SP650_062718	Water		27-Jun-2018 14:00	28-Jun-2018 08:40	☐
HS18061470-02	Trip Blank	Water	ALS-050418-49	27-Jun-2018 00:00	28-Jun-2018 08:40	☐

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Work Order: HS18061470

CASE NARRATIVE

GCMS Volatiles by Method SW8260

Batch ID: R319098

Sample ID: VSTD050

- 1,2-Dibromo-3-chloropropane and Naphthalene exceeded %D limits for CCV. The analytes were not detected in the associated samples.

Sample ID: HS18061493-03MS

- MS and MSD are for an unrelated sample.

WetChemistry by Method E300

Batch ID: R319157

Sample ID: HS18070057-01MS

- MSD is for an unrelated sample

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
ANALYTICAL REPORT
Project: LHAAP 18 24
WorkOrder:HS18061470
Sample ID: LH18/24-SP650_062718
Lab ID:HS18061470-01
Collection Date: 27-Jun-2018 14:00
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,2-Dichloroethane	**0.56**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	02-Jul-2018 18:01
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 18:01
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	02-Jul-2018 18:01
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	02-Jul-2018 18:01
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 18:01
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	02-Jul-2018 18:01
Acetone	**6.0**		**0.40**	**1.0**	**2.0**	**ug/L**	1	02-Jul-2018 18:01
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	02-Jul-2018 18:01
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Sample ID: LH18/24-SP650_062718
Collection Date: 27-Jun-2018 14:00

ANALYTICAL REPORT
WorkOrder:HS18061470
Lab ID:HS18061470-01
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
cis-1,2-Dichloroethene	**4.0**		**0.20**	**0.50**	**1.0**	**ug/L**	1	02-Jul-2018 18:01
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	02-Jul-2018 18:01
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	02-Jul-2018 18:01
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 18:01
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Trichloroethene	**1.9**		**0.20**	**0.50**	**1.0**	**ug/L**	1	02-Jul-2018 18:01
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 18:01
Surr: 1,2-Dichloroethane-d4	*93.3*			**0**	*81-118*	*%REC*	*1*	*02-Jul-2018 18:01*
Surr: 4-Bromofluorobenzene	*99.9*			**0**	*85-114*	*%REC*	*1*	*02-Jul-2018 18:01*
Surr: Dibromofluoromethane	*92.8*			**0**	*80-119*	*%REC*	*1*	*02-Jul-2018 18:01*
Surr: Toluene-d8	*100*			**0**	*89-112*	*%REC*	*1*	*02-Jul-2018 18:01*
ANIONS BY E300.0		**Method:E300**						Analyst: KMU
Chloride	**536**		**2.00**	**5.00**	**5.00**	**mg/L**	10	03-Jul-2018 17:59
Sulfate	**87.9**		**2.00**	**5.00**	**5.00**	**mg/L**	10	03-Jul-2018 17:59

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Sample ID: Trip Blank
Collection Date: 27-Jun-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18061470
Lab ID:HS18061470-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,1-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 17:11
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	02-Jul-2018 17:11
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	02-Jul-2018 17:11
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 17:11
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	02-Jul-2018 17:11
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	02-Jul-2018 17:11
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	02-Jul-2018 17:11
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
Sample ID: Trip Blank
Collection Date: 27-Jun-2018 00:00

ANALYTICAL REPORT
WorkOrder:HS18061470
Lab ID:HS18061470-02
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
Chloroform	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Chloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
cis-1,3-Dichloropropene	0.50	U	0.10	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Dibromochloromethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Dibromomethane	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Dichlorodifluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Ethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Hexachlorobutadiene	0.50	U	1.0	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Isopropylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
m,p-Xylene	1.0	U	0.50	1.0	2.0	ug/L	1	02-Jul-2018 17:11
Methylene chloride	1.0	U	0.40	1.0	2.0	ug/L	1	02-Jul-2018 17:11
n-Butylbenzene	0.50	U	0.40	0.50	1.0	ug/L	1	02-Jul-2018 17:11
n-Propylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Naphthalene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
o-Xylene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
sec-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Styrene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
tert-Butylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Tetrachloroethene	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Toluene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
trans-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
trans-1,3-Dichloropropene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Trichlorofluoromethane	0.50	U	0.30	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	02-Jul-2018 17:11
Surr: 1,2-Dichloroethane-d4	*92.2*			**0**	*81-118*	*%REC*	*1*	*02-Jul-2018 17:11*
Surr: 4-Bromofluorobenzene	*99.9*			**0**	*85-114*	*%REC*	*1*	*02-Jul-2018 17:11*
Surr: Dibromofluoromethane	*90.4*			**0**	*80-119*	*%REC*	*1*	*02-Jul-2018 17:11*
Surr: Toluene-d8	*101*			**0**	*89-112*	*%REC*	*1*	*02-Jul-2018 17:11*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R319098	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C			**Matrix:** Water		
HS18061470-01	LH18/24-SP650_062718	27 Jun 2018 14:00			02 Jul 2018 18:01	1
HS18061470-02	Trip Blank	27 Jun 2018 00:00			02 Jul 2018 17:11	1
Batch ID R319157	**Test Name :** ANIONS BY E300.0			**Matrix:** Water		
HS18061470-01	LH18/24-SP650_062718	27 Jun 2018 14:00			03 Jul 2018 17:59	10

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319098 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **VBLKW-180702** Units: **ug/L** Analysis Date: **02-Jul-2018 16:47**
Client ID: Run ID: **VOA6_319098** SeqNo: **4634417** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	0.50	1.0								U
1,1,1-Trichloroethane	0.50	1.0								U
1,1,2,2-Tetrachloroethane	0.50	1.0								U
1,1,2-Trichloroethane	0.50	1.0								U
1,1-Dichloroethane	0.50	1.0								U
1,1-Dichloroethene	0.50	1.0								U
1,1-Dichloropropene	0.50	1.0								U
1,2,3-Trichlorobenzene	0.50	1.0								U
1,2,3-Trichloropropane	0.50	1.0								U
1,2,4-Trichlorobenzene	0.50	1.0								U
1,2,4-Trimethylbenzene	0.50	1.0								U
1,2-Dibromo-3-chloropropane	0.50	1.0								U
1,2-Dibromoethane	0.50	1.0								U
1,2-Dichlorobenzene	0.50	1.0								U
1,2-Dichloroethane	0.50	1.0								U
1,2-Dichloropropane	0.50	1.0								U
1,3,5-Trimethylbenzene	0.50	1.0								U
1,3-Dichlorobenzene	0.50	1.0								U
1,3-Dichloropropane	0.50	1.0								U
1,4-Dichlorobenzene	0.50	1.0								U
2,2-Dichloropropane	0.50	1.0								U
2-Butanone	1.0	2.0								U
2-Chlorotoluene	0.50	1.0								U
2-Hexanone	1.0	2.0								U
4-Chlorotoluene	0.50	1.0								U
4-Isopropyltoluene	0.50	1.0								U
4-Methyl-2-pentanone	1.0	2.0								U
Acetone	1.0	2.0								U
Benzene	0.50	1.0								U
Bromobenzene	0.50	1.0								U
Bromochloromethane	0.50	1.0								U
Bromodichloromethane	0.50	1.0								U
Bromoform	0.50	1.0								U
Bromomethane	0.50	1.0								U

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319098 **Instrument: VOA6** **Method: SW8260**

MBLK Sample ID: **VBLKW-180702** Units: **ug/L** Analysis Date: **02-Jul-2018 16:47**
Client ID: Run ID: **VOA6_319098** SeqNo: **4634417** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	1.0	2.0								U
Carbon tetrachloride	0.50	1.0								U
Chlorobenzene	0.50	1.0								U
Chloroethane	0.50	1.0								U
Chloroform	0.50	1.0								U
Chloromethane	0.50	1.0								U
cis-1,2-Dichloroethene	0.50	1.0								U
cis-1,3-Dichloropropene	0.50	1.0								U
Dibromochloromethane	0.50	1.0								U
Dibromomethane	0.50	1.0								U
Dichlorodifluoromethane	0.50	1.0								U
Ethylbenzene	0.50	1.0								U
Hexachlorobutadiene	0.50	1.0								U
Isopropylbenzene	0.50	1.0								U
m,p-Xylene	1.0	2.0								U
Methylene chloride	1.0	2.0								U
Naphthalene	0.50	1.0								U
n-Butylbenzene	0.50	1.0								U
n-Propylbenzene	0.50	1.0								U
o-Xylene	0.50	1.0								U
sec-Butylbenzene	0.50	1.0								U
Styrene	0.50	1.0								U
tert-Butylbenzene	0.50	1.0								U
Tetrachloroethene	0.50	1.0								U
Toluene	0.50	1.0								U
trans-1,2-Dichloroethene	0.50	1.0								U
trans-1,3-Dichloropropene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Trichlorofluoromethane	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*46.14*	*1.0*	*50*	*0*	*92.3*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.65*	*1.0*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*45.15*	*1.0*	*50*	*0*	*90.3*	*80 - 119*				
Surr: Toluene-d8	*50.6*	*1.0*	*50*	*0*	*101*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319098 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-180702** Units: **ug/L** Analysis Date: **02-Jul-2018 15:33**
Client ID: Run ID: **VOA6_319098** SeqNo: **4634416** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	47.98	1.0	50	0	96.0	78 - 124				
1,1,1-Trichloroethane	46.88	1.0	50	0	93.8	74 - 131				
1,1,2,2-Tetrachloroethane	57.92	1.0	50	0	116	71 - 121				
1,1,2-Trichloroethane	50.07	1.0	50	0	100	80 - 119				
1,1-Dichloroethane	51.13	1.0	50	0	102	77 - 125				
1,1-Dichloroethene	46.59	1.0	50	0	93.2	71 - 131				
1,1-Dichloropropene	46.11	1.0	50	0	92.2	78 - 125				
1,2,3-Trichlorobenzene	53.77	1.0	50	0	108	69 - 129				
1,2,3-Trichloropropane	53.32	1.0	50	0	107	73 - 122				
1,2,4-Trichlorobenzene	51.69	1.0	50	0	103	69 - 130				
1,2,4-Trimethylbenzene	49.81	1.0	50	0	99.6	76 - 124				
1,2-Dibromo-3-chloropropane	62.65	1.0	50	0	125	62 - 128				
1,2-Dibromoethane	51.05	1.0	50	0	102	77 - 121				
1,2-Dichlorobenzene	51.77	1.0	50	0	104	80 - 119				
1,2-Dichloroethane	48.97	1.0	50	0	97.9	73 - 128				
1,2-Dichloropropane	49.14	1.0	50	0	98.3	78 - 122				
1,3,5-Trimethylbenzene	48.71	1.0	50	0	97.4	75 - 124				
1,3-Dichlorobenzene	50.31	1.0	50	0	101	80 - 119				
1,3-Dichloropropane	54.69	1.0	50	0	109	80 - 119				
1,4-Dichlorobenzene	50.55	1.0	50	0	101	79 - 118				
2,2-Dichloropropane	50.92	1.0	50	0	102	60 - 139				
2-Butanone	118.3	2.0	100	0	118	56 - 143				
2-Chlorotoluene	49.96	1.0	50	0	99.9	79 - 122				
2-Hexanone	117.8	2.0	100	0	118	57 - 139				
4-Chlorotoluene	50.12	1.0	50	0	100	78 - 122				
4-Isopropyltoluene	45.67	1.0	50	0	91.3	77 - 127				
4-Methyl-2-pentanone	112.7	2.0	100	0	113	67 - 130				
Acetone	118.6	2.0	100	0	119	39 - 160				
Benzene	47	1.0	50	0	94.0	79 - 120				
Bromobenzene	50.74	1.0	50	0	101	80 - 120				
Bromochloromethane	45.69	1.0	50	0	91.4	78 - 123				
Bromodichloromethane	48.19	1.0	50	0	96.4	79 - 125				
Bromoform	54.9	1.0	50	0	110	66 - 130				
Bromomethane	52.3	1.0	50	0	105	53 - 141				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319098 **Instrument: VOA6** **Method: SW8260**

LCS Sample ID: **VLCSW-180702** Units: **ug/L** Analysis Date: **02-Jul-2018 15:33**
Client ID: Run ID: **VOA6_319098** SeqNo: **4634416** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	87.11	2.0	100	0	87.1	64 - 133				
Carbon tetrachloride	43.35	1.0	50	0	86.7	72 - 136				
Chlorobenzene	48.05	1.0	50	0	96.1	82 - 118				
Chloroethane	55.02	1.0	50	0	110	60 - 138				
Chloroform	46.93	1.0	50	0	93.9	79 - 124				
Chloromethane	53.38	1.0	50	0	107	50 - 139				
cis-1,2-Dichloroethene	46.83	1.0	50	0	93.7	78 - 123				
cis-1,3-Dichloropropene	50.42	1.0	50	0	101	75 - 124				
Dibromochloromethane	52.76	1.0	50	0	106	74 - 126				
Dibromomethane	52.37	1.0	50	0	105	79 - 123				
Dichlorodifluoromethane	36.99	1.0	50	0	74.0	32 - 152				
Ethylbenzene	48.09	1.0	50	0	96.2	79 - 121				
Hexachlorobutadiene	54.1	1.0	50	0	108	66 - 134				
Isopropylbenzene	45.5	1.0	50	0	91.0	72 - 131				
m,p-Xylene	92.84	2.0	100	0	92.8	80 - 121				
Methylene chloride	50.83	2.0	50	0	102	74 - 124				
Naphthalene	62.82	1.0	50	0	126	61 - 128				
n-Butylbenzene	49.83	1.0	50	0	99.7	75 - 128				
n-Propylbenzene	45.17	1.0	50	0	90.3	76 - 126				
o-Xylene	48.07	1.0	50	0	96.1	78 - 122				
sec-Butylbenzene	47.96	1.0	50	0	95.9	77 - 126				
Styrene	48.92	1.0	50	0	97.8	78 - 123				
tert-Butylbenzene	48.1	1.0	50	0	96.2	78 - 124				
Tetrachloroethene	45.05	1.0	50	0	90.1	74 - 129				
Toluene	47.32	1.0	50	0	94.6	80 - 121				
trans-1,2-Dichloroethene	45.64	1.0	50	0	91.3	75 - 124				
trans-1,3-Dichloropropene	51.87	1.0	50	0	104	73 - 127				
Trichloroethene	46.14	1.0	50	0	92.3	79 - 123				
Trichlorofluoromethane	46.09	1.0	50	0	92.2	65 - 141				
Vinyl chloride	46.53	1.0	50	0	93.1	58 - 137				
Surr: 1,2-Dichloroethane-d4	*45.53*	*1.0*	*50*	*0*	*91.1*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.9*	*1.0*	*50*	*0*	*99.8*	*85 - 114*				
Surr: Dibromofluoromethane	*45.2*	*1.0*	*50*	*0*	*90.4*	*80 - 119*				
Surr: Toluene-d8	*50.19*	*1.0*	*50*	*0*	*100*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319098 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS18061493-03MS** Units: **ug/L** Analysis Date: **02-Jul-2018 19:40**
Client ID: Run ID: **VOA6_319098** SeqNo: **4634423** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.02	1.0	50	0	86.0	78 - 124				
1,1,1-Trichloroethane	43.02	1.0	50	0	86.0	74 - 131				
1,1,2,2-Tetrachloroethane	55.13	1.0	50	0	110	71 - 121				
1,1,2-Trichloroethane	45.93	1.0	50	0	91.9	80 - 119				
1,1-Dichloroethane	44.8	1.0	50	0	89.6	77 - 125				
1,1-Dichloroethene	41.88	1.0	50	0	83.8	71 - 131				
1,1-Dichloropropene	40.87	1.0	50	0	81.7	78 - 125				
1,2,3-Trichlorobenzene	42.73	1.0	50	0	85.5	69 - 129				
1,2,3-Trichloropropane	50.16	1.0	50	0	100	73 - 122				
1,2,4-Trichlorobenzene	42.48	1.0	50	0	85.0	69 - 130				
1,2,4-Trimethylbenzene	45.63	1.0	50	0	91.3	76 - 124				
1,2-Dibromo-3-chloropropane	54.34	1.0	50	0	109	62 - 128				
1,2-Dibromoethane	46.01	1.0	50	0	92.0	77 - 121				
1,2-Dichlorobenzene	47.99	1.0	50	0	96.0	80 - 119				
1,2-Dichloroethane	43.62	1.0	50	0	87.2	73 - 128				
1,2-Dichloropropane	43.4	1.0	50	0	86.8	78 - 122				
1,3,5-Trimethylbenzene	45.22	1.0	50	0	90.4	75 - 124				
1,3-Dichlorobenzene	46.3	1.0	50	0	92.6	80 - 119				
1,3-Dichloropropane	49.85	1.0	50	0	99.7	80 - 119				
1,4-Dichlorobenzene	46.27	1.0	50	0	92.5	79 - 118				
2,2-Dichloropropane	42.91	1.0	50	0	85.8	60 - 139				
2-Butanone	107.6	2.0	100	0	108	56 - 143				
2-Chlorotoluene	46.18	1.0	50	0	92.4	79 - 122				
2-Hexanone	108.1	2.0	100	0	108	57 - 139				
4-Chlorotoluene	46.54	1.0	50	0	93.1	78 - 122				
4-Isopropyltoluene	40.73	1.0	50	0	81.5	77 - 127				
4-Methyl-2-pentanone	103.8	2.0	100	0	104	67 - 130				
Acetone	99.8	2.0	100	0	99.8	39 - 160				
Benzene	40.84	1.0	50	0	81.7	79 - 120				
Bromobenzene	48.02	1.0	50	0	96.0	80 - 120				
Bromochloromethane	41.2	1.0	50	0	82.4	78 - 123				
Bromodichloromethane	42.42	1.0	50	0	84.8	79 - 125				
Bromoform	50.07	1.0	50	0	100	66 - 130				
Bromomethane	24.65	1.0	50	0	49.3	53 - 141				S

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319098 **Instrument: VOA6** **Method: SW8260**

MS Sample ID: **HS18061493-03MS** Units: **ug/L** Analysis Date: **02-Jul-2018 19:40**
Client ID: Run ID: **VOA6_319098** SeqNo: **4634423** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Carbon disulfide	76.22	2.0	100	0	76.2	64 - 133				
Carbon tetrachloride	40.18	1.0	50	0	80.4	72 - 136				
Chlorobenzene	42.75	1.0	50	0	85.5	82 - 118				
Chloroethane	46.74	1.0	50	0	93.5	60 - 138				
Chloroform	41.12	1.0	50	0	82.2	79 - 124				
Chloromethane	34.15	1.0	50	0	68.3	50 - 139				
cis-1,2-Dichloroethene	41.72	1.0	50	0	83.4	78 - 123				
cis-1,3-Dichloropropene	43.49	1.0	50	0	87.0	75 - 124				
Dibromochloromethane	48.32	1.0	50	0	96.6	74 - 126				
Dibromomethane	47.31	1.0	50	0	94.6	79 - 123				
Dichlorodifluoromethane	25.95	1.0	50	0	51.9	32 - 152				
Ethylbenzene	42.92	1.0	50	0	85.8	79 - 121				
Hexachlorobutadiene	33.92	1.0	50	0	67.8	66 - 134				
Isopropylbenzene	41.11	1.0	50	0	82.2	72 - 131				
m,p-Xylene	83.6	2.0	100	0	83.6	80 - 121				
Methylene chloride	46.4	2.0	50	0	92.8	74 - 124				
Naphthalene	49.24	1.0	50	0	98.5	61 - 128				
n-Butylbenzene	43.23	1.0	50	0	86.5	75 - 128				
n-Propylbenzene	41.87	1.0	50	0	83.7	76 - 126				
o-Xylene	42.53	1.0	50	0	85.1	78 - 122				
sec-Butylbenzene	43.13	1.0	50	0	86.3	77 - 126				
Styrene	43.04	1.0	50	0	86.1	78 - 123				
tert-Butylbenzene	44.32	1.0	50	0	88.6	78 - 124				
Tetrachloroethene	41.41	1.0	50	0	82.8	74 - 129				
Toluene	43.13	1.0	50	0	86.3	80 - 121				
trans-1,2-Dichloroethene	40.66	1.0	50	0	81.3	75 - 124				
trans-1,3-Dichloropropene	45.03	1.0	50	0	90.1	73 - 127				
Trichloroethene	42.23	1.0	50	0.5173	83.4	79 - 123				
Trichlorofluoromethane	42.11	1.0	50	0	84.2	65 - 141				
Vinyl chloride	37.39	1.0	50	0	74.8	58 - 137				
Surr: 1,2-Dichloroethane-d4	*45.03*	*1.0*	*50*	*0*	*90.1*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*49.48*	*1.0*	*50*	*0*	*99.0*	*85 - 114*				
Surr: Dibromofluoromethane	*45.13*	*1.0*	*50*	*0*	*90.3*	*80 - 119*				
Surr: Toluene-d8	*49.46*	*1.0*	*50*	*0*	*98.9*	*89 - 112*				

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319098 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS18061493-03MSD** Units: **ug/L** Analysis Date: **02-Jul-2018 20:04**
Client ID: Run ID: **VOA6_319098** SeqNo: **4634424** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
1,1,1,2-Tetrachloroethane	43.83	1.0	50	0	87.7	78 - 124	43.02	1.88	20	
1,1,1-Trichloroethane	43	1.0	50	0	86.0	74 - 131	43.02	0.0355	20	
1,1,2,2-Tetrachloroethane	54.62	1.0	50	0	109	71 - 121	55.13	0.928	20	
1,1,2-Trichloroethane	47.6	1.0	50	0	95.2	80 - 119	45.93	3.57	20	
1,1-Dichloroethane	47.56	1.0	50	0	95.1	77 - 125	44.8	5.98	20	
1,1-Dichloroethene	39.99	1.0	50	0	80.0	71 - 131	41.88	4.63	20	
1,1-Dichloropropene	40.44	1.0	50	0	80.9	78 - 125	40.87	1.05	20	
1,2,3-Trichlorobenzene	47.95	1.0	50	0	95.9	69 - 129	42.73	11.5	20	
1,2,3-Trichloropropane	49.28	1.0	50	0	98.6	73 - 122	50.16	1.77	20	
1,2,4-Trichlorobenzene	45.85	1.0	50	0	91.7	69 - 130	42.48	7.64	20	
1,2,4-Trimethylbenzene	46.14	1.0	50	0	92.3	76 - 124	45.63	1.11	20	
1,2-Dibromo-3-chloropropane	58.11	1.0	50	0	116	62 - 128	54.34	6.7	20	
1,2-Dibromoethane	48.45	1.0	50	0	96.9	77 - 121	46.01	5.16	20	
1,2-Dichlorobenzene	47.75	1.0	50	0	95.5	80 - 119	47.99	0.493	20	
1,2-Dichloroethane	45	1.0	50	0	90.0	73 - 128	43.62	3.11	20	
1,2-Dichloropropane	45.28	1.0	50	0	90.6	78 - 122	43.4	4.24	20	
1,3,5-Trimethylbenzene	45.58	1.0	50	0	91.2	75 - 124	45.22	0.801	20	
1,3-Dichlorobenzene	46.99	1.0	50	0	94.0	80 - 119	46.3	1.48	20	
1,3-Dichloropropane	51.52	1.0	50	0	103	80 - 119	49.85	3.28	20	
1,4-Dichlorobenzene	46.58	1.0	50	0	93.2	79 - 118	46.27	0.668	20	
2,2-Dichloropropane	42.78	1.0	50	0	85.6	60 - 139	42.91	0.283	20	
2-Butanone	110.3	2.0	100	0	110	56 - 143	107.6	2.41	20	
2-Chlorotoluene	45.93	1.0	50	0	91.9	79 - 122	46.18	0.545	20	
2-Hexanone	111.2	2.0	100	0	111	57 - 139	108.1	2.88	20	
4-Chlorotoluene	46.4	1.0	50	0	92.8	78 - 122	46.54	0.294	20	
4-Isopropyltoluene	41.67	1.0	50	0	83.3	77 - 127	40.73	2.28	20	
4-Methyl-2-pentanone	106.5	2.0	100	0	106	67 - 130	103.8	2.59	20	
Acetone	101.5	2.0	100	0	101	39 - 160	99.8	1.69	20	
Benzene	42.1	1.0	50	0	84.2	79 - 120	40.84	3.03	20	
Bromobenzene	47.05	1.0	50	0	94.1	80 - 120	48.02	2.04	20	
Bromochloromethane	42.56	1.0	50	0	85.1	78 - 123	41.2	3.25	20	
Bromodichloromethane	43.58	1.0	50	0	87.2	79 - 125	42.42	2.7	20	
Bromoform	51.78	1.0	50	0	104	66 - 130	50.07	3.37	20	
Bromomethane	31.56	1.0	50	0	63.1	53 - 141	24.65	24.6	20	R

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319098 **Instrument: VOA6** **Method: SW8260**

MSD Sample ID: **HS18061493-03MSD** Units: **ug/L** Analysis Date: **02-Jul-2018 20:04**
Client ID: Run ID: **VOA6_319098** SeqNo: **4634424** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
Carbon disulfide	75.71	2.0	100	0	75.7	64 - 133	76.22	0.672	20	
Carbon tetrachloride	39.13	1.0	50	0	78.3	72 - 136	40.18	2.66	20	
Chlorobenzene	44.22	1.0	50	0	88.4	82 - 118	42.75	3.38	20	
Chloroethane	45.87	1.0	50	0	91.7	60 - 138	46.74	1.89	20	
Chloroform	43	1.0	50	0	86.0	79 - 124	41.12	4.48	20	
Chloromethane	34.54	1.0	50	0	69.1	50 - 139	34.15	1.13	20	
cis-1,2-Dichloroethene	43.41	1.0	50	0	86.8	78 - 123	41.72	3.97	20	
cis-1,3-Dichloropropene	45.07	1.0	50	0	90.1	75 - 124	43.49	3.57	20	
Dibromochloromethane	49.95	1.0	50	0	99.9	74 - 126	48.32	3.31	20	
Dibromomethane	48.9	1.0	50	0	97.8	79 - 123	47.31	3.3	20	
Dichlorodifluoromethane	22.69	1.0	50	0	45.4	32 - 152	25.95	13.4	20	
Ethylbenzene	44.44	1.0	50	0	88.9	79 - 121	42.92	3.49	20	
Hexachlorobutadiene	38.39	1.0	50	0	76.8	66 - 134	33.92	12.4	20	
Isopropylbenzene	42.73	1.0	50	0	85.5	72 - 131	41.11	3.86	20	
m,p-Xylene	86.92	2.0	100	0	86.9	80 - 121	83.6	3.89	20	
Methylene chloride	47.42	2.0	50	0	94.8	74 - 124	46.4	2.18	20	
Naphthalene	55.47	1.0	50	0	111	61 - 128	49.24	11.9	20	
n-Butylbenzene	44.21	1.0	50	0	88.4	75 - 128	43.23	2.24	20	
n-Propylbenzene	41.87	1.0	50	0	83.7	76 - 126	41.87	0.00514	20	
o-Xylene	44.29	1.0	50	0	88.6	78 - 122	42.53	4.05	20	
sec-Butylbenzene	43.43	1.0	50	0	86.9	77 - 126	43.13	0.695	20	
Styrene	44.97	1.0	50	0	89.9	78 - 123	43.04	4.38	20	
tert-Butylbenzene	44.87	1.0	50	0	89.7	78 - 124	44.32	1.23	20	
Tetrachloroethene	41.16	1.0	50	0	82.3	74 - 129	41.41	0.601	20	
Toluene	43.48	1.0	50	0	87.0	80 - 121	43.13	0.817	20	
trans-1,2-Dichloroethene	41.3	1.0	50	0	82.6	75 - 124	40.66	1.56	20	
trans-1,3-Dichloropropene	46.68	1.0	50	0	93.4	73 - 127	45.03	3.58	20	
Trichloroethene	42.11	1.0	50	0.5173	83.2	79 - 123	42.23	0.282	20	
Trichlorofluoromethane	39.5	1.0	50	0	79.0	65 - 141	42.11	6.4	20	
Vinyl chloride	36.48	1.0	50	0	73.0	58 - 137	37.39	2.47	20	
Surr: 1,2-Dichloroethane-d4	*45.8*	*1.0*	*50*	*0*	*91.6*	*81 - 118*	*45.03*	*1.7*	*20*	
Surr: 4-Bromofluorobenzene	*50.13*	*1.0*	*50*	*0*	*100*	*85 - 114*	*49.48*	*1.3*	*20*	
Surr: Dibromofluoromethane	*46.15*	*1.0*	*50*	*0*	*92.3*	*80 - 119*	*45.13*	*2.24*	*20*	
Surr: Toluene-d8	*50.55*	*1.0*	*50*	*0*	*101*	*89 - 112*	*49.46*	*2.18*	*20*	

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client:	Bhate Environmental Associates, Inc.
Project:	LHAAP 18 24
WorkOrder:	HS18061470

QC BATCH REPORT

Batch ID:	**R319098**	**Instrument:**	**VOA6**	**Method:**	**SW8260**

The following samples were analyzed in this batch: HS18061470-01 HS18061470-02

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319157 **Instrument: ICS2100** **Method: E300**

MBLK Sample ID: **WBLKW1-070318** Units: **mg/L** Analysis Date: **03-Jul-2018 23:04**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4636278** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.500	0.500								U
Sulfate	0.500	0.500								U

LCS Sample ID: **WLCSW1-070318** Units: **mg/L** Analysis Date: **03-Jul-2018 23:19**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4636279** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.29	0.500	20	0	101	90 - 110				
Sulfate	20.33	0.500	20	0	102	90 - 110				

LCSD Sample ID: **WLCSDW1-070318** Units: **mg/L** Analysis Date: **03-Jul-2018 23:33**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4636280** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	20.7	0.500	20	0	104	90 - 110	20.29	2	20	
Sulfate	20.7	0.500	20	0	103	90 - 110	20.33	1.78	20	

MS Sample ID: **HS18070057-01MS** Units: **mg/L** Analysis Date: **05-Jul-2018 13:27**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4637210** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	267.1	5.00	100	168.5	98.6	80 - 120				
Sulfate	932.2	5.00	100	862.4	69.8	80 - 120				SO

MS Sample ID: **HS18070057-01MS** Units: **mg/L** Analysis Date: **03-Jul-2018 14:56**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4636250** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	281.8	5.00	100	174.3	107	80 - 120				
Sulfate	975.7	5.00	100	884.5	91.2	80 - 120				O

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319157 **Instrument: ICS2100** **Method: E300**

MS Sample ID: **HS18061510-01MS** Units: **mg/L** Analysis Date: **03-Jul-2018 19:11**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4636265** PrepDate: DF: **100**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	4167	50.0	1000	3063	110	80 - 120				
Sulfate	3625	50.0	1000	2522	110	80 - 120				

MS Sample ID: **HS18061510-01MS** Units: **mg/L** Analysis Date: **05-Jul-2018 14:11**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4637213** PrepDate: DF: **100**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	4157	50.0	1000	3189	96.8	80 - 120				
Sulfate	3635	50.0	1000	2699	93.5	80 - 120				

MSD Sample ID: **HS18070057-01MSD** Units: **mg/L** Analysis Date: **03-Jul-2018 15:11**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4636251** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	270.7	5.00	100	174.3	96.4	80 - 120	281.8	3.99	20	
Sulfate	940.7	5.00	100	884.5	56.2	80 - 120	975.7	3.66	20	SO

MSD Sample ID: **HS18070057-01MSD** Units: **mg/L** Analysis Date: **05-Jul-2018 13:42**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4637211** PrepDate: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	256.2	5.00	100	168.5	87.8	80 - 120	267.1	4.15	20	
Sulfate	893.9	5.00	100	862.4	31.5	80 - 120	932.2	4.19	20	SO

MSD Sample ID: **HS18061510-01MSD** Units: **mg/L** Analysis Date: **03-Jul-2018 19:26**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4636266** PrepDate: DF: **100**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	4090	50.0	1000	3063	103	80 - 120	4167	1.85	20	
Sulfate	3556	50.0	1000	2522	103	80 - 120	3625	1.9	20	

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: HS18061470

QC BATCH REPORT

Batch ID: R319157 **Instrument: ICS2100** **Method: E300**

MSD Sample ID: **HS18061510-01MSD** Units: **mg/L** Analysis Date: **05-Jul-2018 14:25**
Client ID: Run ID: **ICS2100_319157** SeqNo: **4637214** PrepDate: DF: **100**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	4308	50.0	1000	3189	112	80 - 120	4157	3.57	20	
Sulfate	3755	50.0	1000	2699	106	80 - 120	3635	3.26	20	

The following samples were analyzed in this batch: HS18061470-01

Note: See Qualifiers Page for a list of qualifiers and their explanation.

RIGHT SOLUTIONS | RIGHT PARTNER

ALS Group Houston, Corp Date: 06-Jul-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP 18 24
WorkOrder: **HS18061470**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

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CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919 2016-2018	31-Jul-2018
Oklahoma	2017-088	31-Aug-2018
North Carolina	624-2018	31-Dec-2018
Arkansas	88-0356	27-Mar-2019
Kansas	E-10352 2017-218	31-Jul-2018
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	L2231 Rev 3-30-2018	22-Dec-2018
Kentucky	123043 - 2018	30-Apr-2019

RIGHT SOLUTIONS | RIGHT PARTNER

Date: 06-Jul-18

Sample Receipt Checklist

Client Name: Bhate Environmental
Work Order: HS18061470
Date/Time Received: **28-Jun-2018 08:40**
Received by: **JRM**

Checklist completed by: *Pablo Marinez* eSignature — 28-Jun-2018 Date
Reviewed by: *RJ Modashia* eSignature — 29-Jun-2018 Date

Matrices: **WATER**
Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	1.9C/1.3C UC/C	IR # 25	
Cooler(s)/Kit(s):	43305		
Date/Time sample(s) sent to storage:	6/28/2018 17:40		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

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HS18061470

CHAIN OF CUSTODY

Name Of Lab Shipping To: ALS 10450 Stancliff Rd. Suite 210, Houston, Tx. 77099 ATTN: SONIA WEST

Bhate Environmental Associates, Inc.
LHAAP 18 24

Project: BHATE
LONGHORN ARMY AMMN. PLANT (LHAAP)
GROUNDWATER TREATMENT PLANT (GWTP)
KARNACK, TEXAS

Project No.
NWO1312.0150.0
16.0001

Job:
GROUNDWATER TREATMENT PLANT
BI-WEEKLY SAMPLES

Prepared By:
Scott Beesinger

P.O Number

Field Sample I.D.	Sample Matrix	Date / Time	MS / MSD	No. OF CONTAINERS	Analyses: VOC	Analyses: CHLORIDE, SULFATE	Remarks (Preservatives, etc.)	Lab I.D.#
LH18/24-SP650_062718	Water	06/27/18 / 14:00		3	3		HCL	
LH18/24-SP650_062718	Water	06/27/18 / 14:00		1		1	NONE	
Trip Blank	Water	06/27/18		2	2		HCL	

Additional Remarks: **STANDARD TAT ON ALL PARAMETERS.**

Relinquished By:	Date	Time	Received By:	Date	Time	Relinquished By:	Date	Time	Received By:	Date	Time
Scott Beesinger	06/27/18	14:30									

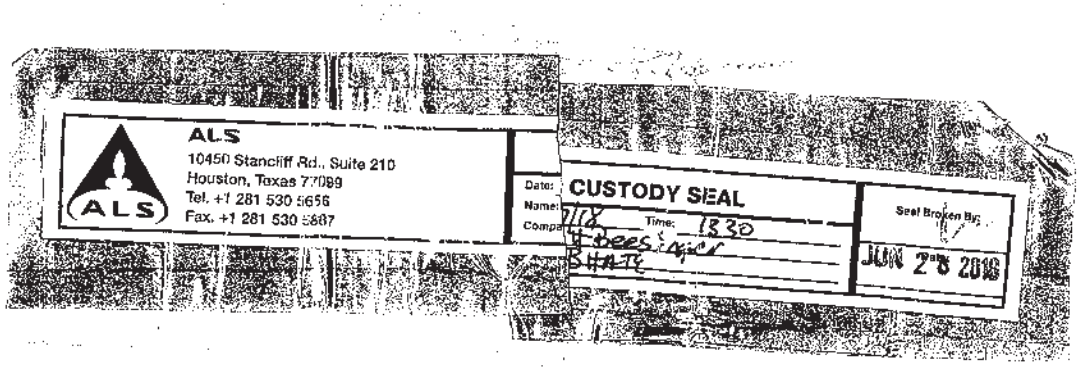
For Lab Use Only

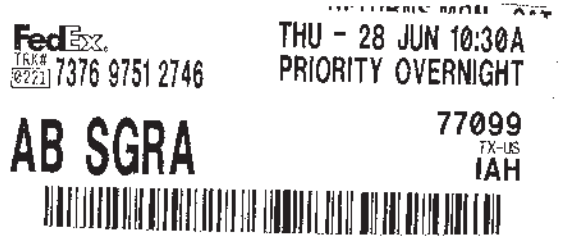
Received At Lab By:	Date	Time	Airbill No.	Opened By:	Date	Time	Temp of Container	Seal No.	Condition
JM	6/28/18	08:40							

Remarks
Cooler - 4305 11:25
Temp - 1.9 CF-0.6

(Word) S \\1-ces\Forms\Chain of Custody - BiWeekly

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APPENDIX G
PROTOCOL FOR DISCHARGING GWTP EFFLUENT

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MEMORANDUM

DATE: August 28, 2017

PROJECT NAME: Remediation of Multiple Sites, Longhorn Army Ammunition Plant, Karnack, TX

TO:	Richard Mayer	Senior Project Engineer US Environmental Protection Agency Federal Facilities Section (6PD-F)
	April Palmie	Project and Grant Manager Superfund Section, Remediation Division Texas Commission on Environmental Quality
FROM:	Rose M. Zeiler, Ph.D.	Longhorn AAP Site Manager

SUBJECT: **Protocol for Discharging GWTP Effluent**
Longhorn Army Ammunition Plant, Karnack, TX
(Contract: W912DY-09-D-0059, Task Order DS01)

INTRODUCTION

The purpose of this memo is to document the protocol for discharging Longhorn Army Ammunition Plant groundwater treatment plant (GWTP) effluent to Harrison Bayou, the INF-Pond, or LHAAP-18/24.

The GWTP is designed to:

- Extract groundwater from LHAAP-18/24 and LHAAP-16 for hydraulic control;
- Remove metals by pH adjustment, polymer addition, and gravity separation;
- Remove volatile organic compounds (VOCs) by air stripping;
- Remove perchlorate in a fluidized bed reactor (FBR) and an ion exchange scavenger system; and
- Discharge the effluent continuously.

DISCHARGE CRITERIA

The discharge criteria established for discharge to Harrison Bayou are:

Parameter	Discharge Criteria (µg/L)	
	Daily Average	Daily Maximum
Volatiles		
1,1,1-Trichloroethane	3,417	7,230
1,1,2-Trichloroethane	102.5	216.9
1,1-Dichloroethane	6,633	14,032
1,1-Dichloroethene	119	253
1,2-Dichloroethane	85	181
Acetone	1,132	2,395
Benzene	85	181
Carbon Tetrachloride	85	181
Chlorobenzene	22,300	47,180
Chloroform	1,708	3,615
Ethylbenzene	26,954	57,025
Xylenes	39.5	83.6
Methylene Chloride	803	1,699
Styrene	2,829	5,987
Tetrachloroethene	85.4	180.7
Toluene	1,980	4,189
Trichloroethene	85	181
Vinyl Chloride	34	72
Anions		
Chloride	*	*
Sulfate	*	*
Perchlorate**	278	589
Metals		
Aluminum	777	1,644
Arsenic	365	772
Barium	1,000	2,000
Cadmium	1.6	3.4
Chromium, Total	355	752
Chromium, Hexavalent	58	124
Cobalt	5,433	11,495
Iron	1,132	2,395
Lead	2.2	4.6
Nickel	87	184
Manganese	7,323	15,494
Silver	1.4	3
Selenium	5.7	12
Vanadium	1,698	3,592
Zinc	146	310
Other		
Hexachlorobenzene	0.22	0.47
1,4-Dioxane		134.2
Oil and Grease		15
Chemical Oxygen Demand		200

* - Based upon flow in Harrison Bayou

** - Discharge criteria, when diverted to the INF Pond, is 17 µg/L

PROTOCOL FOR DISCHARGING GWTP EFFLUENT

In accordance with the *Sampling and Analysis Plan, Groundwater Treatment Plant and Well Fields* (SAP) Table 2-2, indicator parameters for the FBR, such as temperature, pH and oxidation reduction potential (ORP), are monitored in real time to predict FBR performance and perchlorate removal. Based upon these indicator parameters, the operator of the GWTP can make adjustments such as:

- Bring the ion exchange system online;
- Increase or decrease the addition rate of electron donor (acetic acid);
- Increase or decrease the nutrient addition rate (urea or phosphoric acid); or
- Increase or decrease the FBR recirculation rate

Samples of the GWTP effluent are collected weekly, analyzed for perchlorate, nutrients (ammonia-nitrogen and ortho-phosphate), total organic carbon (TOC), chloride, and sulfate, with the results received from the laboratory 14 days later. Other parameters (e.g. Record of Decision metals and volatiles) are collected and analyzed in GWTP effluent samples according to the frequencies listed in Table 2-1 of the SAP.

As shown in Figure 1, groundwater is continuously extracted, treated, and discharged. If Harrison Bayou is flowing and indicator parameters are within their historical optimal ranges, then the ion exchange vessels can be bypassed and the GWTP effluent sample will be collected after the FBR. If Harrison Bayou is not flowing or the indicator parameters are not within historical optimal ranges, then the ion exchange vessels will be put on line, and the GWTP effluent sample will be collected between the lead and lag ion exchange vessel. Professional judgement may also be used as to when to bring the ion exchange vessels online, such as after a power outage or during anticipated cold temperatures when the FBR has historically not performed optimally.

If a parameter is measured in the effluent at a concentration above the discharge criteria, then a confirmation sample and an effluent sample after the lag ion exchange vessel will be collected and analyzed for the parameter with a 24-hour turnaround time. Corrective measures (e.g. increased nutrient or electron donor addition rates, bring ion exchange vessels on line) will be implemented as appropriate to bring the parameter back within the discharge criteria. ***If an upset condition in the FBR leads to high concentrations of perchlorate going into the lead ion exchange vessel and breaking through at the sample location between the vessels, the lag vessel will still remove perchlorate before it is discharged to Harrison Bayou, the INF Pond, or LHAAP-18/24.*** It is estimated that the lag ion exchange vessel can remove all of the perchlorate from two weeks of typical groundwater extraction at a concentration of 920 µg/L. If the residual perchlorate concentration after the FBR and lead ion exchange vessel is only 600 µg/L, the lag ion exchange vessel could last almost 2.5 years before perchlorate would be detected in the discharged effluent.

If a parameter exceeds the discharge criteria by more than 40% (see Appendix A-2, SAP, Section 7c of Monitoring and Reporting Requirements) or reaches 920 µg/L of perchlorate, then the GWTP will be put into full recycle mode (no discharge) until the parameter is below the discharge criteria again. Appendix A-2 of the SAP requires GWTP data to be provided to TCEQ monthly including a list of noncompliance(s), if applicable.

Discharge to Harrison Bayou

As shown in Figure 1, the GWTP effluent will be discharged to Harrison Bayou as long as it has a measurable flow. The flowrate in Harrison Bayou is estimated by measuring the height of water with a staff gauge and velocity in feet/sec at intervals along the width as described in the Installation-Wide Work Plan, Standard Operating Procedures, Attachment 18 – Water Depth and Velocity Measurements (AECOM, July 2014).

The allowable flow rate of GWTP effluent that can be discharged to Harrison Bayou is given by:

$$QE \leq \frac{QS\,(CC - CA)}{(CE - CC)}$$

where Q_E = GWTP effluent flow Q_S = Harrison Bayou flow

C_C = Criteria concentration (100 mg/L for chloride, 50 mg/L for sulfate)

C_A = Ambient concentration = 10 mg/L

C_E = Chloride or sulfate concentration in GWTP effluent

The allowable GWTP effluent flow will be the lower of the calculated values given the measured concentrations of chloride and sulfate in the discharge stream. For each day that GWTP effluent is discharged to Harrison Bayou, the measured Harrison Bayou flow, the allowable effluent flow, and the actual effluent flow are recorded.

Discharge to INF Pond

If Harrison Bayou is not flowing, then GWTP effluent will be discharged to the Intermediate-Range Nuclear Forces (INF) Pond for temporary storage until Harrison Bayou flow resumes. Perchlorate concentration detected in the effluent must be 17 µg/L or less, when this occurs.

The INF Pond has a flexible membrane liner protected by a soil cover with a gravity discharge pipe (and valve) to Harrison Bayou. The INF Pond has a nominal capacity of 3 million gallons with a staff gage to measure the height of water stored in the pond. The GWTP operator maintains the INF Pond by visually inspecting for erosion, vegetative growth including tree growth along the anchor trench, and liner integrity and making necessary repairs. Periodically, accumulated debris must be removed from the influent and effluent piping to the INF Pond.

Prior to discharging to the INF Pond, a lead and lag ion exchange vessel will be brought online. The GWTP Operator will also confirm that the discharge valve is closed, will record the reading on the effluent totalizer, and will record the height of water using the staff gage. The GWTP Operator will then configure valves and pumps to direct GWTP effluent to the INF Pond. The height of water in the INF Pond and totalizer reading will be recorded at the beginning and end of each shift for the duration of active discharge. When the height of water in the pond reaches 3 feet below the height of the berm (freeboard), the GWTP Operator will stop discharging to the INF Pond and TCEQ will be notified. After the TCEQ acknowledges the INF Pond level, GWTP effluent may be discharged to the INF Pond again until 2 feet of freeboard is reached. The GWTP Operator will stop discharging to the INF Pond and TCEQ will be notified again. After the TCEQ acknowledges 2 feet of freeboard in the INF Pond,GWTP effluent may be discharged again until 1 foot of freeboard remains. No additional GWTP effluent can be accepted at the INF Pond until greater than 1 foot of freeboard is measured.

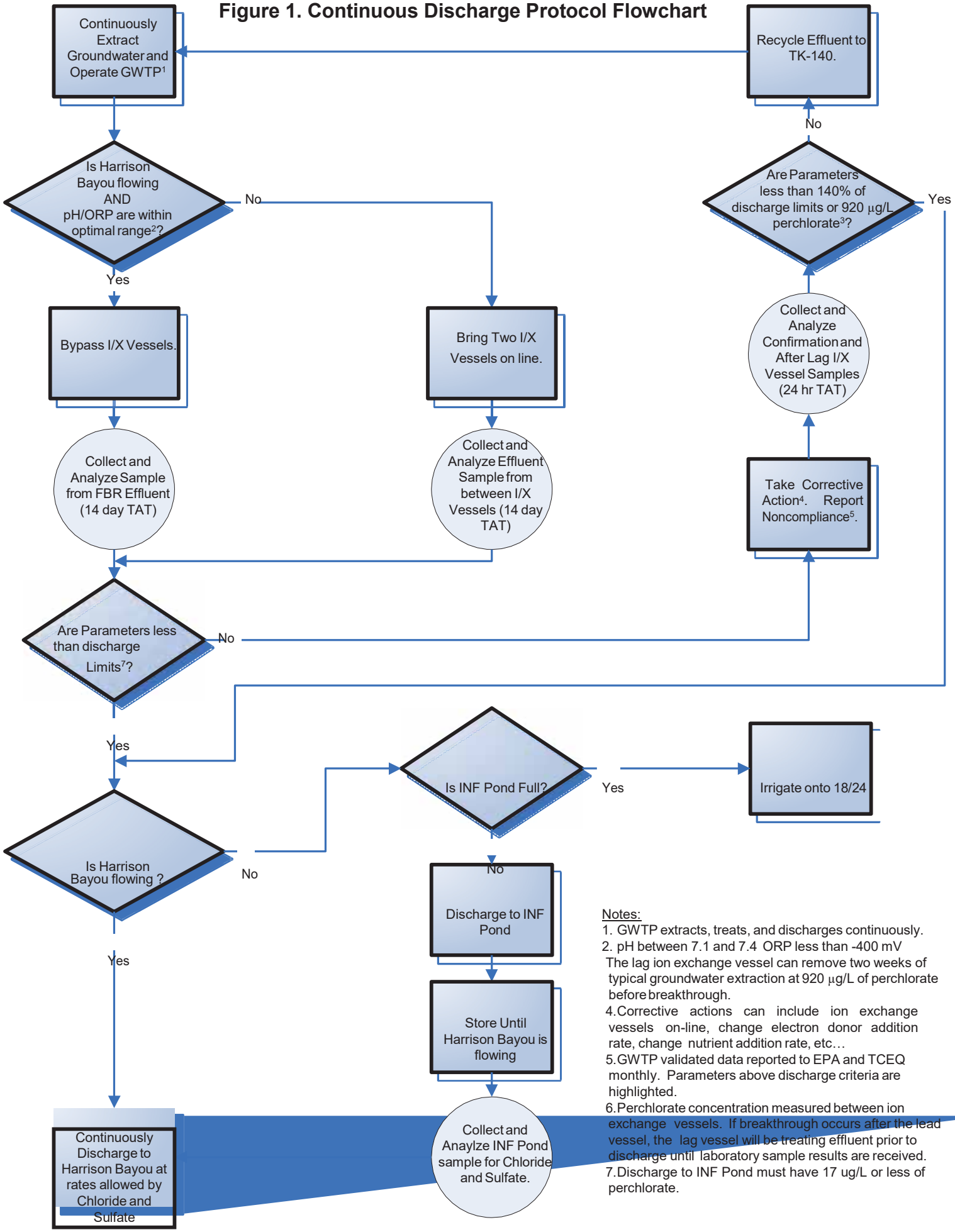
As soon as flow in Harrison Bayou returns, stored GWTP effluent from the INF Pond will be discharged. As with direct discharges from the GWTP to Harrison Bayou, the allowable flowrate of effluent from the INF Pond is calculated based upon the chloride and sulfate concentrations in the pond and the flow in Harrison Bayou. If effluent from the INF Pond and the GWTP are discharged simultaneously, total flow of both streams together should not exceed the calculated discharge level for either discharge location. For each day that INF Pond contents are discharged to Harrison Bayou, the measured Harrison Bayou flow, the allowable effluent flow, and the actual effluent flow are recorded.

Irrigation onto LHAAP-18/24

If Harrison Bayou is not flowing and the INF Pond has less than 1 foot of freeboard, then GWTP effluent will be irrigated onto LHAAP-18/24 using one of the three main sprinkler lines. To avoid pooling and runoff of irrigation water, only one line will be used for half a day at a time, with a separate line being used the second half of the day. If needed, the irrigation will occur 5 days a week for 8 hours each day (using 3 sprinklers in each line). If conditions are wet due to rain events, irrigation will not be conducted to avoid ponding and potential runoff, the GWTP will be put into recycle mode, and groundwater extraction will be interrupted if storage space is not available.

While irrigating, site inspections will be performed to ensure pooling and runoff are not occurring. During the irrigation activities, inspections will be performed twice a day, once approximately three hours and again approximately six hours into the 8-hour irrigation shift. The system will be inspected to ensure that the sprinkler heads are operating properly and not leaking large amounts of water. If ponding or runoff is observed, irrigation at that sprinkler line will cease, and irrigation at another sprinkler line will be started if possible. Volumes of GWTP effluent and twice daily inspections will be recorded daily and reported monthly until flow resumes in Harrison Bayou or greater than 1 foot of freeboard is available in the INF Pond.

Figure 1. Continuous Discharge Protocol Flowchart



Notes:

1. GWTP extracts, treats, and discharges continuously.
2. pH between 7.1 and 7.4 ORP less than -400 mV
   The lag ion exchange vessel can remove two weeks of typical groundwater extraction at 920 µg/L of perchlorate before breakthrough.
4. Corrective actions can include ion exchange vessels on-line, change electron donor addition rate, change nutrient addition rate, etc…
5. GWTP validated data reported to EPA and TCEQ monthly. Parameters above discharge criteria are highlighted.
6. Perchlorate concentration measured between ion exchange vessels. If breakthrough occurs after the lead vessel, the lag vessel will be treating effluent prior to discharge until laboratory sample results are received.
7. Discharge to INF Pond must have 17 ug/L or less of perchlorate.

APPENDIX H
QUALITY CONTROL SUMMARY REPORT

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QUARTERLY CONTROL SUMMARY REPORT
2nd QUARTER (APRIL-JUNE) 2018
GROUNDWATER TREATMENT PLANT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

October 2018

Prepared For:

Longhorn Army Ammunition Plant
Karnack, Texas

Under Contract To:

U.S. Army Corps of Engineers
Tulsa District
Tulsa, Oklahoma

Contract Number: W9128F-13-D-0012
Task Order Number: W912BV17F0150

Prepared By:

1608 13th Avenue South, Suite 300
Birmingham, Alabama 35205
1-800-806-4001 • www.bhate.com

Table of Contents

1 INTRODUCTION 3
1.1 Intended Use of Data 3
1.2 Preservation and Holding Times 3
1.3 Calibrations 4
1.3.1 Continuing Calibration Verifications 4
1.4 Blanks 4
1.4.1 SW6020 4
1.5 Surrogates 5
1.6 Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD) 5
1.7 Matrix Spike (MS)/Matrix Spike Duplicate Sample (MSD) 5
1.7.1 SW8260 5
1.7.2 SW6020 5
1.7.3 SW6850 6
1.8 Internal Standards 6
1.9 Precision 6
1.9.1 Laboratory Duplicate 6
1.9.2 Field Duplicate 6
2 DATA USABILITY SUMMARY 6

Tables

Table 1: Field Sample Identification and Laboratory Packages
Table 2: Qualified Analytical Data
Table 3: Completeness by Method

1 INTRODUCTION

Bhate Environmental Associates, Inc. (Bhate) reviewed 44 data packages from ALS Environmental, Houston, Texas. Groundwater samples were collected from April 4, 2018, through June 28, 2018, at the Groundwater Treatment Plant (GWTP) and Site LHAAP 18/24 at Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. Data were reviewed for conformance to the requirements of the following guidance documents: *USEPA Contract Laboratory Program* [CLP] *National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA, January 2017); *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA, January 2017); and the *Final Basewide Uniform Federal Policy* [UFP] – *Quality Assurance Project Plan* [QAPP] *Longhorn Army Ammunition Plant* which is in Appendix C of the *Final Installation-Wide Work Plan for Longhorn Army Ammunition Plant Karnack, Texas* (Bhate, May 2018).

1.1 Intended Use of Data

The objective of sampling at the GWTP is to monitor effluent streams to confirm compliance with discharge limits.

Analyses performed include:

- SW6850 – Perchlorate
- E350.3/SM4500 NH3 – Nitrogen, Ammonia
- E365.3/SM4500 P – Orthophosphate
- E415.1/SM5310 – Total Organic Carbon
- SW8260C - Volatiles
- SW8270D Selected Ion Monitoring (SIM) - 1,4-Dioxane
- SW6020A/7470A – Metals
- SW9056A – Chloride (Cl) and Sulfate (SO_4)
- SW7196A – Hexavalent Chromium
- E410.4 – Chemical Oxygen Demand
- E1664A – Oil and Grease
- TO-15 – Volatiles in Air

Table 1 lists the sample identification (ID) numbers and their associated laboratory package.

Table 2 lists qualified results with the qualification flag and reason code.

The following narrative is a brief synopsis of data that required qualification due to quality control discrepancies.

1.2 Preservation and Holding Times

Sample identification data were evaluated for agreement with the chain-of-custody (CoC). All samples were received in appropriate containers, within the proper temperature range, in good condition, and within the required hold time.

1.3 Calibrations

All analytes reported must be present in the initial and continuing calibration. The calibrations must meet the acceptance criteria specified in Worksheet 24 (Analytical Instrument Calibration) of the QAPP. All results reported must be within the calibration range. Samples were diluted, if necessary, to bring analyte responses within the calibration range.

1.3.1 Continuing Calibration Verifications

The calibrations must meet the following criteria otherwise the compound is qualified J or UJ: The continuing calibration verification (CCV) criteria are 20 percent difference (%D) for VOCs and SVOCs and 50% for closing CCVs. Metals and general chemistry are 10%D; perchlorate is 15%D; and volatiles in air are 30%D.

1.3.1.1 SW8260

GWTP sample LH18/24-SP140_062018 and Site LHAAP 18/24 samples C01_062018, C09_062018, C06_062018, MW6_0620218, 130_062118, MW9_062118, 18CPTMW10DW_062118, 18CPTMW10SW_062118, AWD3_061818, MW7_061818, 18CPTMW12DW_061818, 18CPTMW12SW_061818, MW13_061818, C02_061818, ICT2_062818, ICT4_062818, ICT7_062818, ICT8_062818, ICT8_062818_a, ICT13B_062818, ICT13B_062818_a, ICT13D_062818, ICT13E_062818, ICT13F_062818, and ICT14C_062818 reported naphthalene outside calibration criteria. Naphthalene was qualified as estimated non-detected, “UJ”, in the aforementioned samples. Additionally, 1,2-dibromo-3-chloropropane was reported outside calibration range for samples ICT2_062818, ICT4_062818, ICT7_062818, ICT8_062818, ICT8_062818_a, ICT13B_062818, ICT13B_062818_a, ICT13D_062818, ICT13E_062818, ICT13F_062818, and ICT14C_062818 and were qualified as “UJ”.

1.4 Blanks

If the analyte result for an associated sample was less than 5X (10X for common laboratory contaminants) the analyte concentration in the blank, that result was qualified as “UB” and considered an artifact of blank contamination. Where the sample result for the affected analyte was non-detect or greater than 5X the amount in the blank, no qualifier was applied.

1.4.1 SW6020

GWTP samples LH18/24-SP140_062018, LH18/24-SP650_062018, and Site LHAAP 18/24 samples 18CPTMW03SW_061118, C03_061118, 18WW03_061218, 18WW03_061218_a, C06_062018, MW6_0620218, MW9_062118, 18CPTMW12DW_061818, ICT4_062818, ICT11_062818, ICT13A_062818, and MW3_061418 reported aluminum at a concentration less than 5X the blank concentration. Also, AWD4_061918, 18WW02_061918, and 18WW14_061918 reported mercury less than 5X the blank concertation. These metals were qualified as “UB”.

1.5 Surrogates

Surrogates were evaluated using limits defined by each method in the project-specific QAPP Worksheet 28.

No surrogates were reported outside control limits.

1.6 Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

LCS/LCSD recoveries were evaluated using limits defined in the project-specific QAPP Worksheet 15.

All sample recoveries were within control limits.

1.7 Matrix Spike (MS)/Matrix Spike Duplicate Sample (MSD)

MS/MSD recoveries were evaluated using limits defined in Worksheet 15 of the project-specific QAPP. When sample results were greater than 4X the spike amount, control limits were not applicable and require no qualification. Furthermore, if a MS/MSD analyses was performed on a batched (unrelated) sample no qualification was made to the sample data. Otherwise, only the sample used for spiking requires qualification.

1.7.1 SW8260

The LHAAP 18/24 spike sample MW8_060518 reported bromobenzene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; and 1,4-dichlorobenzene outside MS and/or MSD control limits. These compounds were qualified as estimated non-detect, "UJ". Spike samples 18CPTMW22SW_061518 and 18CPTMW07_061418 reported multiple compounds outside control limits. These compounds were qualified as estimated, "J/UJ". Sample 18WW19_061918 reported hexachlorobutadiene below control limits for the MSD recovery and was qualified "UJ". Its field duplicate was also impacted and qualified as "UJ" for hexachlorobutadiene. Sample ICT7_062818 reported bromomethane below MS recovery and outside relative percent difference (RPD) limits and was qualified "UJ". Sample ICT14C_062818 reported low MS/MSD recoveries of cis-1,2-dichloroethene; methylene chloride; and trichloroethene. These detected compounds were qualified as estimated, "J". Sample MW22_060718 reported 1,2,4-trimethylbenzene; 1,2-dichlorobenzene; 1,3-dichlorobezene; 4-isopropyltoluene; bromobenzene; and sec-butylbenzene below MS and/or MSD control limits and were flagged "UJ".

1.7.2 SW6020

The LHAAP 18/24 spike sample MW21-060518 reported aluminum outside MS/MSD control limits and was qualified as estimated, "J". The field duplicate collected along with this sample was also influenced and qualified estimated "J" for aluminum. Sample MW22_060718 reported chromium below MSD recovery limits and was flagged "J".

1.7.3 SW6850

The LHAAP 18/24 spike samples MW8_060518, MW22_060718 and ICT14C_062818 reported perchlorate above MS/MSD recovery limits. These detections were qualified as estimated, "J".

1.8 Internal Standards

If the %R for an internal standard in a sample is not within the limit, the associated sample is qualified for those analytes associated with the internal standard(s) outside of the limit.

Internal standards were within acceptance criteria for the associated compounds.

1.9 Precision

Precision is the measure of variability of individual sample measurements. Evaluation of laboratory and/or field duplicates for precision was done using the RPD. The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD limits were set at <30% for groundwater and air matrices. Laboratory duplicate RPD limits were set at <25% for air matrices.

1.9.1 Laboratory Duplicate

The laboratory duplicate results for propene in air sample LH18/24-Air_053018_Downwind_South was above laboratory defined RPD limits and was qualified as estimated, "J".

1.9.2 Field Duplicate

The LHAAP 18/24 sample 18WW19_061918 and its duplicate reported aluminum outside control limits. Sample ICT8_062818 and its duplicate were outside the RPD limit for chromium, bromochloromethane, tetrachloroethene, cis-1,2-dichloroethene, and methylene chloride. Sample 18CPTMW15_060618 and its duplicate were outside RPD limits for benzene and 1,4-dioxane. These compounds were qualified as estimated, "J", in both parent sample and associated duplicate.

2 DATA USABILITY SUMMARY

The data are usable for the intended purposes of the project (Table 3). The data quality objectives have been met for the project.

Table 1: Field Sample Identification and Laboratory Packages

Client Sample ID	Lab Package	SW6850	E350.3	E365.3	E415.1	SW8270D SIM	SW8260C	SW6020A	SW9056A	SW7196A	E410.4	1664A	TO-15
GWTP Samples													
LH18/24-SP650_040418	HS18040240	X	X	X	X								
LH18/24-SP650_040418	HS18040244						X		X				
LH18/24-SP650_041118	HS18040597	X	X	X	X								
LH18/24-SP650_041118	HS18040595	X				X	X	X		X			
LH18/24-SP140_041118	HS18040596	X						X		X			
LH18/24-SP650_041818	HS18040991						X		X				
LH18/24-SP650_041818	HS18040989	X	X	X	X								
LH18/24-SP650_042518	HS18041331	X	X	X	X								
LH18/24-SP650_050318	HS18050260						X		X				
LH18/24-SP650_050318	HS18050220	X	X	X	X								
LH18/24-SP650_051718	HS18050925	X	X	X	X								
LH18/24-SP650_051718	HS18050932						X		X				
LH18/24-SP140_052418	HS18051255	X						X		X			
LH18/24-SP650_052418	HS18051257	X				X	X	X		X			
LH18/24-SP650_052418	HS18051260	X	X	X	X								
LH18/24-SP650_053018_Before IX	HS18051489	X											
LH18/24-SP650_053018_After IX	HS18051489	X											
LH18/24-SP650_053018	HS18051489		X	X	X								
LH18/24-SP650_053018	HS18051472						X		X				
LH18/24-SP650_060618	HS18060306	X				X	X	X		X			
LH18/24-SP140_060618	HS18060308	X						X		X			
LH18/24-SP650_060618	HS18060310	X	X	X	X								
LH18/24-SP650_061218	HS18060609	X											
LH18/24-SP650_061318	HS18060751						X		X				
LH18/24-SP650_061318	HS18060661	X	X	X	X								
LH18/24-SP650_061818	HS18060892	X											
LH18/24-SP140_062018	HS18061036	X				X	X	X	X		X	X	
LH18/24-SP650_062018	HS18061031	X	X	X	X								
LH18/24-SP650_062018	HS18061039	X				X	X	X	X		X	X	
LH18/24_SP650_062618	HS18061367	X											
LH18/24-SP650_062718	HS18061423		X	X	X								
LH18/24-SP650_062718	HS18061470						X		X				
Air Samples													
LH18/24-Air_052918_Stripper	P1802915												X
LH18/24-Air_052918_Stripper_Dup	P1802915												X
LH18/24-Air_052918_GWTP	P1802915												X
LH18/24-Air_053018_Downwind_South	P1802915												X
Site 18/24													
AWD1_061218	HS18060613					X							
AWD3_061818	HS18060954	X					X	X					
AWD4_061918	HS18060947	X				X	X	X					
18CPTMW01DW_060618	HS18060352	X				X	X	X					
18CPTMW01SW_060618	HS18060352	X				X	X	X					
18CPTMW03SW_061118	HS18060552	X				X	X	X					
18CPTMW04_060718	HS18060425	X				X	X						
18CPTMW04_060718_a	HS18060425	X				X	X						
18CPTMW04SW_060718	HS18060425	X				X	X	X					
18CPTMW06_060718	HS18060425	X				X	X						
18CPTMW07_061418	HS18060725	X				X	X						
18CPTMW08SW-060418	HS18060188	X				X	X						
18CPTMW08DW-060418	HS18060188	X				X	X						
18CPTMW10SW_062118	HS18061144	X				X	X						
18CPTMW10DW_062118	HS18061144	X					X	X					

Client Sample ID	Lab Package	SW6850	E350.3	E365.3	E415.1	SW8270D SIM	SW8260C	SW6020A	SW9056A	SW7196A	E410.4	1664A	TO-15
18CPTMW12SW_061818	HS18060954	X				X	X	X					
18CPTMW12DW_061818	HS18060954	X				X	X	X					
18CPTMW14_061318	HS18060669	X				X	X	X					
18CPTMW15_060618	HS18060352	X				X	X						
18CPTMW15_06062018_a	HS18060352	X				X	X						
18CPTMW16_061518	HS18060825	X				X							
18CPTMW18_061118	HS18060552	X				X	X	X					
18CPTMW19_061218	HS18060613	X				X	X						
18CPTMW19SW_061218	HS18060613	X				X	X	X					
18CPTMW22R_061518	HS18060825	X				X	X	X					
18CPTMW22SW_061518	HS18060825	X				X	X	X					
18CPTMW22DW_061518	HS18060825	X				X	X	X					
18CPTMW23-060418	HS18060188	X				X	X						
18CPTMW23SW-060418	HS18060188	X				X	X						
18CPTMW24_061318	HS18060669	X				X	X						
18CPTMW26SW_061418	HS18060725	X				X	X						
17WW08_061418	HS18060725	X					X	X					
18WW02_061918	HS18060947	X				X	X	X					
18WW03_061218	HS18060613	X				X	X	X					
18WW03_061218_a	HS18060613	X				X	X	X					
18WW06_061918	HS18060947	X				X	X						
18WW08_060718	HS18060425	X				X	X						
18WW09_060718	HS18060425	X				X		X					
18WW14_061918	HS18060947	X						X					
18WW17_060618	HS18060352	X					X	X					
18WW18_060618	HS18060352	X				X	X	X					
18WW19_061918	HS18060947	X					X	X					
18WW19_061918_a	HS18060947	X					X	X					
18WW20_061918	HS18060947	X				X	X	X					
18WW22_061118	HS18060552	X				X	X	X					
18WW24_060418	HS18060188	X					X	X					
18WW25_060418	HS18060188	X				X	X	X					
C01_062018	HS18061144	X					X						
C02_061818	HS18060954	X				X	X						
C03_061118	HS18060552	X				X	X	X					
C04_060618	HS18060352	X					X						
C06_062018	HS18061144	X					X	X					
C08_061318	HS18060669	X				X	X						
C09_062018	HS18061144	X					X	X					
MW1_061118	HS18060552	X					X	X					
MW1_061118_a	HS18060552	X					X	X					
MW2_060618	HS18060352	X				X	X						
MW3_061418	HS18060725	X					X	X					
MW5_060418	HS18060188	X				X	X						
MW6_0620218	HS18061144	X					X	X					
MW7_061818	HS18060954	X				X	X						
MW8_060518	HS18060281	X				X	X						
MW9_062118	HS18061144	X				X	X	X					
MW10_061118	HS18060552	X				X	X						
MW12_061318	HS18060669	X					X						
MW12_061318_a	HS18060669	X					X						
MW13_061818	HS18060954	X					X	X					
MW14_061218	HS18060613	X				X	X	X					
MW16_061318	HS18060669	X				X	X						
MW17_061818	HS18060954	X				X							
MW18_060718	HS18060425	X					X						
MW19_061418	HS18060725	X					X	X					
MW20_061518	HS18060825	X					X	X					

Client Sample ID	Lab Package	SW6850	E350.3	E365.3	E415.1	SW8270D SIM	SW8260C	SW6020A	SW9056A	SW7196A	E410.4	1664A	TO-15
MW21-060518	HS18060281	X				X	X	X					
MW21-060518-a	HS18060281	X				X	X	X					
MW22_060718	HS18060425	X					X	X					
MW23_061118	HS18060552	X					X						
102_061318	HS18060669	X					X	X					
109_061418	HS18060725	X				X	X						
120_061418	HS18060725	X				X	X						
123_061418	HS18060725	X				X	X						
126_061518	HS18060825	X				X	X	X					
126_061518_a	HS18060825	X				X	X	X					
129_061418	HS18060725	X				X	X	X					
130_062118	HS18061144	X					X	X					
ICT2_062818	HS18061493	X					X	X					
ICT4_062818	HS18061493	X					X	X					
ICT7_062818	HS18061493	X					X	X					
ICT8_062818	HS18061493	X					X	X					
ICT8_062818_a	HS18061493	X					X	X					
ICT11_062818	HS18061493	X					X	X					
ICT12B_062818	HS18061493	X					X	X					
ICT12C_062818	HS18061493	X					X	X					
ICT12D_062818	HS18061493	X					X	X					
ICT12E_062818	HS18061493	X					X	X					
ICT13A_062818	HS18061493	X					X	X					
ICT13B_062818	HS18061493	X					X	X					
ICT13B_062818_a	HS18061493	X					X	X					
ICT13D_062818	HS18061493	X					X	X					
ICT13E_062818	HS18061493	X					X	X					
ICT13F_062818	HS18061493	X					X	X					
ICT14B_062818	HS18061493	X					X	X					
ICT14C_062818	HS18061493	X					X	X					
ICT14D_062818	HS18061493	X					X	X					

Notes:
MW – Monitoring Well
SM – Standard Method
SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
E – U.S. Environmental Protection Agency Method
HS – Houston
ICT – Interceptor Collection Trench

Table 2: Qualified Analytical Data

Client Sample ID Laboratory	Laboratory Package	Analyte Name	Data Validation Qualifier	Reason for Qualification
GWTP				
LH18/24-Air_053018_Downwind_South	P1802915	Propene	4.8 J	LD RPD
LH18/24-SP140_062018	HS18061036	Aluminum Naphthalene	0.0160 UB < 10 UJ	MB CCV
LH18/24-SP650_062018	HS18061039	Aluminum	0.0170 UB	MB
LHAAP 18/24				
MW8_060518	HS18060281	Bromobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Perchlorate	< 0.5 UJ < 0.5 UJ < 0.5 UJ < 0.5 UJ 8800 J	MS/MSD MS MS MS MS/MSD
MW21-060518	HS18060281	Aluminum	0.0426 J	MS/MSD

Client Sample ID Laboratory	Laboratory Package	Analyte Name	Data Validation Qualifier	Reason for Qualification
MW21-060518-a	HS18060281	Aluminum	0.0406 J	MS/MSD
18CPTMW03SW_061118	HS18060552	Aluminum	0.0131 UB	MB
C03_061118	HS18060552	Aluminum	0.00810 UB	MB
18WW03_061218	HS18060613	Aluminum	0.0100 UB	MB
18WW03_061218_a	HS18060613	Aluminum	0.0103 UB	MB
C01_062018	HS18061144	Naphthalene	< 0.5 UJ	CCV
C09_062018	HS18061144	Naphthalene	< 0.5 UJ	CCV
C06_062018	HS18061144	Naphthalene Aluminum	< 0.5 UJ 0.0181 UB	CCV MB
MW6_062018	HS18061144	Naphthalene Aluminum	< 0.5 UJ 0.0103 UB	CCV MB
130_062118	HS18061144	Naphthalene	< 0.5 UJ	CCV
MW9_062118	HS18061144	Naphthalene Aluminum	< 0.5 UJ 0.0221 UB	CCV MB
18CPTMW10DW_062118	HS18061144	Naphthalene	< 0.5 UJ	CCV
18CPTMW10SW_062118	HS18061144	Naphthalene	< 0.5 UJ	CCV
AWD3_061818	HS18060954	Naphthalene	< 0.5 UJ	CCV
MW7_061818	HS18060954	Naphthalene	< 0.5 UJ	CCV
18CPTMW12DW_061818	HS18060954	Naphthalene Aluminum	< 0.5 UJ 0.0124 UB	CCV MB
18CPTMW12SW_061818	HS18060954	Naphthalene	< 0.5 UJ	CCV
MW13_061818	HS18060954	Naphthalene	< 0.5 UJ	CCV
C02_061818	HS18060954	Naphthalene	< 0.5 UJ	CCV
18CPTMW22SW_061518	HS18060825	51 non detect volatile compounds Trichloroethene	UJ 2.0 J	MS/MSD MS/MSD
18WW19_061918	HS18060947	Hexachlorobutadiene Aluminum	0.5 UJ 0.592 J	MSD FD RPD
18WW19_061918_a	HS18060947	Hexachlorobutadiene Aluminum	0.5 UJ 0.836 J	MSD FD RPD
AWD4_061918	HS18060947	Mercury	0.0000930 UB	MB
18WW02_061918	HS18060947	Mercury	0.0000600 UB	MB
18WW14_061918	HS18060947	Mercury	0.0000410 UB	MB
ICT2_062818	HS18061493	Naphthalene 1,2-Dibromo-3-chloropropane	< 0.5 UJ < 0.5 UJ	CCV CCV
ICT4_062818	HS18061493	Naphthalene 1,2-Dibromo-3-chloropropane Aluminum	< 12 UJ < 12 UJ 0.00509 UB	CCV CCV MB
ICT7_062818	HS18061493	Naphthalene 1,2-Dibromo-3-chloropropane Bromomethane	< 0.5 UJ < 0.5 UJ < 0.5 UJ	CCV CCV MS/RPD
ICT8_062818	HS18061493	Naphthalene 1,2-Dibromo-3-chloropropane Chromium Bromochloromethane cis-1,2-Dichloroethene Methylene chloride	< 50 UJ < 50 UJ 0.000861 J 270 J 17,000 J 100,000 J	CCV CCV FD RPD FD RPD FD RPD FD RPD
ICT8_062818_a	HS18061493	Naphthalene 1,2-Dibromo-3-chloropropane Chromium Bromochloromethane cis-1,2-Dichloroethene Methylene chloride	< 50 UJ < 50 UJ 0.00155 J 87 J 10,000 J 56,000 J	CCV CCV FD RPD FD RPD FD RPD FD RPD
ICT11_062818	HS18061493	Aluminum	0.00386 UB	MB
ICT13A_062818	HS18061493	Aluminum	0.00923 UB	MB
ICT13B_062818	HS18061493	Naphthalene 1,2-Dibromo-3-chloropropane	< 0.5 UJ < 0.5 UJ	CCV CCV
ICT13B_062818_a	HS18061493	Naphthalene 1,2-Dibromo-3-chloropropane	< 0.5 UJ < 0.5 UJ	CCV CCV
ICT13D_062818	HS18061493	Naphthalene 1,2-Dibromo-3-chloropropane	< 0.5 UJ < 0.5 UJ	CCV CCV

Client Sample ID Laboratory	Laboratory Package	Analyte Name	Data Validation Qualifier	Reason for Qualification
ICT13E_062818	HS18061493	Naphthalene	< 0.5 UJ	CCV
		1,2-Dibromo-3-chloropropane	< 0.5 UJ	CCV
ICT13F_062818	HS18061493	Naphthalene	< 0.5 UJ	CCV
		1,2-Dibromo-3-chloropropane	< 0.5 UJ	CCV
ICT14C_062818	HS18061493	Naphthalene	< 12 UJ	CCV
		1,2-Dibromo-3-chloropropane	< 12 UJ	CCV
		cis-1,2-Dichloroethene	2,900 J	MS/MSD
		Methylene chloride	7,000 J	MS/MSD
		Trichloroethene	1,800 J	MS/MSD
		Perchlorate	710 J	MS/MSD
18CPTMW15_060618	HS18060352	Benzene	3.3 J	FD RPD
		1,4-Dioxane	0.065 J	FD RPD
18CPTMW15_060618_a	HS18060352	Benzene	1.4 J	FD RPD
		1,4-Dioxane	0.031 J	FD RPD
MW22_060718	HS18060425	1,2,4-Trimethylbenzene	< 0.5 UJ	MS
		1,2-Dichlorobenzene	< 0.5 UJ	MS
		1,3-Dichlorobenzene	< 0.5 UJ	MS/MSD
		4-Isopropyltoluene	< 0.5 UJ	MS
		Bromobenzene	< 0.5 UJ	MS/MSD
		sec-Butylbenzene	< 0.5 UJ	MS/MSD
		Chromium	0.181 J	MSD
		Perchlorate	66 J	MS/MSD
MW3_061418	HS18060725	Aluminum	0.00590 UB	MB
18CPTMW07_061418	HS18060725	50 Volatiles	UJ	MS/MSD

Notes:
J – Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
(FD)(LD) RPD – (Field Duplicate)(Lab duplicate) Relative Percent Difference outside control limits
MB – Method Blank contamination
CCV – Continuing calibration verification percent recovery outside control limits
MS/MSD – Matrix spike/Matrix spike duplicate outside control limits

Table 3: Completeness by Method

Method	No. of Rejected Results	% Completeness
SW6850	0	100
E350.1	0	100
E365.2	0	100
E415.1	0	100
SW8270D	0	100
SW8260B	0	100
SW6020A	0	100
SW9056	0	100
SW7196A	0	100
E410.4	0	100
E1664	0	100
TO-15	0	100

APPENDIX I
AIR MONITORING DATA – 2ND QUARTER 2018

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ATTACHMENT 1: AIR MONITORING CALCULATIONS

Table 1. Ambient Air Data - May 2018
Longhorn Army Ammunition Plant
Groundwater Treatment Plant

Pollutant	CAS #	Short Term ESL March 2012	AMCVs (ST Health)	GWTP Ambient Air Concentrations (1)		Status (3)	Downwind Ambient Air Concentrations (2)		Status (3)
		µg/m^3	µg/m^3	µg/m^3			µg/m^3		
1,1-Dichloroethane	75-34-3	4,000	4,047	0.85	U	PASS	1.00	U	PASS
1,1-Dichloroethene	75-35-4	210	714	0.89	U	PASS	1.00	U	PASS
1,2-Dichloroethane	107-06-2	160	162	0.89	U	PASS	1.00	U	PASS
Acetone	67-64-1	5,900	NA	**10**		PASS	**73.0**		PASS
Benzene	71-43-2	170	575	0.89	U	PASS	**2.90**		PASS
Carbon disulfide	75-15-0	30	NA	8.9	U	PASS	10.0	U	PASS
Chloroform	67-66-3	100	98	0.89	U	PASS	1.00	U	PASS
cis-1,2-Dichloroethene	156-59-2	7,900	NA	**16**		PASS	1.00	U	PASS
Methylene chloride	75-09-2	3,600	12,158	**1.60**		PASS	1.00	U	PASS
Tetrachloroethene	127-18-4	2,000	6,782	0.89	U	PASS	1.00	U	PASS
trans-1,2-Dichloroethene	156-60-5	7,900	NA	0.90	U	PASS	1.10	U	PASS
Trichloroethene	79-01-6	540	537	**48.0**		PASS	**2.50**		PASS
Vinyl chloride	75-01-4	20,000	66,460	0.87	U	PASS	1.00	U	PASS
n-Hexane	110-54-3	5,300	6,336	0.89	U	PASS	**11.00**		PASS
Styrene	100-42-5	110	21,725	0.89	U	PASS	**2.50**		PASS
Toluene	108-88-3	640	15,074	0.89	U	PASS	**23.00**		PASS
Ethylbenzene	100-41-4	740	86,844	0.89	U	PASS	**5.30**		PASS
m,p-Xylenes	179601-23-1	180	7,382	1.8	U	PASS	**17.0**		PASS
o-Xylene	95-47-6	1,600	7,382	0.89	U	PASS	**5.10**		PASS
1,3-Dichlorobenzene	541-73-1	720	NA	0.90	U	PASS	1.10	U	PASS
Propene (C3 H6)	115-07-1	Asphyxiant	Asphyxiant	0.87	U	NA	**4.80**	J	NA
Dichlorodifluoromethane (CCl2F2)	75-71-8	50,000	49,452	**2.3**		PASS	**26.0**		PASS
Ethanol	64-17-5	18,800	NA	8.9	U	PASS	**94.0**		PASS
Trichlorofluoromethane (CCl3F)	75-69-4	28,000	56,184	**1.3**		PASS	**21**		PASS
Trichlorotrifluoroethane (C2Cl3F3)	76-13-1	38,000	NA	**83**		PASS	**3.5**		PASS
alpha-Pinene	80-56-8	60	3,499	**1.40**		PASS	**6.30**		PASS
d-Limonene	5989-27-5	1,100	NA	0.84	U	PASS	**2.70**		PASS

Notes:

(1) Sample collected over an 8-hour period on May 29, 2018, between 8 AM and 4 PM

(2) Sample collected over a 24-hour period beginning on May 29, 2018, at 6:30 AM and ending on May 30, 2018 at 6:30 AM

(3) Status based on comparison of air sample result to Air Monitoring Comparison Values (AMCVs). When there is no AMCV value for a chemical, the air sample concentration is compared to the short-term Effects Screening Level (ESL).

CAS # = Chemcial Abstracts Service Number

GWTP = Groundwater Treatment Plant

J = estiamted value

U = non-detect

µg/m^3 = micrograms per cubic meter

Table 2. Emission Stack Air Data - May 2018
Longhorn Army Ammunition Plant
Groundwater Treatment Plant

Pollutant	CAS #	Measured Air Stripper Stack Concentrations (1)		Air Stripper Emission Rates (2)		Air Stripper Emission Rates (2a)		Allowable Annual Emission (3)	Status (4)	TLV (L)	TLV Reference	Compliance section	Distance Downwind to nearest off-site Receptor (D)	(K) conversion value	Allowable Maximum Hourly Emission Limit at Nearest off-site Receptor [6][7] (E) = L/K	Status (8)
		µg/m^3		lb/hr		tpy		tpy		mg/m^3			feet		lb/hr	
1,1-Dichloroethane	75-34-3	110	U	9.02E-04	U	5.86E-04	U	5	PASS	405	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
1,1-Dichloroethene	75-35-4	**310**		5.08E-03		3.30E-03		5	PASS	20	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.4	PASS
1,2-Dichloroethane	107-06-2	**370**		6.07E-03		3.94E-03		5	PASS	40	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	2.9	PASS
Acetone	67-64-1	2,300	U	1.89E-02	U	1.23E-02	U	5	PASS	590	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Benzene	71-43-2	230	U	1.89E-03	U	1.23E-03	U	5	PASS	3	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	0.21	PASS
Carbon disulfide	75-15-0	2,300	U	1.89E-02	U	1.23E-02	U	5	PASS	31	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	2.2	PASS
Chloroform	67-66-3	230	U	1.89E-03	U	1.23E-03	U	5	PASS	10	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	0.71	PASS
cis-1,2-Dichloroethene	156-59-2	**21,000**		3.44E-01		2.24E-01		5	PASS	793	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Methylene chloride	75-09-2	**1,400**		2.30E-02		1.49E-02		5	PASS	26	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.9	PASS
Tetrachloroethene	127-18-4	**250**		4.10E-03		2.66E-03		5	PASS	33.5	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	2.4	PASS
trans-1,2-Dichloroethene	156-60-5	230	U	1.89E-03	U	1.23E-03	U	5	PASS	793	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Trichloroethene	79-01-6	**38,000**		6.23E-01		4.05E-01		5	PASS	135	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	6.0	PASS
Vinyl chloride	75-01-4	220	U	1.80E-03	U	1.17E-03	U	5	PASS	2	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	0.14	PASS
n-Hexane	110-54-3	230	U	1.89E-03	U	1.23E-03	U	5	PASS	1,800	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Styrene	100-42-5	230	U	1.89E-03	U	1.23E-03	U	5	PASS	21	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.5	PASS
Toluene	108-88-3	230	U	1.89E-03	U	1.23E-03	U	5	PASS	188	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	6.0	PASS
Ethylbenzene	100-41-4	230	U	1.89E-03	U	1.23E-03	U	5	PASS	434	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
m,p-Xylenes	179601-23-1	470	U	3.85E-03	U	2.50E-03	U	5	PASS	434	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
o-Xylene	95-47-6	230	U	1.89E-03	U	1.23E-03	U	5	PASS	434	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
1,3-Dichlorobenzene	541-73-1	230	U	1.89E-03	U	1.23E-03	U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2,000	14	1.0	PASS
Propene (C3 H6)	115-07-1	220	U	1.80E-03	U	1.17E-03	U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2,000	14	6.0	PASS
Dichlorodifluoromethane (CCl2F2)	75-71-8	220	U	1.80E-03	U	1.17E-03	U	5	PASS	4,950	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Ethanol	64-17-5	2,300	U	1.89E-02	U	1.23E-02	U	5	PASS	1,880	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Trichlorofluoromethane (CCl3F)	75-69-4	230	U	1.89E-03	U	1.23E-03	U	5	PASS	5,620	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Trichlorotrifluoroethane (C2Cl3F3)	76-13-1	**28,000**		4.59E-01		2.98E-01		5	PASS	7,670	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
alpha-Pinene	80-56-8	220	U	1.80E-03	U	1.17E-03	U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2,000	14	1.0	PASS
d-Limonene	5989-27-5	220	U	1.80E-03	U	1.17E-03	U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2,000	14	1.0	PASS
		TOTAL		1.554												

Notes:

(1) Sample collected on May 29, 2018. The higher value of the sample or duplicate is reported.

(2) Based on a blower flow rate of 4,390 cubic feet per minute (cfm). Note that plant operations is less than or equal to 25 hours per week. 1/2 of detection limit was used for estimating mass rate

(2a) Based on operation of 25 hours per week, 52 weeks per year.

(3) Per 30TAC 106.533(f)(1)(B)

(4) Based on comparing the calculated air stripper stack sample emission rate in tons per year (tpy) to the allowable annual emission limit per chemical of 5 tpy.

(5) No Threshold Limit Values (TLVs) for these chemicals

(6) The maximum hourly limit allowed by 30 Texas Administrative Code (TAC) 106.262, per pollutant, is 6 pounds per hour (lb/hr) per "Figure 1: 30 TAC 106.262(a)". The E value was overridden with 6 lb/hr when the calculated E was higher.

(7) The maximum hourly emission rate allowed by 30 TAC 106.261(a)(3) for chemicals with a limit value (L) greater than 200 mg/m^3 is 1 lb/hr.

(8) Based on comparing the calculated air stripper stack sample emission rate in lb/hr to the allowable maximum emission limit per chemical based on distance downwind to nearest off-site receptor.

CAS # = Chemical Abstracts Service Number

mg/m^3 = milligrams per cubic meter

µg/m^3 = micrograms per cubic meter

U = non-detect

ATTACHMENT 2: PID READINGS AND CALIBRATION LOGS

Table 3. PID Readings for 2nd Quarter 2018
Longhorn Army Ammunition Plant
Groundwater Treatment Plant

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
4/2/2018	8:00	Outside GWTP Office	4369 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 56 degrees
4/2/2018	8:00	Downwind	4369 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 56 degrees
4/2/2018	8:00	Stripper	4369 ACFM	MiniRAE 3000	Kennie Moore	Max. 20.2 ppm Steady State 5.4 ppm	Clear 56 degrees
4/2/2018	14:00	Outside GWTP Office	3870 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 76 degrees
4/2/2018	14:00	Downwind	3870 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 76 degrees
4/2/2018	14:00	Stripper	3870 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.9 ppm Steady State 6.3 ppm	Clear 76 degrees
4/5/2018	8:00	Outside GWTP Office	4601 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 44 degrees
4/5/2018	8:00	Downwind	4601 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 44 degrees
4/5/2018	8:00	Stripper	4601 ACFM	MiniRAE 3000	Kennie Moore	Max. 21.7 ppm Steady State 5.5 ppm	Clear 44 degrees
4/5/2018	12:00	Outside GWTP Office	4420 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 59 degrees
4/5/2018	12:00	Downwind	4420 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 59 degrees
4/5/2018	12:00	Stripper	4420 ACFM	MiniRAE 3000	Scott Beesinger	Max. 18.3 ppm Steady State 3.9 ppm	Cloudy 59 degrees
4/9/2018	8:00	Outside GWTP Office	4514 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 50 degrees
4/9/2018	8:00	Downwind	4514 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 50 degrees
4/9/2018	8:00	Stripper	4514 ACFM	MiniRAE 3000	Kennie Moore	Max. 21.9 ppm Steady State 7.4 ppm	Clear 50 degrees
4/9/2018	14:00	Outside GWTP Office	3862 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 66 degrees
4/9/2018	14:00	Downwind	3862 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 66 degrees
4/9/2018	14:00	Stripper	3862 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.0 ppm Steady State 5.2 ppm	Clear 66 degrees
4/12/2018	8:00	Outside GWTP Office	4494 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 57 degrees
4/12/2018	8:00	Downwind	4494 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 57 degrees
4/12/2018	8:00	Stripper	4494 ACFM	MiniRAE 3000	Kennie Moore	Max. 17.3 ppm Steady State 3.4 ppm	Clear 57 degrees
4/12/2018	11:00	Outside GWTP Office	3851 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 70 degrees
4/12/2018	11:00	Downwind	3851 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 70 degrees
4/12/2018	11:00	Stripper	3851 ACFM	MiniRAE 3000	Scott Beesinger	Max. 19.9 ppm Steady State 5.1 ppm	Clear 70 degrees
4/16/2018	8:00	Outside GWTP Office	4217 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 41 degrees
4/16/2018	8:00	Downwind	4217 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 41 degrees
4/16/2018	8:00	Stripper	4217 ACFM	MiniRAE 3000	Kennie Moore	Max. 22.7 ppm Steady State 6.9 ppm	Clear 41 degrees
4/16/2018	14:00	Outside GWTP Office	3611 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 70 degrees
4/16/2018	14:00	Downwind	3611 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 70 degrees
4/16/2018	14:00	Stripper	3611 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.1 ppm Steady State 5.5 ppm	Clear 70 degrees
4/19/2018	9:00	Outside GWTP Office	4122 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 54 degrees
4/19/2018	9:00	Downwind	4122 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 54 degrees
4/19/2018	9:00	Stripper	4122 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.6 ppm Steady State 3.4 ppm	Clear 54 degrees
4/19/2018	14:00	Outside GWTP Office	3761 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 67 degrees
4/19/2018	14:00	Downwind	3761 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 67 degrees
4/19/2018	14:00	Stripper	3761 ACFM	MiniRAE 3000	Scott Beesinger	Max. 21.1 ppm Steady State 4.7 ppm	Clear 67 degrees

Table 3. PID Readings for 2nd Quarter 2018
Longhorn Army Ammunition Plant
Groundwater Treatment Plant

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
4/23/2018	8:00	Outside GWTP Office	4237 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 52 degrees
4/23/2018	8:00	Downwind	4237 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 52 degrees
4/23/2018	8:00	Stripper	4237 ACFM	MiniRAE 3000	Kennie Moore	Max. 22.6 ppm Steady State 7.2 ppm	Cloudy 52 degrees
4/23/2018	14:00	Outside GWTP Office	4151 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 65 degrees
4/23/2018	14:00	Downwind	4151 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 65 degrees
4/23/2018	14:00	Stripper	4151 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.3 ppm Steady State 6.5 ppm	Cloudy 65 degrees
4/26/2018	8:00	Outside GWTP Office	4432 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 46 degrees
4/26/2018	8:00	Downwind	4432 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 46 degrees
4/26/2018	8:00	Stripper	4432 ACFM	MiniRAE 3000	Kennie Moore	Max. 23.3 ppm Steady State 8.2 ppm	Clear 46 degrees
4/26/2018	13:30	Outside GWTP Office	4011 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 66 degrees
4/26/2018	13:30	Downwind	4011 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 66 degrees
4/26/2018	13:30	Stripper	4011 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.7 ppm Steady State 7.7 ppm	Clear 66 degrees
4/30/2018	8:00	Outside GWTP Office	4138 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 58 degrees
4/30/2018	8:00	Downwind	4138 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 58 degrees
4/30/2018	8:00	Stripper	4138 ACFM	MiniRAE 3000	Kennie Moore	Max. 22.2 ppm Steady State 6.5 ppm	Clear 58 degrees
4/30/2018	14:00	Outside GWTP Office	3819 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 82 degrees
4/30/2018	14:00	Downwind	3819 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 82 degrees
4/30/2018	14:00	Stripper	3819 ACFM	MiniRAE 3000	Scott Beesinger	Max. 23.8 ppm Steady State 7.3 ppm	Clear 82 degrees
5/7/2018	8:00	Outside GWTP Office	4155 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 66 degrees
5/7/2018	8:00	Downwind	4155 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 66 degrees
5/7/2018	8:00	Stripper	4155 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.6 ppm Steady State 7.2 ppm	Clear 66 degrees
5/7/2018	14:00	Outside GWTP Office	3606 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 88 degrees
5/7/2018	14:00	Downwind	3606 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 88 degrees
5/7/2018	14:00	Stripper	3606 ACFM	MiniRAE 3000	Kennie Moore	Max. 21.5 ppm Steady State 7.9 ppm	Clear 88 degrees
5/16/2018	11:00	Outside GWTP Office	4223 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 86 degrees
5/16/2018	11:00	Downwind	4223 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 86 degrees
5/16/2018	11:00	Stripper	4223 ACFM	MiniRAE 3000	Kennie Moore	Max. 22.9 ppm Steady State 5.6 ppm	Clear 86 degrees
5/16/2018	15:00	Outside GWTP Office	4157 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 89 degrees
5/16/2018	15:00	Downwind	4157 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 89 degrees
5/16/2018	15:00	Stripper	4157 ACFM	MiniRAE 3000	Kennie Moore	Max. 20.1 ppm Steady State 4.3 ppm	Clear 89 degrees
5/21/2018	8:00	Outside GWTP Office	4425 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 73 degrees
5/21/2018	8:00	Downwind	4425 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 73 degrees
5/21/2018	8:00	Stripper	4425 ACFM	MiniRAE 3000	Kennie Moore	Max. 20.6 ppm Steady State 7.3 ppm	Clear 73 degrees
5/21/2018	14:00	Outside GWTP Office	4170 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 86 degrees
5/21/2018	14:00	Downwind	4170 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 86 degrees
5/21/2018	14:00	Stripper	4170 ACFM	MiniRAE 3000	Kennie Moore	Max.18.4 ppm Steady State 5.7 ppm	Clear 86 degrees

Table 3. PID Readings for 2nd Quarter 2018
Longhorn Army Ammunition Plant
Groundwater Treatment Plant

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
5/24/2018	8:00	Outside GWTP Office	4560 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 72 degrees
5/24/2018	8:00	Downwind	4560 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 72 degrees
5/24/2018	8:00	Stripper	4560 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.2 ppm Steady State 8.7 ppm	Clear 72 degrees
5/24/2018	11:30	Outside GWTP Office	4150 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 84 degrees
5/24/2018	11:30	Downwind	4150 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 84 degrees
5/24/2018	11:30	Stripper	4150 ACFM	MiniRAE 3000	Kennie Moore	Max.21.6 ppm Steady State 7.4 ppm	Clear 84 degrees
5/30/2018	8:00	Outside GWTP Office	4159 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 73 degrees
5/30/2018	8:00	Downwind	4159 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 73 degrees
5/30/2018	8:00	Stripper	4159 ACFM	MiniRAE 3000	Scott Beesinger	Max. 21.4 ppm Steady State 5.2 ppm	Clear 73 degrees
5/30/2018	14:00	Outside GWTP Office	4066 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 93 degrees
5/30/2018	14:00	Downwind	4066 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 93 degrees
5/30/2018	14:00	Stripper	4066 ACFM	MiniRAE 3000	Kennie Moore	Max.19.9 ppm Steady State 4.6 ppm	Clear 93 degrees
6/4/2018	8:00	Outside GWTP Office	4425 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 70 degrees
6/4/2018	8:00	Downwind	4425 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 70 degrees
6/4/2018	8:00	Stripper	4425 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.3 ppm Steady State 8.9 ppm	Clear 70 degrees
6/4/2018	14:00	Outside GWTP Office	4170 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 86 degrees
6/4/2018	14:00	Downwind	4170 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 86 degrees
6/4/2018	14:00	Stripper	4170 ACFM	MiniRAE 3000	Kennie Moore	Max.21.6 ppm Steady State 7.5 ppm	Clear 86 degrees
6/11/2018	8:00	Outside GWTP Office	4255 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 76 degrees
6/11/2018	8:00	Downwind	4255 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 76 degrees
6/11/2018	8:00	Stripper	4255 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.1 ppm Steady State 7.6 ppm	Clear 76 degrees
6/11/2018	14:00	Outside GWTP Office	4043 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 91 degrees
6/11/2018	14:00	Downwind	4043 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 91 degrees
6/11/2018	14:00	Stripper	4043 ACFM	MiniRAE 3000	Kennie Moore	Max.22.3 ppm Steady State 8.8 ppm	Clear 91 degrees
6/18/2018	8:00	Outside GWTP Office	4345 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 74 degrees
6/18/2018	8:00	Downwind	4345 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 74 degrees
6/18/2018	8:00	Stripper	4345 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.4 ppm Steady State 8.7 ppm	Clear 74 degrees
6/18/2018	14:00	Outside GWTP Office	4123 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 88 degrees
6/18/2018	14:00	Downwind	4123 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 88 degrees
6/18/2018	14:00	Stripper	4123 ACFM	MiniRAE 3000	Kennie Moore	Max. 22.1 ppm Steady State 6.9 ppm	Clear 88 degrees
6/26/2018	8:00	Outside GWTP Office	4168 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 76 degrees
6/26/2018	8:00	Downwind	4168 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 76 degrees
6/26/2018	8:00	Stripper	4168 ACFM	MiniRAE 3000	Scott Beesinger	Max. 21.4 ppm Steady State 6.3 ppm	Clear 76 degrees
6/26/2018	14:00	Outside GWTP Office	3862 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 93 degrees
6/26/2018	14:00	Downwind	3862 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 93 degrees
6/26/2018	14:00	Stripper	3862 ACFM	MiniRAE 3000	Kennie Moore	Max. 18.6 ppm Steady State 3.9 ppm	Clear 93 degrees

00905858

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/2/18 | Project Name: LHAAP - GWTP

Project Number: NW01312.0150 | Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 | Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0710	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905859

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/5/18 | Project Name: LHAAP - GWTP

Project Number: NWD 1312.0150 | Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 | Bulb: 10.6 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0720	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (Isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905860

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/9/18

Project Number: NWD 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.6 meV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0725	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905861

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/12/18

Project Number: NWD 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0715	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905862

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/16/18

Project Number: NWD 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesley/Geel

PID

Model: M.i. Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0715	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905863

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/19/18

Project Number: NWD 1312.8150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0730	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905864

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/23/18

Project Number: NWD 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0720	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905865

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/26/18 | Project Name: LHAAP - GWTP

Project Number: NW01312.0150 | Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 | Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0715	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (Isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905866

EQUIPMENT CALIBRATION DAILY LOG

Date: 4/30/18

Project Number: NW01312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.6 meV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0730	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (Isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905867

EQUIPMENT CALIBRATION DAILY LOG

Date: 5/7/18

Project Number: NWD 1312.8150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0710	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905868

EQUIPMENT CALIBRATION DAILY LOG

Date: 5/16/18

Project Number: NW0 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0725	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (Isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905869

EQUIPMENT CALIBRATION DAILY LOG

Date: 5/21/18 | Project Name: LHAAP - GWTP

Project Number: NW01312.0150 | Recorded By: Scott Beerslager

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model: Mini Rae 3000	Bulb: 10.7 eV					
	Equipment ID #: PGM7320						
	Parameter	Standard	Exp. Date	Lot #	Time: 0720	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
COMB. GAS/O_2 METER	Model:						
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

					Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
WATER QUALITY METER	Model:						
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905870

EQUIPMENT CALIBRATION DAILY LOG

Date: 5/24/18 | Project Name: LHAAP - GWTP

Project Number: NW01312.0150 | Recorded By: Scott Beesinger

PID

Model: M.E. Rae 3000 | Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0715	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.8-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905871

EQUIPMENT CALIBRATION DAILY LOG

Date: 5/29/18

Project Number: NWO 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beerstecker

PID

Model: M.i. Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0735	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905872

EQUIPMENT CALIBRATION DAILY LOG

Date: 6/4/18

Project Number: NWD 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0715	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (Isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905873

EQUIPMENT CALIBRATION DAILY LOG

Date: 6/11/18

Project Number: NWO 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beeslarger

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model: Mini Rae 3000		Bulb: 10.7 eV				
	Equipment ID #: PGM7320						
	Parameter	Standard	Exp. Date	Lot #	Time: 0745	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
COMB. GAS/O_2 METER	Model:						
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

					Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
WATER QUALITY METER	Model:						
	Equipment ID #:						
	Parameter	Standard	Exp. Date	Lot #	Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905874

EQUIPMENT CALIBRATION DAILY LOG

Date: 6/18/18

Project Number: NW01312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: MiniRae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0725	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

00905875

EQUIPMENT CALIBRATION DAILY LOG

Date: 6/26/18

Project Number: NWD 1312.0150

Project Name: LHAAP - GWTP

Recorded By: Scott Beesinger

PID

Model: Mini Rae 3000 Bulb: 10.7 eV

Equipment ID #: PGM7320

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time: 0715	Time:	Time:
					Initials: SB	Initials:	Initials:
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Value: To zero SB	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	100ppm (isobutylene)	2/6/19	CAP-248-100-4	Value: SB	Value:	Value:

COMB. GAS/O_2 METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration	O2 (%)				Value:	Value:	Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model:

Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
					Time:	Time:	Time:
					Initials:	Initials:	Initials:
First Point Calibration (Auto)	pH	4.00			Value:	Value:	Value:
	Conductivity (mS/cm)	4.49			Value:	Value:	Value:
	Turbidity (NTU)	0			Value:	Value:	Value:
	DO (mg/L)	8.9-9.1 (ambient air)	NA	NA	Value:	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	53.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

ATTACHMENT 3: AIR ANALYTICAL LABORATORY REPORT

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
T: +1 805 526 7161
F: +1 805 526 7270
www.alsglobal.com

LABORATORY REPORT

June 25, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Suite 129
Lakewood, CO 80228

RE: LHAAP-GWTP / NW01312.0150

Dear Marcia:

Enclosed are the results of the samples submitted to our laboratory on June 6, 2018. For your reference, these analyses have been assigned our service request number P1802915.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Kate Kaneko
By Kate Kaneko at 12:02 pm, 06/25/18

Kate Kaneko
Project Manager

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
T: +1 805 526 7161
F: +1 805 526 7270
www.alsglobal.com

Client: Bhate Environmental Associates, Inc. Service Request No: P1802915
Project: LHAAP-GWTP / NW01312.0150

CASE NARRATIVE

The samples were received intact under chain of custody on June 6, 2018 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Volatile Organic Compound Analysis

The samples were analyzed for volatile organic compounds in accordance with EPA Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition (EPA/625/R-96/010b), January, 1999. This procedure is described in laboratory SOP VOA-TO15. The analytical system was comprised of a gas chromatograph / mass spectrometer (GC/MS) interfaced to a whole-air preconcentrator. This method is included on the laboratory's NELAP and DoD-ELAP scope of accreditation. Any analytes flagged with an X are not included on the NELAP or DoD-ELAP accreditation.

The Relative Percent Difference (RPD) criterion was exceeded for the duplicate analysis of propene in the sample labeled "LH18/24-Air_05302018_Downwind_South." However, analyte concentrations close to the Method Reporting Limit (MRL) may not be subject to the same precision criteria as results derived from measurements higher in the calibration range for the method. The magnitude of error may increase as the concentrations get closer to the reporting limit, therefore the reported precision may be unrealistically large.

The containers were cleaned, prior to sampling, down to the method reporting limit (MRL) reported for this project. For projects requiring DoD QSM 5.1 compliance canisters were cleaned to <1/2 the MRL. Please note, projects which require reporting below the MRL could have results between the MRL and method detection limit (MDL) that are biased high.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
T: +1 805 526 7161
F: +1 805 526 7270
www.alsglobal.com

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
Arizona DHS	http://www.azdhs.gov/preparedness/state-laboratory/lab-licensure-certification/index.php#laboratory-licensure-home	AZ0694
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Louisiana DEQ (NELAP)	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	05071
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2016036
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	1347317
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-005
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
PJLA (DoD ELAP)	http://www.pjlabs.com/search-accredited-labs	65818 (Testing)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-17-8
Utah DOH (NELAP)	http://health.utah.gov/lab/environmental-lab-certification/	CA016272017-8
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Bhate Environmental Associates, Inc. Service Request: P1802915
Project ID: LHAAP-GWTP / NW01312.0150

Date Received: 6/6/2018
Time Received: 09:15

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	Container ID	Pi1 (psig)	Pfl (psig)	TO-15 - VOC Cans
LH18/24-Air_052918-Stripper	P1802915-001	Air	5/29/2018	14:00	SC01875	-0.39	3.62	X
LH18/24-Air_052918-Stripper-Dup	P1802915-002	Air	5/29/2018	14:00	SC02178	-0.42	3.66	X
LH18/24-Air_052918-GWTP	P1802915-003	Air	5/29/2018	14:15	AS00548	-3.63	3.79	X
LH18/24-Air_053018_Downwind_South	P1802915-004	Air	5/30/2018	06:30	AS00879	-5.38	3.76	X

00905881

Air - Chain of Custody Record & Analytical Service Request

Page 1 of 1

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10-Day-Standard

ALS Project No: P1805915

Company Name & Address (Reporting Information)	BHATE ENVIRONMENTAL 445 UNION BLVD. SUITE 129 LAKEWOOD, CO. 80228
Project Manager	Kim Nemmers
Phone	(205) 918-4000
Fax	
Email Address for Result Reporting	enolivie@bhate.com
Project Name	LHAAP- GWTP
Project Number	NW013I2.0150
P.O. # / Billing Information	BHATE ENVIRONMENTAL 445 UNION BLVD. SUITE 129 LAKEWOOD, CO. 80228
Sampler (Print & Sign)	Scott Beesinger
ALS Contact:	

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume	Analysis Method: TO-15		Comments e.g. Actual Preservative or specific instructions
LH18/24-AIR_052918-Stripper		5/29/18	1400	SC01875		-28	0	6L	✓		
LH18/24-AIR_052918-Stripper-Dup		5/29/18	1400	SC02178		-30	0	6L	✓		
LH18/24-AIR-052918-GWTP		5/29/18	1415	AS00548	FCR00321	-30	-6	6L	✓		
LH18/24-AIR-053018_Downwind South		5/30/18	0630	AS00879	FCA01042	-28	-9	6L	✓		

Report Tier Levels - please select

Tier I - Results (Default In not specified) _____ Tier III (Results + QC & Calibration Summaries) _____
Tier II (Results + QC Summaries _____ Tier IV (Date Validation Package) 10% Surcharge _____

EDD required YES / No
Type: _____ Units: _____

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature) Scott Beesinger	Date: 5/30/18	Time: 0700	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date: 6/6/18	Time: 0915

Cooler / Blank Temperature _____ °C

ALS Environmental
Sample Acceptance Check Form

Client: Bhate Environmental Associates, Inc. Work order: P1802915

Project: LHAAP-GWTP / NW01312.0150

Sample(s) received on: 6/6/18 Date opened: 6/6/18 by: ADAVID

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Did **sample containers** arrive in good condition?	☒	☐	☐
3	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
4	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
5	Was **sample volume** received adequate for analysis?	☒	☐	☐
6	Are samples within specified holding times?	☒	☐	☐
7	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☐	☐	☒
8	Were **custody seals** on outside of cooler/Box/Container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
9	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
10	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
11	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1802915-001.01	6.0 L Source Can					
P1802915-002.01	6.0 L Source Can					
P1802915-003.01	6.0 L Silonite Can					
P1802915-004.01	6.0 L Silonite Can					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-Stripper** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-001

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0030 Liter(s)
Test Notes:
Container ID: SC01875

Initial Pressure (psig): -0.39 Final Pressure (psig): 3.62

Container Dilution Factor: 1.28

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	220	ND	130	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	220	ND	45	
74-87-3	Chloromethane	ND	210	ND	100	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	220	ND	31	
75-01-4	Vinyl Chloride	ND	220	ND	87	
106-99-0	1,3-Butadiene	ND	230	ND	100	
74-83-9	Bromomethane	ND	210	ND	55	
75-00-3	Chloroethane	ND	220	ND	82	
64-17-5	Ethanol	ND	2,300	ND	1,200	
75-05-8	Acetonitrile	ND	230	ND	130	
107-02-8	Acrolein	ND	900	ND	390	
67-64-1	Acetone	ND	2,300	ND	950	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	230	ND	40	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	2,300	ND	920	
107-13-1	Acrylonitrile	ND	230	ND	100	
75-35-4	1,1-Dichloroethene	**290**	230	**74**	57	
75-09-2	Methylene Chloride	**1,400**	230	**400**	65	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	230	ND	72	
76-13-1	Trichlorotrifluoroethane (CFC 113)	**27,000**	230	**3,500**	30	
75-15-0	Carbon Disulfide	ND	2,300	ND	730	
156-60-5	trans-1,2-Dichloroethene	ND	230	ND	58	
75-34-3	1,1-Dichloroethane	ND	220	ND	54	
1634-04-4	Methyl tert-Butyl Ether	ND	230	ND	64	
108-05-4	Vinyl Acetate	ND	2,300	ND	640	
78-93-3	2-Butanone (MEK)	ND	2,300	ND	770	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-Stripper** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-001

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0030 Liter(s)
Test Notes:
Container ID: SC01875

Initial Pressure (psig): -0.39 Final Pressure (psig): 3.62

Container Dilution Factor: 1.28

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**20,000**	230	**5,100**	57	
141-78-6	Ethyl Acetate	ND	470	ND	130	
110-54-3	n-Hexane	ND	230	ND	64	
67-66-3	Chloroform	ND	230	ND	46	
109-99-9	Tetrahydrofuran (THF)	ND	230	ND	77	
107-06-2	1,2-Dichloroethane	**350**	230	**87**	56	
71-55-6	1,1,1-Trichloroethane	ND	230	ND	42	
71-43-2	Benzene	ND	230	ND	71	
56-23-5	Carbon Tetrachloride	ND	230	ND	36	
110-82-7	Cyclohexane	ND	470	ND	140	
78-87-5	1,2-Dichloropropane	ND	230	ND	49	
75-27-4	Bromodichloromethane	ND	230	ND	34	
79-01-6	Trichloroethene	**37,000**	230	**6,800**	42	
123-91-1	1,4-Dioxane	ND	230	ND	63	
80-62-6	Methyl Methacrylate	ND	470	ND	110	
142-82-5	n-Heptane	ND	230	ND	55	
10061-01-5	cis-1,3-Dichloropropene	ND	240	ND	53	
108-10-1	4-Methyl-2-pentanone	ND	230	ND	55	
10061-02-6	trans-1,3-Dichloropropene	ND	230	ND	50	
79-00-5	1,1,2-Trichloroethane	ND	230	ND	41	
108-88-3	Toluene	ND	230	ND	60	
591-78-6	2-Hexanone	ND	230	ND	55	
124-48-1	Dibromochloromethane	ND	230	ND	27	
106-93-4	1,2-Dibromoethane	ND	230	ND	29	
123-86-4	n-Butyl Acetate	ND	230	ND	48	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-Stripper** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-001

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0030 Liter(s)
Test Notes:
Container ID: SC01875

Initial Pressure (psig): -0.39 Final Pressure (psig): 3.62

Container Dilution Factor: 1.28

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	230	ND	48	
127-18-4	Tetrachloroethene	**250**	230	**36**	33	
108-90-7	Chlorobenzene	ND	230	ND	49	
100-41-4	Ethylbenzene	ND	230	ND	52	
179601-23-1	m,p-Xylenes	ND	470	ND	110	
75-25-2	Bromoform	ND	230	ND	22	
100-42-5	Styrene	ND	230	ND	53	
95-47-6	o-Xylene	ND	230	ND	52	
111-84-2	n-Nonane	ND	230	ND	43	
79-34-5	1,1,2,2-Tetrachloroethane	ND	230	ND	33	
98-82-8	Cumene	ND	230	ND	46	
80-56-8	alpha-Pinene	ND	220	ND	40	
103-65-1	n-Propylbenzene	ND	230	ND	46	
622-96-8	4-Ethyltoluene	ND	220	ND	45	
108-67-8	1,3,5-Trimethylbenzene	ND	220	ND	45	
95-63-6	1,2,4-Trimethylbenzene	ND	230	ND	46	
100-44-7	Benzyl Chloride	ND	470	ND	91	
541-73-1	1,3-Dichlorobenzene	ND	230	ND	38	
106-46-7	1,4-Dichlorobenzene	ND	230	ND	38	
95-50-1	1,2-Dichlorobenzene	ND	230	ND	38	
5989-27-5	d-Limonene	ND	210	ND	38	
96-12-8	1,2-Dibromo-3-chloropropane	ND	230	ND	23	
120-82-1	1,2,4-Trichlorobenzene	ND	230	ND	32	
91-20-3	Naphthalene	ND	230	ND	43	
87-68-3	Hexachlorobutadiene	ND	230	ND	21	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-Stripper-Dup** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-002

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0030 Liter(s)
Test Notes:
Container ID: SC02178

Initial Pressure (psig): -0.42 Final Pressure (psig): 3.66

Container Dilution Factor: 1.29

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	220	ND	130	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	220	ND	45	
74-87-3	Chloromethane	ND	220	ND	100	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	220	ND	31	
75-01-4	Vinyl Chloride	ND	220	ND	88	
106-99-0	1,3-Butadiene	ND	230	ND	100	
74-83-9	Bromomethane	ND	220	ND	55	
75-00-3	Chloroethane	ND	220	ND	83	
64-17-5	Ethanol	ND	2,300	ND	1,200	
75-05-8	Acetonitrile	ND	230	ND	140	
107-02-8	Acrolein	ND	900	ND	390	
67-64-1	Acetone	ND	2,300	ND	960	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	230	ND	41	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	2,300	ND	930	
107-13-1	Acrylonitrile	ND	230	ND	110	
75-35-4	1,1-Dichloroethene	**310**	230	**78**	58	
75-09-2	Methylene Chloride	**1,400**	230	**410**	66	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	230	ND	73	
76-13-1	Trichlorotrifluoroethane (CFC 113)	**28,000**	230	**3,600**	30	
75-15-0	Carbon Disulfide	ND	2,300	ND	730	
156-60-5	trans-1,2-Dichloroethene	ND	230	ND	59	
75-34-3	1,1-Dichloroethane	ND	220	ND	54	
1634-04-4	Methyl tert-Butyl Ether	ND	230	ND	64	
108-05-4	Vinyl Acetate	ND	2,300	ND	650	
78-93-3	2-Butanone (MEK)	ND	2,300	ND	770	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-Stripper-Dup** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-002

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0030 Liter(s)
Test Notes:
Container ID: SC02178

Initial Pressure (psig): -0.42 Final Pressure (psig): 3.66

Container Dilution Factor: 1.29

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**21,000**	230	**5,300**	58	
141-78-6	Ethyl Acetate	ND	470	ND	130	
110-54-3	n-Hexane	ND	230	ND	65	
67-66-3	Chloroform	ND	230	ND	47	
109-99-9	Tetrahydrofuran (THF)	ND	230	ND	77	
107-06-2	1,2-Dichloroethane	**370**	230	**91**	56	
71-55-6	1,1,1-Trichloroethane	ND	230	ND	43	
71-43-2	Benzene	ND	230	ND	71	
56-23-5	Carbon Tetrachloride	ND	230	ND	36	
110-82-7	Cyclohexane	ND	470	ND	140	
78-87-5	1,2-Dichloropropane	ND	230	ND	49	
75-27-4	Bromodichloromethane	ND	230	ND	34	
79-01-6	Trichloroethene	**38,000**	230	**7,000**	42	
123-91-1	1,4-Dioxane	ND	230	ND	63	
80-62-6	Methyl Methacrylate	ND	470	ND	120	
142-82-5	n-Heptane	ND	230	ND	56	
10061-01-5	cis-1,3-Dichloropropene	ND	240	ND	53	
108-10-1	4-Methyl-2-pentanone	ND	230	ND	56	
10061-02-6	trans-1,3-Dichloropropene	ND	230	ND	50	
79-00-5	1,1,2-Trichloroethane	ND	230	ND	42	
108-88-3	Toluene	ND	230	ND	60	
591-78-6	2-Hexanone	ND	230	ND	56	
124-48-1	Dibromochloromethane	ND	230	ND	27	
106-93-4	1,2-Dibromoethane	ND	230	ND	30	
123-86-4	n-Butyl Acetate	ND	230	ND	48	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-Stripper-Dup** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-002

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.0030 Liter(s)
Test Notes:
Container ID: SC02178

Initial Pressure (psig): -0.42 Final Pressure (psig): 3.66

Container Dilution Factor: 1.29

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	230	ND	49	
127-18-4	Tetrachloroethene	**240**	230	**36**	34	
108-90-7	Chlorobenzene	ND	230	ND	50	
100-41-4	Ethylbenzene	ND	230	ND	52	
179601-23-1	m,p-Xylenes	ND	470	ND	110	
75-25-2	Bromoform	ND	230	ND	22	
100-42-5	Styrene	ND	230	ND	54	
95-47-6	o-Xylene	ND	230	ND	52	
111-84-2	n-Nonane	ND	230	ND	43	
79-34-5	1,1,2,2-Tetrachloroethane	ND	230	ND	33	
98-82-8	Cumene	ND	230	ND	46	
80-56-8	alpha-Pinene	ND	220	ND	40	
103-65-1	n-Propylbenzene	ND	230	ND	46	
622-96-8	4-Ethyltoluene	ND	220	ND	46	
108-67-8	1,3,5-Trimethylbenzene	ND	220	ND	46	
95-63-6	1,2,4-Trimethylbenzene	ND	230	ND	46	
100-44-7	Benzyl Chloride	ND	470	ND	91	
541-73-1	1,3-Dichlorobenzene	ND	230	ND	39	
106-46-7	1,4-Dichlorobenzene	ND	230	ND	38	
95-50-1	1,2-Dichlorobenzene	ND	230	ND	39	
5989-27-5	d-Limonene	ND	220	ND	39	
96-12-8	1,2-Dibromo-3-chloropropane	ND	230	ND	24	
120-82-1	1,2,4-Trichlorobenzene	ND	240	ND	32	
91-20-3	Naphthalene	ND	230	ND	43	
87-68-3	Hexachlorobutadiene	ND	230	ND	21	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-GWTP** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-003

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00548

Initial Pressure (psig): -3.63 Final Pressure (psig): 3.79

Container Dilution Factor: 1.67

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	0.87	ND	0.50	
75-71-8	Dichlorodifluoromethane (CFC 12)	**2.3**	0.87	**0.47**	0.18	
74-87-3	Chloromethane	ND	0.84	ND	0.40	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.85	ND	0.12	
75-01-4	Vinyl Chloride	ND	0.87	ND	0.34	
106-99-0	1,3-Butadiene	ND	0.89	ND	0.40	
74-83-9	Bromomethane	ND	0.84	ND	0.22	
75-00-3	Chloroethane	ND	0.85	ND	0.32	
64-17-5	Ethanol	ND	8.9	ND	4.7	
75-05-8	Acetonitrile	ND	0.89	ND	0.53	
107-02-8	Acrolein	ND	3.5	ND	1.5	
67-64-1	Acetone	**10**	8.9	**4.2**	3.7	
75-69-4	Trichlorofluoromethane (CFC 11)	**1.3**	0.89	**0.24**	0.16	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	8.9	ND	3.6	
107-13-1	Acrylonitrile	ND	0.89	ND	0.41	
75-35-4	1,1-Dichloroethene	ND	0.89	ND	0.22	
75-09-2	Methylene Chloride	**1.6**	0.89	**0.45**	0.25	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.89	ND	0.28	
76-13-1	Trichlorotrifluoroethane (CFC 113)	**83**	0.89	**11**	0.12	
75-15-0	Carbon Disulfide	ND	8.9	ND	2.8	
156-60-5	trans-1,2-Dichloroethene	ND	0.90	ND	0.23	
75-34-3	1,1-Dichloroethane	ND	0.85	ND	0.21	
1634-04-4	Methyl tert-Butyl Ether	ND	0.90	ND	0.25	
108-05-4	Vinyl Acetate	ND	8.9	ND	2.5	
78-93-3	2-Butanone (MEK)	ND	8.9	ND	3.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-GWTP** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-003

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00548

Initial Pressure (psig): -3.63 Final Pressure (psig): 3.79

Container Dilution Factor: 1.67

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	**16**	0.89	**4.1**	0.22	
141-78-6	Ethyl Acetate	ND	1.8	ND	0.51	
110-54-3	n-Hexane	ND	0.89	ND	0.25	
67-66-3	Chloroform	ND	0.89	ND	0.18	
109-99-9	Tetrahydrofuran (THF)	ND	0.89	ND	0.30	
107-06-2	1,2-Dichloroethane	ND	0.89	ND	0.22	
71-55-6	1,1,1-Trichloroethane	ND	0.90	ND	0.17	
71-43-2	Benzene	ND	0.89	ND	0.28	
56-23-5	Carbon Tetrachloride	ND	0.89	ND	0.14	
110-82-7	Cyclohexane	ND	1.8	ND	0.53	
78-87-5	1,2-Dichloropropane	ND	0.89	ND	0.19	
75-27-4	Bromodichloromethane	ND	0.89	ND	0.13	
79-01-6	Trichloroethene	**48**	0.89	**8.8**	0.16	
123-91-1	1,4-Dioxane	ND	0.89	ND	0.25	
80-62-6	Methyl Methacrylate	ND	1.8	ND	0.45	
142-82-5	n-Heptane	ND	0.89	ND	0.22	
10061-01-5	cis-1,3-Dichloropropene	ND	0.94	ND	0.21	
108-10-1	4-Methyl-2-pentanone	ND	0.89	ND	0.22	
10061-02-6	trans-1,3-Dichloropropene	ND	0.89	ND	0.20	
79-00-5	1,1,2-Trichloroethane	ND	0.89	ND	0.16	
108-88-3	Toluene	ND	0.89	ND	0.23	
591-78-6	2-Hexanone	ND	0.89	ND	0.22	
124-48-1	Dibromochloromethane	ND	0.89	ND	0.10	
106-93-4	1,2-Dibromoethane	ND	0.89	ND	0.12	
123-86-4	n-Butyl Acetate	ND	0.89	ND	0.19	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_052918-GWTP** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-003

Test Code: EPA TO-15 Date Collected: 5/29/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00548

Initial Pressure (psig): -3.63 Final Pressure (psig): 3.79

Container Dilution Factor: 1.67

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.89	ND	0.19	
127-18-4	Tetrachloroethene	ND	0.89	ND	0.13	
108-90-7	Chlorobenzene	ND	0.89	ND	0.19	
100-41-4	Ethylbenzene	ND	0.89	ND	0.20	
179601-23-1	m,p-Xylenes	ND	1.8	ND	0.42	
75-25-2	Bromoform	ND	0.89	ND	0.086	
100-42-5	Styrene	ND	0.89	ND	0.21	
95-47-6	o-Xylene	ND	0.89	ND	0.20	
111-84-2	n-Nonane	ND	0.89	ND	0.17	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.89	ND	0.13	
98-82-8	Cumene	ND	0.89	ND	0.18	
80-56-8	alpha-Pinene	**1.4**	0.87	**0.25**	0.16	
103-65-1	n-Propylbenzene	ND	0.89	ND	0.18	
622-96-8	4-Ethyltoluene	ND	0.87	ND	0.18	
108-67-8	1,3,5-Trimethylbenzene	ND	0.87	ND	0.18	
95-63-6	1,2,4-Trimethylbenzene	ND	0.89	ND	0.18	
100-44-7	Benzyl Chloride	ND	1.8	ND	0.35	
541-73-1	1,3-Dichlorobenzene	ND	0.90	ND	0.15	
106-46-7	1,4-Dichlorobenzene	ND	0.89	ND	0.15	
95-50-1	1,2-Dichlorobenzene	ND	0.90	ND	0.15	
5989-27-5	d-Limonene	ND	0.84	ND	0.15	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.89	ND	0.092	
120-82-1	1,2,4-Trichlorobenzene	ND	0.92	ND	0.12	
91-20-3	Naphthalene	ND	0.89	ND	0.17	
87-68-3	Hexachlorobutadiene	ND	0.89	ND	0.083	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_053018_Downwind_South** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-004

Test Code: EPA TO-15 Date Collected: 5/30/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00879

Initial Pressure (psig): -5.38 Final Pressure (psig): 3.76

Container Dilution Factor: 1.98

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	**4.8**	1.0	**2.8**	0.60	
75-71-8	Dichlorodifluoromethane (CFC 12)	**26**	1.0	**5.3**	0.21	
74-87-3	Chloromethane	ND	0.99	ND	0.48	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	1.0	ND	0.14	
75-01-4	Vinyl Chloride	ND	1.0	ND	0.40	
106-99-0	1,3-Butadiene	ND	1.0	ND	0.47	
74-83-9	Bromomethane	ND	0.99	ND	0.26	
75-00-3	Chloroethane	ND	1.0	ND	0.38	
64-17-5	Ethanol	**94**	10	**50**	5.6	
75-05-8	Acetonitrile	**1.6**	1.0	**0.94**	0.63	
107-02-8	Acrolein	ND	4.2	ND	1.8	
67-64-1	Acetone	**73**	10	**31**	4.4	
75-69-4	Trichlorofluoromethane (CFC 11)	**21**	1.0	**3.7**	0.19	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	10	ND	4.3	
107-13-1	Acrylonitrile	ND	1.0	ND	0.48	
75-35-4	1,1-Dichloroethene	ND	1.0	ND	0.26	
75-09-2	Methylene Chloride	ND	1.0	ND	0.30	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	1.0	ND	0.34	
76-13-1	Trichlorotrifluoroethane (CFC 113)	**3.5**	1.0	**0.45**	0.14	
75-15-0	Carbon Disulfide	ND	10	ND	3.4	
156-60-5	trans-1,2-Dichloroethene	ND	1.1	ND	0.27	
75-34-3	1,1-Dichloroethane	ND	1.0	ND	0.25	
1634-04-4	Methyl tert-Butyl Ether	ND	1.1	ND	0.30	
108-05-4	Vinyl Acetate	ND	10	ND	3.0	
78-93-3	2-Butanone (MEK)	**30**	10	**10**	3.6	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_053018_Downwind_South** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-004

Test Code: EPA TO-15 Date Collected: 5/30/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00879

Initial Pressure (psig): -5.38 Final Pressure (psig): 3.76

Container Dilution Factor: 1.98

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	1.0	ND	0.26	
141-78-6	Ethyl Acetate	**4.4**	2.2	**1.2**	0.60	
110-54-3	n-Hexane	**11**	1.0	**3.2**	0.30	
67-66-3	Chloroform	ND	1.0	ND	0.21	
109-99-9	Tetrahydrofuran (THF)	**55**	1.0	**19**	0.36	
107-06-2	1,2-Dichloroethane	ND	1.0	ND	0.26	
71-55-6	1,1,1-Trichloroethane	ND	1.1	ND	0.20	
71-43-2	Benzene	**2.9**	1.0	**0.90**	0.33	
56-23-5	Carbon Tetrachloride	ND	1.0	ND	0.17	
110-82-7	Cyclohexane	ND	2.2	ND	0.63	
78-87-5	1,2-Dichloropropane	ND	1.0	ND	0.23	
75-27-4	Bromodichloromethane	ND	1.0	ND	0.16	
79-01-6	Trichloroethene	**2.5**	1.0	**0.46**	0.20	
123-91-1	1,4-Dioxane	ND	1.0	ND	0.29	
80-62-6	Methyl Methacrylate	ND	2.2	ND	0.53	
142-82-5	n-Heptane	**5.3**	1.0	**1.3**	0.26	
10061-01-5	cis-1,3-Dichloropropene	ND	1.1	ND	0.24	
108-10-1	4-Methyl-2-pentanone	**2.0**	1.0	**0.49**	0.26	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	ND	0.23	
79-00-5	1,1,2-Trichloroethane	ND	1.0	ND	0.19	
108-88-3	Toluene	**23**	1.0	**6.2**	0.28	
591-78-6	2-Hexanone	ND	1.0	ND	0.26	
124-48-1	Dibromochloromethane	ND	1.0	ND	0.12	
106-93-4	1,2-Dibromoethane	ND	1.0	ND	0.14	
123-86-4	n-Butyl Acetate	ND	1.0	ND	0.22	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_053018_Downwind_South** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-004

Test Code: EPA TO-15 Date Collected: 5/30/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00879

Initial Pressure (psig): -5.38 Final Pressure (psig): 3.76

Container Dilution Factor: 1.98

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	**1.9**	1.0	**0.40**	0.22	
127-18-4	Tetrachloroethene	ND	1.0	ND	0.15	
108-90-7	Chlorobenzene	ND	1.0	ND	0.23	
100-41-4	Ethylbenzene	**5.3**	1.0	**1.2**	0.24	
179601-23-1	m,p-Xylenes	**17**	2.2	**3.8**	0.50	
75-25-2	Bromoform	ND	1.0	ND	0.10	
100-42-5	Styrene	**2.5**	1.0	**0.59**	0.25	
95-47-6	o-Xylene	**5.1**	1.0	**1.2**	0.24	
111-84-2	n-Nonane	**3.4**	1.0	**0.65**	0.20	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	ND	0.15	
98-82-8	Cumene	ND	1.0	ND	0.21	
80-56-8	alpha-Pinene	**6.3**	1.0	**1.1**	0.18	
103-65-1	n-Propylbenzene	ND	1.0	ND	0.21	
622-96-8	4-Ethyltoluene	ND	1.0	ND	0.21	
108-67-8	1,3,5-Trimethylbenzene	ND	1.0	ND	0.21	
95-63-6	1,2,4-Trimethylbenzene	**2.8**	1.0	**0.57**	0.21	
100-44-7	Benzyl Chloride	ND	2.2	ND	0.42	
541-73-1	1,3-Dichlorobenzene	ND	1.1	ND	0.18	
106-46-7	1,4-Dichlorobenzene	ND	1.0	ND	0.17	
95-50-1	1,2-Dichlorobenzene	ND	1.1	ND	0.18	
5989-27-5	d-Limonene	**2.7**	0.99	**0.48**	0.18	
96-12-8	1,2-Dibromo-3-chloropropane	ND	1.0	ND	0.11	
120-82-1	1,2,4-Trichlorobenzene	ND	1.1	ND	0.15	
91-20-3	Naphthalene	ND	1.0	ND	0.20	
87-68-3	Hexachlorobutadiene	ND	1.0	ND	0.098	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P180611-MB

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:

Container Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
115-07-1	Propene	ND	0.52	ND	0.30	
75-71-8	Dichlorodifluoromethane (CFC 12)	ND	0.52	ND	0.11	
74-87-3	Chloromethane	ND	0.50	ND	0.24	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	0.51	ND	0.073	
75-01-4	Vinyl Chloride	ND	0.52	ND	0.20	
106-99-0	1,3-Butadiene	ND	0.53	ND	0.24	
74-83-9	Bromomethane	ND	0.50	ND	0.13	
75-00-3	Chloroethane	ND	0.51	ND	0.19	
64-17-5	Ethanol	ND	5.3	ND	2.8	
75-05-8	Acetonitrile	ND	0.53	ND	0.32	
107-02-8	Acrolein	ND	2.1	ND	0.92	
67-64-1	Acetone	ND	5.3	ND	2.2	
75-69-4	Trichlorofluoromethane (CFC 11)	ND	0.53	ND	0.094	
67-63-0	2-Propanol (Isopropyl Alcohol)	ND	5.3	ND	2.2	
107-13-1	Acrylonitrile	ND	0.53	ND	0.24	
75-35-4	1,1-Dichloroethene	ND	0.53	ND	0.13	
75-09-2	Methylene Chloride	ND	0.53	ND	0.15	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	ND	0.53	ND	0.17	
76-13-1	Trichlorotrifluoroethane (CFC 113)	ND	0.53	ND	0.069	
75-15-0	Carbon Disulfide	ND	5.3	ND	1.7	
156-60-5	trans-1,2-Dichloroethene	ND	0.54	ND	0.14	
75-34-3	1,1-Dichloroethane	ND	0.51	ND	0.13	
1634-04-4	Methyl tert-Butyl Ether	ND	0.54	ND	0.15	
108-05-4	Vinyl Acetate	ND	5.3	ND	1.5	
78-93-3	2-Butanone (MEK)	ND	5.3	ND	1.8	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P180611-MB

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:

Container Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	ND	0.53	ND	0.13	
141-78-6	Ethyl Acetate	ND	1.1	ND	0.31	
110-54-3	n-Hexane	ND	0.53	ND	0.15	
67-66-3	Chloroform	ND	0.53	ND	0.11	
109-99-9	Tetrahydrofuran (THF)	ND	0.53	ND	0.18	
107-06-2	1,2-Dichloroethane	ND	0.53	ND	0.13	
71-55-6	1,1,1-Trichloroethane	ND	0.54	ND	0.099	
71-43-2	Benzene	ND	0.53	ND	0.17	
56-23-5	Carbon Tetrachloride	ND	0.53	ND	0.084	
110-82-7	Cyclohexane	ND	1.1	ND	0.32	
78-87-5	1,2-Dichloropropane	ND	0.53	ND	0.11	
75-27-4	Bromodichloromethane	ND	0.53	ND	0.079	
79-01-6	Trichloroethene	ND	0.53	ND	0.099	
123-91-1	1,4-Dioxane	ND	0.53	ND	0.15	
80-62-6	Methyl Methacrylate	ND	1.1	ND	0.27	
142-82-5	n-Heptane	ND	0.53	ND	0.13	
10061-01-5	cis-1,3-Dichloropropene	ND	0.56	ND	0.12	
108-10-1	4-Methyl-2-pentanone	ND	0.53	ND	0.13	
10061-02-6	trans-1,3-Dichloropropene	ND	0.53	ND	0.12	
79-00-5	1,1,2-Trichloroethane	ND	0.53	ND	0.097	
108-88-3	Toluene	ND	0.53	ND	0.14	
591-78-6	2-Hexanone	ND	0.53	ND	0.13	
124-48-1	Dibromochloromethane	ND	0.53	ND	0.062	
106-93-4	1,2-Dibromoethane	ND	0.53	ND	0.069	
123-86-4	n-Butyl Acetate	ND	0.53	ND	0.11	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Method Blank** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P180611-MB

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:

Container Dilution Factor: 1.00

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111-65-9	n-Octane	ND	0.53	ND	0.11	
127-18-4	Tetrachloroethene	ND	0.53	ND	0.078	
108-90-7	Chlorobenzene	ND	0.53	ND	0.12	
100-41-4	Ethylbenzene	ND	0.53	ND	0.12	
179601-23-1	m,p-Xylenes	ND	1.1	ND	0.25	
75-25-2	Bromoform	ND	0.53	ND	0.051	
100-42-5	Styrene	ND	0.53	ND	0.12	
95-47-6	o-Xylene	ND	0.53	ND	0.12	
111-84-2	n-Nonane	ND	0.53	ND	0.10	
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.53	ND	0.077	
98-82-8	Cumene	ND	0.53	ND	0.11	
80-56-8	alpha-Pinene	ND	0.52	ND	0.093	
103-65-1	n-Propylbenzene	ND	0.53	ND	0.11	
622-96-8	4-Ethyltoluene	ND	0.52	ND	0.11	
108-67-8	1,3,5-Trimethylbenzene	ND	0.52	ND	0.11	
95-63-6	1,2,4-Trimethylbenzene	ND	0.53	ND	0.11	
100-44-7	Benzyl Chloride	ND	1.1	ND	0.21	
541-73-1	1,3-Dichlorobenzene	ND	0.54	ND	0.090	
106-46-7	1,4-Dichlorobenzene	ND	0.53	ND	0.088	
95-50-1	1,2-Dichlorobenzene	ND	0.54	ND	0.090	
5989-27-5	d-Limonene	ND	0.50	ND	0.090	
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.53	ND	0.055	
120-82-1	1,2,4-Trichlorobenzene	ND	0.55	ND	0.074	
91-20-3	Naphthalene	ND	0.53	ND	0.10	
87-68-3	Hexachlorobutadiene	ND	0.53	ND	0.050	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

SURROGATE SPIKE RECOVERY RESULTS

Client: **Bhate Environmental Associates, Inc.**
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Project ID: P1802915

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date(s) Collected: 5/29 - 5/30/18
Analyst: Wida Ang Date(s) Received: 6/6/18
Sample Type: 6.0 L Summa Canister(s) / 6.0 L Silonite Canister(s) Date(s) Analyzed: 6/11/18
Test Notes:

Client Sample ID	ALS Sample ID	1,2-Dichloroethane-d4 Percent Recovered	Toluene-d8 Percent Recovered	Bromofluorobenzene Percent Recovered	Acceptance Limits	Data Qualifier
Method Blank	P180611-MB	**96**	**101**	**104**	70-130	
Lab Control Sample	P180611-LCS	**93**	**98**	**106**	70-130	
LH18/24-Air_052918-Stripper	P1802915-001	**94**	**97**	**104**	70-130	
LH18/24-Air_052918-Stripper-Dup	P1802915-002	**94**	**98**	**103**	70-130	
LH18/24-Air_052918-GWTP	P1802915-003	**93**	**98**	**104**	70-130	
LH18/24-Air_053018_Downwind_South	P1802915-004	**93**	**100**	**104**	70-130	
LH18/24-Air_053018_Downwind_South	P1802915-004DUP	**93**	**99**	**104**	70-130	

Surrogate percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly from the on-column percent recovery.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P180611-LCS

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
115-07-1	Propene	210	**183**	**87**	54-133	
75-71-8	Dichlorodifluoromethane (CFC 12)	213	**186**	**87**	64-115	
74-87-3	Chloromethane	210	**189**	**90**	47-140	
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	211	**190**	**90**	60-112	
75-01-4	Vinyl Chloride	211	**182**	**86**	63-127	
106-99-0	1,3-Butadiene	210	**195**	**93**	57-149	
74-83-9	Bromomethane	210	**195**	**93**	63-132	
75-00-3	Chloroethane	210	**189**	**90**	68-129	
64-17-5	Ethanol	1,040	**932**	**90**	62-131	
75-05-8	Acetonitrile	210	**184**	**88**	56-136	
107-02-8	Acrolein	209	**190**	**91**	60-132	
67-64-1	Acetone	1,050	**879**	**84**	63-124	
75-69-4	Trichlorofluoromethane (CFC 11)	208	**182**	**88**	65-113	
67-63-0	2-Propanol (Isopropyl Alcohol)	422	**391**	**93**	62-135	
107-13-1	Acrylonitrile	212	**192**	**91**	68-138	
75-35-4	1,1-Dichloroethene	213	**195**	**92**	72-118	
75-09-2	Methylene Chloride	213	**187**	**88**	67-116	
107-05-1	3-Chloro-1-propene (Allyl Chloride)	212	**198**	**93**	61-143	
76-13-1	Trichlorotrifluoroethane (CFC 113)	214	**194**	**91**	68-113	
75-15-0	Carbon Disulfide	214	**197**	**92**	68-120	
156-60-5	trans-1,2-Dichloroethene	214	**193**	**90**	71-125	
75-34-3	1,1-Dichloroethane	212	**186**	**88**	68-118	
1634-04-4	Methyl tert-Butyl Ether	213	**189**	**89**	60-123	
108-05-4	Vinyl Acetate	1,060	**1030**	**97**	73-135	
78-93-3	2-Butanone (MEK)	212	**189**	**89**	70-129	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P180611-LCS

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
156-59-2	cis-1,2-Dichloroethene	212	**185**	**87**	69-121	
141-78-6	Ethyl Acetate	426	**389**	**91**	66-140	
110-54-3	n-Hexane	213	**188**	**88**	61-124	
67-66-3	Chloroform	212	**185**	**87**	69-113	
109-99-9	Tetrahydrofuran (THF)	212	**187**	**88**	66-121	
107-06-2	1,2-Dichloroethane	212	**180**	**85**	62-120	
71-55-6	1,1,1-Trichloroethane	212	**189**	**89**	65-116	
71-43-2	Benzene	213	**183**	**86**	66-111	
56-23-5	Carbon Tetrachloride	214	**195**	**91**	64-122	
110-82-7	Cyclohexane	425	**385**	**91**	69-115	
78-87-5	1,2-Dichloropropane	212	**192**	**91**	69-121	
75-27-4	Bromodichloromethane	214	**199**	**93**	69-123	
79-01-6	Trichloroethene	212	**197**	**93**	69-112	
123-91-1	1,4-Dioxane	213	**195**	**92**	74-123	
80-62-6	Methyl Methacrylate	424	**407**	**96**	75-125	
142-82-5	n-Heptane	213	**189**	**89**	68-118	
10061-01-5	cis-1,3-Dichloropropene	208	**204**	**98**	74-129	
108-10-1	4-Methyl-2-pentanone	213	**193**	**91**	66-138	
10061-02-6	trans-1,3-Dichloropropene	213	**210**	**99**	75-130	
79-00-5	1,1,2-Trichloroethane	212	**198**	**93**	73-117	
108-88-3	Toluene	211	**206**	**98**	66-114	
591-78-6	2-Hexanone	211	**195**	**92**	58-146	
124-48-1	Dibromochloromethane	212	**220**	**104**	67-130	
106-93-4	1,2-Dibromoethane	211	**212**	**100**	70-127	
123-86-4	n-Butyl Acetate	215	**204**	**95**	62-140	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **Lab Control Sample** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P180611-LCS

Test Code: EPA TO-15 Date Collected: NA
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: NA
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister Volume(s) Analyzed: 0.125 Liter(s)
Test Notes:

CAS #	Compound	Spike Amount µg/m³	Result µg/m³	% Recovery	ALS Acceptance Limits	Data Qualifier
111-65-9	n-Octane	212	**202**	**95**	65-121	
127-18-4	Tetrachloroethene	212	**214**	**101**	62-119	
108-90-7	Chlorobenzene	212	**206**	**97**	66-115	
100-41-4	Ethylbenzene	212	**203**	**96**	69-117	
179601-23-1	m,p-Xylenes	424	**397**	**94**	67-117	
75-25-2	Bromoform	212	**234**	**110**	67-135	
100-42-5	Styrene	211	**212**	**100**	70-128	
95-47-6	o-Xylene	211	**202**	**96**	67-118	
111-84-2	n-Nonane	212	**195**	**92**	61-127	
79-34-5	1,1,2,2-Tetrachloroethane	212	**205**	**97**	70-125	
98-82-8	Cumene	212	**207**	**98**	68-116	
80-56-8	alpha-Pinene	213	**206**	**97**	69-122	
103-65-1	n-Propylbenzene	214	**208**	**97**	70-118	
622-96-8	4-Ethyltoluene	211	**202**	**96**	69-124	
108-67-8	1,3,5-Trimethylbenzene	212	**204**	**96**	65-117	
95-63-6	1,2,4-Trimethylbenzene	212	**200**	**94**	67-124	
100-44-7	Benzyl Chloride	212	**229**	**108**	75-142	
541-73-1	1,3-Dichlorobenzene	212	**210**	**99**	70-124	
106-46-7	1,4-Dichlorobenzene	214	**207**	**97**	63-124	
95-50-1	1,2-Dichlorobenzene	214	**212**	**99**	66-125	
5989-27-5	d-Limonene	213	**199**	**93**	64-135	
96-12-8	1,2-Dibromo-3-chloropropane	210	**232**	**110**	73-136	
120-82-1	1,2,4-Trichlorobenzene	218	**236**	**108**	70-141	
91-20-3	Naphthalene	209	**209**	**100**	71-146	
87-68-3	Hexachlorobutadiene	212	**223**	**105**	63-126	

Laboratory Control Sample percent recovery is verified and accepted based on the on-column result.
Reported results are shown in concentration units and as a result of the calculation, may vary slightly.

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_053018_Downwind_South** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-004DUP

Test Code: EPA TO-15 Date Collected: 5/30/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00879

Initial Pressure (psig): -5.38 Final Pressure (psig): 3.76

Container Dilution Factor: 1.98

Compound	Sample Result µg/m³	Sample Result ppbV	Duplicate Sample Result µg/m³	Duplicate Sample Result ppbV	Average µg/m³	% RPD	RPD Limit	Data Qualifier
Propene	4.76	2.77	3.67	2.13	4.215	**26**	25	**R**
Dichlorodifluoromethane (CFC 12)	26.2	5.31	24.6	4.98	25.4	**6**	25	
Chloromethane	ND	ND	ND	ND	-	-	25	
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	ND	ND	ND	ND	-	-	25	
Vinyl Chloride	ND	ND	ND	ND	-	-	25	
1,3-Butadiene	ND	ND	ND	ND	-	-	25	
Bromomethane	ND	ND	ND	ND	-	-	25	
Chloroethane	ND	ND	ND	ND	-	-	25	
Ethanol	93.8	49.8	91.9	48.8	92.85	**2**	25	
Acetonitrile	1.58	0.941	1.56	0.927	1.57	**1**	25	
Acrolein	ND	ND	ND	ND	-	-	25	
Acetone	73.5	31.0	71.5	30.1	72.5	**3**	25	
Trichlorofluoromethane	20.6	3.67	20.3	3.62	20.45	**1**	25	
2-Propanol (Isopropyl Alcohol)	ND	ND	11.2	4.55	-	-	25	
Acrylonitrile	ND	ND	ND	ND	-	-	25	
1,1-Dichloroethene	ND	ND	ND	ND	-	-	25	
Methylene Chloride	ND	ND	ND	ND	-	-	25	
3-Chloro-1-propene (Allyl Chloride)	ND	ND	ND	ND	-	-	25	
Trichlorotrifluoroethane	3.48	0.455	3.39	0.442	3.435	**3**	25	
Carbon Disulfide	ND	ND	ND	ND	-	-	25	
trans-1,2-Dichloroethene	ND	ND	ND	ND	-	-	25	
1,1-Dichloroethane	ND	ND	ND	ND	-	-	25	
Methyl tert-Butyl Ether	ND	ND	ND	ND	-	-	25	
Vinyl Acetate	ND	ND	ND	ND	-	-	25	
2-Butanone (MEK)	30.0	10.2	29.4	9.98	29.7	**2**	25	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
R = Duplicate precision not met.

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_053018_Downwind_South** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-004DUP

Test Code: EPA TO-15 Date Collected: 5/30/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00879

Initial Pressure (psig): -5.38 Final Pressure (psig): 3.76

Container Dilution Factor: 1.98

Compound	Sample Result µg/m³	Sample Result ppbV	Duplicate Sample Result µg/m³	Duplicate Sample Result ppbV	Average µg/m³	% RPD	RPD Limit	Data Qualifier
cis-1,2-Dichloroethene	ND	ND	ND	ND	-	-	25	
Ethyl Acetate	4.36	1.21	4.23	1.17	4.295	**3**	25	
n-Hexane	11.3	3.20	10.9	3.11	11.1	**4**	25	
Chloroform	ND	ND	ND	ND	-	-	25	
Tetrahydrofuran (THF)	54.6	18.5	53.5	18.2	54.05	**2**	25	
1,2-Dichloroethane	ND	ND	ND	ND	-	-	25	
1,1,1-Trichloroethane	ND	ND	ND	ND	-	-	25	
Benzene	2.86	0.896	2.81	0.879	2.835	**2**	25	
Carbon Tetrachloride	ND	ND	ND	ND	-	-	25	
Cyclohexane	ND	ND	ND	ND	-	-	25	
1,2-Dichloropropane	ND	ND	ND	ND	-	-	25	
Bromodichloromethane	ND	ND	ND	ND	-	-	25	
Trichloroethene	2.48	0.462	2.41	0.448	2.445	**3**	25	
1,4-Dioxane	ND	ND	ND	ND	-	-	25	
Methyl Methacrylate	ND	ND	ND	ND	-	-	25	
n-Heptane	5.30	1.29	5.15	1.26	5.225	**3**	25	
cis-1,3-Dichloropropene	ND	ND	ND	ND	-	-	25	
4-Methyl-2-pentanone	2.02	0.494	1.99	0.487	2.005	**1**	25	
trans-1,3-Dichloropropene	ND	ND	ND	ND	-	-	25	
1,1,2-Trichloroethane	ND	ND	ND	ND	-	-	25	
Toluene	23.2	6.17	22.7	6.03	22.95	**2**	25	
2-Hexanone	ND	ND	ND	ND	-	-	25	
Dibromochloromethane	ND	ND	ND	ND	-	-	25	
1,2-Dibromoethane	ND	ND	ND	ND	-	-	25	
n-Butyl Acetate	ND	ND	ND	ND	-	-	25	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

ALS ENVIRONMENTAL

LABORATORY DUPLICATE SUMMARY RESULTS

Client: **Bhate Environmental Associates, Inc.**
Client Sample ID: **LH18/24-Air_053018_Downwind_South** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150** ALS Sample ID: P1802915-004DUP

Test Code: EPA TO-15 Date Collected: 5/30/18
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Date Received: 6/6/18
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Silonite Canister Volume(s) Analyzed: 1.00 Liter(s)
Test Notes:
Container ID: AS00879

Initial Pressure (psig): -5.38 Final Pressure (psig): 3.76

Container Dilution Factor: 1.98

Compound	Sample Result µg/m³	Sample Result ppbV	Duplicate Sample Result µg/m³	Duplicate Sample Result ppbV	Average µg/m³	% RPD	RPD Limit	Data Qualifier
n-Octane	1.86	0.399	1.82	0.389	1.84	**2**	25	
Tetrachloroethene	ND	ND	ND	ND	-	-	25	
Chlorobenzene	ND	ND	ND	ND	-	-	25	
Ethylbenzene	5.30	1.22	5.19	1.19	5.245	**2**	25	
m,p-Xylenes	16.6	3.81	16.2	3.73	16.4	**2**	25	
Bromoform	ND	ND	ND	ND	-	-	25	
Styrene	2.53	0.594	2.45	0.576	2.49	**3**	25	
o-Xylene	5.09	1.17	4.95	1.14	5.02	**3**	25	
n-Nonane	3.39	0.646	3.28	0.626	3.335	**3**	25	
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	-	-	25	
Cumene	ND	ND	ND	ND	-	-	25	
alpha-Pinene	6.34	1.14	6.21	1.12	6.275	**2**	25	
n-Propylbenzene	ND	ND	ND	ND	-	-	25	
4-Ethyltoluene	ND	ND	ND	ND	-	-	25	
1,3,5-Trimethylbenzene	ND	ND	ND	ND	-	-	25	
1,2,4-Trimethylbenzene	2.82	0.574	2.78	0.565	2.8	**1**	25	
Benzyl Chloride	ND	ND	ND	ND	-	-	25	
1,3-Dichlorobenzene	ND	ND	ND	ND	-	-	25	
1,4-Dichlorobenzene	ND	ND	ND	ND	-	-	25	
1,2-Dichlorobenzene	ND	ND	ND	ND	-	-	25	
d-Limonene	2.69	0.483	2.66	0.477	2.675	**1**	25	
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	-	-	25	
1,2,4-Trichlorobenzene	ND	ND	ND	ND	-	-	25	
Naphthalene	ND	ND	ND	ND	-	-	25	
Hexachlorobutadiene	ND	ND	ND	ND	-	-	25	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Bhate Environmental Associates, Inc.** ALS Project ID: P1802915
Client Project ID: **LHAAP-GWTP / NW01312.0150**

Internal Standard Area and RT Summary

Test Code: EPA TO-15
Instrument ID: Tekmar AUTOCAN/Agilent 5975Cinert/6890N/MS16 Lab File ID: 06111802.D
Analyst: Wida Ang Date Analyzed: 6/11/18
Sample Type: 6.0 L Summa Canister(s) Time Analyzed: 07:40
Test Notes:

		IS1 (BCM)		IS2 (DFB)		IS3 (CBZ)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	24 Hour Standard	334900	11.33	1432657	13.44	611456	17.72
	Upper Limit	468860	11.66	2005720	13.77	856038	18.05
	Lower Limit	200940	11.00	859594	13.11	366874	17.39
	Client Sample ID						
01	Method Blank	329700	11.31	1462819	13.43	628324	17.72
02	Lab Control Sample	348723	11.33	1492124	13.44	648661	17.72
03	LH18/24-Air_052918-Stripper	352311	11.32	1531596	13.43	675865	17.72
04	LH18/24-Air_052918-Stripper-Dup	359331	11.31	1548677	13.43	677771	17.72
05	LH18/24-Air_052918-GWTP	359128	11.31	1561105	13.43	690555	17.72
06	LH18/24-Air_053018_Downwind_South	339056	11.32	1476453	13.43	640891	17.72
07	LH18/24-Air_053018_Downwind_South (Lab Du	345753	11.32	1509790	13.43	656961	17.72
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = 140% of internal standard area
AREA LOWER LIMIT = 60% of internal standard area
RT UPPER LIMIT = 0.33 minutes of internal standard RT
RT LOWER LIMIT = 0.33 minutes of internal standard RT

Column used to flag values outside QC limits with an I.
I = Internal standard not within the specified limits.

Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111814.D
Acq On : 11 Jun 2018 14:37 Operator: WA
Sample : P1802915-001 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Jun 11 15:37:06 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

6/14/18

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.32	130	352311	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.43	114	1531596	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	17.72	82	675865	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	12.17	65	469206	11.782	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.24%			
57) Toluene-d8 (SS2)	15.87	98	1430227	12.185	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.52%			
73) Bromofluorobenzene (SS3)	19.09	174	483308	12.971	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.76%			
Target Compounds						Qvalue
2) Propene	4.09	42	616	N.D.		
3) Dichlorodifluoromethan...	4.24	85	1522	N.D.		
4) Chloromethane	4.54	50	181	N.D.		
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	N.D.		
6) Vinyl Chloride	4.97	62	26955	N.D.		
7) 1,3-Butadiene	0.00	54	0	N.D.		
8) Bromomethane	0.00	94	0	N.D.		
9) Chloroethane	0.00	64	0	N.D.		
10) Ethanol	6.54	45	132	N.D.		
11) Acetonitrile	6.75	41	1291	N.D.		
12) Acrolein	6.93	56	229	N.D.		
13) Acetone	7.17	58	6303	N.D.		
14) Trichlorofluoromethane	7.35	101	891	N.D.		
15) 2-Propanol (Isopropanol)	7.68	45	4885	N.D.		
16) Acrylonitrile	7.94	53	566	N.D.		
17) 1,1-Dichloroethene	8.34	96	27432	0.683	ng	86
18) 2-Methyl-2-Propanol (t...	8.61	59	1176	N.D.		
19) Methylene Chloride	8.56	84	142740	3.227	ng	85
20) 3-Chloro-1-propene (Al...	0.00	41	0	N.D.		
21) Trichlorotrifluoroethane	8.99	151	2265899	62.178	ng	92
22) Carbon Disulfide	8.85	76	3045	N.D.		
23) trans-1,2-Dichloroethene	9.86	61	7154	N.D.		
24) 1,1-Dichloroethane	10.11	63	9111	N.D.		
25) Methyl tert-Butyl Ether	10.26	73	2946	N.D.		
26) Vinyl Acetate	0.00	86	0	N.D.		
27) 2-Butanone (MEK)	10.66	72	1009	N.D.		
28) cis-1,2-Dichloroethene	11.13	61	2790422	47.178	ng	91
29) Diisopropyl Ether	11.48	87	1190	N.D.		
30) Ethyl Acetate	11.46	61	2620	N.D.		
31) n-Hexane	11.41	57	1700	N.D.		
32) Chloroform	11.48	83	11762	N.D.		
34) Tetrahydrofuran (THF)	11.95	72	656	N.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	N.D.		
36) 1,2-Dichloroethane	12.29	62	42432	0.826	ng	99
38) 1,1,1-Trichloroethane	12.57	97	1100	N.D.		
39) Isopropyl Acetate	0.00	61	0	N.D.		
40) 1-Butanol	13.06	56	1562	N.D.		
41) Benzene	13.04	78	8990	N.D.		
42) Carbon Tetrachloride	13.20	117	1355	N.D.		
43) Cyclohexane	13.33	84	3696	N.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	N.D.		
45) 1,2-Dichloropropane	0.00	63	0	N.D.		
46) Bromodichloromethane	0.00	83	0	N.D.	d	
47) Trichloroethene	14.13	130	3786288	85.913	ng	100
48) 1,4-Dioxane	14.14	88	599	N.D.		
49) 2,2,4-Trimethylpentane...	14.19	57	5094	N.D.		

Data File: I:\MS16\DATA\2018_06\11\06111814.D
Acq On : 11 Jun 2018 14:37 Operator: WA
Sample : P1802915-001 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

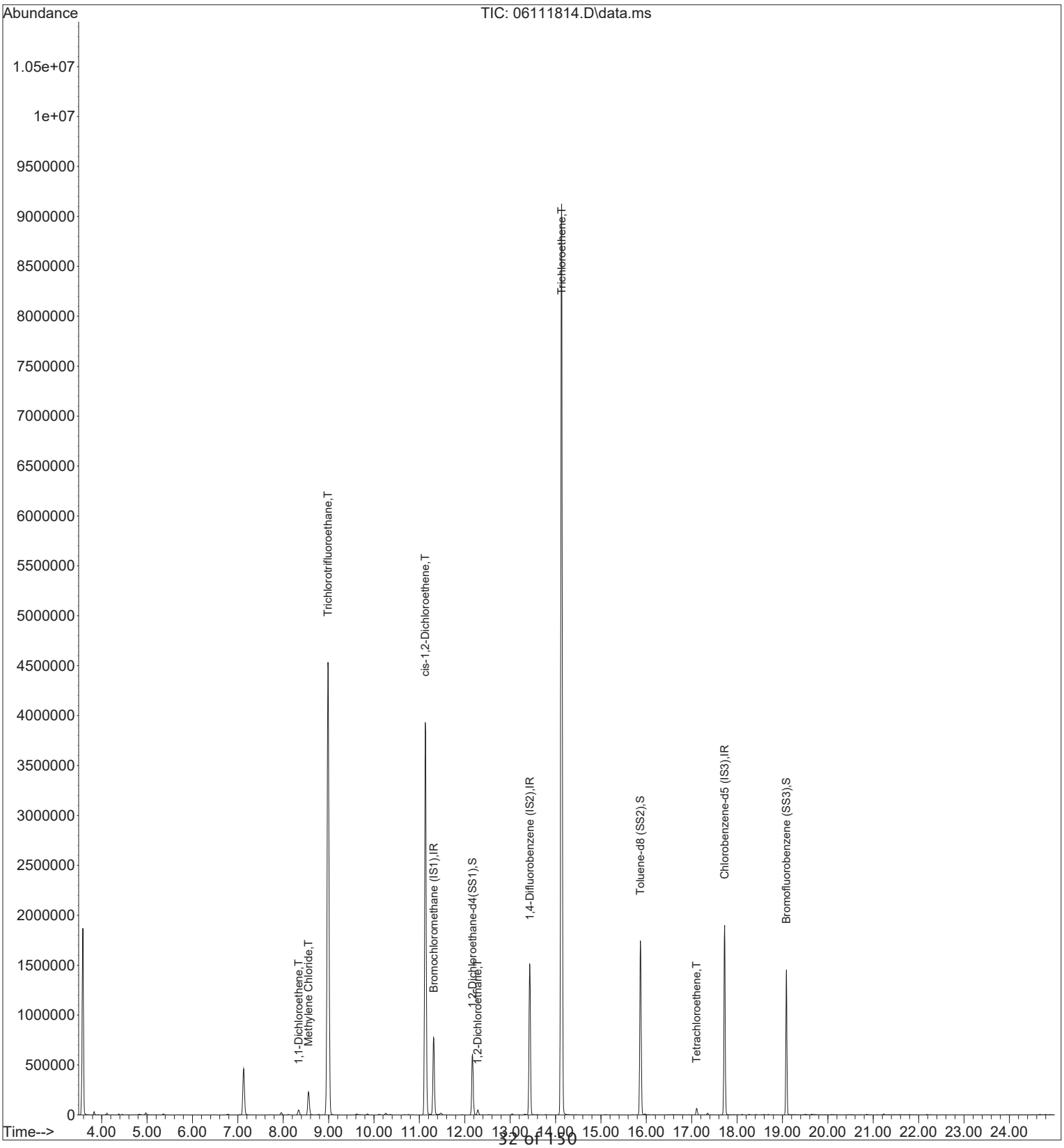
Quant Time: Jun 11 15:37:06 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	N.D. d		
51) n-Heptane	14.45	71	471	N.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	N.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	N.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	N.D.		
55) 1,1,2-Trichloroethane	15.69	97	1110	N.D.		
58) Toluene	15.98	91	10690	N.D.		
59) 2-Hexanone	16.23	43	861	N.D.		
60) Dibromochloromethane	0.00	129	0	N.D.		
61) 1,2-Dibromoethane	0.00	107	0	N.D.		
62) n-Butyl Acetate	16.84	43	374	N.D.		
63) n-Octane	16.95	57	180	N.D.		
64) Tetrachloroethene	17.11	166	24964	0.575	ng	99
65) Chlorobenzene	17.77	112	173	N.D.		
66) Ethylbenzene	18.11	91	4994	N.D.		
67) m- & p-Xylenes	18.26	91	6284	N.D.		
68) Bromoform	0.00	173	0	N.D.		
69) Styrene	18.59	104	1643	N.D.		
70) o-Xylene	18.69	91	3697	N.D.		
71) n-Nonane	18.87	43	465	N.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	N.D.		
74) Cumene	19.20	105	639	N.D.		
75) alpha-Pinene	19.54	93	183	N.D.		
76) n-Propylbenzene	19.64	91	2187	N.D.		
77) 3-Ethyltoluene	19.74	105	780	N.D.		
78) 4-Ethyltoluene	19.76	105	661	N.D.		
79) 1,3,5-Trimethylbenzene	19.84	105	544	N.D.		
80) alpha-Methylstyrene	19.97	118	121	N.D.		
81) 2-Ethyltoluene	20.00	105	878	N.D.		
82) 1,2,4-Trimethylbenzene	20.19	105	1949	N.D.		
83) n-Decane	20.26	57	1888	N.D.		
84) Benzyl Chloride	20.31	91	618	N.D.		
85) 1,3-Dichlorobenzene	20.32	146	264	N.D.		
86) 1,4-Dichlorobenzene	20.39	146	390	N.D.		
87) sec-Butylbenzene	20.42	105	357	N.D.		
88) 4-Isopropyltoluene (p-...	20.56	119	560	N.D.		
89) 1,2,3-Trimethylbenzene	20.56	105	759	N.D.		
90) 1,2-Dichlorobenzene	20.68	146	286	N.D.		
91) d-Limonene	20.68	68	253	N.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	N.D.		
93) n-Undecane	21.34	57	909	N.D.		
94) 1,2,4-Trichlorobenzene	22.17	180	217	N.D.		
95) Naphthalene	22.28	128	2216	N.D.		
96) n-Dodecane	22.25	57	919	N.D.		
97) Hexachlorobutadiene	0.00	225	0	N.D.		
98) Cyclohexanone	18.41	55	1707	N.D.		
99) tert-Butylbenzene	20.19	119	382	N.D.		
100) n-Butylbenzene	20.92	91	400	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111814.D
Acq On : 11 Jun 2018 14:37 Operator: WA
Sample : P1802915-001 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Jun 11 15:37:06 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111814.D
Acq On : 11 Jun 2018 14:37 Operator: WA
Sample : P1802915-001 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Jun 11 15:37:06 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

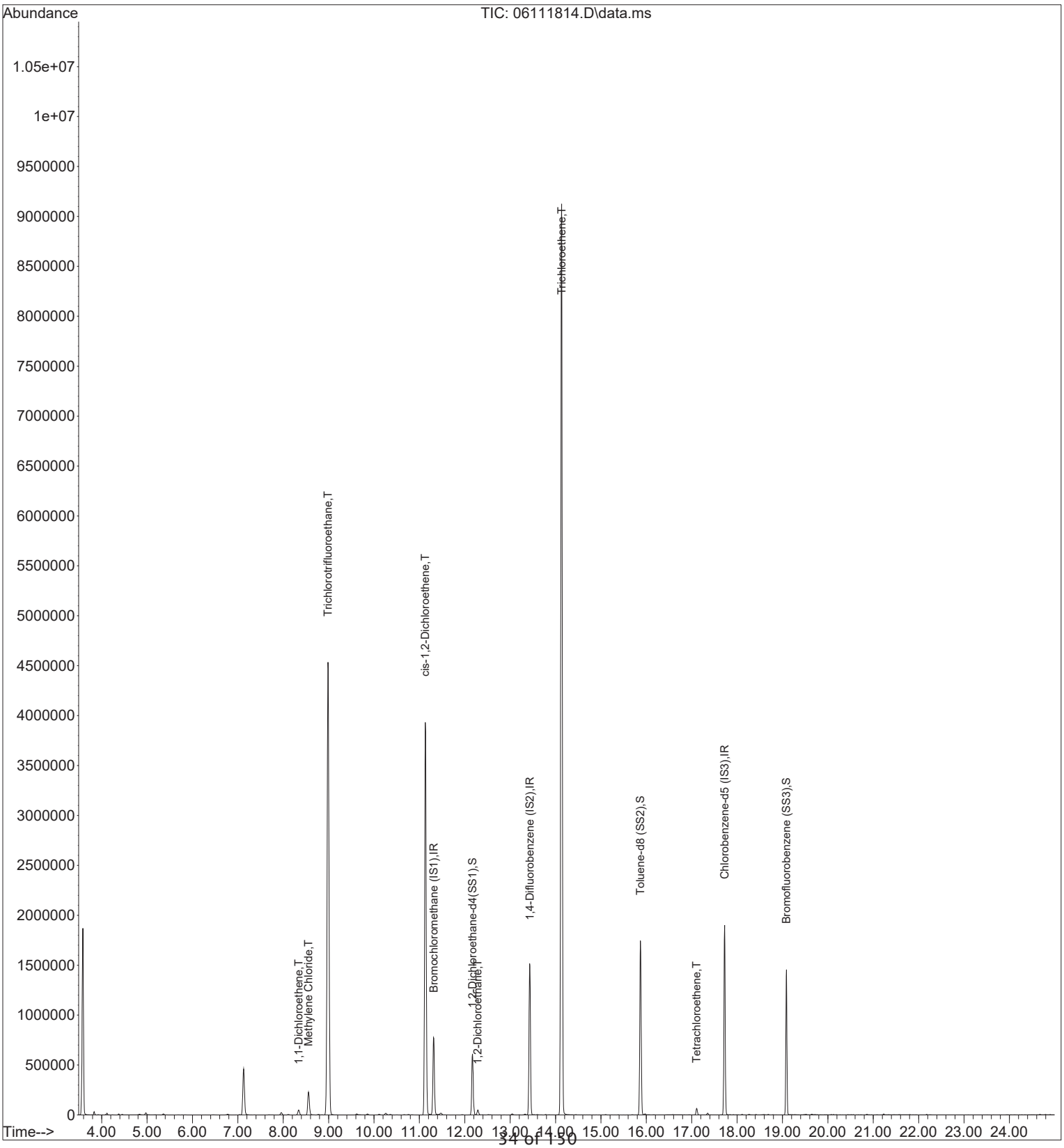
VOA 6/14/18

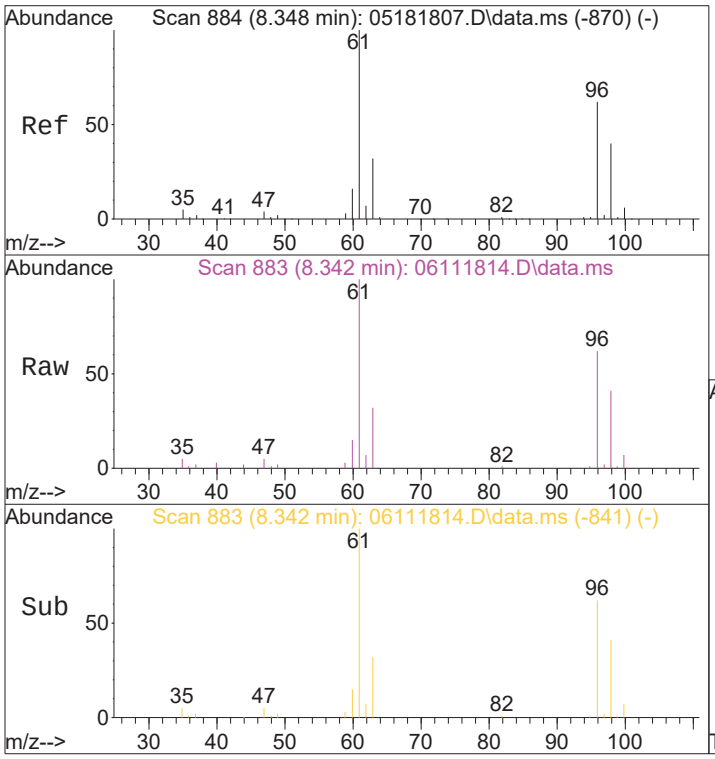
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.32	130	352311	12.500	ng	-0.02
37) 1,4-Difluorobenzene (IS2)	13.43	114	1531596	12.500	ng	-0.01
56) Chlorobenzene-d5 (IS3)	17.72	82	675865	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	12.17	65	469206	11.782	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.24%			
57) Toluene-d8 (SS2)	15.87	98	1430227	12.185	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.52%			
73) Bromofluorobenzene (SS3)	19.09	174	483308	12.971	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.76%			
Target Compounds						Qvalue
17) 1,1-Dichloroethene	8.34	96	27432	0.683	ng	86
19) Methylene Chloride	8.56	84	142740	3.227	ng	85
21) Trichlorotrifluoroethane	8.99	151	2265899	62.178	ng	92
28) cis-1,2-Dichloroethene	11.13	61	2790422	47.178	ng	91
36) 1,2-Dichloroethane	12.29	62	42432	0.826	ng	99
47) Trichloroethene	14.13	130	3786288	85.913	ng	100
64) Tetrachloroethene	17.11	166	24964	0.575	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111814.D
Acq On : 11 Jun 2018 14:37 Operator: WA
Sample : P1802915-001 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Jun 11 15:37:06 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

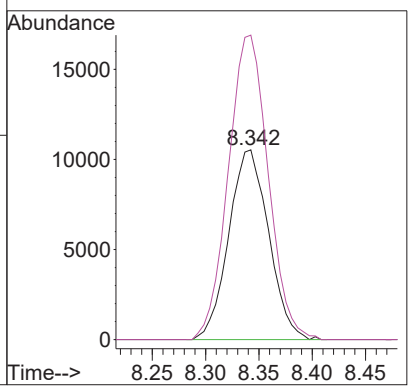


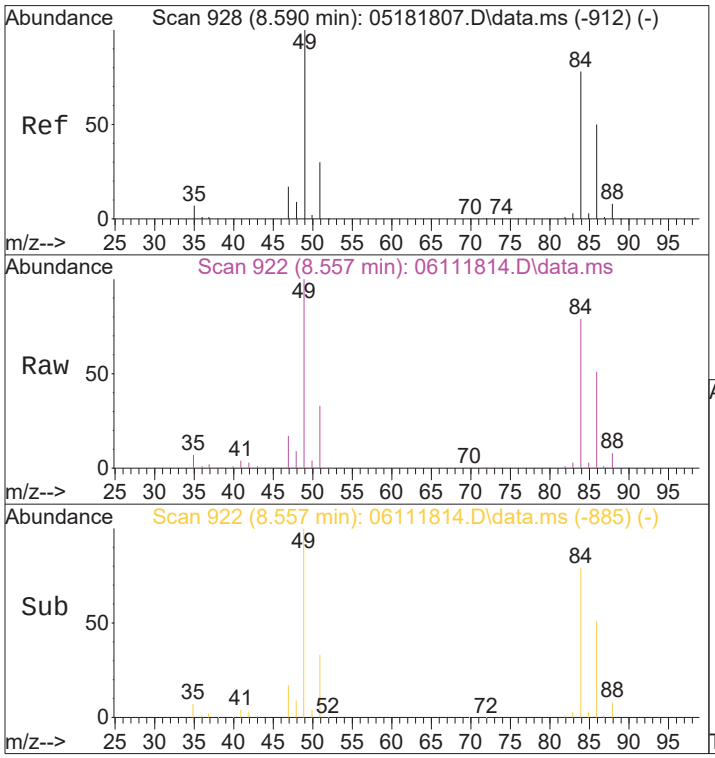


#17
1,1-Dichloroethene
Concen: 0.68 ng
RT: 8.34 min Scan# 883
Delta R.T. -0.017 min
Lab File: 06111814.D
Acq: 11 Jun 2018 14:37

Tgt Ion: 96 Resp: 27432

Ion	Ratio	Lower	Upper
96	100		
61	160.3	123.5	163.5

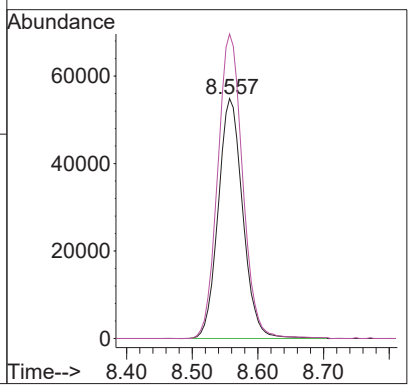


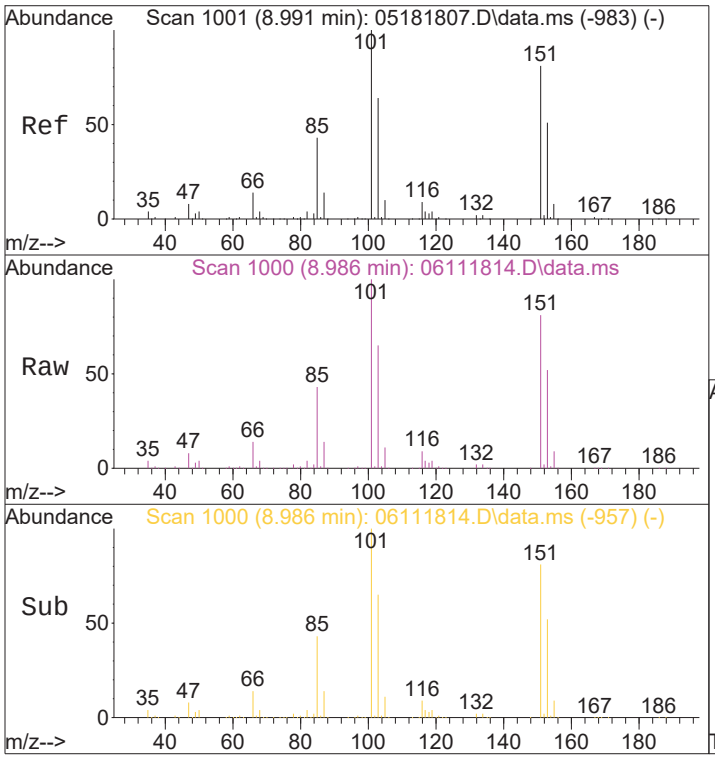


#19
Methylene Chloride
Concen: 3.23 ng
RT: 8.56 min Scan# 922
Delta R.T. -0.044 min
Lab File: 06111814.D
Acq: 11 Jun 2018 14:37

Tgt Ion: 84 Resp: 142740

Ion	Ratio	Lower	Upper
84	100		
49	128.9	87.3	137.3

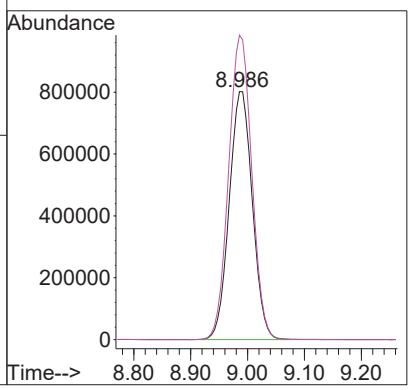


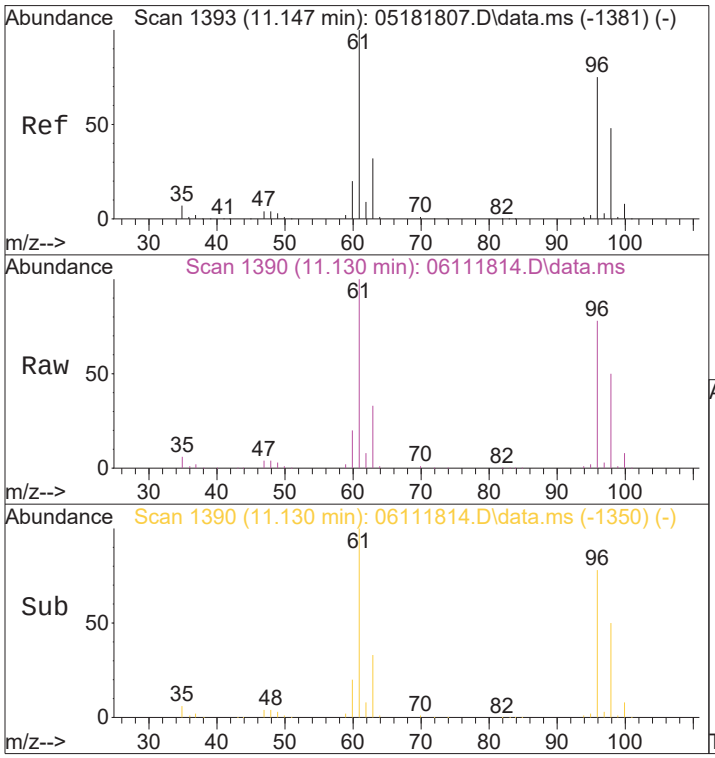


#21
Trichlorotrifluoroethane
Concen: 62.18 ng
RT: 8.99 min Scan# 1000
Delta R.T. -0.011 min
Lab File: 06111814.D
Acq: 11 Jun 2018 14:37

Tgt Ion:151 Resp: 2265899

Ion	Ratio	Lower	Upper
151	100		
101	122.8	94.6	134.6

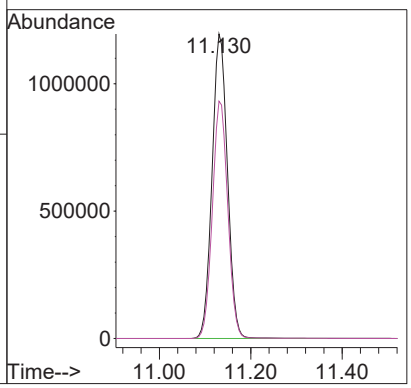


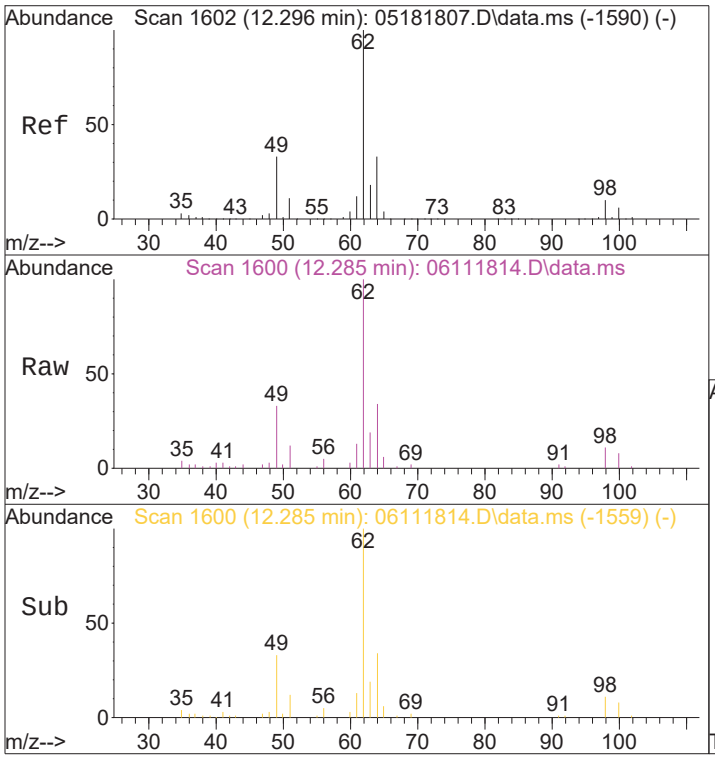


#28
cis-1,2-Dichloroethene
Concen: 47.18 ng
RT: 11.13 min Scan# 1390
Delta R.T. -0.028 min
Lab File: 06111814.D
Acq: 11 Jun 2018 14:37

Tgt Ion: 61 Resp: 2790422

Ion	Ratio	Lower	Upper
61	100		
96	78.0	66.3	106.3

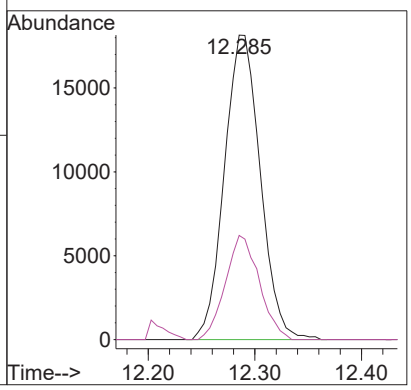


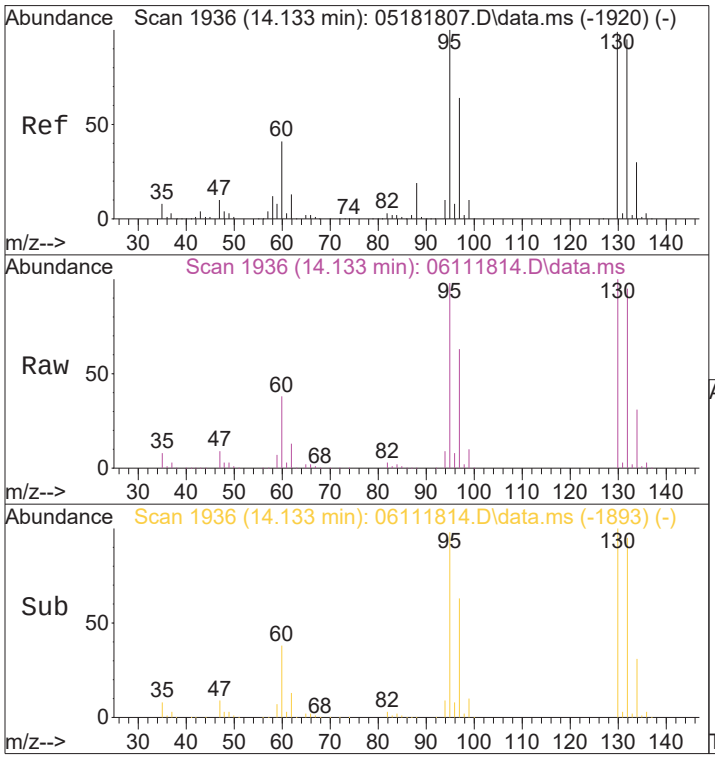


#36
1,2-Dichloroethane
Concen: 0.83 ng
RT: 12.29 min Scan# 1600
Delta R.T. -0.022 min
Lab File: 06111814.D
Acq: 11 Jun 2018 14:37

Tgt Ion: 62 Resp: 42432

Ion	Ratio	Lower	Upper
62	100		
64	32.3	12.9	52.9

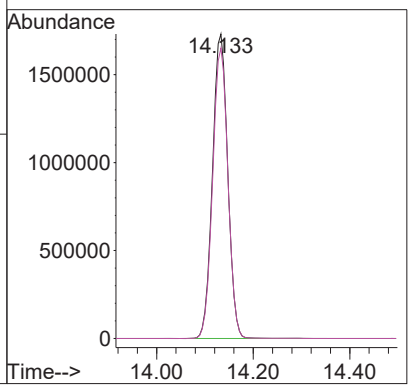


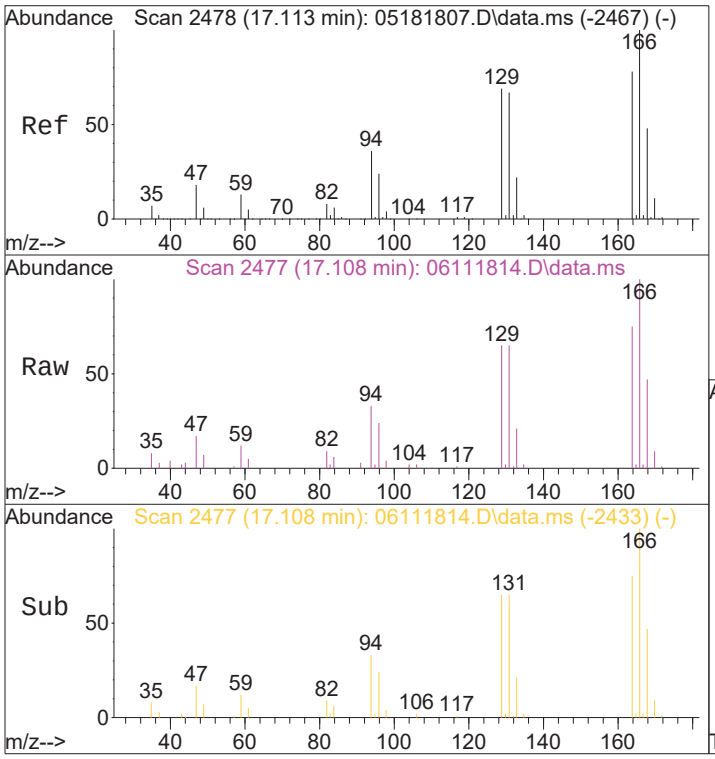


#47
Trichloroethene
Concen: 85.91 ng
RT: 14.13 min Scan# 1936
Delta R.T. -0.011 min
Lab File: 06111814.D
Acq: 11 Jun 2018 14:37

Tgt Ion:130 Resp: 3786288

Ion	Ratio	Lower	Upper
130	100		
132	95.8	76.0	116.0

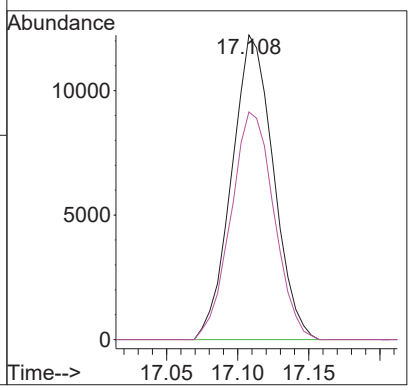




#64
Tetrachloroethene
Concen: 0.57 ng
RT: 17.11 min Scan# 2477
Delta R.T. -0.006 min
Lab File: 06111814.D
Acq: 11 Jun 2018 14:37

Tgt Ion:166 Resp: 24964

Ion	Ratio	Lower	Upper
166	100		
164	77.3	57.9	97.9



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111815.D
Acq On : 11 Jun 2018 15:10 Operator: WA
Sample : P1802915-002 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Jun 14 10:59:51 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

VOA 6/14/18

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	359331	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.43	114	1548677	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.72	82	677771	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	12.17	65	479643	11.809	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.48%			
57) Toluene-d8 (SS2)	15.87	98	1448957	12.310	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.48%			
73) Bromofluorobenzene (SS3)	19.09	174	483188	12.932	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.44%			
Target Compounds						Qvalue
2) Propene	4.09	42	766	.D.		
3) Dichlorodifluoromethan...	4.23	85	3242	.D.		
4) Chloromethane	4.54	50	283	.D.		
5) 1,2-Dichloro-1,1,2,2-t...	4.81	135	610	.D.		
6) Vinyl Chloride	4.97	62	28689	.D.		
7) 1,3-Butadiene	0.00	54	0	.D.		
8) Bromomethane	0.00	94	0	.D.		
9) Chloroethane	0.00	64	0	.D.		
10) Ethanol	6.53	45	52	.D.		
11) Acetonitrile	6.75	41	863	.D.		
12) Acrolein	6.93	56	51	.D.		
13) Acetone	7.17	58	5322	.D.		
14) Trichlorofluoromethane	7.35	101	1296	.D.		
15) 2-Propanol (Isopropanol)	7.69	45	4233	.D.		
16) Acrylonitrile	8.11	53	1751	.D.		
17) 1,1-Dichloroethene	8.34	96	29380	0.717	ng	90
18) 2-Methyl-2-Propanol (t...	8.61	59	401	.D.		
19) Methylene Chloride	8.56	84	150911	3.345	ng	85
20) 3-Chloro-1-propene (Al...	0.00	41	0	.D.		
21) Trichlorotrifluoroethane	8.99	151	2381249	64.066	ng	92
22) Carbon Disulfide	8.85	76	4248	.D.		
23) trans-1,2-Dichloroethene	9.85	61	7493	.D.		
24) 1,1-Dichloroethane	10.12	63	9563	.D.		
25) Methyl tert-Butyl Ether	10.25	73	2387	.D.		
26) Vinyl Acetate	0.00	86	0	.D.		
27) 2-Butanone (ME)	10.66	72	291	.D.		
28) cis-1,2-Dichloroethene	11.13	61	2927983	48.536	ng	91
29) Diisopropyl Ether	11.48	87	1175	.D.		
30) Ethyl Acetate	11.52	61	321	.D.		
31) n-He ane	11.42	57	1799	.D.		
32) Chloroform	11.48	83	12192	.D.		
34) Tetrahydrofuran (THF)	11.96	72	235	.D.		
35) Ethyl tert-Butyl Ether	0.00	87	0	.D.		
36) 1,2-Dichloroethane	12.29	62	44818	0.856	ng	100
38) 1,1,1-Trichloroethane	12.56	97	1214	.D.		
39) Isopropyl Acetate	0.00	61	0	.D.		
40) 1-Butanol	13.05	56	430	.D.		
41) Benzene	13.04	78	9268	.D.		
42) Carbon Tetrachloride	13.20	117	1562	.D.		
43) Cyclohe ane	13.32	84	3934	.D.		
44) tert-Amyl Methyl Ether	0.00	73	0	.D.		
45) 1,2-Dichloropropane	0.00	63	0	.D.		
46) Bromodichloromethane	0.00	83	0	.D.	d	
47) Trichloroethene	14.13	130	3919235	87.949	ng	100
48) 1,4-Dio ane	14.13	88	660	.D.		
49) 2,2,4-Trimethylpentane...	14.19	57	5600	.D.		

Data File: I:\MS16\DATA\2018_06\11\06111815.D
Acq On : 11 Jun 2018 15:10 Operator: WA
Sample : P1802915-002 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

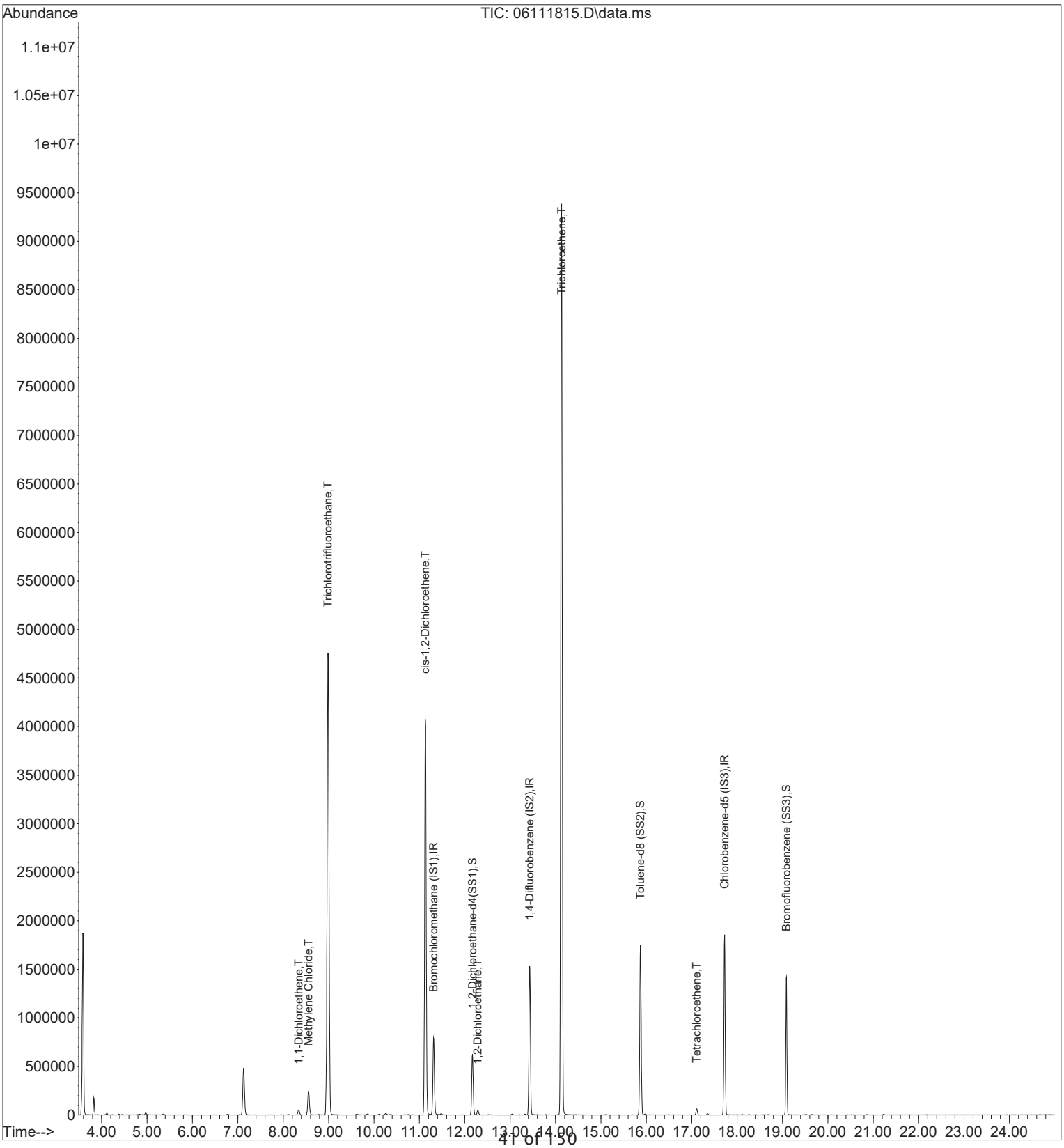
Quant Time: Jun 14 10:59:51 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	0.00	100	0	.D.	d	
51) n-Heptane	14.45	71	535	.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	.D.		
55) 1,1,2-Trichloroethane	15.69	97	1187	.D.		
58) Toluene	15.97	91	9295	.D.		
59) 2-He anone	16.22	43	701	.D.		
60) Dibromochloromethane	0.00	129	0	.D.		
61) 1,2-Dibromoethane	0.00	107	0	.D.		
62) n-Butyl Acetate	16.85	43	102	.D.		
63) n-Octane	0.00	57	0	.D.		
64) Tetrachloroethene	17.11	166	24574	0.564	ng	99
65) Chlorobenzene	17.77	112	176	.D.		
66) Ethylbenzene	18.11	91	4607	.D.		
67) m- p- ylenes	18.26	91	4334	.D.		
68) Bromoform	0.00	173	0	.D.		
69) Styrene	18.60	104	1277	.D.		
70) o- ylene	18.69	91	2342	.D.		
71) n- onane	18.87	43	185	.D.		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	.D.		
74) Cumene	19.20	105	1049	.D.		
75) alpha-Pinene	19.55	93	114	.D.		
76) n-Propylbenzene	19.65	91	831	.D.		
77) 3-Ethyltoluene	19.73	105	1000	.D.		
78) 4-Ethyltoluene	19.77	105	760	.D.		
79) 1,3,5-Trimethylbenzene	19.83	105	637	.D.		
80) alpha-Methylstyrene	0.00	118	0	.D.		
81) 2-Ethyltoluene	20.00	105	882	.D.		
82) 1,2,4-Trimethylbenzene	20.19	105	1109	.D.		
83) n-Decane	20.26	57	430	.D.		
84) Benzyl Chloride	20.31	91	129	.D.		
85) 1,3-Dichlorobenzene	20.32	146	191	.D.		
86) 1,4-Dichlorobenzene	20.39	146	272	.D.		
87) sec-Butylbenzene	20.56	105	453	.D.		
88) 4-Isopropyltoluene (p-...	20.56	119	447	.D.		
89) 1,2,3-Trimethylbenzene	20.56	105	453	.D.		
90) 1,2-Dichlorobenzene	20.68	146	172	.D.		
91) d-Limonene	0.00	68	0	.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	.D.		
93) n-Undecane	21.35	57	363	.D.		
94) 1,2,4-Trichlorobenzene	22.16	180	237	.D.		
95) aphthalene	22.28	128	1657	.D.		
96) n-Dodecane	22.24	57	339	.D.		
97) He achlorobutadiene	0.00	225	0	.D.		
98) Cyclohe anone	18.42	55	1288	.D.		
99) tert-Butylbenzene	20.19	119	219	.D.		
100) n-Butylbenzene	20.92	91	280	.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111815.D
Acq On : 11 Jun 2018 15:10 Operator: WA
Sample : P1802915-002 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Jun 14 10:59:51 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111815.D
Acq On : 11 Jun 2018 15:10 Operator: WA
Sample : P1802915-002 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

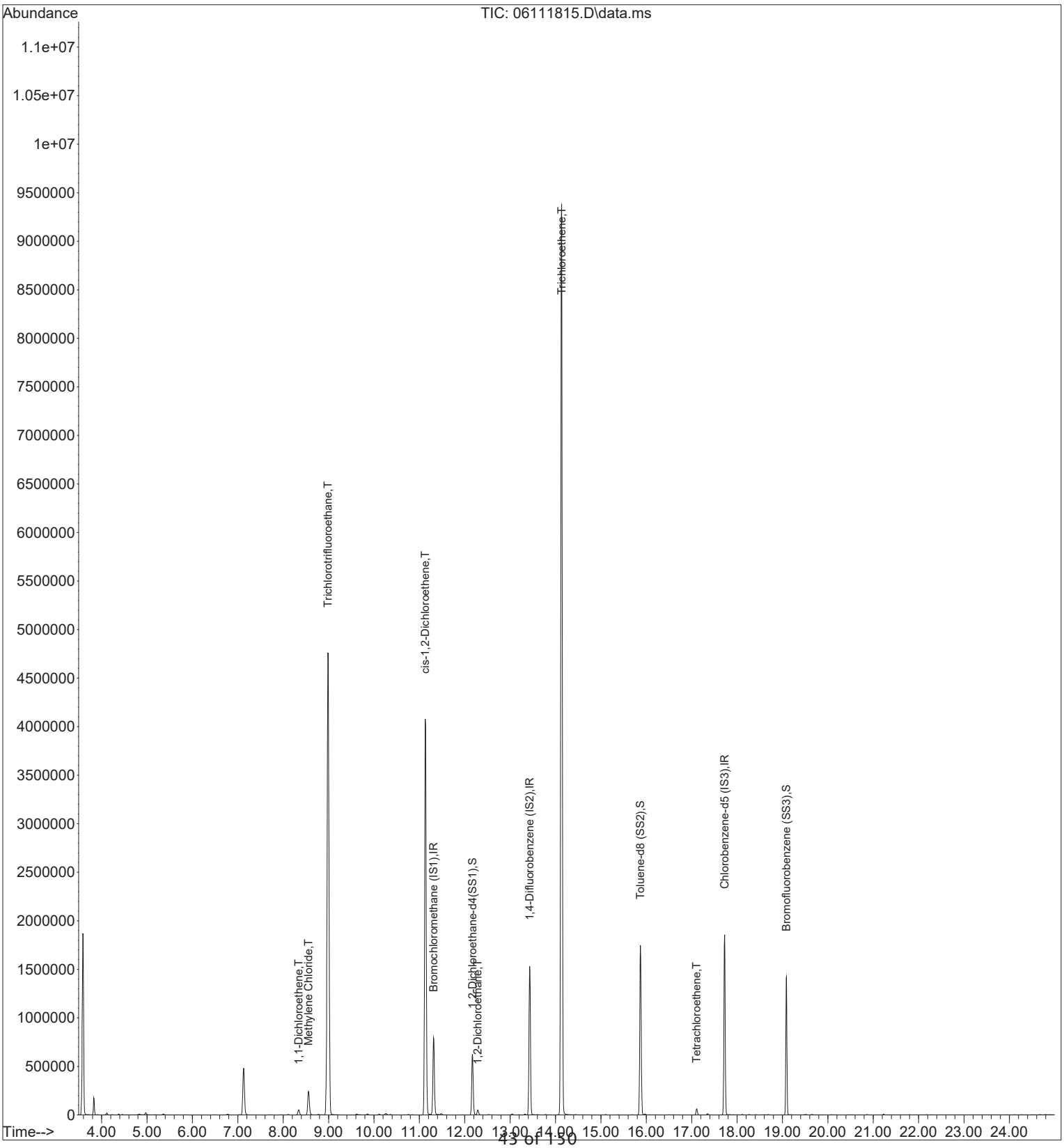
Quant Time: Jun 14 10:59:51 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018 WSA 6/14/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

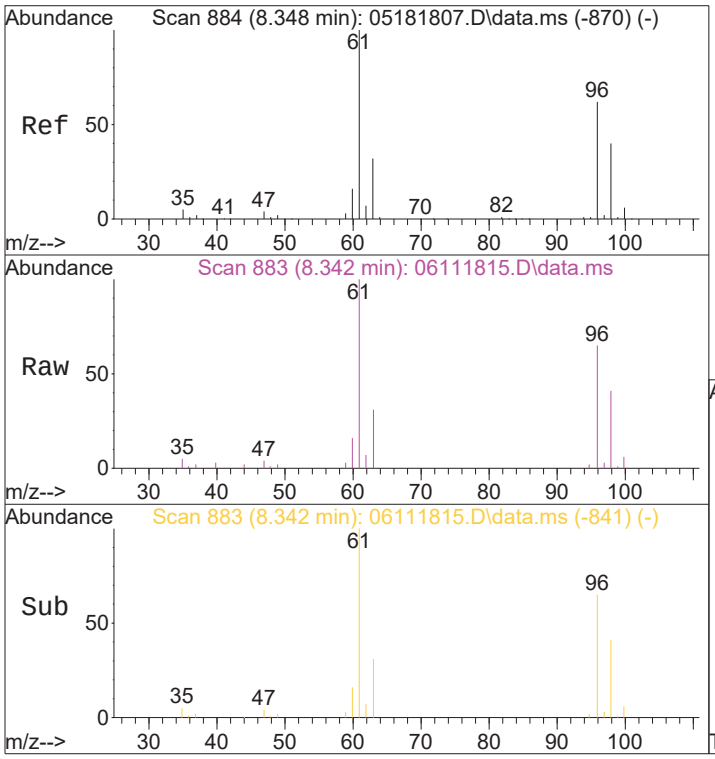
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	359331	12.500	ng	-0.03
37) 1,4-Difluorobenzene (IS2)	13.43	114	1548677	12.500	ng	-0.02
56) Chlorobenzene-d5 (IS3)	17.72	82	677771	12.500	ng	0.00
System Monitoring Compounds						
33) 1,2-Dichloroethane-d4(...	12.17	65	479643	11.809	ng	-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 94.48%			
57) Toluene-d8 (SS2)	15.87	98	1448957	12.310	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.48%			
73) Bromofluorobenzene (SS3)	19.09	174	483188	12.932	ng	0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.44%			
Target Compounds						Qvalue
17) 1,1-Dichloroethene	8.34	96	29380	0.717	ng	90
19) Methylene Chloride	8.56	84	150911	3.345	ng	85
21) Trichlorotrifluoroethane	8.99	151	2381249	64.066	ng	92
28) cis-1,2-Dichloroethene	11.13	61	2927983	48.536	ng	91
36) 1,2-Dichloroethane	12.29	62	44818	0.856	ng	100
47) Trichloroethene	14.13	130	3919235	87.949	ng	100
64) Tetrachloroethene	17.11	166	24574	0.564	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111815.D
Acq On : 11 Jun 2018 15:10 Operator: WA
Sample : P1802915-002 (3.0mL)
Misc : S31-04201801
ALS Vial : 1 Sample Multiplier: 1

Quant Time: Jun 14 10:59:51 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

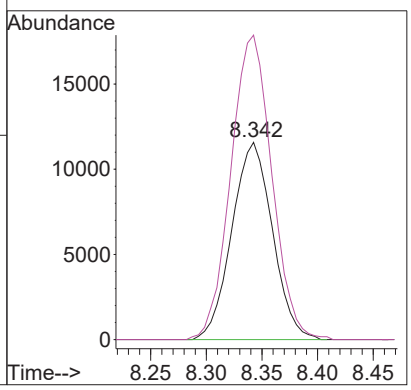


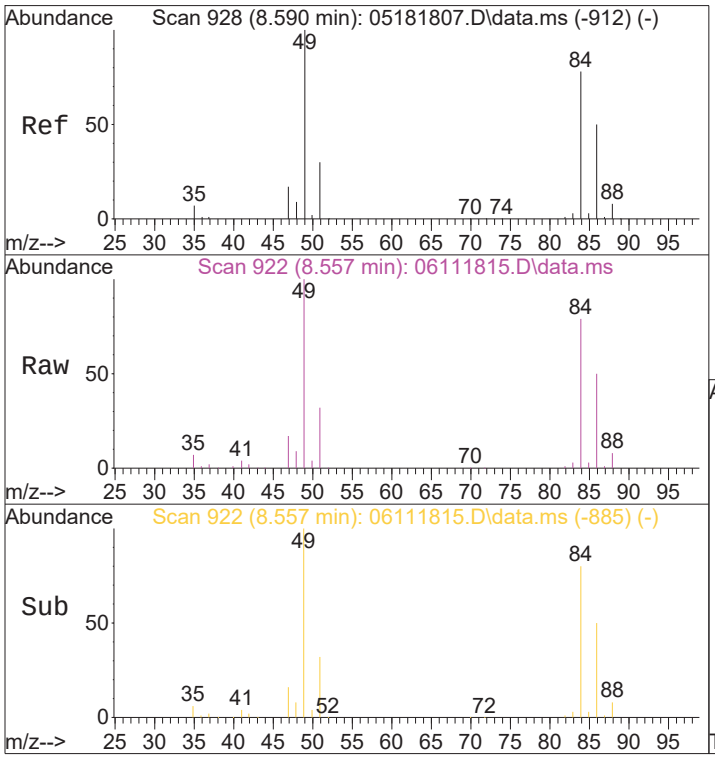


#17
1,1-Dichloroethene
Concen: 0.72 ng
RT: 8.34 min Scan# 883
Delta R.T. -0.016 min
Lab File: 06111815.D
Acq: 11 Jun 2018 15:10

Tgt Ion: 96 Resp: 29380

Ion	Ratio	Lower	Upper
96	100		
61	155.9	123.5	163.5

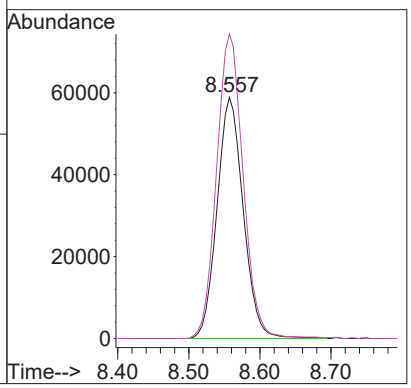


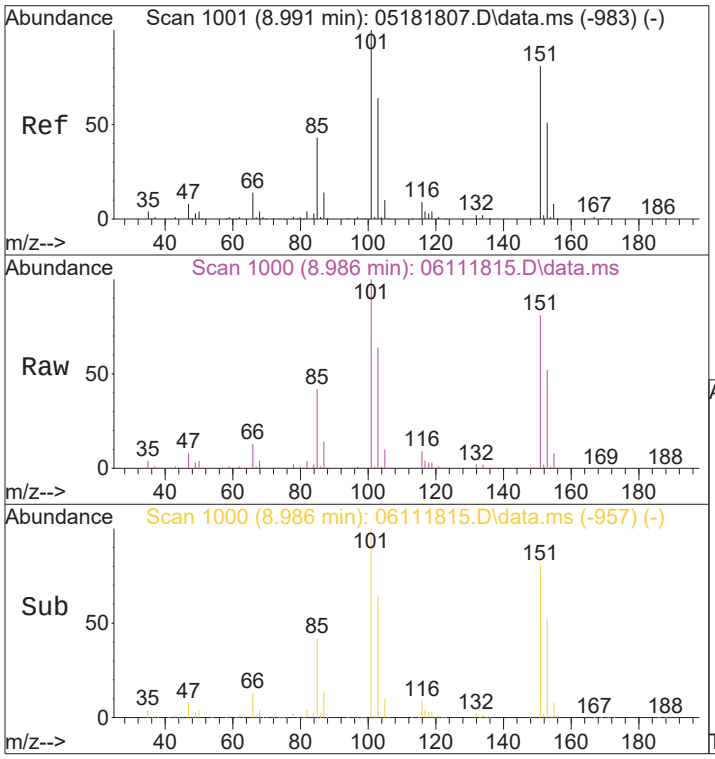


#19
Methylene Chloride
Concen: 3.34 ng
RT: 8.56 min Scan# 922
Delta R.T. -0.044 min
Lab File: 06111815.D
Acq: 11 Jun 2018 15:10

Tgt Ion: 84 Resp: 150911

Ion	Ratio	Lower	Upper
84	100		
49	128.1	87.3	137.3

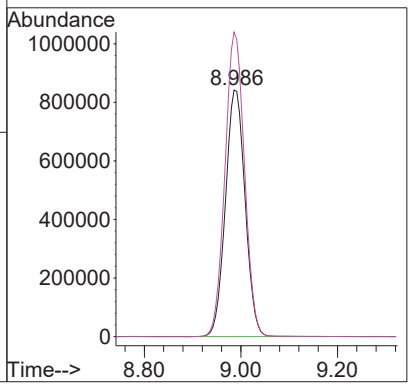


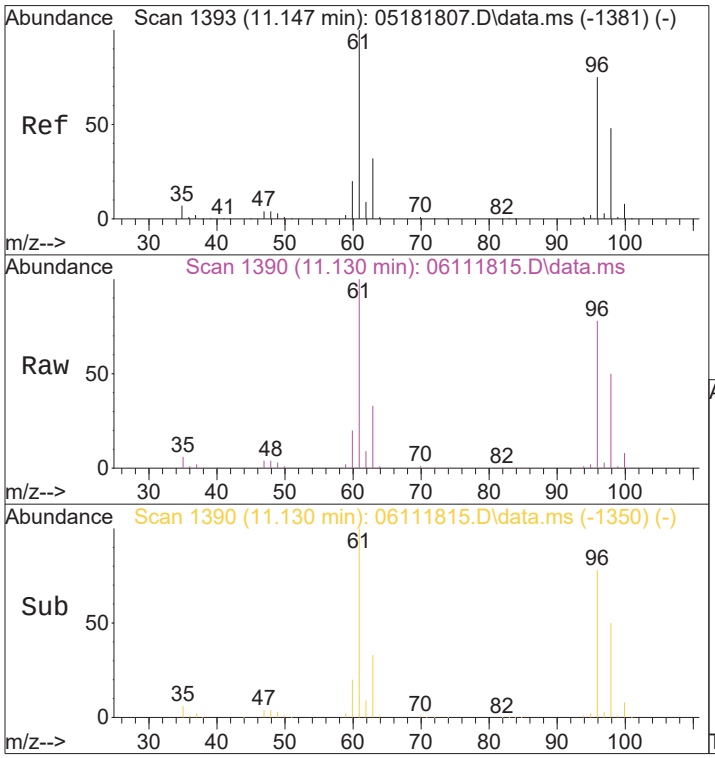


#21
Trichlorotrifluoroethane
Concen: 64.07 ng
RT: 8.99 min Scan# 1000
Delta R.T. -0.011 min
Lab File: 06111815.D
Acq: 11 Jun 2018 15:10

Tgt Ion:151 Resp: 2381249

Ion	Ratio	Lower	Upper
151	100		
101	122.8	94.6	134.6

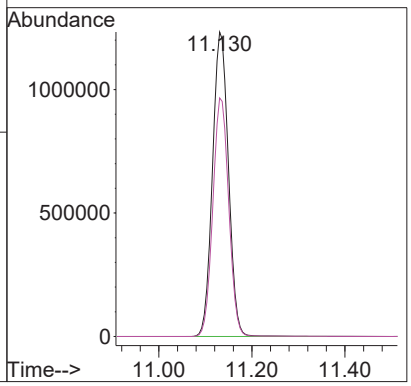


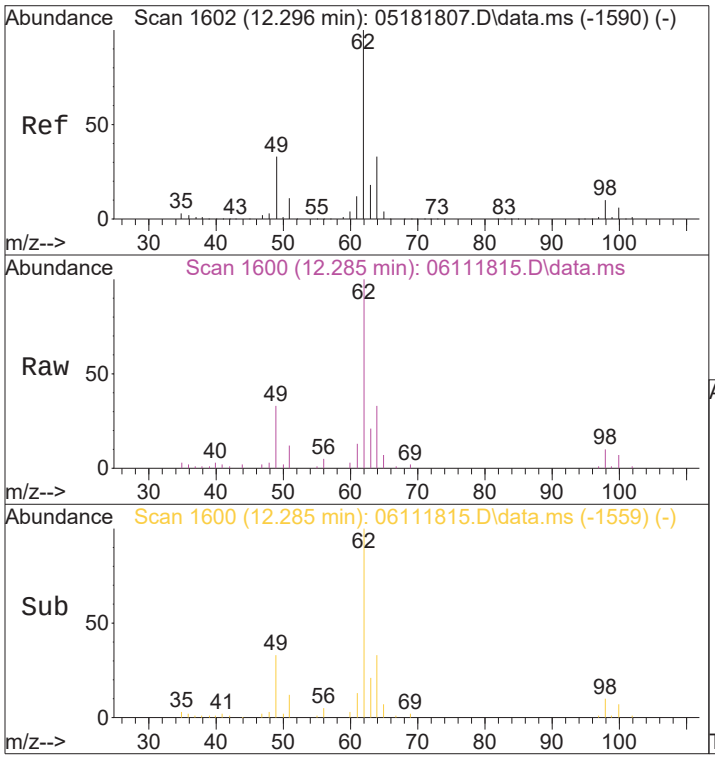


#28
cis-1,2-Dichloroethene
Concen: 48.54 ng
RT: 11.13 min Scan# 1390
Delta R.T. -0.027 min
Lab File: 06111815.D
Acq: 11 Jun 2018 15:10

Tgt Ion: 61 Resp: 2927983

Ion	Ratio	Lower	Upper
61	100		
96	78.3	66.3	106.3

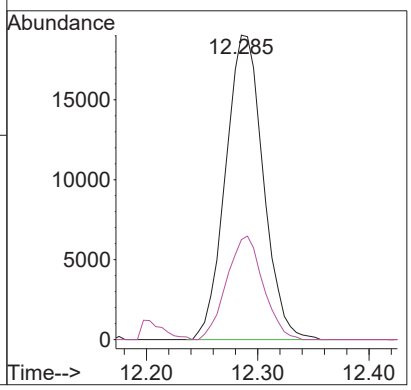


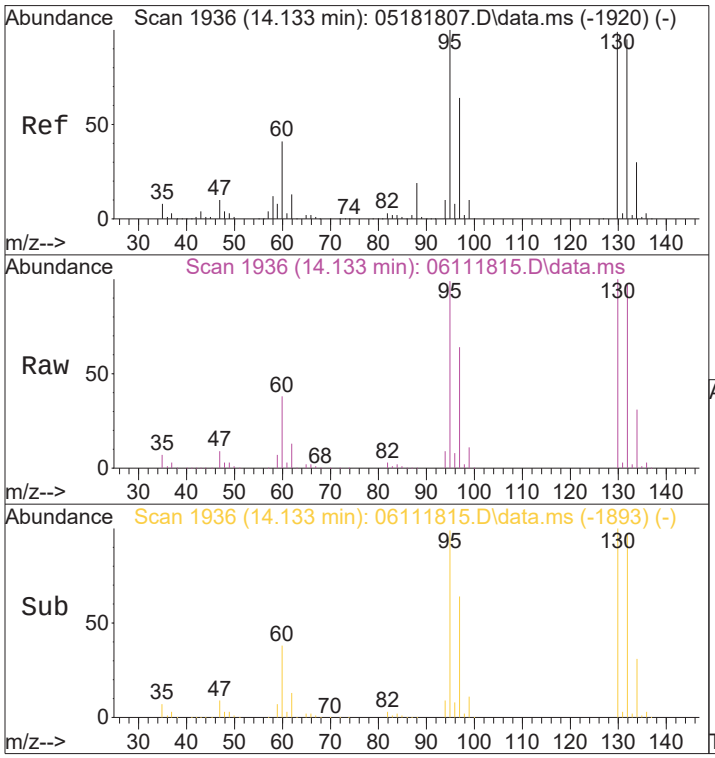


#36
1,2-Dichloroethane
Concen: 0.86 ng
RT: 12.29 min Scan# 1600
Delta R.T. -0.022 min
Lab File: 06111815.D
Acq: 11 Jun 2018 15:10

Tgt Ion: 62 Resp: 44818

Ion	Ratio	Lower	Upper
62	100		
64	32.9	12.9	52.9

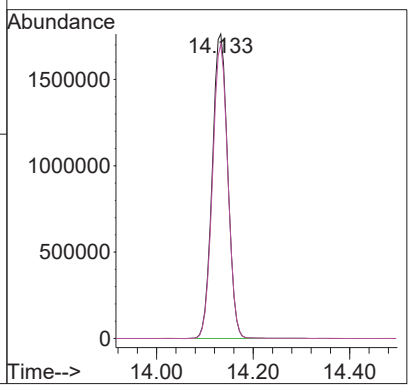


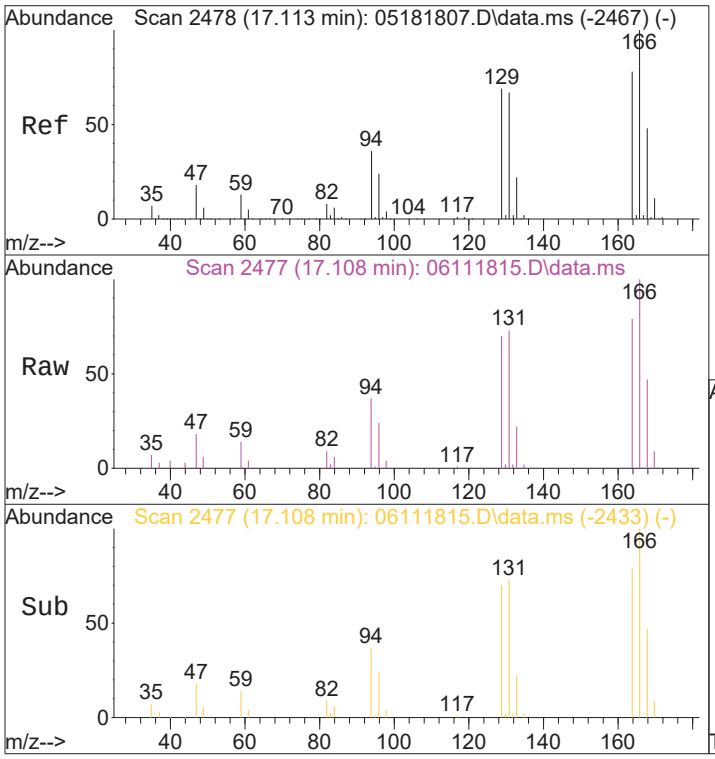


#47
Trichloroethene
Concen: 87.95 ng
RT: 14.13 min Scan# 1936
Delta R.T. -0.011 min
Lab File: 06111815.D
Acq: 11 Jun 2018 15:10

Tgt Ion:130 Resp: 3919235

Ion	Ratio	Lower	Upper
130	100		
132	96.0	76.0	116.0

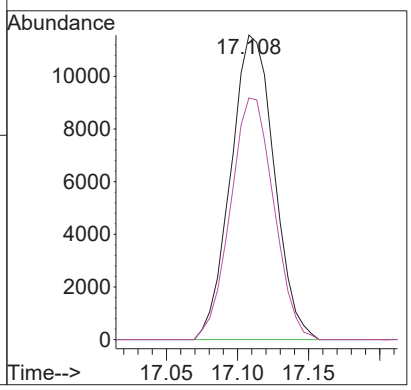




#64
Tetrachloroethene
Concen: 0.56 ng
RT: 17.11 min Scan# 2477
Delta R.T. -0.005 min
Lab File: 06111815.D
Acq: 11 Jun 2018 15:10

Tgt Ion:166 Resp: 24574

Ion	Ratio	Lower	Upper
166	100		
164	79.1	57.9	97.9



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111816.D
Acq On : 11 Jun 2018 16:10 Operator: WA
Sample : P1802915-003 (1000mL)
Misc : S31-04201801
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 14 11:01:10 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

WA 6/14/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	359128	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	13.43	114	1561105	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	17.72	82	690555	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.17	65	471918	11.625	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.04%				
57) Toluene-d8 (SS2)	15.87	98	1468736	12.247	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.00%				
73) Bromofluorobenzene (SS3)	19.09	174	495015	13.003	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 104.00%				
Target Compounds							Qvalue
2) Propene	4.06	42	22944m	0.457	ng		
3) Dichlorodifluoromethan...	4.23	85	111409	1.395	ng		99
4) Chloromethane	4.53	50	9320	.D.			
5) 1,2-Dichloro-1,1,2,2-t...	4.81	135	2465	.D.			
6) Vinyl Chloride	4.97	62	13492	.D.			
7) 1,3-Butadiene	0.00	54	0	.D.			
8) Bromomethane	5.71	94	724	.D.			
9) Chloroethane	6.04	64	285	.D.			
10) Ethanol	6.41	45	37433	1.090	ng		96
11) Acetonitrile	6.71	41	12137	.D.			
12) Acrolein	6.91	56	5328	.D.			
13) Acetone	7.11	58	209638	5.993	ng	#	77
14) Trichlorofluoromethane	7.35	101	53614	0.794	ng		99
15) 2-Propanol (Isopropanol)	7.63	45	55338	0.502	ng		86
16) Acrylonitrile	7.95	53	1701	.D.			
17) 1,1-Dichloroethene	8.34	96	14082	.D.			
18) 2-Methyl-2-Propanol (t...	8.58	59	3114	.D.			
19) Methylene Chloride	8.56	84	42442	0.941	ng		87
20) 3-Chloro-1-propene (Al...	8.64	41	640	.D.			
21) Trichlorotrifluoroethane	8.99	151	1836917	49.449	ng		93
22) Carbon Disulfide	8.85	76	8059	.D.			
23) trans-1,2-Dichloroethene	9.85	61	2516	.D.			
24) 1,1-Dichloroethane	10.11	63	2559	.D.			
25) Methyl tert-Butyl Ether	10.24	73	312	.D.			
26) Vinyl Acetate	0.00	86	0	.D.	d		
27) 2-Butanone (ME)	10.63	72	24338	0.804	ng	#	72
28) cis-1,2-Dichloroethene	11.13	61	586837	9.733	ng		90
29) Diisopropyl Ether	11.43	87	310	.D.			
30) Ethyl Acetate	11.44	61	15280	0.938	ng		88
31) n-He ane	11.41	57	31045	0.460	ng		98
32) Chloroform	11.48	83	6842	.D.			
34) Tetrahydrofuran (THF)	11.91	72	12005	.D.			
35) Ethyl tert-Butyl Ether	0.00	87	0	.D.			
36) 1,2-Dichloroethane	12.29	62	7577	.D.			
38) 1,1,1-Trichloroethane	12.56	97	746	.D.			
39) Isopropyl Acetate	0.00	61	0	.D.			
40) 1-Butanol	13.02	56	13857	.D.			
41) Benzene	13.04	78	39260	.D.			
42) Carbon Tetrachloride	13.19	117	13098	.D.			
43) Cyclohe ane	13.32	84	8297	.D.			
44) tert-Amyl Methyl Ether	13.72	73	3774	.D.			
45) 1,2-Dichloropropane	13.89	63	316	.D.			
46) Bromodichloromethane	14.13	83	15394	.D.			
47) Trichloroethene	14.13	130	1278316	28.458	ng		99
48) 1,4-Dio ane	0.00	88	0	.D.			
49) 2,2,4-Trimethylpentane...	14.19	57	15744	.D.			

00905925

Data File: I:\MS16\DATA\2018_06\11\06111816.D
Acq On : 11 Jun 2018 16:10 Operator: WA
Sample : P1802915-003 (1000mL)
Misc : S31-04201801
ALS Vial : 3 Sample Multiplier: 1

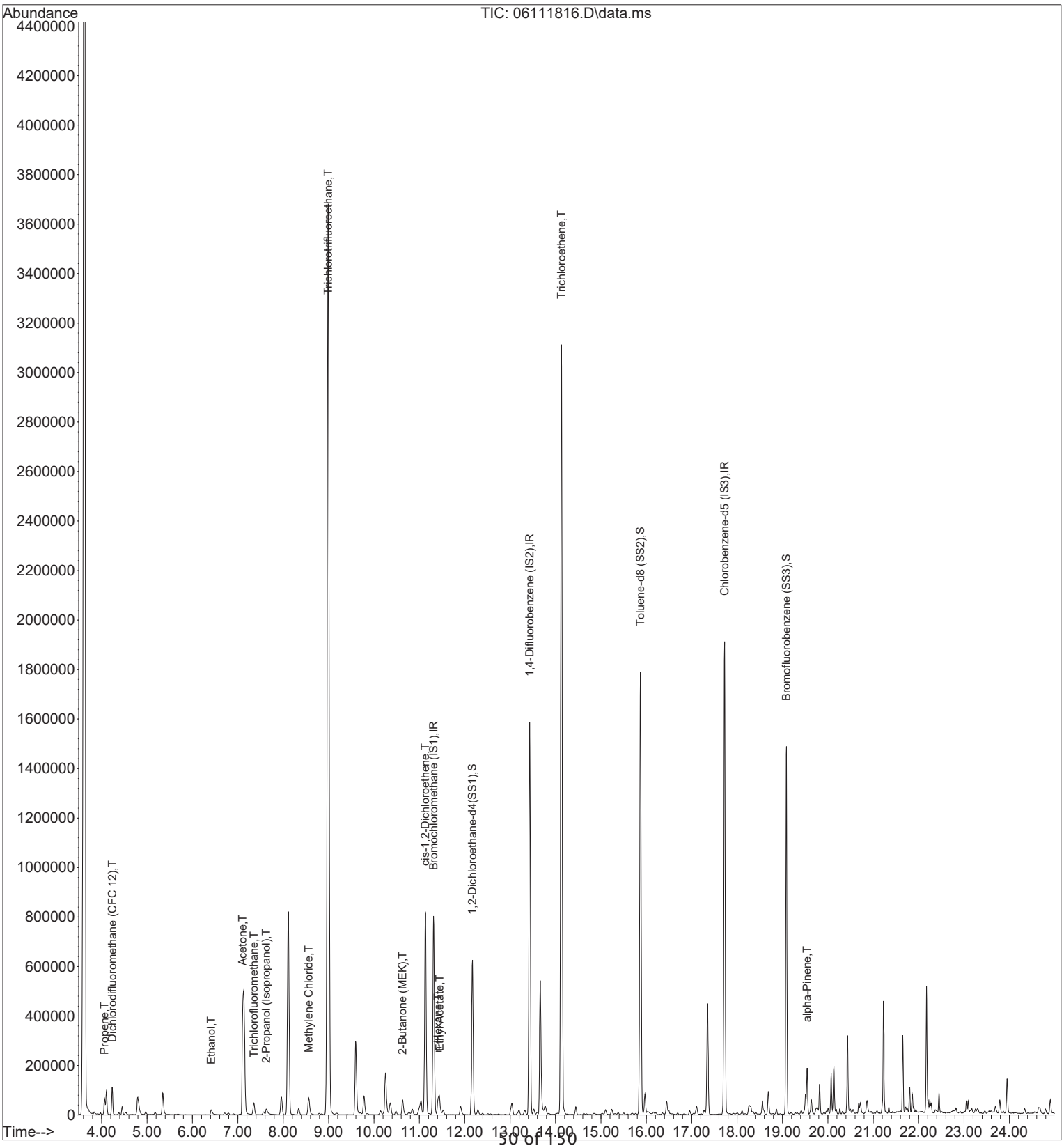
Quant Time: Jun 14 11:01:10 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
50) Methyl Methacrylate	14.45	100	2112	.D.	
51) n-Heptane	14.45	71	8593	.D.	
52) cis-1,3-Dichloropropene	0.00	75	0	.D.	
53) 4-Methyl-2-pentanone	15.03	58	1598	.D.	
54) trans-1,3-Dichloropropene	15.50	75	464	.D.	
55) 1,1,2-Trichloroethane	15.68	97	107	.D.	
58) Toluene	15.97	91	68832	.D.	
59) 2-He anone	16.21	43	4794	.D.	
60) Dibromochloromethane	0.00	129	0	.D.	
61) 1,2-Dibromoethane	0.00	107	0	.D.	
62) n-Butyl Acetate	16.84	43	2613	.D.	
63) n-Octane	16.95	57	3716	.D.	
64) Tetrachloroethene	17.11	166	11484	.D.	
65) Chlorobenzene	17.77	112	742	.D.	
66) Ethylbenzene	18.11	91	12252	.D.	
67) m- p- ylenes	18.26	91	28563	.D.	
68) Bromoform	0.00	173	0	.D.	
69) Styrene	18.59	104	8453	.D.	
70) o- ylene	18.69	91	9799	.D.	
71) n- onane	18.87	43	8176	.D.	
72) 1,1,2,2-Tetrachloroethane	18.69	83	3332	.D.	
74) Cumene	19.20	105	1190	.D.	
75) alpha-Pinene	19.54	93	79059	0.838 ng	98
76) n-Propylbenzene	19.63	91	5560	.D.	
77) 3-Ethyltoluene	19.73	105	5294	.D.	
78) 4-Ethyltoluene	19.77	105	2934	.D.	
79) 1,3,5-Trimethylbenzene	19.84	105	2083	.D.	
80) alpha-Methylstyrene	19.96	118	406	.D.	
81) 2-Ethyltoluene	20.00	105	2435	.D.	
82) 1,2,4-Trimethylbenzene	20.19	105	7175	.D.	
83) n-Decane	20.26	57	6386	.D.	
84) Benzyl Chloride	20.31	91	1103	.D.	
85) 1,3-Dichlorobenzene	20.33	146	436	.D.	
86) 1,4-Dichlorobenzene	20.39	146	1621	.D.	
87) sec-Butylbenzene	20.43	105	2049	.D.	
88) 4-Isopropyltoluene (p-...	20.56	119	4677	.D.	
89) 1,2,3-Trimethylbenzene	20.56	105	2529	.D.	
90) 1,2-Dichlorobenzene	20.68	146	268	.D.	
91) d-Limonene	20.68	68	10874	.D.	
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	.D.	
93) n-Undecane	21.34	57	6709	.D.	
94) 1,2,4-Trichlorobenzene	22.17	180	568	.D.	
95) aphthalene	22.28	128	25926	.D.	
96) n-Dodecane	22.24	57	16205	.D.	
97) He achlorobutadiene	0.00	225	0	.D.	
98) Cyclohe anone	18.41	55	3399	.D.	
99) tert-Butylbenzene	20.18	119	1194	.D.	
100) n-Butylbenzene	20.89	91	5444	.D.	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111816.D
Acq On : 11 Jun 2018 16:10 Operator: WA
Sample : P1802915-003 (1000mL)
Misc : S31-04201801
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 14 11:01:10 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111816.D
Acq On : 11 Jun 2018 16:10 Operator: WA
Sample : P1802915-003 (1000mL)
Misc : S31-04201801
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 14 11:01:10 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

WA 6/14/18

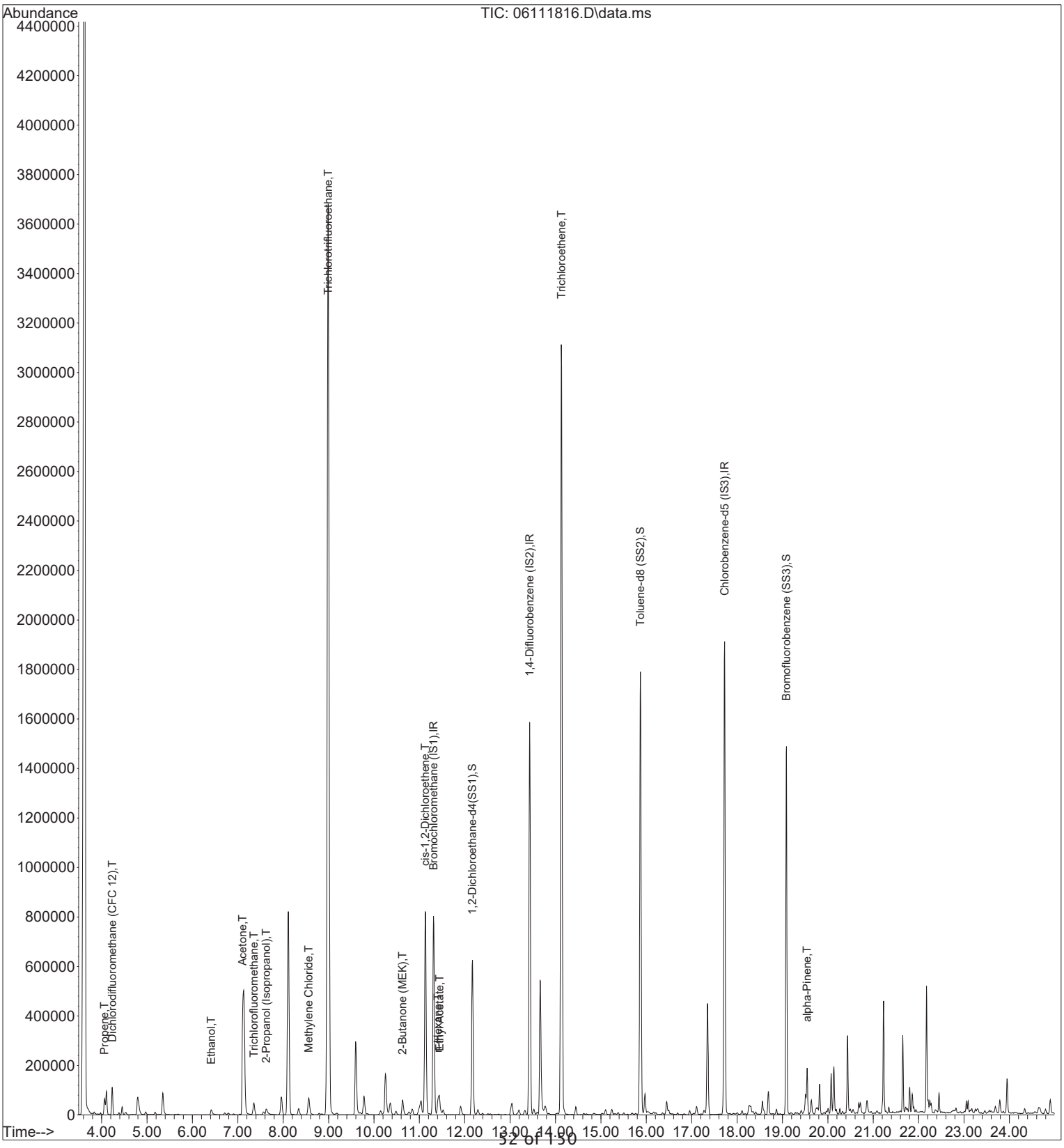
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	359128	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	13.43	114	1561105	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	17.72	82	690555	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.17	65	471918	11.625	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.04%				
57) Toluene-d8 (SS2)	15.87	98	1468736	12.247	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.00%				
73) Bromofluorobenzene (SS3)	19.09	174	495015	13.003	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 104.00%				
Target Compounds							Qvalue
2) Propene	4.06	42	22944m	0.457	ng		
3) Dichlorodifluoromethan...	4.23	85	111409	1.395	ng		99
10) Ethanol	6.41	45	37433	1.090	ng		96
13) Acetone	7.11	58	209638	5.993	ng	#	77
14) Trichlorofluoromethane	7.35	101	53614	0.794	ng		99
15) 2-Propanol (Isopropanol)	7.63	45	55338	0.502	ng		86
19) Methylene Chloride	8.56	84	42442	0.941	ng		87
21) Trichlorotrifluoroethane	8.99	151	1836917	49.449	ng		93
27) 2-Butanone (MEK)	10.63	72	24338	0.804	ng	#	72
28) cis-1,2-Dichloroethene	11.13	61	586837	9.733	ng		90
30) Ethyl Acetate	11.44	61	15280	0.938	ng		88
31) n-Hexane	11.41	57	31045	0.460	ng		98
47) Trichloroethene	14.13	130	1278316	28.458	ng		99
75) alpha-Pinene	19.54	93	79059	0.838	ng		98

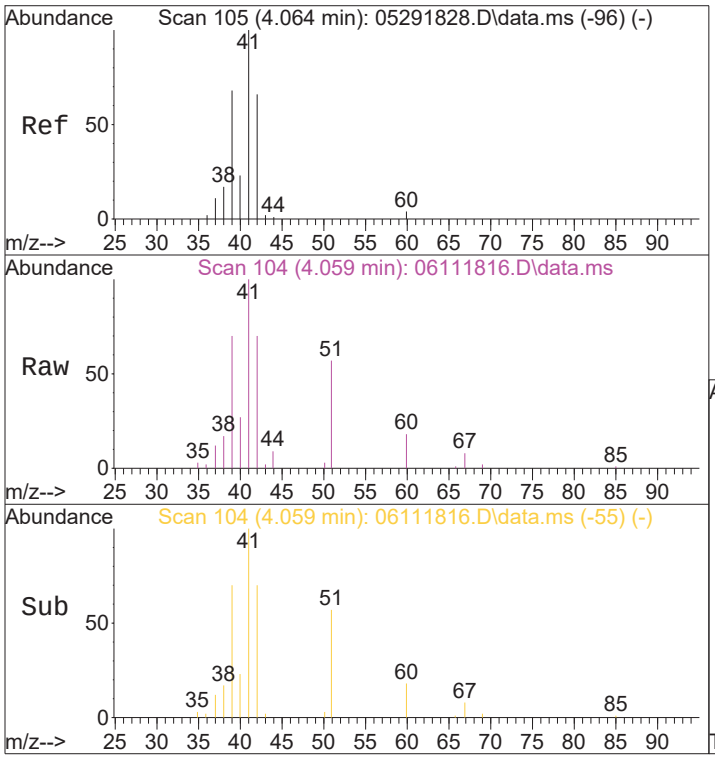
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111816.D
Acq On : 11 Jun 2018 16:10 Operator: WA
Sample : P1802915-003 (1000mL)
Misc : S31-04201801
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 14 11:01:10 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

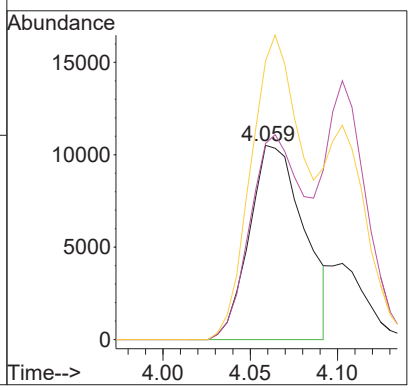


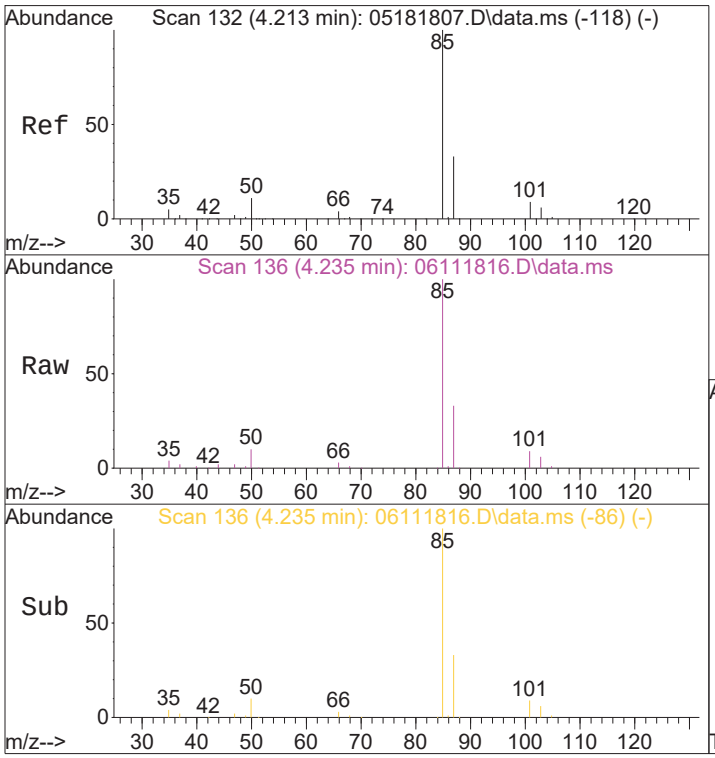


#2
Propene
Concen: 0.46 ng m
RT: 4.06 min Scan# 104
Delta R.T. 0.017 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 42 Resp: 22944

Ion	Ratio	Lower	Upper
42	100		
39	105.2	86.8	126.8
41	145.6	130.4	170.4

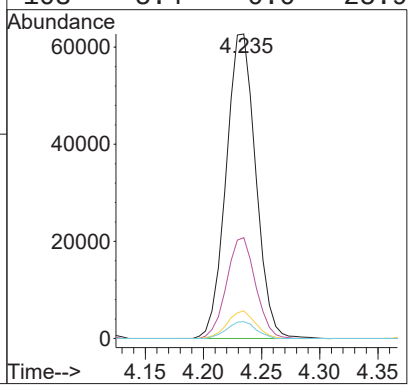


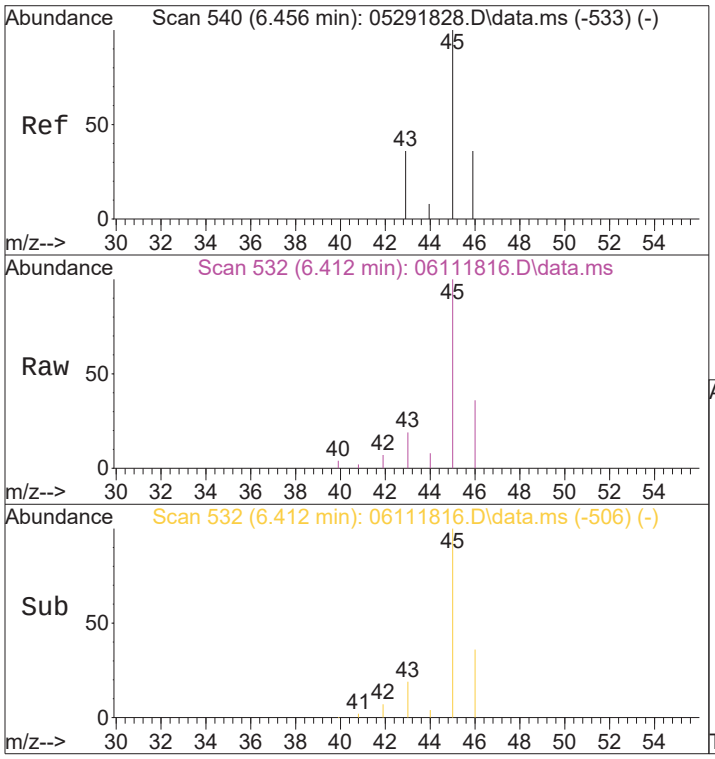


#3
Dichlorodifluoromethane (CFC 12)
Concen: 1.40 ng
RT: 4.23 min Scan# 136
Delta R.T. 0.028 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 85 Resp: 111409

Ion	Ratio	Lower	Upper
85	100		
87	32.4	12.6	52.6
101	8.7	0.0	29.1
103	5.4	0.0	25.9

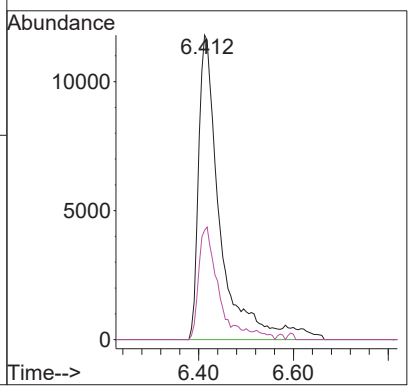


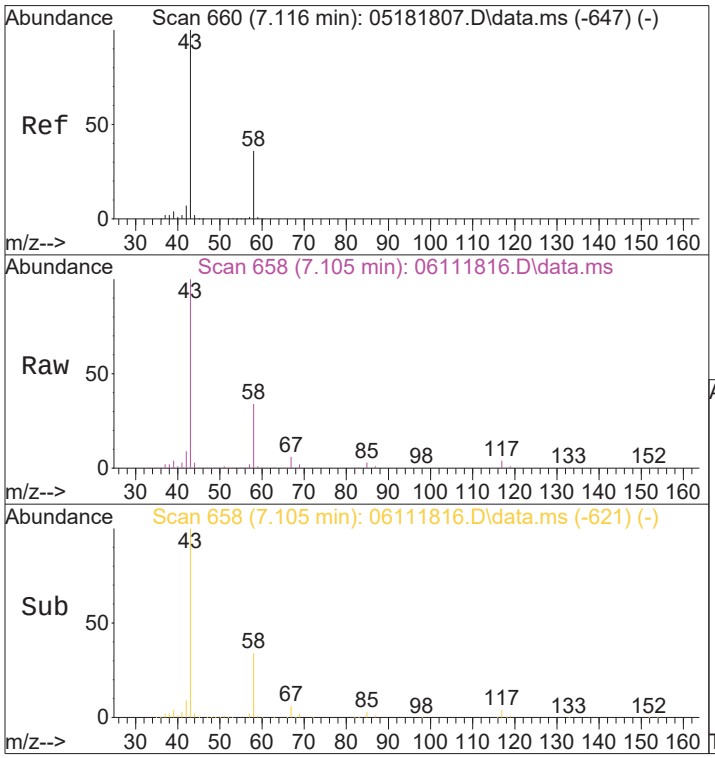


#10
Ethanol
Concen: 1.09 ng
RT: 6.41 min Scan# 532
Delta R.T. -0.104 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 45 Resp: 37433

Ion	Ratio	Lower	Upper
45	100		
46	34.9	17.2	57.2

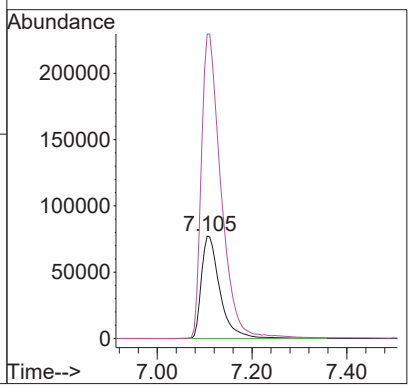


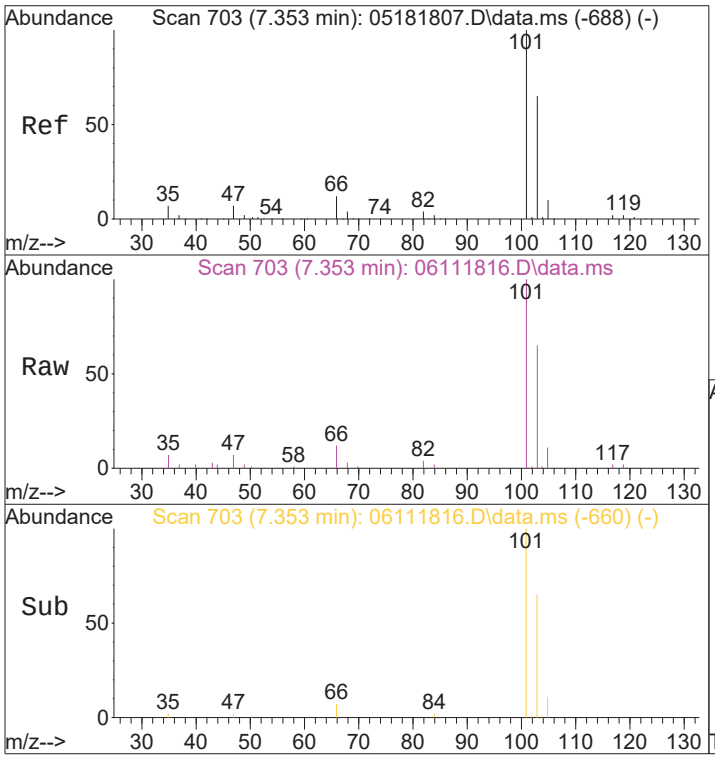


#13
Acetone
Concen: 5.99 ng
RT: 7.11 min Scan# 658
Delta R.T. -0.044 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 58 Resp: 209638

Ion	Ratio	Lower	Upper
58	100		
43	315.4	242.9	302.9#

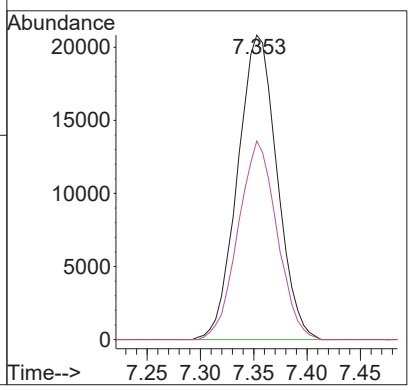


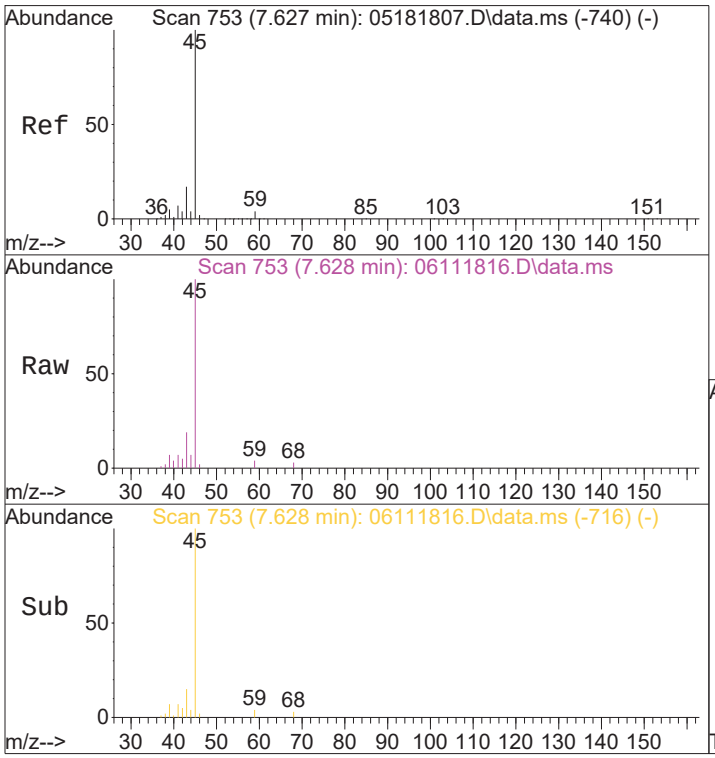


#14
Trichlorofluoromethane
Concen: 0.79 ng
RT: 7.35 min Scan# 703
Delta R.T. -0.011 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion:101 Resp: 53614

Ion	Ratio	Lower	Upper
101	100		
103	64.2	44.9	84.9

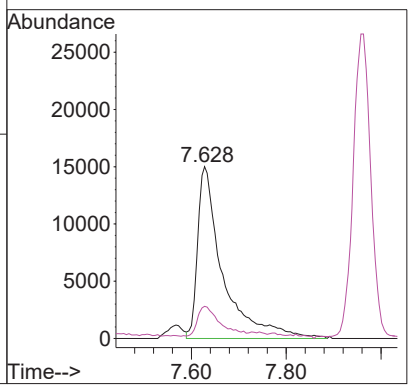


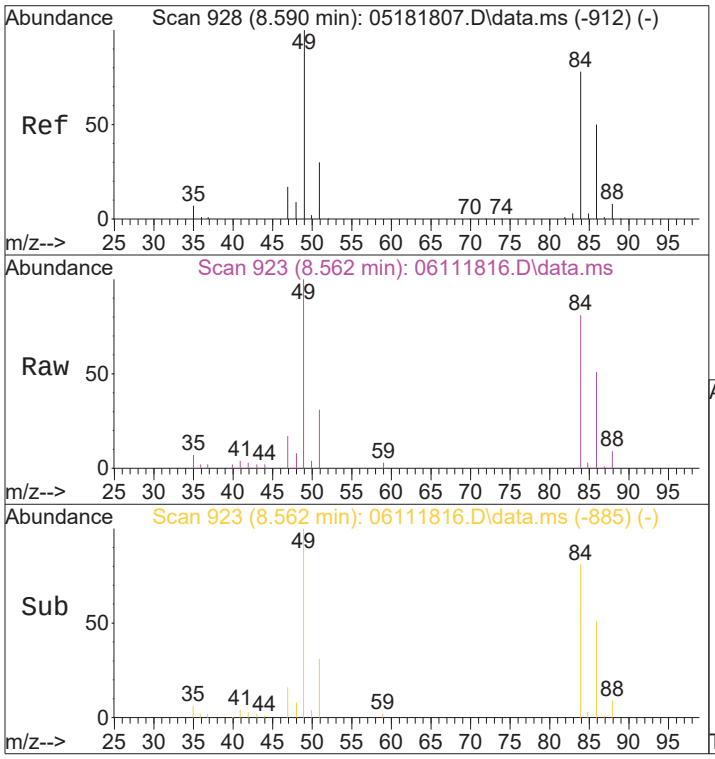


#15
2-Propanol (Isopropanol)
Concen: 0.50 ng
RT: 7.63 min Scan# 753
Delta R.T. -0.044 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 45 Resp: 55338

Ion	Ratio	Lower	Upper
45	100		
43	23.6	0.0	37.4

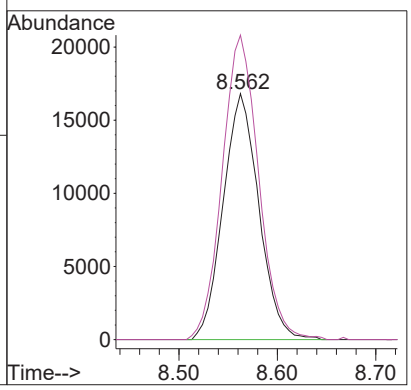


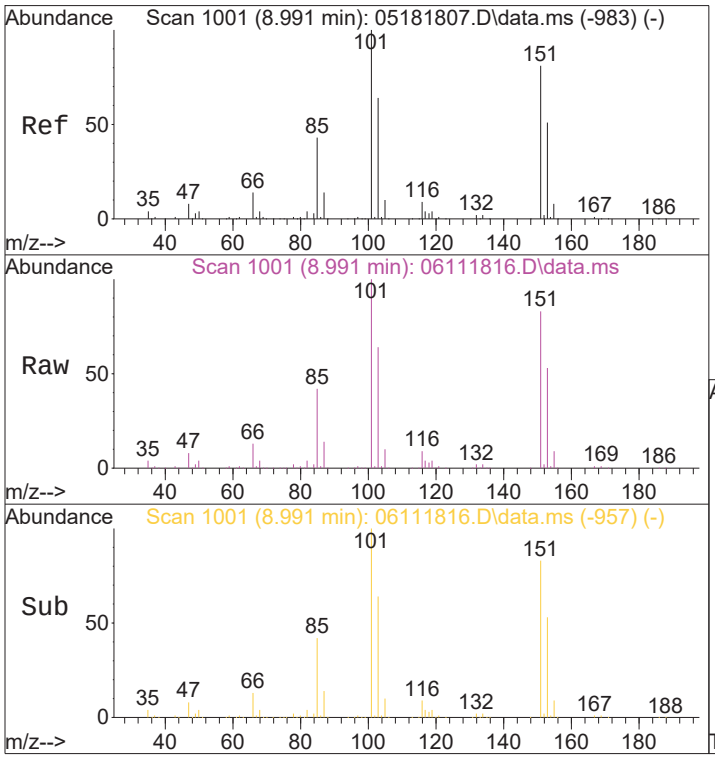


#19
Methylene Chloride
Concen: 0.94 ng
RT: 8.56 min Scan# 923
Delta R.T. -0.038 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 84 Resp: 42442

Ion	Ratio	Lower	Upper
84	100		
49	126.3	87.3	137.3

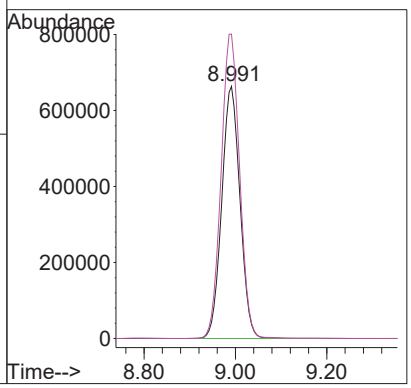


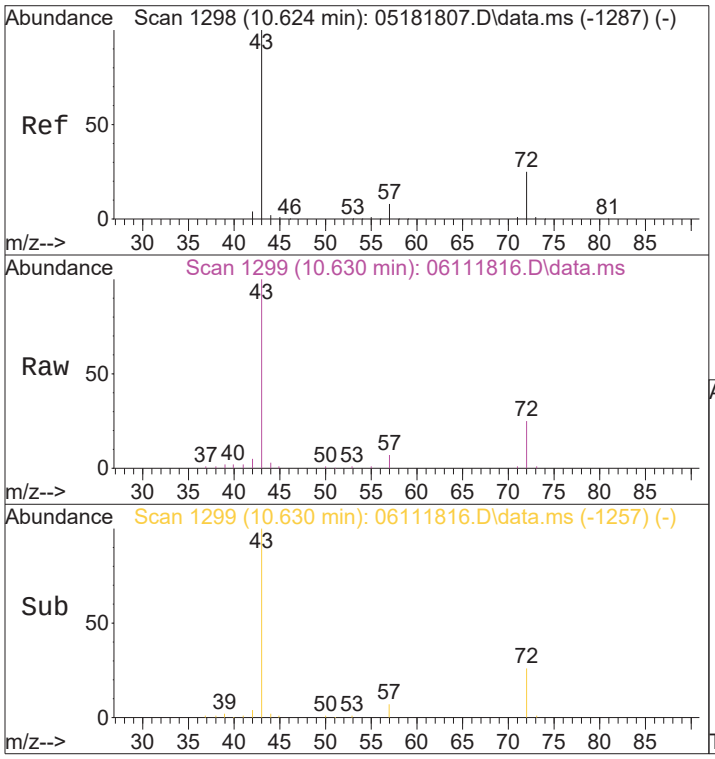


#21
Trichlorotrifluoroethane
Concen: 49.45 ng
RT: 8.99 min Scan# 1001
Delta R.T. -0.005 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion:151 Resp: 1836917

Ion	Ratio	Lower	Upper
151	100		
101	122.6	94.6	134.6

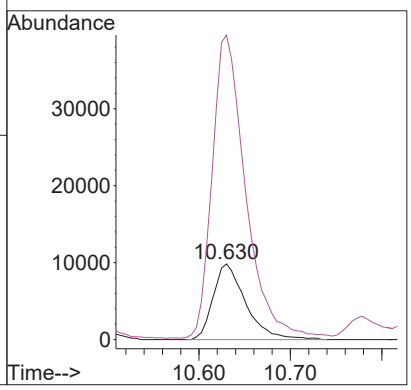


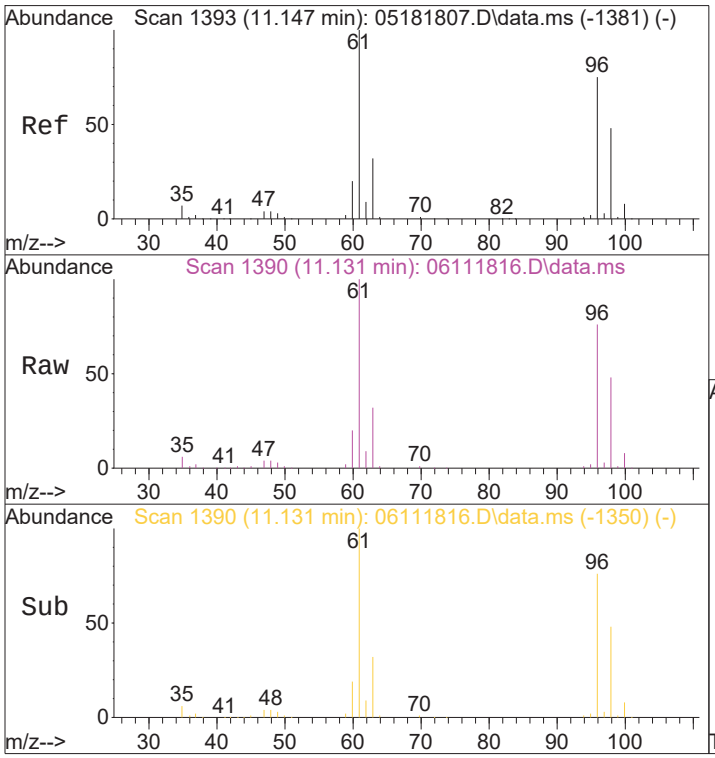


#27
2-Butanone (MEK)
Concen: 0.80 ng
RT: 10.63 min Scan# 1299
Delta R.T. -0.016 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 72 Resp: 24338

Ion	Ratio	Lower	Upper
72	100		
43	409.8	330.0	370.0#

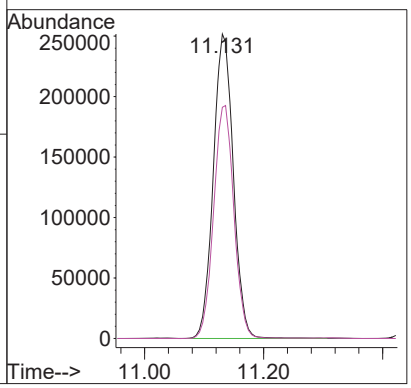


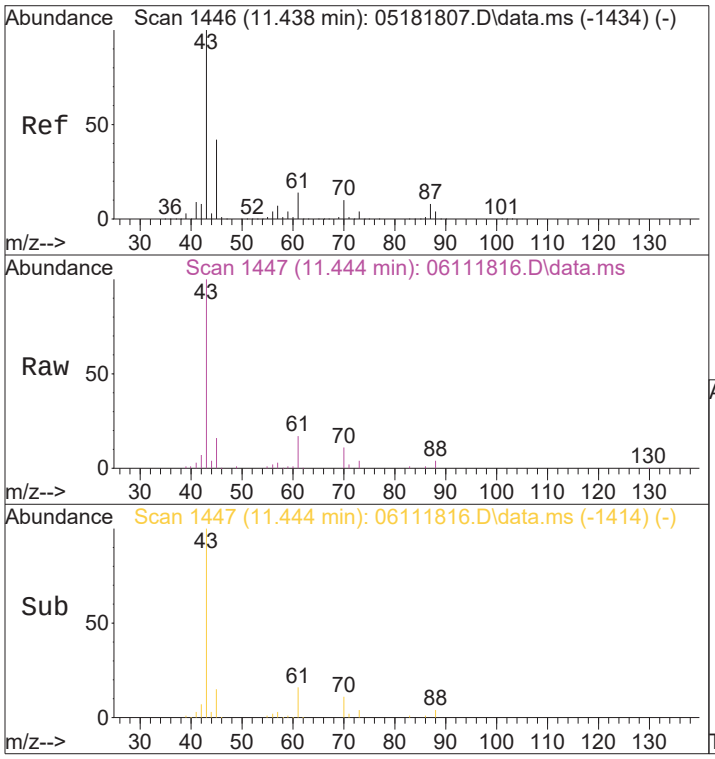


#28
cis-1,2-Dichloroethene
Concen: 9.73 ng
RT: 11.13 min Scan# 1390
Delta R.T. -0.027 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 61 Resp: 586837

Ion	Ratio	Lower	Upper
61	100		
96	77.3	66.3	106.3

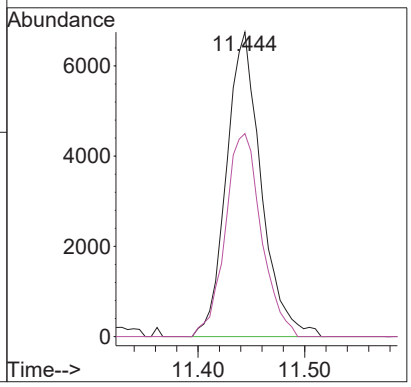


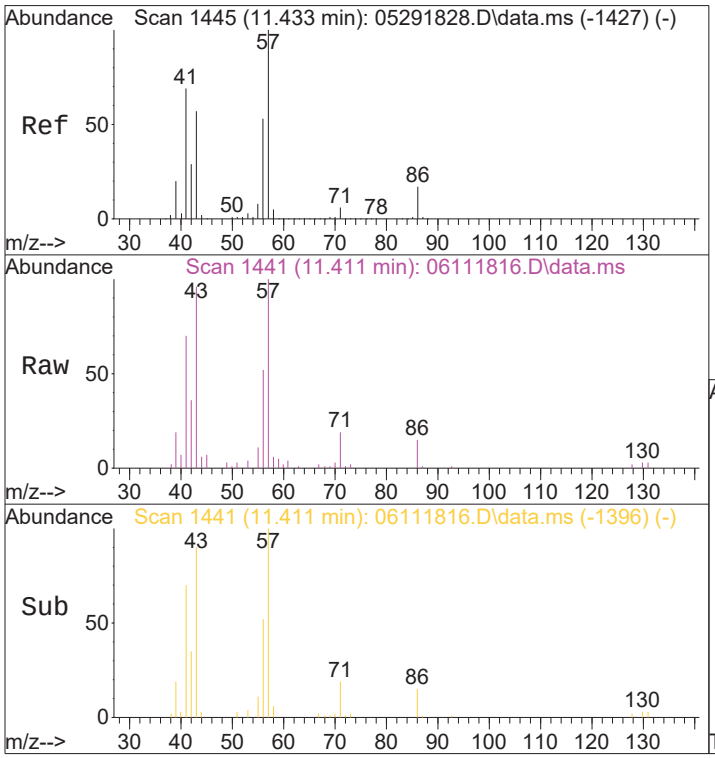


#30
Ethyl Acetate
Concen: 0.94 ng
RT: 11.44 min Scan# 1447
Delta R.T. -0.016 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 61 Resp: 15280

Ion	Ratio	Lower	Upper
61	100		
70	69.1	59.3	99.3

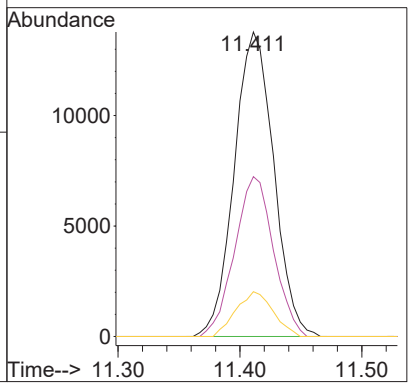


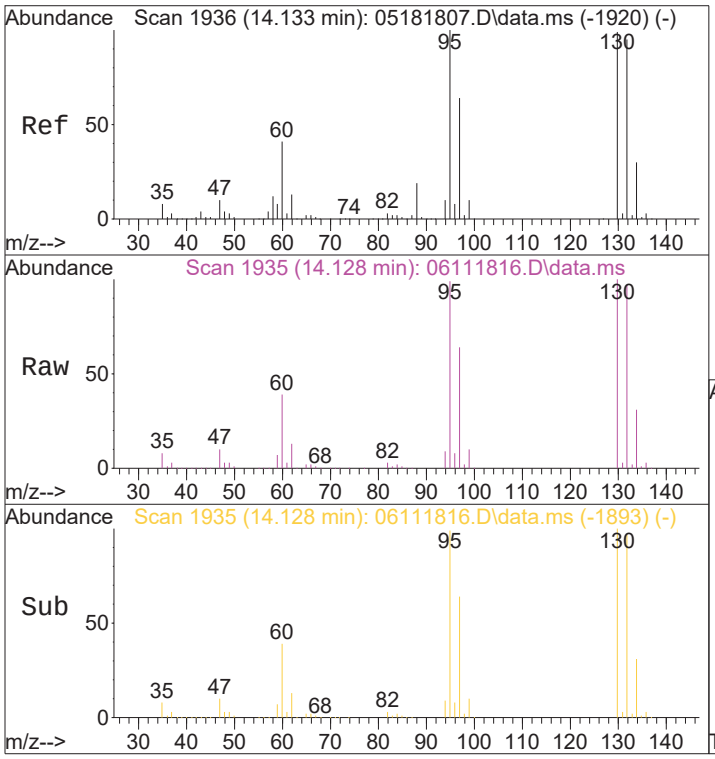


#31
n-Hexane
Concen: 0.46 ng
RT: 11.41 min Scan# 1441
Delta R.T. -0.005 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion: 57 Resp: 31045

Ion	Ratio	Lower	Upper
57	100		
56	51.6	40.6	61.0
86	13.8	13.0	19.4

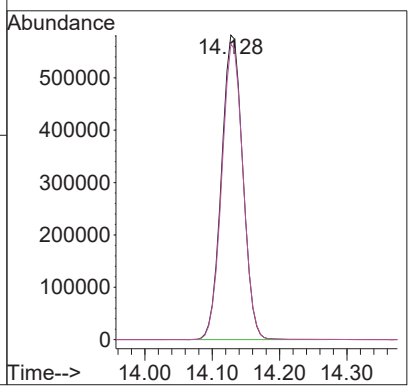


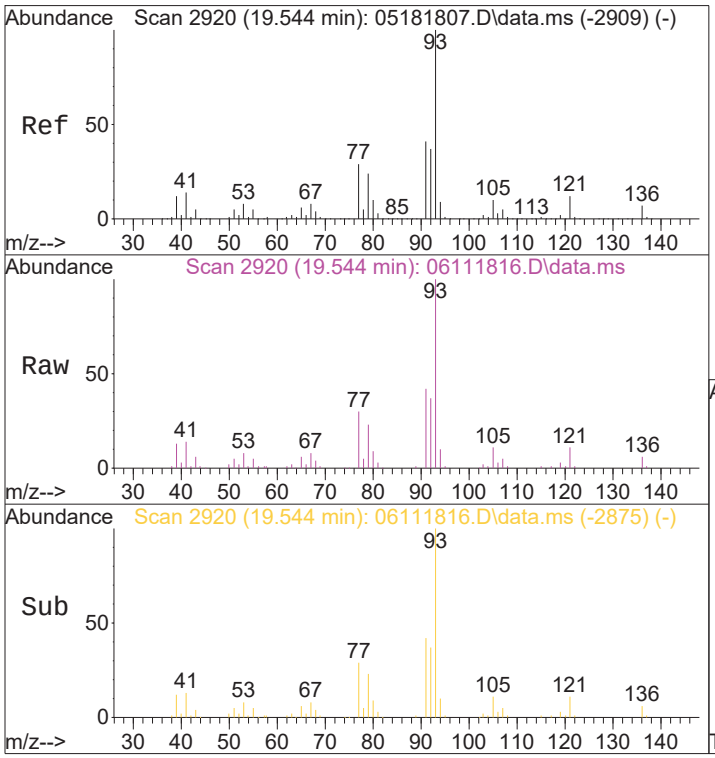


#47
Trichloroethene
Concen: 28.46 ng
RT: 14.13 min Scan# 1935
Delta R.T. -0.016 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

Tgt Ion:130 Resp: 1278316

Ion	Ratio	Lower	Upper
130	100		
132	96.9	76.0	116.0

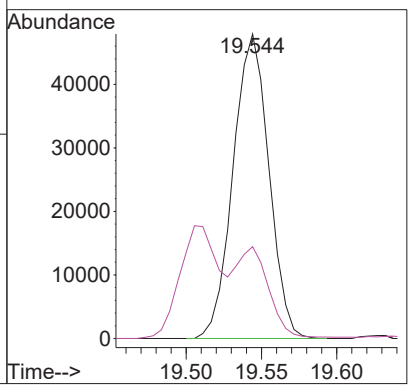




#75
alpha-Pinene
Concen: 0.84 ng
RT: 19.54 min Scan# 2920
Delta R.T. 0.000 min
Lab File: 06111816.D
Acq: 11 Jun 2018 16:10

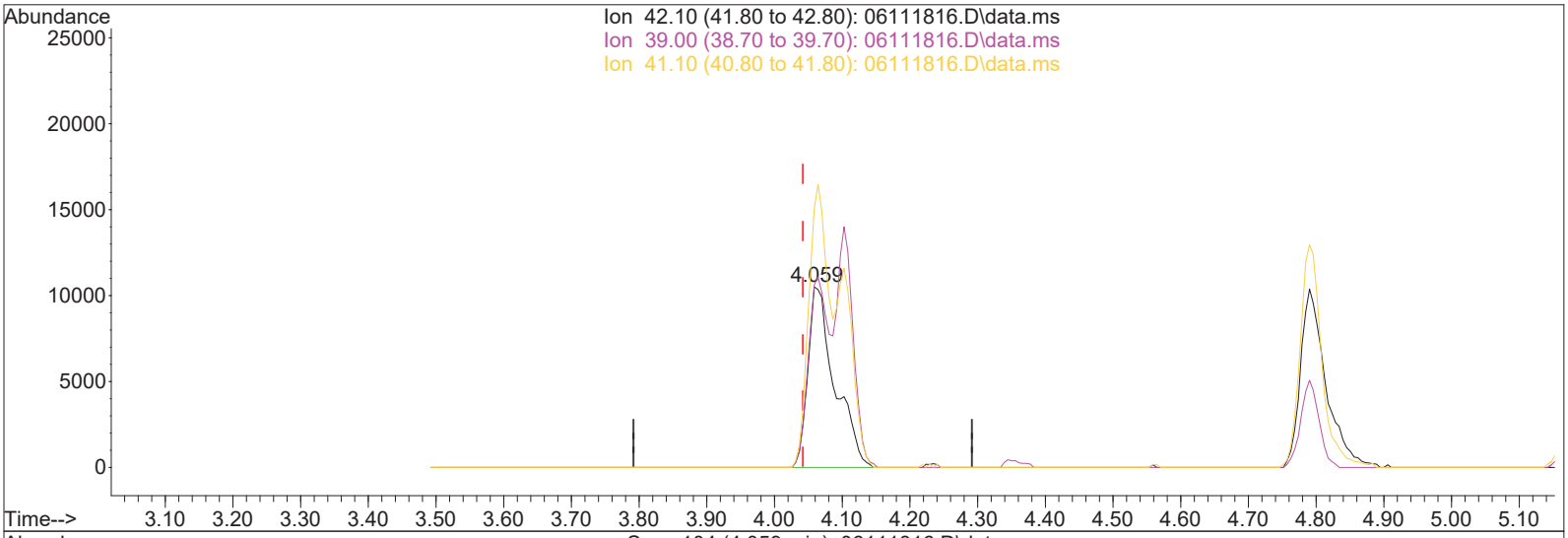
Tgt Ion: 93 Resp: 79059

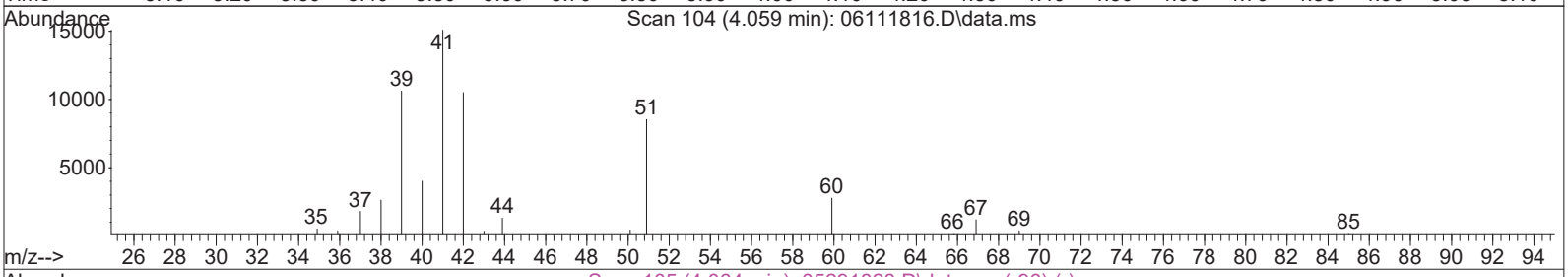
Ion	Ratio	Lower	Upper
93	100		
77	27.9	9.1	49.1

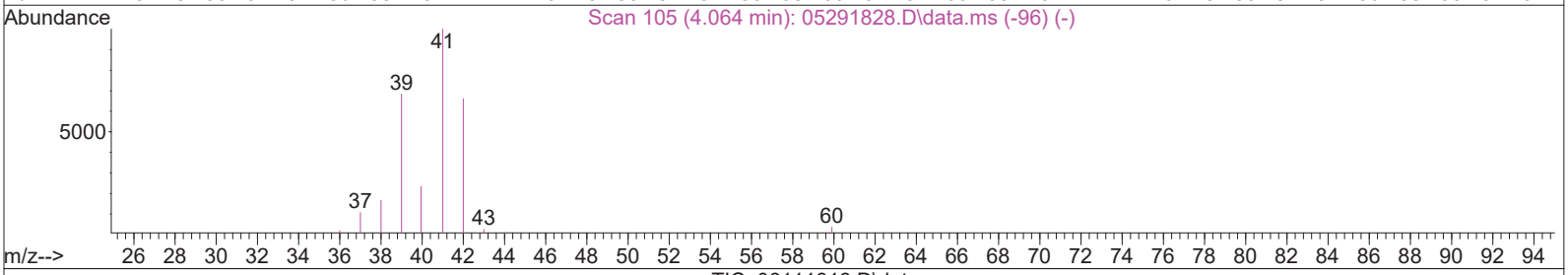


Data File: I:\MS16\DATA\2018_06\11\06111816.D
Acq On : 11 Jun 2018 16:10 Operator: WA
Sample : P1802915-003 (1000mL)
Misc : S31-04201801
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 12 06:26:51 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 06111816.D\data.ms

(2) Propene (T)

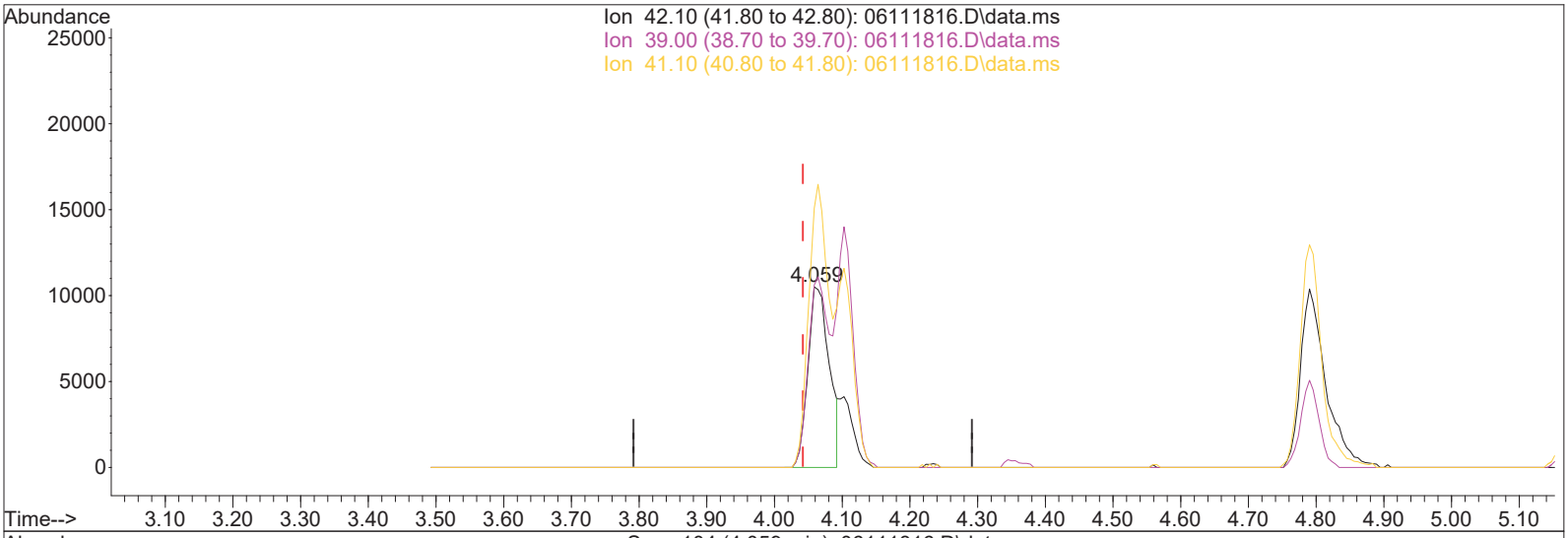
4.059min (+0.017) 0.58ng

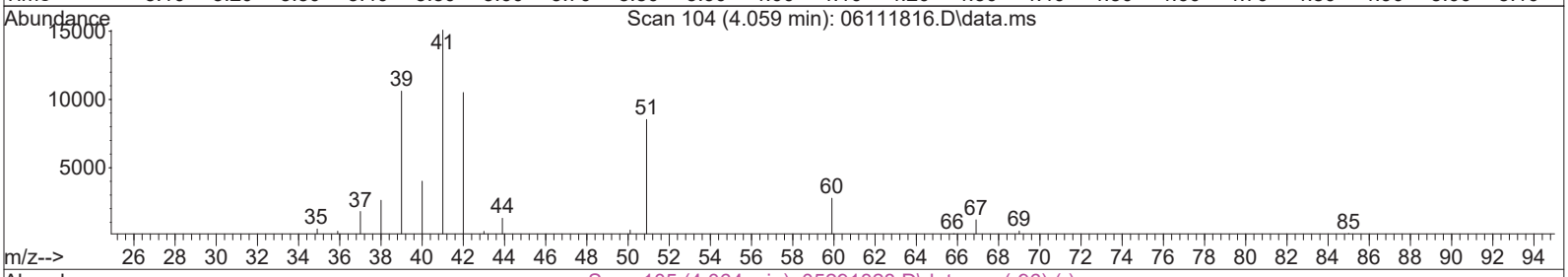
response 28918

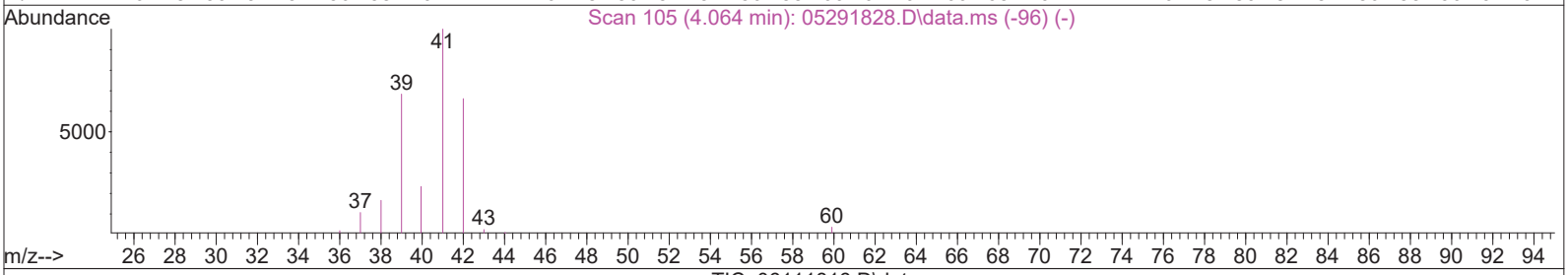
Ion	Exp%	Act%
42.10	100	100
39.00	106.80	83.47#
41.10	150.40	115.54#
0.00	0.00	0.00

Data File: I:\MS16\DATA\2018_06\11\06111816.D
Acq On : 11 Jun 2018 16:10 Operator: WA
Sample : P1802915-003 (1000mL)
Misc : S31-04201801
ALS Vial : 3 Sample Multiplier: 1

Quant Time: Jun 12 06:26:51 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M







TIC: 06111816.D\data.ms

(2) Propene (T)

4.059min (+0.017) 0.46ng m

response 22944

Ion	Exp%	Act%
42.10	100	100
39.00	106.80	105.20
41.10	150.40	145.63
0.00	0.00	0.00

IPC

6/14/18

6/14/18

Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111817.D
Acq On : 11 Jun 2018 16:43 Operator: WA
Sample : P1802915-004 (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Jun 14 11:03:12 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration 6/14/18
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.32	130	339056	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	13.43	114	1476453	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	17.72	82	640891	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.18	65	445974	11.637	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.12%				
57) Toluene-d8 (SS2)	15.87	98	1387285	12.465	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.68%				
73) Bromofluorobenzene (SS3)	19.09	174	461324	13.057	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 104.48%				
Target Compounds							Qvalue
2) Propene	4.04	42	113837	2.404	ng		98
3) Dichlorodifluoromethan...	4.21	85	999060	13.252	ng		100
4) Chloromethane	4.53	50	11315	N.D.			
5) 1,2-Dichloro-1,1,2,2-t...	4.80	135	2053	N.D.			
6) Vinyl Chloride	4.96	62	463	N.D.			
7) 1,3-Butadiene	5.24	54	655	N.D.			
8) Bromomethane	5.71	94	601	N.D.			
9) Chloroethane	6.05	64	991	N.D.			
10) Ethanol	6.42	45	1535161	47.366	ng		100
11) Acetonitrile	6.70	41	67836	0.798	ng		99
12) Acrolein	6.90	56	29078	1.062	ng		100
13) Acetone	7.09	58	1225828	37.118	ng	#	75
14) Trichlorofluoromethane	7.35	101	664613	10.426	ng		100
15) 2-Propanol (Isopropanol)	7.62	45	530297	5.093	ng		98
16) Acrylonitrile	7.97	53	12863	N.D.			
17) 1,1-Dichloroethene	8.34	96	410	N.D.			
18) 2-Methyl-2-Propanol (t...	8.55	59	18516	N.D.			
19) Methylene Chloride	8.58	84	8580	N.D.			
20) 3-Chloro-1-propene (Al...	8.74	41	162	N.D.			
21) Trichlorotrifluoroethane	9.00	151	61701	1.759	ng		93
22) Carbon Disulfide	8.85	76	28162	N.D.			
23) trans-1,2-Dichloroethene	9.87	61	789	N.D.			
24) 1,1-Dichloroethane	10.16	63	6905	N.D.			
25) Methyl tert-Butyl Ether	10.24	73	1189	N.D.			
26) Vinyl Acetate	0.00	86	0	N.D.	d		
27) 2-Butanone (MEK)	10.61	72	433083	15.156	ng	#	76
28) cis-1,2-Dichloroethene	11.14	61	27171	0.477	ng		89
29) Diisopropyl Ether	11.42	87	3866	N.D.			
30) Ethyl Acetate	11.44	61	33865	2.201	ng		100
31) n-Hexane	11.41	57	362596	5.689	ng		98
32) Chloroform	11.49	83	18182	N.D.			
34) Tetrahydrofuran (THF)	11.88	72	791707	27.573	ng	#	86
35) Ethyl tert-Butyl Ether	12.03	87	155	N.D.			
36) 1,2-Dichloroethane	12.30	62	3449	N.D.			
38) 1,1,1-Trichloroethane	12.57	97	283	N.D.			
39) Isopropyl Acetate	12.99	61	2102	N.D.			
40) 1-Butanol	0.00	56	0	N.D.	d		
41) Benzene	13.04	78	245153	1.445	ng		99
42) Carbon Tetrachloride	13.20	117	10986	N.D.			
43) Cyclohexane	13.33	84	53255	0.883	ng		85
44) tert-Amyl Methyl Ether	13.72	73	7808	N.D.			
45) 1,2-Dichloropropane	13.90	63	434	N.D.			
46) Bromodichloromethane	14.09	83	7724	N.D.			
47) Trichloroethene	14.13	130	53223	1.253	ng		100
48) 1,4-Dioxane	14.13	88	517	N.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	N.D.	d		

Data File: I:\MS16\DATA\2018_06\11\06111817.D
Acq On : 11 Jun 2018 16:43 Operator: WA
Sample : P1802915-004 (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

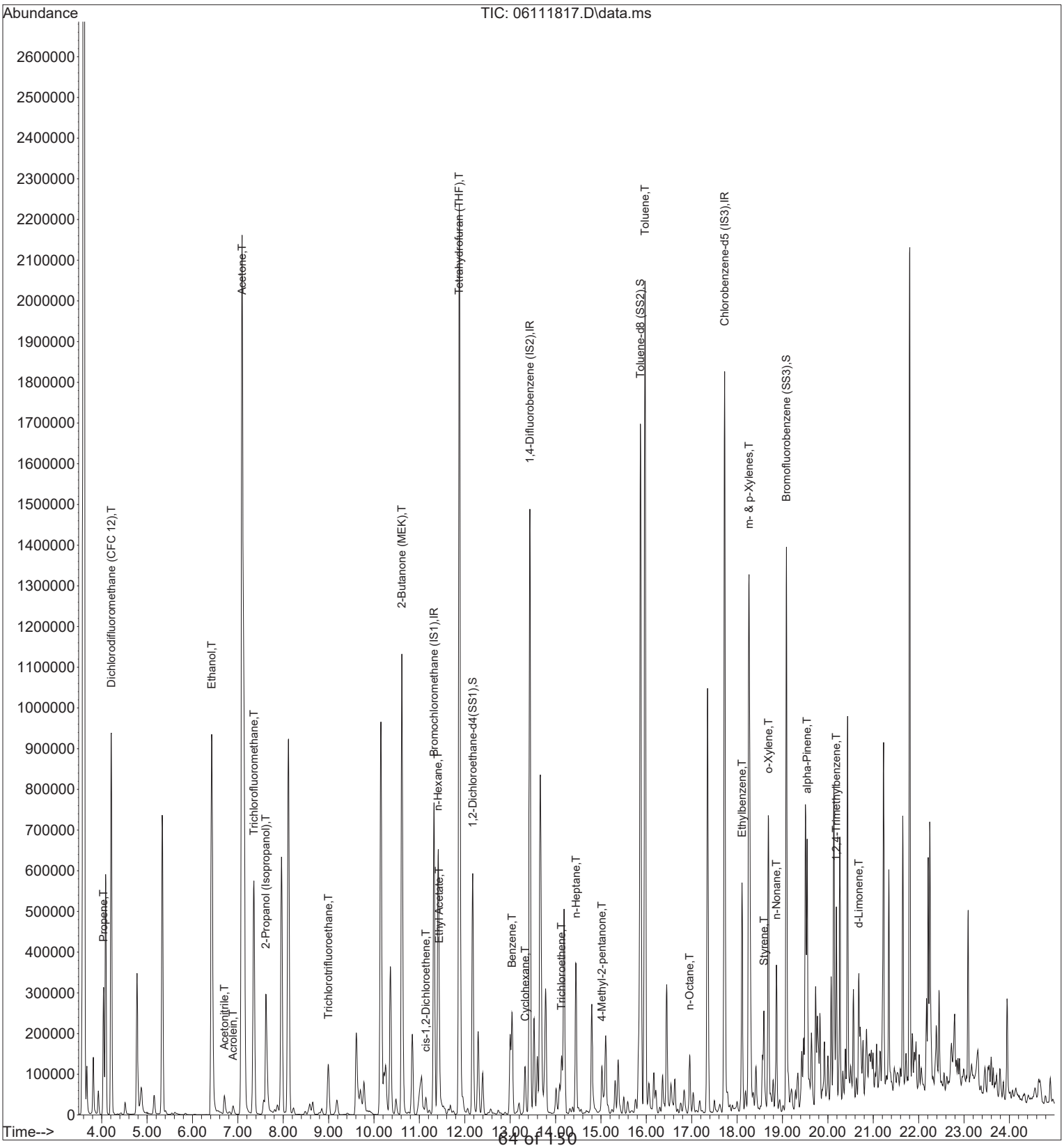
Quant Time: Jun 14 11:03:12 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	604	N.D.			
51) n-Heptane	14.45	71	103846	2.678	ng		93
52) cis-1,3-Dichloropropene	14.89	75	1312	N.D.			
53) 4-Methyl-2-pentanone	15.02	58	41116	1.022	ng	#	88
54) trans-1,3-Dichloropropene	15.51	75	1897	N.D.			
55) 1,1,2-Trichloroethane	15.58	97	947	N.D.			
58) Toluene	15.97	91	1740647	11.737	ng		99
59) 2-Hexanone	16.21	43	32258	N.D.			
60) Dibromochloromethane	0.00	129	0	N.D.			
61) 1,2-Dibromoethane	0.00	107	0	N.D.			
62) n-Butyl Acetate	16.83	43	39160	N.D.			
63) n-Octane	16.95	57	30586	0.941	ng		89
64) Tetrachloroethene	17.12	166	1523	N.D.			
65) Chlorobenzene	17.79	112	5171	N.D.			
66) Ethylbenzene	18.11	91	455661	2.677	ng		97
67) m- & p-Xylenes	18.26	91	1082585	8.362	ng		99
68) Bromoform	0.00	173	0	.D.			
69) Styrene	18.59	104	131721	1.276	ng		99
70) o- ylene	18.69	91	337687	2.569	ng		98
71) n- onane	18.87	43	128346	1.711	ng		92
72) 1,1,2,2-Tetrachloroethane	18.74	83	12097	.D.			
74) Cumene	19.20	105	23676	.D.			
75) alpha-Pinene	19.54	93	280424	3.204	ng	#	46
76) n-Propylbenzene	19.64	91	65786	.D.			
77) 3-Ethyltoluene	0.00	105	0	.D.	d		
78) 4-Ethyltoluene	19.77	105	67332	.D.			
79) 1,3,5-Trimethylbenzene	19.83	105	51305	.D.			
80) alpha-Methylstyrene	19.96	118	1845	.D.			
81) 2-Ethyltoluene	20.00	105	56729	.D.			
82) 1,2,4-Trimethylbenzene	20.19	105	193835	1.424	ng		88
83) n-Decane	0.00	57	0	.D.	d		
84) Benzyl Chloride	20.39	91	4433	.D.			
85) 1,3-Dichlorobenzene	20.32	146	459	.D.			
86) 1,4-Dichlorobenzene	20.39	146	36015	.D.			
87) sec-Butylbenzene	20.42	105	9610	.D.			
88) 4-Isopropyltoluene (p-...	20.56	119	22723	.D.			
89) 1,2,3-Trimethylbenzene	20.56	105	50777	.D.			
90) 1,2-Dichlorobenzene	20.68	146	637	.D.			
91) d-Limonene	20.68	68	75873	1.359	ng		93
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	.D.			
93) n-Undecane	0.00	57	0	.D.	d		
94) 1,2,4-Trichlorobenzene	22.17	180	511	.D.			
95) aphthalene	22.28	128	66525	.D.			
96) n-Dodecane	0.00	57	0	.D.	d		
97) He achlorobutadiene	0.00	225	0	.D.			
98) Cyclohe anone	0.00	55	0	.D.	d		
99) tert-Butylbenzene	20.19	119	24669	.D.			
100) n-Butylbenzene	20.91	91	26212	.D.			

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111817.D
Acq On : 11 Jun 2018 16:43 Operator: WA
Sample : P1802915-004 (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Jun 14 11:03:12 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111817.D
Acq On : 11 Jun 2018 16:43 Operator: WA
Sample : P1802915-004 (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Jun 14 11:03:12 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

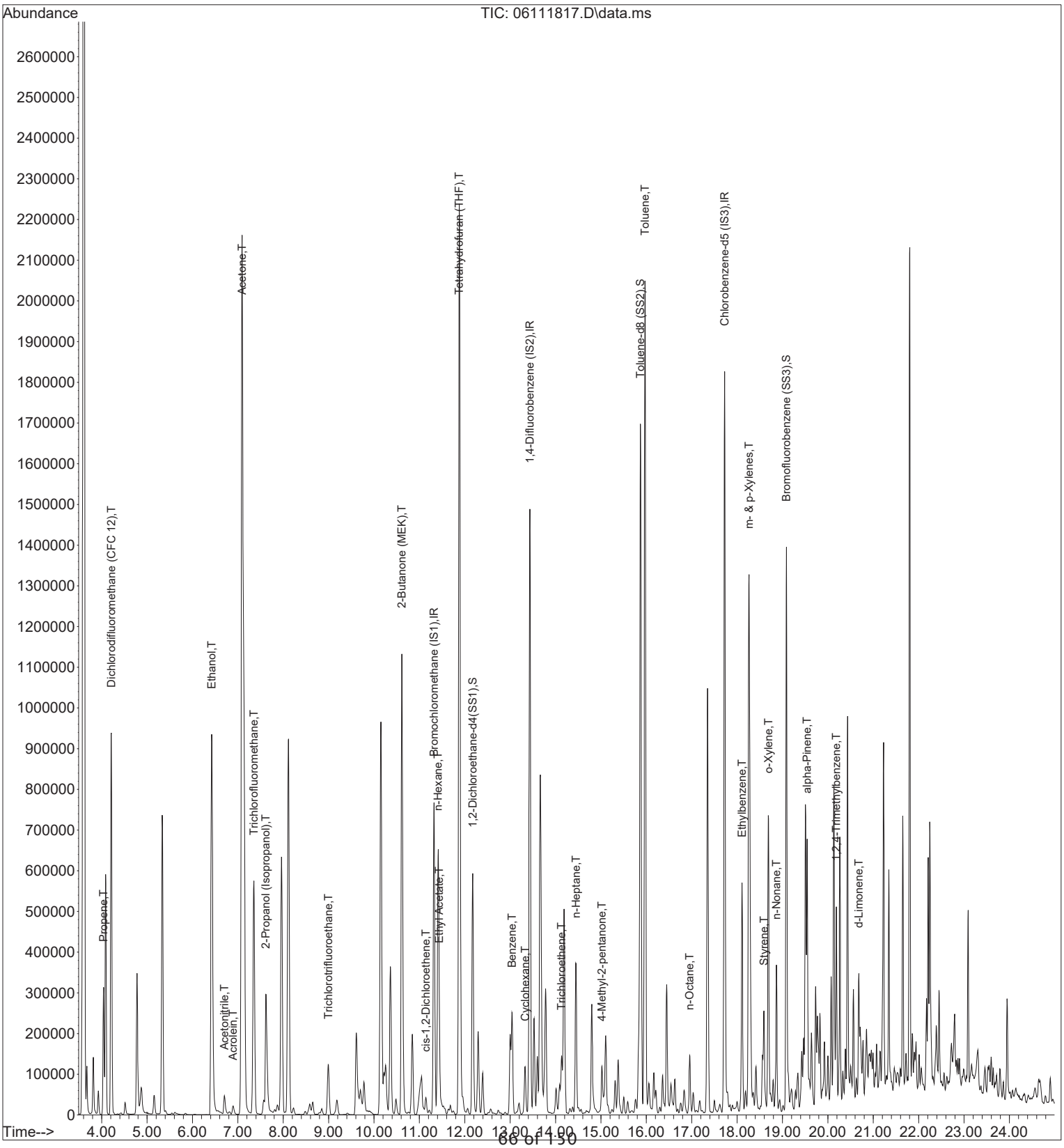
WA 6/14/18

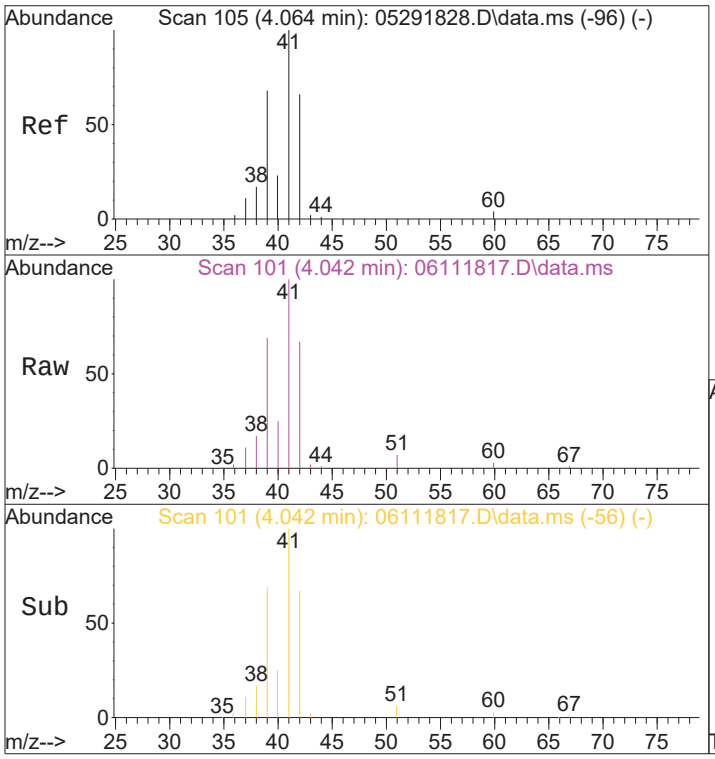
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.32	130	339056	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	13.43	114	1476453	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	17.72	82	640891	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.18	65	445974	11.637	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 93.12%				
57) Toluene-d8 (SS2)	15.87	98	1387285	12.465	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.68%				
73) Bromofluorobenzene (SS3)	19.09	174	461324	13.057	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 104.48%				
Target Compounds							Qvalue
2) Propene	4.04	42	113837	2.404	ng		98
3) Dichlorodifluoromethan...	4.21	85	999060	13.252	ng		100
10) Ethanol	6.42	45	1535161	47.366	ng		100
11) Acetonitrile	6.70	41	67836	0.798	ng		99
12) Acrolein	6.90	56	29078	1.062	ng		100
13) Acetone	7.09	58	1225828	37.118	ng	#	75
14) Trichlorofluoromethane	7.35	101	664613	10.426	ng		100
15) 2-Propanol (Isopropanol)	7.62	45	530297	5.093	ng		98
21) Trichlorotrifluoroethane	9.00	151	61701	1.759	ng		93
27) 2-Butanone (MEK)	10.61	72	433083	15.156	ng	#	76
28) cis-1,2-Dichloroethene	11.14	61	27171	0.477	ng		89
30) Ethyl Acetate	11.44	61	33865	2.201	ng		100
31) n-Hexane	11.41	57	362596	5.689	ng		98
34) Tetrahydrofuran (THF)	11.88	72	791707	27.573	ng	#	86
41) Benzene	13.04	78	245153	1.445	ng		99
43) Cyclohexane	13.33	84	53255	0.883	ng		85
47) Trichloroethene	14.13	130	53223	1.253	ng		100
51) n-Heptane	14.45	71	103846	2.678	ng		93
53) 4-Methyl-2-pentanone	15.02	58	41116	1.022	ng	#	88
58) Toluene	15.97	91	1740647	11.737	ng		99
63) n-Octane	16.95	57	30586	0.941	ng		89
66) Ethylbenzene	18.11	91	455661	2.677	ng		97
67) m- & p-Xylenes	18.26	91	1082585	8.362	ng		99
69) Styrene	18.59	104	131721	1.276	ng		99
70) o-Xylene	18.69	91	337687	2.569	ng		98
71) n-Nonane	18.87	43	128346	1.711	ng		92
75) alpha-Pinene	19.54	93	280424	3.204	ng	#	46
82) 1,2,4-Trimethylbenzene	20.19	105	193835	1.424	ng		88
91) d-Limonene	20.68	68	75873	1.359	ng		93

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111817.D
Acq On : 11 Jun 2018 16:43 Operator: WA
Sample : P1802915-004 (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Jun 14 11:03:12 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

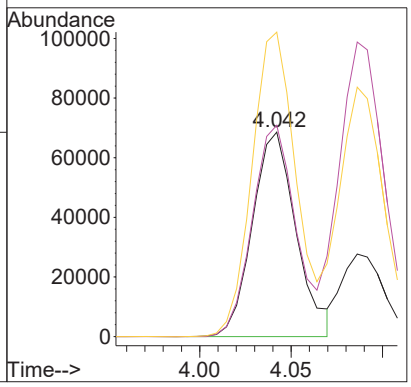


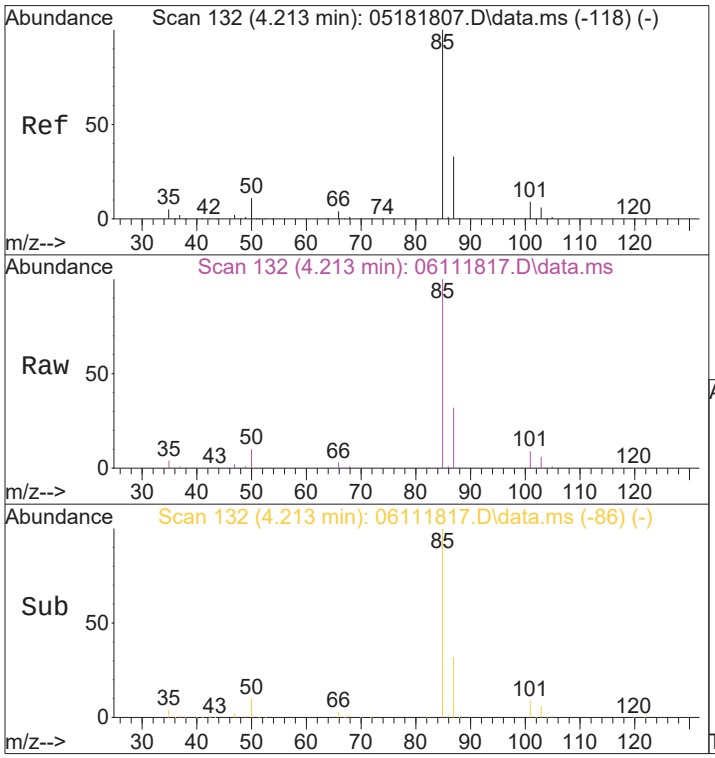


#2
Propene
Concen: 2.40 ng
RT: 4.04 min Scan# 101
Delta R.T. 0.000 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 42 Resp: 113837

Ion	Ratio	Lower	Upper
42	100		
39	103.2	86.8	126.8
41	149.3	130.4	170.4

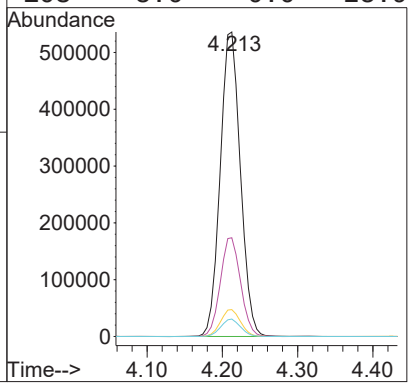


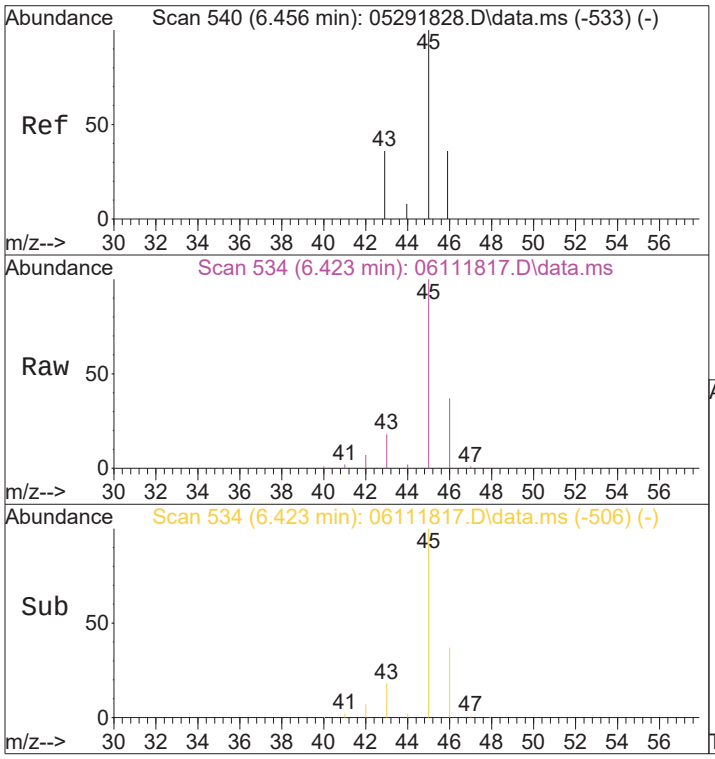


#3
Dichlorodifluoromethane (CFC 12)
Concen: 13.25 ng
RT: 4.21 min Scan# 132
Delta R.T. 0.005 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 85 Resp: 999060

Ion	Ratio	Lower	Upper
85	100		
87	32.5	12.6	52.6
101	8.8	0.0	29.1
103	5.6	0.0	25.9

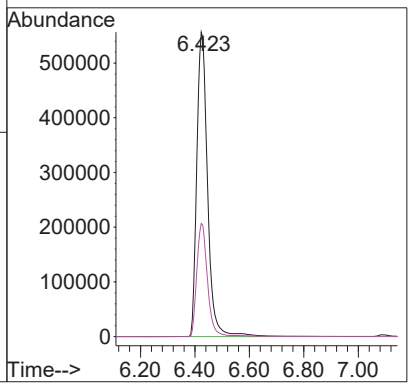


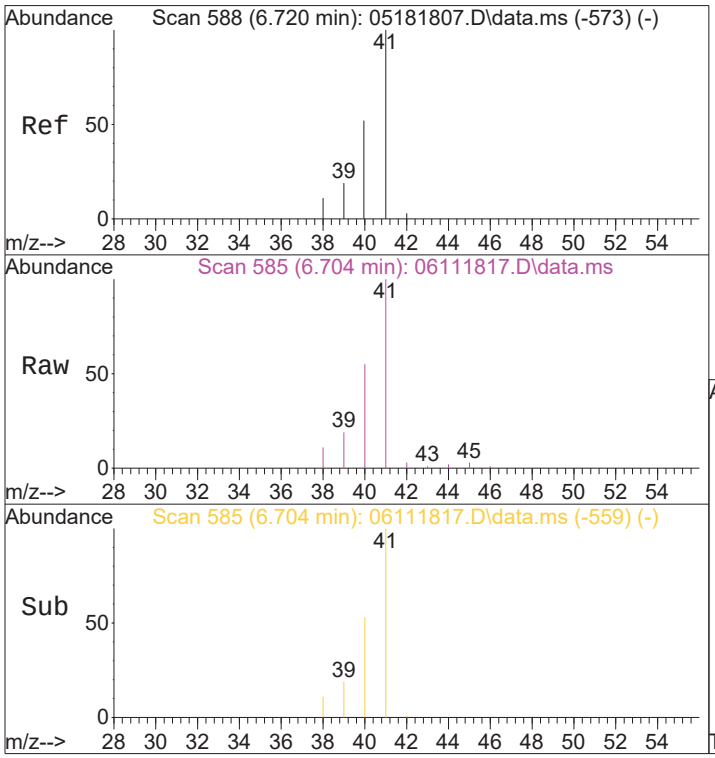


#10
Ethanol
Concen: 47.37 ng
RT: 6.42 min Scan# 534
Delta R.T. -0.094 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 45 Resp: 1535161

Ion	Ratio	Lower	Upper
45	100		
46	37.1	17.2	57.2

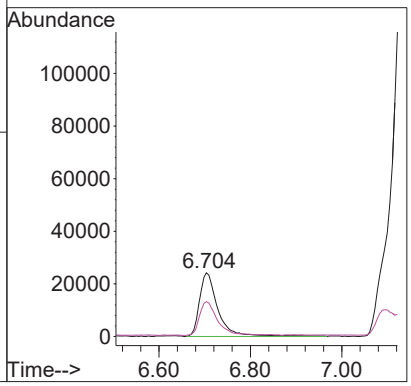


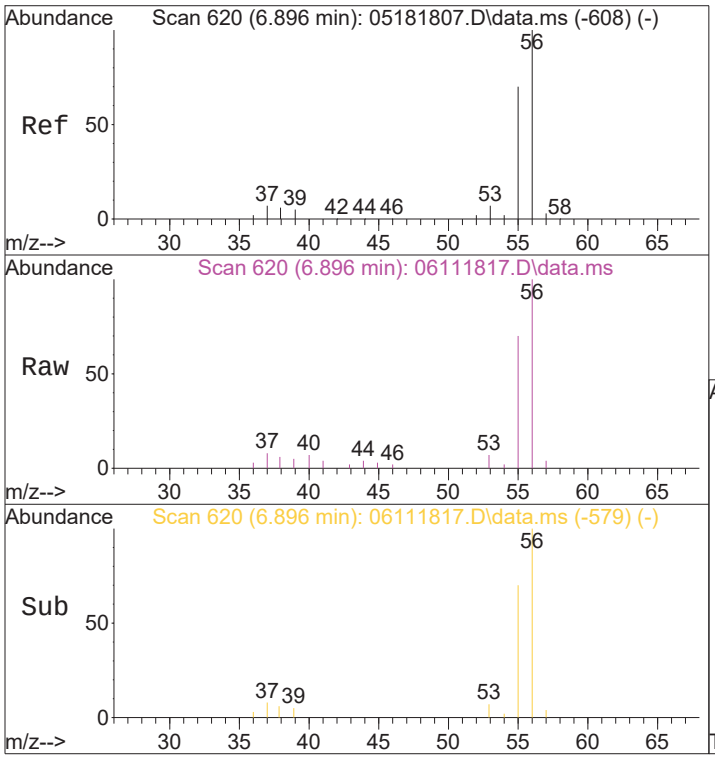


#11
Acetonitrile
Concen: 0.80 ng
RT: 6.70 min Scan# 585
Delta R.T. -0.055 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 41 Resp: 67836

Ion	Ratio	Lower	Upper
41	100		
40	52.2	33.1	73.1

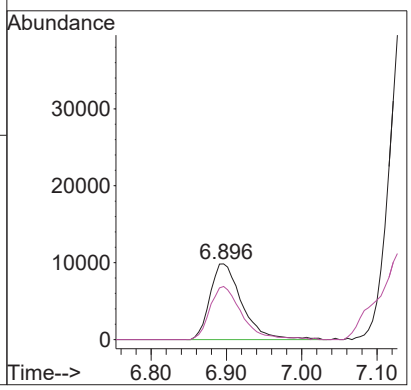


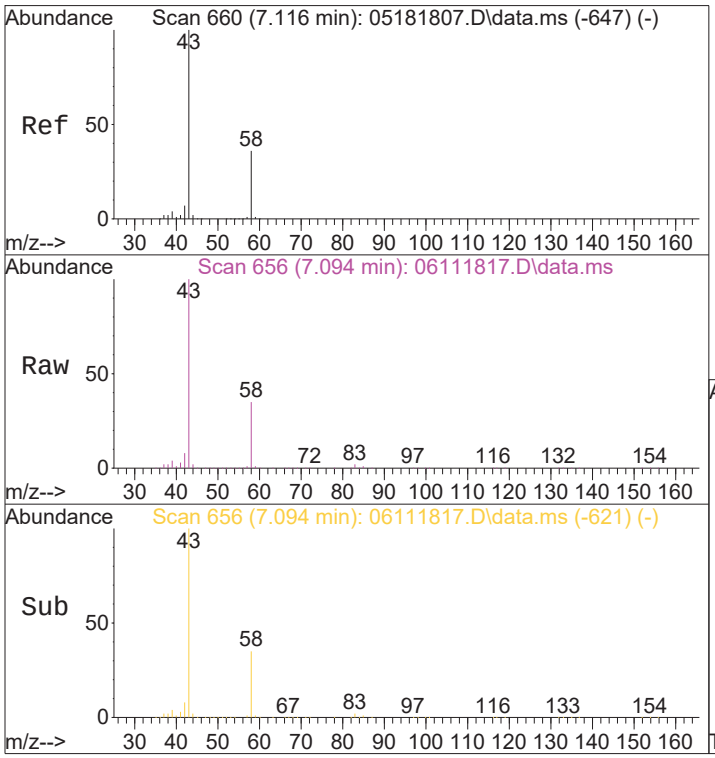


#12
Acrolein
Concen: 1.06 ng
RT: 6.90 min Scan# 620
Delta R.T. -0.022 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 56 Resp: 29078

Ion	Ratio	Lower	Upper
56	100		
55	69.9	49.7	89.7

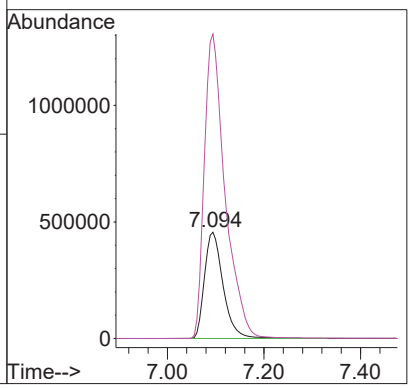


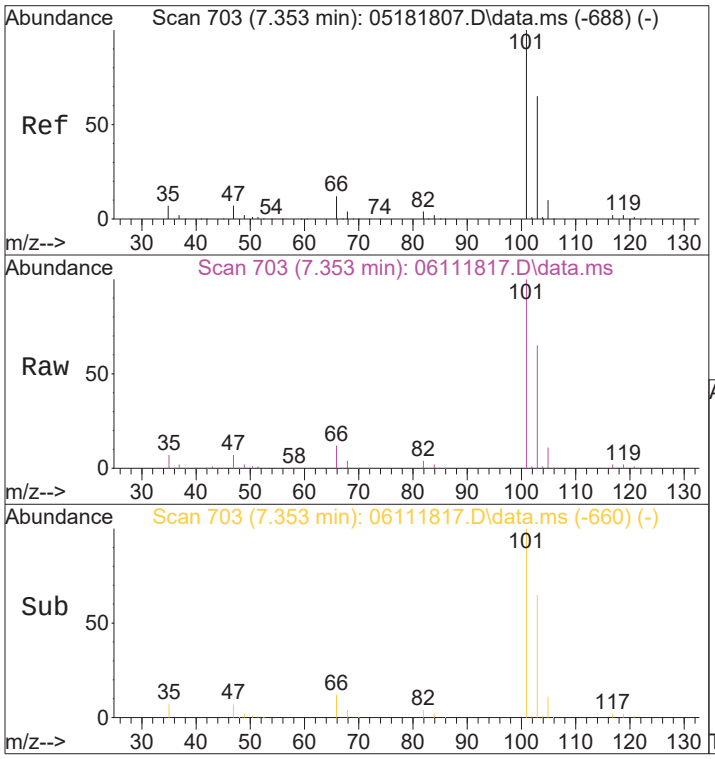


#13
Acetone
Concen: 37.12 ng
RT: 7.09 min Scan# 656
Delta R.T. -0.055 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 58 Resp: 1225828

Ion	Ratio	Lower	Upper
58	100		
43	319.1	242.9	302.9#

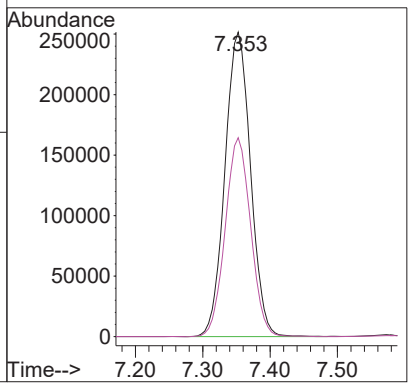


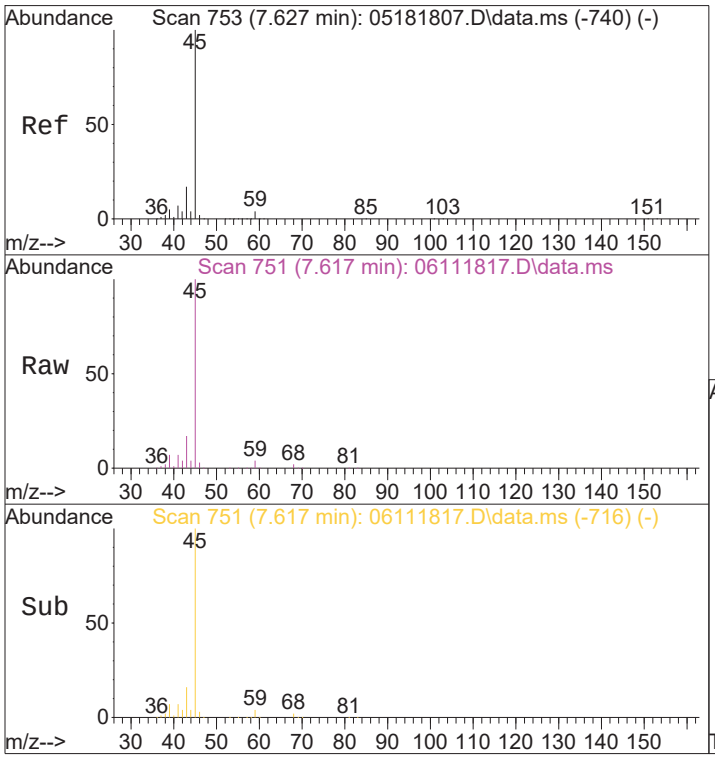


#14
Trichlorofluoromethane
Concen: 10.43 ng
RT: 7.35 min Scan# 703
Delta R.T. -0.011 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion:101 Resp: 664613

Ion	Ratio	Lower	Upper
101	100		
103	65.0	44.9	84.9

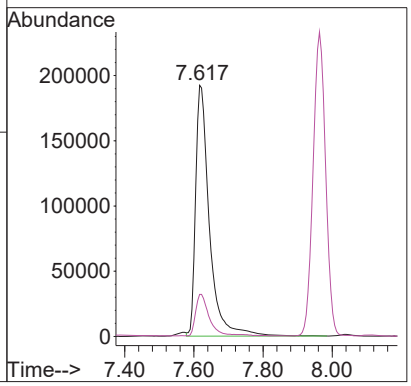


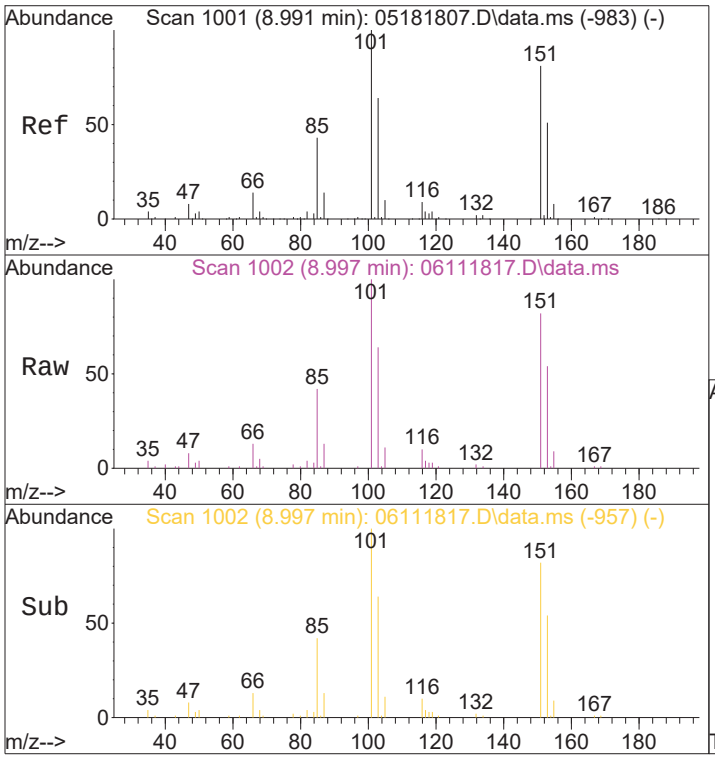


#15
2-Propanol (Isopropanol)
Concen: 5.09 ng
RT: 7.62 min Scan# 751
Delta R.T. -0.055 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 45 Resp: 530297

Ion	Ratio	Lower	Upper
45	100		
43	16.6	0.0	37.4

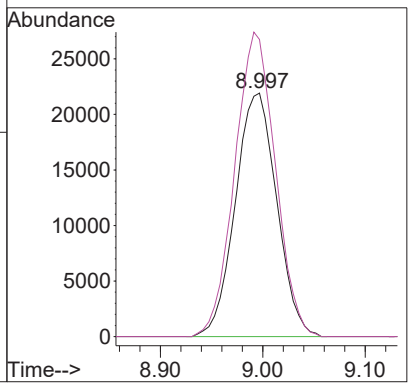


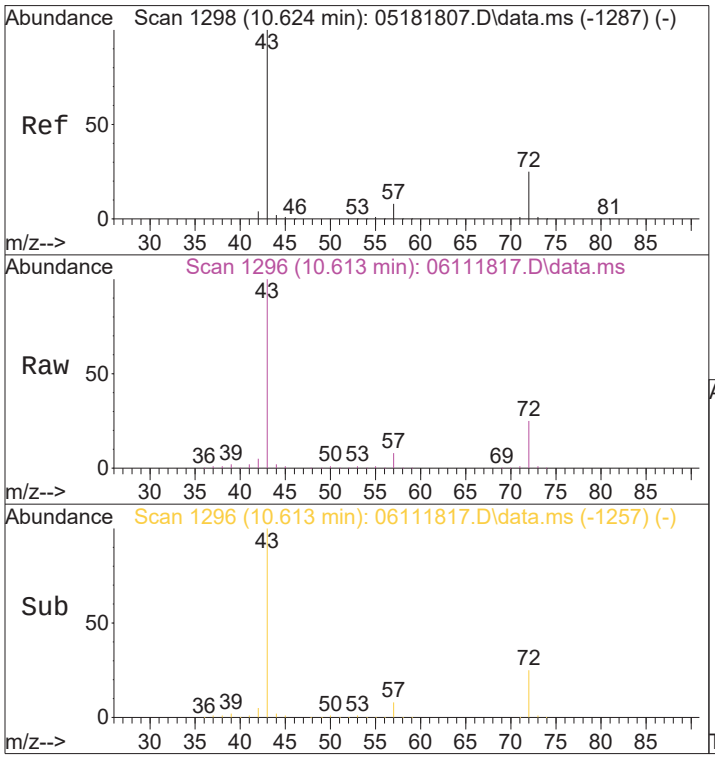


#21
Trichlorotrifluoroethane
Concen: 1.76 ng
RT: 9.00 min Scan# 1002
Delta R.T. -0.000 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion:151 Resp: 61701

Ion	Ratio	Lower	Upper
151	100		
101	122.6	94.6	134.6

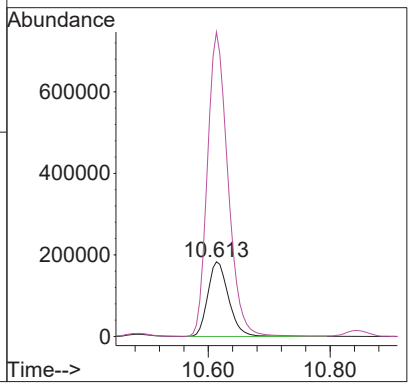


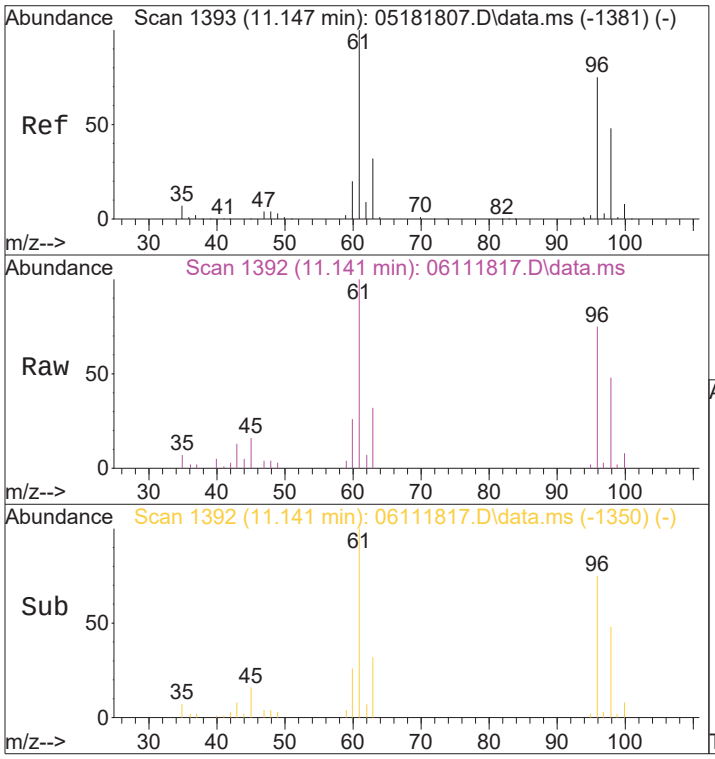


#27
2-Butanone (MEK)
Concen: 15.16 ng
RT: 10.61 min Scan# 1296
Delta R.T. -0.033 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 72 Resp: 433083

Ion	Ratio	Lower	Upper
72	100		
43	402.0	330.0	370.0#

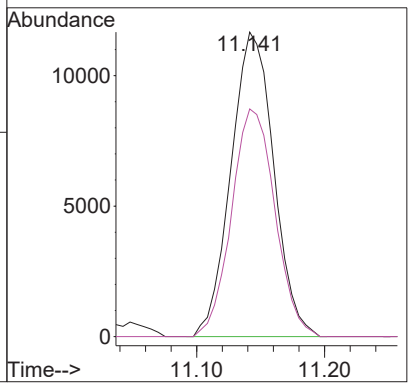


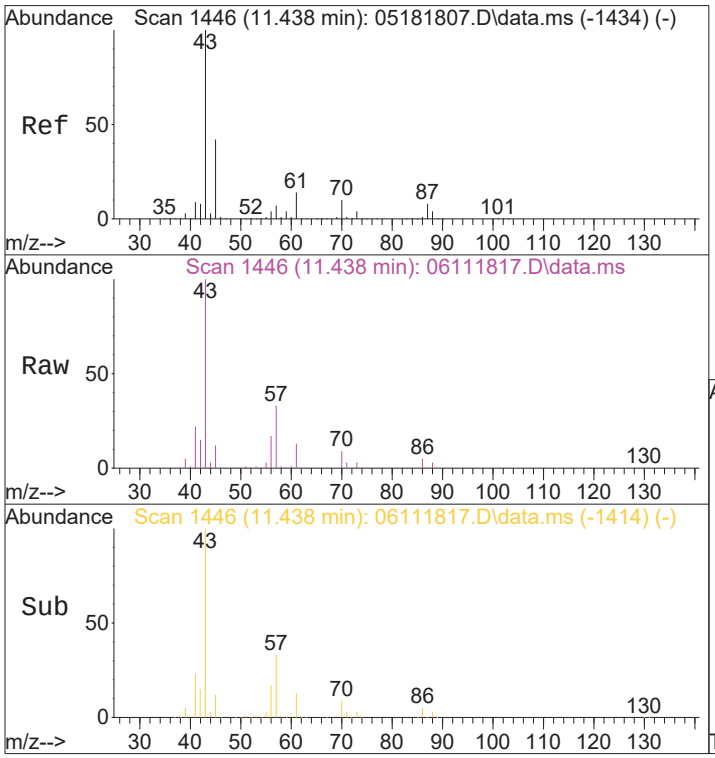


#28
cis-1,2-Dichloroethene
Concen: 0.48 ng
RT: 11.14 min Scan# 1392
Delta R.T. -0.017 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 61 Resp: 27171

Ion	Ratio	Lower	Upper
61	100		
96	75.8	66.3	106.3

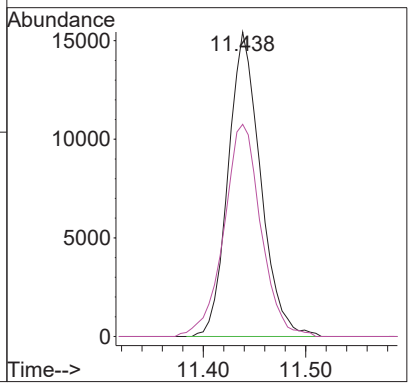


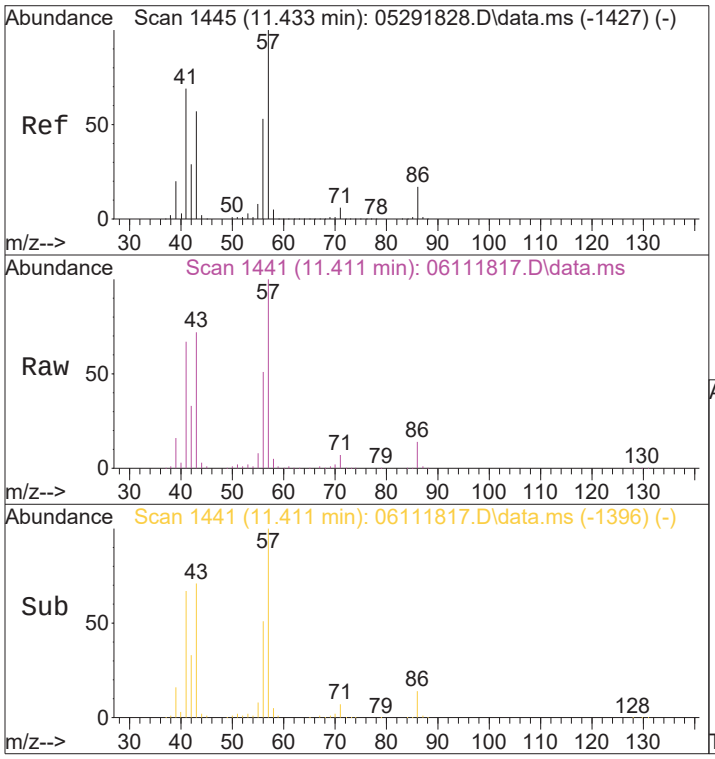


#30
Ethyl Acetate
Concen: 2.20 ng
RT: 11.44 min Scan# 1446
Delta R.T. -0.022 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 61 Resp: 33865

Ion	Ratio	Lower	Upper
61	100		
70	79.7	59.3	99.3

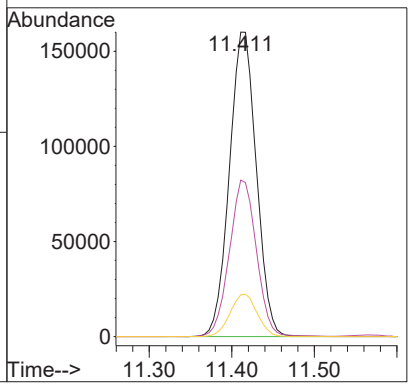


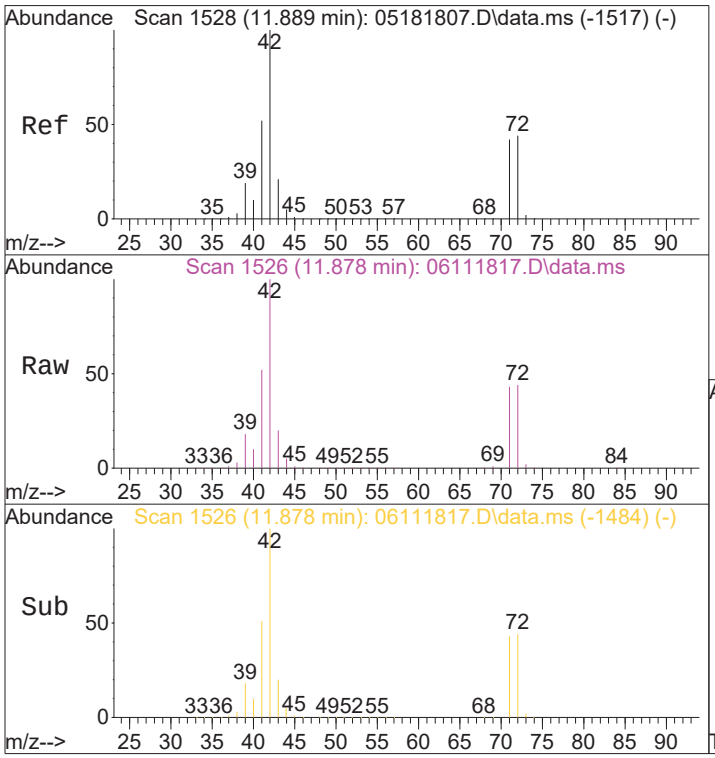


#31
n-Hexane
Concen: 5.69 ng
RT: 11.41 min Scan# 1441
Delta R.T. -0.005 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 57 Resp: 362596

Ion	Ratio	Lower	Upper
57	100		
56	51.7	40.6	61.0
86	14.1	13.0	19.4

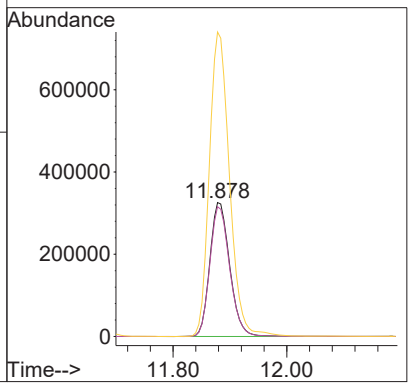


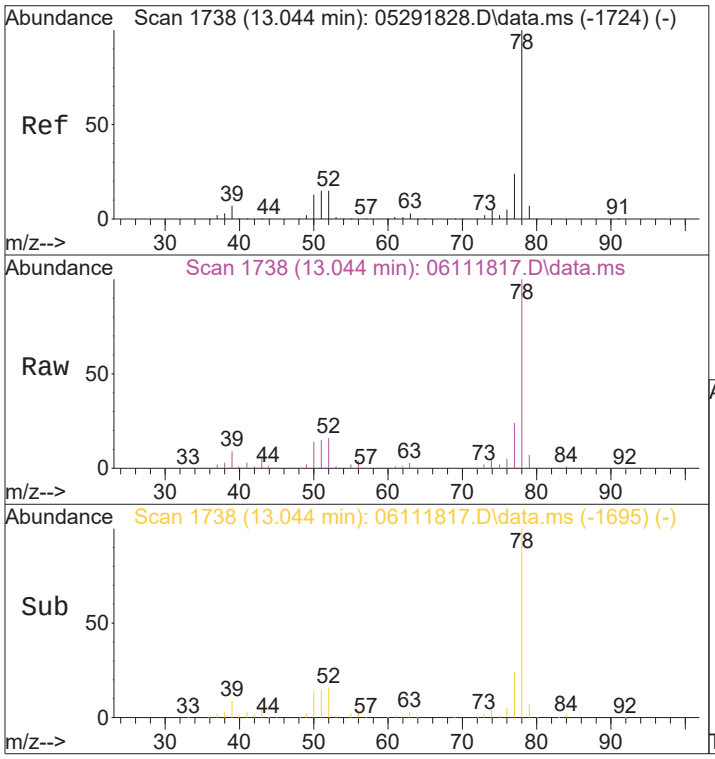


#34
Tetrahydrofuran (THF)
Concen: 27.57 ng
RT: 11.88 min Scan# 1526
Delta R.T. -0.017 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 72 Resp: 791707

Ion	Ratio	Lower	Upper
72	100		
71	96.7	76.1	116.1
42	230.8	179.9	219.9#

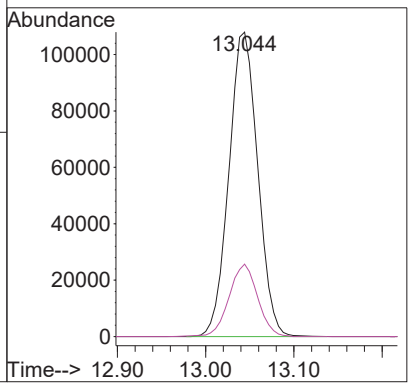


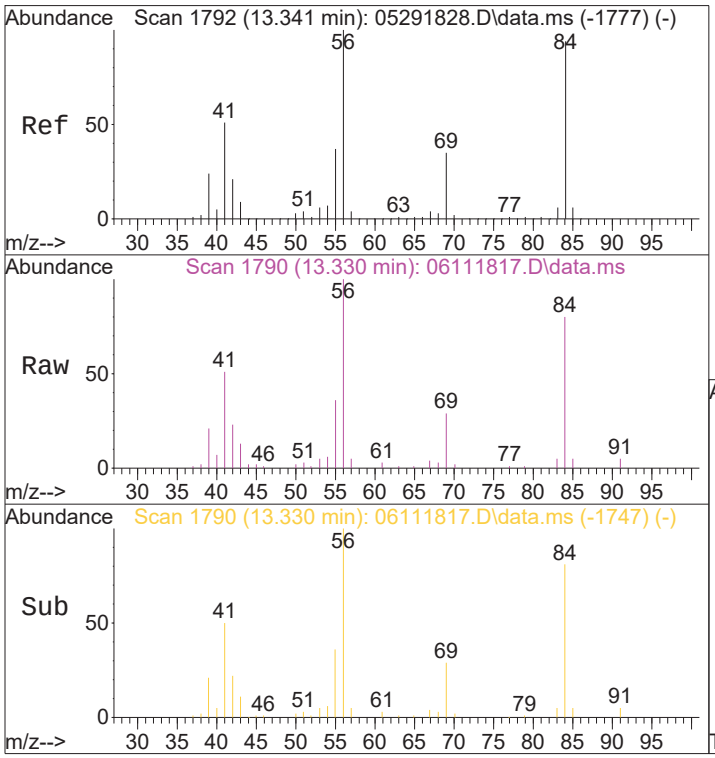


#41
Benzene
Concen: 1.45 ng
RT: 13.04 min Scan# 1738
Delta R.T. -0.011 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 78 Resp: 245153

Ion	Ratio	Lower	Upper
78	100		
77	23.6	3.1	43.1

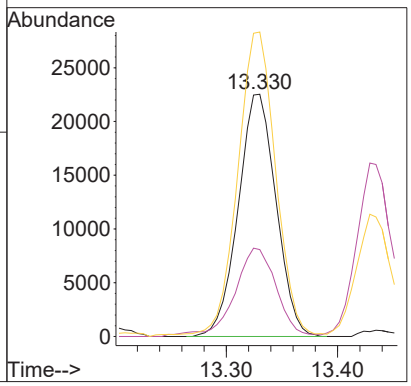


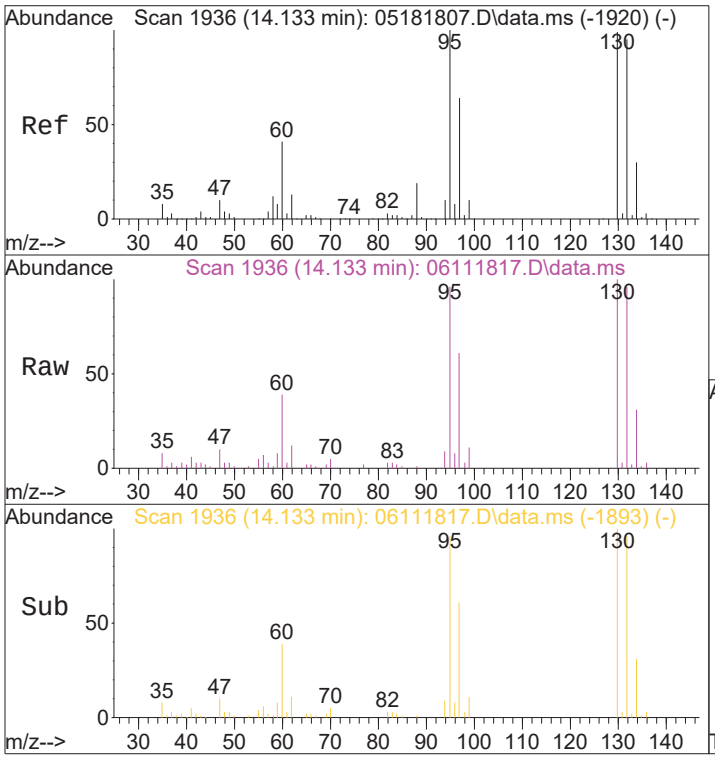


#43
Cyclohexane
Concen: 0.88 ng
RT: 13.33 min Scan# 1790
Delta R.T. -0.011 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 84 Resp: 53255

Ion	Ratio	Lower	Upper
84	100		
69	40.1	15.6	55.6
56	127.0	88.8	128.8

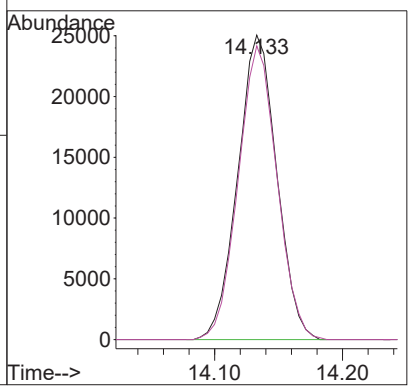


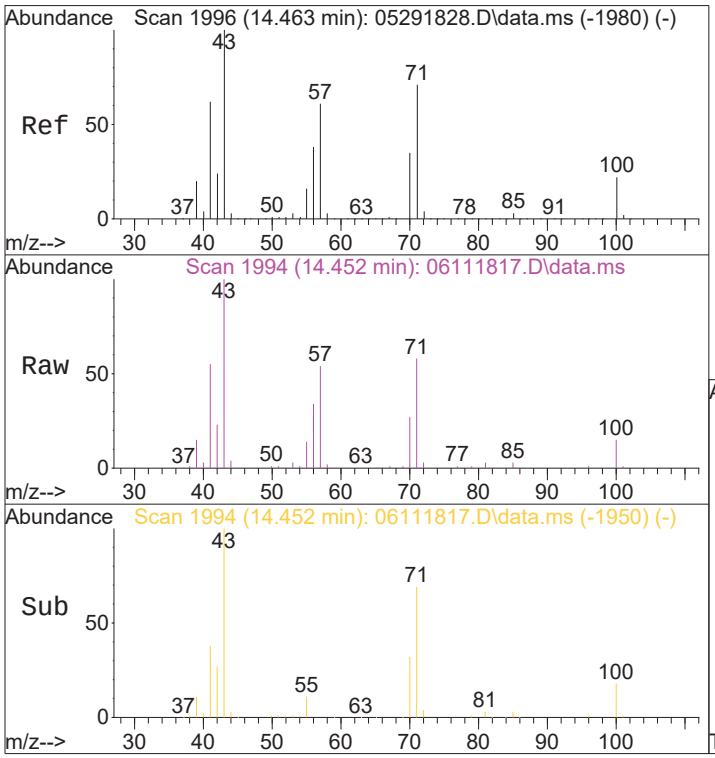


#47
Trichloroethene
Concen: 1.25 ng
RT: 14.13 min Scan# 1936
Delta R.T. -0.011 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion:130 Resp: 53223

Ion	Ratio	Lower	Upper
130	100		
132	95.8	76.0	116.0

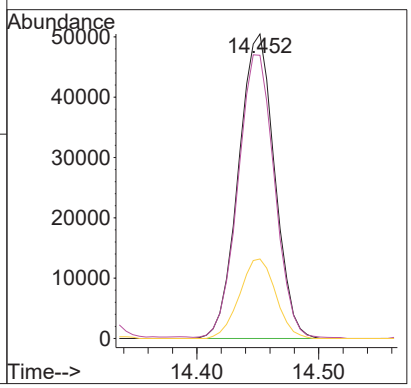


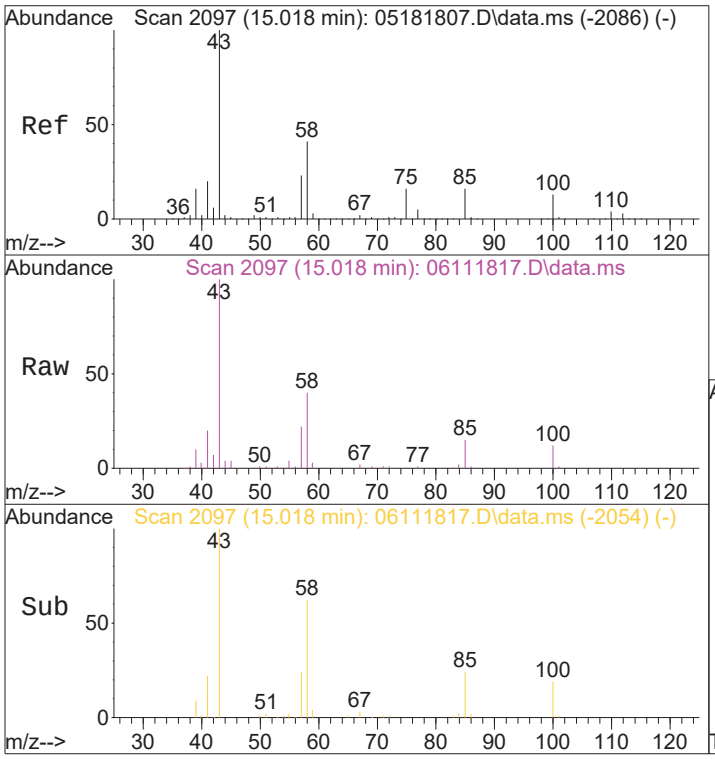


#51
n-Heptane
Concen: 2.68 ng
RT: 14.45 min Scan# 1994
Delta R.T. -0.006 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 71 Resp: 103846

Ion	Ratio	Lower	Upper
71	100		
57	94.4	67.9	107.9
100	26.2	9.2	49.2

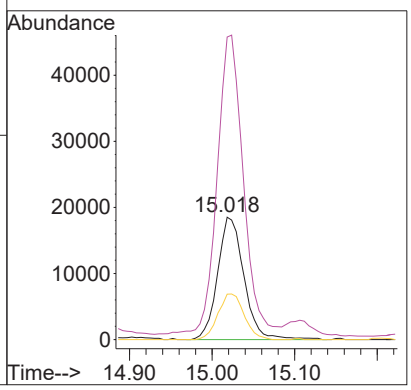


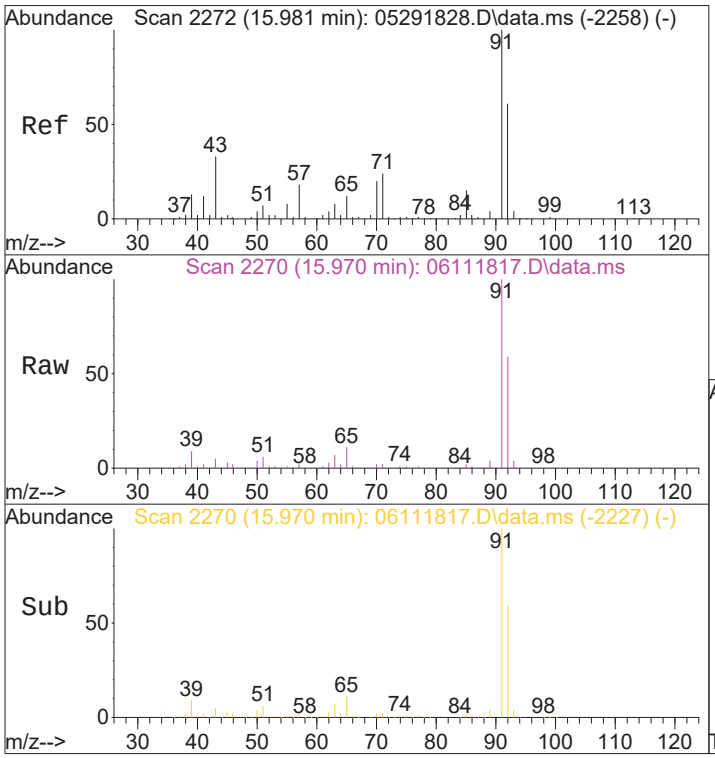


#53
4-Methyl-2-pentanone
Concen: 1.02 ng
RT: 15.02 min Scan# 2097
Delta R.T. -0.011 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 58 Resp: 41116

Ion	Ratio	Lower	Upper
58	100		
43	245.6	181.7	272.5
85	36.9	37.8	56.6#

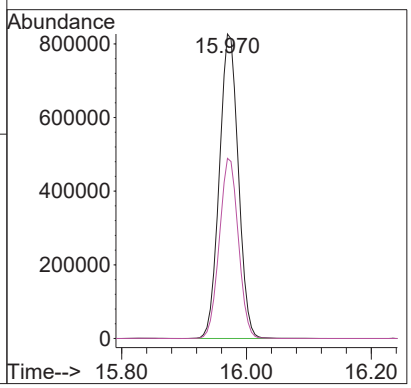


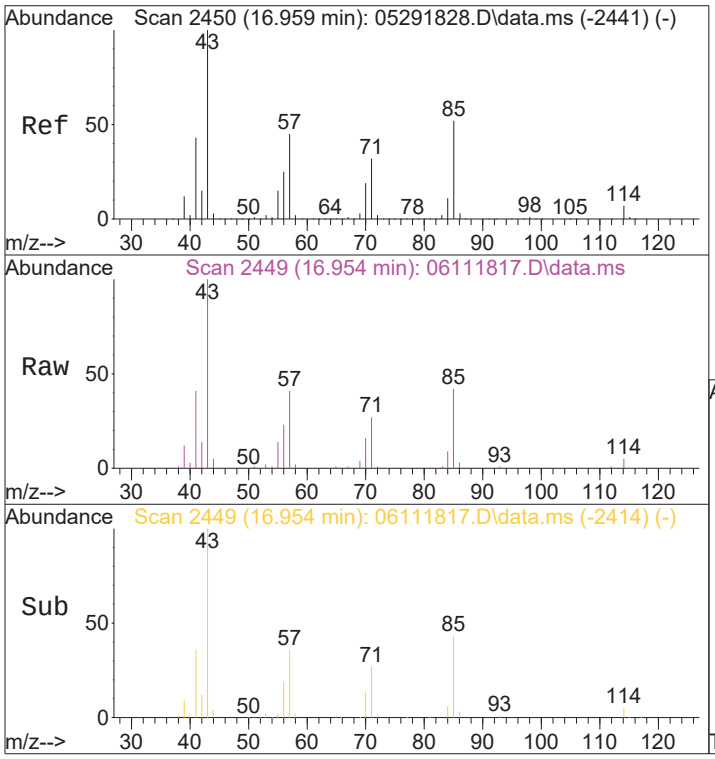


#58
Toluene
Concen: 11.74 ng
RT: 15.97 min Scan# 2270
Delta R.T. -0.011 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 91 Resp: 1740647

Ion	Ratio	Lower	Upper
91	100		
92	59.3	39.7	79.7

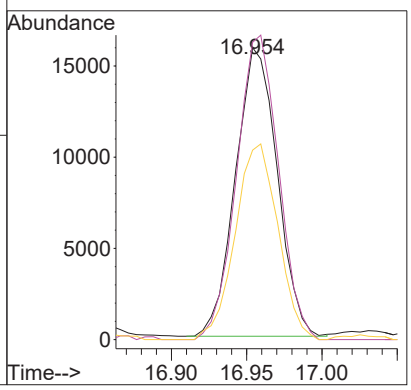


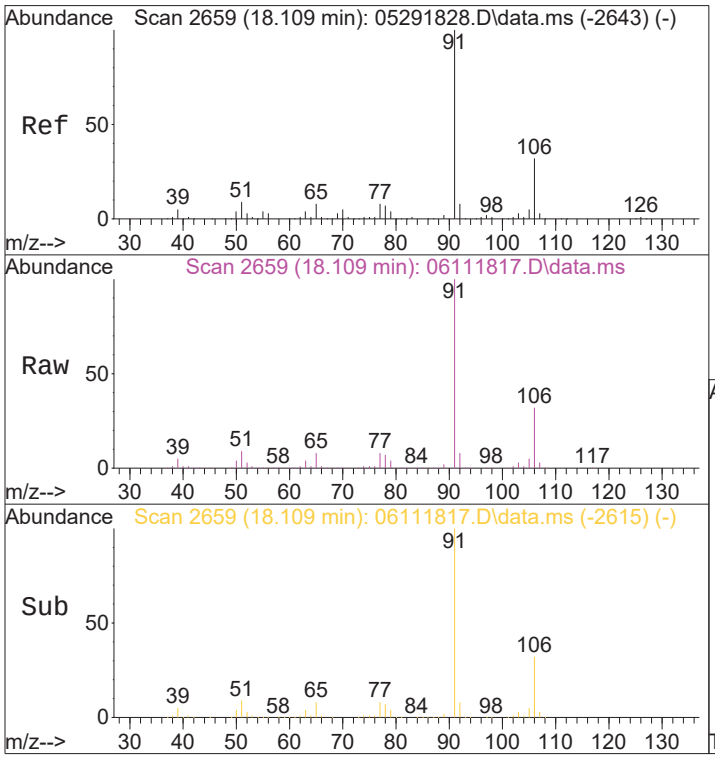


#63
n-Octane
Concen: 0.94 ng
RT: 16.95 min Scan# 2449
Delta R.T. -0.006 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 57 Resp: 30586

Ion	Ratio	Lower	Upper
57	100		
85	105.8	98.2	147.4
71	69.2	58.9	88.3

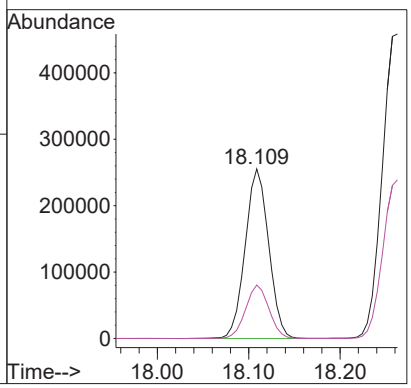


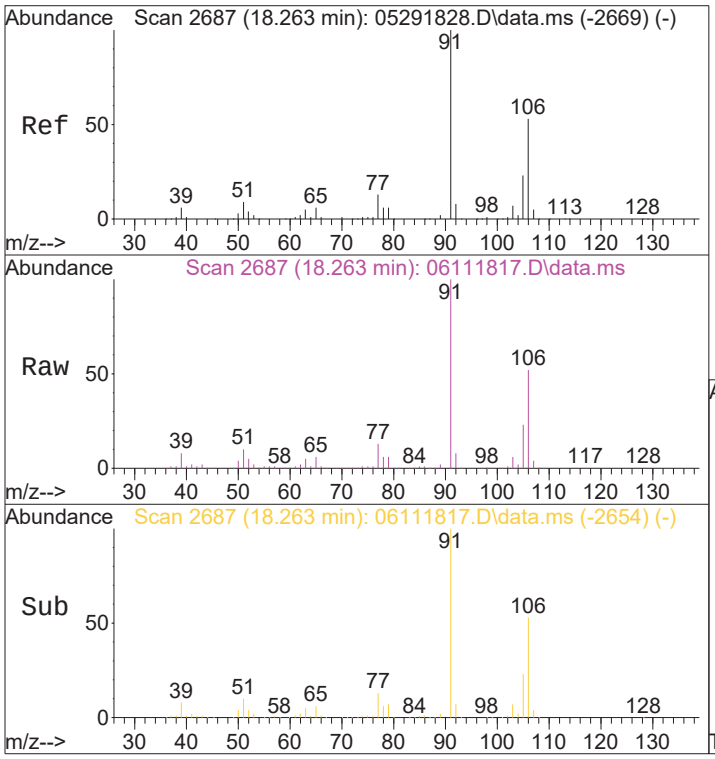


#66
Ethylbenzene
Concen: 2.68 ng
RT: 18.11 min Scan# 2659
Delta R.T. -0.006 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 91 Resp: 455661

Ion	Ratio	Lower	Upper
91	100		
106	31.3	12.9	52.9

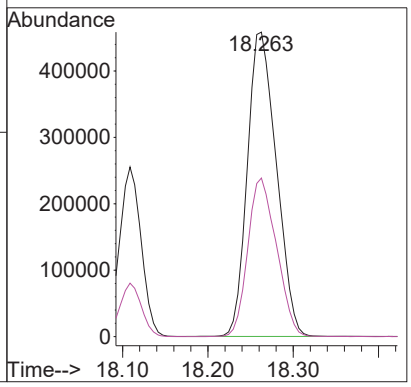


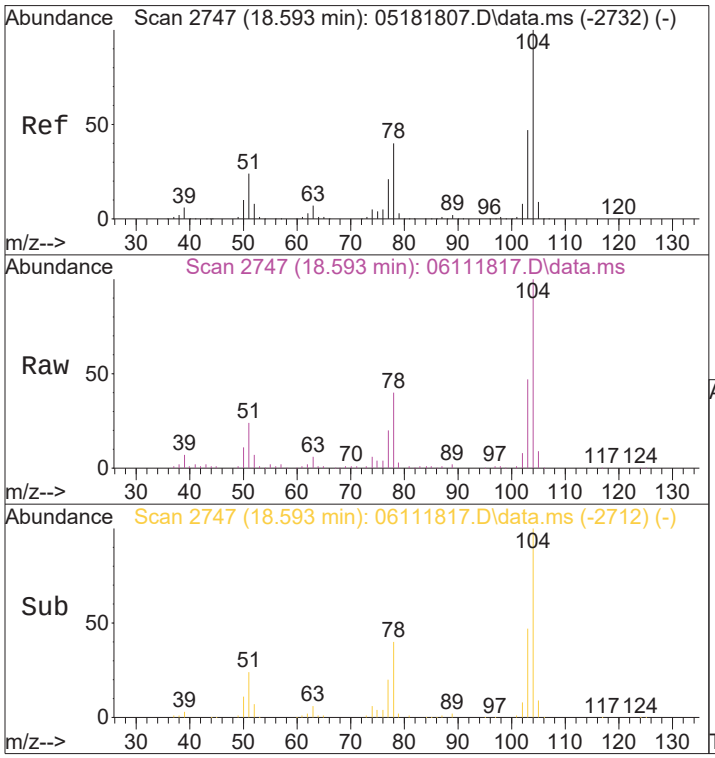


#67
m- & p-Xylenes
Concen: 8.36 ng
RT: 18.26 min Scan# 2687
Delta R.T. -0.017 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 91 Resp: 1082585

Ion	Ratio	Lower	Upper
91	100		
106	51.6	32.6	72.6

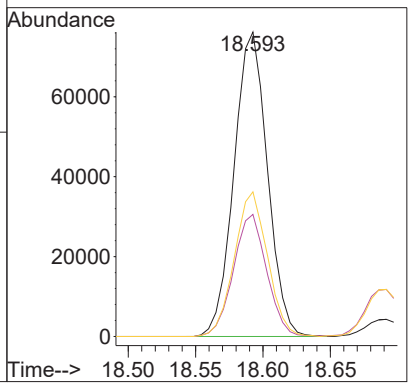


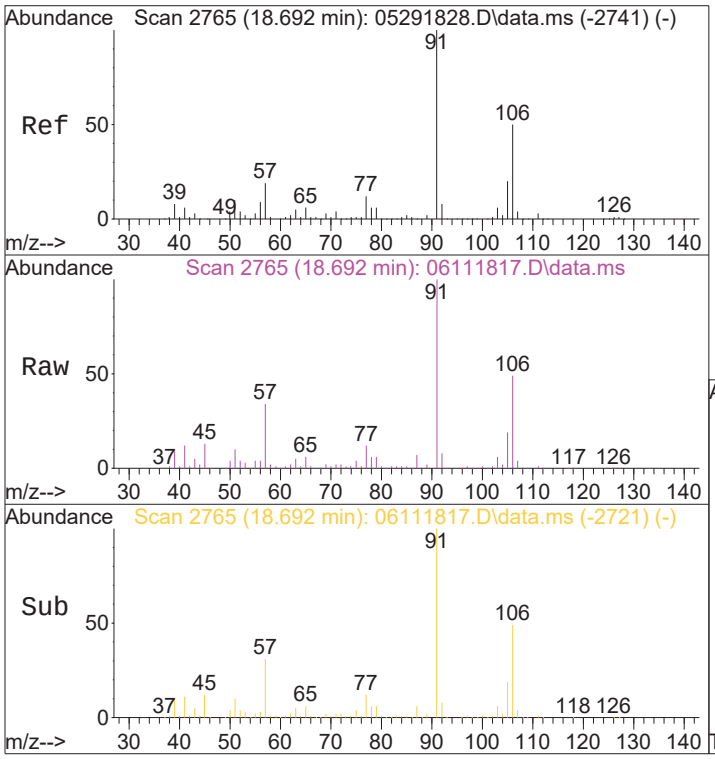


#69
Styrene
Concen: 1.28 ng
RT: 18.59 min Scan# 2747
Delta R.T. -0.006 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion:104 Resp: 131721

Ion	Ratio	Lower	Upper
104	100		
78	39.9	18.3	58.3
103	47.1	26.7	66.7

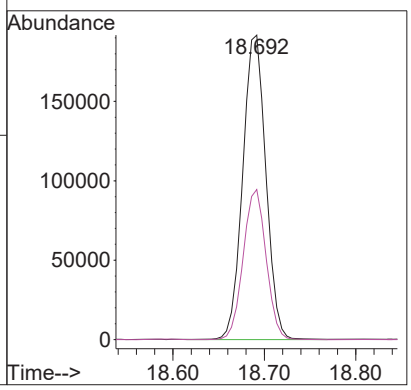


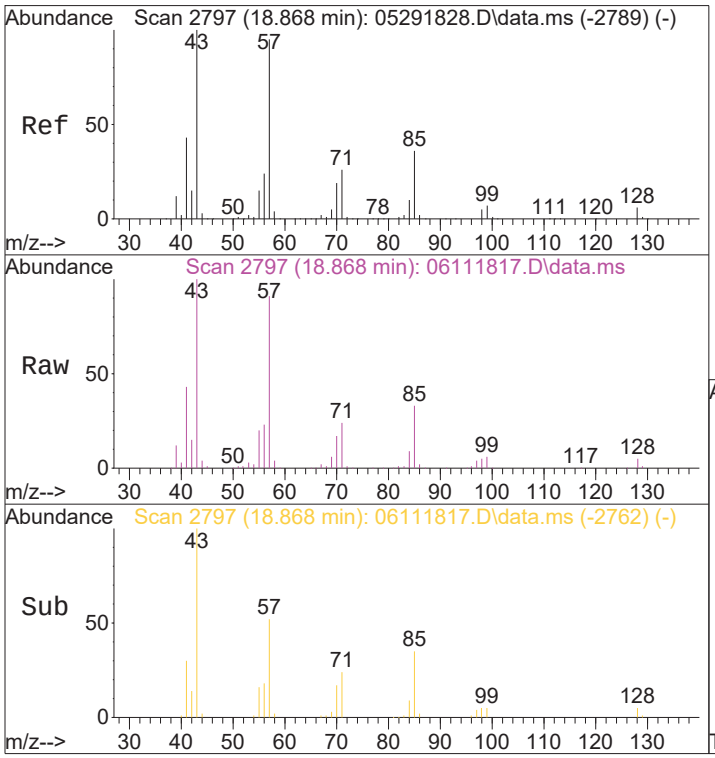


#70
o-Xylene
Concen: 2.57 ng
RT: 18.69 min Scan# 2765
Delta R.T. -0.006 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 91 Resp: 337687

Ion	Ratio	Lower	Upper
91	100		
106	48.7	30.0	70.0

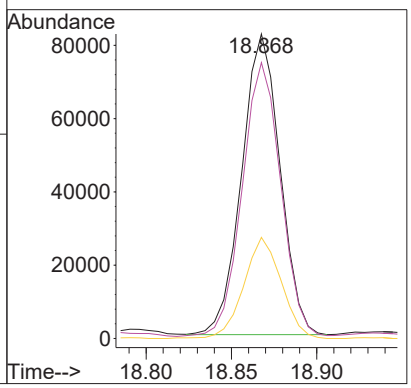


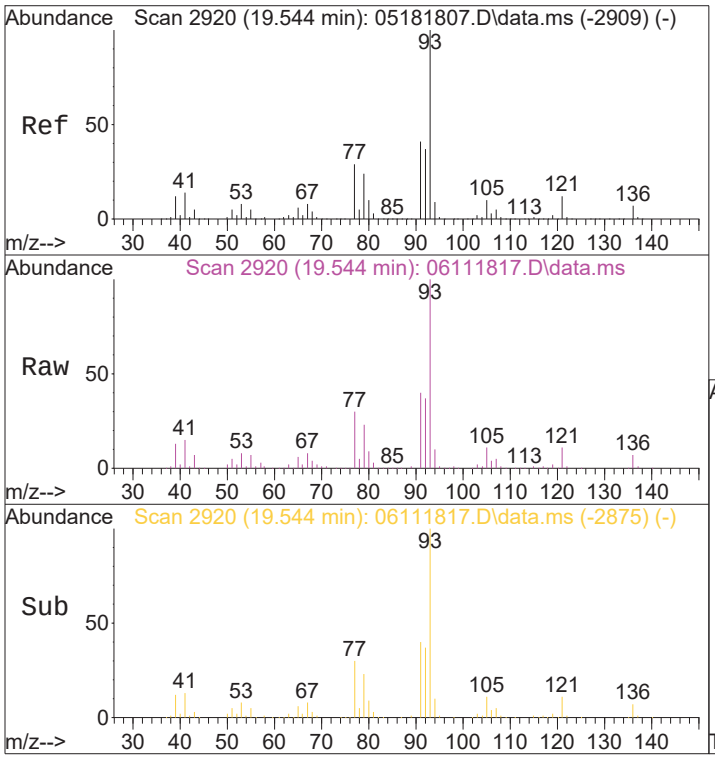


#71
n-Nonane
Concen: 1.71 ng
RT: 18.87 min Scan# 2797
Delta R.T. -0.006 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 43 Resp: 128346

Ion	Ratio	Lower	Upper
43	100		
57	91.6	77.9	117.9
85	32.9	20.8	60.8

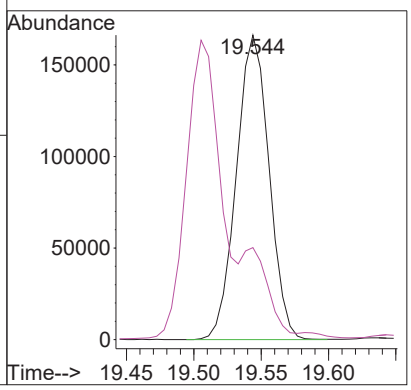


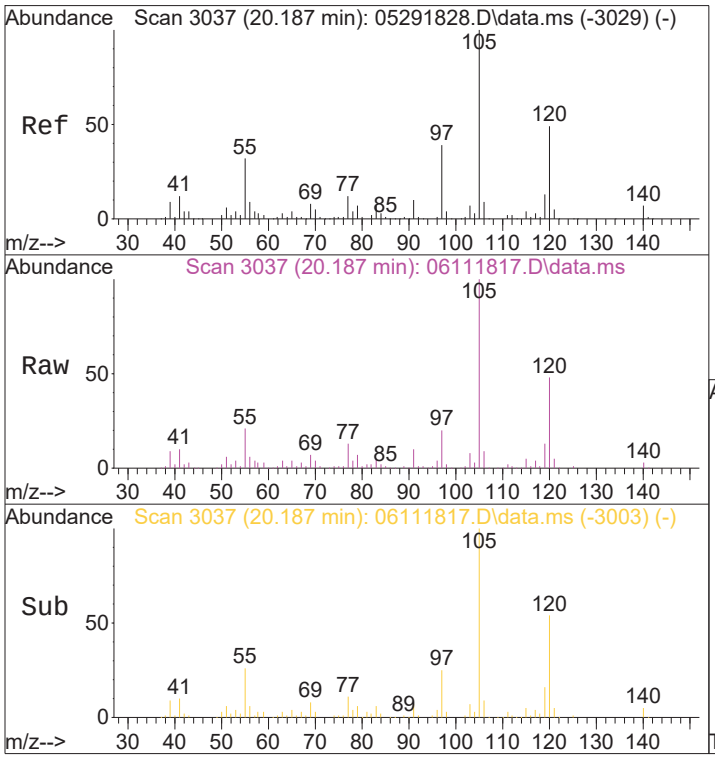


#75
alpha-Pinene
Concen: 3.20 ng
RT: 19.54 min Scan# 2920
Delta R.T. -0.000 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 93 Resp: 280424

Ion	Ratio	Lower	Upper
93	100		
77	0.0	9.1	49.1#

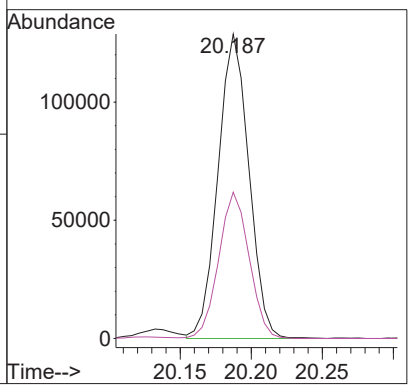


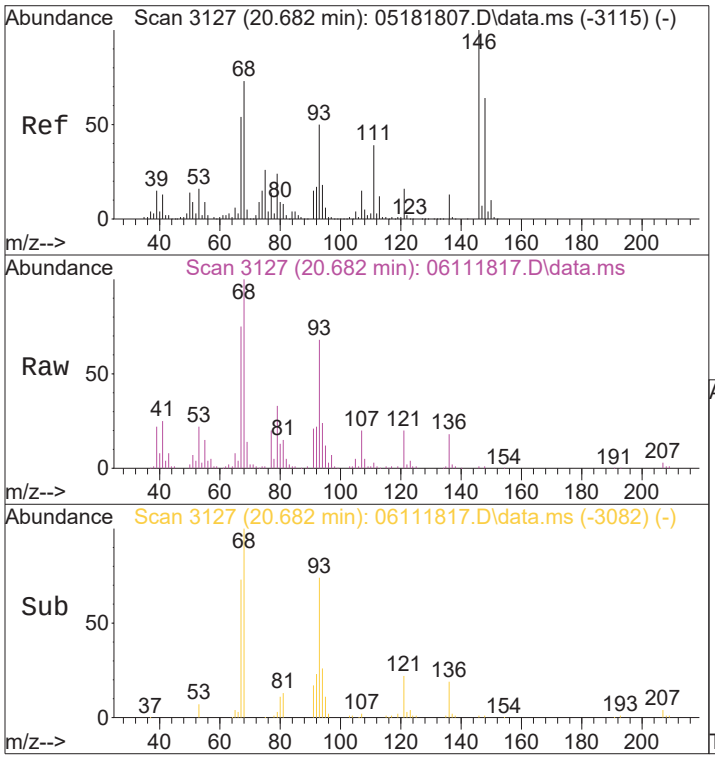


#82
1,2,4-Trimethylbenzene
Concen: 1.42 ng
RT: 20.19 min Scan# 3037
Delta R.T. -0.011 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion:105 Resp: 193835

Ion	Ratio	Lower	Upper
105	100		
120	47.5	36.4	76.4

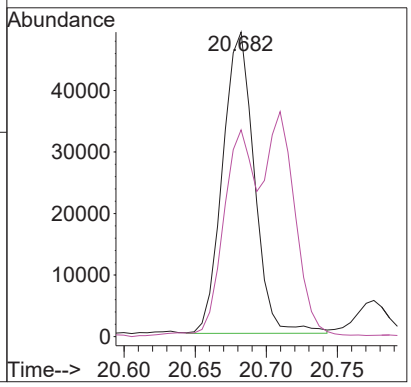




#91
d-Limonene
Concen: 1.36 ng
RT: 20.68 min Scan# 3127
Delta R.T. -0.000 min
Lab File: 06111817.D
Acq: 11 Jun 2018 16:43

Tgt Ion: 68 Resp: 75873

Ion	Ratio	Lower	Upper
68	100		
93	68.6	54.6	94.6



00905958

Data File: I:\MS16\DATA\2018_06\11\06111804.D
Acq On : 11 Jun 2018 8:46 Operator: WA
Sample : MB R16061118_1000mL
Misc : S31-04201801/AC00442
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 11 09:59:15 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018 6/11/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	329700	12.500	ng		-0.03
37) 1,4-Difluorobenzene (IS2)	13.43	114	1462819	12.500	ng		-0.02
56) Chlorobenzene-d5 (IS3)	17.72	82	628324	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.17	65	447339	12.004	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 96.00%				
57) Toluene-d8 (SS2)	15.87	98	1371338	12.568	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.56%				
73) Bromofluorobenzene (SS3)	19.09	174	450673	13.011	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 104.08%				
Target Compounds							Qvalue
2) Propene	4.10	42	1491	0.032	ng	#	65
3) Dichlorodifluoromethan...	0.00	85	0	.D.	d		
4) Chloromethane	0.00	50	0	.D.			
5) 1,2-Dichloro-1,1,2,2-t...	0.00	135	0	.D.			
6) Vinyl Chloride	0.00	62	0	.D.			
7) 1,3-Butadiene	0.00	54	0	.D.			
8) Bromomethane	0.00	94	0	.D.			
9) Chloroethane	0.00	64	0	.D.			
10) Ethanol	6.45	45	5526	0.175	ng		94
11) Acetonitrile	0.00	41	0	.D.	d		
12) Acrolein	6.93	56	1796	0.067	ng		81
13) Acetone	7.15	58	12139	0.378	ng		93
14) Trichlorofluoromethane	0.00	101	0	.D.			
15) 2-Propanol (Isopropanol)	0.00	45	0	.D.	d		
16) Acrylonitrile	7.91	53	1124	0.020	ng		90
17) 1,1-Dichloroethene	0.00	96	0	.D.			
18) 2-Methyl-2-Propanol (t...	0.00	59	0	.D.	d		
19) Methylene Chloride	8.57	84	873	0.021	ng		78
20) 3-Chloro-1-propene (Al...	0.00	41	0	.D.			
21) Trichlorotrifluoroethane	8.80	151	573	0.017	ng	#	1
22) Carbon Disulfide	8.86	76	4831	0.033	ng		85
23) trans-1,2-Dichloroethene	0.00	61	0	.D.			
24) 1,1-Dichloroethane	0.00	63	0	.D.			
25) Methyl tert-Butyl Ether	0.00	73	0	.D.			
26) Vinyl Acetate	0.00	86	0	.D.			
27) 2-Butanone (ME)	10.67	72	992	0.036	ng	#	1
28) cis-1,2-Dichloroethene	0.00	61	0	.D.			
29) Diisopropyl Ether	0.00	87	0	.D.			
30) Ethyl Acetate	0.00	61	0	.D.			
31) n-He ane	11.42	57	630	0.010	ng	#	66
32) Chloroform	0.00	83	0	.D.			
34) Tetrahydrofuran (THF)	11.95	72	602	0.022	ng	#	60
35) Ethyl tert-Butyl Ether	0.00	87	0	.D.			
36) 1,2-Dichloroethane	0.00	62	0	.D.			
38) 1,1,1-Trichloroethane	0.00	97	0	.D.			
39) Isopropyl Acetate	0.00	61	0	.D.			
40) 1-Butanol	13.04	56	3394	0.077	ng		85
41) Benzene	13.04	78	4264	0.025	ng		99
42) Carbon Tetrachloride	0.00	117	0	.D.			
43) Cyclohe ane	0.00	84	0	.D.	d		
44) tert-Amyl Methyl Ether	0.00	73	0	.D.			
45) 1,2-Dichloropropane	0.00	63	0	.D.			
46) Bromodichloromethane	0.00	83	0	.D.			
47) Trichloroethene	0.00	130	0	.D.			
48) 1,4-Dio ane	0.00	88	0	.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	.D.	d		

Data File: I:\MS16\DATA\2018_06\11\06111804.D
Acq On : 11 Jun 2018 8:46 Operator: WA
Sample : MB R16061118_1000mL
Misc : S31-04201801/AC00442
ALS Vial : 2 Sample Multiplier: 1

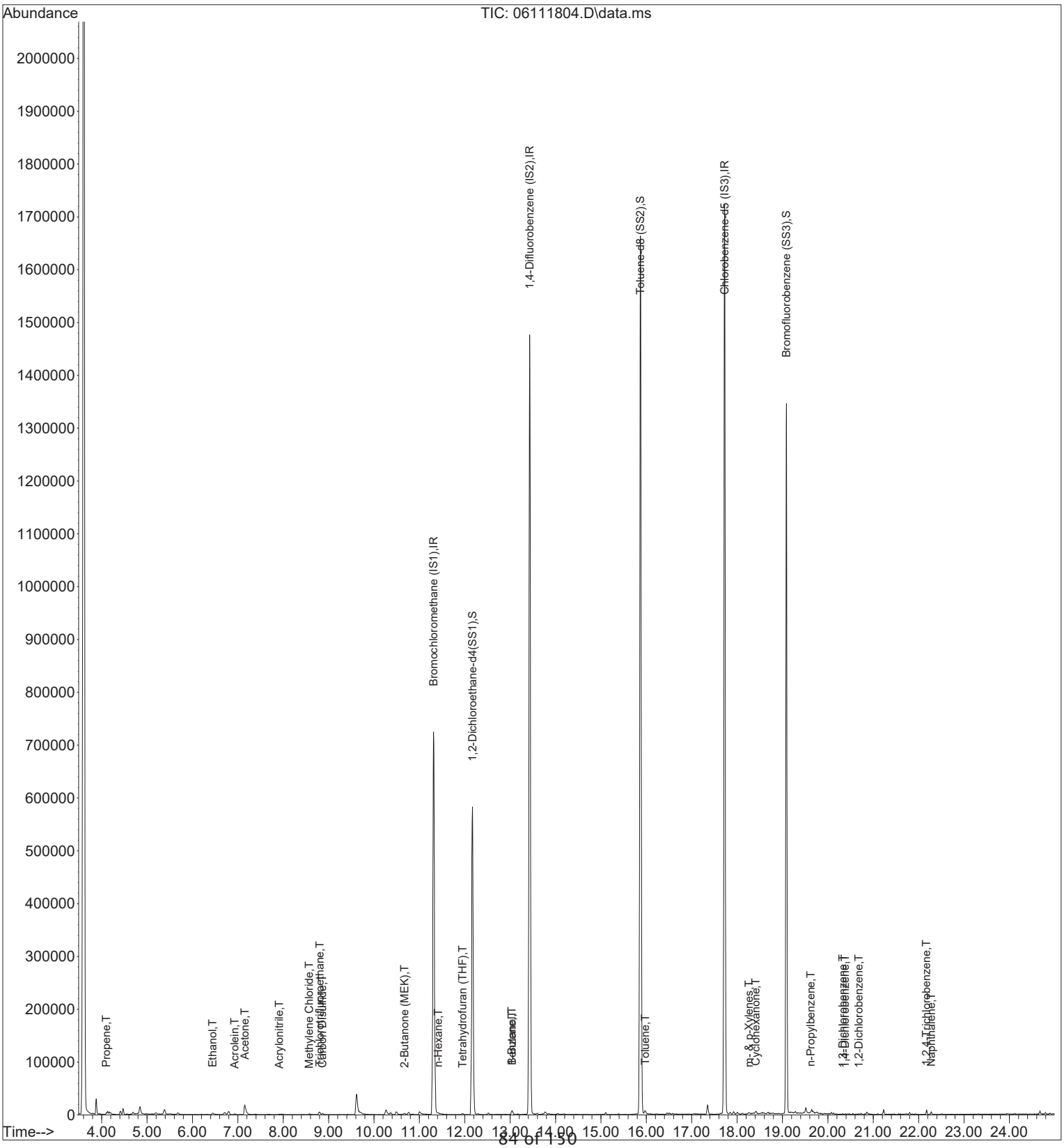
Quant Time: Jun 11 09:59:15 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc Units		Dev(Min)
50) Methyl Methacrylate	0.00	100	0	.D.		
51) n-Heptane	0.00	71	0	.D.		
52) cis-1,3-Dichloropropene	0.00	75	0	.D.		
53) 4-Methyl-2-pentanone	0.00	58	0	.D.		
54) trans-1,3-Dichloropropene	0.00	75	0	.D.		
55) 1,1,2-Trichloroethane	0.00	97	0	.D.		
58) Toluene	15.98	91	7245	0.050 ng	#	72
59) 2-He anone	0.00	43	0	.D. d		
60) Dibromochloromethane	0.00	129	0	.D.		
61) 1,2-Dibromoethane	0.00	107	0	.D.		
62) n-Butyl Acetate	0.00	43	0	.D. d		
63) n-Octane	0.00	57	0	.D. d		
64) Tetrachloroethene	0.00	166	0	.D.		
65) Chlorobenzene	0.00	112	0	.D. d		
66) Ethylbenzene	0.00	91	0	.D. d		
67) m- p- ylenes	18.26	91	7231	0.057 ng	#	43
68) Bromoform	0.00	173	0	.D.		
69) Styrene	0.00	104	0	.D. d		
70) o- ylene	0.00	91	0	.D. d		
71) n- onane	0.00	43	0	.D. d		
72) 1,1,2,2-Tetrachloroethane	0.00	83	0	.D.		
74) Cumene	0.00	105	0	.D. d		
75) alpha-Pinene	0.00	93	0	.D.		
76) n-Propylbenzene	19.62	91	2321	0.012 ng	#	27
77) 3-Ethyltoluene	0.00	105	0	.D. d		
78) 4-Ethyltoluene	0.00	105	0	.D. d		
79) 1,3,5-Trimethylbenzene	0.00	105	0	.D. d		
80) alpha-Methylstyrene	0.00	118	0	.D. d		
81) 2-Ethyltoluene	0.00	105	0	.D. d		
82) 1,2,4-Trimethylbenzene	0.00	105	0	.D. d		
83) n-Decane	0.00	57	0	.D. d		
84) Benzyl Chloride	0.00	91	0	.D. d		
85) 1,3-Dichlorobenzene	20.32	146	742	0.009 ng		93
86) 1,4-Dichlorobenzene	20.38	146	942	0.011 ng		92
87) sec-Butylbenzene	0.00	105	0	.D. d		
88) 4-Isopropyltoluene (p-...	0.00	119	0	.D. d		
89) 1,2,3-Trimethylbenzene	0.00	105	0	.D. d		
90) 1,2-Dichlorobenzene	20.68	146	500	0.007 ng	#	71
91) d-Limonene	0.00	68	0	.D.		
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	.D.		
93) n-Undecane	0.00	57	0	.D. d		
94) 1,2,4-Trichlorobenzene	22.17	180	1008	0.018 ng	#	95
95) aphthalene	22.28	128	4777	0.025 ng		93
96) n-Dodecane	0.00	57	0	.D. d		
97) He achlorobutadiene	0.00	225	0	.D.		
98) Cyclohe anone	18.41	55	1964	0.033 ng	#	86
99) tert-Butylbenzene	0.00	119	0	.D. d		
100) n-Butylbenzene	0.00	91	0	.D. d		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111804.D
Acq On : 11 Jun 2018 8:46 Operator: WA
Sample : MB R16061118_1000mL
Misc : S31-04201801/AC00442
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 11 09:59:15 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111811.D
Acq On : 11 Jun 2018 12:39 Operator: WA
Sample : LCS R16061118_25ng
Misc : S31-04201801/S31-05311801 (6/29)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 11 13:49:06 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018 6/11/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.33	130	348723	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	13.44	114	1492124	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	17.72	82	648661	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.18	65	457811	11.614	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 92.88%				
57) Toluene-d8 (SS2)	15.88	98	1377689	12.230	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.84%				
73) Bromofluorobenzene (SS3)	19.09	174	472183	13.204	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 105.60%				
Target Compounds							Qvalue
2) Propene	4.04	42	1112821	22.845	ng		98
3) Dichlorodifluoromethan...	4.21	85	1805931	23.290	ng		100
4) Chloromethane	4.50	50	1627761	23.593	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.78	135	1002401	23.741	ng		100
6) Vinyl Chloride	4.95	62	1563139	22.801	ng		100
7) 1,3-Butadiene	5.23	54	1197673	24.412	ng		98
8) Bromomethane	5.69	94	948231	24.382	ng		99
9) Chloroethane	6.04	64	765115	23.653	ng		100
10) Ethanol	6.45	45	3882600	116.473	ng		100
11) Acetonitrile	6.71	41	2006636	22.954	ng		99
12) Acrolein	6.90	56	668912	23.743	ng		100
13) Acetone	7.11	58	3730338	109.824	ng		96
14) Trichlorofluoromethane	7.35	101	1490272	22.730	ng		100
15) 2-Propanol (Isopropanol)	7.63	45	5229500	48.837	ng		98
16) Acrylonitrile	7.91	53	1427901	24.036	ng		100
17) 1,1-Dichloroethene	8.35	96	968217	24.356	ng		92
18) 2-Methyl-2-Propanol (t...	8.52	59	5040245	48.004	ng		99
19) Methylene Chloride	8.59	84	1025582	23.423	ng		87
20) 3-Chloro-1-propene (Al...	8.74	41	1526056	24.793	ng		91
21) Trichlorotrifluoroethane	8.99	151	874377	24.240	ng		93
22) Carbon Disulfide	8.85	76	3819440	24.652	ng		100
23) trans-1,2-Dichloroethene	9.87	61	1453768	24.134	ng		91
24) 1,1-Dichloroethane	10.13	63	1757359	23.308	ng		100
25) Methyl tert-Butyl Ether	10.21	73	2877954	23.588	ng		96
26) Vinyl Acetate	10.38	86	1146352	128.875	ng	#	65
27) 2-Butanone (MEK)	10.62	72	695498	23.665	ng	#	82
28) cis-1,2-Dichloroethene	11.15	61	1353080	23.112	ng		92
29) Diisopropyl Ether	11.42	87	765293	23.339	ng	#	64
30) Ethyl Acetate	11.44	61	769381	48.629	ng		96
31) n-Hexane	11.42	57	1543916	23.550	ng		99
32) Chloroform	11.50	83	1629616	23.101	ng		100
34) Tetrahydrofuran (THF)	11.89	72	691854	23.428	ng	#	88
35) Ethyl tert-Butyl Ether	12.02	87	1132539	23.759	ng	#	88
36) 1,2-Dichloroethane	12.30	62	1140510	22.440	ng		100
38) 1,1,1-Trichloroethane	12.57	97	1353295	23.583	ng		98
39) Isopropyl Acetate	12.98	61	1296215	47.511	ng	#	91
40) 1-Butanol	13.01	56	2167058	48.382	ng		95
41) Benzene	13.05	78	3918693	22.858	ng		100
42) Carbon Tetrachloride	13.20	117	1197179	24.319	ng		100
43) Cyclohexane	13.33	84	2934389	48.120	ng		90
44) tert-Amyl Methyl Ether	13.67	73	2811272	23.780	ng		97
45) 1,2-Dichloropropane	13.90	63	1021992	23.946	ng		100
46) Bromodichloromethane	14.09	83	1312756	24.890	ng		99
47) Trichloroethene	14.14	130	1058075	24.643	ng		100
48) 1,4-Dioxane	14.11	88	847618	24.421	ng		91
49) 2,2,4-Trimethylpentane...	14.19	57	4221044	23.360	ng		100

Data File: I:\MS16\DATA\2018_06\11\06111811.D
Acq On : 11 Jun 2018 12:39 Operator: WA
Sample : LCS R16061118_25ng
Misc : S31-04201801/S31-05311801 (6/29)
ALS Vial : 2 Sample Multiplier: 1

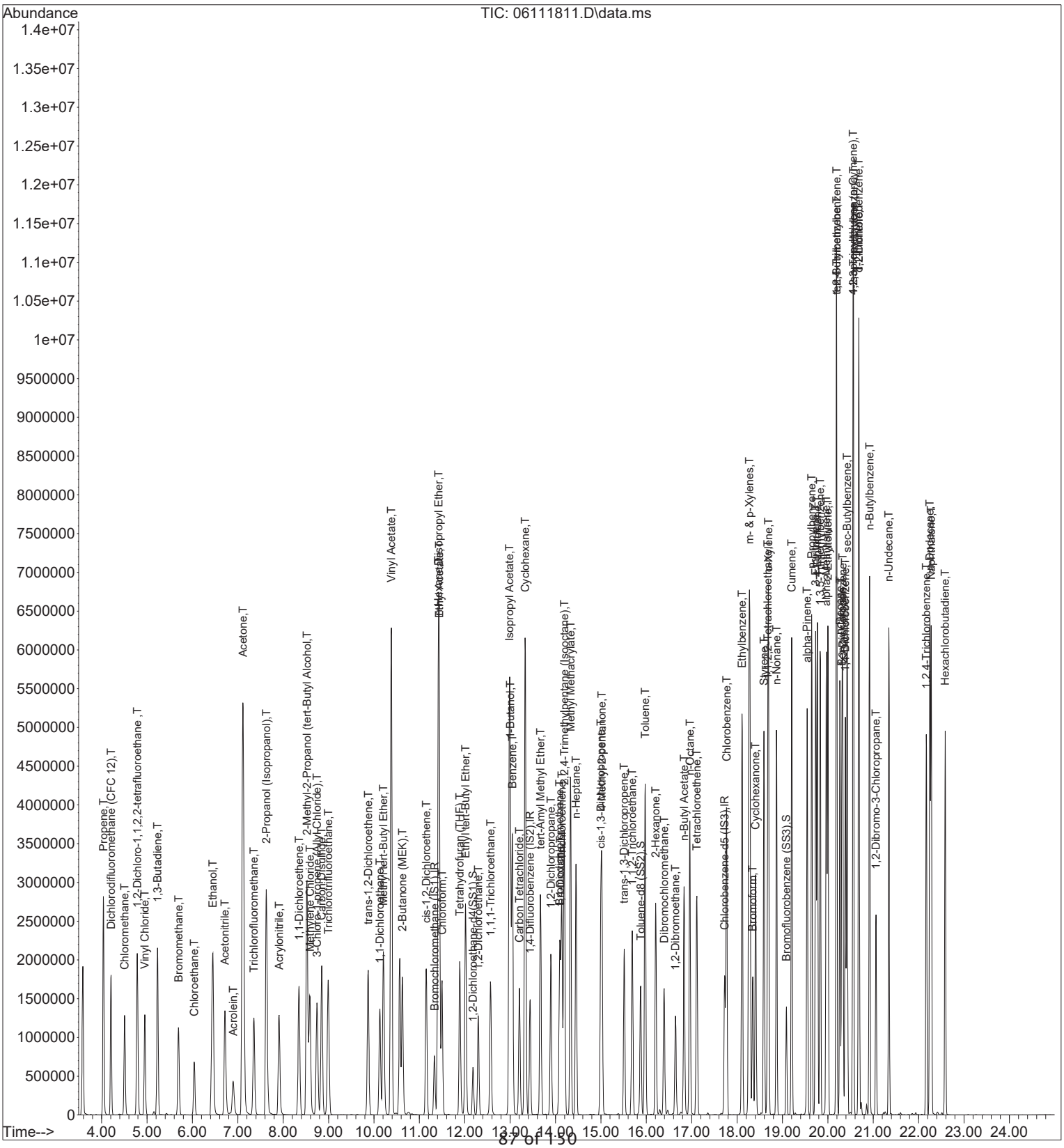
Quant Time: Jun 11 13:49:06 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	14.33	100	819436	50.864	ng	89
51) n-Heptane	14.45	71	923629	23.565	ng	94
52) cis-1,3-Dichloropropene	15.00	75	1634216	25.507	ng	100
53) 4-Methyl-2-pentanone	15.02	58	982106	24.164	ng	93
54) trans-1,3-Dichloropropene	15.51	75	1465624	26.270	ng	100
55) 1,1,2-Trichloroethane	15.69	97	973349	24.697	ng	97
58) Toluene	15.98	91	3860936	25.721	ng	100
59) 2-Hexanone	16.21	43	2213463	24.423	ng	96
60) Dibromochloromethane	16.39	129	1136777	27.490	ng	100
61) 1,2-Dibromoethane	16.64	107	1109512	26.560	ng	99
62) n-Butyl Acetate	16.83	43	2577368	25.506	ng	97
63) n-Octane	16.96	57	830422	25.252	ng	91
64) Tetrachloroethene	17.11	166	1114517	26.739	ng	100
65) Chlorobenzene	17.77	112	2595048	25.774	ng	99
66) Ethylbenzene	18.11	91	4364745	25.333	ng	98
67) m- & p-Xylenes	18.27	91	6510089	49.680	ng	98
68) Bromoform	18.35	173	995720	29.232	ng	100
69) Styrene	18.59	104	2773461	26.542	ng	99
70) o-Xylene	18.69	91	3354659	25.216	ng	98
71) n-Nonane	18.87	43	1851335	24.390	ng	94
72) 1,1,2,2-Tetrachloroethane	18.68	83	1751771	25.602	ng	100
74) Cumene	19.20	105	4343178	25.813	ng	98
75) alpha-Pinene	19.54	93	2277687	25.714	ng	99
76) n-Propylbenzene	19.64	91	5238652	25.943	ng	98
77) 3-Ethyltoluene	19.73	105	4437582	26.481	ng	94
78) 4-Ethyltoluene	19.77	105	3908406	25.286	ng	96
79) 1,3,5-Trimethylbenzene	19.83	105	3459960	25.464	ng	98
80) alpha-Methylstyrene	19.97	118	1943303	26.885	ng	100
81) 2-Ethyltoluene	20.00	105	4116900	25.197	ng	99
82) 1,2,4-Trimethylbenzene	20.19	105	3447285	25.022	ng	99
83) n-Decane	20.26	57	1948816	25.461	ng	95
84) Benzyl Chloride	20.31	91	3238797	28.639	ng	97
85) 1,3-Dichlorobenzene	20.33	146	2159505	26.207	ng	100
86) 1,4-Dichlorobenzene	20.39	146	2197123	25.877	ng	100
87) sec-Butylbenzene	20.42	105	4689902	25.680	ng	99
88) 4-Isopropyltoluene (p-...	20.56	119	4229096	25.572	ng	99
89) 1,2,3-Trimethylbenzene	20.56	105	3517547	25.890	ng	98
90) 1,2-Dichlorobenzene	20.68	146	2059043	26.528	ng	100
91) d-Limonene	20.68	68	1407838	24.915	ng	93
92) 1,2-Dibromo-3-Chloropr...	21.06	157	817941	28.977	ng	91
93) n-Undecane	21.34	57	2105028	28.259	ng	95
94) 1,2,4-Trichlorobenzene	22.17	180	1731961	29.544	ng	100
95) Naphthalene	22.28	128	5155591	26.079	ng	100
96) n-Dodecane	22.25	57	2126691	29.240	ng	94
97) Hexachlorobutadiene	22.59	225	1061918	27.840	ng	100
98) Cyclohexanone	18.41	55	1494060	24.118	ng	95
99) tert-Butylbenzene	20.19	119	3311472	25.270	ng	98
100) n-Butylbenzene	20.92	91	3853801	25.581	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111811.D
Acq On : 11 Jun 2018 12:39 Operator: WA
Sample : LCS R16061118_25ng
Misc : S31-04201801/S31-05311801 (6/29)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 11 13:49:06 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111818.D
Acq On : 11 Jun 2018 17:17 Operator: WA
Sample : P1802915-004dup (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Jun 14 11:05:46 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

WA 6/14/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.32	130	345753	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	13.43	114	1509790	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	17.72	82	656961	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.17	65	453242	11.597	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 92.80%				
57) Toluene-d8 (SS2)	15.87	98	1408548	12.346	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.80%				
73) Bromofluorobenzene (SS3)	19.09	174	469430	12.961	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.68%				
Target Compounds							Qvalue
2) Propene	4.04	42	89422	1.852	ng		98
3) Dichlorodifluoromethan...	4.21	85	956504	12.442	ng		99
4) Chloromethane	4.52	50	8795	.D.			
5) 1,2-Dichloro-1,1,2,2-t...	4.80	135	1892	.D.			
6) Vinyl Chloride	4.95	62	537	.D.			
7) 1,3-Butadiene	5.22	54	762	.D.			
8) Bromomethane	5.70	94	530	.D.			
9) Chloroethane	6.04	64	917	.D.			
10) Ethanol	6.42	45	1534572	46.431	ng		100
11) Acetonitrile	6.70	41	68089	0.786	ng		96
12) Acrolein	6.89	56	28226	1.010	ng		100
13) Acetone	7.09	58	1215776	36.101	ng	#	75
14) Trichlorofluoromethane	7.35	101	667482	10.268	ng		100
15) 2-Propanol (Isopropanol)	7.61	45	599742	5.649	ng		98
16) Acrylonitrile	7.96	53	12545	.D.			
17) 1,1-Dichloroethene	8.34	96	413	.D.			
18) 2-Methyl-2-Propanol (t...	8.55	59	16908	.D.			
19) Methylene Chloride	8.58	84	8802	.D.			
20) 3-Chloro-1-propene (Al...	8.73	41	520	.D.			
21) Trichlorotrifluoroethane	8.99	151	61153	1.710	ng		92
22) Carbon Disulfide	8.84	76	27794	.D.			
23) trans-1,2-Dichloroethene	9.86	61	742	.D.			
24) 1,1-Dichloroethane	10.15	63	6905	.D.			
25) Methyl tert-Butyl Ether	10.23	73	1129	.D.			
26) Vinyl Acetate	0.00	86	0	.D.	d		
27) 2-Butanone (ME)	10.61	72	433053	14.862	ng	#	77
28) cis-1,2-Dichloroethene	11.14	61	26796	0.462	ng		90
29) Diisopropyl Ether	11.42	87	3853	.D.			
30) Ethyl Acetate	11.44	61	33520	2.137	ng		97
31) n-He ane	11.41	57	359449	5.530	ng		97
32) Chloroform	11.49	83	18550	.D.			
34) Tetrahydrofuran (THF)	11.88	72	791334	27.026	ng	#	87
35) Ethyl tert-Butyl Ether	12.02	87	118	.D.			
36) 1,2-Dichloroethane	12.29	62	3549	.D.			
38) 1,1,1-Trichloroethane	12.57	97	122	.D.			
39) Isopropyl Acetate	12.98	61	2051	.D.			
40) 1-Butanol	0.00	56	0	.D.	d		
41) Benzene	13.04	78	245891	1.418	ng		99
42) Carbon Tetrachloride	13.20	117	11133	.D.			
43) Cyclohe ane	13.32	84	52931	0.858	ng		86
44) tert-Amyl Methyl Ether	13.72	73	8627	.D.			
45) 1,2-Dichloropropane	13.90	63	408	.D.			
46) Bromodichloromethane	14.09	83	8138	.D.			
47) Trichloroethene	14.13	130	52817	1.216	ng		99
48) 1,4-Dio ane	14.13	88	645	.D.			
49) 2,2,4-Trimethylpentane...	0.00	57	0	.D.	d		

Data File: I:\MS16\DATA\2018_06\11\06111818.D
Acq On : 11 Jun 2018 17:17 Operator: WA
Sample : P1802915-004dup (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

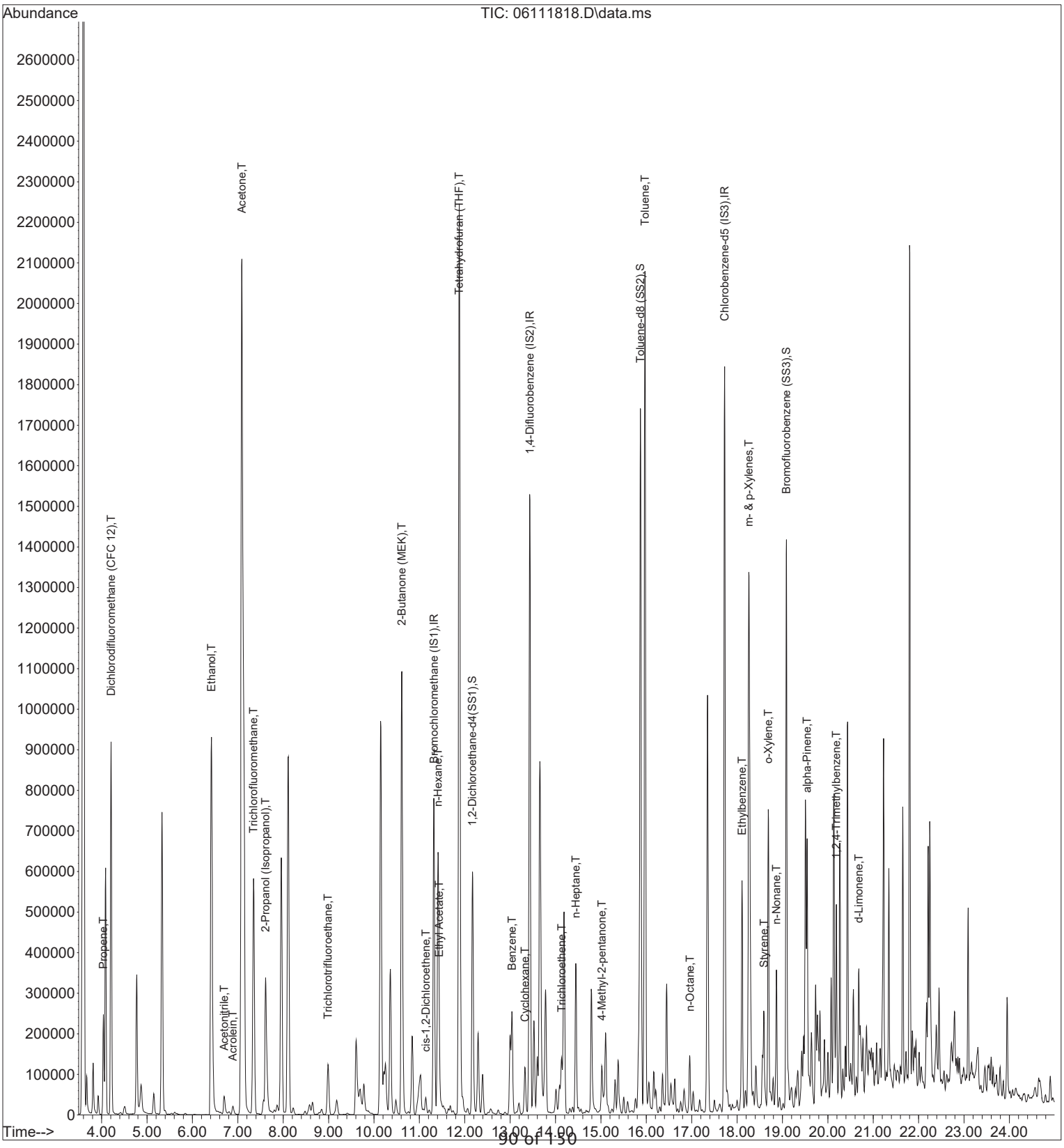
Quant Time: Jun 14 11:05:46 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	509	.D.			
51) n-Heptane	14.45	71	103155	2.601	ng		93
52) cis-1,3-Dichloropropene	14.89	75	1403	.D.			
53) 4-Methyl-2-pentanone	15.02	58	41412	1.007	ng	#	88
54) trans-1,3-Dichloropropene	15.51	75	1695	.D.			
55) 1,1,2-Trichloroethane	15.59	97	1011	.D.			
58) Toluene	15.97	91	1745116	11.479	ng		99
59) 2-He anone	16.21	43	31594	.D.			
60) Dibromochloromethane	0.00	129	0	.D.			
61) 1,2-Dibromoethane	0.00	107	0	.D.			
62) n-Butyl Acetate	16.83	43	38471	.D.			
63) n-Octane	16.96	57	30542	0.917	ng		89
64) Tetrachloroethene	17.11	166	1383	.D.			
65) Chlorobenzene	17.79	112	5528	.D.			
66) Ethylbenzene	18.11	91	457220	2.620	ng		97
67) m- p- ylenes	18.26	91	1085506	8.179	ng		98
68) Bromoform	0.00	173	0	.D.			
69) Styrene	18.59	104	131100	1.239	ng		99
70) o- ylene	18.69	91	336572	2.498	ng		98
71) n- onane	18.87	43	127480	1.658	ng		91
72) 1,1,2,2-Tetrachloroethane	18.69	83	1681	.D.			
74) Cumene	19.20	105	23369	.D.			
75) alpha-Pinene	19.54	93	281517	3.138	ng	#	1
76) n-Propylbenzene	19.64	91	67331	.D.			
77) 3-Ethyltoluene	0.00	105	0	.D.	d		
78) 4-Ethyltoluene	19.77	105	66947	.D.			
79) 1,3,5-Trimethylbenzene	19.83	105	50712	.D.			
80) alpha-Methylstyrene	19.97	118	1860	.D.			
81) 2-Ethyltoluene	20.00	105	55798	.D.			
82) 1,2,4-Trimethylbenzene	20.19	105	195664	1.402	ng		88
83) n-Decane	0.00	57	0	.D.	d		
84) Benzyl Chloride	20.39	91	4507	.D.			
85) 1,3-Dichlorobenzene	20.32	146	467	.D.			
86) 1,4-Dichlorobenzene	20.39	146	36567	.D.			
87) sec-Butylbenzene	20.42	105	10712	.D.			
88) 4-Isopropyltoluene (p-...	20.56	119	22496	.D.			
89) 1,2,3-Trimethylbenzene	20.56	105	51753	.D.			
90) 1,2-Dichlorobenzene	20.68	146	661	.D.			
91) d-Limonene	20.68	68	76796	1.342	ng		92
92) 1,2-Dibromo-3-Chloropr...	0.00	157	0	.D.			
93) n-Undecane	0.00	57	0	.D.	d		
94) 1,2,4-Trichlorobenzene	22.17	180	403	.D.			
95) aphthalene	22.28	128	66155	.D.			
96) n-Dodecane	0.00	57	0	.D.	d		
97) He achlorobutadiene	0.00	225	0	.D.			
98) Cyclohe anone	0.00	55	0	.D.	d		
99) tert-Butylbenzene	20.19	119	24998	.D.			
100) n-Butylbenzene	20.91	91	26900	.D.			

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111818.D
Acq On : 11 Jun 2018 17:17 Operator: WA
Sample : P1802915-004dup (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Jun 14 11:05:46 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111818.D
Acq On : 11 Jun 2018 17:17 Operator: WA
Sample : P1802915-004dup (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

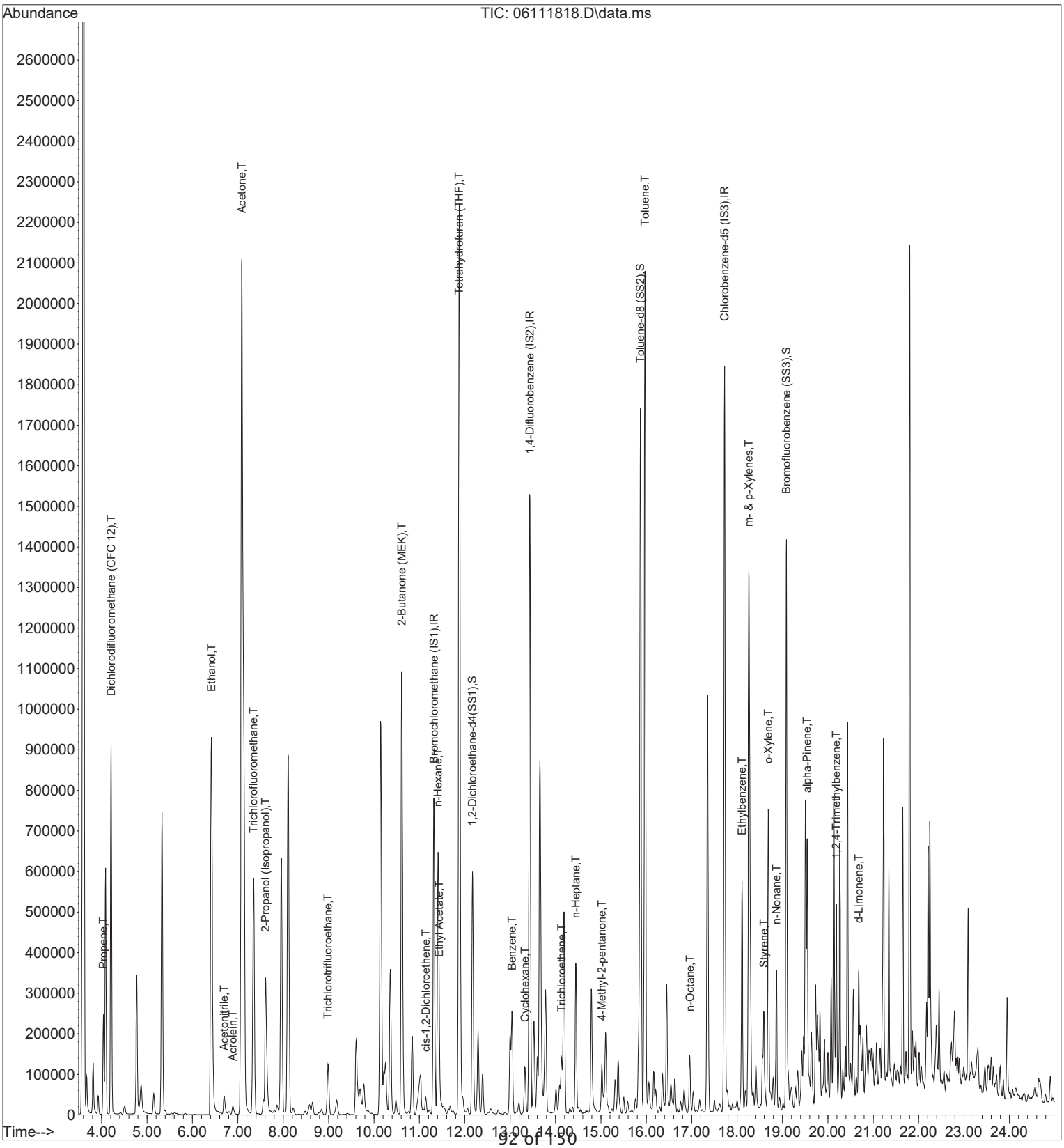
Quant Time: Jun 14 11:05:46 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration 6/14/18
DataAcq Meth:TO15.M

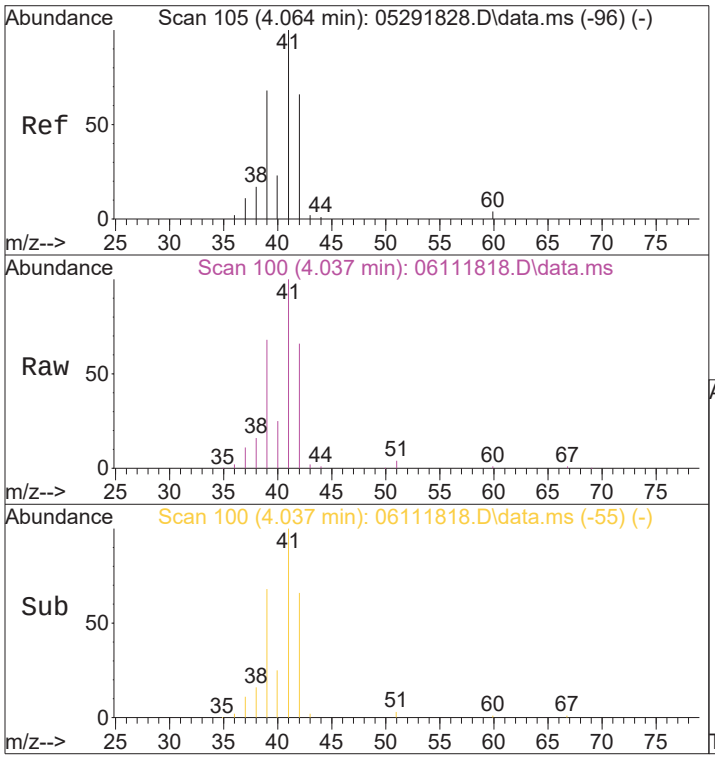
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.32	130	345753	12.500	ng		-0.02
37) 1,4-Difluorobenzene (IS2)	13.43	114	1509790	12.500	ng		-0.01
56) Chlorobenzene-d5 (IS3)	17.72	82	656961	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.17	65	453242	11.597	ng		-0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 92.80%				
57) Toluene-d8 (SS2)	15.87	98	1408548	12.346	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 98.80%				
73) Bromofluorobenzene (SS3)	19.09	174	469430	12.961	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.68%				
Target Compounds							Qvalue
2) Propene	4.04	42	89422	1.852	ng		98
3) Dichlorodifluoromethan...	4.21	85	956504	12.442	ng		99
10) Ethanol	6.42	45	1534572	46.431	ng		100
11) Acetonitrile	6.70	41	68089	0.786	ng		96
12) Acrolein	6.89	56	28226	1.010	ng		100
13) Acetone	7.09	58	1215776	36.101	ng	#	75
14) Trichlorofluoromethane	7.35	101	667482	10.268	ng		100
15) 2-Propanol (Isopropanol)	7.61	45	599742	5.649	ng		98
21) Trichlorotrifluoroethane	8.99	151	61153	1.710	ng		92
27) 2-Butanone (MEK)	10.61	72	433053	14.862	ng	#	77
28) cis-1,2-Dichloroethene	11.14	61	26796	0.462	ng		90
30) Ethyl Acetate	11.44	61	33520	2.137	ng		97
31) n-Hexane	11.41	57	359449	5.530	ng		97
34) Tetrahydrofuran (THF)	11.88	72	791334	27.026	ng	#	87
41) Benzene	13.04	78	245891	1.418	ng		99
43) Cyclohexane	13.32	84	52931	0.858	ng		86
47) Trichloroethene	14.13	130	52817	1.216	ng		99
51) n-Heptane	14.45	71	103155	2.601	ng		93
53) 4-Methyl-2-pentanone	15.02	58	41412	1.007	ng	#	88
58) Toluene	15.97	91	1745116	11.479	ng		99
63) n-Octane	16.96	57	30542	0.917	ng		89
66) Ethylbenzene	18.11	91	457220	2.620	ng		97
67) m- & p-Xylenes	18.26	91	1085506	8.179	ng		98
69) Styrene	18.59	104	131100	1.239	ng		99
70) o-Xylene	18.69	91	336572	2.498	ng		98
71) n-Nonane	18.87	43	127480	1.658	ng		91
75) alpha-Pinene	19.54	93	281517	3.138	ng	#	1
82) 1,2,4-Trimethylbenzene	20.19	105	195664	1.402	ng		88
91) d-Limonene	20.68	68	76796	1.342	ng		92

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111818.D
Acq On : 11 Jun 2018 17:17 Operator: WA
Sample : P1802915-004dup (1000mL)
Misc : S31-04201801
ALS Vial : 4 Sample Multiplier: 1

Quant Time: Jun 14 11:05:46 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

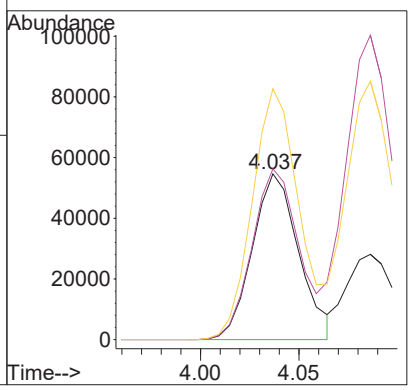


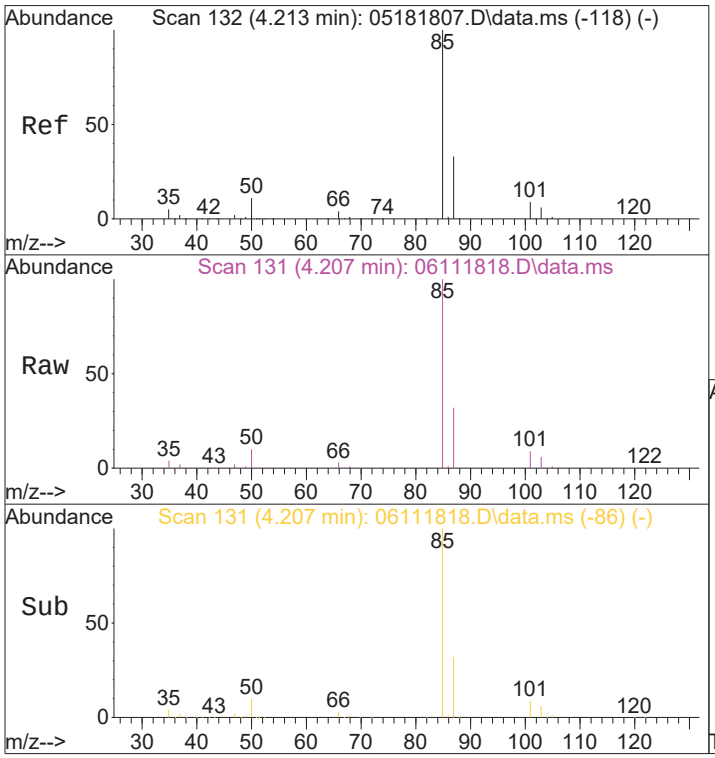


#2
Propene
Concen: 1.85 ng
RT: 4.04 min Scan# 100
Delta R.T. -0.005 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 42 Resp: 89422

Ion	Ratio	Lower	Upper
42	100		
39	103.3	86.8	126.8
41	148.3	130.4	170.4

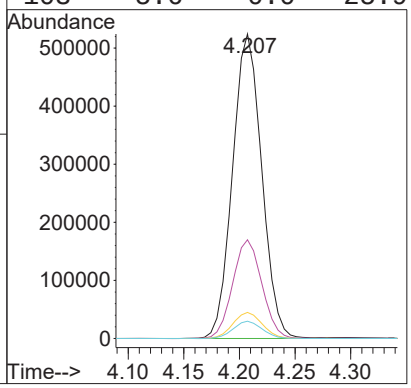


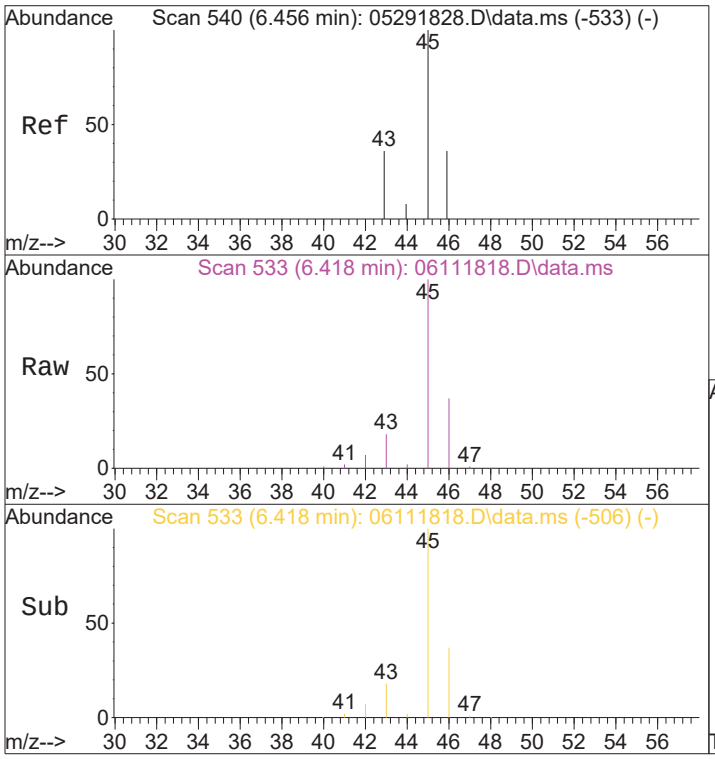


#3
Dichlorodifluoromethane (CFC 12)
Concen: 12.44 ng
RT: 4.21 min Scan# 131
Delta R.T. 0.000 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 85 Resp: 956504

Ion	Ratio	Lower	Upper
85	100		
87	32.4	12.6	52.6
101	8.6	0.0	29.1
103	5.6	0.0	25.9

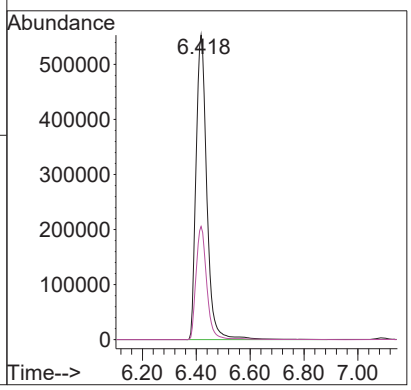


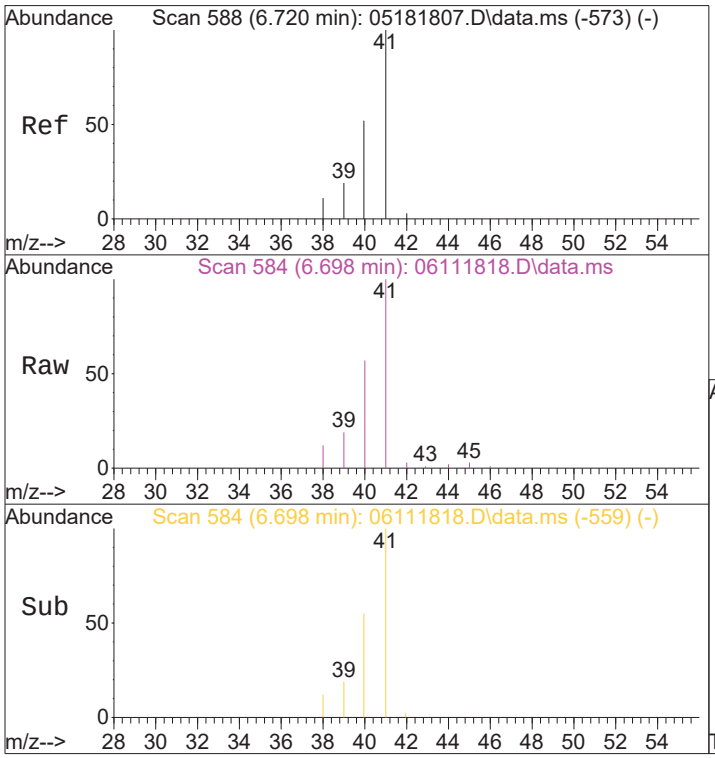


#10
Ethanol
Concen: 46.43 ng
RT: 6.42 min Scan# 533
Delta R.T. -0.099 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 45 Resp: 1534572

Ion	Ratio	Lower	Upper
45	100		
46	37.1	17.2	57.2

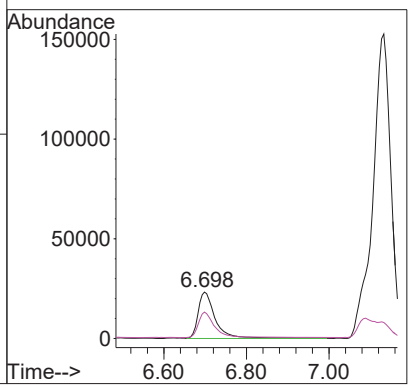


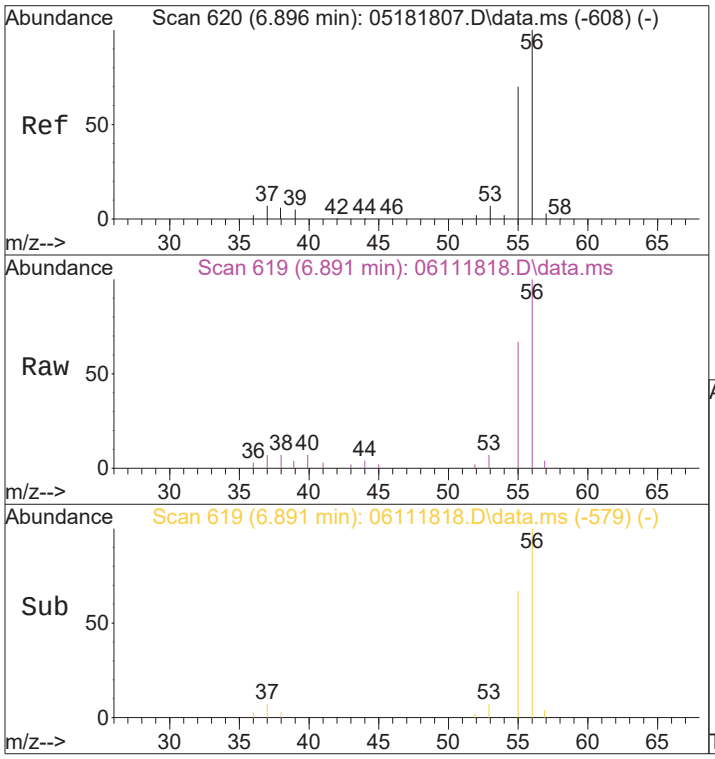


#11
Acetonitrile
Concen: 0.79 ng
RT: 6.70 min Scan# 584
Delta R.T. -0.060 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 41 Resp: 68089

Ion	Ratio	Lower	Upper
41	100		
40	55.9	33.1	73.1

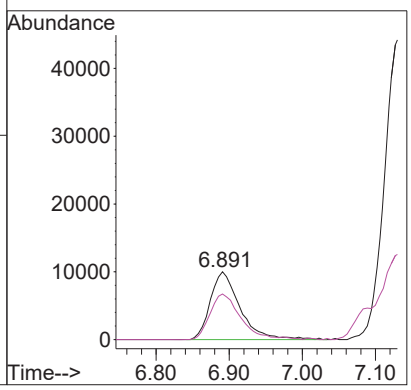


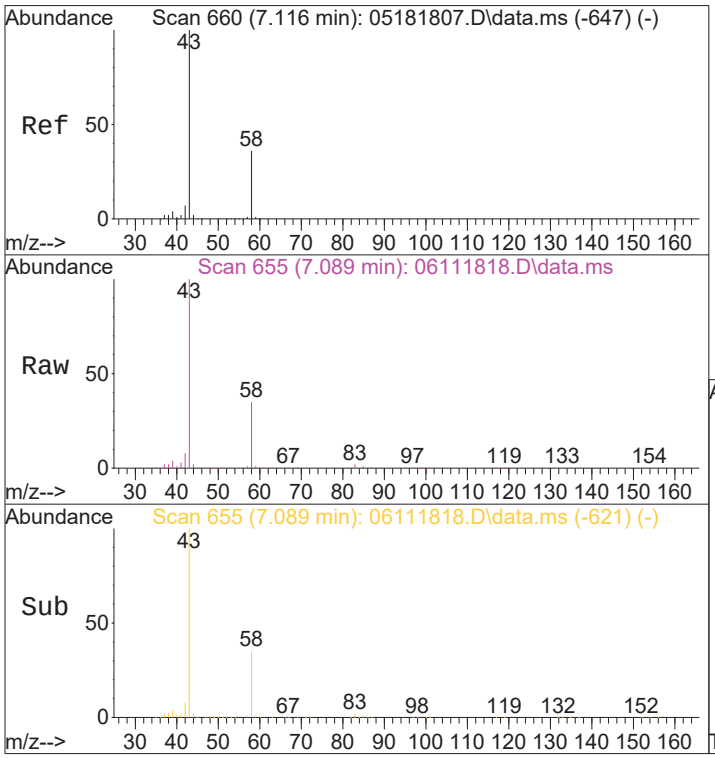


#12
Acrolein
Concen: 1.01 ng
RT: 6.89 min Scan# 619
Delta R.T. -0.027 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 56 Resp: 28226

Ion	Ratio	Lower	Upper
56	100		
55	69.9	49.7	89.7

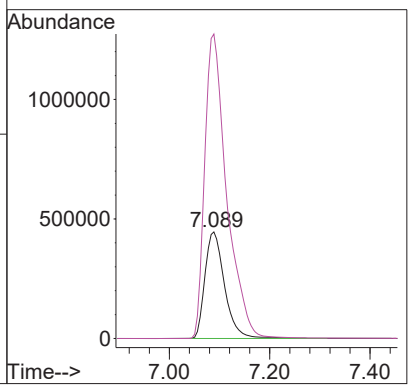


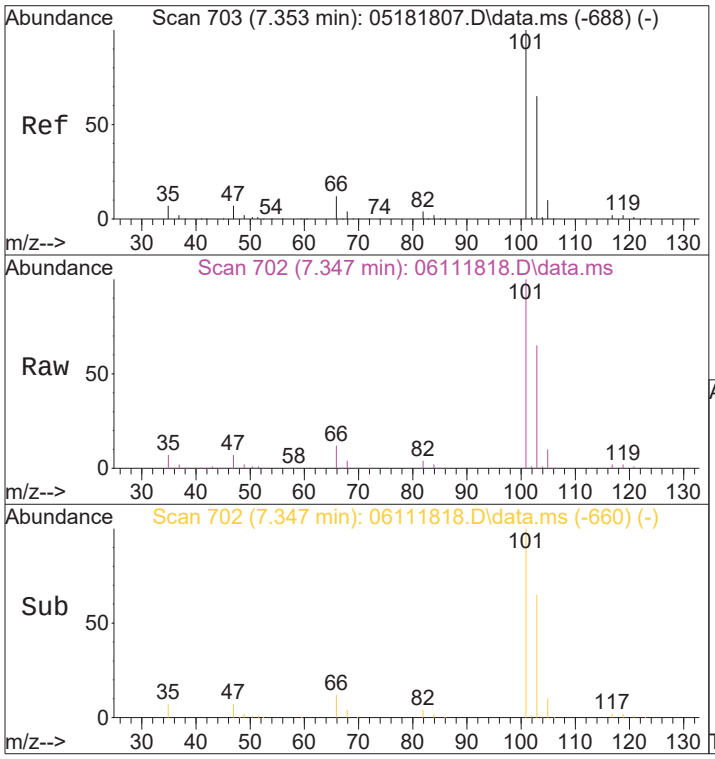


#13
Acetone
Concen: 36.10 ng
RT: 7.09 min Scan# 655
Delta R.T. -0.060 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 58 Resp: 1215776

Ion	Ratio	Lower	Upper
58	100		
43	319.6	242.9	302.9#

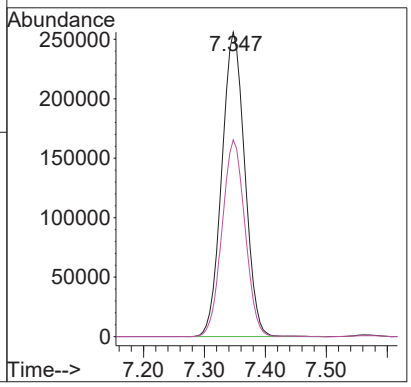


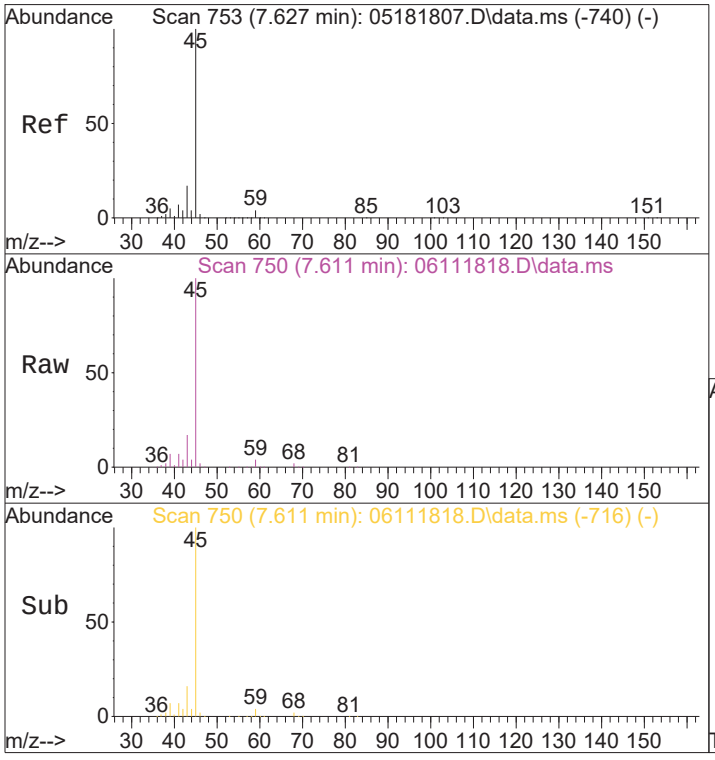


#14
Trichlorofluoromethane
Concen: 10.27 ng
RT: 7.35 min Scan# 702
Delta R.T. -0.016 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion:101 Resp: 667482

Ion	Ratio	Lower	Upper
101	100		
103	64.7	44.9	84.9

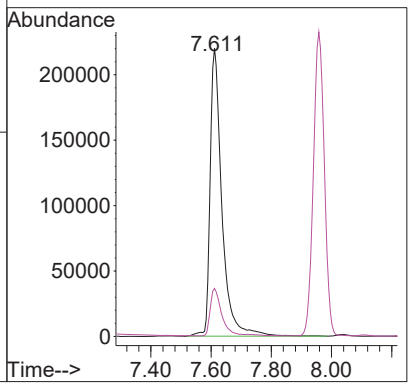


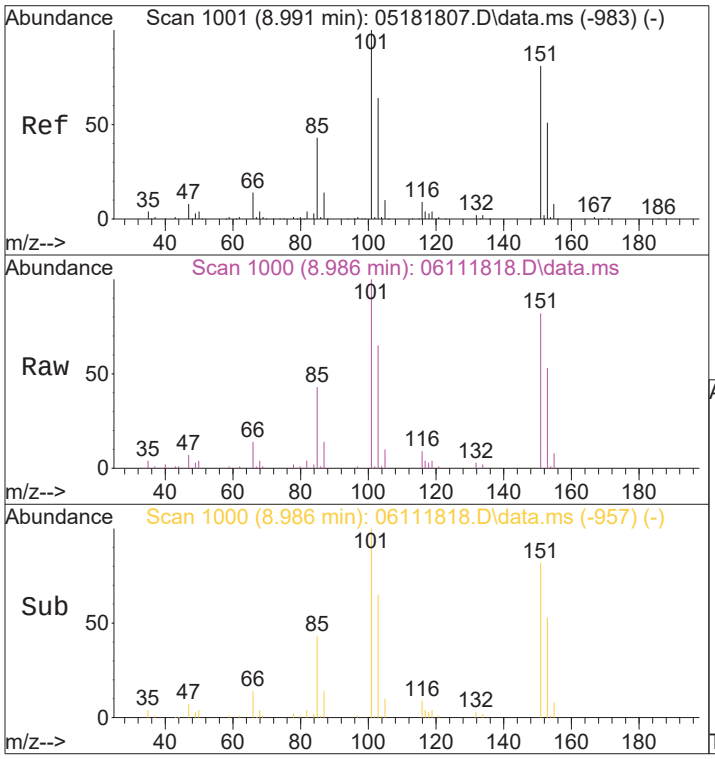


#15
2-Propanol (Isopropanol)
Concen: 5.65 ng
RT: 7.61 min Scan# 750
Delta R.T. -0.060 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 45 Resp: 599742

Ion	Ratio	Lower	Upper
45	100		
43	16.5	0.0	37.4

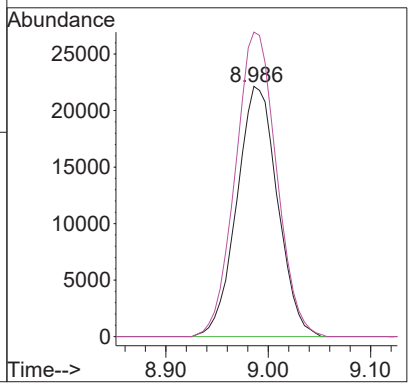


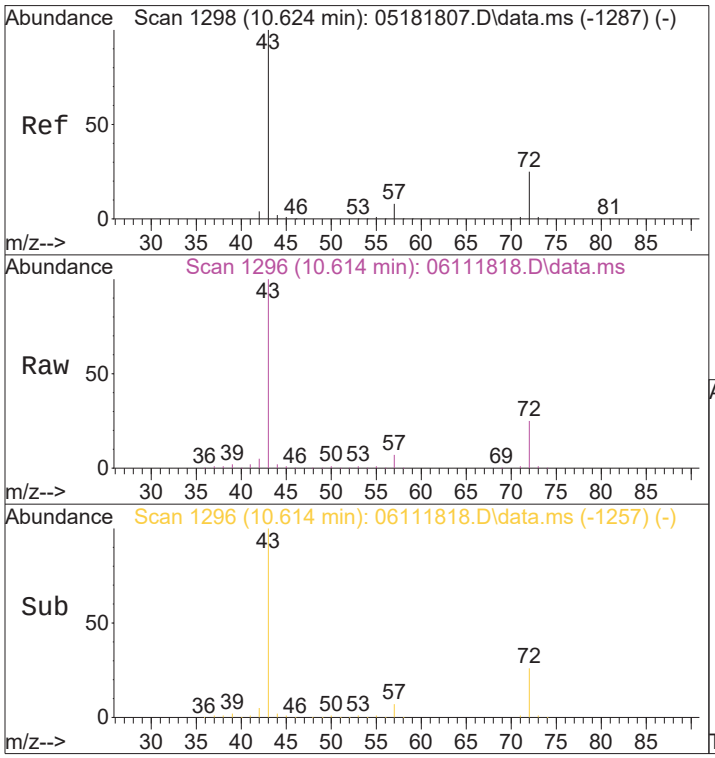


#21
Trichlorotrifluoroethane
Concen: 1.71 ng
RT: 8.99 min Scan# 1000
Delta R.T. -0.011 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion:151 Resp: 61153

Ion	Ratio	Lower	Upper
151	100		
101	123.1	94.6	134.6

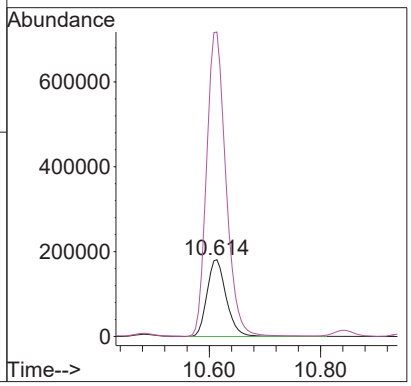


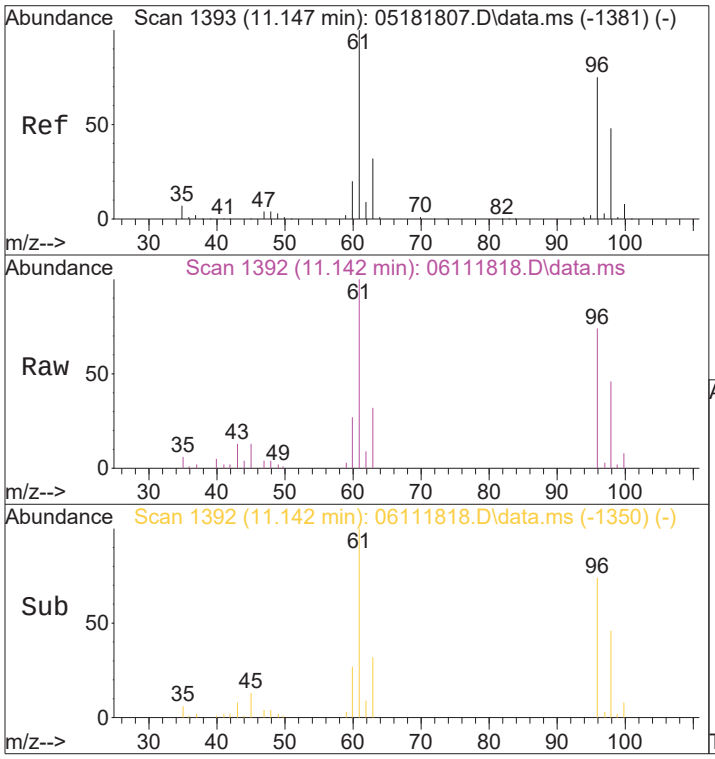


#27
2-Butanone (MEK)
Concen: 14.86 ng
RT: 10.61 min Scan# 1296
Delta R.T. -0.033 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 72 Resp: 433053

Ion	Ratio	Lower	Upper
72	100		
43	399.9	330.0	370.0#

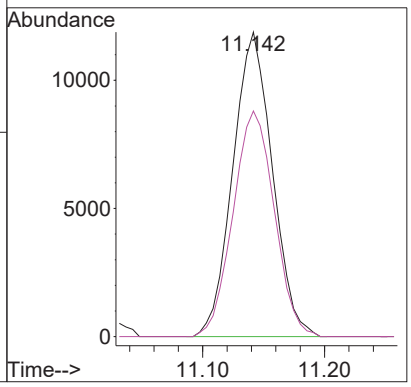


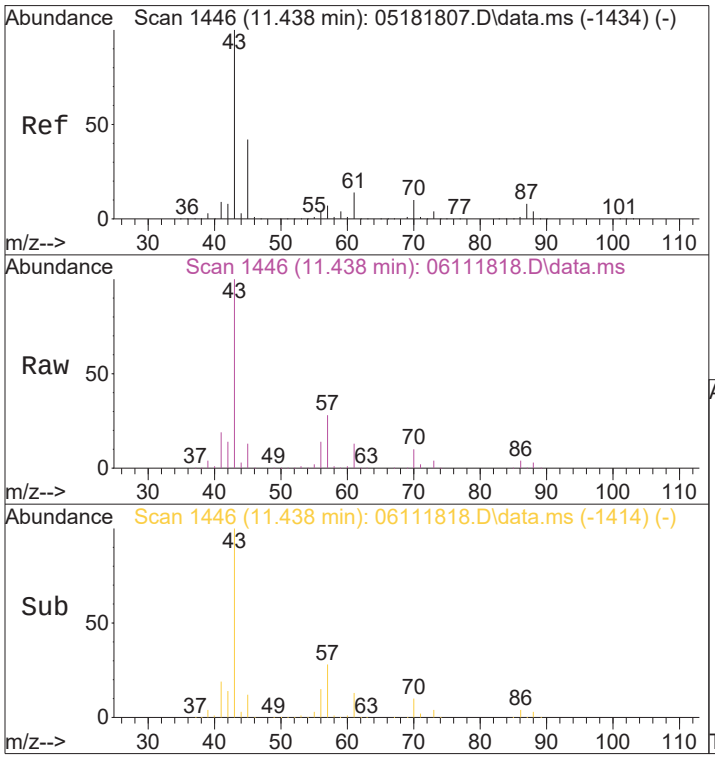


#28
cis-1,2-Dichloroethene
Concen: 0.46 ng
RT: 11.14 min Scan# 1392
Delta R.T. -0.016 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 61 Resp: 26796

Ion	Ratio	Lower	Upper
61	100		
96	77.2	66.3	106.3

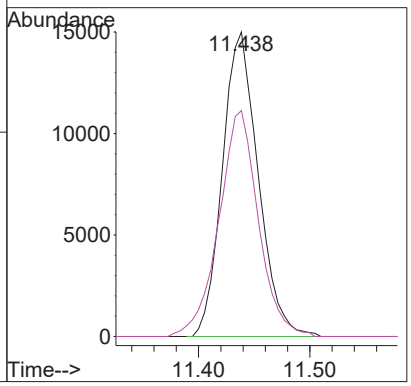


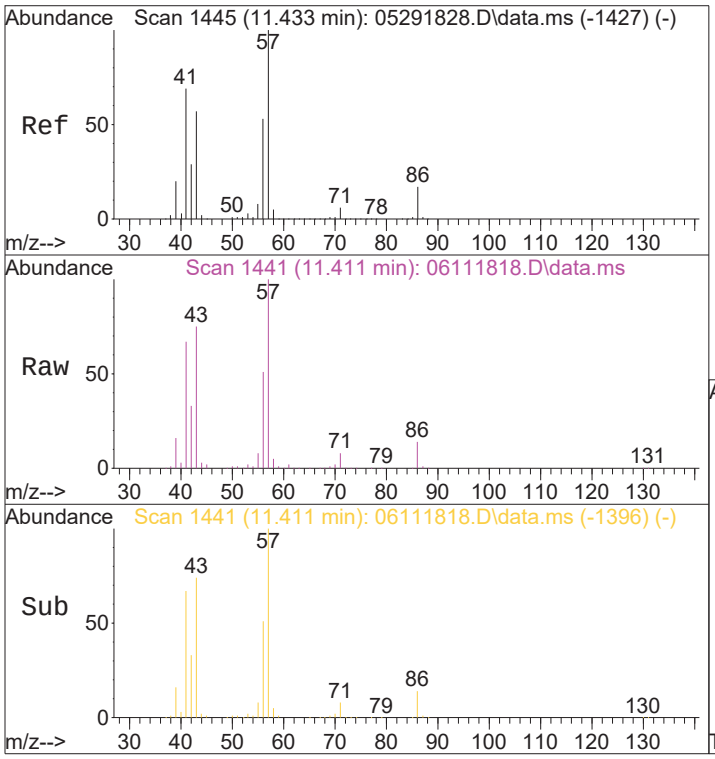


#30
Ethyl Acetate
Concen: 2.14 ng
RT: 11.44 min Scan# 1446
Delta R.T. -0.022 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 61 Resp: 33520

Ion	Ratio	Lower	Upper
61	100		
70	81.8	59.3	99.3

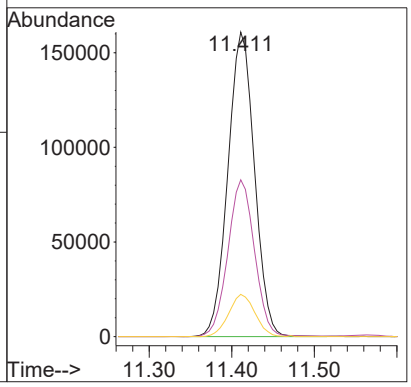


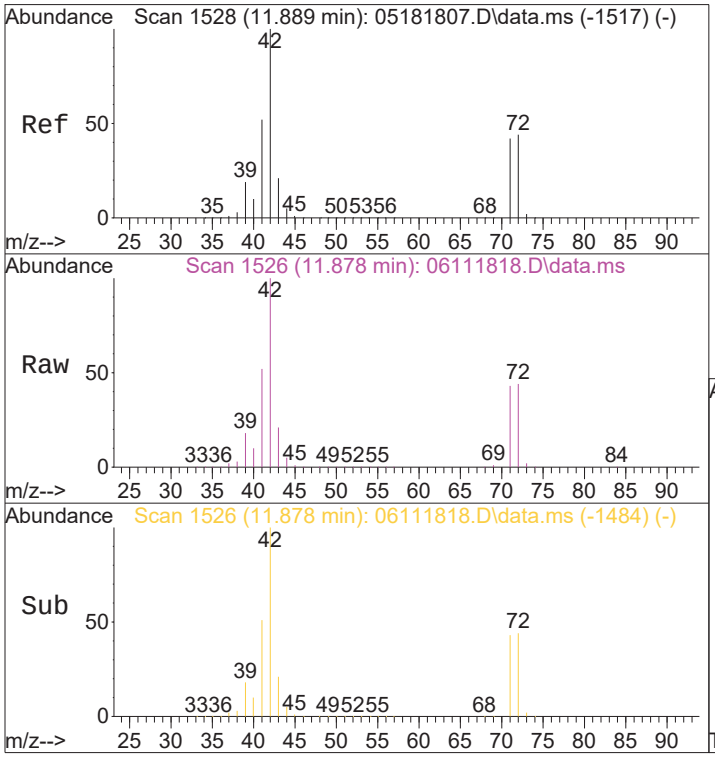


#31
n-Hexane
Concen: 5.53 ng
RT: 11.41 min Scan# 1441
Delta R.T. -0.005 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 57 Resp: 359449

Ion	Ratio	Lower	Upper
57	100		
56	51.9	40.6	61.0
86	13.8	13.0	19.4

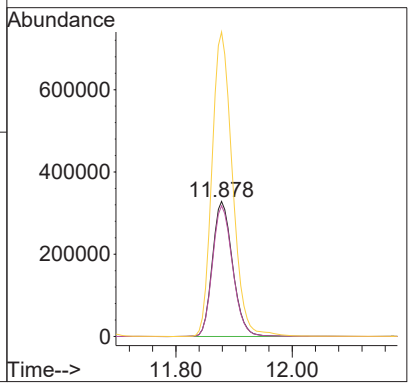


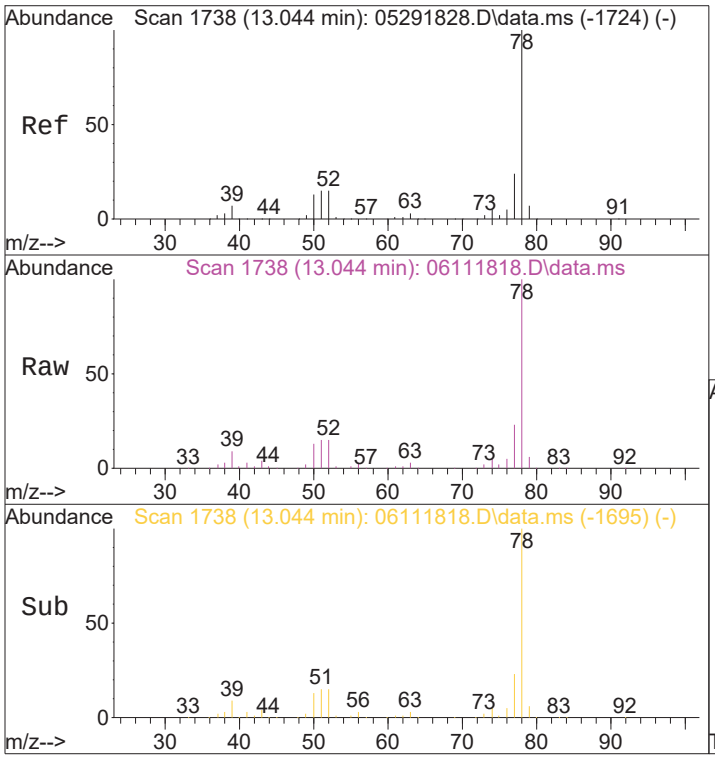


#34
Tetrahydrofuran (THF)
Concen: 27.03 ng
RT: 11.88 min Scan# 1526
Delta R.T. -0.016 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 72 Resp: 791334

Ion	Ratio	Lower	Upper
72	100		
71	96.6	76.1	116.1
42	229.4	179.9	219.9#

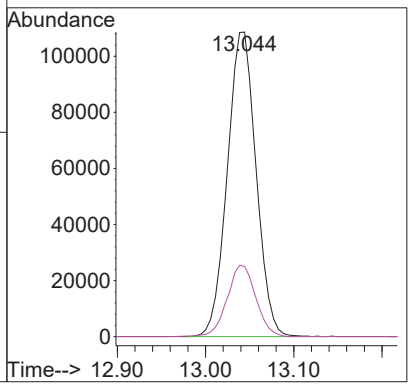


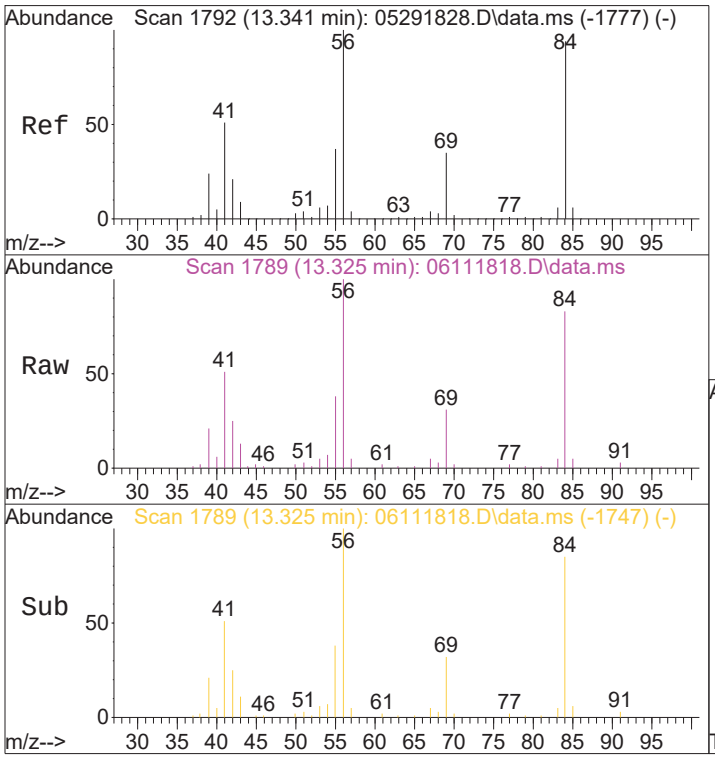


#41
Benzene
Concen: 1.42 ng
RT: 13.04 min Scan# 1738
Delta R.T. -0.011 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 78 Resp: 245891

Ion	Ratio	Lower	Upper
78	100		
77	23.4	3.1	43.1

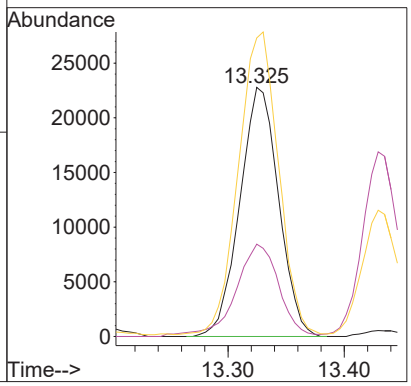


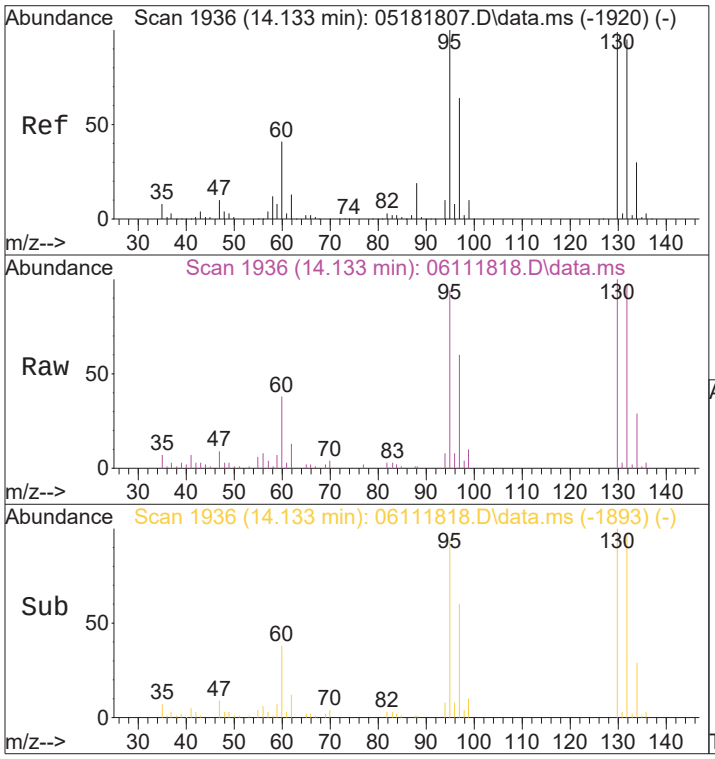


#43
Cyclohexane
Concen: 0.86 ng
RT: 13.32 min Scan# 1789
Delta R.T. -0.016 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 84 Resp: 52931

Ion	Ratio	Lower	Upper
84	100		
69	41.0	15.6	55.6
56	124.7	88.8	128.8

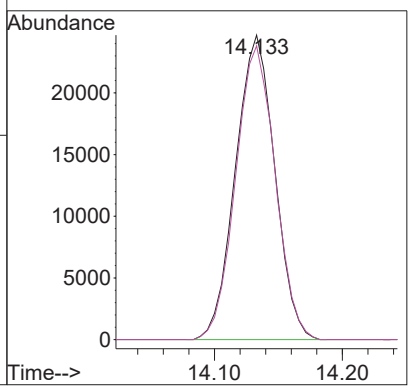


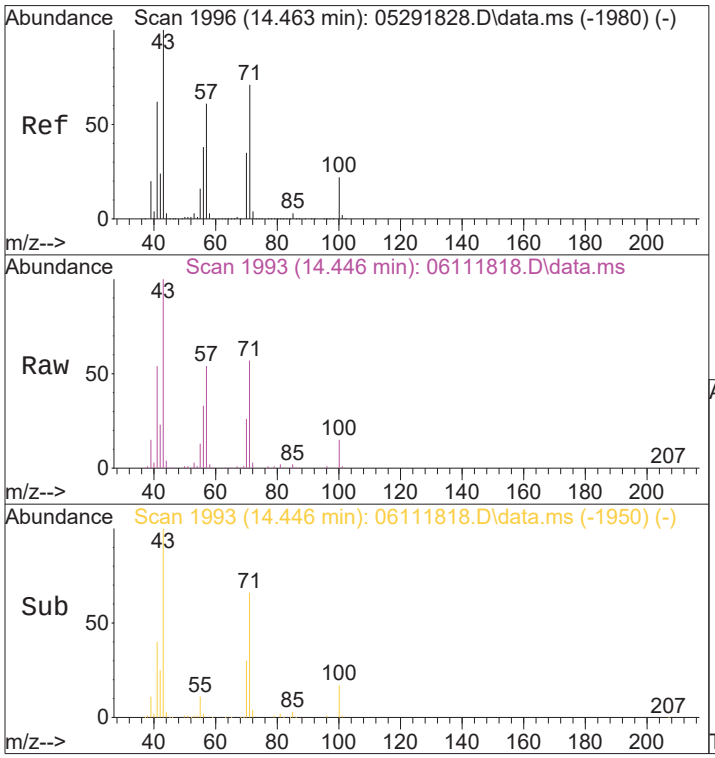


#47
Trichloroethene
Concen: 1.22 ng
RT: 14.13 min Scan# 1936
Delta R.T. -0.011 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion:130 Resp: 52817

Ion	Ratio	Lower	Upper
130	100		
132	97.0	76.0	116.0

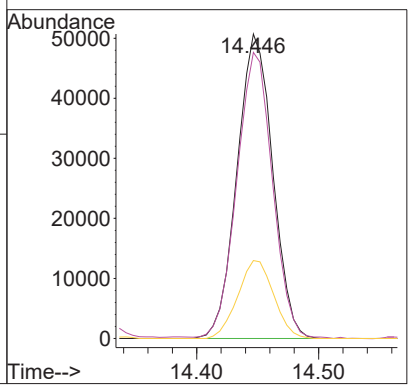


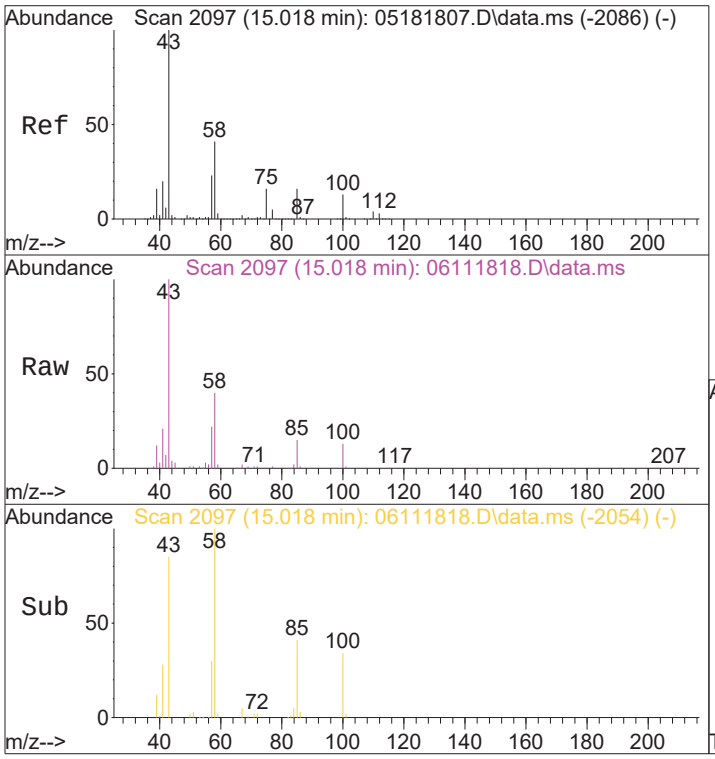


#51
n-Heptane
Concen: 2.60 ng
RT: 14.45 min Scan# 1993
Delta R.T. -0.011 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 71 Resp: 103155

Ion	Ratio	Lower	Upper
71	100		
57	94.1	67.9	107.9
100	25.8	9.2	49.2

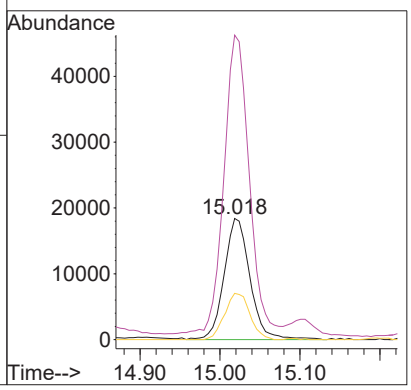


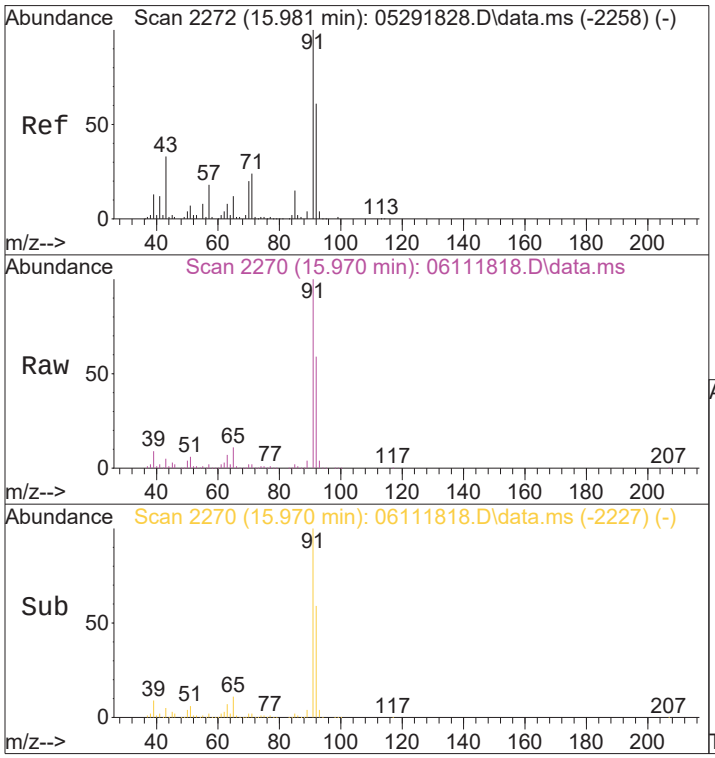


#53
4-Methyl-2-pentanone
Concen: 1.01 ng
RT: 15.02 min Scan# 2097
Delta R.T. -0.011 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 58 Resp: 41412

Ion	Ratio	Lower	Upper
58	100		
43	244.8	181.7	272.5
85	37.1	37.8	56.6#

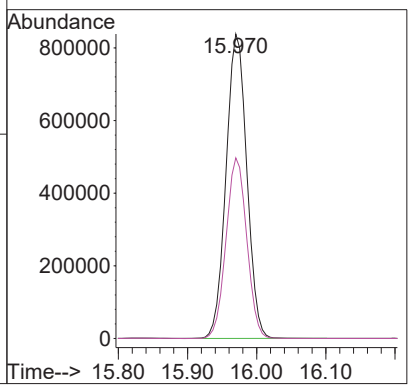


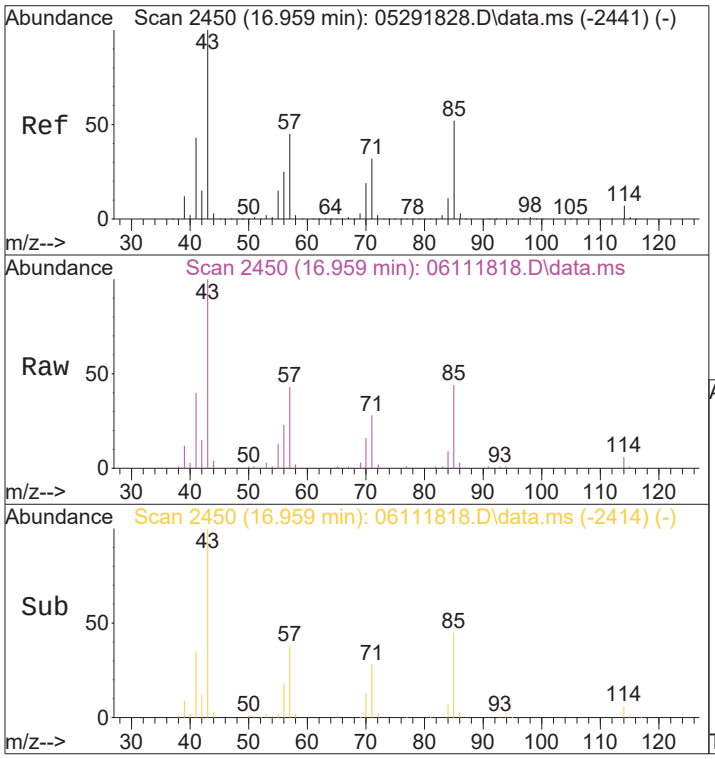


#58
Toluene
Concen: 11.48 ng
RT: 15.97 min Scan# 2270
Delta R.T. -0.011 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 91 Resp: 1745116

Ion	Ratio	Lower	Upper
91	100		
92	59.2	39.7	79.7

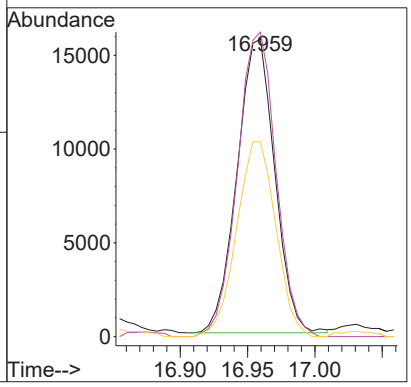


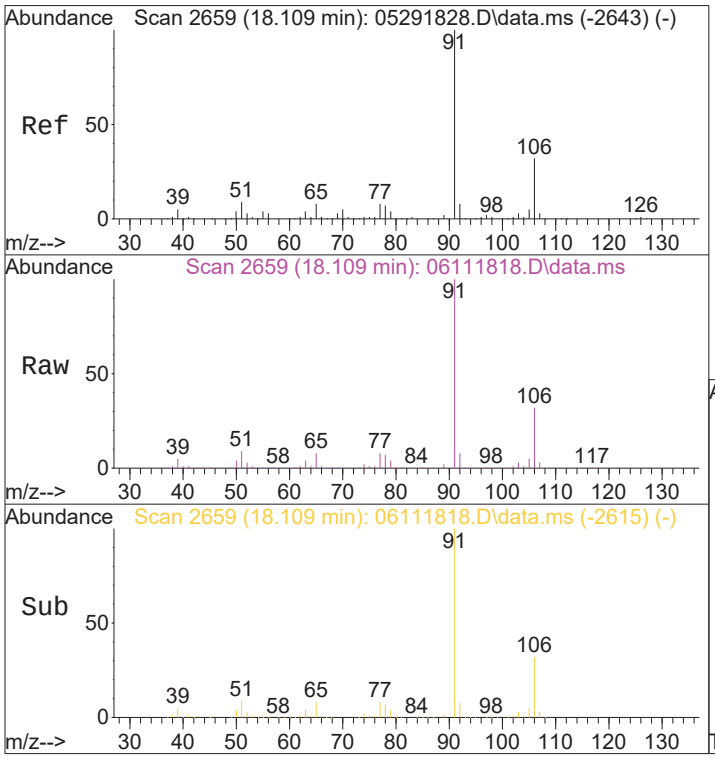


#63
n-Octane
Concen: 0.92 ng
RT: 16.96 min Scan# 2450
Delta R.T. 0.000 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 57 Resp: 30542

Ion	Ratio	Lower	Upper
57	100		
85	105.9	98.2	147.4
71	68.9	58.9	88.3

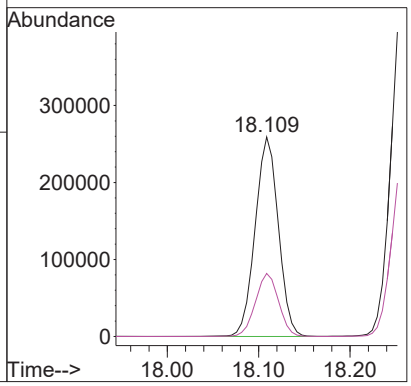


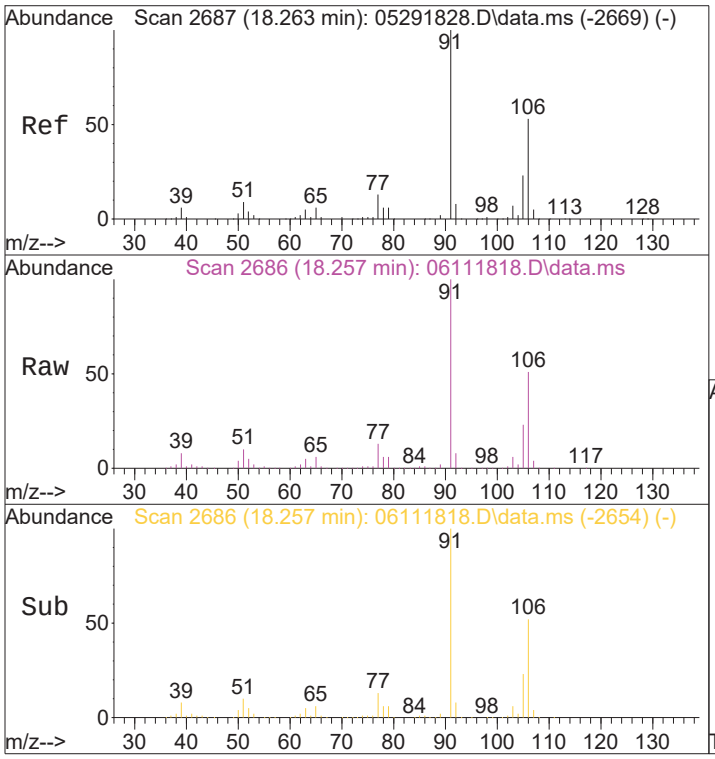


#66
Ethylbenzene
Concen: 2.62 ng
RT: 18.11 min Scan# 2659
Delta R.T. -0.005 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 91 Resp: 457220

Ion	Ratio	Lower	Upper
91	100		
106	31.5	12.9	52.9

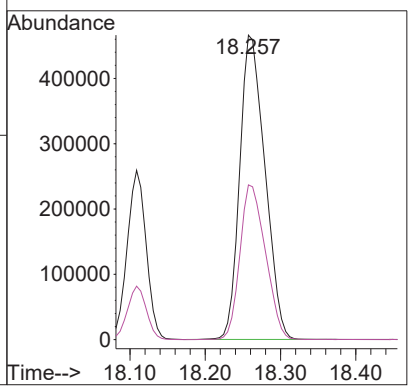


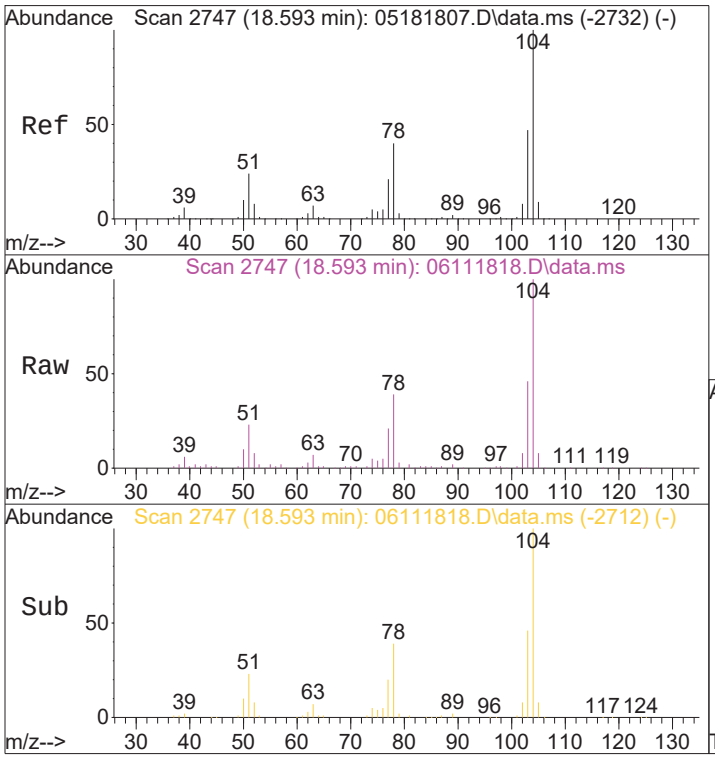


#67
m- & p-Xylenes
Concen: 8.18 ng
RT: 18.26 min Scan# 2686
Delta R.T. -0.022 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 91 Resp: 1085506

Ion	Ratio	Lower	Upper
91	100		
106	51.4	32.6	72.6

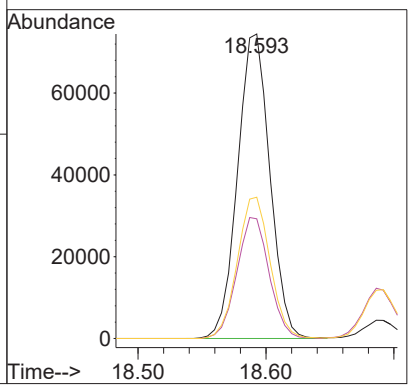


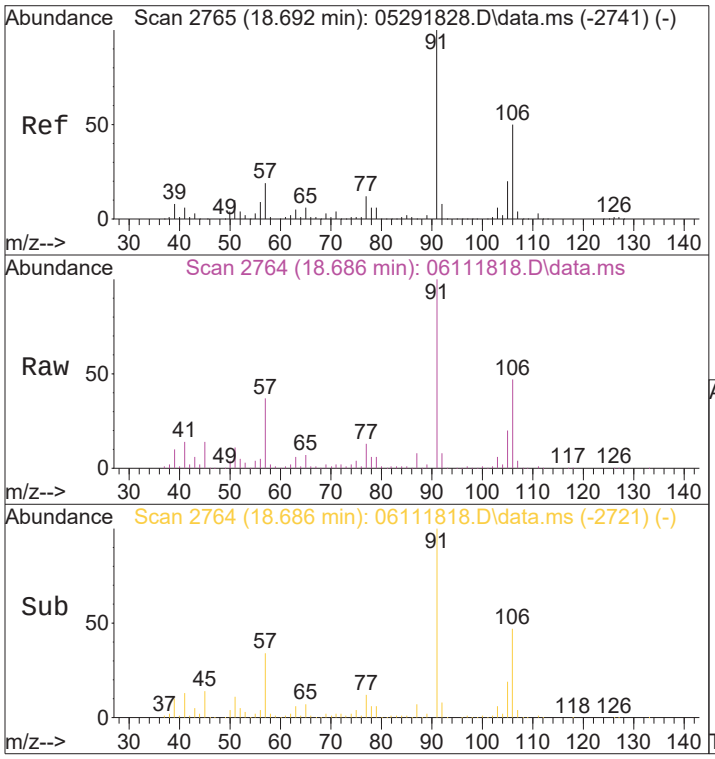


#69
Styrene
Concen: 1.24 ng
RT: 18.59 min Scan# 2747
Delta R.T. -0.005 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion:104 Resp: 131100

Ion	Ratio	Lower	Upper
104	100		
78	39.7	18.3	58.3
103	47.0	26.7	66.7

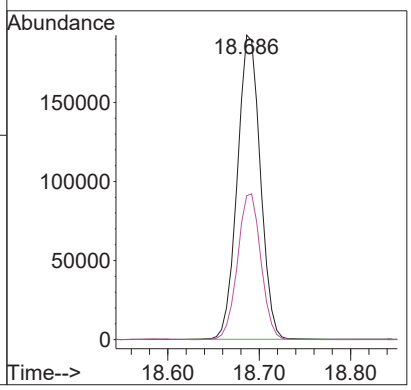


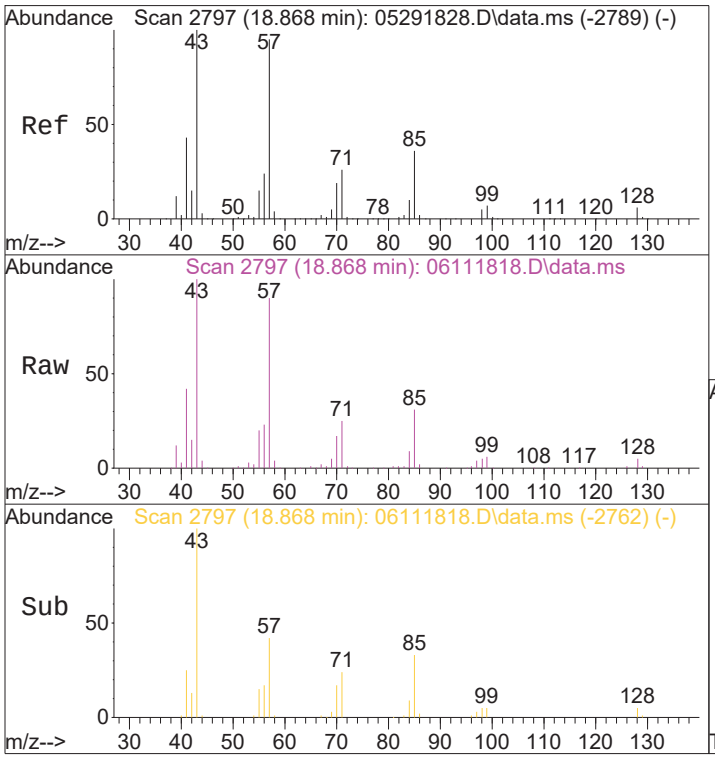


#70
o-Xylene
Concen: 2.50 ng
RT: 18.69 min Scan# 2764
Delta R.T. -0.011 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 91 Resp: 336572

Ion	Ratio	Lower	Upper
91	100		
106	48.5	30.0	70.0

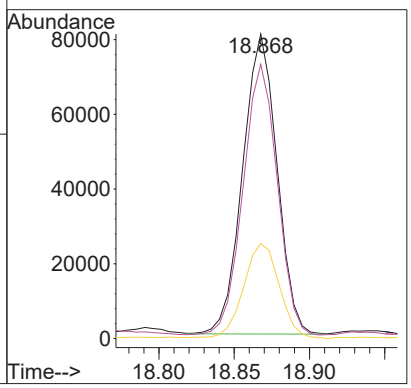


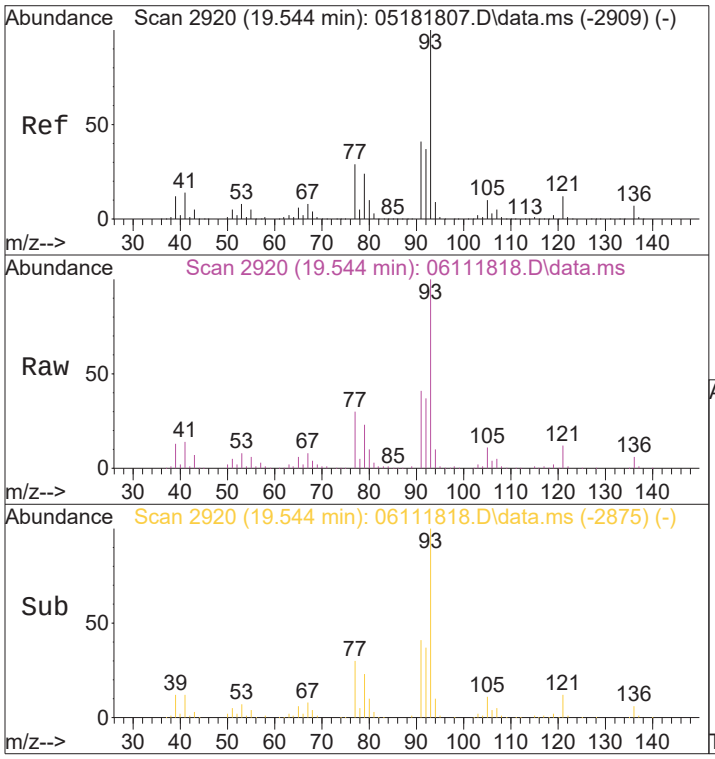


#71
n-Nonane
Concen: 1.66 ng
RT: 18.87 min Scan# 2797
Delta R.T. -0.005 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 43 Resp: 127480

Ion	Ratio	Lower	Upper
43	100		
57	89.9	77.9	117.9
85	33.0	20.8	60.8

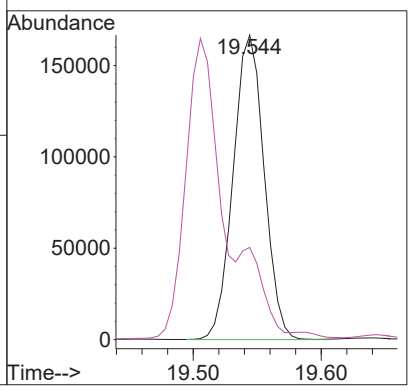


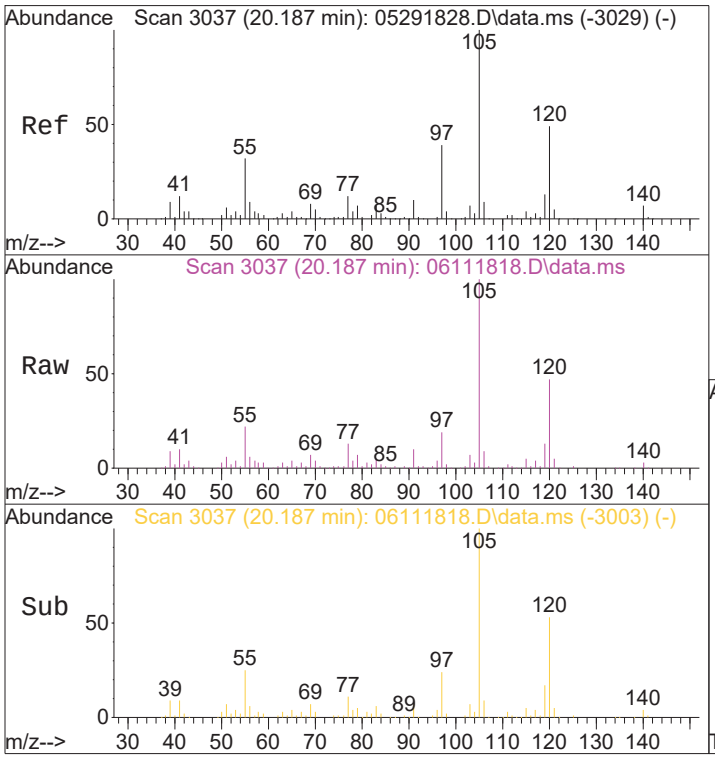


#75
alpha-Pinene
Concen: 3.14 ng
RT: 19.54 min Scan# 2920
Delta R.T. 0.000 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 93 Resp: 281517

Ion	Ratio	Lower	Upper
93	100		
77	129.6	9.1	49.1#

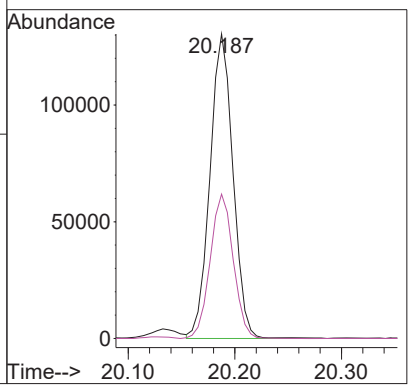


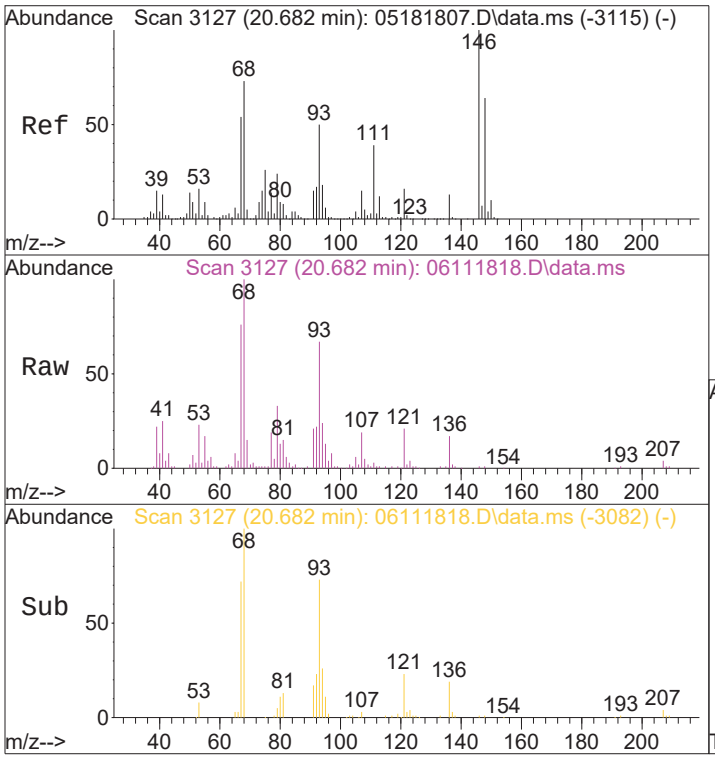


#82
1,2,4-Trimethylbenzene
Concen: 1.40 ng
RT: 20.19 min Scan# 3037
Delta R.T. -0.011 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion:105 Resp: 195664

Ion	Ratio	Lower	Upper
105	100		
120	47.4	36.4	76.4

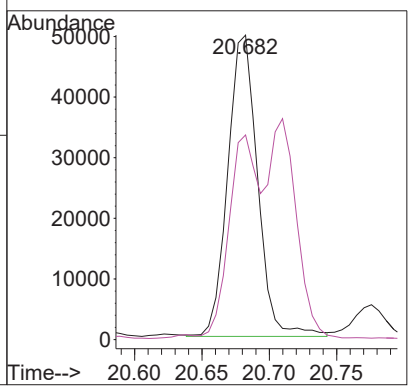




#91
d-Limonene
Concen: 1.34 ng
RT: 20.68 min Scan# 3127
Delta R.T. 0.000 min
Lab File: 06111818.D
Acq: 11 Jun 2018 17:17

Tgt Ion: 68 Resp: 76796

Ion	Ratio	Lower	Upper
68	100		
93	67.9	54.6	94.6



00905984

Method Path : I:\MS16\METHODS\
Method File : R16051818.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Fri May 18 10:36:37 2018
Response Via : Initial Calibration

LH 5/18/18

Calibration Files
0.10=05181802.D 0.20=05181803.D ~~0.40~~=05181804.D 1.0 =05181805.D 5.0 =05181806.D 25 =05181
100 =05181809.D

0.50

		Compound	0.10	0.20	~~0.40~~	1.0	5.0	25	50	100	Avg	%RSD
1)	IR	Bromochloromethane...	----------ISTD----------									
2)	T	Propene		1.946	1.925	1.712	1.827	1.626	1.591	1.595	1.746	8.77
3)	T	Dichlorodifluo...	3.333	3.040	3.123	2.744	2.791	2.631	2.426	2.147	2.779	13.87
4)	T	Chloromethane	3.196	2.889	2.755	2.612	2.314	2.411	2.084	1.523	2.473	20.94
5)	T	1,2-Dichloro-1...	1.841	1.594	1.672	1.478	1.491	1.429	1.344	1.257	1.513	12.30
6)	T	Vinyl Chloride	2.933	2.617	2.739	2.438	2.460	2.321	2.163	1.988	2.457	12.47
7)	T	1,3-Butadiene	2.057	1.841	1.820	1.765	1.768	1.742	1.616	1.459	1.759	9.86
8)	T	Bromomethane	1.609	1.477	1.510	1.366	1.369	1.336	1.267	1.218	1.394	9.34
9)	T	Chloroethane	1.348	1.212	1.261	1.140	1.141	1.102	1.051	1.020	1.159	9.46
10)	T	Ethanol	1.435	1.262	1.241	1.206	1.179	1.172	1.080	0.984	1.195	11.09
11)	T	Acetonitrile	3.738	3.302	3.330	3.082	3.076	2.975	2.834	2.731	3.134	10.20
12)	T	Acrolein	1.152	1.046	1.048	1.000	1.036	0.973	0.930	0.895	1.010	7.90
13)	T	Acetone	1.597	1.351	1.366	1.224	1.221	1.122	1.003	0.856	1.218	18.87
14)	T	Trichlorofluor...	2.875	2.509	2.594	2.233	2.321	2.181	2.074	2.015	2.350	12.37
15)	T	2-Propanol (Is...	4.598	4.155	4.215	3.952	3.863	3.960	3.433	2.531	3.838	16.24
16)	T	Acrylonitrile	2.283	2.131	2.240	2.132	2.164	2.117	2.013	1.955	2.129	5.06
17)	T	1,1-Dichloroet...	1.614	1.463	1.541	1.373	1.416	1.383	1.318	1.291	1.425	7.72
18)	T	2-Methyl-2-Pro...	4.366	3.954	4.065	3.781	3.925	3.783	3.527	2.708	3.764	13.04
19)	T	Methylene Chlo...	1.900	1.698	1.706	1.512	1.520	1.473	1.403	1.343	1.569	11.77
20)	T	3-Chloro-1-pro...	2.660	2.244	2.180	2.098	2.182	2.188	2.089	2.010	2.206	8.94
21)	T	Trichlorotrifl...	1.553	1.348	1.417	1.245	1.258	1.216	1.166	1.141	1.293	10.72
22)	T	Carbon Disulfide		6.032	6.165	5.533	5.647	5.482	5.144	4.873	5.554	8.21
23)	T	trans-1,2-Dich...	2.499	2.206	2.284	2.124	2.153	2.089	1.999	1.920	2.159	8.25
24)	T	1,1-Dichloroet...	3.093	2.865	2.940	2.643	2.682	2.570	2.455	2.373	2.703	9.13
25)	T	Methyl tert-Bu...	5.196	4.576	4.743	4.261	4.352	4.148	3.952	3.759	4.373	10.49
26)	T	Vinyl Acetate	0.337	0.314	0.329	0.315	0.332	0.335	0.314	0.276	0.319	6.22
27)	T	2-Butanone (MEK)	1.180	1.104	1.141	1.008	1.066	1.018	0.972	0.938	1.053	8.00
28)	T	cis-1,2-Dichlo...	2.408	2.197	2.273	2.071	2.080	2.013	1.911	1.835	2.099	8.99
29)	T	Diisopropyl Ether	1.444	1.318	1.316	1.149	1.154	1.094	1.019	0.910	1.175	14.91
30)	T	Ethyl Acetate	0.650	0.573	0.630	0.554	0.591	0.563	0.521	0.454	0.567	10.89
31)	T	n-Hexane		2.746	2.849	2.347	2.461	2.179	2.037	1.831	2.350	15.67
32)	T	Chloroform	3.010	2.656	2.758	2.461	2.500	2.402	2.270	2.170	2.529	10.76
33)	S	1,2-Dichloroet...	1.462	1.436	1.435	1.401	1.421	1.396	1.383	1.371	1.413	2.18
34)	T	Tetrahydrofura...	1.309	1.116	1.108	0.991	1.032	1.008	0.965	0.938	1.059	11.28
35)	T	Ethyl tert-But...	1.988	1.754	1.875	1.651	1.693	1.639	1.568	1.502	1.709	9.35
36)	T	1,2-Dichloroet...	2.189	1.935	1.993	1.777	1.794	1.710	1.623	1.555	1.822	11.42
37)	IR	1,4-Difluorobenzen...	----------ISTD----------									
38)	T	1,1,1-Trichlor...	0.561	0.506	0.510	0.478	0.468	0.462	0.437	0.424	0.481	9.17
39)	T	Isopropyl Acetate	0.261	0.241	0.246	0.227	0.228	0.225	0.209	0.191	0.229	9.61
40)	T	1-Butanol	0.387	0.350	0.368	0.407	0.426	0.394	0.361	0.308	0.375	9.82
41)	T	Benzene	1.911	1.667	1.546	1.409	1.365	1.315	1.219	1.057	1.436	18.65
42)	T	Carbon Tetrach...	0.477	0.418	0.428	0.408	0.404	0.407	0.385	0.374	0.412	7.58
43)	T	Cyclohexane	0.606	0.547	0.557	0.518	0.505	0.495	0.456	0.404	0.511	12.23
44)	T	tert-Amyl Meth...	1.175	1.029	1.047	0.982	0.971	0.963	0.907	0.849	0.990	9.88
45)	T	1,2-Dichloropr...	0.424	0.377	0.379	0.349	0.348	0.340	0.325	0.317	0.358	9.73
46)	T	Bromodichlorom...	0.493	0.444	0.456	0.438	0.442	0.443	0.419	0.400	0.442	6.05
47)	T	Trichloroethene	0.423	0.378	0.379	0.356	0.350	0.346	0.328	0.317	0.360	9.34
48)	T	1,4-Dioxane	0.321	0.300	0.309	0.288	0.289	0.288	0.273	0.259	0.291	6.73
49)	T	2,2,4-Trimethy...	1.821	1.628	1.637	1.541	1.493	1.461	1.338	1.191	1.514	12.78
50)	T	Methyl Methacr...	0.150	0.136	0.140	0.133	0.136	0.135	0.128	0.121	0.135	6.18
51)	T	n-Heptane	0.410	0.361	0.364	0.321	0.315	0.299	0.283	0.274	0.328	14.07
52)	T	cis-1,3-Dichlo...	0.569	0.529	0.543	0.525	0.507	0.551	0.525	0.505	0.537	3.73
53)	T	4-Methyl-2-pen...	0.375	0.354	0.358	0.343	0.342	0.338	0.318	0.295	0.340	7.24
54)	T	trans-1,3-Dich...	0.471	0.438	0.459	0.453	0.483	0.494	0.476	0.465	0.467	3.81

55)	T	1,1,2-Trichlor...	0.377	0.339	0.350	0.327	0.326	0.322	0.306	0.296	0.330	7.64
56)	IR	Chlorobenzene-d5 (...	----------ISTD----------									
57)	S	Toluene-d8 (SS2)	2.160	2.168	2.169	2.161	2.182	2.170	2.173	2.183	2.171	0.40
58)	T	Toluene		3.317	3.252	2.946	2.897	2.811	2.624	2.402	2.893	11.22
59)	T	2-Hexanone	2.046	1.827	1.834	1.763	1.751	1.693	1.582	1.475	1.747	9.86
60)	T	Dibromochlorom...	0.835	0.763	0.804	0.769	0.815	0.831	0.791	0.767	0.797	3.61
61)	T	1,2-Dibromoethane	0.890	0.811	0.831	0.791	0.802	0.804	0.765	0.747	0.805	5.37
62)	T	n-Butyl Acetate	2.275	1.980	2.015	1.934	1.950	1.927	1.809	1.687	1.947	8.70
63)	T	n-Octane	0.738	0.665	0.688	0.627	0.628	0.612	0.575	0.538	0.634	9.98
64)	T	Tetrachloroethene	0.920	0.832	0.858	0.781	0.787	0.783	0.744	0.722	0.803	7.97
65)	T	Chlorobenzene	2.304	2.043	2.056	1.923	1.905	1.865	1.759	1.666	1.940	10.16
66)	T	Ethylbenzene	4.091	3.511	3.529	3.289	3.308	3.249	2.993	2.592	3.320	13.07
67)	T	m- & p-Xylenes	3.369	2.685	2.680	2.513	2.492	2.431	2.202	1.829	2.525	17.46
68)	T	Bromoform	0.629	0.605	0.628	0.626	0.682	0.723	0.689	0.669	0.656	6.17
69)	T	Styrene	2.260	2.025	2.078	2.015	2.063	2.057	1.898	1.712	2.014	7.81
70)	T	o-Xylene	3.094	2.714	2.794	2.626	2.572	2.509	2.270	1.930	2.564	13.60
71)	T	n-Nonane	1.719	1.572	1.593	1.510	1.491	1.430	1.289	1.098	1.463	13.22
72)	T	1,1,2,2-Tetrac...	1.449	1.368	1.412	1.357	1.351	1.338	1.220	1.052	1.319	9.60
73)	S	Bromofluoroben...	0.689	0.690	0.686	0.691	0.693	0.696	0.685	0.683	0.689	0.61
74)	T	Cumene	3.808	3.490	3.514	3.296	3.280	3.221	2.906	2.423	3.242	13.00
75)	T	alpha-Pinene	1.937	1.784	1.798	1.682	1.744	1.713	1.585	1.412	1.707	9.16
76)	T	n-Propylbenzene	4.642	4.249	4.255	4.046	3.986	3.872	3.435	2.646	3.891	15.71
77)	T	3-Ethyltoluene	3.660	3.376	3.464	3.319	3.300	3.419	2.956	2.341	3.229	12.69
78)	T	4-Ethyltoluene	3.554	3.161	3.220	3.151	3.097	2.811	2.601	2.235	2.979	13.84
79)	T	1,3,5-Trimethy...	3.001	2.734	2.793	2.718	2.695	2.622	2.358	2.027	2.618	11.40
80)	T	alpha-Methylst...	1.466	1.381	1.464	1.427	1.475	1.448	1.318	1.163	1.393	7.67
81)	T	2-Ethyltoluene	3.806	3.328	3.425	3.308	3.209	3.096	2.740	2.276	3.149	14.71
82)	T	1,2,4-Trimethy...	3.357	2.800	2.834	2.781	2.737	2.647	2.262	1.821	2.655	16.96
83)	T	n-Decane	1.653	1.519	1.551	1.586	1.557	1.487	1.333	1.113	1.475	11.74
84)	T	Benzyl Chloride				2.025	2.307	2.440	2.235	1.890	2.179	10.11
85)	T	1,3-Dichlorobe...	1.908	1.664	1.668	1.626	1.606	1.581	1.411	1.240	1.588	12.34
86)	T	1,4-Dichlorobe...	1.971	1.706	1.716	1.690	1.655	1.599	1.456	1.296	1.636	12.15
87)	T	sec-Butylbenzene	4.151	3.781	3.863	3.732	3.655	3.509	3.054	2.411	3.519	15.54
88)	T	4-Isopropyltol...	3.683	3.426	3.534	3.472	3.428	3.200	2.681	2.073	3.187	17.02
89)	T	1,2,3-Trimethy...	3.006	2.757	2.854	2.805	2.776	2.657	2.271	1.820	2.618	14.76
90)	T	1,2-Dichlorobe...	1.786	1.576	1.596	1.569	1.558	1.494	1.303	1.083	1.496	14.24
91)	T	d-Limonene	1.213	1.129	1.181	1.152	1.175	1.136	0.968	0.759	1.089	14.00
92)	T	1,2-Dibromo-3-...	0.516	0.486	0.537	0.545	0.587	0.593	0.560	0.529	0.544	6.59
93)	T	n-Undecane	1.359	1.248	1.325	1.645	1.671	1.610	1.443	1.184	1.435	13.07
94)	T	1,2,4-Trichlor...	1.203	1.031	1.075	1.163	1.202	1.190	1.124	1.048	1.130	6.26
95)	T	Naphthalene	4.456	3.825	3.942	4.082	4.183	3.886	3.441	2.663	3.810	14.40
96)	T	n-Dodecane			0.949	1.612	1.688	1.556	1.423	1.182	1.402	20.27
97)	T	Hexachlorobuta...	0.778	0.736	0.741	0.728	0.743	0.759	0.720	0.676	0.735	4.08
98)	T	Cyclohexanone	1.382	1.220	1.244	1.221	1.204	1.171	1.093	1.016	1.194	9.07
99)	T	tert-Butylbenzene	3.009	2.758	2.780	2.665	2.649	2.500	2.124	1.717	2.525	16.42
100)	T	n-Butylbenzene	3.347	3.054	3.133	3.076	3.054	2.916	2.568	2.077	2.903	13.78

(#) = Out of Range

R16051818.M Fri May 18 11:30:26 2018

Primary Source Standards Concentrations (Working & Initial Calibration)

LH 5/18/18

1ng/L Std. ID:
4ng/L Std. ID: S31-05161805
20ng/L Std. ID: S31-05161803
200ng/L Std. ID: S31-05161801

Dilution Factors:		5	50	250	1000	Working STD Conc.(ng/L):	4	4	4	20	20	200	200	200
	Source Std.	Primary Working Standards				Injection (L):	0.025	0.050	0.125	0.050	0.25	0.125	0.25	0.50
Compounds	mg/m^3	200ng/L	20ng/L	4ng/L	1ng/L	ICAL Points:	0.1ng	0.2ng	0.5ng	1ng	5ng	25ng	50ng	100ng
Propene	1.037	207.4	20.74	4.148	1.037		0.1037	0.2074	0.5185	1.037	5.185	25.925	51.85	103.7
Dichlorodifluoromethane	1.048	209.6	20.96	4.192	1.048		0.1048	0.2096	0.5240	1.048	5.240	26.200	52.40	104.8
Chloromethane	1.006	201.2	20.12	4.024	1.006		0.1006	0.2012	0.5030	1.006	5.030	25.150	50.30	100.6
Freon-114	1.021	204.2	20.42	4.084	1.021		0.1021	0.2042	0.5105	1.021	5.105	25.525	51.05	102.1
Vinyl Chloride	1.032	206.4	20.64	4.128	1.032		0.1032	0.2064	0.5160	1.032	5.160	25.800	51.60	103.2
1,3-Butadiene	1.059	211.8	21.18	4.236	1.059		0.1059	0.2118	0.5295	1.059	5.295	26.475	52.95	105.9
Bromomethane	0.993	198.6	19.86	3.972	0.993		0.0993	0.1986	0.4965	0.993	4.965	24.825	49.65	99.3
Chloroethane	1.012	202.4	20.24	4.048	1.012		0.1012	0.2024	0.5060	1.012	5.060	25.300	50.60	101.2
Ethanol	5.271	1054.2	105.42	21.084	5.271		0.5271	1.0542	2.6355	5.271	26.355	131.775	263.55	527.1
Acetonitrile	1.059	211.8	21.18	4.236	1.059		0.1059	0.2118	0.5295	1.059	5.295	26.475	52.95	105.9
Acrolein	1.054	210.8	21.08	4.216	1.054		0.1054	0.2108	0.5270	1.054	5.270	26.350	52.70	105.4
Acetone	5.322	1064.4	106.44	21.288	5.322		0.5322	1.0644	2.6610	5.322	26.610	133.050	266.10	532.2
Trichlorofluoromethane	1.051	210.2	21.02	4.204	1.051		0.1051	0.2102	0.5255	1.051	5.255	26.275	52.55	105.1
Isopropanol	2.107	421.4	42.14	8.428	2.107		0.2107	0.4214	1.0535	2.107	10.535	52.675	105.35	210.7
Acrylonitrile	1.056	211.2	21.12	4.224	1.056		0.1056	0.2112	0.5280	1.056	5.280	26.400	52.80	105.6
1,1-Dichloroethene	1.061	212.2	21.22	4.244	1.061		0.1061	0.2122	0.5305	1.061	5.305	26.525	53.05	106.1
tert-Butanol	2.120	424.0	42.40	8.480	2.120		0.2120	0.4240	1.0600	2.120	10.600	53.000	106.00	212.0
Methylene Chloride	1.058	211.6	21.16	4.232	1.058		0.1058	0.2116	0.5290	1.058	5.290	26.450	52.90	105.8
Allyl Chloride	1.054	210.8	21.08	4.216	1.054		0.1054	0.2108	0.5270	1.054	5.270	26.350	52.70	105.4
Trichlorotrifluoroethane	1.053	210.6	21.06	4.212	1.053		0.1053	0.2106	0.5265	1.053	5.265	26.325	52.65	105.3
Carbon Disulfide	1.063	212.6	21.26	4.252	1.063		0.1063	0.2126	0.5315	1.063	5.315	26.575	53.15	106.3
trans-1,2-Dichloroethene	1.081	216.2	21.62	4.324	1.081		0.1081	0.2162	0.5405	1.081	5.405	27.025	54.05	108.1
1,1-Dichloroethane	1.022	204.4	20.44	4.088	1.022		0.1022	0.2044	0.5110	1.022	5.110	25.550	51.10	102.2
Methyl tert-Butyl Ether	1.070	214.0	21.40	4.280	1.070		0.1070	0.2140	0.5350	1.070	5.350	26.750	53.50	107.0
Vinyl Acetate	5.281	1056.2	105.62	21.124	5.281		0.5281	1.0562	2.6405	5.281	26.405	132.025	264.05	528.1
2-Butanone	1.052	210.4	21.04	4.208	1.052		0.1052	0.2104	0.5260	1.052	5.260	26.300	52.60	105.2
cis-1,2-Dichloroethene	1.067	213.4	21.34	4.268	1.067		0.1067	0.2134	0.5335	1.067	5.335	26.675	53.35	106.7
Diisopropyl Ether	1.065	213.0	21.30	4.260	1.065		0.1065	0.2130	0.5325	1.065	5.325	26.625	53.25	106.5
Ethyl Acetate	2.136	427.2	42.72	8.544	2.136		0.2136	0.4272	1.0680	2.136	10.680	53.400	106.80	213.6
n-Hexane	1.066	213.2	21.32	4.264	1.066		0.1066	0.2132	0.5330	1.066	5.330	26.650	53.30	106.6
Chloroform	1.061	212.2	21.22	4.244	1.061		0.1061	0.2122	0.5305	1.061	5.305	26.525	53.05	106.1
Tetrahydrofuran	1.064	212.8	21.28	4.256	1.064		0.1064	0.2128	0.5320	1.064	5.320	26.600	53.20	106.4
Ethyl tert-Butyl Ether	1.059	211.8	21.18	4.236	1.059		0.1059	0.2118	0.5295	1.059	5.295	26.475	52.95	105.9
1,2-Dichloroethane	1.055	211.0	21.10	4.220	1.055		0.1055	0.2110	0.5275	1.055	5.275	26.375	52.75	105.5
1,1,1-Trichloroethane	1.077	215.4	21.54	4.308	1.077		0.1077	0.2154	0.5385	1.077	5.385	26.925	53.85	107.7
Isopropyl Acetate	2.113	422.6	42.26	8.452	2.113		0.2113	0.4226	1.0565	2.113	10.565	52.825	105.65	211.3
1-Butanol	2.114	422.8	42.28	8.456	2.114		0.2114	0.4228	1.0570	2.114	10.570	52.850	105.70	211.4
Benzene	1.057	211.4	21.14	4.228	1.057		0.1057	0.2114	0.5285	1.057	5.285	26.425	52.85	105.7
Carbon Tetrachloride	1.060	212.0	21.20	4.240	1.060		0.1060	0.2120	0.5300	1.060	5.300	26.500	53.00	106.0
Cyclohexane	2.135	427.0	42.70	8.540	2.135		0.2135	0.4270	1.0675	2.135	10.675	53.375	106.75	213.5
tert-Amyl Methyl Ether	1.057	211.4	21.14	4.228	1.057		0.1057	0.2114	0.5285	1.057	5.285	26.425	52.85	105.7
1,2-Dichloropropane	1.066	213.2	21.32	4.264	1.066		0.1066	0.2132	0.5330	1.066	5.330	26.650	53.30	106.6
Bromodichloromethane	1.067	213.4	21.34	4.268	1.067		0.1067	0.2134	0.5335	1.067	5.335	26.675	53.35	106.7
Trichloroethene	1.061	212.2	21.22	4.244	1.061		0.1061	0.2122	0.5305	1.061	5.305	26.525	53.05	106.1
1,4-Dioxane	1.063	212.6	21.26	4.252	1.063		0.1063	0.2126	0.5315	1.063	5.315	26.575	53.15	106.3
Isooctane	1.060	212.0	21.20	4.240	1.060		0.1060	0.2120	0.5300	1.060	5.300	26.500	53.00	106.0
Methyl Methacrylate	2.112	422.4	42.24	8.448	2.112		0.2112	0.4224	1.0560	2.112	10.560	52.800	105.60	211.2
n-Heptane	1.065	213.0	21.30	4.260	1.065		0.1065	0.2130	0.5325	1.065	5.325	26.625	53.25	106.5

Q:\TO15 Std. Concentrations\MS16 Std. Conc\2018\R16051818\ICAL Conc. (Primary Source)

Date Updated: 05/04/18
Version: 1

Primary Source Standards Concentrations (Working & Initial Calibration)

LH 5/18/18

1ng/L Std. ID:
4ng/L Std. ID: S31-05161805
20ng/L Std. ID: S31-05161803
200ng/L Std. ID: S31-05161801

Dilution Factors:		5	50	250	1000	Working STD Conc.(ng/L):	4	4	4	20	20	200	200	200
	Source Std.	Primary Working Standards				Injection (L):	0.025	0.050	0.125	0.050	0.25	0.125	0.25	0.50
Compounds	mg/m^3	200ng/L	20ng/L	4ng/L	1ng/L	ICAL Points:	0.1ng	0.2ng	0.5ng	1ng	5ng	25ng	50ng	100ng
cis-1,3-Dichloropropene	1.120	224.0	22.40	4.480	1.120		0.1120	0.2240	0.5600	1.120	5.600	28.000	56.00	112.0
4-Methyl-2-pentanone	1.059	211.8	21.18	4.236	1.059		0.1059	0.2118	0.5295	1.059	5.295	26.475	52.95	105.9
trans-1,3-Dichloropropene	1.067	213.4	21.34	4.268	1.067		0.1067	0.2134	0.5335	1.067	5.335	26.675	53.35	106.7
1,1,2-Trichloroethane	1.064	212.8	21.28	4.256	1.064		0.1064	0.2128	0.5320	1.064	5.320	26.600	53.20	106.4
Toluene	1.054	210.8	21.08	4.216	1.054		0.1054	0.2108	0.5270	1.054	5.270	26.350	52.70	105.4
2-Hexanone	1.060	212.0	21.20	4.240	1.060		0.1060	0.2120	0.5300	1.060	5.300	26.500	53.00	106.0
Dibromochloromethane	1.061	212.2	21.22	4.244	1.061		0.1061	0.2122	0.5305	1.061	5.305	26.525	53.05	106.1
1,2-Dibromoethane	1.064	212.8	21.28	4.256	1.064		0.1064	0.2128	0.5320	1.064	5.320	26.600	53.20	106.4
n-Butyl Acetate	1.068	213.6	21.36	4.272	1.068		0.1068	0.2136	0.5340	1.068	5.340	26.700	53.40	106.8
n-Octane	1.060	212.0	21.20	4.240	1.060		0.1060	0.2120	0.5300	1.060	5.300	26.500	53.00	106.0
Tetrachloroethene	1.063	212.6	21.26	4.252	1.063		0.1063	0.2126	0.5315	1.063	5.315	26.575	53.15	106.3
Chlorobenzene	1.066	213.2	21.32	4.264	1.066		0.1066	0.2132	0.5330	1.066	5.330	26.650	53.30	106.6
Ethylbenzene	1.052	210.4	21.04	4.208	1.052		0.1052	0.2104	0.5260	1.052	5.260	26.300	52.60	105.2
m-&p-Xylene	2.123	424.6	42.46	8.492	2.123		0.2123	0.4246	1.0615	2.123	10.615	53.075	106.15	212.3
Bromoform	1.063	212.6	21.26	4.252	1.063		0.1063	0.2126	0.5315	1.063	5.315	26.575	53.15	106.3
Styrene	1.058	211.6	21.16	4.232	1.058		0.1058	0.2116	0.5290	1.058	5.290	26.450	52.90	105.8
o-Xylene	1.055	211.0	21.10	4.220	1.055		0.1055	0.2110	0.5275	1.055	5.275	26.375	52.75	105.5
n-Nonane	1.054	210.8	21.08	4.216	1.054		0.1054	0.2108	0.5270	1.054	5.270	26.350	52.70	105.4
1,1,2,2-Tetrachloroethane	1.057	211.4	21.14	4.228	1.057		0.1057	0.2114	0.5285	1.057	5.285	26.425	52.85	105.7
Cumene	1.052	210.4	21.04	4.208	1.052		0.1052	0.2104	0.5260	1.052	5.260	26.300	52.60	105.2
alpha-Pinene	1.046	209.2	20.92	4.184	1.046		0.1046	0.2092	0.5230	1.046	5.230	26.150	52.30	104.6
n-Propylbenzene	1.064	212.8	21.28	4.256	1.064		0.1064	0.2128	0.5320	1.064	5.320	26.600	53.20	106.4
3-Ethyltoluene	1.050	210.0	21.00	4.200	1.050		0.1050	0.2100	0.5250	1.050	5.250	26.250	52.50	105.0
4-Ethyltoluene	1.049	209.8	20.98	4.196	1.049		0.1049	0.2098	0.5245	1.049	5.245	26.225	52.45	104.9
1,3,5-Trimethylbenzene	1.049	209.8	20.98	4.196	1.049		0.1049	0.2098	0.5245	1.049	5.245	26.225	52.45	104.9
alpha-Methylstyrene	1.049	209.8	20.98	4.196	1.049		0.1049	0.2098	0.5245	1.049	5.245	26.225	52.45	104.9
2-Ethyltoluene	1.060	212.0	21.20	4.240	1.060		0.1060	0.2120	0.5300	1.060	5.300	26.500	53.00	106.0
1,2,4-Trimethylbenzene	1.051	210.2	21.02	4.204	1.051		0.1051	0.2102	0.5255	1.051	5.255	26.275	52.55	105.1
n-Decane	1.059	211.8	21.18	4.236	1.059		0.1059	0.2118	0.5295	1.059	5.295	26.475	52.95	105.9
Benzyl Chloride	1.074	214.8	21.48	4.296	1.074		0.1074	0.2148	0.5370	1.074	5.370	26.850	53.70	107.4
1,3-Dichlorobenzene	1.071	214.2	21.42	4.284	1.071		0.1071	0.2142	0.5355	1.071	5.355	26.775	53.55	107.1
1,4-Dichlorobenzene	1.064	212.8	21.28	4.256	1.064		0.1064	0.2128	0.5320	1.064	5.320	26.600	53.20	106.4
sec-Butylbenzene	1.055	211.0	21.10	4.220	1.055		0.1055	0.2110	0.5275	1.055	5.275	26.375	52.75	105.5
p-Isopropyltoluene	1.026	205.2	20.52	4.104	1.026		0.1026	0.2052	0.5130	1.026	5.130	25.650	51.30	102.6
1,2,3-Trimethylbenzene	1.026	205.2	20.52	4.104	1.026		0.1026	0.2052	0.5130	1.026	5.130	25.650	51.30	102.6
1,2-Dichlorobenzene	1.083	216.6	21.66	4.332	1.083		0.1083	0.2166	0.5415	1.083	5.415	27.075	54.15	108.3
d-Limonene	1.005	201.0	20.10	4.020	1.005		0.1005	0.2010	0.5025	1.005	5.025	25.125	50.25	100.5
1,2-Dibromo-3-chloropropane	1.051	210.2	21.02	4.204	1.051		0.1051	0.2102	0.5255	1.051	5.255	26.275	52.55	105.1
n-Undecane	1.053	210.6	21.06	4.212	1.053		0.1053	0.2106	0.5265	1.053	5.265	26.325	52.65	105.3
1,2,4-Trichlorobenzene	1.097	219.4	21.94	4.388	1.097		0.1097	0.2194	0.5485	1.097	5.485	27.425	54.85	109.7
Naphthalene	1.056	211.2	21.12	4.224	1.056		0.1056	0.2112	0.5280	1.056	5.280	26.400	52.80	105.6
n-Dodecane	1.056	211.2	21.12	4.224	1.056		0.1056	0.2112	0.5280	1.056	5.280	26.400	52.80	105.6
Hexachloro-1,3-butadiene	1.057	211.4	21.14	4.228	1.057		0.1057	0.2114	0.5285	1.057	5.285	26.425	52.85	105.7
Methacrylonitrile	1.067	213.4	21.34	4.268	1.067		0.1067	0.2134	0.5335	1.067	5.335	26.675	53.35	106.7
Cyclohexanone	1.039	207.8	20.78	4.156	1.039		0.1039	0.2078	0.5195	1.039	5.195	25.975	51.95	103.9
tert-Butylbenzene	1.050	210.0	21.00	4.200	1.050		0.1050	0.2100	0.5250	1.050	5.250	26.250	52.50	105.0
n-Butylbenzene	1.054	210.8	21.08	4.216	1.054		0.1054	0.2108	0.5270	1.054	5.270	26.350	52.70	105.4

Q:\TO15 Std. Concentrations\MS16 Std. Conc\2018\R16051818\ICAL Conc. (Primary Source)

Calibration Status Report GCMS-16

Method : I:\MS16\METHODS\R16051818.M (RTE Integrator)
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Fri May 18 10:36:37 2018
Response via : Initial Calibration

#	ID	Conc	ISTD Conc	Path\File
2	0.10	13	13	I:\MS16\DATA\2018_05\18\05181802.D
3	0.20	13	13	I:\MS16\DATA\2018_05\18\05181803.D
4	0.40	13	13	I:\MS16\DATA\2018_05\18\05181804.D
5	1.0	13	13	I:\MS16\DATA\2018_05\18\05181805.D
6	5.0	13	13	I:\MS16\DATA\2018_05\18\05181806.D
7	25	13	13	I:\MS16\DATA\2018_05\18\05181807.D
8	50	13	13	I:\MS16\DATA\2018_05\18\05181808.D

#	ID	Update Time	Quant Time	Acquisition Time
2	0.10	May 18 10:35 2018	May 18 10:31 2018	18 May 2018 00:57
3	0.20	May 18 10:35 2018	May 18 10:31 2018	18 May 2018 1:30
4	0.40	May 18 10:35 2018	May 18 10:31 2018	18 May 2018 2:04
5	1.0	May 18 10:36 2018	May 18 10:31 2018	18 May 2018 2:37
6	5.0	May 18 10:36 2018	May 18 10:31 2018	18 May 2018 3:10
7	25	May 18 10:36 2018	May 18 10:31 2018	18 May 2018 3:43
8	50	May 18 10:36 2018	May 18 10:31 2018	18 May 2018 4:16

R16051818.M Fri May 18 11:29:41 2018

LH 5/18/18

00905989

Data File: I:\MS16\DATA\2018_05\18\05181802.D
Acq On : 18 May 2018 00:57 Operator: LH
Sample : 0.1ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: May 18 10:31:29 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 5/18/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	374568	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	13.43	114	1623893	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	17.72	82	762684	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.16	65	547573	13.725	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 109.84%				
57) Toluene-d8 (SS2)	15.87	98	1647144	11.060	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.48%				
73) Bromofluorobenzene (SS3)	19.09	174	525381	9.773	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 78.16%				
Target Compounds							Qvalue
2) Propene	4.08	42	6825	0.178	ng		99
3) Dichlorodifluoromethan...	4.24	85	10466	0.144	ng		98
4) Chloromethane	4.54	50	9633	0.177	ng		97
5) 1,2-Dichloro-1,1,2,2-t...	4.81	135	5634	0.132	ng		94
6) Vinyl Chloride	4.98	62	9070	0.154	ng		97
7) 1,3-Butadiene	5.25	54	6529	0.158	ng		92
8) Bromomethane	5.71	94	4787	0.137	ng		99
9) Chloroethane	6.05	64	4089	0.153	ng		95
10) Ethanol	6.41	45	22667	0.886	ng		95
11) Acetonitrile	6.71	41	11861	0.180	ng		97
12) Acrolein	6.91	56	3637	0.167	ng		97
13) Acetone	7.12	58	25471	0.912	ng		84
14) Trichlorofluoromethane	7.36	101	9053	0.145	ng		97
15) 2-Propanol (Isopropanol)	7.64	45	29032	0.339	ng		88
16) Acrylonitrile	7.90	53	7225	0.155	ng		100
17) 1,1-Dichloroethene	8.35	96	5133	0.141	ng	#	80
18) 2-Methyl-2-Propanol (t...	8.55	59	27734	0.306	ng		93
19) Methylene Chloride	8.57	84	6025	0.153	ng		80
20) 3-Chloro-1-propene (Al...	8.73	41	8400	0.181	ng		79
21) Trichlorotrifluoroethane	8.99	151	4899	0.136	ng		90
22) Carbon Disulfide	8.85	76	21824	0.157	ng		98
23) trans-1,2-Dichloroethene	9.86	61	8094	0.162	ng		85
24) 1,1-Dichloroethane	10.11	63	9471	0.150	ng		97
25) Methyl tert-Butyl Ether	10.22	73	16659	0.157	ng		95
26) Vinyl Acetate	10.37	86	5328	0.675	ng	#	15
27) 2-Butanone (MEK)	10.64	72	3721	0.150	ng	#	12
28) cis-1,2-Dichloroethene	11.13	61	7699	0.157	ng		88
29) Diisopropyl Ether	11.43	87	4609	0.148	ng	#	43
30) Ethyl Acetate	11.44	61	4162	0.315	ng		95
31) n-Hexane	11.41	57	10068	0.179	ng	#	98
32) Chloroform	11.48	83	9571	0.150	ng		99
34) Tetrahydrofuran (THF)	11.92	72	4175	0.168	ng	#	78
35) Ethyl tert-Butyl Ether	12.02	87	6309	0.145	ng	#	80
36) 1,2-Dichloroethane	12.29	62	6920	0.155	ng		98
38) 1,1,1-Trichloroethane	12.55	97	7849	0.153	ng		94
39) Isopropyl Acetate	12.99	61	7165	0.330	ng	#	77
40) 1-Butanol	13.02	56	10617	0.310	ng		88
41) Benzene	13.04	78	26243	0.183	ng		100
42) Carbon Tetrachloride	13.19	117	6568	0.145	ng		98
43) Cyclohexane	13.32	84	16809	0.321	ng		86
44) tert-Amyl Methyl Ether	13.67	73	16135	0.164	ng		82
45) 1,2-Dichloropropane	13.89	63	5877	0.174	ng		98
46) Bromodichloromethane	14.08	83	6827	0.151	ng		97
47) Trichloroethene	14.13	130	5834	0.147	ng		96
48) 1,4-Dioxane	14.12	88	4429	0.150	ng		79
49) 2,2,4-Trimethylpentane...	14.19	57	25083	0.177	ng		94

Data File: I:\MS16\DATA\2018_05\18\05181802.D
Acq On : 18 May 2018 00:57 Operator: LH
Sample : 0.1ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

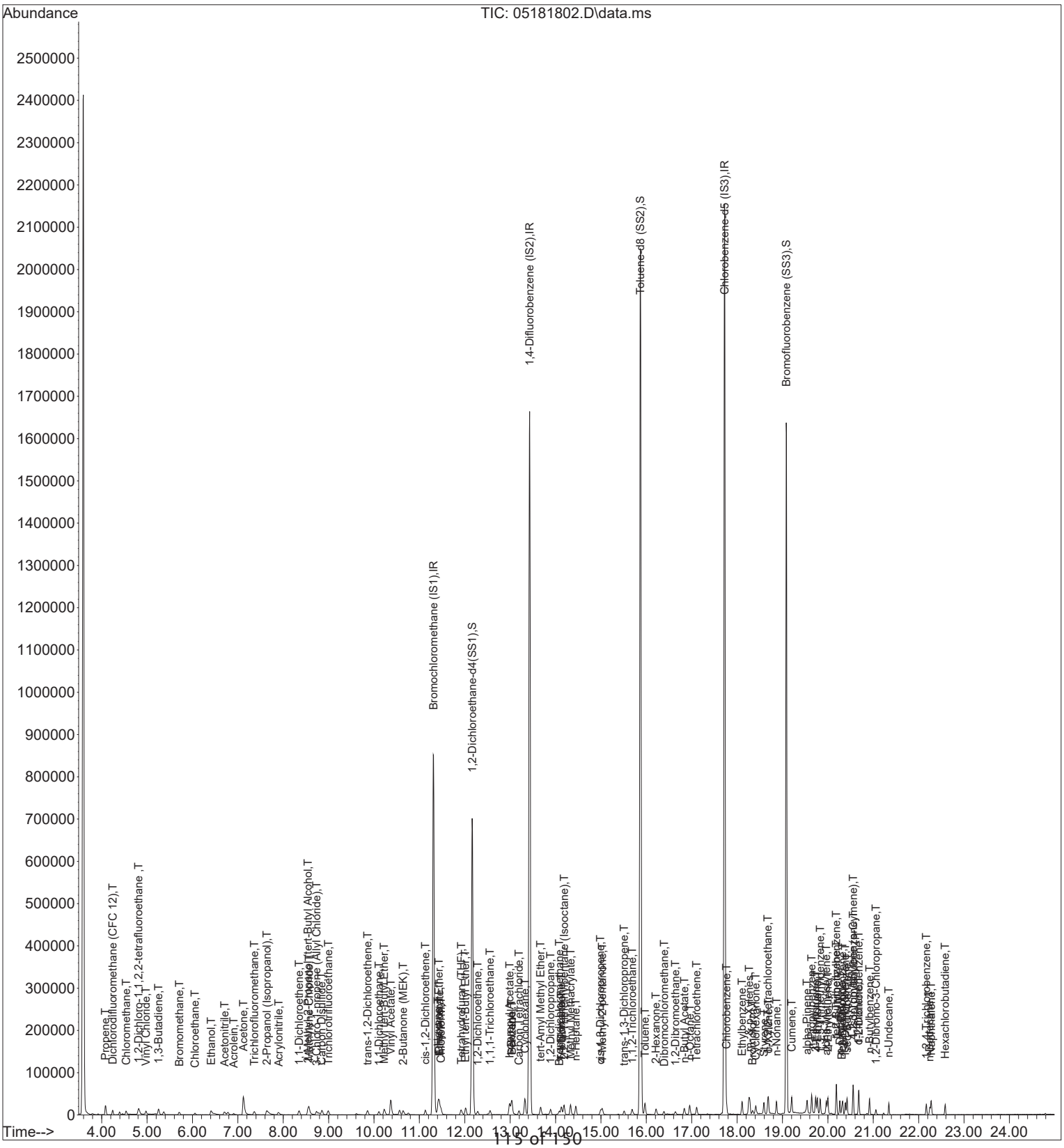
Quant Time: May 18 10:31:29 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	4119	0.288	ng	#	83
51) n-Heptane	14.45	71	5667	0.178	ng		95
52) cis-1,3-Dichloropropene	14.99	75	8283	0.155	ng		93
53) 4-Methyl-2-pentanone	15.03	58	5157	0.163	ng		82
54) trans-1,3-Dichloropropene	15.51	75	6533	0.139	ng		94
55) 1,1,2-Trichloroethane	15.69	97	5206	0.152	ng		97
58) Toluene	15.97	91	27132	0.164	ng		88
59) 2-Hexanone	16.21	43	13230	0.161	ng		83
60) Dibromochloromethane	16.39	129	5405	0.117	ng		97
61) 1,2-Dibromoethane	16.64	107	5776	0.128	ng		98
62) n-Butyl Acetate	16.84	43	14828	0.161	ng		91
63) n-Octane	16.96	57	4774	0.153	ng		88
64) Tetrachloroethene	17.11	166	5965	0.121	ng		97
65) Chlorobenzene	17.76	112	14987	0.134	ng		99
66) Ethylbenzene	18.11	91	26258	0.144	ng		96
67) m- & p-Xylenes	18.27	91	43646	0.318	ng		88
68) Bromoform	18.34	173	4081	0.103	ng		98
69) Styrene	18.59	104	14589	0.131	ng		94
70) o-Xylene	18.69	91	19917	0.140	ng		95
71) n-Nonane	18.87	43	11052	0.158	ng		87
72) 1,1,2,2-Tetrachloroethane	18.68	83	9348	0.133	ng		98
74) Cumene	19.20	105	24445	0.132	ng		98
75) alpha-Pinene	19.54	93	12361	0.132	ng	#	31
76) n-Propylbenzene	19.64	91	30135	0.139	ng		94
77) 3-Ethyltoluene	19.73	105	23448	0.126	ng		100
78) 4-Ethyltoluene	19.77	105	22744	0.134	ng		99
79) 1,3,5-Trimethylbenzene	19.83	105	19205	0.128	ng		97
80) alpha-Methylstyrene	19.97	118	9385	0.119	ng		92
81) 2-Ethyltoluene	20.00	105	24618	0.137	ng		97
82) 1,2,4-Trimethylbenzene	20.19	105	21528	0.146	ng		92
83) n-Decane	20.26	57	10684	0.144	ng		93
84) Benzyl Chloride	20.31	91	12103	0.108	ng		91
85) 1,3-Dichlorobenzene	20.32	146	12467	0.134	ng		100
86) 1,4-Dichlorobenzene	20.39	146	12798	0.136	ng		99
87) sec-Butylbenzene	20.42	105	26722	0.132	ng		98
88) 4-Isopropyltoluene (p-...	20.56	119	23054	0.124	ng		93
89) 1,2,3-Trimethylbenzene	20.56	105	18818	0.126	ng		99
90) 1,2-Dichlorobenzene	20.68	146	11805	0.134	ng		98
91) d-Limonene	20.68	68	7438	0.132	ng		89
92) 1,2-Dibromo-3-Chloropr...	21.06	157	3307	0.104	ng	#	66
93) n-Undecane	21.34	57	8729	0.118	ng		92
94) 1,2,4-Trichlorobenzene	22.17	180	8055	0.125	ng		97
95) Naphthalene	22.28	128	28708	0.136	ng		99
96) n-Dodecane	22.24	57	5877	0.090	ng		92
97) Hexachlorobutadiene	22.58	225	5017	0.107	ng		98
98) Cyclohexanone	18.41	55	8763	0.153	ng	#	91
99) tert-Butylbenzene	20.19	119	19276	0.131	ng		97
100) n-Butylbenzene	20.92	91	21522	0.135	ng		95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181802.D
Acq On : 18 May 2018 00:57 Operator: LH
Sample : 0.1ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: May 18 10:31:29 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_05\18\05181803.D
Acq On : 18 May 2018 1:30 Operator: LH
Sample : 0.2ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: May 18 10:31:32 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 5/18/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	378921	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	13.43	114	1624401	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	17.72	82	755818	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.16	65	544139	13.482	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 107.84%				
57) Toluene-d8 (SS2)	15.87	98	1638469	11.102	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.80%				
73) Bromofluorobenzene (SS3)	19.09	174	521835	9.795	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 78.40%				
Target Compounds							Qvalue
2) Propene	4.08	42	12233	0.315	ng		97
3) Dichlorodifluoromethan...	4.23	85	19313	0.263	ng		99
4) Chloromethane	4.53	50	17619	0.320	ng		98
5) 1,2-Dichloro-1,1,2,2-t...	4.80	135	9866	0.229	ng		98
6) Vinyl Chloride	4.97	62	16376	0.274	ng		98
7) 1,3-Butadiene	5.25	54	11819	0.283	ng		94
8) Bromomethane	5.71	94	8893	0.252	ng		98
9) Chloroethane	6.05	64	7439	0.275	ng		98
10) Ethanol	6.40	45	40345	1.558	ng		100
11) Acetonitrile	6.69	41	21203	0.318	ng		90
12) Acrolein	6.90	56	6681	0.303	ng		96
13) Acetone	7.11	58	43589	1.543	ng	#	82
14) Trichlorofluoromethane	7.36	101	15985	0.253	ng		99
15) 2-Propanol (Isopropanol)	7.62	45	53072	0.613	ng		92
16) Acrylonitrile	7.89	53	13640	0.289	ng		98
17) 1,1-Dichloroethene	8.34	96	9408	0.256	ng	#	82
18) 2-Methyl-2-Propanol (t...	8.54	59	50824	0.554	ng		94
19) Methylene Chloride	8.56	84	10893	0.273	ng		83
20) 3-Chloro-1-propene (Al...	8.74	41	14339	0.305	ng		82
21) Trichlorotrifluoroethane	8.99	151	8607	0.237	ng		90
22) Carbon Disulfide	8.85	76	38876	0.276	ng		99
23) trans-1,2-Dichloroethene	9.85	61	14460	0.286	ng		88
24) 1,1-Dichloroethane	10.11	63	17754	0.278	ng		98
25) Methyl tert-Butyl Ether	10.22	73	29688	0.276	ng		95
26) Vinyl Acetate	10.37	86	10060	1.260	ng	#	12
27) 2-Butanone (ME)	10.64	72	7044	0.280	ng	#	60
28) cis-1,2-Dichloroethene	11.13	61	14214	0.287	ng		88
29) Diisopropyl Ether	11.42	87	8507	0.271	ng	#	55
30) Ethyl Acetate	11.44	61	7423	0.555	ng		96
31) n-He ane	11.41	57	17744	0.312	ng		98
32) Chloroform	11.47	83	17088	0.266	ng		99
34) Tetrahydrofuran (THF)	11.92	72	7200	0.287	ng	#	80
35) Ethyl tert-Butyl Ether	12.02	87	11263	0.256	ng	#	80
36) 1,2-Dichloroethane	12.29	62	12374	0.273	ng		98
38) 1,1,1-Trichloroethane	12.55	97	14163	0.276	ng		97
39) Isopropyl Acetate	12.98	61	13262	0.611	ng	#	78
40) 1-Butanol	13.02	56	19252	0.562	ng	#	78
41) Benzene	13.04	78	45808	0.320	ng		100
42) Carbon Tetrachloride	13.19	117	11510	0.254	ng		98
43) Cyclohe ane	13.32	84	30332	0.579	ng		86
44) tert-Amyl Methyl Ether	13.67	73	28280	0.287	ng		88
45) 1,2-Dichloropropane	13.89	63	10445	0.309	ng		98
46) Bromodichloromethane	14.08	83	12313	0.272	ng		99
47) Trichloroethene	14.13	130	10425	0.263	ng		98
48) 1,4-Dio ane	14.12	88	8281	0.279	ng		84
49) 2,2,4-Trimethylpentane...	14.19	57	44856	0.317	ng		97

Data File: I:\MS16\DATA\2018_05\18\05181803.D
Acq On : 18 May 2018 1:30 Operator: LH
Sample : 0.2ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

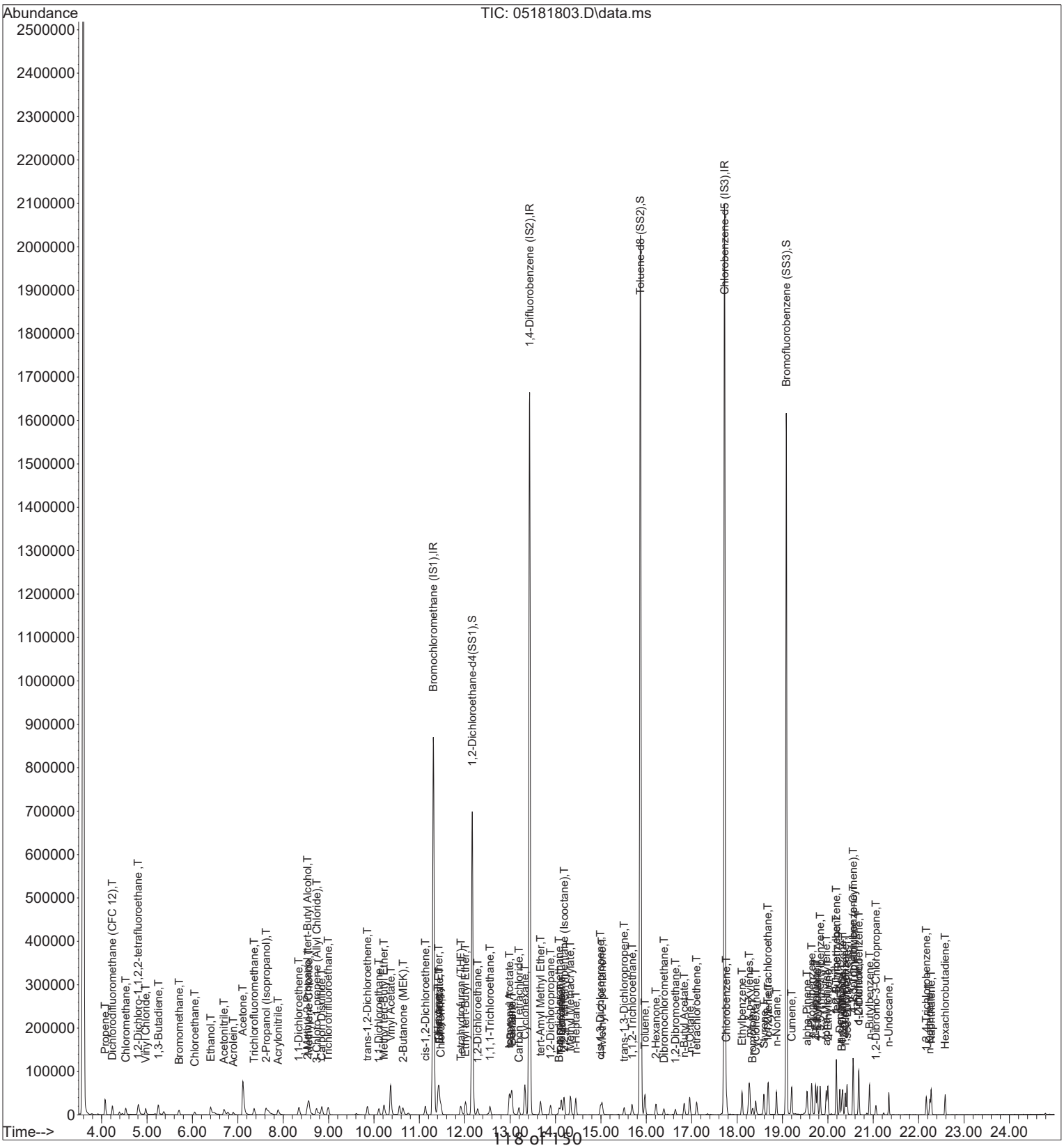
Quant Time: May 18 10:31:32 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	7458	0.522	ng	#	81
51) n-Heptane	14.45	71	9983	0.313	ng		94
52) cis-1,3-Dichloropropene	14.99	75	15385	0.287	ng		99
53) 4-Methyl-2-pentanone	15.02	58	9745	0.308	ng	#	80
54) trans-1,3-Dichloropropene	15.51	75	12135	0.258	ng		98
55) 1,1,2-Trichloroethane	15.69	97	9362	0.273	ng		94
58) Toluene	15.97	91	42274	0.258	ng		97
59) 2-He anone	16.21	43	23426	0.289	ng		88
60) Dibromochloromethane	16.39	129	9790	0.213	ng		98
61) 1,2-Dibromoethane	16.64	107	10430	0.234	ng		100
62) n-Butyl Acetate	16.83	43	25575	0.281	ng		93
63) n-Octane	16.96	57	8519	0.276	ng		88
64) Tetrachloroethene	17.11	166	10693	0.219	ng		99
65) Chlorobenzene	17.76	112	26343	0.238	ng		99
66) Ethylbenzene	18.11	91	44663	0.248	ng		97
67) m- p- ylenes	18.27	91	68935	0.508	ng		94
68) Bromoform	18.34	173	7778	0.197	ng		98
69) Styrene	18.59	104	25907	0.235	ng		98
70) o- ylene	18.69	91	34632	0.246	ng		96
71) n- onane	18.87	43	20039	0.290	ng		86
72) 1,1,2,2-Tetrachloroethane	18.68	83	17491	0.252	ng		99
74) Cumene	19.20	105	44397	0.241	ng		98
75) alpha-Pinene	19.54	93	22571	0.242	ng	#	60
76) n-Propylbenzene	19.64	91	54675	0.255	ng		94
77) 3-Ethyltoluene	19.73	105	42864	0.233	ng		93
78) 4-Ethyltoluene	19.77	105	40096	0.238	ng		95
79) 1,3,5-Trimethylbenzene	19.83	105	34677	0.233	ng		96
80) alpha-Methylstyrene	19.97	118	17524	0.224	ng		97
81) 2-Ethyltoluene	20.00	105	42660	0.240	ng		96
82) 1,2,4-Trimethylbenzene	20.19	105	35587	0.243	ng		97
83) n-Decane	20.26	57	19448	0.264	ng		93
84) Benzyl Chloride	20.31	91	22111	0.200	ng		91
85) 1,3-Dichlorobenzene	20.32	146	21551	0.234	ng		100
86) 1,4-Dichlorobenzene	20.39	146	21952	0.235	ng		98
87) sec-Butylbenzene	20.42	105	48235	0.240	ng		95
88) 4-Isopropyltoluene (p-...	20.56	119	42502	0.230	ng		94
89) 1,2,3-Trimethylbenzene	20.56	105	34211	0.231	ng		99
90) 1,2-Dichlorobenzene	20.68	146	20640	0.237	ng		100
91) d-Limonene	20.68	68	13717	0.247	ng		90
92) 1,2-Dibromo-3-Chloropr...	21.06	157	6171	0.196	ng	#	66
93) n-Undecane	21.34	57	15891	0.217	ng		94
94) 1,2,4-Trichlorobenzene	22.17	180	13679	0.214	ng		99
95) aphthalene	22.28	128	48843	0.234	ng		99
96) n-Dodecane	22.24	57	10942	0.169	ng		92
97) He achlorobutadiene	22.59	225	9409	0.203	ng		99
98) Cyclohe anone	18.41	55	15325	0.271	ng		91
99) tert-Butylbenzene	20.19	119	35025	0.241	ng		99
100) n-Butylbenzene	20.92	91	38926	0.246	ng		95

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181803.D
Acq On : 18 May 2018 1:30 Operator: LH
Sample : 0.2ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: May 18 10:31:32 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_05\18\05181804.D
Acq On : 18 May 2018 2:04 Operator: LH
Sample : 0.5ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: May 18 10:31:34 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 5/18/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	338913	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	13.43	114	1488643	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	17.72	82	690094	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.16	65	486262	13.471	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 107.76%				
57) Toluene-d8 (SS2)	15.87	98	1497098	11.110	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.88%				
73) Bromofluorobenzene (SS3)	19.09	174	473355	9.732	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 77.84%				
Target Compounds							Qvalue
2) Propene	4.07	42	27063	0.779	ng		98
3) Dichlorodifluoromethan...	4.23	85	44376	0.677	ng		99
4) Chloromethane	4.53	50	37577	0.762	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.80	135	23146	0.600	ng		99
6) Vinyl Chloride	4.97	62	38323	0.718	ng		100
7) 1,3-Butadiene	5.24	54	26123	0.700	ng		96
8) Bromomethane	5.70	94	20330	0.644	ng		100
9) Chloroethane	6.04	64	17304	0.716	ng		98
10) Ethanol	6.40	45	88649	3.828	ng		99
11) Acetonitrile	6.69	41	47813	0.802	ng		99
12) Acrolein	6.89	56	14979	0.760	ng		99
13) Acetone	7.10	58	98532	3.900	ng		86
14) Trichlorofluoromethane	7.35	101	36965	0.654	ng		99
15) 2-Propanol (Isopropanol)	7.60	45	120405	1.554	ng		93
16) Acrylonitrile	7.88	53	32073	0.760	ng		99
17) 1,1-Dichloroethene	8.34	96	22172	0.675	ng	#	84
18) 2-Methyl-2-Propanol (t...	8.51	59	116816	1.424	ng		95
19) Methylene Chloride	8.56	84	24467	0.687	ng		83
20) 3-Chloro-1-propene (Al...	8.73	41	31156	0.740	ng		87
21) Trichlorotrifluoroethane	8.99	151	20228	0.623	ng		93
22) Carbon Disulfide	8.84	76	88840	0.706	ng		100
23) trans-1,2-Dichloroethene	9.85	61	33475	0.740	ng		89
24) 1,1-Dichloroethane	10.11	63	40738	0.714	ng		100
25) Methyl tert-Butyl Ether	10.21	73	68801	0.715	ng		97
26) Vinyl Acetate	10.37	86	23522	3.295	ng	#	20
27) 2-Butanone (ME)	10.63	72	16274	0.723	ng	#	62
28) cis-1,2-Dichloroethene	11.13	61	32884	0.741	ng		87
29) Diisopropyl Ether	11.42	87	18996	0.676	ng	#	46
30) Ethyl Acetate	11.44	61	18251	1.526	ng		94
31) n-He ane	11.41	57	41169	0.809	ng		98
32) Chloroform	11.48	83	39674	0.689	ng		100
34) Tetrahydrofuran (THF)	11.91	72	15985	0.711	ng	#	80
35) Ethyl tert-Butyl Ether	12.02	87	26911	0.685	ng	#	84
36) 1,2-Dichloroethane	12.29	62	28498	0.704	ng		100
38) 1,1,1-Trichloroethane	12.55	97	32719	0.695	ng		96
39) Isopropyl Acetate	12.98	61	31014	1.558	ng	#	80
40) 1-Butanol	13.01	56	46272	1.474	ng		82
41) Benzene	13.04	78	97300	0.741	ng		100
42) Carbon Tetrachloride	13.19	117	27000	0.649	ng		100
43) Cyclohe ane	13.32	84	70808	1.474	ng		87
44) tert-Amyl Methyl Ether	13.67	73	65883	0.730	ng		93
45) 1,2-Dichloropropane	13.89	63	24082	0.779	ng		100
46) Bromodichloromethane	14.08	83	28975	0.698	ng		99
47) Trichloroethene	14.13	130	23949	0.660	ng		100
48) 1,4-Dio ane	14.11	88	19571	0.721	ng		89
49) 2,2,4-Trimethylpentane...	14.19	57	103302	0.796	ng		97

Data File: I:\MS16\DATA\2018_05\18\05181804.D
Acq On : 18 May 2018 2:04 Operator: LH
Sample : 0.5ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

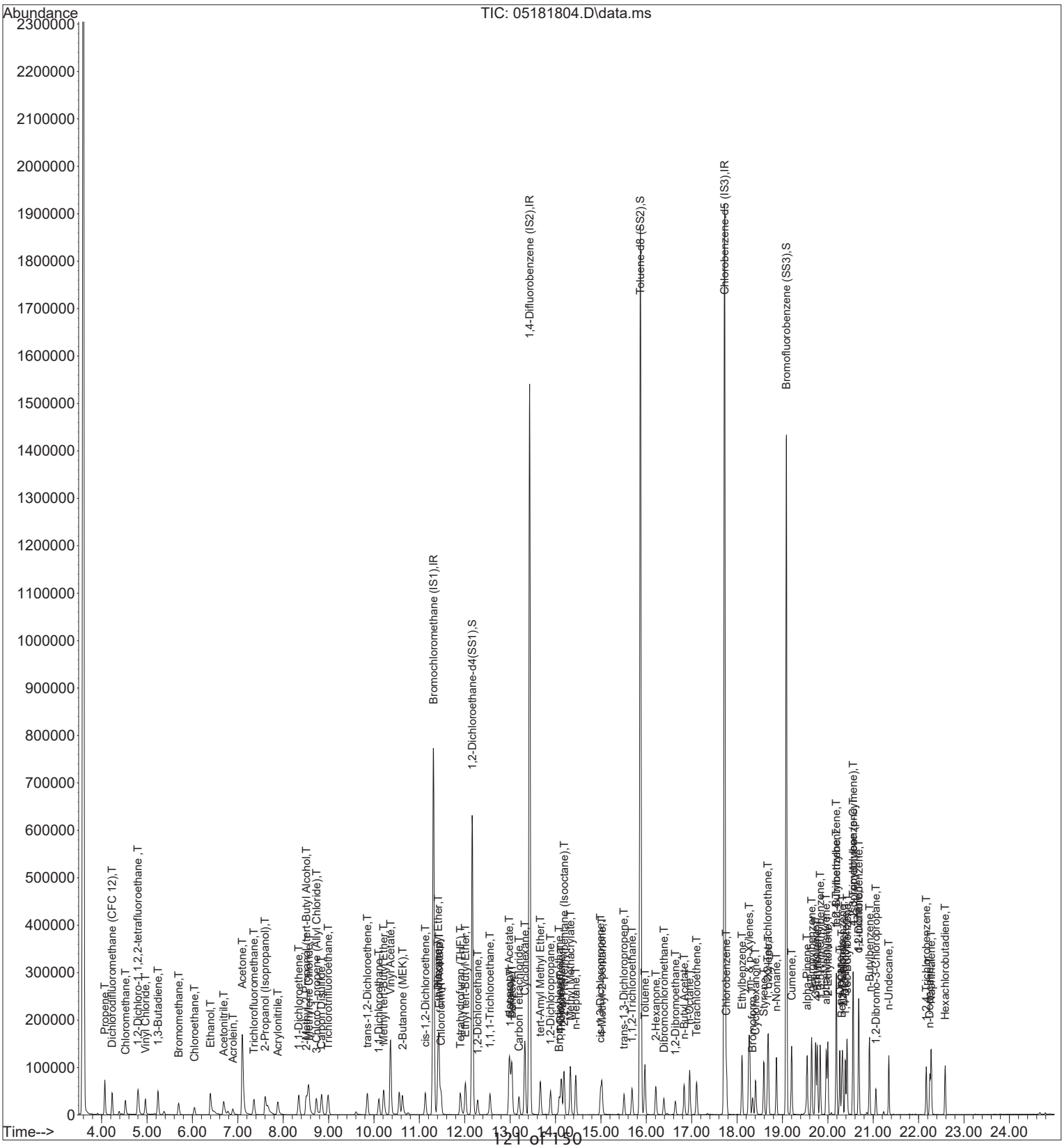
Quant Time: May 18 10:31:34 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	17568	1.342	ng	#	82
51) n-Heptane	14.45	71	23053	0.790	ng		94
52) cis-1,3-Dichloropropene	14.99	75	36222	0.737	ng		100
53) 4-Methyl-2-pentanone	15.02	58	22598	0.780	ng		83
54) trans-1,3-Dichloropropene	15.51	75	29143	0.675	ng		99
55) 1,1,2-Trichloroethane	15.68	97	22162	0.704	ng		97
58) Toluene	15.97	91	94618	0.634	ng		98
59) 2-He anone	16.21	43	53659	0.724	ng		92
60) Dibromochloromethane	16.39	129	23535	0.562	ng		99
61) 1,2-Dibromoethane	16.64	107	24399	0.599	ng		100
62) n-Butyl Acetate	16.83	43	59416	0.715	ng		95
63) n-Octane	16.95	57	20125	0.713	ng		87
64) Tetrachloroethene	17.11	166	25173	0.566	ng		99
65) Chlorobenzene	17.76	112	60509	0.599	ng		99
66) Ethylbenzene	18.11	91	102486	0.622	ng		96
67) m- p- ylenes	18.27	91	157031	1.266	ng		96
68) Bromoform	18.34	173	18426	0.512	ng		100
69) Styrene	18.59	104	60697	0.604	ng		97
70) o- ylene	18.69	91	81365	0.634	ng		96
71) n- onane	18.87	43	46358	0.734	ng		89
72) 1,1,2,2-Tetrachloroethane	18.68	83	41208	0.650	ng		100
74) Cumene	19.20	105	102044	0.607	ng		98
75) alpha-Pinene	19.54	93	51922	0.611	ng		79
76) n-Propylbenzene	19.64	91	124976	0.638	ng		94
77) 3-Ethyltoluene	19.73	105	100399	0.597	ng		92
78) 4-Ethyltoluene	19.77	105	93229	0.606	ng		96
79) 1,3,5-Trimethylbenzene	19.83	105	80879	0.595	ng		98
80) alpha-Methylstyrene	19.96	118	42405	0.593	ng		93
81) 2-Ethyltoluene	20.00	105	100215	0.618	ng		96
82) 1,2,4-Trimethylbenzene	20.19	105	82220	0.615	ng		98
83) n-Decane	20.26	57	45353	0.673	ng		94
84) Benzyl Chloride	20.31	91	55808	0.552	ng		91
85) 1,3-Dichlorobenzene	20.32	146	49298	0.587	ng		99
86) 1,4-Dichlorobenzene	20.39	146	50400	0.590	ng		99
87) sec-Butylbenzene	20.42	105	112486	0.614	ng		97
88) 4-Isopropyltoluene (p-...	20.56	119	100077	0.594	ng		97
89) 1,2,3-Trimethylbenzene	20.56	105	80823	0.597	ng		97
90) 1,2-Dichlorobenzene	20.68	146	47714	0.599	ng		100
91) d-Limonene	20.68	68	32750	0.645	ng		93
92) 1,2-Dibromo-3-Chloropr...	21.06	157	15566	0.540	ng	#	71
93) n-Undecane	21.34	57	38502	0.575	ng		93
94) 1,2,4-Trichlorobenzene	22.17	180	32546	0.558	ng		98
95) aphthalene	22.28	128	114915	0.603	ng		99
96) n-Dodecane	22.24	57	27658	0.467	ng		92
97) He achlorobutadiene	22.59	225	21625	0.511	ng		100
98) Cyclohe anone	18.41	55	35675	0.690	ng	#	91
99) tert-Butylbenzene	20.19	119	80587	0.606	ng		98
100) n-Butylbenzene	20.92	91	91158	0.631	ng		97

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181804.D
Acq On : 18 May 2018 2:04 Operator: LH
Sample : 0.5ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161805 (6/14)
ALS Vial : 5 Sample Multiplier: 1

Quant Time: May 18 10:31:34 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



00905998

Data File: I:\MS16\DATA\2018_05\18\05181805.D
Acq On : 18 May 2018 2:37 Operator: LH
Sample : 1.0ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161803 (6/14)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: May 18 10:31:36 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS) LH 5/18/18
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.31	130	377272	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	13.43	114	1569608	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	17.72	82	731098	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.17	65	528631	13.155	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 105.28%				
57) Toluene-d8 (SS2)	15.87	98	1579663	11.065	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.56%				
73) Bromofluorobenzene (SS3)	19.09	174	505261	9.805	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 78.40%				
Target Compounds							Qvalue
2) Propene	4.06	42	53574	1.384	ng		99
3) Dichlorodifluoromethan...	4.22	85	86809	1.189	ng		100
4) Chloromethane	4.52	50	79315	1.445	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.80	135	45554	1.061	ng		99
6) Vinyl Chloride	4.96	62	75939	1.278	ng		99
7) 1,3-Butadiene	5.24	54	56429	1.358	ng		96
8) Bromomethane	5.69	94	40954	1.165	ng		100
9) Chloroethane	6.04	64	34815	1.294	ng		98
10) Ethanol	6.40	45	191864	7.443	ng		100
11) Acetonitrile	6.68	41	98496	1.484	ng		99
12) Acrolein	6.88	56	31802	1.450	ng		100
13) Acetone	7.09	58	196655	6.992	ng		87
14) Trichlorofluoromethane	7.35	101	70821	1.125	ng		100
15) 2-Propanol (Isopropanol)	7.60	45	251315	2.914	ng		96
16) Acrylonitrile	7.88	53	67956	1.446	ng		98
17) 1,1-Dichloroethene	8.34	96	43965	1.202	ng	#	82
18) 2-Methyl-2-Propanol (t...	8.50	59	241943	2.649	ng		95
19) Methylene Chloride	8.56	84	48295	1.218	ng		82
20) 3-Chloro-1-propene (Al...	8.73	41	66725	1.424	ng		88
21) Trichlorotrifluoroethane	8.99	151	39578	1.095	ng		90
22) Carbon Disulfide	8.84	76	177521	1.267	ng		100
23) trans-1,2-Dichloroethene	9.85	61	69297	1.376	ng		87
24) 1,1-Dichloroethane	10.11	63	81538	1.283	ng		99
25) Methyl tert-Butyl Ether	10.21	73	137593	1.284	ng		96
26) Vinyl Acetate	10.36	86	50185	6.315	ng	#	25
27) 2-Butanone (MEK)	10.62	72	32016	1.279	ng	#	69
28) cis-1,2-Dichloroethene	11.13	61	66696	1.350	ng		87
29) Diisopropyl Ether	11.42	87	36937	1.180	ng	#	48
30) Ethyl Acetate	11.43	61	35714	2.682	ng		93
31) n-Hexane	11.41	57	75505	1.334	ng		99
32) Chloroform	11.48	83	78806	1.230	ng		100
34) Tetrahydrofuran (THF)	11.90	72	31829	1.272	ng	#	81
35) Ethyl tert-Butyl Ether	12.02	87	52760	1.206	ng	#	83
36) 1,2-Dichloroethane	12.29	62	56585	1.256	ng		100
38) 1,1,1-Trichloroethane	12.56	97	64657	1.302	ng		96
39) Isopropyl Acetate	12.98	61	60144	2.866	ng	#	75
40) 1-Butanol	13.00	56	108131	3.266	ng		87
41) Benzene	13.04	78	186946	1.350	ng		100
42) Carbon Tetrachloride	13.19	117	54324	1.238	ng		99
43) Cyclohexane	13.32	84	138868	2.741	ng		87
44) tert-Amyl Methyl Ether	13.67	73	130342	1.370	ng		94
45) 1,2-Dichloropropane	13.89	63	46777	1.434	ng		99
46) Bromodichloromethane	14.08	83	58664	1.340	ng		98
47) Trichloroethene	14.13	130	47433	1.240	ng		100
48) 1,4-Dioxane	14.11	88	38382	1.341	ng		88
49) 2,2,4-Trimethylpentane...	14.19	57	205126	1.499	ng		97

Data File: I:\MS16\DATA\2018_05\18\05181805.D
Acq On : 18 May 2018 2:37 Operator: LH
Sample : 1.0ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161803 (6/14)
ALS Vial : 6 Sample Multiplier: 1

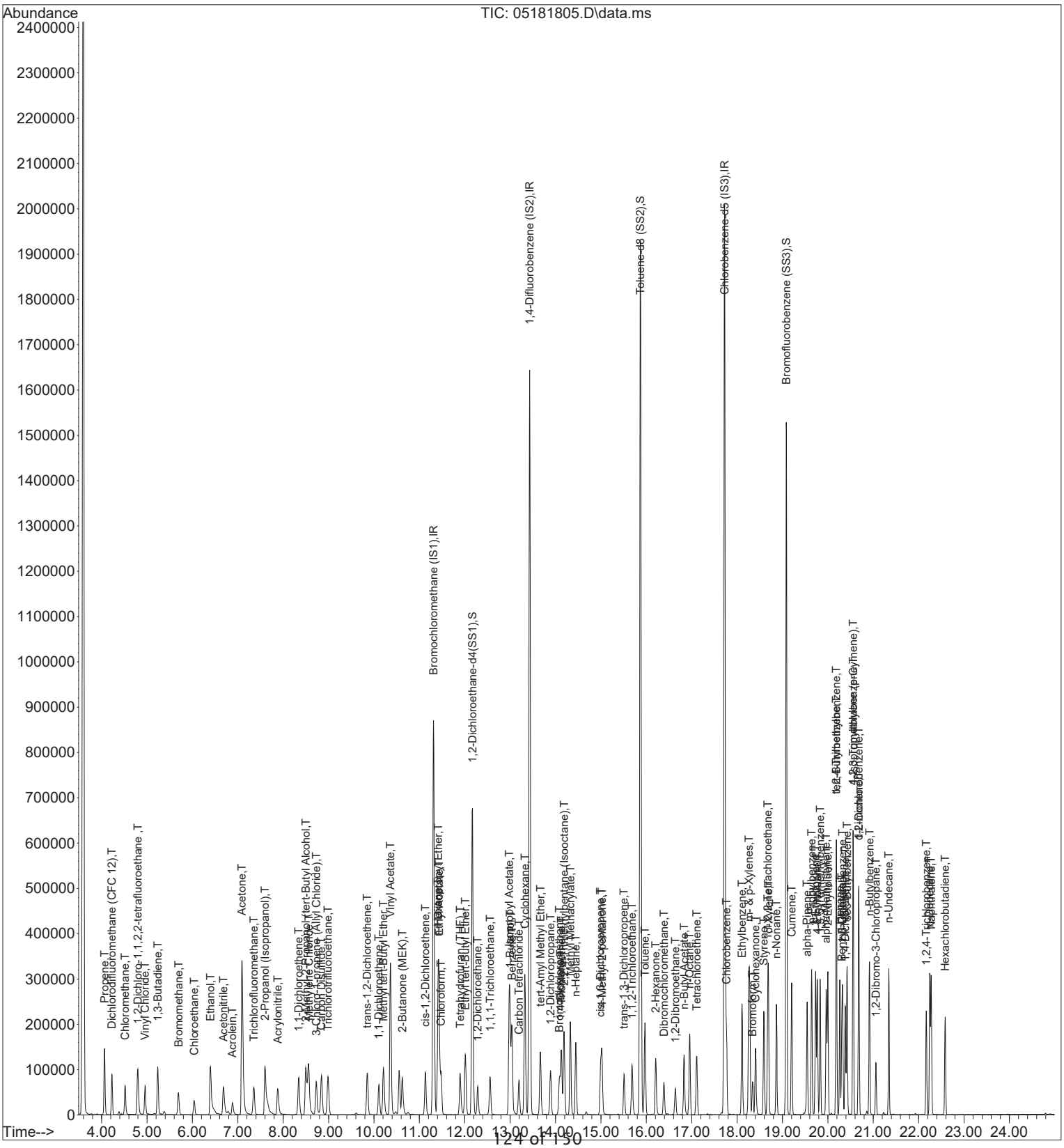
Quant Time: May 18 10:31:36 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	35401	2.564	ng	#	83
51) n-Heptane	14.45	71	42963	1.396	ng		91
52) cis-1,3-Dichloropropene	14.99	75	73782	1.424	ng		100
53) 4-Methyl-2-pentanone	15.02	58	45622	1.493	ng		86
54) trans-1,3-Dichloropropene	15.51	75	60684	1.334	ng		100
55) 1,1,2-Trichloroethane	15.68	97	43646	1.315	ng		97
58) Toluene	15.97	91	181590	1.148	ng		98
59) 2-Hexanone	16.21	43	109315	1.392	ng		91
60) Dibromochloromethane	16.39	129	47750	1.076	ng		100
61) 1,2-Dibromoethane	16.64	107	49200	1.141	ng		99
62) n-Butyl Acetate	16.83	43	120833	1.372	ng		95
63) n-Octane	16.95	57	38862	1.300	ng		88
64) Tetrachloroethene	17.11	166	48538	1.029	ng		99
65) Chlorobenzene	17.77	112	119867	1.119	ng		100
66) Ethylbenzene	18.11	91	202355	1.160	ng		97
67) m- & p-Xylenes	18.26	91	312022	2.375	ng		97
68) Bromoform	18.34	173	38900	1.020	ng		99
69) Styrene	18.59	104	124715	1.171	ng		97
70) o-Xylene	18.69	91	162024	1.191	ng		97
71) n-Nonane	18.87	43	93100	1.391	ng		89
72) 1,1,2,2-Tetrachloroethane	18.68	83	83896	1.250	ng		99
74) Cumene	19.20	105	202797	1.139	ng		98
75) alpha-Pinene	19.54	93	102922	1.143	ng		91
76) n-Propylbenzene	19.64	91	251791	1.214	ng		96
77) 3-Ethyltoluene	19.73	105	203823	1.143	ng		93
78) 4-Ethyltoluene	19.77	105	193341	1.187	ng		97
79) 1,3,5-Trimethylbenzene	19.83	105	166765	1.157	ng		97
80) alpha-Methylstyrene	19.96	118	87572	1.156	ng		99
81) 2-Ethyltoluene	20.00	105	205069	1.193	ng		97
82) 1,2,4-Trimethylbenzene	20.19	105	170976	1.206	ng		98
83) n-Decane	20.26	57	98226	1.377	ng		93
84) Benzyl Chloride	20.31	91	127218	1.187	ng		93
85) 1,3-Dichlorobenzene	20.32	146	101859	1.145	ng		99
86) 1,4-Dichlorobenzene	20.39	146	105173	1.163	ng		98
87) sec-Butylbenzene	20.42	105	230277	1.186	ng		97
88) 4-Isopropyltoluene (p-...	20.56	119	208356	1.167	ng		97
89) 1,2,3-Trimethylbenzene	20.56	105	168332	1.173	ng		98
90) 1,2-Dichlorobenzene	20.68	146	99371	1.178	ng		100
91) d-Limonene	20.68	68	67710	1.258	ng		91
92) 1,2-Dibromo-3-Chloropr...	21.06	157	33516	1.098	ng	#	75
93) n-Undecane	21.34	57	101282	1.428	ng		93
94) 1,2,4-Trichlorobenzene	22.17	180	74623	1.208	ng		100
95) Naphthalene	22.28	128	252119	1.248	ng		99
96) n-Dodecane	22.24	57	99544	1.586	ng		92
97) Hexachlorobutadiene	22.58	225	45001	1.003	ng		100
98) Cyclohexanone	18.41	55	74201	1.355	ng		91
99) tert-Butylbenzene	20.19	119	163681	1.163	ng		97
100) n-Butylbenzene	20.92	91	189635	1.240	ng		96

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181805.D
Acq On : 18 May 2018 2:37 Operator: LH
Sample : 1.0ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161803 (6/14)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: May 18 10:31:36 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_05\18\05181806.D
Acq On : 18 May 2018 3:10 Operator: LH
Sample : 5.0ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161803 (6/14)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: May 18 10:31:38 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018 LH 5/18/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.32	130	337237	12.500	ng		0.01
37) 1,4-Difluorobenzene (IS2)	13.43	114	1470901	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	17.72	82	676395	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.17	65	479134	13.339	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 106.72%				
57) Toluene-d8 (SS2)	15.87	98	1475745	11.173	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 89.36%				
73) Bromofluorobenzene (SS3)	19.09	174	468598	9.829	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 78.64%				
Target Compounds							Qvalue
2) Propene	4.05	42	255566	7.388	ng		99
3) Dichlorodifluoromethan...	4.22	85	394515	6.047	ng		99
4) Chloromethane	4.51	50	314027	6.400	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.79	135	205414	5.353	ng		100
6) Vinyl Chloride	4.95	62	342398	6.447	ng		99
7) 1,3-Butadiene	5.23	54	252620	6.800	ng		97
8) Bromomethane	5.69	94	183441	5.839	ng		99
9) Chloroethane	6.04	64	155814	6.481	ng		100
10) Ethanol	6.41	45	838095	36.370	ng		100
11) Acetonitrile	6.69	41	439468	7.409	ng		99
12) Acrolein	6.89	56	147287	7.515	ng		100
13) Acetone	7.09	58	876470	34.863	ng		89
14) Trichlorofluoromethane	7.35	101	329031	5.848	ng		99
15) 2-Propanol (Isopropanol)	7.61	45	1097896	14.241	ng		100
16) Acrylonitrile	7.89	53	308222	7.340	ng		100
17) 1,1-Dichloroethene	8.34	96	202666	6.199	ng		85
18) 2-Methyl-2-Propanol (t...	8.50	59	1122480	13.751	ng		97
19) Methylene Chloride	8.57	84	216992	6.120	ng		82
20) 3-Chloro-1-propene (Al...	8.73	41	310268	7.405	ng		88
21) Trichlorotrifluoroethane	8.99	151	178679	5.528	ng		89
22) Carbon Disulfide	8.84	76	809690	6.467	ng		100
23) trans-1,2-Dichloroethene	9.86	61	313965	6.975	ng		88
24) 1,1-Dichloroethane	10.11	63	369748	6.510	ng		99
25) Methyl tert-Butyl Ether	10.20	73	628110	6.556	ng		96
26) Vinyl Acetate	10.37	86	236166	33.247	ng	#	32
27) 2-Butanone (ME)	10.62	72	151220	6.756	ng	#	72
28) cis-1,2-Dichloroethene	11.14	61	299357	6.781	ng		88
29) Diisopropyl Ether	11.42	87	165761	5.926	ng	#	42
30) Ethyl Acetate	11.43	61	170361	14.311	ng		94
31) n-He ane	11.41	57	353916	6.994	ng		99
32) Chloroform	11.49	83	357840	6.250	ng		100
34) Tetrahydrofuran (THF)	11.89	72	148088	6.623	ng	#	84
35) Ethyl tert-Butyl Ether	12.01	87	241804	6.182	ng	#	83
36) 1,2-Dichloroethane	12.29	62	255254	6.339	ng		99
38) 1,1,1-Trichloroethane	12.56	97	296460	6.371	ng		97
39) Isopropyl Acetate	12.98	61	283586	14.418	ng	#	78
40) 1-Butanol	12.99	56	530053	17.083	ng		94
41) Benzene	13.04	78	848621	6.538	ng		100
42) Carbon Tetrachloride	13.20	117	251656	6.122	ng		100
43) Cyclohe ane	13.32	84	634554	13.366	ng		87
44) tert-Amyl Methyl Ether	13.67	73	603689	6.771	ng		95
45) 1,2-Dichloropropane	13.89	63	218157	7.138	ng		99
46) Bromodichloromethane	14.08	83	277201	6.755	ng		99
47) Trichloroethene	14.13	130	218631	6.099	ng		99
48) 1,4-Dio ane	14.11	88	180941	6.744	ng		89
49) 2,2,4-Trimethylpentane...	14.19	57	931329	7.261	ng		98

Data File: I:\MS16\DATA\2018_05\18\05181806.D
Acq On : 18 May 2018 3:10 Operator: LH
Sample : 5.0ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161803 (6/14)
ALS Vial : 6 Sample Multiplier: 1

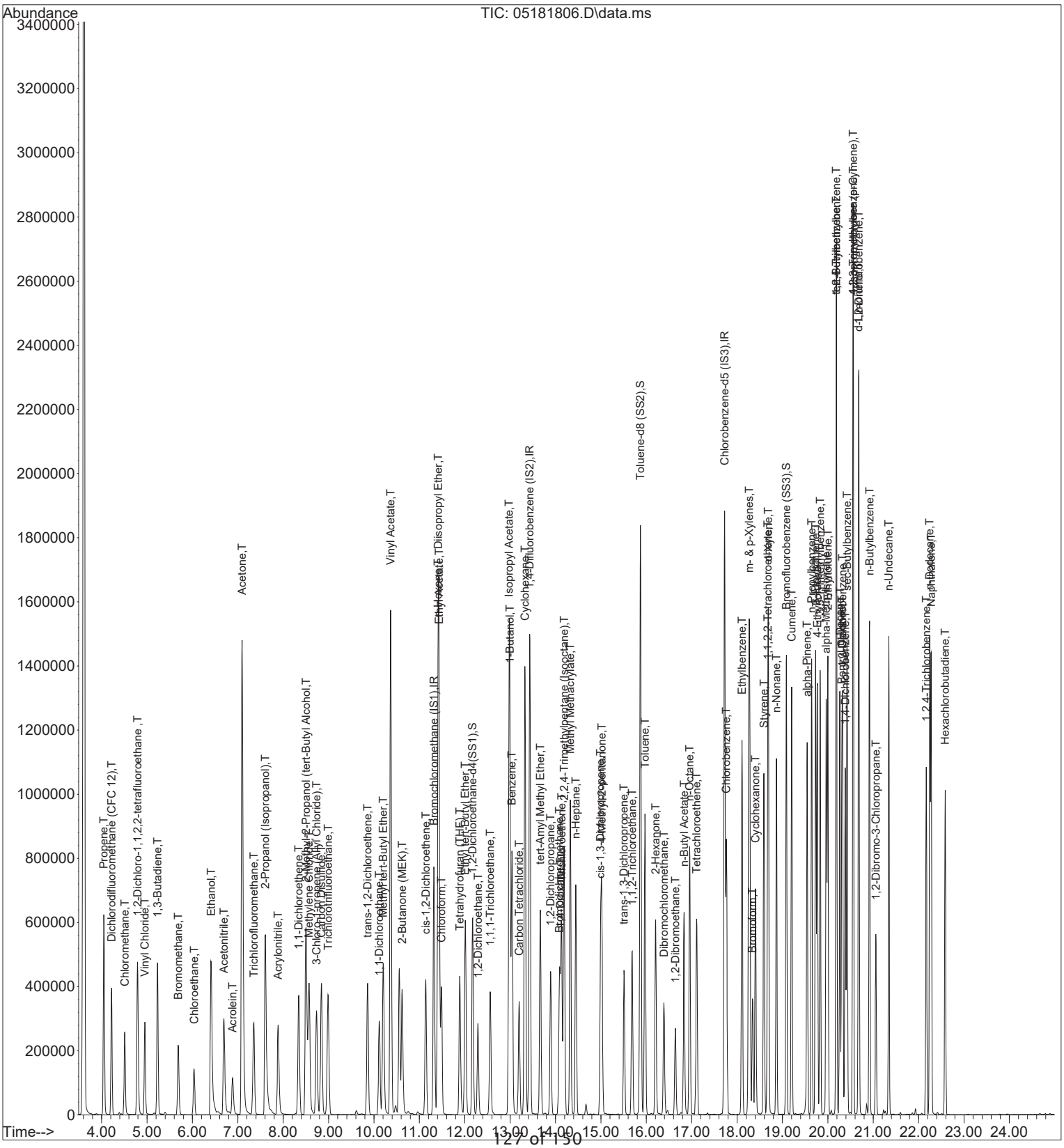
Quant Time: May 18 10:31:38 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	169058	13.065	ng	#	83
51) n-Heptane	14.45	71	197608	6.851	ng		93
52) cis-1,3-Dichloropropene	14.99	75	360725	7.429	ng		100
53) 4-Methyl-2-pentanone	15.02	58	212958	7.435	ng		89
54) trans-1,3-Dichloropropene	15.51	75	302964	7.107	ng		100
55) 1,1,2-Trichloroethane	15.69	97	203788	6.552	ng		96
58) Toluene	15.97	91	826183	5.644	ng		100
59) 2-He anone	16.21	43	502311	6.913	ng		94
60) Dibromochloromethane	16.39	129	233850	5.698	ng		100
61) 1,2-Dibromoethane	16.64	107	230930	5.789	ng		100
62) n-Butyl Acetate	16.83	43	563375	6.914	ng		96
63) n-Octane	16.95	57	179998	6.509	ng		88
64) Tetrachloroethene	17.11	166	226245	5.187	ng		100
65) Chlorobenzene	17.76	112	549386	5.544	ng		100
66) Ethylbenzene	18.11	91	941574	5.833	ng		97
67) m- p- ylenes	18.27	91	1431525	11.778	ng		97
68) Bromoform	18.34	173	196220	5.561	ng		100
69) Styrene	18.59	104	590406	5.990	ng		98
70) o- ylene	18.69	91	734191	5.834	ng		97
71) n- onane	18.87	43	425236	6.869	ng		90
72) 1,1,2,2-Tetrachloroethane	18.68	83	386437	6.221	ng		99
74) Cumene	19.20	105	933543	5.669	ng		98
75) alpha-Pinene	19.54	93	493489	5.923	ng		96
76) n-Propylbenzene	19.64	91	1147518	5.981	ng		96
77) 3-Ethyltoluene	19.73	105	937359	5.683	ng		93
78) 4-Ethyltoluene	19.77	105	878840	5.832	ng		97
79) 1,3,5-Trimethylbenzene	19.83	105	764915	5.738	ng		98
80) alpha-Methylstyrene	19.96	118	418626	5.971	ng		93
81) 2-Ethyltoluene	20.00	105	920227	5.788	ng		98
82) 1,2,4-Trimethylbenzene	20.19	105	778275	5.935	ng		99
83) n-Decane	20.26	57	446205	6.759	ng		93
84) Benzyl Chloride	20.31	91	670249	6.760	ng		95
85) 1,3-Dichlorobenzene	20.32	146	465390	5.655	ng		100
86) 1,4-Dichlorobenzene	20.39	146	476440	5.694	ng		100
87) sec-Butylbenzene	20.42	105	1043277	5.809	ng		98
88) 4-Isopropyltoluene (p-...	20.56	119	951502	5.758	ng		98
89) 1,2,3-Trimethylbenzene	20.56	105	770616	5.804	ng		98
90) 1,2-Dichlorobenzene	20.68	146	456577	5.849	ng		100
91) d-Limonene	20.68	68	319488	6.416	ng		91
92) 1,2-Dibromo-3-Chloropr...	21.06	157	166826	5.909	ng		82
93) n-Undecane	21.34	57	476188	7.258	ng		93
94) 1,2,4-Trichlorobenzene	22.17	180	356852	6.243	ng		100
95) aphthalene	22.28	128	1195079	6.393	ng		100
96) n-Dodecane	22.24	57	482184	8.305	ng		92
97) He achlorobutadiene	22.59	225	212510	5.120	ng		100
98) Cyclohe anone	18.41	55	338412	6.680	ng		92
99) tert-Butylbenzene	20.19	119	752572	5.777	ng		97
100) n-Butylbenzene	20.92	91	870818	6.153	ng		97

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181806.D
Acq On : 18 May 2018 3:10 Operator: LH
Sample : 5.0ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161803 (6/14)
ALS Vial : 6 Sample Multiplier: 1

Quant Time: May 18 10:31:38 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_05\18\05181807.D
Acq On : 18 May 2018 3:43 Operator: LH
Sample : 25ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: May 18 10:31:40 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 5/18/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.33	130	350770	12.500	ng		0.02
37) 1,4-Difluorobenzene (IS2)	13.44	114	1489721	12.500	ng		0.01
56) Chlorobenzene-d5 (IS3)	17.72	82	684390	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.18	65	489539	13.103	ng		0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 104.80%				
57) Toluene-d8 (SS2)	15.87	98	1485352	11.115	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 88.88%				
73) Bromofluorobenzene (SS3)	19.09	174	476032	9.868	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 78.96%				
Target Compounds							Qvalue
2) Propene	4.05	42	1183133	32.884	ng		99
3) Dichlorodifluoromethan...	4.21	85	1934695	28.511	ng		100
4) Chloromethane	4.52	50	1701686	33.343	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.79	135	1023887	25.651	ng		100
6) Vinyl Chloride	4.95	62	1680632	30.422	ng		100
7) 1,3-Butadiene	5.24	54	1294318	33.495	ng		97
8) Bromomethane	5.70	94	930521	28.478	ng		99
9) Chloroethane	6.04	64	782191	31.281	ng		100
10) Ethanol	6.45	45	4333702	180.809	ng		100
11) Acetonitrile	6.72	41	2210229	35.823	ng		99
12) Acrolein	6.90	56	719568	35.298	ng		100
13) Acetone	7.12	58	4188057	160.159	ng		94
14) Trichlorofluoromethane	7.35	101	1608237	27.483	ng		100
15) 2-Propanol (Isopropanol)	7.63	45	5853135	72.993	ng		99
16) Acrylonitrile	7.91	53	1568412	35.907	ng		100
17) 1,1-Dichloroethene	8.35	96	1029265	30.269	ng		87
18) 2-Methyl-2-Propanol (t...	8.52	59	5626275	66.266	ng		98
19) Methylene Chloride	8.59	84	1093372	29.647	ng		84
20) 3-Chloro-1-propene (Al...	8.74	41	1617706	37.121	ng		89
21) Trichlorotrifluoroethane	8.99	151	898534	26.727	ng		91
22) Carbon Disulfide	8.85	76	4088090	31.392	ng		100
23) trans-1,2-Dichloroethene	9.87	61	1583894	33.832	ng		89
24) 1,1-Dichloroethane	10.13	63	1842372	31.184	ng		99
25) Methyl tert-Butyl Ether	10.21	73	3114040	31.247	ng		96
26) Vinyl Acetate	10.38	86	1242959	168.231	ng	#	54
27) 2-Butanone (MEK)	10.62	72	750966	32.256	ng	#	76
28) cis-1,2-Dichloroethene	11.15	61	1506761	32.815	ng		89
29) Diisopropyl Ether	11.42	87	817082	28.084	ng	#	53
30) Ethyl Acetate	11.44	61	844218	68.180	ng		95
31) n-Hexane	11.42	57	1629230	30.952	ng		99
32) Chloroform	11.50	83	1788219	30.026	ng		99
34) Tetrahydrofuran (THF)	11.89	72	752775	32.369	ng	#	86
35) Ethyl tert-Butyl Ether	12.02	87	1217681	29.929	ng	#	85
36) 1,2-Dichloroethane	12.30	62	1265427	30.214	ng		100
38) 1,1,1-Trichloroethane	12.57	97	1481631	31.436	ng		97
39) Isopropyl Acetate	12.98	61	1415788	71.074	ng	#	87
40) 1-Butanol	13.01	56	2483923	79.043	ng		95
41) Benzene	13.05	78	4142353	31.511	ng		100
42) Carbon Tetrachloride	13.20	117	1284966	30.865	ng		100
43) Cyclohexane	13.33	84	3146762	65.445	ng		87
44) tert-Amyl Methyl Ether	13.67	73	3031851	33.577	ng		96
45) 1,2-Dichloropropane	13.90	63	1080042	34.894	ng		99
46) Bromodichloromethane	14.09	83	1408134	33.882	ng		99
47) Trichloroethene	14.13	130	1094982	30.161	ng		99
48) 1,4-Dioxane	14.11	88	911363	33.539	ng		89
49) 2,2,4-Trimethylpentane...	14.19	57	4613562	35.515	ng		99

Data File: I:\MS16\DATA\2018_05\18\05181807.D
Acq On : 18 May 2018 3:43 Operator: LH
Sample : 25ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

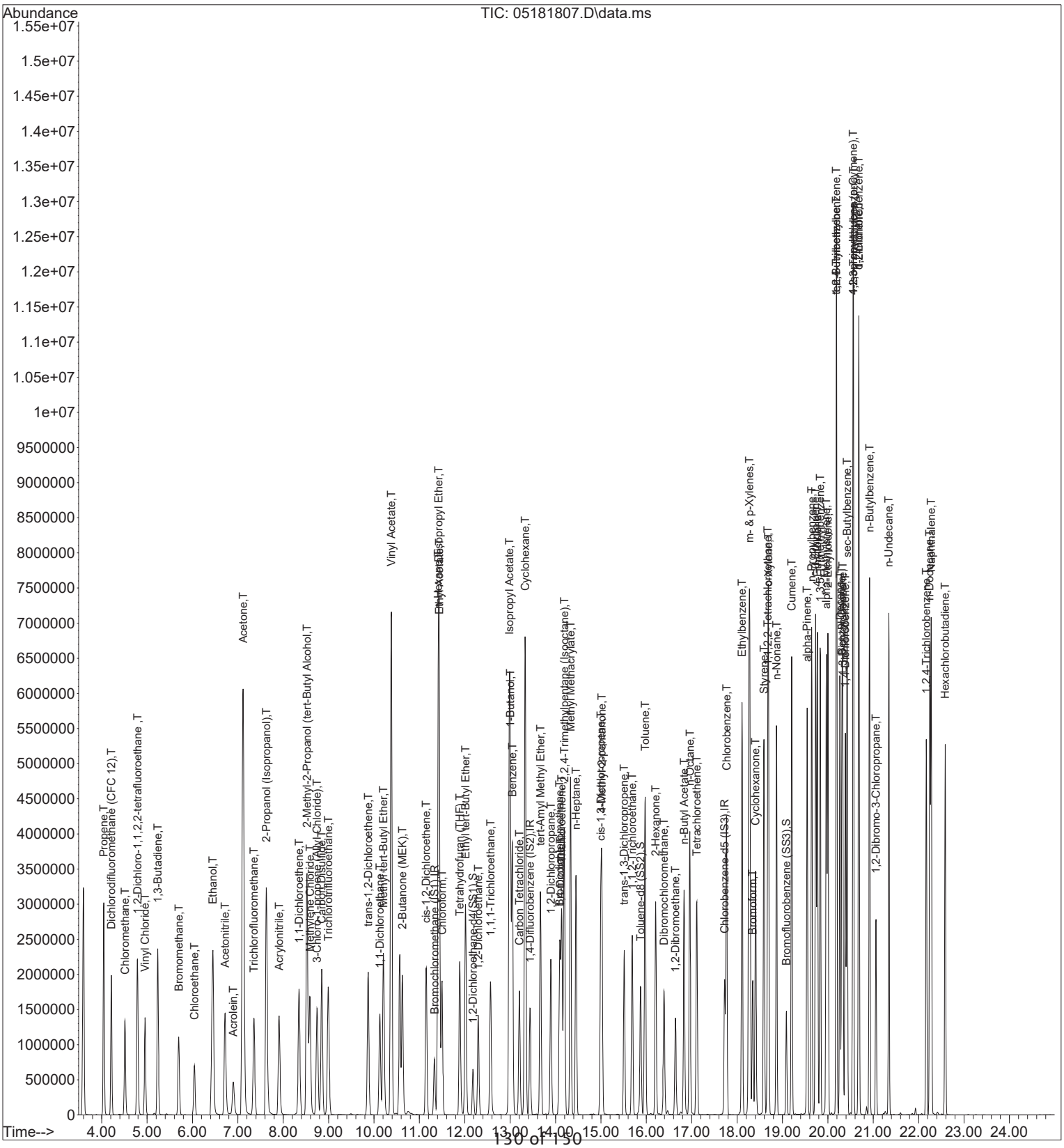
Quant Time: May 18 10:31:40 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	848843	64.772	ng	#	84
51) n-Heptane	14.45	71	948819	32.481	ng		93
52) cis-1,3-Dichloropropene	15.00	75	1839602	37.407	ng		100
53) 4-Methyl-2-pentanone	15.02	58	1067308	36.793	ng		91
54) trans-1,3-Dichloropropene	15.51	75	1571023	36.388	ng		100
55) 1,1,2-Trichloroethane	15.69	97	1019962	32.378	ng		95
58) Toluene	15.98	91	4056046	27.383	ng		100
59) 2-Hexanone	16.21	43	2457070	33.422	ng		95
60) Dibromochloromethane	16.39	129	1206888	29.065	ng		100
61) 1,2-Dibromoethane	16.64	107	1171542	29.025	ng		99
62) n-Butyl Acetate	16.83	43	2816824	34.167	ng		96
63) n-Octane	16.96	57	887908	31.732	ng		89
64) Tetrachloroethene	17.11	166	1139431	25.816	ng		100
65) Chlorobenzene	17.77	112	2721934	27.148	ng		100
66) Ethylbenzene	18.11	91	4678808	28.649	ng		98
67) m- & p-Xylenes	18.27	91	7065521	57.452	ng		97
68) Bromoform	18.35	173	1052235	29.472	ng		100
69) Styrene	18.59	104	2979325	29.874	ng		98
70) o-Xylene	18.69	91	3623235	28.456	ng		98
71) n-Nonane	18.87	43	2062372	32.924	ng		92
72) 1,1,2,2-Tetrachloroethane	18.68	83	1935271	30.791	ng		99
74) Cumene	19.20	105	4638799	27.840	ng		98
75) alpha-Pinene	19.54	93	2452489	29.094	ng		99
76) n-Propylbenzene	19.64	91	5638733	29.047	ng		97
77) 3-Ethyltoluene	19.73	105	4914113	29.447	ng		93
78) 4-Ethyltoluene	19.77	105	4035481	26.468	ng		96
79) 1,3,5-Trimethylbenzene	19.83	105	3764587	27.912	ng		98
80) alpha-Methylstyrene	19.97	118	2078700	29.305	ng		99
81) 2-Ethyltoluene	20.00	105	4492671	27.929	ng		98
82) 1,2,4-Trimethylbenzene	20.19	105	3807627	28.699	ng		98
83) n-Decane	20.26	57	2154992	32.261	ng		94
84) Benzyl Chloride	20.31	91	3586253	35.746	ng		96
85) 1,3-Dichlorobenzene	20.33	146	2317030	27.823	ng		99
86) 1,4-Dichlorobenzene	20.39	146	2328971	27.509	ng		100
87) sec-Butylbenzene	20.42	105	5066975	27.882	ng		98
88) 4-Isopropyltoluene (p-...	20.56	119	4494042	26.878	ng		98
89) 1,2,3-Trimethylbenzene	20.56	105	3731398	27.774	ng		97
90) 1,2-Dichlorobenzene	20.68	146	2214233	28.033	ng		100
91) d-Limonene	20.68	68	1562485	31.011	ng		92
92) 1,2-Dibromo-3-Chloropr...	21.06	157	853331	29.873	ng		85
93) n-Undecane	21.34	57	2320164	34.949	ng		94
94) 1,2,4-Trichlorobenzene	22.17	180	1787499	30.905	ng		100
95) Naphthalene	22.28	128	5616477	29.696	ng		100
96) n-Dodecane	22.24	57	2249732	38.294	ng		93
97) Hexachlorobutadiene	22.58	225	1097780	26.140	ng		100
98) Cyclohexanone	18.41	55	1665031	32.481	ng		93
99) tert-Butylbenzene	20.19	119	3592432	27.256	ng		98
100) n-Butylbenzene	20.92	91	4206352	29.376	ng		98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181807.D
Acq On : 18 May 2018 3:43 Operator: LH
Sample : 25ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: May 18 10:31:40 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_05\18\05181808.D
Acq On : 18 May 2018 4:16 Operator: LH
Sample : 50ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: May 18 10:31:43 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

LH 5/18/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.33	130	357584	12.500	ng		0.02
37) 1,4-Difluorobenzene (IS2)	13.44	114	1536141	12.500	ng		0.01
56) Chlorobenzene-d5 (IS3)	17.72	82	706093	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.19	65	494390	12.981	ng		0.02
Spiked Amount 12.500	Range 70 - 130		Recovery = 103.84%				
57) Toluene-d8 (SS2)	15.88	98	1534540	11.130	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 89.04%				
73) Bromofluorobenzene (SS3)	19.09	174	483691	9.719	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 77.76%				
Target Compounds							Qvalue
2) Propene	4.04	42	2360493	64.358	ng		99
3) Dichlorodifluoromethan...	4.20	85	3636913	52.576	ng		100
4) Chloromethane	4.51	50	2998591	57.635	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.78	135	1962666	48.233	ng		100
6) Vinyl Chloride	4.96	62	3193427	56.705	ng		100
7) 1,3-Butadiene	5.24	54	2448285	62.150	ng		98
8) Bromomethane	5.70	94	1799273	54.017	ng		99
9) Chloroethane	6.04	64	1521338	59.681	ng		99
10) Ethanol	6.48	45	8142184	333.232	ng		100
11) Acetonitrile	6.73	41	4292754	68.251	ng		99
12) Acrolein	6.90	56	1401914	67.460	ng		100
13) Acetone	7.13	58	7636279	286.461	ng		99
14) Trichlorofluoromethane	7.35	101	3118063	52.268	ng		100
15) 2-Propanol (Isopropanol)	7.64	45	10344835	126.550	ng		99
16) Acrylonitrile	7.92	53	3040215	68.276	ng		100
17) 1,1-Dichloroethene	8.35	96	1999963	57.695	ng		88
18) 2-Methyl-2-Propanol (t...	8.54	59	10694224	123.556	ng		98
19) Methylene Chloride	8.60	84	2122517	56.455	ng		85
20) 3-Chloro-1-propene (Al...	8.75	41	3149107	70.885	ng		89
21) Trichlorotrifluoroethane	8.99	151	1755597	51.226	ng		91
22) Carbon Disulfide	8.85	76	7820948	58.912	ng		100
23) trans-1,2-Dichloroethene	9.87	61	3090131	64.747	ng		89
24) 1,1-Dichloroethane	10.14	63	3588295	59.579	ng		99
25) Methyl tert-Butyl Ether	10.21	73	6048886	59.540	ng		95
26) Vinyl Acetate	10.39	86	2368394	314.447	ng	#	92
27) 2-Butanone (ME)	10.63	72	1462906	61.638	ng	#	79
28) cis-1,2-Dichloroethene	11.15	61	2916353	62.303	ng		90
29) Diisopropyl Ether	11.43	87	1552414	52.342	ng	#	64
30) Ethyl Acetate	11.44	61	1591204	126.058	ng		97
31) n-He ane	11.42	57	3105970	57.883	ng		99
32) Chloroform	11.50	83	3445168	56.745	ng		99
34) Tetrahydrofuran (THF)	11.89	72	1469332	61.976	ng	#	87
35) Ethyl tert-Butyl Ether	12.02	87	2374884	57.260	ng	#	86
36) 1,2-Dichloroethane	12.30	62	2448629	57.351	ng		100
38) 1,1,1-Trichloroethane	12.57	97	2892134	59.509	ng		97
39) Isopropyl Acetate	12.98	61	2716231	132.236	ng		93
40) 1-Butanol	13.02	56	4693244	144.835	ng		96
41) Benzene	13.05	78	7920346	58.429	ng		100
42) Carbon Tetrachloride	13.20	117	2504353	58.337	ng		100
43) Cyclohe ane	13.34	84	5976072	120.533	ng		89
44) tert-Amyl Methyl Ether	13.67	73	5893279	63.294	ng		96
45) 1,2-Dichloropropane	13.90	63	2128354	66.684	ng		99
46) Bromodichloromethane	14.09	83	2749515	64.159	ng		99
47) Trichloroethene	14.14	130	2135770	57.052	ng		99
48) 1,4-Dio ane	14.11	88	1785146	63.710	ng		89
49) 2,2,4-Trimethylpentane...	14.19	57	8714906	65.061	ng		99

Data File: I:\MS16\DATA\2018_05\18\05181808.D
Acq On : 18 May 2018 4:16 Operator: LH
Sample : 50ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

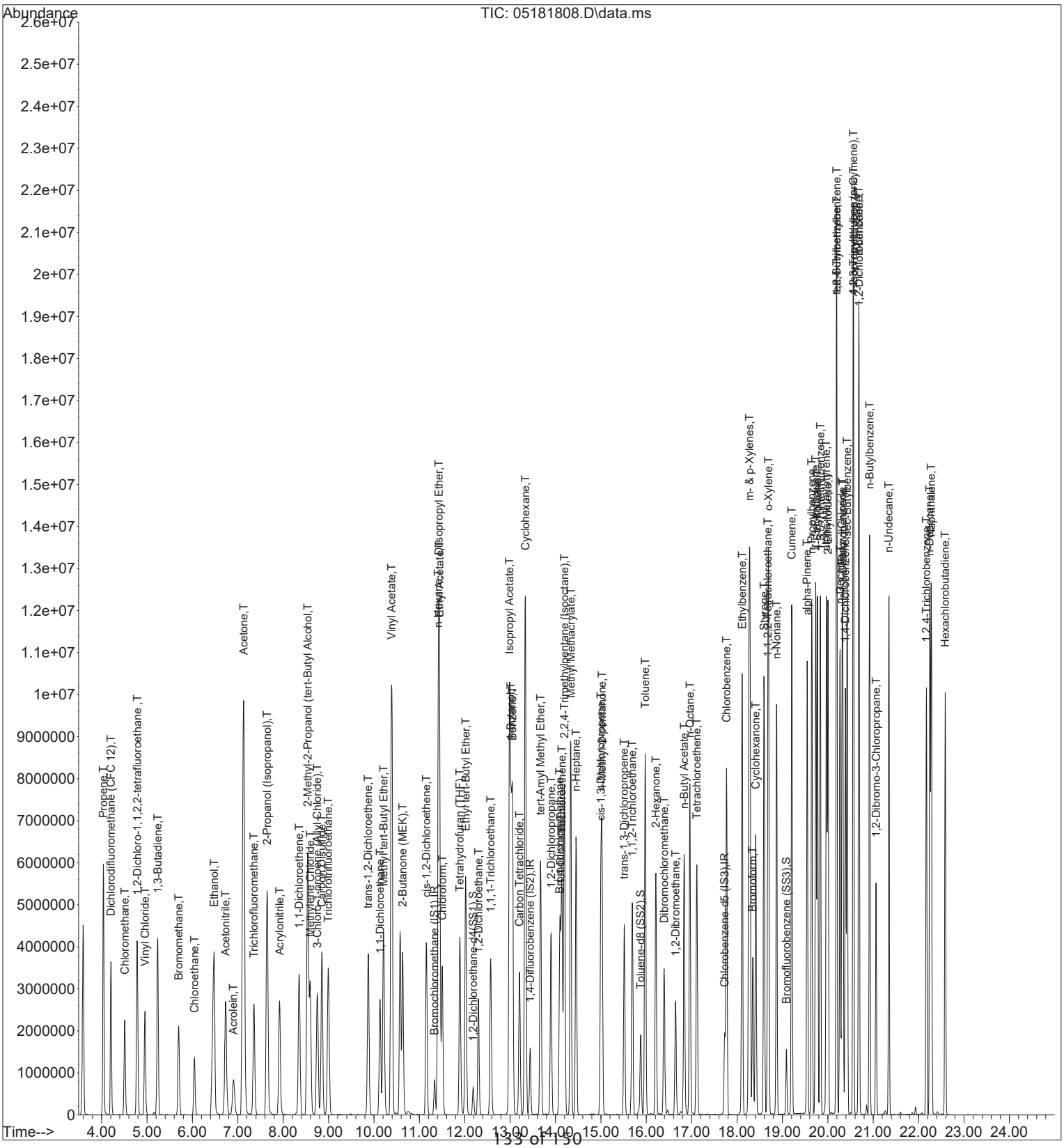
Quant Time: May 18 10:31:43 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.34	100	1663094	123.069	ng	#	86
51) n-Heptane	14.45	71	1855112	61.587	ng		94
52) cis-1,3-Dichloropropene	15.00	75	3612646	71.241	ng		100
53) 4-Methyl-2-pentanone	15.02	58	2072282	69.279	ng		93
54) trans-1,3-Dichloropropene	15.51	75	3123251	70.155	ng		100
55) 1,1,2-Trichloroethane	15.69	97	2002607	61.651	ng		95
58) Toluene	15.98	91	7810450	51.110	ng		100
59) 2-He anone	16.21	43	4736824	62.452	ng		96
60) Dibromochloromethane	16.39	129	2370841	55.342	ng		100
61) 1,2-Dibromoethane	16.65	107	2298895	55.204	ng		99
62) n-Butyl Acetate	16.83	43	5456479	64.151	ng		97
63) n-Octane	16.96	57	1722446	59.665	ng		89
64) Tetrachloroethene	17.11	166	2233572	49.051	ng		100
65) Chlorobenzene	17.77	112	5295469	51.193	ng		100
66) Ethylbenzene	18.11	91	8892517	52.776	ng		98
67) m- p- ylenes	18.27	91	13204685	104.072	ng		97
68) Bromoform	18.35	173	2068566	56.158	ng		100
69) Styrene	18.59	104	5672590	55.130	ng		97
70) o- ylene	18.69	91	6763407	51.486	ng		98
71) n- onane	18.87	43	3837380	59.378	ng		93
72) 1,1,2,2-Tetrachloroethane	18.68	83	3643144	56.183	ng		99
74) Cumene	19.20	105	8635441	50.233	ng		99
75) alpha-Pinene	19.54	93	4683204	53.849	ng		98
76) n-Propylbenzene	19.64	91	10322063	51.539	ng		98
77) 3-Ethyltoluene	19.73	105	8765374	50.910	ng		94
78) 4-Ethyltoluene	19.77	105	7707588	49.000	ng		95
79) 1,3,5-Trimethylbenzene	19.84	105	6986222	50.206	ng		98
80) alpha-Methylstyrene	19.97	118	3904298	53.350	ng		99
81) 2-Ethyltoluene	20.00	105	8203366	49.430	ng		99
82) 1,2,4-Trimethylbenzene	20.19	105	6713835	49.049	ng		97
83) n-Decane	20.27	57	3986589	57.847	ng		95
84) Benzyl Chloride	20.31	91	6778494	65.488	ng		98
85) 1,3-Dichlorobenzene	20.33	146	4269552	49.694	ng		100
86) 1,4-Dichlorobenzene	20.39	146	4375356	50.092	ng		100
87) sec-Butylbenzene	20.42	105	9099089	48.530	ng		98
88) 4-Isopropyltoluene (p-...	20.56	119	7768974	45.036	ng		97
89) 1,2,3-Trimethylbenzene	20.56	105	6580238	47.474	ng		97
90) 1,2-Dichlorobenzene	20.69	146	3986052	48.914	ng		100
91) d-Limonene	20.68	68	2746964	52.843	ng		94
92) 1,2-Dibromo-3-Chloropr...	21.06	157	1661813	56.387	ng		87
93) n-Undecane	21.34	57	4290529	62.642	ng		95
94) 1,2,4-Trichlorobenzene	22.17	180	3484013	58.385	ng		99
95) aphthalene	22.28	128	10263332	52.598	ng		99
96) n-Dodecane	22.24	57	4242928	70.002	ng		95
97) He achlorobutadiene	22.59	225	2148316	49.583	ng		100
98) Cyclohe anone	18.41	55	3207059	60.640	ng		94
99) tert-Butylbenzene	20.19	119	6297958	46.314	ng		99
100) n-Butylbenzene	20.92	91	7645445	51.753	ng		99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181808.D
Acq On : 18 May 2018 4:16 Operator: LH
Sample : 50ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: May 18 10:31:43 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_05\18\05181809.D
Acq On : 18 May 2018 4:49 Operator: LH
Sample : 100ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: May 18 10:31:46 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018 LH 5/18/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.34	130	362549	12.500	ng		0.03
37) 1,4-Difluorobenzene (IS2)	13.45	114	1553971	12.500	ng		0.02
56) Chlorobenzene-d5 (IS3)	17.73	82	710217	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.19	65	496903	12.868	ng		0.03
Spiked Amount 12.500	Range 70 - 130		Recovery = 102.96%				
57) Toluene-d8 (SS2)	15.88	98	1550511	11.181	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 89.44%				
73) Bromofluorobenzene (SS3)	19.09	174	485224	9.693	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 77.52%				
Target Compounds							Qvalue
2) Propene	4.04	42	4797573	129.013	ng		99
3) Dichlorodifluoromethan...	4.21	85	6525510	93.041	ng		100
4) Chloromethane	4.52	50	4444767	84.261	ng		100
5) 1,2-Dichloro-1,1,2,2-t...	4.79	135	3722346	90.225	ng		100
6) Vinyl Chloride	4.96	62	5949031	104.189	ng		100
7) 1,3-Butadiene	5.24	54	4480374	112.177	ng		98
8) Bromomethane	5.71	94	3507225	103.850	ng		99
9) Chloroethane	6.05	64	2993069	115.808	ng		99
10) Ethanol	6.52	45	15046850	607.384	ng		100
11) Acetonitrile	6.76	41	8388264	131.540	ng		99
12) Acrolein	6.92	56	2735413	129.825	ng		100
13) Acetone	7.15	58	13218986	489.095	ng		91
14) Trichlorofluoromethane	7.36	101	6141872	101.547	ng		100
15) 2-Propanol (Isopropanol)	7.67	45	15469402	186.648	ng		99
16) Acrylonitrile	7.94	53	5988859	132.653	ng		100
17) 1,1-Dichloroethene	8.36	96	3974324	113.081	ng		89
18) 2-Methyl-2-Propanol (t...	8.56	59	16650903	189.742	ng		98
19) Methylene Chloride	8.60	84	4120619	108.100	ng		86
20) 3-Chloro-1-propene (Al...	8.76	41	6145693	136.442	ng		91
21) Trichlorotrifluoroethane	9.00	151	3484145	100.271	ng		91
22) Carbon Disulfide	8.86	76	15024006	111.619	ng		99
23) trans-1,2-Dichloroethene	9.88	61	6020933	124.428	ng		90
24) 1,1-Dichloroethane	10.14	63	7034835	115.205	ng		100
25) Methyl tert-Butyl Ether	10.22	73	11665562	113.253	ng		95
26) Vinyl Acetate	10.40	86	4226662	553.481	ng	#	58
27) 2-Butanone (MEK)	10.65	72	2862359	118.951	ng	#	85
28) cis-1,2-Dichloroethene	11.16	61	5678675	119.654	ng		91
29) Diisopropyl Ether	11.43	87	2810889	93.475	ng	#	85
30) Ethyl Acetate	11.46	61	2811486	219.680	ng		99
31) n-Hexane	11.42	57	5662613	104.083	ng		99
32) Chloroform	11.52	83	6678105	108.488	ng		100
34) Tetrahydrofuran (THF)	11.89	72	2893973	120.396	ng	#	89
35) Ethyl tert-Butyl Ether	12.03	87	4613163	109.703	ng		90
36) 1,2-Dichloroethane	12.31	62	4758839	109.933	ng		100
38) 1,1,1-Trichloroethane	12.57	97	5676404	115.458	ng		97
39) Isopropyl Acetate	12.99	61	5005307	240.882	ng	#	90
40) 1-Butanol	13.04	56	8095271	246.957	ng		95
41) Benzene	13.06	78	13889793	101.290	ng		99
42) Carbon Tetrachloride	13.21	117	4924290	113.392	ng		99
43) Cyclohexane	13.34	84	10717984	213.693	ng		92
44) tert-Amyl Methyl Ether	13.68	73	11153062	118.409	ng		96
45) 1,2-Dichloropropane	13.90	63	4204987	130.237	ng		99
46) Bromodichloromethane	14.09	83	5312088	122.533	ng		99
47) Trichloroethene	14.14	130	4179135	110.355	ng		99
48) 1,4-Dioxane	14.12	88	3416979	120.550	ng		90
49) 2,2,4-Trimethylpentane...	14.20	57	15689528	115.785	ng		97

Data File: I:\MS16\DATA\2018_05\18\05181809.D
Acq On : 18 May 2018 4:49 Operator: LH
Sample : 100ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

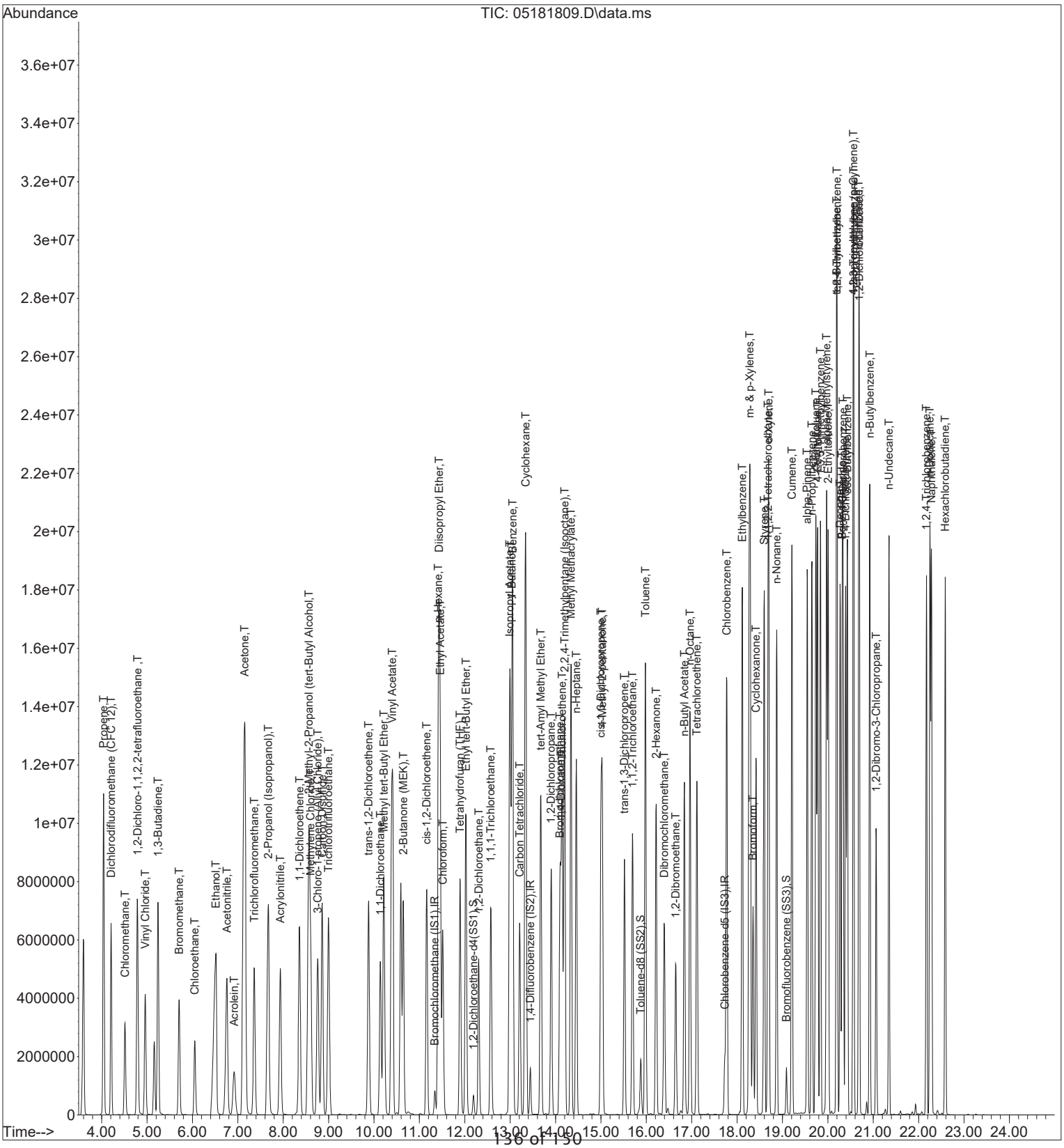
Quant Time: May 18 10:31:46 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	14.34	100	3187965	233.202	ng	90
51) n-Heptane	14.46	71	3625826	118.991	ng	95
52) cis-1,3-Dichloropropene	15.00	75	7026245	136.967	ng	100
53) 4-Methyl-2-pentanone	15.03	58	3883622	128.345	ng	97
54) trans-1,3-Dichloropropene	15.52	75	6172672	137.060	ng	100
55) 1,1,2-Trichloroethane	15.69	97	3916542	119.189	ng	94
58) Toluene	15.98	91	14383336	93.574	ng	98
59) 2-Hexanone	16.22	43	8881493	116.416	ng	97
60) Dibromochloromethane	16.39	129	4625547	107.345	ng	99
61) 1,2-Dibromoethane	16.65	107	4514153	107.771	ng	99
62) n-Butyl Acetate	16.84	43	10238271	119.670	ng	98
63) n-Octane	16.96	57	3237483	111.495	ng	92
64) Tetrachloroethene	17.11	166	4359664	95.186	ng	99
65) Chlorobenzene	17.77	112	10091388	96.990	ng	100
66) Ethylbenzene	18.11	91	15490672	91.401	ng	98
67) m- & p-Xylenes	18.28	91	22060083	172.855	ng	99
68) Bromoform	18.35	173	4040064	109.045	ng	100
69) Styrene	18.60	104	10293605	99.460	ng	95
70) o-Xylene	18.70	91	11571270	87.575	ng	98
71) n-Nonane	18.87	43	6574695	101.143	ng	97
72) 1,1,2,2-Tetrachloroethane	18.68	83	6316327	96.843	ng	100
74) Cumene	19.21	105	14483262	83.762	ng	97
75) alpha-Pinene	19.54	93	8389592	95.906	ng	96
76) n-Propylbenzene	19.65	91	15993021	79.390	ng	93
77) 3-Ethyltoluene	19.74	105	13965872	80.644	ng	96
78) 4-Ethyltoluene	19.77	105	13321250	84.196	ng	96
79) 1,3,5-Trimethylbenzene	19.84	105	12081225	86.317	ng	100
80) alpha-Methylstyrene	19.97	118	6934367	94.204	ng	98
81) 2-Ethyltoluene	20.01	105	13708053	82.119	ng	97
82) 1,2,4-Trimethylbenzene	20.20	105	10875659	78.992	ng	98
83) n-Decane	20.27	57	6699301	96.644	ng	98
84) Benzyl Chloride	20.31	91	11535566	110.799	ng	99
85) 1,3-Dichlorobenzene	20.34	146	7543898	87.295	ng	100
86) 1,4-Dichlorobenzene	20.39	146	7833459	89.162	ng	99
87) sec-Butylbenzene	20.43	105	14452687	76.636	ng	94
88) 4-Isopropyltoluene (p-...	20.56	119	12085905	69.654	ng	95
89) 1,2,3-Trimethylbenzene	20.57	105	10608634	76.092	ng	96
90) 1,2-Dichlorobenzene	20.69	146	6666655	81.333	ng	100
91) d-Limonene	20.68	68	4331261	82.837	ng	98
92) 1,2-Dibromo-3-Chloropr...	21.07	157	3158572	106.551	ng	88
93) n-Undecane	21.35	57	7086027	102.855	ng	98
94) 1,2,4-Trichlorobenzene	22.17	180	6531198	108.814	ng	99
95) Naphthalene	22.28	128	15976019	81.399	ng	95
96) n-Dodecane	22.25	57	7093776	116.358	ng	98
97) Hexachlorobutadiene	22.58	225	4058221	93.119	ng	100
98) Cyclohexanone	18.42	55	5996050	112.717	ng	95
99) tert-Butylbenzene	20.19	119	10242955	74.888	ng	99
100) n-Butylbenzene	20.92	91	12438689	83.710	ng	96

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181809.D
Acq On : 18 May 2018 4:49 Operator: LH
Sample : 100ng TO-15 ICAL STD
Misc : S31-04201801/S31-05161801 (6/14)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: May 18 10:31:46 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:31:09 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_05\18\05181810.D
Acq On : 18 May 2018 5:22 Operator: LH
Sample : 25ng TO-15 ICV STD
Misc : S31-04201801/S31-05081803 (6/6)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: May 18 11:27:54 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:36:37 2018 LH 5/18/18
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.33	130	367239	12.500	ng		-0.01
37) 1,4-Difluorobenzene (IS2)	13.44	114	1573105	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	17.72	82	712518	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.18	65	504510	12.154	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 97.20%				
57) Toluene-d8 (SS2)	15.87	98	1560723	12.613	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.88%				
73) Bromofluorobenzene (SS3)	19.09	174	488051	12.425	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 99.36%				
Target Compounds							Qvalue
2) Propene	4.04	42	1157038	22.556	ng		99
3) Dichlorodifluoromethan...	4.21	85	1874501	22.956	ng		100
4) Chloromethane	4.51	50	1646513	22.662	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.78	135	1022277	22.991	ng		100
6) Vinyl Chloride	4.96	62	1617742	22.407	ng		100
7) 1,3-Butadiene	5.23	54	1236345	23.929	ng		97
8) Bromomethane	5.69	94	978162	23.883	ng		99
9) Chloroethane	6.04	64	795545	23.354	ng		100
10) Ethanol	6.45	45	4250109	121.070	ng		100
11) Acetonitrile	6.71	41	2165345	23.521	ng		99
12) Acrolein	6.90	56	709929	23.928	ng		100
13) Acetone	7.11	58	4101026	114.650	ng		94
14) Trichlorofluoromethane	7.35	101	1606713	23.270	ng		100
15) 2-Propanol (Isopropanol)	7.63	45	5614354	49.787	ng		99
16) Acrylonitrile	7.91	53	1556661	24.883	ng		100
17) 1,1-Dichloroethene	8.35	96	1027056	24.533	ng		88
18) 2-Methyl-2-Propanol (t...	8.52	59	5418759	49.007	ng		98
19) Methylene Chloride	8.58	84	1094088	23.728	ng		85
20) 3-Chloro-1-propene (Al...	8.74	41	1669652	25.758	ng		90
21) Trichlorotrifluoroethane	8.99	151	912049	24.010	ng		91
22) Carbon Disulfide	8.85	76	4086861	25.048	ng		100
23) trans-1,2-Dichloroethene	9.87	61	1568878	24.732	ng		90
24) 1,1-Dichloroethane	10.13	63	1905897	24.003	ng		99
25) Methyl tert-Butyl Ether	10.21	73	3120856	24.289	ng		96
26) Vinyl Acetate	10.38	86	1245623	132.975	ng	#	55
27) 2-Butanone (ME)	10.62	72	754986	24.394	ng	#	76
28) cis-1,2-Dichloroethene	11.15	61	1489147	24.154	ng		89
29) Diisopropyl Ether	11.42	87	825052	23.892	ng	#	57
30) Ethyl Acetate	11.44	61	835979	50.174	ng		96
31) n-He ane	11.42	57	1633161	23.656	ng		99
32) Chloroform	11.50	83	1771934	23.852	ng		99
34) Tetrahydrofuran (THF)	11.89	72	747169	24.025	ng	#	86
35) Ethyl tert-Butyl Ether	12.02	87	1229235	24.488	ng	#	85
36) 1,2-Dichloroethane	12.30	62	1262656	23.591	ng		100
38) 1,1,1-Trichloroethane	12.57	97	1468988	24.281	ng		97
39) Isopropyl Acetate	12.98	61	1387735	48.247	ng	#	86
40) 1-Butanol	13.01	56	2362660	50.034	ng		93
41) Benzene	13.04	78	4194163	23.205	ng		100
42) Carbon Tetrachloride	13.20	117	1294327	24.939	ng		100
43) Cyclohe ane	13.33	84	3150413	49.003	ng		88
44) tert-Amyl Methyl Ether	13.67	73	3064336	24.587	ng		96
45) 1,2-Dichloropropane	13.90	63	1080508	24.013	ng		99
46) Bromodichloromethane	14.09	83	1414432	25.437	ng		100
47) Trichloroethene	14.13	130	1093335	24.154	ng		100
48) 1,4-Dio ane	14.11	88	906112	24.762	ng		89
49) 2,2,4-Trimethylpentane...	14.19	57	4617040	24.236	ng		99

Data File: I:\MS16\DATA\2018_05\18\05181810.D
Acq On : 18 May 2018 5:22 Operator: LH
Sample : 25ng TO-15 ICV STD
Misc : S31-04201801/S31-05081803 (6/6)
ALS Vial : 2 Sample Multiplier: 1

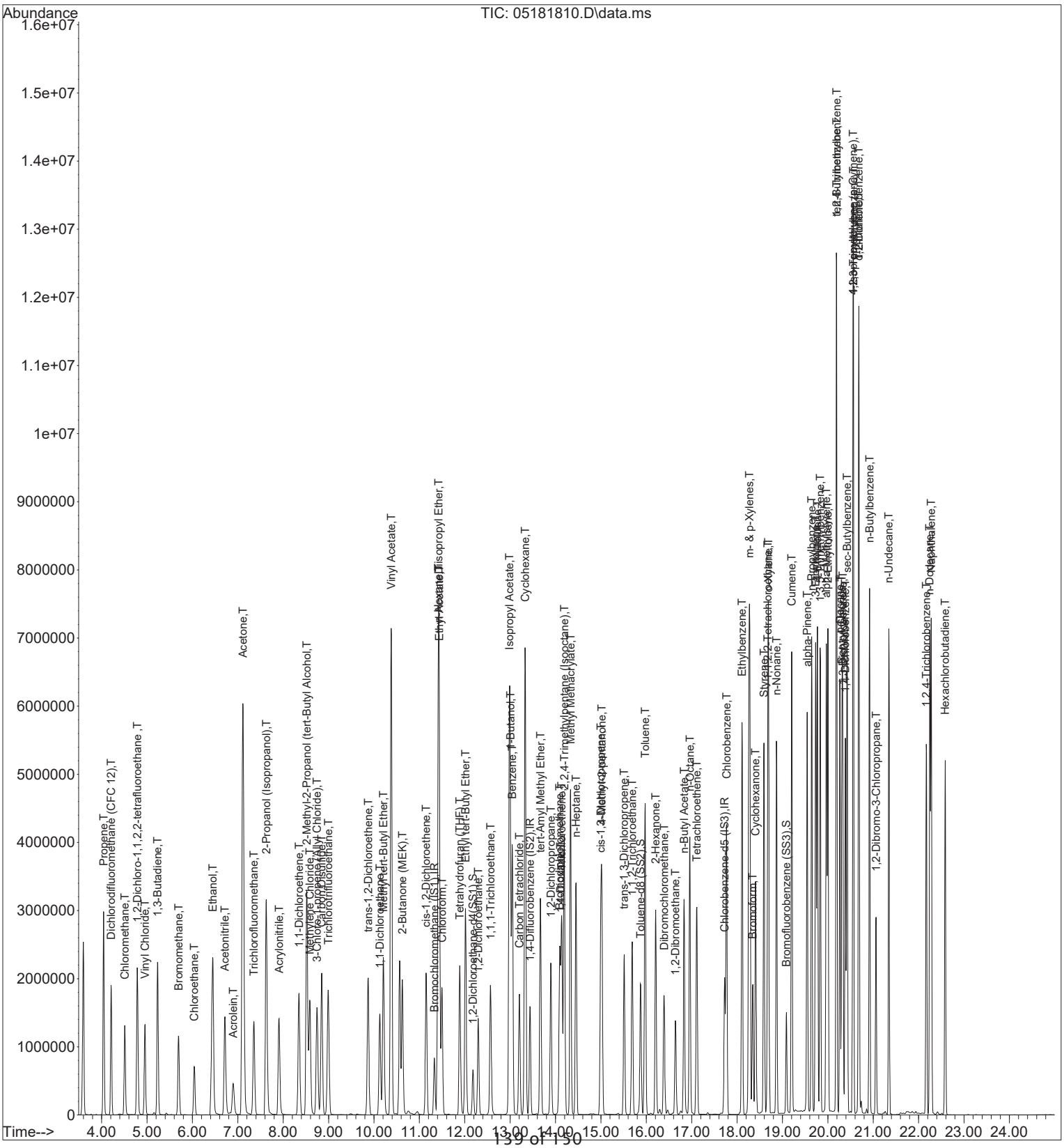
Quant Time: May 18 11:27:54 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:36:37 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
50) Methyl Methacrylate	14.33	100	854316	50.299	ng	#	85
51) n-Heptane	14.45	71	961848	23.277	ng		94
52) cis-1,3-Dichloropropene	15.00	75	1746664	25.859	ng		100
53) 4-Methyl-2-pentanone	15.02	58	1051881	24.548	ng		91
54) trans-1,3-Dichloropropene	15.51	75	1591881	27.064	ng		100
55) 1,1,2-Trichloroethane	15.69	97	1020781	24.567	ng		96
58) Toluene	15.98	91	4063006	24.641	ng		100
59) 2-He anone	16.21	43	2419760	24.306	ng		95
60) Dibromochloromethane	16.39	129	1213137	26.707	ng		100
61) 1,2-Dibromoethane	16.64	107	1171936	25.540	ng		99
62) n-Butyl Acetate	16.83	43	2773992	24.991	ng		96
63) n-Octane	16.96	57	892000	24.693	ng		89
64) Tetrachloroethene	17.11	166	1144211	24.992	ng		100
65) Chlorobenzene	17.77	112	2730807	24.692	ng		100
66) Ethylbenzene	18.11	91	4701248	24.841	ng		98
67) m- p- ylenes	18.27	91	7101471	49.336	ng		97
68) Bromoform	18.35	173	1045836	27.951	ng		100
69) Styrene	18.59	104	2994152	26.086	ng		98
70) o- ylene	18.69	91	3650599	24.981	ng		98
71) n- onane	18.87	43	2072684	24.859	ng		92
72) 1,1,2,2-Tetrachloroethane	18.68	83	1915437	25.486	ng		99
74) Cumene	19.20	105	4687427	25.362	ng		98
75) alpha-Pinene	19.54	93	2518587	25.886	ng		99
76) n-Propylbenzene	19.64	91	5679973	25.607	ng		97
77) 3-Ethyltoluene	19.73	105	4829389	26.236	ng		93
78) 4-Ethyltoluene	19.77	105	4244178	24.998	ng		96
79) 1,3,5-Trimethylbenzene	19.83	105	3785129	25.360	ng		97
80) alpha-Methylstyrene	19.97	118	2177129	27.420	ng		99
81) 2-Ethyltoluene	20.00	105	4527779	25.228	ng		98
82) 1,2,4-Trimethylbenzene	20.19	105	3834612	25.339	ng		98
83) n-Decane	20.26	57	2174657	25.866	ng		94
84) Benzyl Chloride	20.31	91	3640453	29.306	ng		96
85) 1,3-Dichlorobenzene	20.33	146	2325433	25.692	ng		100
86) 1,4-Dichlorobenzene	20.39	146	2356555	25.267	ng		100
87) sec-Butylbenzene	20.42	105	5091718	25.381	ng		98
88) 4-Isopropyltoluene (p-...	20.56	119	4608593	25.369	ng		97
89) 1,2,3-Trimethylbenzene	20.56	105	3912145	26.213	ng		97
90) 1,2-Dichlorobenzene	20.68	146	2230066	26.157	ng		100
91) d-Limonene	20.68	68	1655685	26.675	ng		91
92) 1,2-Dibromo-3-Chloropr...	21.06	157	871544	28.109	ng		85
93) n-Undecane	21.34	57	2333419	28.517	ng		94
94) 1,2,4-Trichlorobenzene	22.17	180	1869455	29.032	ng		100
95) aphthalene	22.28	128	5754912	26.502	ng		100
96) n-Dodecane	22.24	57	2345971	29.364	ng		94
97) He achlorobutadiene	22.58	225	1109222	26.474	ng		100
98) Cyclohe anone	18.41	55	1607248	23.620	ng		93
99) tert-Butylbenzene	20.19	119	3636061	25.260	ng		98
100) n-Butylbenzene	20.92	91	4218477	25.492	ng		98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_05\18\05181810.D
Acq On : 18 May 2018 5:22 Operator: LH
Sample : 25ng TO-15 ICV STD
Misc : S31-04201801/S31-05081803 (6/6)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: May 18 11:27:54 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 10:36:37 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M



LH 5/18/18

Initial Calibration Verification/LABORATORY CONTROL SAMPLE CHECK SHEET

Data File Name: **05181810.D** Acq. Method File: **TO15.M**
Data File Path: **I:\MS16\DATA\2018_05\18** Sample Name: **25ng TO-15 ICV STD**
Operator: **LH** Misc Info: **S31-04201801/S31-05081803 (**
Date Acquired: **5/18/18** **5:22** Instrument Name: **GCMS-16**

#	Compound Name	Ret. Time	Amt. (ng)	Spike Amt.(ng)	% Rec.	Lower Limit	Upper Limit	* OR Fail	ICV/AZ 70-130%
2)	**Propene**	**4.04**	**22.556**	26.275	86	**54**	**133**	*	*
3)	**Dichlorodifluoromethane (CFC 1**	**4.21**	**22.956**	**26.600**	86	**64**	**115**	*	*
4)	**Chloromethane**	**4.51**	**22.662**	**26.250**	86	**47**	**140**	*	*
5)	**1,2-Dichloro-1,1,2,2-tetrafluoroet**	**4.78**	**22.991**	**26.325**	87	**60**	**112**	*	*
6)	**Vinyl Chloride**	**4.96**	**22.407**	**26.350**	85	**63**	**127**	*	*
7)	**1,3-Butadiene**	**5.23**	**23.929**	**26.225**	91	**57**	**149**	*	*
8)	**Bromomethane**	**5.69**	**23.883**	**26.225**	91	**63**	**132**	*	*
9)	**Chloroethane**	**6.04**	**23.354**	**26.250**	89	**68**	**129**	*	*
10)	**Ethanol**	**6.45**	**121.070**	**130.375**	93	**62**	**131**	*	*
11)	**Acetonitrile**	**6.71**	**23.521**	**26.200**	90	**56**	**136**	*	*
12)	**Acrolein**	**6.90**	**23.928**	**26.075**	92	**60**	**132**	*	*
13)	**Acetone**	**7.11**	**114.650**	**131.825**	87	**63**	**124**	*	*
14)	**Trichlorofluoromethane**	**7.35**	**23.270**	**26.025**	89	**65**	**113**	*	*
15)	**2-Propanol (Isopropanol)**	**7.63**	**49.787**	**52.775**	94	**62**	**135**	*	*
16)	**Acrylonitrile**	**7.91**	**24.883**	**26.450**	94	**68**	**138**	*	*
17)	**1,1-Dichloroethene**	**8.35**	**24.533**	**26.675**	92	**72**	**118**	*	*
18)	2-Methyl-2-Propanol (tert-Butyl Alc	8.52	49.007	53.350	92	61	128	*	*
19)	**Methylene Chloride**	**8.58**	**23.728**	**26.600**	89	**67**	**116**	*	*
20)	**3-Chloro-1-propene (Allyl Chlorid**	**8.74**	**25.758**	**26.525**	97	**61**	**143**	*	*
21)	**Trichlorotrifluoroethane**	**8.99**	**24.010**	**26.750**	90	**68**	**113**	*	*
22)	**Carbon Disulfide**	**8.85**	**25.048**	**26.725**	94	**68**	**120**	*	*
23)	**trans-1,2-Dichloroethene**	**9.87**	**24.732**	**26.700**	93	**71**	**125**	*	*
24)	**1,1-Dichloroethane**	**10.13**	**24.003**	**26.525**	90	**68**	**118**	*	*
25)	**Methyl tert-Butyl Ether**	**10.21**	**24.289**	**26.625**	91	**60**	**123**	*	*
26)	**Vinyl Acetate**	**10.38**	**132.975**	**132.750**	100	**73**	**135**	*	*
27)	**2-Butanone (MEK)**	**10.62**	**24.394**	**26.450**	92	**70**	**129**	*	*
28)	**cis-1,2-Dichloroethene**	**11.15**	**24.154**	**26.475**	91	**69**	**121**	*	*
29)	Diisopropyl Ether	11.42	23.892	26.600	90	65	117	*	*
30)	**Ethyl Acetate**	**11.44**	**50.174**	**53.300**	94	**66**	**140**	*	*
31)	**n-Hexane**	**11.42**	**23.656**	**26.625**	89	**61**	**124**	*	*
32)	**Chloroform**	**11.50**	**23.852**	**26.500**	90	**69**	**113**	*	*
34)	**Tetrahydrofuran (THF)**	**11.89**	**24.025**	**26.550**	90	**66**	**121**	*	*
35)	Ethyl tert-Butyl Ether	12.02	24.488	26.525	92	69	120	*	*
36)	**1,2-Dichloroethane**	**12.30**	**23.591**	**26.500**	89	**62**	**120**	*	*
38)	**1,1,1-Trichloroethane**	**12.57**	**24.281**	**26.525**	92	**65**	**116**	*	*
39)	Isopropyl Acetate	12.98	48.247	53.275	91	70	126	*	*
40)	1-Butanol	13.01	50.034	53.300	94	62	141	*	*
41)	**Benzene**	**13.04**	**23.205**	**26.625**	87	**66**	**111**	*	*
42)	**Carbon Tetrachloride**	**13.20**	**24.939**	**26.700**	93	**64**	**122**	*	*
43)	**Cyclohexane**	**13.33**	**49.003**	**53.150**	92	**69**	**115**	*	*
44)	tert-Amyl Methyl Ether	13.67	24.587	**26.550**	93	68	119	*	*
45)	**1,2-Dichloropropane**	**13.90**	**24.013**	**26.525**	91	**69**	**121**	*	*
46)	**Bromodichloromethane**	**14.09**	**25.437**	**26.700**	95	**69**	**123**	*	*
47)	**Trichloroethene**	**14.13**	**24.154**	**26.550**	91	**69**	**112**	*	*
48)	**1,4-Dioxane**	**14.11**	**24.762**	**26.600**	93	**74**	**123**	*	*
49)	2,2,4-Trimethylpentane (Isooctane)	14.19	24.236	26.525	91	67	120	*	*

Bold = 75 Compound List
*** = Pass**

Initial Calibration Verification/LABORATORY CONTROL SAMPLE CHECK SHEET

Data File Name: **05181810.D** **TO15.M**
Data File Path: **I:\MS16\DATA\2018_05\18** Sample Name: **25ng TO-15 ICV STD**
Operator: **LH** Misc Info: **S31-04201801/S31-05081803 (**
Date Acquired: **5/18/18** **5:22** Instrument Name: **GCMS-16**

#	Compound Name	Ret. Time	Amt. (ng)	Spike Amt.(ng)	% Rec.	Lower Limit	Upper Limit	* OR Fail	ICV/AZ 70-130%
50)	**Methyl Methacrylate**	**14.33**	**50.299**	**52.950**	95	**75**	**125**	*	*
51)	**n-Heptane**	**14.45**	**23.277**	**26.625**	87	**68**	**118**	*	*
52)	**cis-1,3-Dichloropropene**	**15.00**	**25.859**	**26.025**	99	**74**	**129**	*	*
53)	**4-Methyl-2-pentanone**	**15.02**	**24.548**	**26.650**	92	**66**	**138**	*	*
54)	**trans-1,3-Dichloropropene**	**15.51**	**27.064**	**26.625**	102	**75**	**130**	*	*
55)	**1,1,2-Trichloroethane**	**15.69**	**24.567**	**26.500**	93	**73**	**117**	*	*
58)	**Toluene**	**15.98**	**24.641**	**26.400**	93	**66**	**114**	*	*
59)	**2-Hexanone**	**16.21**	**24.306**	**26.425**	92	**58**	**146**	*	*
60)	**Dibromochloromethane**	**16.39**	**26.707**	**26.450**	101	**67**	**130**	*	*
61)	**1,2-Dibromoethane**	**16.64**	**25.540**	**26.425**	97	**70**	**127**	*	*
62)	**n-Butyl Acetate**	**16.83**	**24.991**	**26.850**	93	**62**	**140**	*	*
63)	**n-Octane**	**16.96**	**24.693**	**26.525**	93	**65**	**121**	*	*
64)	**Tetrachloroethene**	**17.11**	**24.992**	**26.500**	94	**62**	**119**	*	*
65)	**Chlorobenzene**	**17.77**	**24.692**	**26.525**	93	**66**	**115**	*	*
66)	**Ethylbenzene**	**18.11**	**24.841**	**26.475**	94	**69**	**117**	*	*
67)	**m- & p-Xylenes**	**18.27**	**49.336**	**52.975**	93	**67**	**117**	*	*
68)	**Bromoform**	**18.35**	**27.951**	**26.525**	105	**67**	**135**	*	*
69)	**Styrene**	**18.59**	**26.086**	**26.350**	99	**70**	**128**	*	*
70)	**o-Xylene**	**18.69**	**24.981**	**26.400**	95	**67**	**118**	*	*
71)	**n-Nonane**	**18.87**	**24.859**	**26.500**	94	**61**	**127**	*	*
72)	**1,1,2,2-Tetrachloroethane**	**18.68**	**25.486**	**26.450**	96	**70**	**125**	*	*
74)	**Cumene**	**19.20**	**25.362**	**26.525**	96	**68**	**116**	*	*
75)	**alpha-Pinene**	**19.54**	**25.886**	**26.600**	97	**69**	**122**	*	*
76)	**n-Propylbenzene**	**19.64**	**25.607**	**26.750**	96	**70**	**118**	*	*
77)	3-Ethyltoluene	19.73	26.236	26.450	99	68	117	*	*
78)	**4-Ethyltoluene**	**19.77**	**24.998**	**26.425**	**95**	**69**	**124**	*	*
79)	**1,3,5-Trimethylbenzene**	**19.83**	**25.360**	**26.500**	**96**	**65**	**117**	*	*
80)	alpha-Methylstyrene	19.97	27.420	26.525	**103**	71	132	*	*
81)	2-Ethyltoluene	20.00	25.228	26.700	**94**	67	119	*	*
82)	**1,2,4-Trimethylbenzene**	**20.19**	**25.339**	**26.550**	**95**	**67**	**124**	*	*
83)	n-Decane	20.26	25.866	26.625	**97**	63	129	*	*
84)	**Benzyl Chloride**	**20.31**	**29.306**	**26.550**	**110**	**75**	**142**	*	*
85)	**1,3-Dichlorobenzene**	**20.33**	**25.692**	**26.475**	**97**	**70**	**124**	*	*
86)	**1,4-Dichlorobenzene**	**20.39**	**25.267**	**26.750**	**94**	**63**	**124**	*	*
87)	sec-Butylbenzene	20.42	25.381	26.575	**96**	68	119	*	*
88)	4-Isopropyltoluene (p-Cymene)	20.56	25.369	26.600	**95**	65	122	*	*
89)	1,2,3-Trimethylbenzene	20.56	26.213	26.600	**99**	66	128	*	*
90)	**1,2-Dichlorobenzene**	**20.68**	**26.157**	**26.750**	**98**	**66**	**125**	*	*
91)	**d-Limonene**	**20.68**	**26.675**	**26.625**	**100**	**64**	**135**	*	*
92)	**1,2-Dibromo-3-Chloropropane**	**21.06**	**28.109**	**26.300**	**107**	**73**	**136**	*	*
93)	n-Undecane	21.34	28.517	26.775	**107**	67	135	*	*
94)	**1,2,4-Trichlorobenzene**	**22.17**	**29.032**	**27.200**	**107**	**70**	**141**	*	*
95)	**Naphthalene**	**22.28**	**26.502**	**26.125**	**101**	**71**	**146**	*	*
96)	n-Dodecane	22.24	29.364	26.825	**109**	69	152	*	*
97)	**Hexachlorobutadiene**	**22.58**	**26.474**	**26.550**	**100**	63	126	*	*
98)	Cyclohexanone	18.41	23.620	26.150	90	58	138	*	*
99)	tert-Butylbenzene	20.19	25.260	26.525	95	65	121	*	*
100)	n-Butylbenzene	20.92	25.492	26.575	96	71	125	*	*

Data File: I:\MS16\DATA\2018_06\11\06111802.D
Acq On : 11 Jun 2018 7:40 Operator: WA
Sample : CCV R16061118_25ng
Misc : S31-04201801/S31-06041804 (7/2)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 11 08:12:26 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

WA 6/11/18

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
Max. RRF Dev : 30% Max. Rel. Area : 200%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	IR	Bromochloromethane (IS1)	1.000	1.000	0.0	95	0.00
2	T	Propene	1.746	1.520	12.9	89	0.00
3	T	Dichlorodifluoromethane (CF	2.779	2.533	8.9	92	0.00
4	T	Chloromethane	2.473	2.296	7.2	91	0.00
5	T	1,2-Dichloro-1,1,2,2-tetraf	1.513	1.435	5.2	96	0.00
6	T	Vinyl Chloride	2.457	2.202	10.4	91	0.00
7	T	1,3-Butadiene	1.759	1.645	6.5	90	0.00
8	T	Bromomethane	1.394	1.358	2.6	97	-0.01
9	T	Chloroethane	1.159	1.092	5.8	95	0.00
10	T	Ethanol	1.195	1.089	8.9	89	-0.07
11	T	Acetonitrile	3.134	2.829	9.7	91	-0.04
12	T	Acrolein	1.010	0.929	8.0	91	-0.02
13	T	Acetone	1.218	1.044	14.3	89	-0.03
14	T	Trichlorofluoromethane	2.350	2.114	10.0	93	-0.01
15	T	2-Propanol (Isopropanol)	3.838	3.679	4.1	89	-0.04
16	T	Acrylonitrile	2.129	2.024	4.9	91	-0.03
17	T	1,1-Dichloroethene	1.425	1.376	3.4	95	-0.01
18	T	2-Methyl-2-Propanol (tert-B	3.764	3.518	6.5	89	-0.04
19	T	Methylene Chloride	1.569	1.449	7.6	94	-0.01
20	T	3-Chloro-1-propene (Allyl C	2.206	2.068	6.3	90	-0.02
21	T	Trichlorotrifluoroethane	1.293	1.250	3.3	98	0.00
22	T	Carbon Disulfide	5.554	5.451	1.9	95	-0.01
23	T	trans-1,2-Dichloroethene	2.159	2.011	6.9	92	-0.01
24	T	1,1-Dichloroethane	2.703	2.490	7.9	93	-0.01
25	T	Methyl tert-Butyl Ether	4.373	4.039	7.6	93	-0.01
26	T	Vinyl Acetate	0.319	0.327	-2.5	93	-0.02
27	T	2-Butanone (MEK)	1.053	0.989	6.1	93	-0.02
28	T	cis-1,2-Dichloroethene	2.099	1.928	8.1	91	0.00
29	T	Diisopropyl Ether	1.175	1.078	8.3	94	0.00
30	T	Ethyl Acetate	0.567	0.542	4.4	92	-0.02
31	T	n-Hexane	2.350	2.156	8.3	94	0.00
32	T	Chloroform	2.529	2.328	7.9	93	-0.02
33	S	1,2-Dichloroethane-d4(SS1)	1.413	1.297	8.2	89	-0.01
34	T	Tetrahydrofuran (THF)	1.059	0.986	6.9	93	0.00
35	T	Ethyl tert-Butyl Ether	1.709	1.608	5.9	94	-0.01
36	T	1,2-Dichloroethane	1.822	1.611	11.6	90	-0.01
37	IR	1,4-Difluorobenzene (IS2)	1.000	1.000	0.0	96	0.00
38	T	1,1,1-Trichloroethane	0.481	0.452	6.0	94	0.00
39	T	Isopropyl Acetate	0.229	0.216	5.7	93	0.00
40	T	1-Butanol	0.375	0.356	5.1	87	-0.03
41	T	Benzene	1.436	1.295	9.8	95	0.00
42	T	Carbon Tetrachloride	0.412	0.401	2.7	95	0.00
43	T	Cyclohexane	0.511	0.485	5.1	94	-0.01
44	T	tert-Amyl Methyl Ether	0.990	0.930	6.1	93	-0.01
45	T	1,2-Dichloropropane	0.358	0.335	6.4	95	0.00
46	T	Bromodichloromethane	0.442	0.431	2.5	94	0.00
47	T	Trichloroethene	0.360	0.353	1.9	98	0.00
48	T	1,4-Dioxane	0.291	0.286	1.7	96	0.00
49	T	2,2,4-Trimethylpentane (Iso	1.514	1.399	7.6	92	0.00
50	T	Methyl Methacrylate	0.135	0.137	-1.5	98	-0.01
51	T	n-Heptane	0.328	0.306	6.7	98	0.00
52	T	cis-1,3-Dichloropropene	0.537	0.543	-1.1	95	0.00
53	T	4-Methyl-2-pentanone	0.340	0.323	5.0	92	-0.01
54	T	trans-1,3-Dichloropropene	0.467	0.488	-4.5	95	0.00

00906019

Data File: I:\MS16\DATA\2018_06\11\06111802.D
Acq On : 11 Jun 2018 7:40 Operator: WA
Sample : CCV R16061118_25ng
Misc : S31-04201801/S31-06041804 (7/2)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 11 08:12:26 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.33min
Max. RRF Dev : 30% Max. Rel. Area : 200%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
55	T	1,1,2-Trichloroethane	0.330	0.324	1.8	97	0.00
56	IR	Chlorobenzene-d5 (IS3)	1.000	1.000	0.0	89	0.00
57	S	Toluene-d8 (SS2)	2.171	2.173	-0.1	89	0.00
58	T	Toluene	2.893	3.047	-5.3	97	0.00
59	T	2-Hexanone	1.747	1.707	2.3	90	-0.01
60	T	Dibromochloromethane	0.797	0.902	-13.2	97	0.00
61	T	1,2-Dibromoethane	0.805	0.874	-8.6	97	0.00
62	T	n-Butyl Acetate	1.947	1.953	-0.3	91	0.00
63	T	n-Octane	0.634	0.644	-1.6	94	0.00
64	T	Tetrachloroethene	0.803	0.880	-9.6	100	0.00
65	T	Chlorobenzene	1.940	2.032	-4.7	97	0.00
66	T	Ethylbenzene	3.320	3.468	-4.5	95	0.00
67	T	m- & p-Xylenes	2.525	2.558	-1.3	94	0.00
68	T	Bromoform	0.656	0.796	-21.3	98	0.00
69	T	Styrene	2.014	2.214	-9.9	96	0.00
70	T	o-Xylene	2.564	2.634	-2.7	94	0.00
71	T	n-Nonane	1.463	1.439	1.6	90	0.00
72	T	1,1,2,2-Tetrachloroethane	1.319	1.394	-5.7	93	0.00
73	S	Bromofluorobenzene (SS3)	0.689	0.729	-5.8	94	0.00
74	T	Cumene	3.242	3.427	-5.7	95	0.00
75	T	alpha-Pinene	1.707	1.810	-6.0	94	0.00
76	T	n-Propylbenzene	3.891	4.085	-5.0	94	0.00
77	T	3-Ethyltoluene	3.229	3.571	-10.6	93	0.00
78	T	4-Ethyltoluene	2.979	3.035	-1.9	96	0.00
79	T	1,3,5-Trimethylbenzene	2.618	2.768	-5.7	94	0.00
80	T	alpha-Methylstyrene	1.393	1.586	-13.9	98	0.00
81	T	2-Ethyltoluene	3.149	3.249	-3.2	94	0.00
82	T	1,2,4-Trimethylbenzene	2.655	2.741	-3.2	93	0.00
83	T	n-Decane	1.475	1.507	-2.2	91	0.00
84	T	Benzyl Chloride	2.179	2.546	-16.8	93	0.00
85	T	1,3-Dichlorobenzene	1.588	1.701	-7.1	96	0.00
86	T	1,4-Dichlorobenzene	1.636	1.745	-6.7	97	0.00
87	T	sec-Butylbenzene	3.519	3.703	-5.2	94	0.00
88	T	4-Isopropyltoluene (p-Cymen	3.187	3.368	-5.7	94	0.00
89	T	1,2,3-Trimethylbenzene	2.618	2.750	-5.0	92	0.00
90	T	1,2-Dichlorobenzene	1.496	1.595	-6.6	95	-0.01
91	T	d-Limonene	1.089	1.160	-6.5	91	0.00
92	T	1,2-Dibromo-3-Chloropropane	0.544	0.654	-20.2	99	0.00
93	T	n-Undecane	1.435	1.617	-12.7	90	0.00
94	T	1,2,4-Trichlorobenzene	1.130	1.321	-16.9	99	0.00
95	T	Naphthalene	3.810	4.228	-11.0	97	0.00
96	T	n-Dodecane	1.402	1.444	-3.0	83	0.00
97	T	Hexachlorobutadiene	0.735	0.844	-14.8	99	0.00
98	T	Cyclohexanone	1.194	1.176	1.5	90	-0.01
99	T	tert-Butylbenzene	2.525	2.619	-3.7	94	0.00
100	T	n-Butylbenzene	2.903	3.057	-5.3	94	0.00

(#) = Out of Range SPCC s out = 0 CCC s out = 0

Quantitation Report (QT Reviewed)

Data File: I:\MS16\DATA\2018_06\11\06111802.D
Acq On : 11 Jun 2018 7:40 Operator: WA
Sample : CCV R16061118_25ng
Misc : S31-04201801/S31-06041804 (7/2)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 11 08:12:26 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

WA 6/11/18

Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Bromochloromethane (IS1)	11.33	130	334900	12.500	ng		0.00
37) 1,4-Difluorobenzene (IS2)	13.44	114	1432657	12.500	ng		0.00
56) Chlorobenzene-d5 (IS3)	17.72	82	611456	12.500	ng		0.00
System Monitoring Compounds							
33) 1,2-Dichloroethane-d4(...	12.18	65	434477	11.477	ng		-0.01
Spiked Amount 12.500	Range 70 - 130		Recovery = 91.84%				
57) Toluene-d8 (SS2)	15.88	98	1328395	12.510	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 100.08%				
73) Bromofluorobenzene (SS3)	19.09	174	446044	13.232	ng		0.00
Spiked Amount 12.500	Range 70 - 130		Recovery = 105.84%				
Target Compounds							Qvalue
2) Propene	4.04	42	1055567	22.564	ng		98
3) Dichlorodifluoromethan...	4.21	85	1778035	23.877	ng		99
4) Chloromethane	4.51	50	1546799	23.345	ng		99
5) 1,2-Dichloro-1,1,2,2-t...	4.78	135	981421	24.203	ng		100
6) Vinyl Chloride	4.96	62	1522074	23.118	ng		100
7) 1,3-Butadiene	5.24	54	1166612	24.760	ng		99
8) Bromomethane	5.70	94	903167	24.182	ng		100
9) Chloroethane	6.04	64	739914	23.818	ng		100
10) Ethanol	6.45	45	3843937	120.073	ng		100
11) Acetonitrile	6.72	41	2007013	23.906	ng		99
12) Acrolein	6.90	56	655714	24.235	ng		100
13) Acetone	7.12	58	3722388	114.114	ng		97
14) Trichlorofluoromethane	7.35	101	1488509	23.640	ng		100
15) 2-Propanol (Isopropanol)	7.63	45	5191960	50.487	ng		98
16) Acrylonitrile	7.91	53	1431445	25.090	ng		100
17) 1,1-Dichloroethene	8.35	96	978081	25.619	ng		92
18) 2-Methyl-2-Propanol (t...	8.52	59	4994808	49.535	ng		99
19) Methylene Chloride	8.59	84	1026631	24.415	ng		89
20) 3-Chloro-1-propene (Al...	8.74	41	1459668	24.693	ng		91
21) Trichlorotrifluoroethane	8.99	151	881700	25.452	ng		94
22) Carbon Disulfide	8.85	76	3881186	26.084	ng		100
23) trans-1,2-Dichloroethene	9.87	61	1455945	25.168	ng		92
24) 1,1-Dichloroethane	10.13	63	1704475	23.539	ng		100
25) Methyl tert-Butyl Ether	10.21	73	2894733	24.705	ng		96
26) Vinyl Acetate	10.38	86	1156409	135.372	ng	#	70
27) 2-Butanone (ME)	10.62	72	696891	24.691	ng	#	84
28) cis-1,2-Dichloroethene	11.15	61	1377822	24.506	ng		92
29) Diisopropyl Ether	11.43	87	769322	24.430	ng	#	67
30) Ethyl Acetate	11.44	61	774961	51.003	ng		97
31) n-He ane	11.42	57	1539264	24.449	ng		99
32) Chloroform	11.50	83	1654262	24.418	ng		100
34) Tetrahydrofuran (THF)	11.89	72	702501	24.770	ng	#	90
35) Ethyl tert-Butyl Ether	12.02	87	1140279	24.909	ng	#	88
36) 1,2-Dichloroethane	12.30	62	1138084	23.317	ng		100
38) 1,1,1-Trichloroethane	12.57	97	1393970	25.300	ng		98
39) Isopropyl Acetate	12.98	61	1309761	50.000	ng		94
40) 1-Butanol	13.01	56	2158851	50.200	ng		96
41) Benzene	13.05	78	3921855	23.826	ng		100
42) Carbon Tetrachloride	13.20	117	1216458	25.736	ng		99
43) Cyclohe ane	13.33	84	2965735	50.653	ng		90
44) tert-Amyl Methyl Ether	13.67	73	2815990	24.809	ng		97
45) 1,2-Dichloropropane	13.90	63	1023638	24.980	ng		99
46) Bromodichloromethane	14.09	83	1318015	26.027	ng		99
47) Trichloroethene	14.14	130	1073498	26.041	ng		100
48) 1,4-Dio ane	14.11	88	870402	26.118	ng		92
49) 2,2,4-Trimethylpentane...	14.19	57	4247821	24.483	ng		99

Data File: I:\MS16\DATA\2018_06\11\06111802.D
Acq On : 11 Jun 2018 7:40 Operator: WA
Sample : CCV R16061118_25ng
Misc : S31-04201801/S31-06041804 (7/2)
ALS Vial : 2 Sample Multiplier: 1

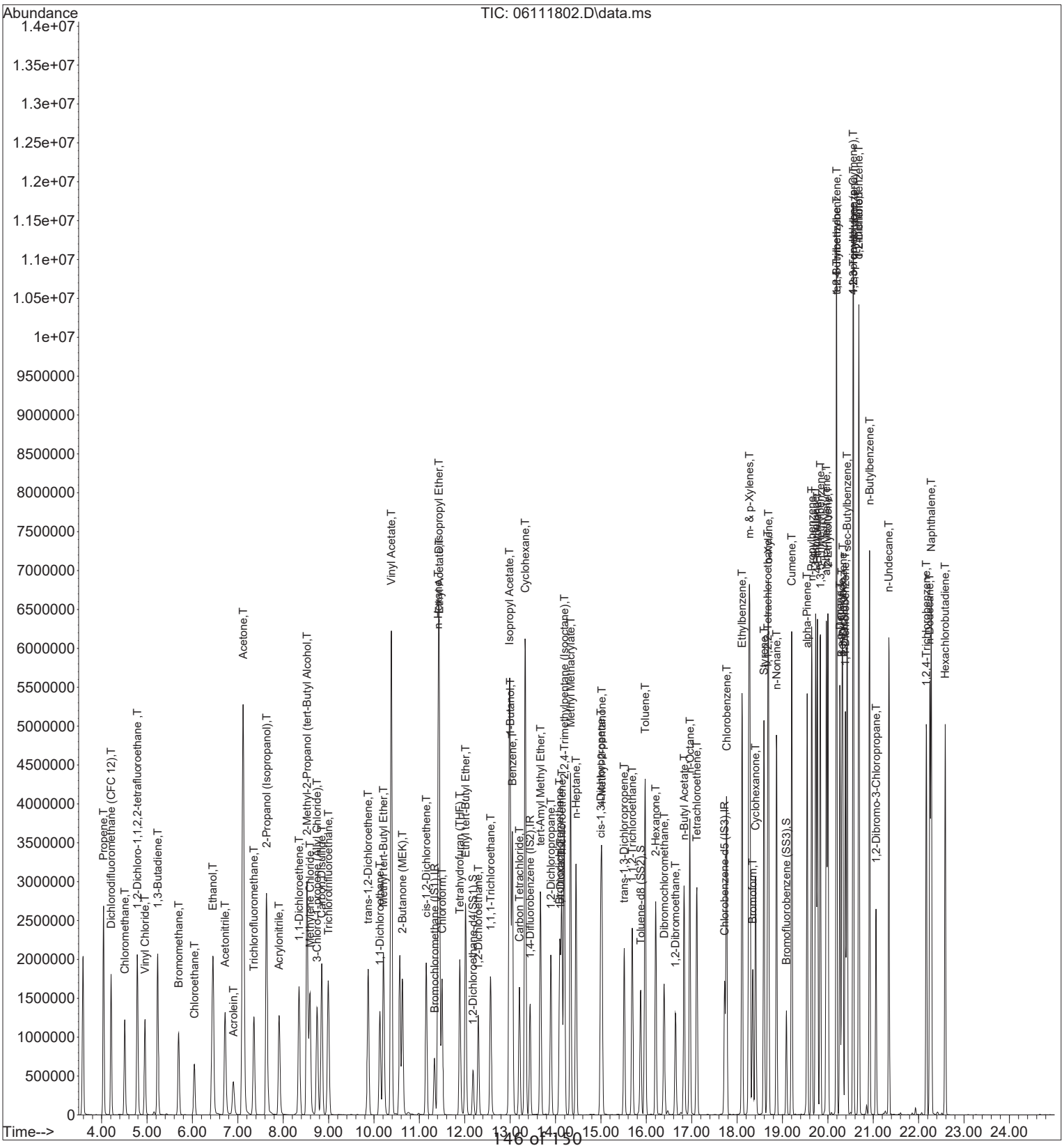
Quant Time: Jun 11 08:12:26 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
50) Methyl Methacrylate	14.33	100	829311	53.614	ng	90
51) n-Heptane	14.45	71	933323	24.801	ng	95
52) cis-1,3-Dichloropropene	15.00	75	1742593	28.328	ng	100
53) 4-Methyl-2-pentanone	15.02	58	980396	25.123	ng	95
54) trans-1,3-Dichloropropene	15.51	75	1490482	27.825	ng	100
55) 1,1,2-Trichloroethane	15.69	97	988579	26.124	ng	97
58) Toluene	15.98	91	3927669	27.758	ng	100
59) 2-He anone	16.21	43	2212983	25.903	ng	97
60) Dibromochloromethane	16.39	129	1170774	30.034	ng	100
61) 1,2-Dibromoethane	16.64	107	1136996	28.874	ng	100
62) n-Butyl Acetate	16.83	43	2550366	26.774	ng	98
63) n-Octane	16.96	57	835248	26.944	ng	91
64) Tetrachloroethene	17.11	166	1143888	29.114	ng	100
65) Chlorobenzene	17.77	112	2649325	27.914	ng	100
66) Ethylbenzene	18.11	91	4461461	27.470	ng	98
67) m- p- ylenes	18.27	91	6642133	53.772	ng	98
68) Bromoform	18.35	173	1035038	32.235	ng	100
69) Styrene	18.59	104	2865096	29.087	ng	99
70) o- ylene	18.69	91	3398217	27.097	ng	98
71) n- onane	18.87	43	1854579	25.919	ng	94
72) 1,1,2,2-Tetrachloroethane	18.68	83	1801409	27.930	ng	100
74) Cumene	19.20	105	4409127	27.799	ng	99
75) alpha-Pinene	19.54	93	2314947	27.725	ng	99
76) n-Propylbenzene	19.64	91	5315425	27.925	ng	98
77) 3-Ethyltoluene	19.73	105	4585962	29.032	ng	94
78) 4-Ethyltoluene	19.77	105	3892844	26.718	ng	96
79) 1,3,5-Trimethylbenzene	19.84	105	3551218	27.726	ng	98
80) alpha-Methylstyrene	19.97	118	2034015	29.852	ng	99
81) 2-Ethyltoluene	20.00	105	4211045	27.342	ng	98
82) 1,2,4-Trimethylbenzene	20.19	105	3522927	27.127	ng	99
83) n-Decane	20.26	57	1951845	27.053	ng	95
84) Benzyl Chloride	20.31	91	3344133	31.370	ng	97
85) 1,3-Dichlorobenzene	20.33	146	2228443	28.689	ng	100
86) 1,4-Dichlorobenzene	20.39	146	2270111	28.364	ng	100
87) sec-Butylbenzene	20.42	105	4777944	27.754	ng	99
88) 4-Isopropyltoluene (p-...	20.56	119	4226035	27.108	ng	99
89) 1,2,3-Trimethylbenzene	20.56	105	3450801	26.944	ng	98
90) 1,2-Dichlorobenzene	20.68	146	2111934	28.865	ng	100
91) d-Limonene	20.68	68	1425349	26.760	ng	94
92) 1,2-Dibromo-3-Chloropr...	21.06	157	840600	31.592	ng	92
93) n-Undecane	21.34	57	2082027	29.651	ng	95
94) 1,2,4-Trichlorobenzene	22.17	180	1772424	32.074	ng	100
95) aphthalene	22.28	128	5460447	29.302	ng	100
96) n-Dodecane	22.24	57	1864856	27.200	ng	95
97) He achlorobutadiene	22.58	225	1091406	30.354	ng	100
98) Cyclohe anone	18.41	55	1494226	25.588	ng	95
99) tert-Butylbenzene	20.19	119	3362596	27.222	ng	98
100) n-Butylbenzene	20.92	91	3940918	27.751	ng	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data File: I:\MS16\DATA\2018_06\11\06111802.D
Acq On : 11 Jun 2018 7:40 Operator: WA
Sample : CCV R16061118_25ng
Misc : S31-04201801/S31-06041804 (7/2)
ALS Vial : 2 Sample Multiplier: 1

Quant Time: Jun 11 08:12:26 2018
Quant Method : I:\MS16\METHODS\R16051818.M
Quant Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
QLast Update : Fri May 18 12:13:28 2018
Response via : Initial Calibration
DataAcq Meth:TO15.M

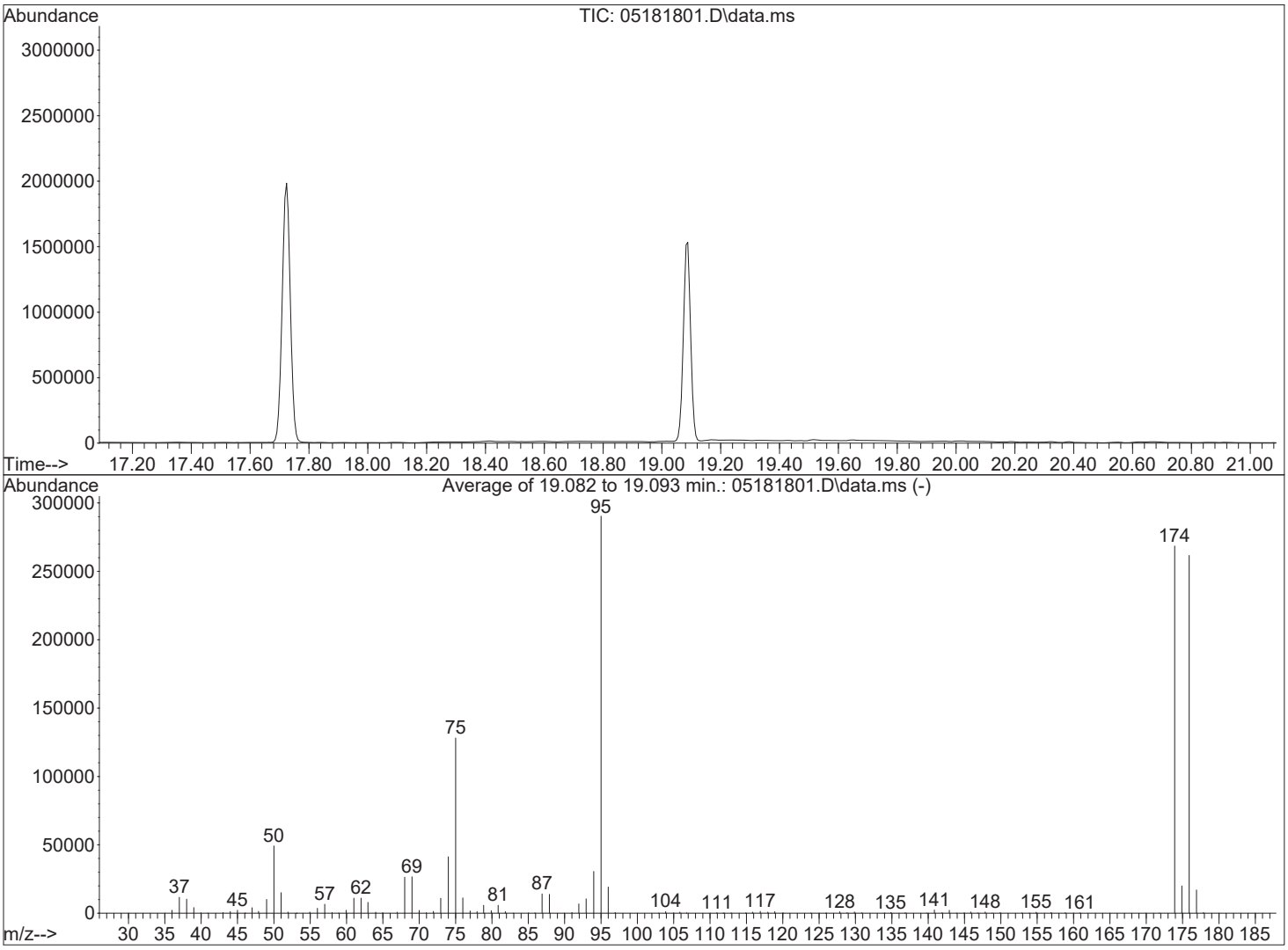


00906023

Data Path : I:\MS16\DATA\2018_05\18\
Data File : 05181801.D
Acq On : 18 May 2018 00:24
Operator : LH
Sample : 12.5ng TO-15 BFB
Misc : S31-04201801
ALS Vial : 2 Sample Multiplier: 1

Integration File: LSCI T.P

Method : I:\MS16\METHODS\R16051818.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Fri Apr 13 10:32:15 2018



AutoFind: Scans 2836, 2837, 2838 Background Corrected with Scan 2828

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	16.9	49194	PASS
75	95	30	66	44.1	128147	PASS
95	95	100	100	100.0	290368	PASS
96	95	5	9	6.6	19122	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	120	92.5	268587	PASS
175	174	4	9	7.4	19968	PASS
176	174	93	101	97.4	261696	PASS
177	176	5	9	6.5	16970	PASS

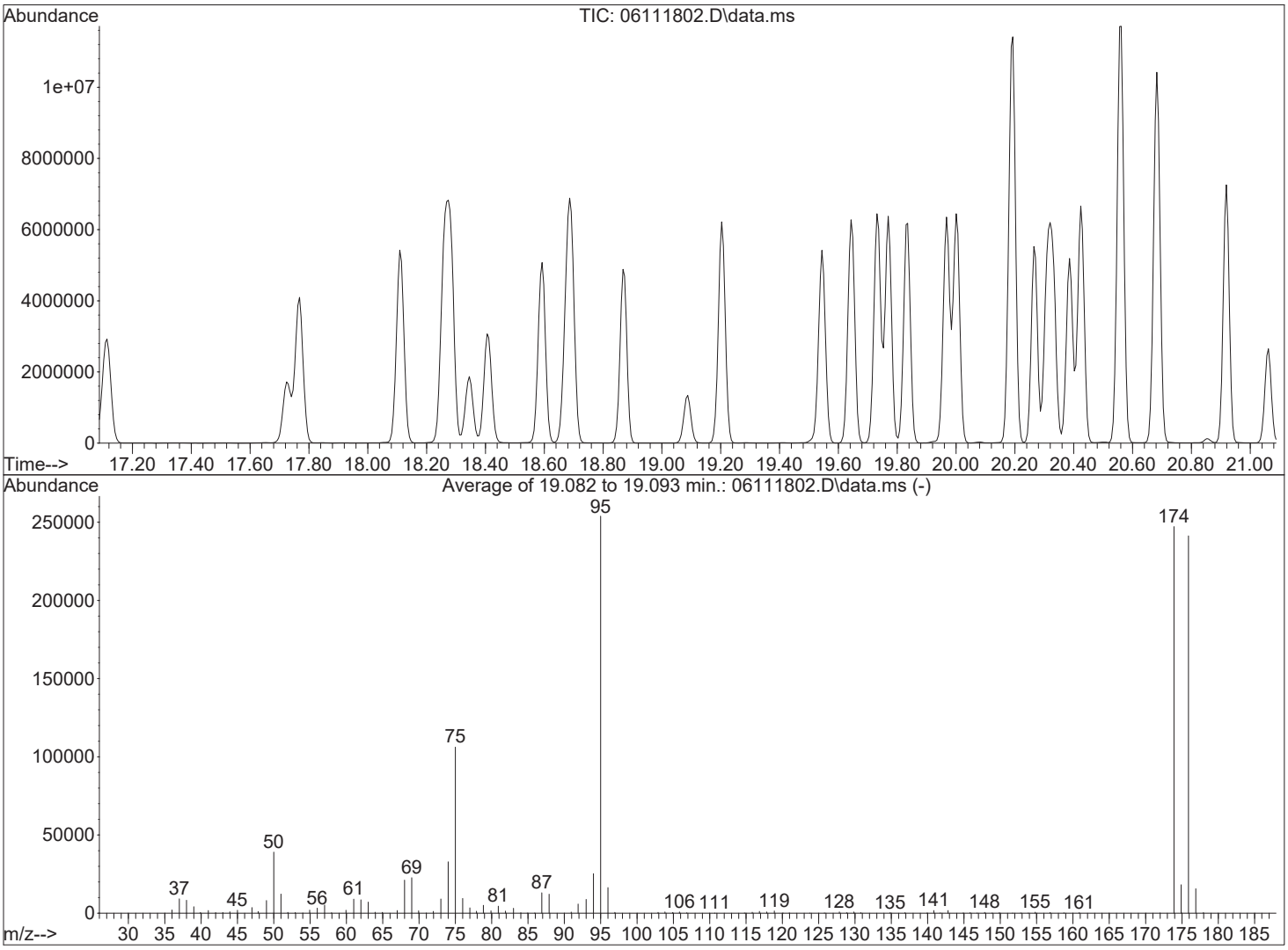
LH 5/18/18

00906024

Data Path : I:\MS16\DATA\2018_06\11\
Data File : 06111802.D
Acq On : 11 Jun 2018 7:40
Operator : WA
Sample : CCV R16061118_25ng
Misc : S31-04201801/S31-06041804 (7/2)
ALS Vial : 2 Sample Multiplier: 1

Integration File: LSCINT.P

Method : I:\MS16\METHODS\R16051818.M
Title : EPA TO-15 per SOP VOA-TO15 (CASS TO-15/GC-MS)
Last Update : Fri May 18 12:13:28 2018



AutoFind: Scans 2836, 2837, 2838 Background Corrected with Scan 2827

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	15.4	39035	PASS
75	95	30	66	41.8	106224	PASS
95	95	100	100	100.0	253867	PASS
96	95	5	9	6.4	16360	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	120	97.4	247253	PASS
175	174	4	9	7.3	18155	PASS
176	174	93	101	97.6	241259	PASS
177	176	5	9	6.5	15698	PASS

WA 6/11/18

Injection Log

Directory: I:\MS16\DATA\2018_05\18\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment
1	5/18/18 0:24	05181801.D	12.5ng TO-15 BFB	S31-04201801	LH	2	passed
2	5/18/18 0:57	05181802.D	0.1ng TO-15 ICAL STD	S31-04201801/S31-05161805 (6/14)	LH	5	
3	5/18/18 1:30	05181803.D	0.2ng TO-15 ICAL STD	S31-04201801/S31-05161805 (6/14)	LH	5	
4	5/18/18 2:04	05181804.D	0.5ng TO-15 ICAL STD	S31-04201801/S31-05161805 (6/14)	LH	5	
5	5/18/18 2:37	05181805.D	1.0ng TO-15 ICAL STD	S31-04201801/S31-05161803 (6/14)	LH	6	
6	5/18/18 3:10	05181806.D	5.0ng TO-15 ICAL STD	S31-04201801/S31-05161803 (6/14)	LH	6	
7	5/18/18 3:43	05181807.D	25ng TO-15 ICAL STD	S31-04201801/S31-05161801 (6/14)	LH	2	R16051818.M
8	5/18/18 4:16	05181808.D	50ng TO-15 ICAL STD	S31-04201801/S31-05161801 (6/14)	LH	2	
9	5/18/18 4:49	05181809.D	100ng TO-15 ICAL STD	S31-04201801/S31-05161801 (6/14)	LH	2	
10	5/18/18 5:22	05181810.D	25ng TO-15 ICV STD	S31-04201801/S31-05081803 (6/6)	LH	2	passed
	ICAL R16051818.M passed for all compounds 0.1ng-100ng, except: propene, carbon disulfide, hexane, toluene 0.2ng-100ng,						
	benzyl chloride 1.0ng-100ng, dodecane 0.5ng-100ng						
					LH 5/18/18		
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Injection Log

00906026

Directory: I:\MS16\DATA\2018_06\11\

	Date/Time	File Name	Sample ID	Misc Info	Operator	Vial	Comment
1	6/11/18 7:06	06111801.D	CCV C16061118_25ng	S31-04201801/S31-05221804 (6/20)	WA	16	*Passes*
2	6/11/18 7:40	06111802.D	CCV R16061118_25ng	S31-04201801/S31-06041804 (7/2)	WA	2	*Passes*
3	6/11/18 8:13	06111803.D	CCV DEC16061118_5ng	S31-04201801/S31-05141803	WA	15	*Passes*
4	6/11/18 8:46	06111804.D	MB R16061118_1000mL	S31-04201801/AC00442	WA	2	*Passes*
5	6/11/18 9:19	06111805.D	P1802962-002 (0.35mL)	S31-04201801	WA	1	
6	6/11/18 9:53	06111806.D	P1802962-003 (100mL)	S31-04201801	WA	7	
7	6/11/18 10:26	06111807.D	P1802962-001 (0.15mL)	S31-04201801	WA	1	
8	6/11/18 10:59	06111808.D	P1802962-002 (1.5mL)	S31-04201801	WA	1	
9	6/11/18 11:33	06111809.D	P1802962-002dil (0.5mL)	S31-04201801	WA	1	
10	6/11/18 12:06	06111810.D	BCEE&BCIE ICV_2ng	S31-04201801/S31-06081801	WA	14	
11	6/11/18 12:39	06111811.D	LCS R16061118_25ng	S31-04201801/S31-05311801 (6/29)	WA	2	*Passes*
12	6/11/18 13:13	06111812.D	J1804068-001 (500mL)	S31-04201801	WA	4	
13	6/11/18 14:04	06111813.D	P1802915-001 (1.25mL)	S31-04201801	WA	1	
14	6/11/18 14:37	06111814.D	P1802915-001 (3.0mL)	S31-04201801	WA	1	
15	6/11/18 15:10	06111815.D	P1802915-002 (3.0mL)	S31-04201801	WA	1	
16	6/11/18 16:10	06111816.D	P1802915-003 (1000mL)	S31-04201801	WA	3	
17	6/11/18 16:43	06111817.D	P1802915-004 (1000mL)	S31-04201801	WA	4	
18	6/11/18 17:17	06111818.D	P1802915-004dup (1000mL)	S31-04201801	WA	4	*Passes(*)*
19	6/11/18 17:50	06111819.D	LCSD R16061118_25ng	S31-04201801/S31-05311801 (6/29)	WA	2	*Passes*
20	6/11/18 18:23	06111820.D	P1802971-001 (15mL)	S31-04201801	WA	9	
21	6/11/18 18:56	06111821.D	P1802971-002 (15mL)	S31-04201801	WA	10	
	Sample dup: RPD out for propene (LCS/LCSD passes)						

6/12/18

Subject:	**Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**
Location of Meeting:	**Via Conference Call-In 267-930-4000 with code 041-819-550**
Date of Meeting:	**20 September 2018 – 10:00 AM Central Daylight Time (CDT)**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
EPA:	Rich Mayer (RM) and Dorelle Harrison (DH)
TCEQ:	April Palmie (AP)
USGS:	Kent Becher (KB)
USFWS:	Paul Bruckwicki (PB)
USACE:	Aaron Williams (AW)
Bhate:	Kim Nemmers (KN)
APTIM:	Praveen Srivastav (PS)

Action Items

Army

- **LHAAP Enforceable Schedule**:
  - RMZ stated that enforceable schedule had been sent out. RMZ determined that the Federal Facility Agreement (FFA) didn't state anything specific about needing concurrence letter for the schedule. RMZ stated that the FFA requires comments to be provided in writing. RM and AP stated that they would send an email. RMZ indicated that an email will work.

Defense Environmental Restoration Program (DERP) Performance Based Remediation (PBR) Update

- LHAAP-16 Groundwater Extraction: KN explained that the compressor for LHAAP-16 extraction had stopped working at the end of June 2018 and that no extraction had occurred in July or August 2018. KN stated that the system operated in September 2018 but continued to have problems resulting in the purchase of a new compressor on Monday (17 September 2018). AP asked if groundwater sampling was planned prior to completion of injections. PS stated that 39 monitoring wells were planned for sampling during the first week in October 2018. RM asked if Scott Beesinger would be completing this sampling. PS stated that a team of three samplers will be used to complete the sampling event. PS stated that the 39 wells include the two new wells planned for installation east of the Harrison Bayou, which is an area that was previously inaccessible due to the wet conditions. PS explained that the area is dryer now and a path has been cleared. PS stated that mobilization for the well installation and injections is planned for 24 September 2018. A total of 11 wells including 10 shallow wells and one intermediate monitoring well is being installed. PS explained that a track-mounted rig will be used to overcome any potential field maneuvering or wet ground issues. Well installation is planned from 24 September until 5 October 2018. RM asked where the driller was coming from. PS stated that ETTL out of Tyler, Texas is being used. RMZ then clarified that the baseline groundwater sampling is being completed after the well installations. PS concurred and stated that both the baseline groundwater sampling event and surface water from the Harrison Bayou will be collected for analysis. PS also stated that the creek will be monitored for potential release. AP circled back to the fact that she asked about groundwater sampling so that potential plume migration due to the two months' pause in extraction (and thus plume containment) can be assessed. PS clarified

that there is no time between groundwater sampling and injections such that adjustments to the injection locations cannot be planned. PS also stated that groundwater samples will be collected one quarter after the injection. PS also invited everyone to visit and to give notice to either himself or Bill Foss. RM stated that the EPA will likely come out to visit.

- PS then presented that the Underground Injection Control approval is based upon the use of diammonium phosphate (DAP) as a nutrient. However, the same vendor that was to provide the DAP suggested a different formulation that will include the DAP plus other nutrients. PS suggested that he could provide a letter documenting this change. However, AP stated that documentation in the Remedial Action Completion Report will be sufficient.
- RMZ noted that people will want to visit Site LHAAP-16 in conjunction with the upcoming onsite meeting at LHAAP in October 2018. PS stated that he will give schedule updates.

KN asked everyone to refer to the Document and Issues Tracking Table dated 20 September 2018.

- **Task 1** (Project Management) -
  - KN stated that the meeting minutes are up to date and that the Restoration Advisory Board (RAB) meeting is schedule for 18 October 2018. KN indicated that the agenda and notice for the RAB would be sent out later in the day.
  - KN stated that TCEQ had approved responses on the Standard Operating Procedures (SOP) A19. KN asked RM if the EPA needed anything further regarding SOP A19. RM stated that he would follow-up with an email.
- **Task 2** (LHAAP-02 Annual Groundwater Monitoring Report) – KN stated that the technical memorandum would then be placed into the administrative record (AR).
- **Task 3** (LHAAP-03 ROD and Explanation of Significant Difference [ESD]) – PS stated that both the ROD and ESD are final and will be sent out at the same time. The public notice is being prepared and will be available in a couple of weeks. PS then explained that additional investigation is being planned for LHAAP-03 and that the results will be documented within the Remedial Design (RD)/Remedial Action Work Plan (RAWP). PS stated that the date for the RD/RAWP is in the enforceable schedule.
- **Task 4** (LHAAP-04 RD/RAWP) –PS stated that a technical memorandum is currently being prepared for plume delineation and that the date for delivery is tentatively 24 October 2018.
- **Task 5** (LHAAP-12 Annual Remedial Action – Operation [RA-O] Report) – PS stated that the draft final RA-O Report was sent to the Regulators on 14 September 2018.
- **Task 6** (LHAAP-16 RAWP) – PS stated RAWP is being placed into the AR.
- **Task 7** (LHAAP-17 Pre-Design Investigation [PDI] Report) - PS stated that the Draft Final PDI Report was issued along with the response to comments (RTCs) on 14 September 2018.
- **Task 9** (LHAAP-37) – PS stated that four quarter sampling events have been completed so the Year 1 Remedial Action Operations (RA-O) Report will be prepared. The most recent analytical data will be available for the October 2018 MMM.
- **Task 10** (LHAAP-46) Year 4 RA-O Report – PS stated that two rounds of semi-annual groundwater sampling has been completed. The most recent analytical data from August 2018 will be provided at the October 2018 MMM. PS stated that the Annual RA-O Report is being prepared.
- **Task 11** (LHAAP-50 RA-O Report) –. The Year 4 RA-O Report is in internal review and should be released for Regulatory review by the end of September 2018.
- **Task 12** (LHAAP-58) – KN stated that Year 4 RA-O Report is listed as being issued in early October 2018 but should be ready for release in the next few days. Also, the quarterly

performance sampling event for the western plume is planned for 26 and 27 of September currently.

- **Task 13** (LHAAP-67) – PS stated that the Year 4 RA-O Report is under internal review.
- **Task 16** (GWTP) **–** KN stated that the 2nd Quarter 2018 GWTP was in internal review and would likely be released towards the end of October 2018 for regulatory review. AP asked if KN could ensure that previous comments could filter into the subsequent GWTP Reports. KN stated that she understood and would make sure this occurred. KN also stated that the change pages due to the 1st Quarter GWTP Report comments would be provided with the 2nd Quarter Report. AP asked for a revised PDF of the 1st Quarter 2018 Report either on the compact disc (CD) with the 2nd Quarter Report or on a separate CD.
- KN also explained that the validated data included the GWTP samples from July 2018 which had samples before and after the repairs to the fluidized bed reactor (FBR) were completed. KN noted that the addition of carbon to the FBR appeared to provide benefit based upon the perchlorate results prior to the repairs. However, KN stated that no perchlorate has been detected in effluent following the FBR repairs but that the effluent is being processed by the ion exchange vessels regardless if the water is discharged to the INF Pond per the protocol.
- **Administrative Record (AR) –** PS stated that the update through May 31, 2018 is complete and the binders will be delivered next week. PS stated that the AR for June 1, 2018 through August 31, 2018 is in process.

Update on other DERP Sites

- **Site LHAAP 18/24** – AW explained that the Proposed Plan (PP) for LHAAP-18/24 is in internal review. RMZ stated that she will have to issue a letter requesting an extension to the PP if the document gets delayed.
- **Site LHAAP-29** – AW explained that the PP for LHAAP-29 is in regulatory review.
- **Site LHAAP-47** –AW stated that the Phase 1 sampling was completed and the data is provided in the validated data package that AW provided via email. Phase 2 includes the new monitoring wells installed and sampled as requested by the Army and Regulators. The monitoring wells are being surveyed today and tomorrow and then the data can be summarized in the PSI Report, which should be provided in January 2018. The data will be summarized in a report. AW explained that the only surprise was the trichloroethene (TCE) hit of 120,000 micrograms per liter (µg/L) in monitoring well 47WW25R. AW stated that previously the highest TCE detection was 25, 000 µg/L. AP stated that she had asked RMZ for the completion log or the drilling log. AW stated that he did not have it on hand but can get it and it will be included in the PSI Report. RMZ recommended looking at the cross section previously provided for the two or three nearby shallow borings in this area that are all non-detect. RMZ stated that the monitoring well is in the next sand layer per the cross-section and considered shallow-intermediate. AP stated that the cross-section is in an email from May 2018 from AW. AP stated that she is wondering if some of the contamination observed is from the clay layer more than from the sand layer. Both AW and RMZ agreed that nothing is being detected to the west or the south per soil borings SB01 and SB02, as presented in the July 2018 RAB slides. RMZ stated that there is a temporary well to the east that was installed by Shaw also. RMZ indicated that there is a fair amount of data in this area. RMZ stated that this is within the 10-percent rule. RM stated that nothing would surprise him at site LHAAP-47 and that little data has been collected over the past 10 years. RMZ stated that she did not think this would stop the ROD process but that additional work may be required for the RD. AW stated that LHSMW-43R had a perchlorate hit of 59 µg/L so it didn't result in a plume boundary delineation but the result is considered low even

though it can't be used to bound the perchlorate plume. RM stated that LHAAP-47 is a unique site with a variance of hits. RMZ stated that she felt the cross sections show reasons why this may be. KB asked what the typical TCE concentration at 47WW34 has been. KB stated that the monitoring well is on the east side Marshall Avenue was not that elevated if he remembered correct and that he didn't remember the TCE detection being that high. KB concurred that results at the site were definitely sporadic. AW stated that the report will likely be provided to the Army in November 2018 and then to the Regulators in January 2019. RMZ stated that all of the most recent detections, even if they are from years ago, will be provided on one map. AW stated that surface water sampling still needs to be completed but may need to wait until the winter months (e.g January or February 2019). The PSI Report will continue to be prepared without the surface water data per RMZ.

  - PB asked about the drums located east of Karnack Avenue. AW stated that PS was notified and is taking care of the drums. PS stated that APTIM has samples and found the email approval from the Army for disposal. PS stated that they will place the soils which are non- hazardous and then get rid of the drums.

- **Five Year Review (FYR)** – AW stated that the Army is awaiting their draft copy of the FYR, which is currently behind schedule per RMZ. RMZ explained that the installation has committed to a four day review period. AP stated that she is okay if the FYR is delayed. RM also indicated he is not worried if the FYR is late. RMZ stated that the FYR has to be signed by May 2019.
- **USFWS Update.** PB asked about Plant 2 Support buildings by Jacksonville Road, along the assembly line, with regards to verifying what is inside. PB things that they look like stand pipes for fueling. RM stated that he and DH had tried to open the stand pipes but could not open them. RMZ stated that this be included as an action item.
- The Environmental Condition of Property VII is being prepared and RMZ asked who to send the document to. PB stated that RMZ should send two copies to PB and he will get the copies to the right people.

Schedule Next Managers' Meeting

The next MMM will be held on 18 October 2018 via at 10:00 am CDT at the LHAAP site trailer.

ACRONYM LIST

µg/L	micrograms per liter
AP	April Palmie
AR	Administrative Record
AW	Aaron Williams
BF	Bill Foss
Bhate	Bhate Environmental Associates, Inc.
BRAC	Base Realignment and Closure
CD	Compact Disc
CDT	Central Daylight Time
DAP	Diammonium phosphate
DERP	Defense Environmental Restoration Program
DPT	Direct push technology
e.g.	Example given
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FBR	Fluidized bed reactor

FFA	Federal Facility Agreement
FYR	Five Year Review
GWTP	Ground Water Treatment Plant
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
MMM	Monthly Managers' Meeting
PB	Paul Bruckwicki
PBR	Performance-Based Remediation
PDI	Pre-Design Investigation
PP	Proposed Plan
PS	Praveen Srivastav
PSI	Post-Screening Investigation
RACR	Remedial Action Completion Report
RA	Remedial Action
RAB	Restoration Advisory Board
RA-O	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
RM	Rich Mayer
RMZ	Rose M. Zeiler
RTC	Response to Comments
SOP	standard operating procedure
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

LHAAP Data Validated

July 2018

GWTP Effluent	*Weekly Perchlorate Sampling – July 2018* Perchlorate (6850)
GWTP Effluent	*Weekly, Bi-Weekly, and Monthly Sampling – July 2018* Ammonia (350.3) Ortho-Phosphate (365.3) Organic Carbon (415.1) VOC (8260C) Metals (6020A) Hexavalent Chromium (7196A) 1,4-Dioxane (8270D-SIM) Anions (9056)
GWTP Influent	*Monthly Sampling – July 2018* Metals (6020A) Perchlorate (6850) Hexavalent Chromium (7196A)

August 2018

LHAAP Surface Water	*Quarterly Perchlorate Sampling - August 2018* Perchlorate (6850)

GWTP Weekly/Effluent Perchlorate Sampling - July 2018

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_070618 7/6/18	LH18/24-SP650_070618 7/6/18	LH18/24-SP650_072618 7/26/18
Location Description			Collected from a spigot on the discharge of effluent TK-650.		
			Monthly EFF before IX	Weekly before IX	Weekly before IX
Perchlorate (6850)					
Perchlorate	µg/L	589	< 2.0 U	**4.9**	< 2.0 U

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected.

*samples were not collected during the week of 7/8 and 7/15 as the GWTP was shut down for FBR maintenance

IX - ion exchange

GWTP Weekly Sampling - July 2018

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_070618 7/6/18	LH18/24-SP650_072618 7/26/18
Location Description			**GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled**	
Ammonia as N (350.3)				
Ammonia as N	mg/L	NV	**30**	**10**
Ortho-Phosphate (365.3)				
Ortho-Phosphate	mg/L	NV	**5.28**	**2.88**
Organic Carbon (415.1)				
Total Organic Carbon (TOC)	mg/L	NV	**12.7**	**26.9**

mg/L - milligrams per liter

NV - No Value

GWTP Bi-Weekly Sampling - July 2018

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_072618 7/26/18
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Biweekly.**
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 0.5 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**1.9**
Vinyl chloride	µg/L	72	< 0.5 U
Anions (9056)			
Chloride	mg/L	NV	**659**
Sulfate	mg/L	NV	**25.9**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected.

NV - No Value

GWTP Monthly Effluent Sampling - July 2018

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_070618 7/6/18
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Quarterly.**
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	**0.77 J**
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 1.0 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**2.5**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Barium	mg/L	2	**0.0943**
Lead	mg/L	0.0046	< 0.00100 U
Selenium	mg/L	0.012	< 0.00200 U
Silver	mg/L	0.003	< 0.00100 U
Hexavalent Chromium (7196A)			
Hexavalent Chromium	mg/L	0.1244	< 0.0100 U
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**1.4**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected.

J - Estimated value

GWTP Monthly Influent Sampling - July 2018

Location ID: Sample Date:	Units	LH18/24-SP140_070618 7/6/18
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.**
Metals (6020A)		
Selenium	mg/L	< 0.00200 U
Silver	mg/L	< 0.00100 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**15,000**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected.

LHAAP-Quarterly Surface Water Sampling - August 2018

Location ID: Sample Date:	Units	PCL	HBW7_081318 8/08/18	HBW7_081318_a 8/08/18	HBW10_081318 8/08/18	HBW1_081318 8/08/18	GPW1_081318 8/08/18	GPW3_081318 8/08/18
Perchlorate (6850)			Harrison Bayou				Goose Prairie Creek	
Perchlorate	µg/L	17	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

µg/L - micrograms per liter

U - Undetected: The analyte was analyzed for, but not detected.

Comprehensive Land Use Control (LUC) Management Plan

Former Longhorn Army Ammunition Plant (LHAAP)
Karnack, Texas

October 15, 2018

COMPREHENSIVE LUC & NOTIFICATION MANAGEMENT PLAN REVISION LOG

Fiscal Year	Date	Reason for Revision	Approved*		
			Army	EPA	TCEQ
Original	9-13-07	N/A			
2008		None Required			
2009		None Required			
2010		None Required			
2011		None Required			
2012	2-4-13	Add LHAAP-06,-07,-08,-35/36,-35B (37)/67, -46, -49, -50,-51,-55,-35A (58),-59,-60,-66,-68, Pistol Range, LHAAP-001-R-01 and LHAAP-003-R-01			
2013	10-1-13	None Required			
2014	12-17-14	Add LHAAP-02, -03, -19, -56, -65, -68, -69 and Notices for LHAAP-46, and -67			
2015	9-14-15	Add Notices for LHAAP-35B(37), -50 and -35A(58) (LHAAP-02, -03, -56, -59, -60, -65, -68, and -69 are contained within the LHAAP-58 LUC boundary)			
2016	10-20-16	None Required			
2017	10-30-17	Add LUCs for LHAAP-16			

Fiscal Year	Date	Reason for Revision	Approved*		
			Army	EPA	TCEQ
2018	9-5-18	Add LUCs and Notices for LHAAP-001-R-01 and LHAAP-003-R-01	ZEILER.ROSE.M.1230811551	RICHARD MAYER	April Palmie Digitally signed by April Palmie Date: 2018.10.15 09:21:03 -05'00'

* Approval by all three parties required during the first quarter of each fiscal year.

TABLE OF CONTENTS

Revision Log……..…….ii
LUC & Notification Management Plan….....1

List of Sites

LHAAP-02 Vacuum Truck Overnight Parking (LHAAP-02)
Nonresidential Land Use site included within the groundwater use restriction
LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-03 Former Waste Collection Pad Building 722-P Paint Shop (LHAAP-03)
Nonresidential Land Use site included within the groundwater use restriction
LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-06 Building 54F Solvent (LHAAP-06)
Notice of Nonresidential Land Use for LHAAP-06 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-07 Building 50G Drum Processing (LHAAP-07)
Notice of Nonresidential Land Use for LHAAP-07 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-08 Former Sewage Treatment Plant (LHAAP-08)
Notice of Nonresidential Land Use for LHAAP-08 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-12 Landfill 12 (LHAAP-12)
12-1 LUC Inspection and Maintenance Log Filed in Public Records of Harrison County, Texas (including survey plat)
12-2 LUCs from Final Remedial Design Addendum
12-3 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-12
12-4 Land Use Control Compliance Inspection Form

LHAAP-16 Old Landfill (LHAAP-16)
16-1 Draft LUC Inspection and Maintenance Log
16-2 LUCs from Draft-Final Remedial Design
16-3 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-16 Filed in Public Records of Harrison County, Texas (including survey plat) (Pending)
16-4 Land Use Control Compliance Inspection Form
LHAAP-19 Construction Materials Landfill (LHAAP-19)
Notice of Land Use Controls and Nonresidential Land Use at LHAAP-19, Filed in the Public Records of Harrison County, Texas (including survey plat)
LHAAP-35/36 Sumps and Waste Rack Sumps (LHAAP-35/36)
Notice of Nonresidential Land Use at Sumps/Waste Rack Sump locations (LHAAP-35/36) Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-37 Chemical Laboratory (LHAAP-35B (37))
37-1 LUCs from Final Remedial Design
37-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-35B (37) Filed in Public Records of Harrison County, Texas (including survey plat)
37-3 Land Use Control Compliance Inspection Form
LHAAP-46 Plant 2 Area (LHAAP-46)
46-1 LUCs from Final Remedial Design
46-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-46 Filed in Public Records of Harrison County, Texas (including survey plat)
46-3 Land Use Control Compliance Inspection Form
LHAAP-49 Former Acid Storage Area (LHAAP-49)
Notice of Nonresidential Land Use for LHAAP-49 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-50 Sump Water Storage Tank (LHAAP-50)
50-1 LUCs from Final Remedial Design

50-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-50 Filed in Public Records of Harrison County, Texas (including survey plat)
50-3 Land Use Control Compliance Inspection Form
LHAAP-51 Building 60-B Photo Lab (LHAAP-51)
Notice of Nonresidential Land Use at LHAAP-51 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-55 Septic Tanks (LHAAP-55)
Notice of Nonresidential Land Use at Septic Tank locations Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-56 Grease Rack (LHAAP-56)
Nonresidential Land Use site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-58 Shops Area (LHAAP-35A (58))
58-1 LUCs from Final Remedial Design
58-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-35A (58) Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-59 Former Pesticide Storage Building 725 (LHAAP-59)
Notice of Nonresidential Land Use for LHAAP-59 Filed in Public Records of Harrison County, Texas (including survey plat)
Site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-60 Former Storage Building 411 & 714 (LHAAP-60)
Notice of Nonresidential Land Use at LHAAP-60 Filed in Public Records of Harrison County, Texas (including survey plat)
Building 714 included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-64 Transformer Storage (LHAAP-64)
Notice of Nonresidential Land Use at LHAAP-64 Filed in Public Records of Harrison County, Texas (including survey plat)

LHAAP-65 Flammable Materials Storehouse Building 209 (LHAAP-65)
Nonresidential Land Use site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-66 405-L Transformer Yard (LHAAP-66)
Notice of Nonresidential Land Use at LHAAP-66 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-67 Aboveground Storage Tank Farm (LHAAP-67)
67-1 LUCs from Final Remedial Design
67-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-67 Filed in Public Records of Harrison County, Texas (including survey plat)
67-3 Land Use Control Compliance Inspection Form
LHAAP-68 Transformer Storage (LHAAP-68)
Notice of Nonresidential Land Use at LHAAP-68 Filed in Public Records of Harrison County, Texas (including survey plat)
Site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-69 Service Station Underground Storage Tank (LHAAP-69)
Nonresidential Land Use site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
Pistol Range
Notice of Nonresidential Land Use at Pistol Range Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-001-R-01/LHAAP-003-R-01 South Test Area (LHAAP-001-R-01) and Ground Signal Test Area (LHAAP-003-R-01)
Checklist
MMRP-2 LUCs from Final Remedial Design
MMRP-3 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-001-R-01 and LHAAP-003-R-01 Filed in Public Records of Harrison County, Texas (including survey plat)

MMRP-4 Land Use Control Compliance Inspection Form

Table 1 Summary of Land Use Controls and Notifications

Figure 1 Sites with Land Use Controls

Figure 2 Sites with Restricted Uses Notifications

List of Appendices

Appendix A GSA Transfer Letters

Comprehensive Land Use Control (LUC) & Notification Management Plan, Former Longhorn Army Ammunition Plant (LHAAP), Texas

The purpose of this management plan is to ensure that all site-specific LUCs are compiled into one comprehensive location for both pre-transfer and post-transfer use. Additionally, all nonresidential use notifications required under 30 TAC §335.560(b) are included. This management plan shall be accessible to the property owner, regulators, local government, and the public and will accompany LHAAP's Administrative Record. This plan will be updated as LUC and notification requirements for additional environmental sites are identified; the revision number, date, reason for revision, and author will be documented in the Revision Log. As a document control measure, an annual approval by the three FFA parties, Army, EPA and TCEQ within the first quarter of the fiscal year will confirm the effective date. This approval is required whether or not a revision took place.

Land Use Controls

Land use controls (LUCs) include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property. LUCs may be a component of an interim or final remedy selected under CERCLA and used to protect human health, the environment, and/or the integrity of an engineered remedy. The LUC performance objectives are established in the site-specific Record of Decision (ROD). The specific LUCs and implementation details are outlined in the corresponding site-specific Remedial Design (RD), a primary document of the Federal Facilities Agreement.

The land use control area is depicted on Figure 1, the site-specific performance objectives and LUCs are presented in Table 1, and the site-specific section contains a LUC Inspection and Maintenance Log, a copy of an approved LUC Remedial Design, Notice of Land Use Controls (including a survey plat) filed in Harrison County public records, and LUC compliance inspection form. Upon USEPA and TCEQ approval of each LUC RD, the LUC requirements will be effective immediately and this management plan will be updated. Once property is transferred, the plan will be amended to include a copy of the transfer letter describing specific LUC obligations assigned to the transferee.

LUCs will remain in place until applicable or relevant and appropriate requirements (ARARs) as established in accordance with the NCP (40 CFR 300) are met; or in the case of a landfill remedy it will remain in place for perpetuity unless otherwise removed by the U.S. Army per agreement with the USEPA and TCEQ. The continued effectiveness of the selected remedy, including LUCs, will be evaluated with the CERCLA 121(c) five-year review process.

Notifications

The future anticipated use of LHAAP is industrial/refuge and is, therefore, consistent with a nonresidential/industrial reuse under the Risk Reduction Rules. As required by 30 TAC §335.560(b) and in accordance with 30 TAC §335.566, a notification must be filed in the Harrison County records stating that the land is considered suitable for future non-residential use. Limited monitoring will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of the sites is consistent with the non-residential use. The non-residential use notification will remain in place until it is demonstrated that the levels of COCs in soil and groundwater allow for unlimited use and unrestricted exposure.

Table 1 –Summary of Land Use Controls and Notifications

Site Name	**Transfer Documents**		**Decision Documents**		**Land Use Controls**					**Notifications**
IRP MMRP* LHAAP-	GSA Transfer To USFWS	ECP/ ECOP	ROD	DD	Groundwater Use Restriction	Nonresidential Land Use Restriction	Intrusive Activities Prohibition	MEC Warning	Landfill Cap Maintenance	Nonresidential Use Notification
2					**					**
3					**					**
6				2008						√
7				2008						√
8	2015	VI		2008						√
12	2014	V	2007		√	Cap Only	Cap Only		√	√
16			2016		√	Cap Only	Cap Only		√	√
19		VII		2014		Cap Only	Cap Only			√
35/36	2015	VI		2010						√
37			2010		√					√
46			2010		√					√
49	2015	VI	2010							√
50			2010		√					√
51				2008						√
55	2015	VI		2008						√
56				2014	**					**
58			2010		√					√
59				2008	**					√
60				2008	**					√
64				2008						√
65				2014	**					**
66				2008						√

Site Name	Transfer Documents		Decision Documents		Land Use Controls					Notifications
IRP MMRP* LHAAP-	GSA Transfer To USFWS	ECP/ ECOP	ROD	DD	Groundwater Use Restriction	Nonresidential Land Use Restriction	Intrusive Activities Prohibition	MEC Warning	Landfill Cap Maintenance	Nonresidential Use Notification
67			2010							√
68				2008	**					√
69				2014	**					**
Pistol Range		VII	2010							√
001-R-01/003-R-01		VII	2016			√	√	√		√

Pending- not final

** Nonresidential Land Use site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)-see LHAAP-35A(58)

FIGURES

00906052

Legend:
- Installation Boundary
- Installation Restoration Program (IRP) Area
- Residential Use and Intrusive Activities Restriction / (IRP) Area
- Stream
- Landfill Cap Maintenance
- Groundwater Use Restriction
- MEC Warning

LHAAP-46
LHAAP-60D (Bldg 714)
LHAAP-02
LHAAP-35A (58)
LHAAP-03 (Bldg 722-P)
LHAAP-56
LHAAP-65 (Bldg 209)
LHAAP-68
LHAAP-59 (Building 725)
LHAAP-69
LHAAP-35B (37)
LHAAP-50
LHAAP-67
LHAAP-12
LHAAP-16
LHAAP-19
MMRP Site LHAAP-003-R
MMRP Site LHAAP-001-R
Longhorn Army Ammunition Plant Boundary

Caddo Lake State Park
Broadway St
FM 2198
Avenue P
Avenue Q
Avenue E
Longhorn Army Ammunition Plant
Karnack
Zeugner Dr
6th St
Substation Rd
County Road 2111
County Road 2603
County Road 2612
County Road 2113
Taylor Ave
Powell St
Old Port Caddo Rd
Plant Rd
County Road 2607
South Shore
Mercer Dr
County Road 2613
Swansons Landing Rd
Wiggins Rd
Buck Hayner Rd
43
134
9

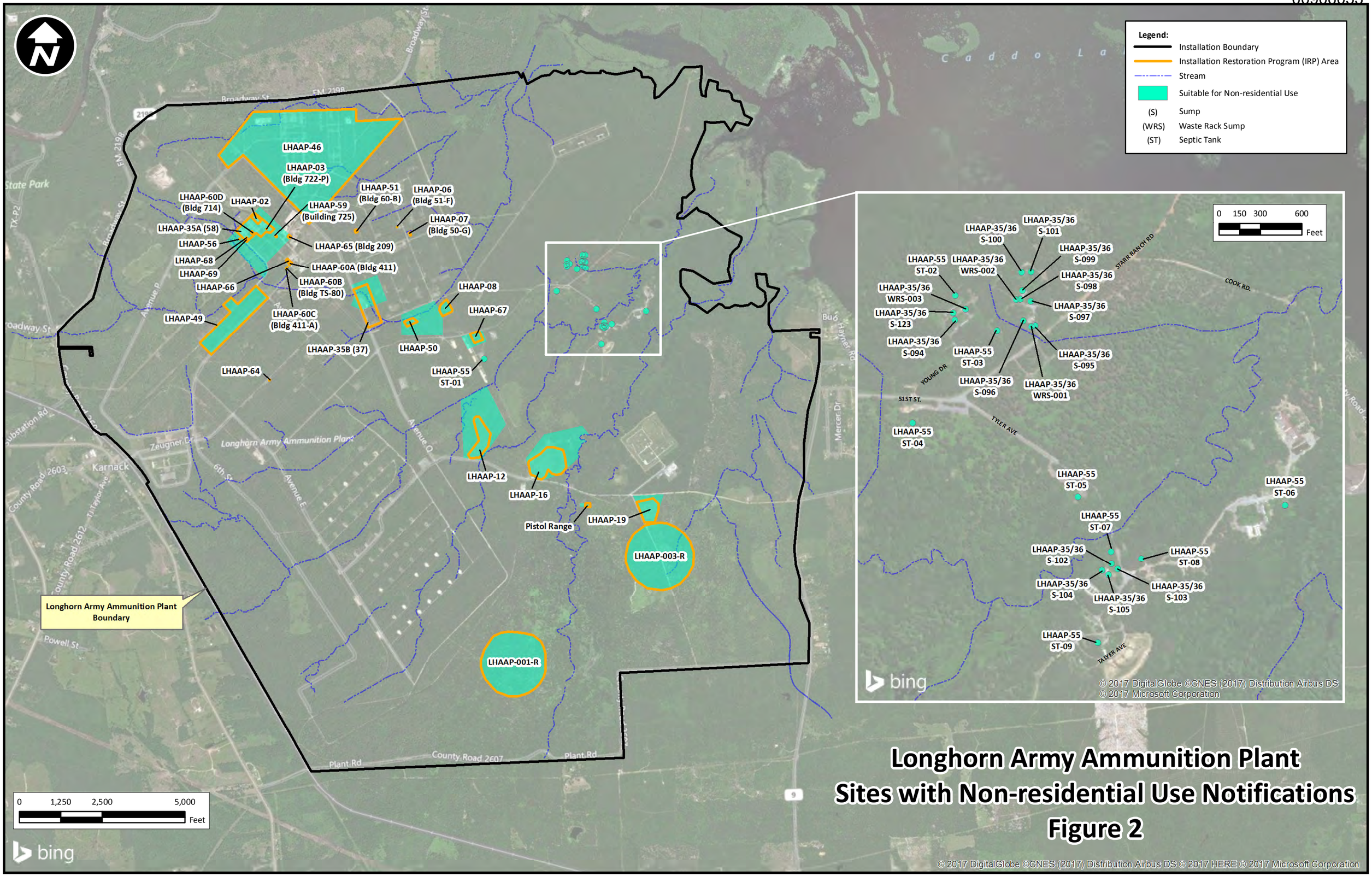
0 1,250 2,500 5,000 Feet

bing

Longhorn Army Ammunition Plant
Sites with Land Use Controls
Figure 1

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00906053



Longhorn Army Ammunition Plant
Sites with Non-residential Use Notifications
Figure 2

LHAAP - 06

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-06 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005555

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005555 **Receipt No:** 1006195 **Amount:** $ 36.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-06, is the area of a demolished building location known as Building 51-F located within the Plant 3 production area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-06 is not itself considered an NPL site. Environmental activities at LHAAP-06 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-06 (Building 51-F) was a collection point for waste acids and solvents. Its three-sided shed contained a rack that held a single 55-gallon drum set on a 50-square foot pie-shaped concrete pad. Beginning in 1985, the drum was used to collect waste acids and solvents from bench-scale manufacture of the explosive cyclotetramethylenetetranitramine. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to

5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-06 parcel is 119 square foot, more or less, or 0.00273 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-06 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-06. Contaminants in soil samples from LHAAP-06 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-06 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-06 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
Or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-06" TRACT
(REMAINS OF DEMOLISHED BUILDING 51-F)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-06" being defined by the four external corners of the three concrete walls remaining at demolished Building 51-F (wall defining the West edge of said building is either gone or never existed) in the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-06" being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HORSE" (N=6960008.269 feet E=3309591.340 feet). Said traverse indicates a surface distance of 4895.70 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation E.C.C.W. indicates External Corner of Concrete Wall,

Commencing at monument "HORSE" referenced above,

THENCE N 59deg52'55"W 597.03' to an E.C.C.W. found for the S.E.C. of this tract and this POINT OF BEGINNING,

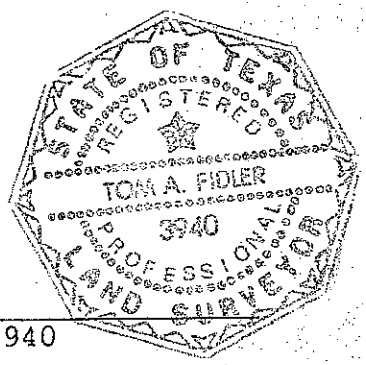
THENCE S 67deg37'19"W 10.93' along the S.B.L. of this tract to an E.C.C.W. found for this tract's S.W.C. ,

THENCE N 22deg14'24"W 10.92' along the W.B.L. of this tract to an E.C.C.W. found for this tract's N.W.C. ,

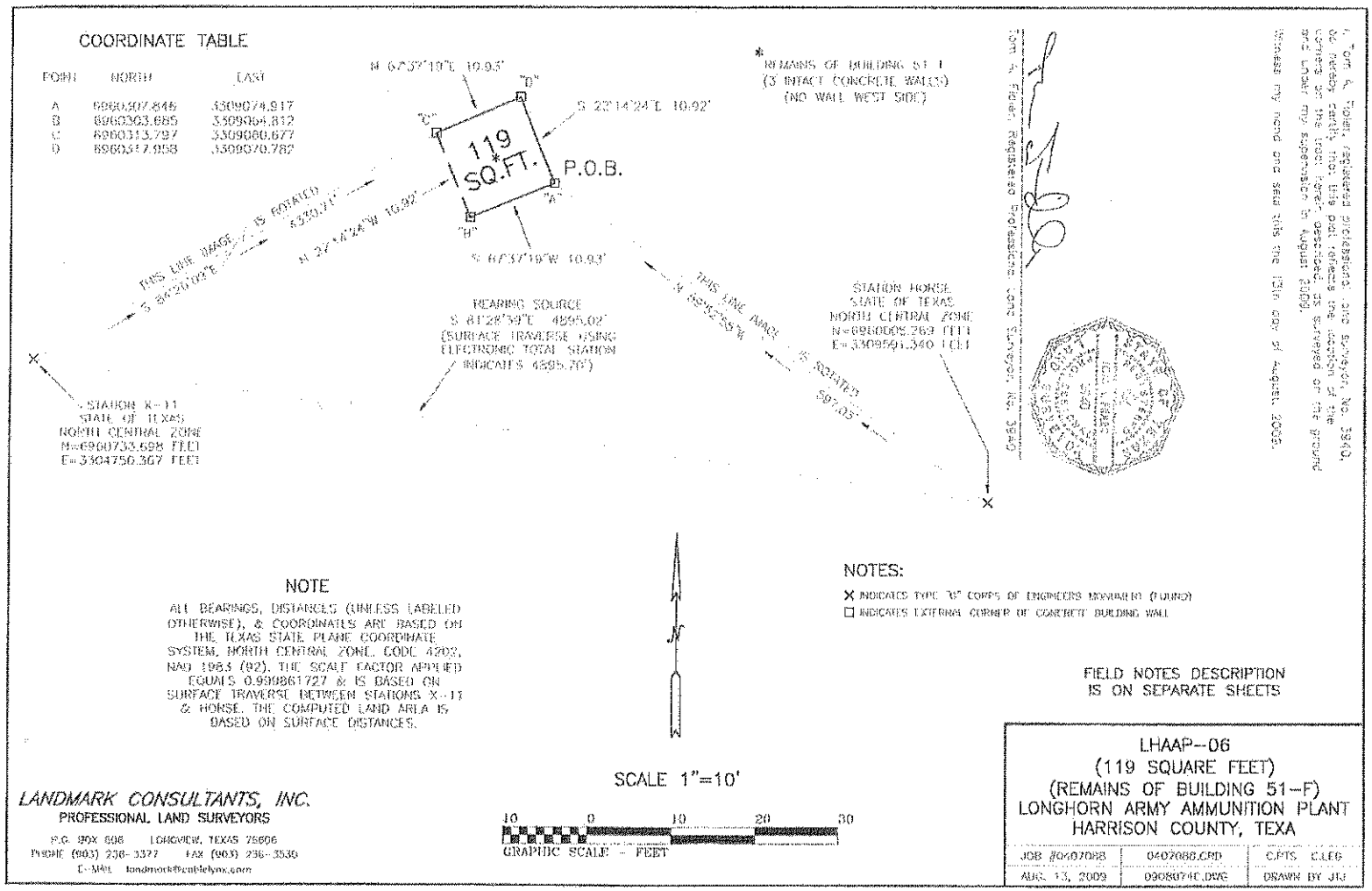
THENCE N 67deg37'19"E 10.93' along the N.B.L. of this tract to an E.C.C.W. found for this tract's N.E.C. ,

THENCE S 22deg14'24"E 10.92' along the E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 119 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940



NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & HORSE. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTES:

X INDICATES TYPE "B" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES EXTERNAL CORNER OF CONCRETE BUILDING WALL

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 238-3377 FAX (903) 236-3536
E-MAIL landmark@cableone.com

LHAAP--06
(119 SQUARE FEET)
(REMAINS OF BUILDING 51--F)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXA

JOB #0407088	0407088.CRD	CPTS CLED
AUG. 13, 2009	0908074C.DWG	DRAWN BY JAT

LHAAP-07

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-07 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005556

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005556 **Receipt No:** 1006195 **Amount:** $ 36.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-07, is the area of a demolished building location known as Building 50-G located within the Plant 3 production area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-07 is not itself considered an NPL site. Environmental activities at LHAAP-07 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-07 (Building 50-G) was the former drum processing building which consisted of a wooden frame building 30 feet by 100 feet in size set on a concrete pad located within the boundary of LHAAP-47. Beginning in 1985, Building 50-G had a separate bay (20 by 30 feet in size) used as a washdown area for empty drums and casting equipment used in ammunition production. The washdown area was an above-grade concrete vault where empty drums were rinsed with hot water and spent sulfuric acid neutralized with limestone. The wastes handled included solvents, oils, and organic liquids. The site ceased operation in 1995. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd,

Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-07 parcel is 3,078 square foot, more or less, or 0.07066 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-07 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-07. Contaminants in soil samples from LHAAP-07 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-07 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-07 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10 th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-07" TRACT
(REMAINS OF DEMOLISHED BUILDING 50-G)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-07" being defined by the four external corners of the concrete foundation stem wall of demolished Building 50-G in the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-07" being more particularly described as follows:

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HORSE" (N=6960008.269 feet E=3309591.340 feet). Said traverse indicates a surface distance of 4895.70 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation E.C.C.F.S.W. indicates External Corner of Concrete Foundation Stem Wall,

Commencing at monument "HORSE" referenced above,

THENCE N 87deg11'48"W 103.14' to an E.C.C.F.S.W. found for the S.E.C. of this tract and this POINT OF BEGINNING,

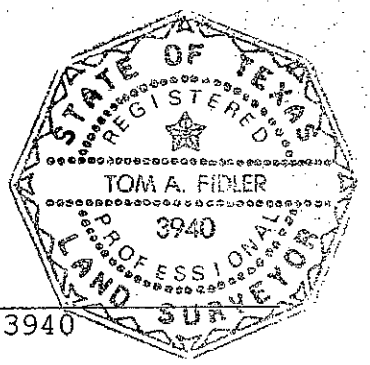
THENCE S 69deg02'55"W 30.36' along the S.B.L. of this tract to an E.C.C.F.S.W. found for this tract's S.W.C. ,

THENCE N 21deg59'26"W 101.90' along the W.B.L. of this tract to an E.C.C.F.S.W. found for this tract's N.W.C. , and being S 82deg14'17"E 4714.65' from monument "X-11" referenced above,

THENCE N 71deg43'04"E 30.53' along the N.B.L. of this tract to an E.C.C.F.S.W. found for this tract's N.E.C. ,

THENCE S 21deg55'35"E 100.48' along the E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 3,078 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

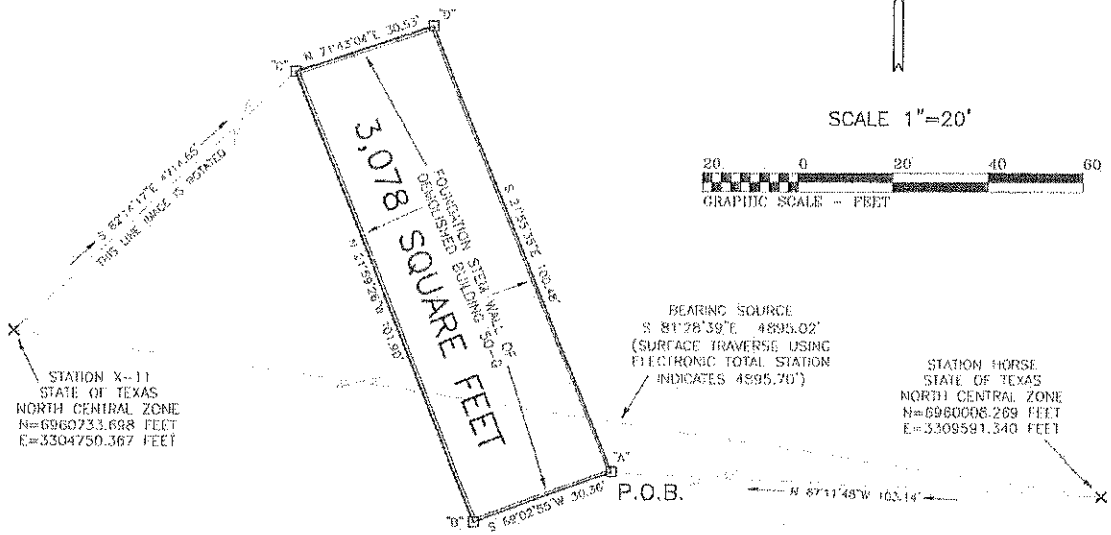
NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)

☐ INDICATES EXTERNAL CORNER OF FOUNDATION STEM WALL

COORDINATE TABLE

POINT	NORTH	EAST
A	6960013.313	3309488.323
B	6960002.458	3309459.972
C	6960096.944	3309421.815
D	6960106.521	3309450.803



SCALE 1"=20'

20 0 20 40 60

GRAPHIC SCALE - FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August, 2009.

Witness my hand and seal this the 13th day of August, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & HORSE. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cableone.com

LHAAP-07
(3,078 SQUARE FEET)
(REMAINS OF BUILDING 50-G)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	B.PTS B.LCG
AUG. 13, 2009	0908074B.DWG	DRAWN BY JTJ

LHAAP-08

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-08 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00906071

2011-000003377

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

NOTICE

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 03/24/2011 03:52 PM	
Document Number: 2011-000003377	
Receipt No: 1103745	
Amount: $ 32.00	
By: Lauren Boyd, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT CDU OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AARON WILLIAMS EC-ER
1645 SOUTH 101ST EAST AVENUE

TULSA, OK 74128

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remedial investigation of the land described herein. The site, LHAAP-08, the former Sewage Treatment Plant, operated from 1942 to 1997. LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-08 is not itself considered an NPL site. Environmental activities at LHAAP-08 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-08 included stabilization ponds, Dunbar filters, sludge drying beds, and an Imhoff tank. The plant received storm water, boiler blow down, laundry waste, vehicle wash rack waste, and effluent from film development at the X-ray facility. Treated effluent was discharged into Goose Prairie Creek and Caddo Lake. Soil and groundwater investigations in 2000, 2001, and 2005 included sampling for explosives compounds, metals, semivolatile organic compounds, volatile organic compounds, dioxins and furans, pesticides and PCBs. Soil results included detections of low levels of metals, perchlorate and dioxin. Low levels of metals, dioxin and furan compounds and perchlorate were detected in groundwater. An assessment of risk to exposure to soil and groundwater at LHAAP-08, based on the

nonresidential use scenario, indicated that potential human health risks are within the acceptable range established by EPA. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-08 parcel is a 2.974 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-08 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-08. Contaminants in soil samples from LHAAP-08 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-08 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-08 is consistent with the non-residential use scenario evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through
12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 25 th day of January, 2011 ~~2010~~.

BEFORE ME, on this the 25 th day of Jan 2011, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 25 day of January,

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-08" TRACT
(PROPOSED INDUSTRIAL USE NOTIFICATION AREA)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-08" being 2.974 acre of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-08" being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998636625, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "IGNATIUS-1" (N=6957090.304 feet E=3311081.788 feet) and "IGNATIUS-2" (N=6955582.752 feet E=3311851.704 feet). Said traverse indicates a surface distance of 1693.005 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940", and the abbreviation C.N.I.B.C. indicates concrete nail in bottle cap.

Commencing at monument "IGNATIUS-1" referenced above,

THENCE N 52deg56'26"W 814.32' to an I.R.O.P.C. set for the Southmost corner of this tract and this POINT OF BEGINNING,

THENCE N 28deg08'32"W 374.05' along the S.W. B.L. of this tract to an I.R.O.P.C. set for this tract's Westmost corner,

THENCE N 62deg03'14"E 348.01' along the N.W. B.L. of this tract to a C.N.I.B.C. set (in the asphalt pavement of South Houston Road) for this tract's Northmost corner,

THENCE S 27deg43'38"E 328.00' along the N.E. B.L. of this tract to a C.N.I.B.C. set (in the asphalt pavement of South Houston Road) for the North end of a curve,

THENCE along a curve to the right (having a radius of 48.04' and an arc length of 75.57', being subtended by a chord of S 17deg20'14"W 68.02') to a C.N.I.B.C. set (in the asphalt pavement of South Houston Road) for the South end of said curve,

THENCE S 62deg24'07"W 297.15' along the S.E. B.L. of this tract to this POINT OF BEGINNING, containing 2.974 acres, more or less.

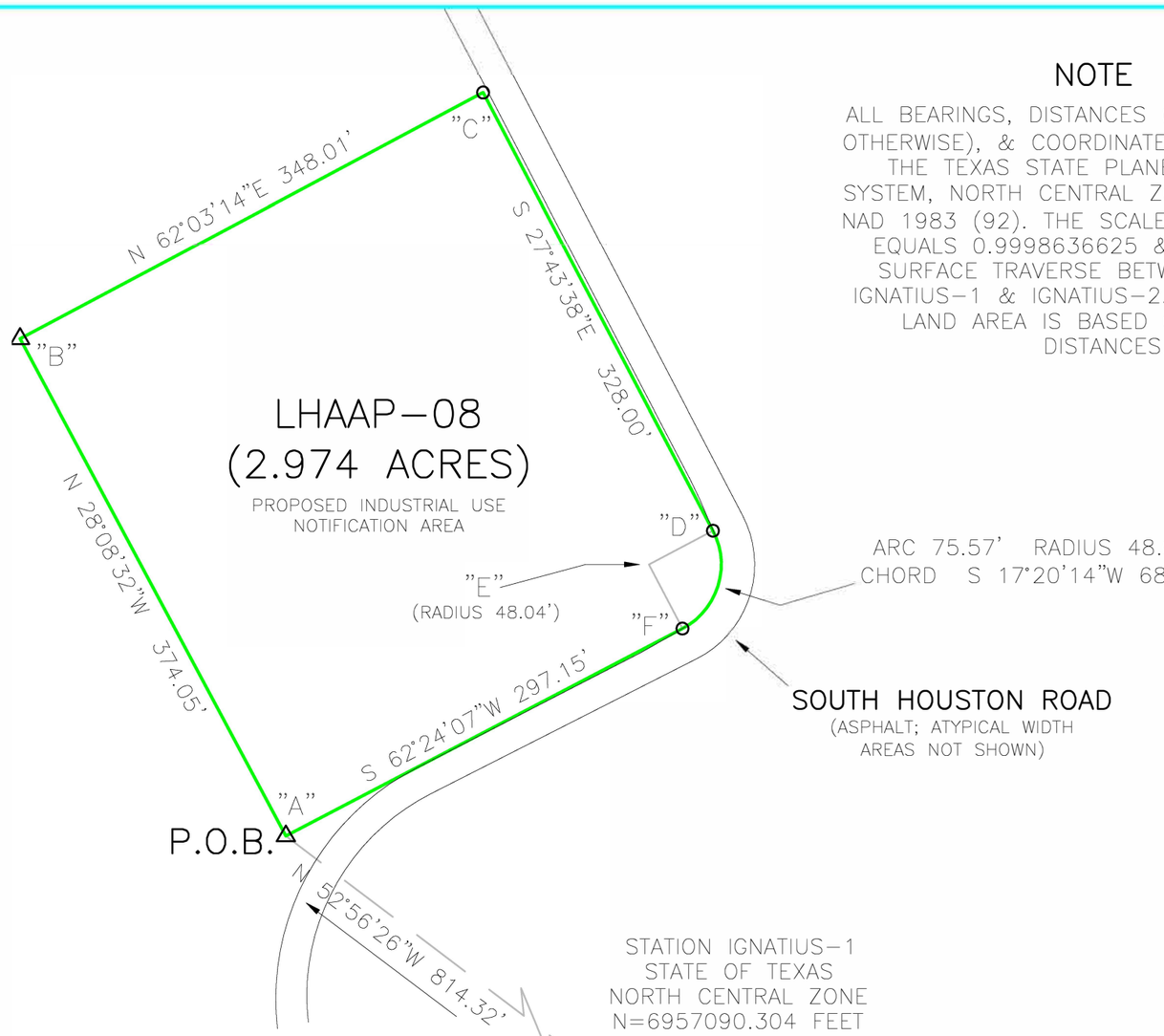
I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler

Tom A. Fidler, R.P.L.S. Number 3940

00906076



ARC 75.57' RADIUS 48.04'
CHORD S 17°20'14"W 68.02'

SOUTH HOUSTON ROAD
(ASPHALT; ATYPICAL WIDTH
AREAS NOT SHOWN)

STATION IGNATIUS-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957090.304 FEET
E=3311081.788 FEET

BEARING SOURCE
S 27°03'13.2"E 1692.774'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1693.005')

STATION IGNATIUS-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6955582.752 FEET
E=3311851.704 FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998636625 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS IGNATIUS-1 & IGNATIUS-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

SCALE 1"=100'

100 0 100 200 300
GRAPHIC SCALE - FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in July 2008.

Witness my hand and seal this the 29th day of July, 2008

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- O INDICATES CONCRETE NAIL IN BOTTLE CAP (SET IN ASPHALT)
- △ INDICATES 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- ——— INDICATES BOUNDARY OF PROPOSED INDUSTRIAL USE NOTIFICATION AREA

COORDINATE TABLE

POINT	NORTH	EAST
A	6957581.048	3310431.952
B	6957910.879	3310255.527
C	6958073.970	3310562.954
D	6957783.633	3310715.561
E	6957761.282	3310673.037
F	6957718.708	3310695.292

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-8
(2.974 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	0605063F.DWG
07/29/2008	0605063.CRD	DRAWN BY JTJ

LHAAP-12, 12-1

LUC INSPECTION AND MAINTENANCE LOG

September 14, 2015

LUC Inspection and Maintenance Log – LHAAP 12

Date	Inspected by:	Inspection / Maintenance Activities					Corrective action or repairs required?	Repairs / Action Taken
		Protect landfill cover integrity				Prevent human exposure to groundwater		
		Vegetative Cover maintained: i.e. grass mowed	Fence and signage maintained	Observance of landfill cover degradation –e.g. desiccation cracks, erosion, or gullying	Continued compliance verified for no digging or disturbance of landfill cover or contents	Verified no withdrawal or use of groundwater (other than environmental testing)		

LHAAP-12, 12-2

LUCs FROM FINAL REMEDIAL DESIGN ADDENDUM

September 14, 2015

FINAL

REMEDIAL DESIGN ADDENDUM
LANDFILL 12 (LHAAP-12)
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS



Prepared for
U.S. Army Corps of Engineers
Tulsa District
1645 South 101st Avenue
Tulsa, Oklahoma

Prepared by
Shaw Environmental, Inc.
3010 Briarpark Drive, Suite 400
Houston, Texas 77042

Contract Number DACA56-94-D-0020
Task Order No. 0109

June 2007

Table of Contents

List of Figures i
List of Appendices i
Acronyms and Abbreviations ii

1.0 Purpose 1-1
2.0 Description of the Site 2-1
3.0 Remedy Performance Objectives 3-1
4.0 Land Use Controls for the Site 4-1
5.0 Monitored Natural Attenuation 5-1
6.0 Remedy Implementation Actions 6-1
6.1 Land Use Control Implementation Actions 6-1
6.1.1 Comprehensive Base-wide Land Use Control Management Plan 6-1
6.1.2 Site Inspections and Reporting 6-2
6.1.3 Notice of Planned Property Conveyances 6-2
6.1.4 Opportunity to Review Text of Intended Land Use Controls 6-2
6.1.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance 6-2
6.1.6 Land Use Control Enforcement 6-2
6.1.7 Modification or Termination of Land Use Controls 6-3
6.2 Monitored Natural Attenuation Implementation Actions 6-3
6.3 CERCLA Five-Year Reviews 6-4
7.0 Points of Contact 7-1
8.0 Source Documents 8-1

List of Figures

Figure 1 Site Location Map, LHAAP-12
Figure 2 LHAAP-12 Land Use Control & Maintenance Map

List of Appendices

Appendix A Groundwater Monitoring Plan
Appendix B Sample Annual Land Use Control Compliance Inspection Documentation

4.0 Land Use Controls for the Site

The LUCs to be implemented by the Army or its representatives for LHAAP-12 include:

- Maintenance of the integrity of the landfill cap, including, at a minimum, repairs to desiccation cracks, erosion, or gullying upon observance.
- Maintenance of a vegetative cover on the landfill cap including regular mowing.
- Maintenance of fence line and signage around landfill cap.
- Prohibition of any activities that would affect the integrity of cap.
- Prohibition of any activities that would cause exposure to the contaminated groundwater.

Although groundwater monitoring is not a LUC, it was included as a component of the remedy for LHAAP-12 identified in the 2006 ROD to evaluate the effectiveness of the landfill cap (Shaw, 2006b). The groundwater monitoring plan is included in **Appendix A**.

6.0 Remedy Implementation Actions

6.1 Land Use Control Implementation Actions

Until LHAAP-12 is transferred, the Army or its representatives will be responsible for LUC implementation, maintenance, inspection, reporting and enforcement. The Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable. If periodic LUC inspections and maintenance are required to address site-specific risks, the Army will be responsible for making the results available to the appropriate regulators.

As a condition of property transfer, the Army may require the transferee to assume responsibility for various implementation actions, as indicated below. Although the Army may transfer responsibility for various implementation actions, the Army shall retain its responsibility for remedy integrity. This means that the Army is responsible for addressing substantive violations of performance objectives that would undermine the Army's CERCLA remedy. The Army also will be responsible for: 1) incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation; 2) recording survey plat and notice of restrictions for both the landfill cap and cover system boundary at the Harrison County Courthouse; 3) recording groundwater use restriction and survey plat at the Harrison County Courthouse; and 4) notifying Texas Department of Licensing and Regulation of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ.

The following LUC implementation actions shall be undertaken by the Army in order to ensure that the aforementioned LUC performance objectives for LHAAP 12 are met and maintained:

6.1.1 Comprehensive Base-wide Land Use Control Management Plan

Within 30 days of receiving USEPA and TCEQ approval of this RD Addendum, the Army will develop a Comprehensive Base-wide LUC Management Plan which shall initially consist of this document and a survey plat showing the locations where the LHAAP-12 LUCs are applied. The purpose of this Comprehensive Base-wide LUC Management Plan is to ensure the all site-specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document is also accessible to regulators, the local government and the public. The Army will locate the Comprehensive Base-wide LUC Management Plan in the City of Marshall Public Library to accompany LHAAP's Administrative Record.

As LUC RD documents for additional environmental sites are approved by USEPA and TCEQ, the Army shall likewise add those documents and survey plats to the Comprehensive Base-wide LUC Management Plan as well as update the previous copy of the plan placed in the City of Marshall Public Library.

6.1.2 Site Inspections and Reporting

Beginning with finalization of this RD Addendum, the Army will undertake annual physical inspections and reporting to confirm continued compliance with all LUC objectives. The Army will provide USEPA and TCEQ with an annual LUC Compliance Inspection document consistent with the form attached hereto as **Appendix B**. In addition, should any deficiency(ies) be found during the annual inspection, the Army will provide to USEPA and TCEQ along with the document, a separate written explanation indicating the specific deficiency(ies) found and what efforts or measures have or will be taken to correct those deficiencies. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECOP). The need to continue annual inspections will be revisited at five year reviews.

6.1.3 Notice of Planned Property Conveyances

Planned conveyance of LHAAP-12 acreage is to U.S. Fish and Wildlife Service for incorporation into the Caddo Lake National Wildlife Refuge. The Army shall provide notice to USEPA and TCEQ of such intended conveyance. The notice shall describe the mechanism by which LUCs will continue to be implemented, maintained, inspected, reported, and enforced.

6.1.4 Opportunity to Review Text of Intended Land Use Controls

The Army will produce an ECOP for LHAAP-12, but before executing the letter of transfer, the Army will provide USEPA and TCEQ with a draft copy of that ECOP so that they may have reasonable opportunity, before document execution, to review all LUC-related provisions.

6.1.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance

Should the Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objectives, the Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 6.1.6** below, the Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

6.1.6 Land Use Control Enforcement

Should the LUC remedy reflected in this LUC RD fail, the Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These

actions may range from informal resolutions with the owner or violator, to the institution of judicial action under the auspices of Texas property law or CERCLA. Alternatively, should the circumstances warrant such, the Army could choose to exercise its response authorities under CERCLA, and then seek cost recovery after the fact from the person(s) or entity(ies) who violated a given LUC. Should the Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the Army will notify these agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUCs.

6.1.7 Modification or Termination of Land Use Controls

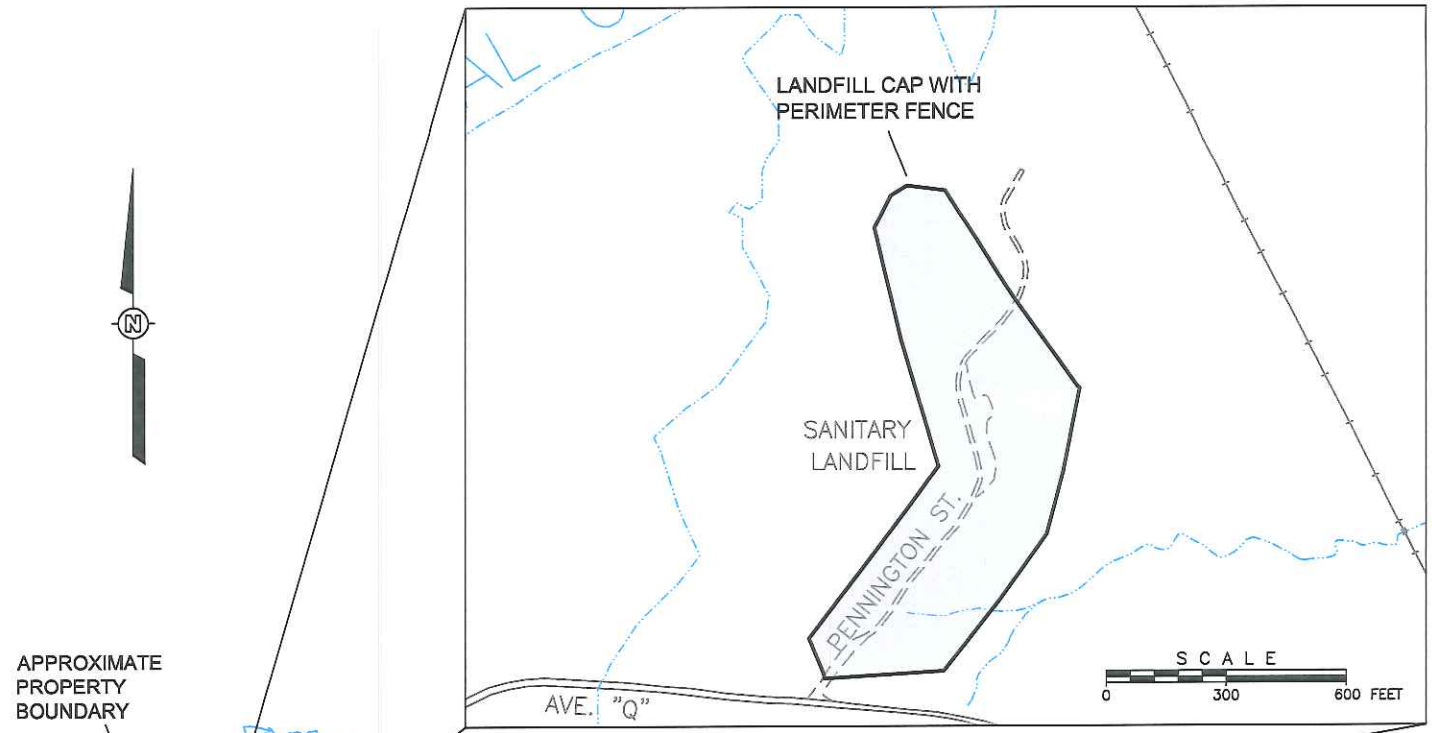
The Army shall not, without USEPA concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the Army shall obtain prior USEPA concurrence as appropriate to the exigencies of the situation.

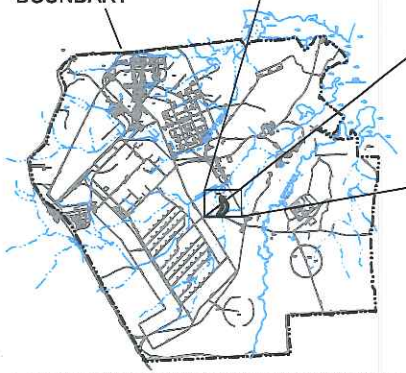
The LUCs shall remain in effect until such time as the Army and USEPA agree that the concentrations of hazardous substances have been reduced to levels that allow for unlimited exposure and unrestricted use. When this occurs, the LUCs will be terminated as needed. The decision to terminate LUCs will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the Army and USEPA has been made to terminate one or more of the LUCs, the Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

6.2 Monitored Natural Attenuation Implementation Actions

Implementation actions include development of a groundwater monitoring plan, monitoring, and reporting. Groundwater monitoring will be conducted to monitor the effectiveness of MNA in reducing contaminant concentrations over time. Monitoring will also be conducted to evaluate plume migration and ensure that TCE-contaminated groundwater does not impact nearby surface water at unacceptable levels. The Groundwater Monitoring Plan, attached as **Appendix A**, describes the wells, their locations, analytical parameters, and the frequency of the monitoring.

Annual reports will be prepared to document the monitoring program. The first year annual report will include a review of the first four quarters of data which include natural attenuation parameters and provide an evaluation for the evidence of MNA as a remedial method. The TCEQ provides guidance for MNA as a remedial action in *Monitored Natural Attenuation*





LONGHORN ARMY AMMUNITION PLANT

LEGEND:

- CREEK/BAYOU
- PAVED ROADS
- UNIMPROVED ROAD

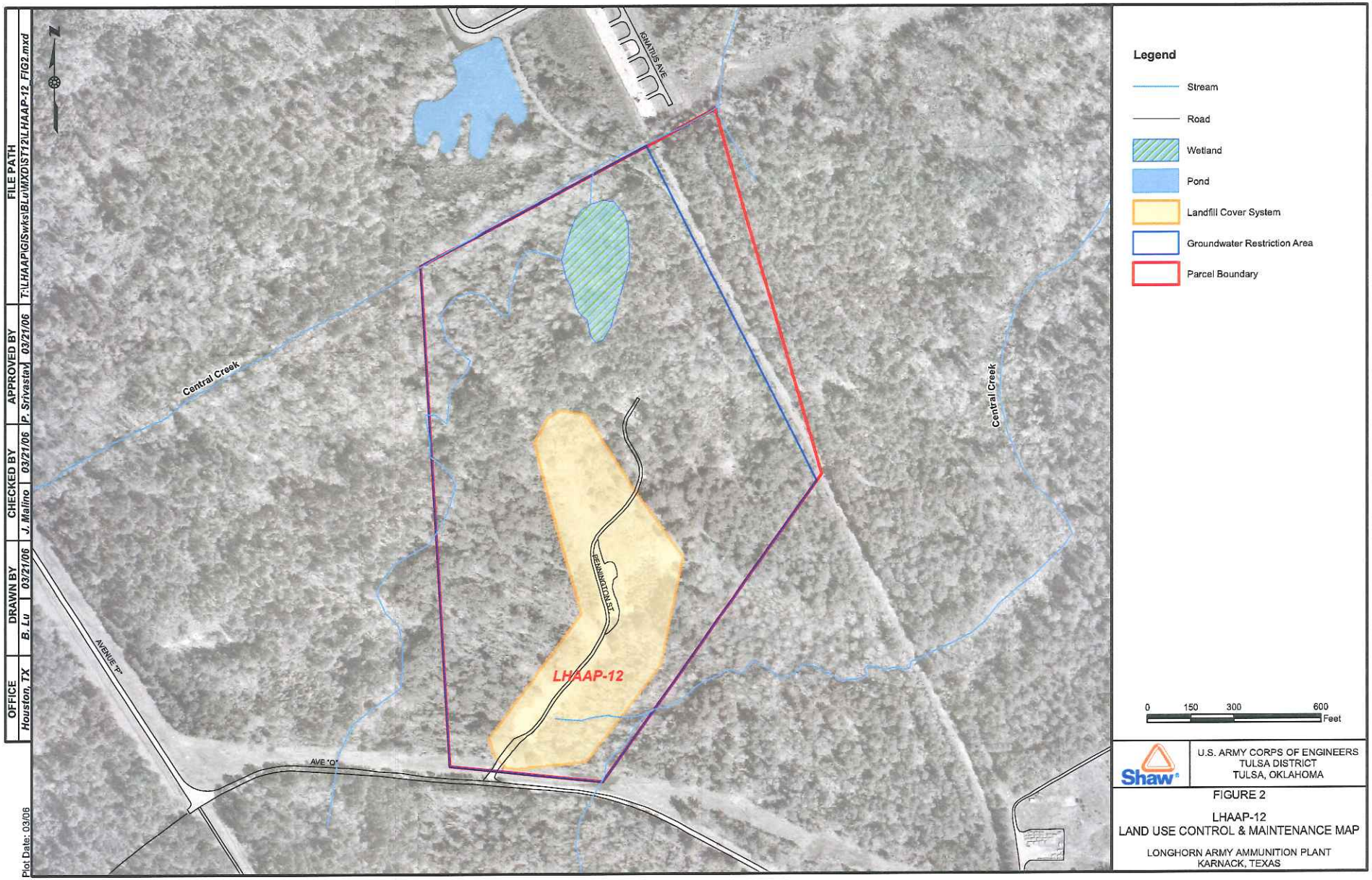
IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
		Houston, Texas	D. DAY 2/14/04	K. EVERETT 6/30/05	P. SRIVASTAV 6/30/05	845714-B44

PLOT DATE: 7/05/05
FORMAT REVISION 3/25/99

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 1
SITE LOCATION MAP
LHAAP-12
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00906087



U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 2

LHAAP-12
LAND USE CONTROL & MAINTENANCE MAP

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Appendix B

Sample Annual Land Use Control Compliance Inspection Documentation

Sample Annual Land Use Control Compliance Inspection Documentation

In accordance with the Remedial Design Addendum dated _____ for LHAAP-12, an inspection of site was conducted by _____ [indicate transferee] on_____.

A summary of land use control mechanisms is as follows:

- Land use and restriction covenants included in ECOP – [Indicate whether the ECOP is on file with the notice of transfer]
- Groundwater restriction – [Indicate whether groundwater restrictions are still required at LHAAP-12]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-12
- No reuse activity at LHAAP-12 that would adversely affect the integrity of the landfill cap
- The fence and posted signs are properly maintained at LHAAP-12
- The vegetative cover is properly maintained over the landfill
- Landfill cap is properly maintained with no evidence of erosion, cracking, settlement, or other damage to engineered components

I, the undersigned, do document that the inspection was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title _____

Signature: _____

Completed annual compliance inspection forms, with relevant annual compliance certification forms, shall be sent no later than March 1 of each year for the previous calendar year.

U.S. Department of the Army
TCEQ
USEPA Region 6

LHAAP-12, 12-3

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-12 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

Doc Bk Vol Pg
7009064 OR 3640 1

00906091

FILED FOR RECORD
07 JUN 13 AM 10: 09
PATSY COX
CO CLERK, HARRISON CO
BY _____ DEPUTY

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROLS AT LHAAP-12

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The remediation site is a capped landfill located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-12. The site is included in TCEQ Notice of Registration No. 30990 as Unit Number 001. LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-12 were performed in accordance with the FFA requirements.

The landfill was used intermittently for the disposal of industrial solid waste, possibly containing small quantities of hazardous constituents generated at LHAAP. A Record of Decision (ROD) for LHAAP-12 was signed by USEPA in 1995 establishing the construction of a cap as an interim remedial action for the site to mitigate potential risks posed by the burial of landfill waste. Construction of the landfill cap was completed in 1998. The final remedy consists of land use controls (LUCs) in conjunction with monitored natural attenuation as documented in the Final ROD signed by USEPA on July 24, 2006. The site was not remediated to levels suitable for unrestricted use. LUCs at LHAAP-12 are required to ensure the integrity of the landfill cap and cover system and prevent human exposure to contaminated groundwater. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the

Doc Bk Vol Pg
7009064 OR 3640 2

Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-12 parcel is a 50.541 acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Within the LHAAP-12 parcel are designated LUC boundaries including a 9.429 acre tract, more or less, and a 45.939 acre tract, more or less, as described in Exhibit A. The LUC boundaries are also presented in the attached Figure 1.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. The United States Department of the Army has undertaken careful environmental study of the LHAAP-12 site and concluded that the LUCs set forth below are required to ensure protection of human health and the environment.

(1) **Landfill Restriction**. A closed non-hazardous landfill (LHAAP-12) of approximately 7 acres is located within the 9.429 acre tract. The landfill restriction boundary consists of the 7-acre capped landfill and an area extending to the surrounding fence. LUCs have been established to protect the integrity of the remedy. No activity shall be conducted or permitted that would damage the integrity of the landfill cover (i.e. digging or disturbing the existing cover or contents of the landfill). The LUCs will remain in place for perpetuity unless otherwise removed by the U.S. Army per agreement with the USEPA and TCEQ.

(2) **Residential Use Restriction**. The residential use restriction boundary consists of the 9.429 acre-tract, more or less, and includes the 7-acre capped landfill and an area extending to the surrounding fence. This tract shall be used solely for the purpose of a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

(3) **Groundwater Restriction**. The groundwater use restriction boundary consists of the 45.939 acre tract, more or less, and extends beyond the landfill

Doc Bk Vol Pg
7009064 OR 3640 3

boundary. Groundwater underlying this land is contaminated with trichloroethene (TCE) and other volatile organic compounds and shall not be accessed or used for any purpose without the prior written approval of U.S. Army, the USEPA and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA and the TCEQ. The LUC will remain in place until applicable or relevant and appropriate requirements (ARARs) as established in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulation 300) are met. Due to the potential for TCE-contaminated groundwater to migrate, monitored natural attenuation will be implemented to assure that TCE-contaminated groundwater will not migrate to nearby surface water at levels that may present an unacceptable risk to human health and the environment. The monitoring and reporting associated with this remedy will continue until ARARs are achieved.

The owner of the site is the Department of the Army, and its address where more specific information may be obtained from is as follows:

ATTN: DAIM-BD-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 13th day of June, 2007.

BEFORE ME, on this the 13th day of June, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 13 day of June, 2007.

LYNDA G. HAYS
Notary Public State of Texas
COMM. EXP. 5-02-2010

Notary Public in and for the State of Texas,
County of Harrison

Doc	Bk	Vol	Pg
7009064	OR	3640	4

EXHIBIT A

Doc 7009064 | Bk OR | Vol 3640 | Pg 5

00906095

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.99991851 3 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS 2-95 & 3-95. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES

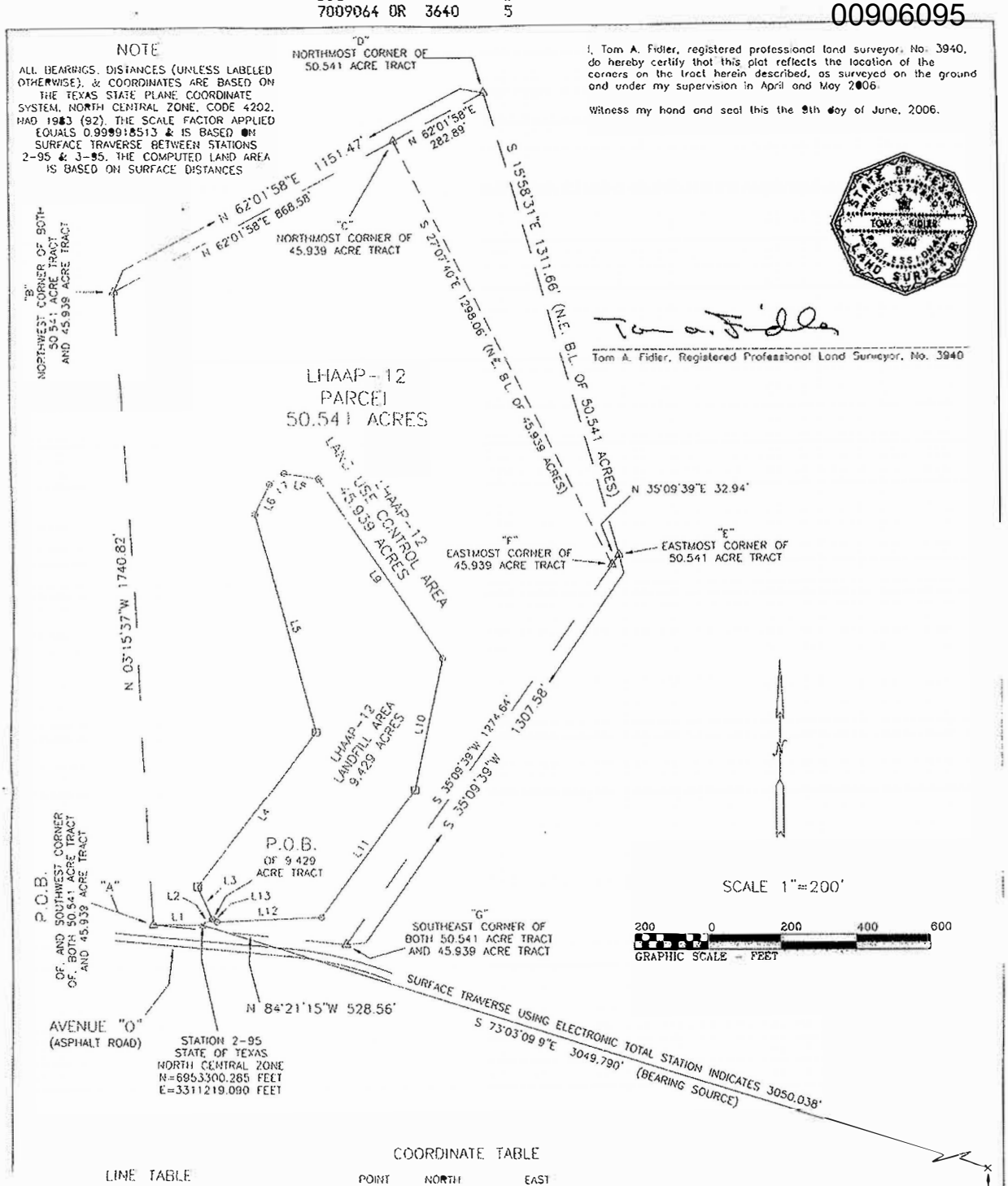
I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in April and May 2006.

Witness my hand and seal this the 9th day of June, 2006.

STATE OF TEXAS · REGISTERED · TOM A. FIDLER · 3940 · PROFESSIONAL LAND SURVEYOR

Tom A. Fidler

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940



LINE TABLE

COURSE	BEARING	DISTANCE
L1	S 89°52'35"W	132.09'
L2	N 58°35'33"E	31.72'
L3	N 23°52'43"W	96.81'
L4	N 37°07'57"E	537.87'
L5	N 15°28'17"W	618.92'
L6	N 26°16'28"E	90.81'
L7	N 54°08'30"E	50.67'
L8	S 81°02'29"E	96.24'
L9	S 34°25'01"E	596.16'
L10	S 12°11'35"W	370.18'
L11	S 36°09'00"W	434.64'
L12	S 87°15'04"W	286.47'
L13	N 57°18'20"W	15.33'

COORDINATE TABLE

POINT	NORTH	EAST
A	6953300.000	3311087.000
B	6955038.000	3310988.000
C	6955445.333	3311755.144
D	6955578.000	3312005.000
E	6954317.000	3312366.000
F	6954290.070	3312347.030
G	6953248.000	3311613.000

NOTES:

- O INDICATES 12" DIAMETER WOODEN FENCE CORNER POST (FOUND)
- □ INDICATES 10" DIAMETER WOODEN FENCE CORNER POST (FOUND)
- × INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- △ INDICATES 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET IN CONCRETE)
- ——— INDICATES BARBED WIRE FENCE AND PERIMETER OF 9.429 ACRE TRACT
- — — — INDICATES PERIMETER OF 50.541 ACRE TRACT ONLY
- — — — — INDICATES PERIMETER OF 45.939 ACRE TRACT ONLY
- ——— INDICATES PERIMETER OF BOTH 50.541 ACRE TRACT AND 45.939 ACRE TRACT

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@caltelynx.com

SHEET 1 OF 4

50.541 ACRES
45.939 ACRES
9.429 ACRES
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	0605063A.DWG
06/09/2006	0605063.CRD	DRAWN BY: JTJ

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7009064 OR 3640 6

FIELD NOTES DESCRIPTION OF
"LHAAP-12 PARCEL"
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The hereinafter described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-12 Parcel" being 50.541 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-12 Parcel" being more particularly described as follows:

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999918513, and is based on surface traverse (using electronic total station) between type "G" Corps of Engineers monuments "2-95"(N=6953300.285 feet & E=3311219.090 feet) and "3-95"(N=6952411.298 feet & E=3314136.438 feet). Said traverse indicates a surface distance of 3050.038 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940".

Commencing at the monument "2-95" referenced above,

THENCE S 89deg52'35"W 132.09' to an I.R.O.P.C. set in concrete for the S.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 03deg15'37"W 1740.82' along the W.B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Northwest corner,

THENCE N 62deg01'58"E 1151.47' along the N.W. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Northmost corner,

THENCE S 15deg58'31"E 1311.66' along the N.E. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Eastmost corner,

THENCE S 35deg09'39"W 1307.58' along the S.E. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Southeast corner,

THENCE N 84deg21'15"W 528.56' along the S.B.L. of this tract to this POINT OF BEGINNING, containing 50.541 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

Doc Bk Vol Pg
7009064 OR 3640 7

FIELD NOTES DESCRIPTION OF
"LHAAP-12 LAND USE CONTROL AREA"
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The hereinafter described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-12 Land Use Control Area" being 45.939 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said "LHAAP-12 Land Use Control Area" being more particularly described as follows:

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999918513, and is based on surface traverse (using electronic total station) between type "G" Corps of Engineers monuments "2-95"(N=6953300.285 feet & E=3311219.090 feet) and "3-95"(N=6952411.298 feet & E=3314136.438 feet). Said traverse indicates a surface distance of 3050.038 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940".

Commencing at the monument "2-95" referenced above,

THENCE S 89deg52'35"W 132.09' to an I.R.O.P.C. set in concrete for the S.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 03deg15'37"W 1740.82' along the W.B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Northwest corner,

THENCE N 62deg01'58"E 868.58' along the N.W. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Northmost corner,

THENCE S 27deg07'40"E 1298.06' along the N.E. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Eastmost corner,

THENCE S 35deg09'39"W 1274.64' along the S.E. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Southeast corner,

THENCE N 84deg21'15"W 528.56' along the S.B.L. of this tract to this POINT OF BEGINNING, containing 45.939 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

Doc 7009064 | Bk OR | Vol 3640 | Pg 8

FIELD NOTES DESCRIPTION OF
"LHAAP-12 LANDFILL AREA"
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The hereinafter described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-12 Landfill Area" being 9.429 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said "LHAAP-12 Landfill Area" being more particularly described as follows:

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999918513, and is based on surface traverse (using electronic total station) between type "G" Corps of Engineers monuments "2-95"(N=6953300.285 feet & E=3311219.090 feet) and "3-95"(N=6952411.298 feet & E=3314136.438 feet). Said traverse indicates a surface distance of 3050.038 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940".

Commencing at the monument "2-95" referenced above,

THENCE N 58deg35'33"E 31.72' to a 12" diameter wooden fence corner post found for a Southwest corner of this tract and this POINT OF BEGINNING,

THENCE generally along a barbed wire fence the following eleven courses,

N 23deg52'43"W 96.81' to a 10" diameter wooden fence corner post found for the Westmost corner of this tract,

N 37deg07'57"E 537.87' to a 10" diameter wooden fence corner post,

N 15deg28'17"W 618.92' to a 12" diameter wooden fence corner post,

N 26deg16'28"E 90.81' to a 12" diameter wooden fence corner post,

N 54deg00'30"E 50.67' to a 12" diameter wooden fence corner post found for the Northmost corner of this tract,

SHEET 4b OF 4

S 81deg02'29"E 96.24' to a 12" diameter wooden fence corner post,

S 34deg25'01"E 596.16' to a 12" diameter wooden fence corner post found for the Eastmost corner of this tract,

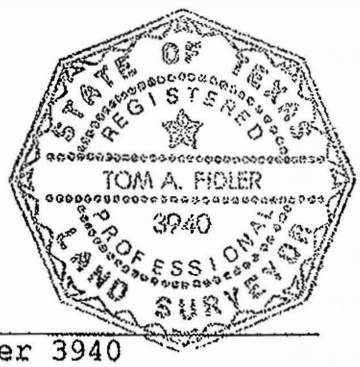
S 12deg11'35"W 370.18' to a 10" diameter wooden fence corner post,

S 36deg09'00"W 434.64' to a 12" diameter wooden fence corner post,

S 87deg15'04"W 286.47' to a 12" diameter wooden fence corner post,

N 57deg18'20"W 15.33' to this POINT OF BEGINNING, containing 9.429 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

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FIGURE 1

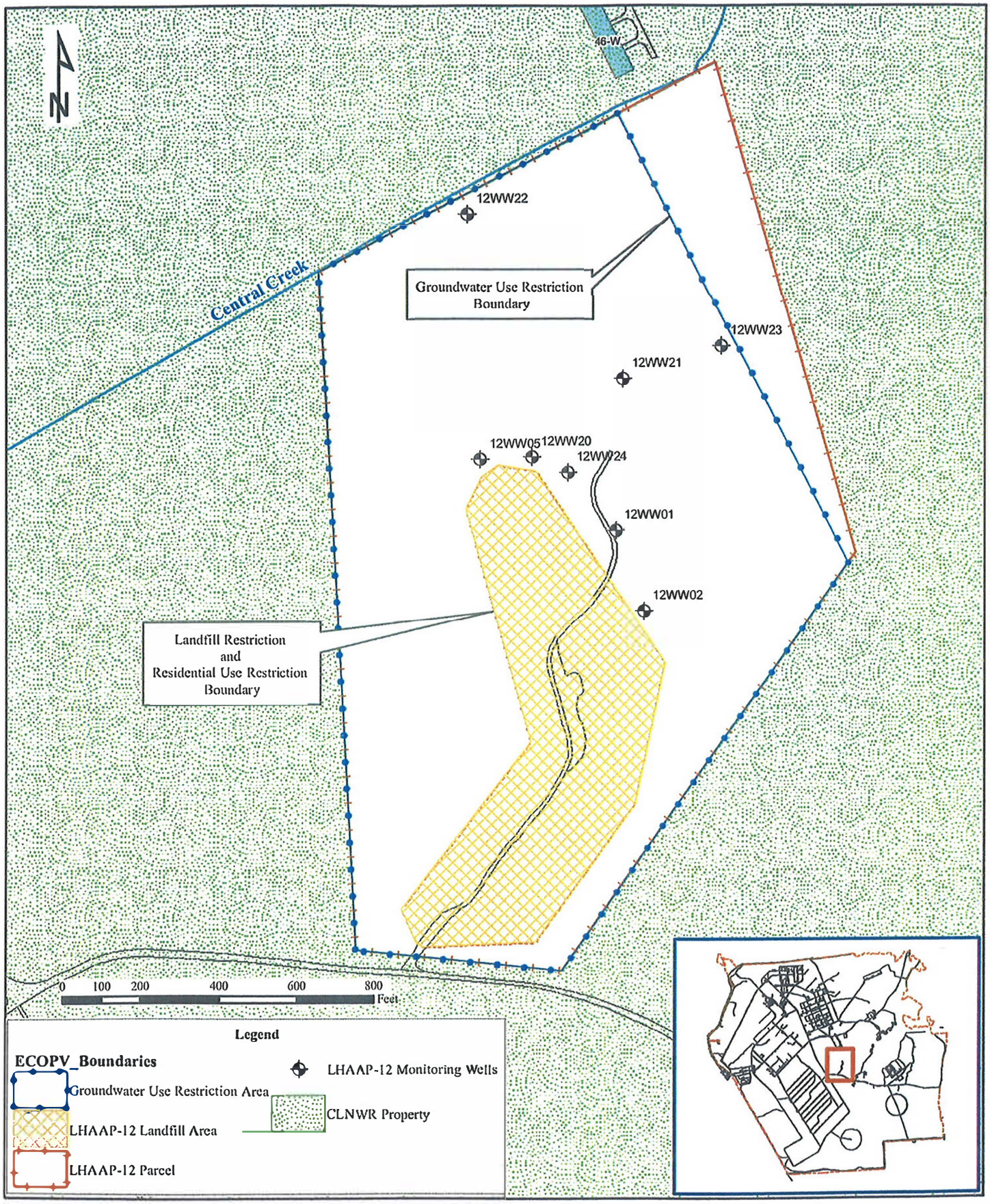


FIGURE 1

Land Use Control Boundaries

00906102

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STATE OF TEXAS COUNTY OF HARRISON

I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the volume and page of the named records of:

Harrison County

as stamped hereon by me.

Jun 13,2007

HONORABLE PATSY COX, COUNTY CLERK
Harrison County

LHAAP-12, 12-4

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

LHAAP-12, Landfill 12 Parcel
Annual Land Use Control Compliance Certification

Land use controls (LUC) at LHAAP-12 in the Landfill 12 Parcel:

• Land use restriction – Prohibition of any activities that would affect the integrity of the cap (i.e. no digging or disturbing the existing cover or contents of the landfill) and of residential use or residential development of the property

• Groundwater use restriction – Prohibition of any activities that would cause exposure to contaminated groundwater (i.e. no withdrawal or use of groundwater for other than environmental monitoring and testing)

Compliance with land use controls:

• No use of groundwater or installation of new groundwater wells (except that required for environmental monitoring and testing), or tampering with existing wells at LHAAP-12

• No reuse activity at LHAAP-12 that would adversely affect the integrity of the landfill cap (i.e no digging or disturbing the existing cover or contents of the landfill) and cap protective components (fencing and signage), and no residential use or residential development of the property

Inspection: In accordance with the LHAAP-12 Remedial Design Addendum dated 21 June 2007, an inspection of LHAAP-12 was conducted by _____ on_____ to visually confirm compliance with the LUCs.

I, the undersigned, do document that the inspection was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title _____

Signature: _____

Completed annual compliance form, to be kept on file at the Administrative Office of the Caddo Lake National Wildlife Refuge by the Refuge staff and available to EPA, TCEQ and Army upon request. The certification shall be conducted no later than March 1 of each year for the previous calendar year.

LHAAP – 16, 16-1
DRAFT LUC INSPECTION AND MAINTENANCE LOG
(RAO Inspection and Maintenance Checklist)
(Well Inspection Form)

November 28, 2017

RAO Inspection and Maintenance Checklist

General Information	
Project Name	RAO Inspection and Maintenance, LHAAP-16 Landfill, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	
Inspector's Name	
Inspector's Title	
Inspector's Signature	
Inspector's Contact Number	
Inspection Date	
Type of Inspection	☐ Quarterly ☐ Semiannual ☐ Annual ☐ Prior to forecast rain ☐ After a rain event ☐ Other ----------

Description		Yes	No	N/A	**Comments** (Attach photos/location sketches)	**Corrective Action** (Attach photos)
A. CAP Cover Surface						
A.1	Are there any significant cracks present?					
A.2.	Are there any damaged areas?					
A.3	Is there any ponded water present?					
A.4	Any other relevant observations?					
B. CAP Vegetation and Animal Burrows						
B.1	Are there signs of stressed/ dead vegetation?					
B.2	Are there any significant bare spots?					
B.3	Are deep-rooted plants present?					
B.4	Are there signs of animal burrows?					
B. 5	Any other relevant observations?					

DRAFT

Description		Yes	No	N/A	**Comments** (Attach photos/location sketches)	**Corrective Action** (Attach photos)
C. CAP Erosion and Drainage System						
C.1	Is there any evidence of significant/ clearly visible erosion, settlement, or other deterioration?					
C.2	Are the drainage systems in poor condition?					
C.3	Is there excessive silting or debris clogging?					
C.4	Is there erosion of banks and slopes?					
C.5	Are there areas of choking by overgrown vegetation?					
C.7	Is there pooling of water in or along side a channel or berm?					
C.8	Any other relevant observations?					
D. Groundwater Monitoring Wells						
D.1	Are the installed groundwater monitoring wells in poor condition?					
D.2	Are there any signs of damage, unusual wear, rust and corrosion, vandalism, unauthorized entry/use, or settlement?					
D.3	Is well cap and/or locking mechanism not properly functioning?					
D.4	Are the well heads and protective casings damaged?					
D.5	Is the well cleared of vegetation and accessible?					
D.6	Any other relevant observations?					

DRAFT

Description		Yes	No	N/A	**Comments** (Attach photos/location sketches)	**Corrective Action** (Attach photos)
E. Site Access Features						
E.1	Are the perimeter fence and gates damaged?					
E.2	Gate(s) damaged?					
E.3	Litter encountered within the area?					
E.4	Are the gate locks missing?					
E.4	Are signs to prevent unauthorized entry missing?					
E.5	Are the access roads in unusable or poor condition?					
E.6	Any other relevant observations?					
F. Concrete Aprons and Bollards						
F.1	Are there any significant cracks present?					
F.2	Are there any damaged areas?					
F.3	Any other relevant observations?					

DRAFT

WELL INSPECTION FORM

Job Name: _____ Well ID: _____

Job No.: _____ Completed Date: _____

Client: _____ Measured Depth: _____

Site Location: _____ Inspector: _____

☐ **ABOVE GROUND**

Protective casing? ☐ Yes ☐ No

Material _____

Condition: ☐ Good ☐ Broken ☐ Cracked

Lid Condition: ☐ Good ☐ Broken ☐ Cracked

Hinge Condition: ☐ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ **FLUSH MOUNTED**

Well cover present? ☐ Yes ☐ No

Condition: ☐ Good ☐ Broken ☐ Cracked

Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Visible? ☐ Yes ☐ No

Dimensions _____ Thickness _____

Sloped away from casing? ☐ Yes ☐ No

Check any of the following features that apply:

☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

CONCRETE PAD:

Inner Diameter (inches) _____

Condition: ☐ Good ☐ Broken ☐ Cracked ☐ Other (describe) _____

Cap present? ☐ Yes ☐ No

Well lock present? ☐ Yes ☐ No

Lock functioning properly? ☐ Yes ☐ No

Bump post? ☐ Yes ☐ No

Well ID visible? ☐ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☐ No

Visual obstruction? ☐ Yes ☐ No

Is well open to completed depth? ☐ Yes ☐ No

Is silt present in well? ☐ Yes ☐ No

Is silt greater than 25% of well screen length? ☐ Yes ☐ No

COMMENTS:

LHAAP-16, 16-2
LUCs FROM DRAFT-FINAL REMEDIAL DESIGN

November 28, 2017

DRAFT FINAL
REMEDIAL DESIGN
LHAAP-16 LANDFILL
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:





U.S. Army Corps of Engineers
Tulsa District

Prepared By:

AECOM

AECOM Technical Services

January 2017

DRAFT FINAL
REMEDIAL DESIGN LHAAP-16 LANDFILL
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:

U.S. Army Corps of Engineers

Tulsa District

Prepared By:

AECOM Technical Services

Contract No. W912DY-09-D-0059

Task Order No. DS01

January 2017

4.2.1.2 Substrate Loading and Injection 4-6
4.2.1.3 Bioaugmentation Culture Injection 4-6
4.2.2 Landfill Biobarrier #2 4-7
4.2.2.1 Injection and Monitoring Well Placement and Design 4-7
4.2.2.2 Substrate Loading and Injection 4-7
4.2.2.3 Bioaugmentation Culture Injection 4-8
4.2.3 Landfill Biobarrier #3 4-8
4.2.3.1 Injection Point and Monitoring Well Placement and Design 4-8
4.2.3.2 Substrate Loading and Injection 4-9
4.2.3.3 Bioaugmentation Culture Injection 4-9

4.3 Bayou Biobarrier 4-9
4.3.1 Injection Point and Monitoring Well Placement and Design 4-9
4.3.2 Substrate Loading and Injection 4-10
4.3.3 Bioaugmentation Culture Injection 4-10

4.4 Mid-Plume ISB 4-10
4.4.1 Well Placement and Design 4-10
4.4.1.1 Shallow Groundwater Zone 4-10
4.4.1.2 Intermediate Groundwater Zone 4-11
4.4.2 Substrate Loading and Injection 4-11
4.4.2.1 Shallow Groundwater Zone 4-11
4.4.2.2 Intermediate Groundwater Zone 4-12
4.4.3 Bioaugmentation Culture Injection 4-12

4.5 Performance Monitoring 4-12
4.5.1 Pre-Remedy Implementation Groundwater Sampling 4-13
4.5.2 Evaluation of Design Effectiveness 4-13
4.5.3 Performance Monitoring – Years 1 and 2 4-13
4.5.3.1 ISB Performance Monitoring 4-13
4.5.3.2 MNA Performance Monitoring 4-14
4.5.3.3 Contingency Action for MNA Areas 4-14
4.5.3.4 Follow-up Injections in Biobarriers 4-14
4.5.3.5 Surface Water Monitoring 4-15
4.5.4 Performance Monitoring – Year 3 through Five-Year Review 4-15
4.5.5 Performance Monitoring Following Five-Year Review 4-16

5 LAND USE CONTROL REMEDIAL DESIGN 5-1

5.1 LUC Implementation 5-1

5.2 Maintenance and Monitoring Requirements 5-2

5.3 Reporting of LUC Inspection and Monitoring 5-3
5.3.1 Notice of Planned Property Conveyances 5-4
5.3.2 Opportunity to Review Text of Intended Land Use Controls 5-4
5.3.3 Notification Should Action(s) which Interfere with land Use Control Effectiveness be Discovered Subsequent to Conveyance 5-4
5.3.4 Land Use Control Enforcement 5-4
5.3.5 Modification or Termination of Land Use Controls 5-5

List of Figures

Figure 1-1: LHAAP-16 Location Map

Figure 1-2: Site Location Map

Figure 1-3: LHAAP-16 Site Plan

Figure 2-1: Groundwater Elevation Map, Shallow Zone – June 2016

Figure 2-2: Groundwater Elevation Map, Intermediate Zone – June 2016

Figure 2-3: LHAAP Site Vicinity Map

Figure 2-4: Perchlorate Concentrations in Groundwater, Shallow Zone – May 2013

Figure 2-5: Perchlorate Concentrations in Groundwater, Intermediate Zone – May 2013

Figure 2-6: VOCs in Groundwater, Shallow Zone – May 2013

Figure 2-7: VOCs in Groundwater, Intermediate Zone – May 2013

Figure 3-1: Landfill Cap

Figure 4-1: ISB Locations

Figure 4-2: Landfill Biobarrier #1 Design

Figure 4-3: Landfill Biobarrier #2 Design

Figure 4-4: Landfill Biobarrier #3 Design

Figure 4-5: Bayou Biobarrier Design

Figure 4-6: Mid Plume Design, Shallow Groundwater Zone

Figure 4-7: Mid Plume Design, Intermediate Groundwater Zone

Figure 4-8: MNA and LTM Performance Monitoring Plan

Figure 4-9: Surface Water Sampling Locations

Figure 5-1: Land Use Control Boundaries

List of Tables

Table 1-1: Groundwater and Surface Water Cleanup Levels

Table 1-2: Federal and State ARARs – LHAAP-16 Remedial Action

Table 3-1: Landfill Inspection Schedule

Table 4-1: Injection Depths and Monitoring Well Screen Intervals – Landfill Biobarrier#1

Table 4-2: Summary of Substrate Loading/Injection – Landfill Biobarrier #1

Table 4-3: Screen Intervals of Injection/Monitoring Wells – Landfill Biobarrier#2

Table 4-4: Summary of Substrate Loading/Injection – Landfill Biobarrier#2

Table 4-5: Injection Depths and Monitoring Well Screen Intervals – Landfill Biobarrier#3

Table 4-6: Summary of Substrate Loading/Injection – Landfill Biobarrier#3

Table 4-7: Injection Depths and Monitoring Well Screening Intervals – Bayou Biobarrier

Table 4-8: Summary of Substrate Loading/Injection – Bayou Biobarrier

Table 4-9: Screen Intervals of Injection/Extraction Wells – Mid-Plume ISB

Table 4-10: Summary of Substrate Loading/Injection – Mid-Plume ISB

Table 4-11: Pre-Remedy Groundwater Sampling Plan in the Shallow Zone – LHAAP-16

Table 4-12: Pre-Remedy Groundwater Sampling Plan in the Intermediate Zone – LHAAP-16

Table 4-13: ISB Performance Monitoring Plan (Years 1 and 2) – Landfill Biobarrier #1

Table 4-14: ISB Performance Monitoring Plan (Years 1 and 2) – Landfill Biobarrier #2

Table 4-15: ISB Performance Monitoring Plan (Years 1 and 2) – Landfill Biobarrier #3

Table 4-16: ISB Performance Monitoring Plan (Years 1 and 2) – Bayou Biobarrier

Table 4-17: ISB Performance Monitoring Plan (Years 1 and 2) – Mid-Plume ISB

Table 4-18: MNA Performance Monitoring Plan – LHAAP-16

Table 6-1: LHAAP-16 Remedial Design Implementation Schedule

List of Appendixes

APPENDIX A: LHAAP-16 INSPECTION AND MAINTENANCE CHECKLIST

APPENDIX B: CHEMICAL MANUFACURER’S LITERATURE

APPENDIX C: LHAAP-16 WELL LOGS

APPENDIX D: ESTCP SUBSTRATE CALCULATION SHEETS

APPENDIX E: ANNUAL LUC COMPLIANCE DOCUMENTATION FORM

Acronyms and Abbreviations

µg/L	microgram per liter
ABC+	Anaerobic Biochem Plus
API	American Petroleum Institute
ARAR	applicable or relevant and appropriate requirements
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm/sec	centimeters per second
COC	contaminant of concern
DCA	Dichloroethane
DCE	Dichloroethene
DO	dissolved oxygen
DPT	direct push technology
ECP	Environmental Condition of Property
EDS-ER	Electron Donor Solution - Extended Release
ESD	Explanation of Significant Difference
ESTCP	Environmental Security Technology Certification Program
EVO	emulsified vegetable oil
FFA	Federal Facilities Agreement
FS	Feasibility Study
HDPE	high-density polyethyelene
HFCS	high-fructose corn syrup
HSA	hollow stem auger
IRA	Interim Remedial Action
ISB	in-situ bioremediation
IWWP	Installation-Wide Work Plan
lbs	pounds
LHAAP	Longhorn Army Ammunition Plant
LTM	long-term monitoring
LUC	land use control
mg/L	milligrams per liter

MNA	monitored natural attenuation
MOA	Memorandum of Agreement
msl	mean sea level
mV	millivolt
NPL	National Priorities List
O&M	operation and maintenance
ORP	Oxidation-Reduction Potential
RACR	Remedial Action Completion Report
RAO	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
ROI	Radius of Influence
SARA	Superfund Amendment and Reauthorization Act
TAC	Texas Administrative Code
TCA	Trichloroethane
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
U.S.	United States
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
VC	Vinyl chloride
ZVI	zero valent iron

5 LAND USE CONTROL REMEDIAL DESIGN

This section describes the LUC RD for LHAAP-16. In accordance with the Final ROD (U.S. Army, 2016), the LUC RD will be finalized as the land use component of the Remedial Design.

Per the Final ROD (U.S. Army, 2016), LUCs' performance objectives are to:

- Prohibit access to the contaminated groundwater except for environmental monitoring and testing only;
- Preserve the integrity of the landfill cap, and to restrict intrusive activities (e.g., digging) that would degrade or alter the cap;
- Restrict land use to nonresidential;
- Maintain the integrity of any current or future remedial or monitoring systems; and

The implementation, maintenance, and inspection requirements associated with each of the performance objectives that comprise this LUC RD are described below. The actions taken to implement the LUC objectives during the RA phase, as well as ongoing maintenance, monitoring and reporting requirements will be presented in the Remedial Action Completion Report (RACR), as the final LUC RD. Upon regulatory review and concurrence with the final LUC RD, it will be distributed as part of the Comprehensive LUC Management Plan.

For portions of the Site subject to land use controls that are not owned by the Army, the Army will monitor and report on the implementation, maintenance, and enforcement of land use controls, and coordinate with federal, state, and local governments and owners and occupants of properties subject to land use controls. The Army remains responsible for ensuring that the remedy remains protective of human health and the environment.

5.1 LUC Implementation

The actions required to implement the LUCs for LHAAP-16 are described below. The first of these, the initial notice of LUCs, has been completed. A figure depicting the preliminary LUC boundaries is presented in **Figure 5-1**. The following actions will be undertaken to implement the LUCs for LHAAP-16:

- Provide initial notice of the LUCs before remedial action is implemented.
    - Develop the initial notice of the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD. The notice will consist of a brief description of the contaminants in groundwater and soil, a written description of the LUCS and a figure depicting the preliminary LUC boundaries presented in **Figure 5-1**.
    - Transmit the notice to federal, state and local governments involved at this site and the owners and occupants of the properties subject to those use restrictions and land use controls within 90 days of ROD signature, which is on or before December 12, 2016. The notices will be sent to federal, state and local officials including: U.S. Senator Ted Cruz, U.S. Senator John Cornyn, U.S. Congressman Louie Gohmert, State Senator Kevin Eltiffe, State Representative Chris Paddie, Harrison County

Judge Hugh Taylor, Harrison County Commissioner Precinct 1 William D. Hatfield, City of Uncertain Mayor Sam Canup, and Karnack Water Supply Corporation Board Members. Notice will also be sent to the Caddo Lake National Wildlife Refuge Manager.

- Finalize the Boundaries for the LUCs as a part of the remedial action.
    - Revise the boundaries if necessary. The LUC boundary presented in this RD is subject to change, based on COC results from the two proposed wells to be installed on the east side of Harrison Bayou. The final boundaries of the groundwater LUCs (prevent the use of groundwater contaminated above cleanup levels as a potable water source and prohibit access to the contaminated groundwater except for environmental monitoring and testing only); the landfill LUCs (preserve the integrity of the landfill cap, and to restrict intrusive activities (e.g., digging) that would degrade or alter the cap); the remedial or monitoring system LUCs (maintain the integrity of any current or future remedial or monitoring systems); and, the nonresidential land use LUC (restrict land use to nonresidential) will be reviewed during remedial action activities after an evaluation of new data has been completed and revised if necessary.
    - Survey the LUC Boundaries. The boundaries will be finalized after concurrence by USEPA and TCEQ, and the LUC boundaries will be surveyed by a State-licensed surveyor. A legal description of the surveyed areas will be appended to the survey plat.
- Record the LUCs in Harrison County. The LUC plat, legal description and LUC restriction language will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566.
- Notify the Texas Department of Licensing and Regulation of the groundwater LUCs. The Texas Department of Licensing and Regulation will be notified of the groundwater restrictions, which include the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ. The survey plat, legal boundary and description of the groundwater restriction LUCs, in conjunction with a locator map, will be provided in hard and electronic copy.

5.2 Maintenance and Monitoring Requirements

The LUCs will be maintained in place as follows:

- The landfill LUCs will remain in place as long as the landfill waste remains at the site or until the levels of Contaminants of Concern (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 1-1**) allow for unlimited use and unrestricted exposure;
- The LUCs restricting the use of groundwater to environmental monitoring and testing only and the LUC restricting land use to nonresidential will remain in place until the levels of COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site

at cleanup levels as listed in **Table 1-1**) in surface and subsurface soil and groundwater allow for unlimited use and unrestricted exposure;

- The LUC to maintain the integrity of any current or future remedial or monitoring systems will remain in place until groundwater cleanup levels of COCs (i.e., including all hazardous substances, pollutants and contaminants found at the Site at cleanup levels as listed in **Table 1-1**) are met; and,
- The LUC prohibiting groundwater use (except for environmental monitoring and testing) as a potable source will remain in place until the levels of COCs (i.e., all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 1-1**) in soil and groundwater allow for unlimited use and unrestricted exposure.

Landfill and Remedial or Monitoring System LUCs include physical components that require repair and maintenance. These are described in **Section 3.0.** The Inspection and Maintenance Checklist is provided in **Appendix A.**

The administrative maintenance required to ensure the five LUCs remain in place and effective until the cleanup levels of the COCs are at levels that allow unrestricted use and unlimited exposure are:

- Annual field inspections of the site to confirm that no violations of the LUCs have occurred. Documentation of the inspection will be included in the Inspection and Maintenance Checklist (see **Appendix A).**
- Annual certifications that no LUC-restricted activities have been authorized and that site conditions and use are consistent with the LUCs. The Certification Form is presented in **Appendix E).**
- Periodic transmittal of a LUC Notice to federal, state, and local authorities and to owners and occupants of LHAAP-16. The notice will include the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD, a written description of the LUCs and a figure depicting the LUC boundaries. The transmittal will coincide with each Five Year Review and will be documented in the report.
- The final LUC RD appendix of the RACR will be added to the Comprehensive LUC Management Plan and the plan will be provided to the owner or occupant of LHAAP-16.

The U.S. Army will address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable.

5.3 Reporting of LUC Inspection and Monitoring

Beginning with finalization of this RD and approval of the Inspection and Maintenance forms and the Annual Certification Form, the U.S. Army will undertake inspections and certify continued compliance with the LUC objectives. The U.S. Army, or the transferee after transfer, will retain the LUC Inspection and Certification documents in the project files for incorporation into the five-year review reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the certification, the U.S. Army will provide to USEPA and TCEQ, along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be

taken to correct those violations. The need to continue inspections and certifications will be revisited at five year reviews.

5.3.1 Notice of Planned Property Conveyances

Upon transfer of Army-owned property, the Army will provide written notice to the transferee of the LHAAP-16 groundwater and soil (surface and subsurface) contamination and any land use restrictions. Within 15 days of transfer, the U.S. Army will provide written notice to USEPA and TCEQ of the division of implementation, maintenance, and enforcement responsibilities unless the information has already been provided in the LUC RD. The notice will describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the US Army may transfer responsibility for various implementation actions, the U.S. Army will also retain ultimate responsibility for the remedy integrity. This means that the U.S. Army is responsible for addressing substantive violations of the LUC performance objectives that would undermine the U.S. Army's CERCLA remedy. The US Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation. In the event property is transferred out of Federal control, the land use controls relating to property and groundwater restrictions shall be recorded in the deed and shall be enforceable by the United States and the state of Texas.

5.3.2 Opportunity to Review Text of Intended Land Use Controls

The US Army will provide a copy of the groundwater and land use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. USEPA will also receive a copy for review. The US Army will produce an ECP or other environmental document for transfer of LHAAP-16, but before executing transfer, the US Army will provide USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

5.3.3 Notification Should Action(s) which Interfere with land Use Control Effectiveness be Discovered Subsequent to Conveyance

Should the US Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objectives, the US Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with Section 5.2.5 below, the US Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the US Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

5.3.4 Land Use Control Enforcement

Should the LUC remedy reflected in this RD fail, the US Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the USFWS or its lessee, to the institution of judicial action against non-federal third

parties. Alternatively, should the circumstances warrant such, the US Army could choose to exercise its response authorities under CERCLA. Should the US Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the US Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

5.3.5 Modification or Termination of Land Use Controls

The LUCs shall remain in effect until such time as the US Army and USEPA agree that the concentrations of COCs in groundwater have met cleanup levels in groundwater and that surface and subsurface soil concentrations allow unrestricted use. When this occurs, the LUC will be terminated as needed. The decision to terminate the LUC will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action complete report. If the property has been transferred and a determination by the US Army and USEPA has been made to terminate the LUC, the US Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

00906123

N

Central Creek

Groundwater Use Restriction
Land Use Control Boundary

Landfill Cap Protection
Land Use Control Boundary

LHAAP-16

AVE "Q"

Harrison Bayou

Approximate Limits of Old Landfill

5 µg/L

17 µg/L

16WW31 16WW32 16WW46 16WW33 16WW34 16WW44 16WW45 16WW22 16WW41 16WW17 16WW21 16WW20 16WW15 16WW14 16EW01 16EW05 16WW39 16WW40 16WW12 16EW02 16EW06 16WW37 16WW38 16WW35 16WW36 16WW16 16EW07 16EW03 16WW30 16WW04 16WW03 16EW04 16WW29 16EW08 16WW26 16WW25 16WW18 16WW01 16WW02 16WW19 16WW42 16WW13 16WW43 16WW27 16WW28 16WW05 16WW06 16WW11 122 16WW24 16WW23 16WW08 16WW07 16WW09 16WW10

0 125 250 500 Feet

Legend

- Existing Shallow Monitoring Well
- Existing Intermediate Monitoring Well
- Existing Upper Deep Monitoring Well
- Existing Lower Deep Monitoring Well
- Abandoned or Plugged Well
- Extent of Perchlorate Contamination > 17 ug/L in Intermediate and Shallow Zones (May 2013)
- Extent of TCE Contamination > 5 ug/L in Intermediate and Shallow Zones (Dashed Where Inferred) (May 2013)
- Location of Semi-Passive Biobarrier Demonstration (February 2004 through June 2006 [ESTCP 2009]).
- Road
- Stream
- Remedial and Monitoring System Boundary
- Groundwater Use Restriction Land Use Control Boundary
- LHAAP-16 Landfill Fence

Path: L:\AGE\GIS\AUS GIS\GIS_Projects\Longhorn_AAP\01_Reports\LHAAP-16\RAWP\Fig 5-1 LHAAP-16 Land Use Control Boundaries.mxd

AECOM

Figure 5-1
Land Use Contol Boundaries
LHAAP-16 Remedial Design

Longhorn Army Ammunition Plant
Karnack, Texas

60256135

January 2017

LHAAP – 16, 16-3
NOTICE OF LAND USE CONTROL AND NONRESIDENTIAL LAND USE FOR LHAAP-16 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

(Pending)

November 28, 2017

Initial Notice of Land Use Controls

LHAAP-001-R, South Test Area/South Bomb Area and LHAAP-003-R, Ground Signal Test Area Longhorn Army Ammunition Plant, Karnack Texas

The former Longhorn Army Ammunition Plant (LHAAP) is an inactive government-owned, formerly contractor-operated and maintained Department of Defense facility located in central east Texas in the northeast corner of Harrison County. LHAAP is approximately 14 miles northeast of Marshall, Texas. The facility is approximately 40 miles west of Shreveport, Louisiana. The former U.S. Army installation occupied nearly 8,416 acres between State Highway 43 at Karnack, Texas, and the southwestern shore of Caddo Lake and is accessed by State Highways 43 and 134.

LHAAP was placed on the National Priorities List (NPL) on August 9, 1990. Activities to remediate contamination began in 1990. After its listing on the NPL, the U.S. Army, the USEPA, and the Texas Water Commission (currently known as the TCEQ) entered into a CERCLA Section 120 Federal Facilities Agreement (FFA) for remedial activities at LHAAP. The FFA became effective December 30, 1991. LHAAP operated until 1997 when it was placed on inactive status and classified by the U.S. Army Armament, Munitions, and Chemical Command as excess property.

The sites addressed in this Initial Notice of Land Use Controls are LHAAP-001-R and LHAAP-003-R, which are shown on the attached Figures and discussed below.

Land Use Controls (LUCs) are applied at LHAAP-001-R and LHAAP-003-R as part of the final remedy in accordance with the Record of Decision signed September 13, 2016. LUCs are necessary to promote ongoing protection of human safety against potential explosive hazards that may remain at the MMRP sites. The performance objectives are to prohibit the development and use of the property for residential housing, elementary and secondary schools, and child care facilities and playgrounds, and to prohibit intrusive activities such as digging or any other activity which could result in explosive safety risks.

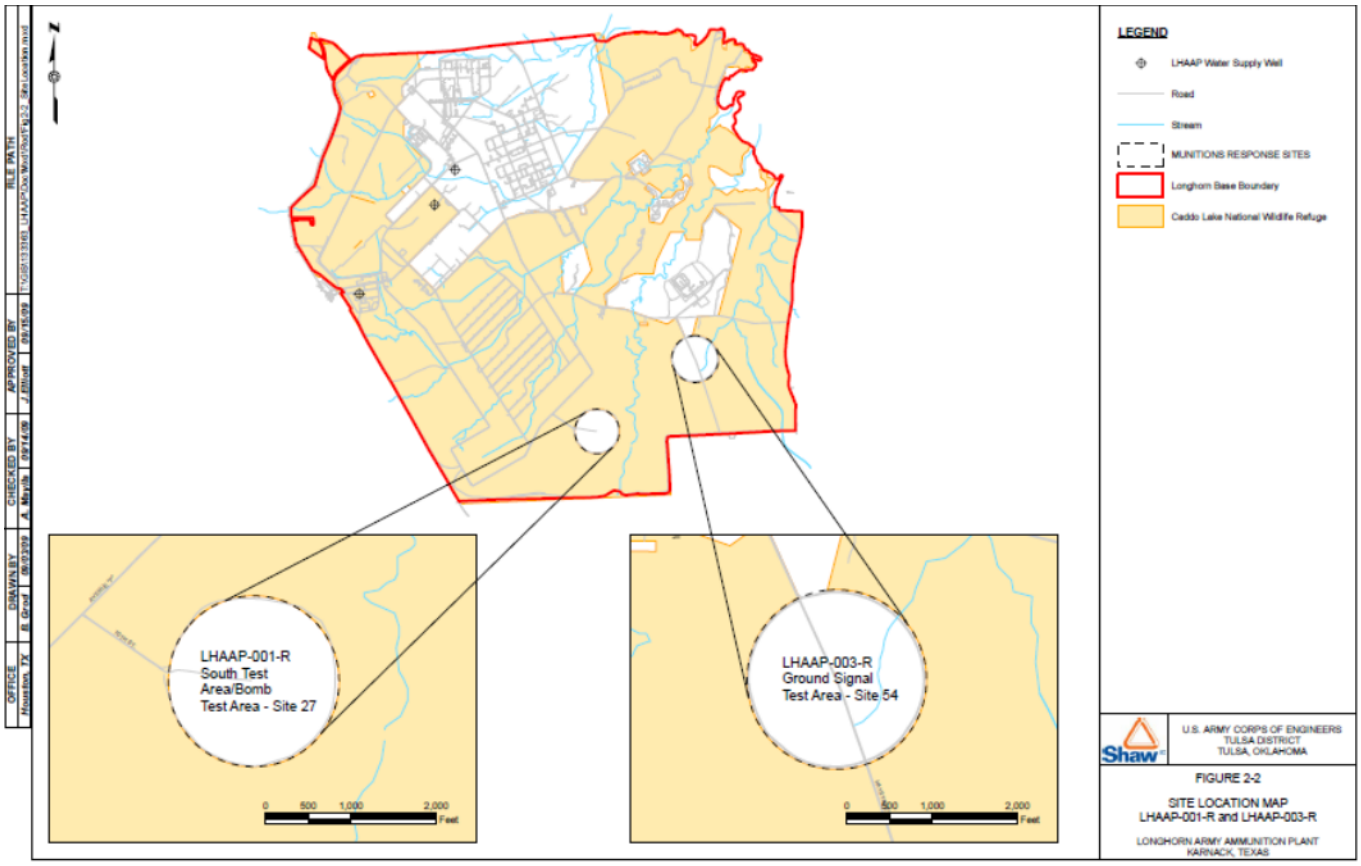
Land Use Controls

- The LUC to prohibit residential land use will remain in place until it is demonstrated that the MEC no longer presents a threat to public/human safety.
- The LUC restricting land use to nonresidential will remain in place until it is demonstrated that the MEC no longer presents a threat to public/human safety.
- A LUC to prohibit intrusive subsurface activities, including digging, will remain in place until it is demonstrated that the MEC no longer present an explosive hazard. However, intrusive subsurface activities may occur provided that the Army and the EPA approve such intrusive subsurface activities before they are commenced and provided that they are undertaken by qualified personnel who are trained in explosives safety measures.

Further information may be found in the Adminstrative Record at the Marshall Public Library, at website www.longhornaap.com or by contacting Rose M. Zeiler (479-635-0110 or rose.m.zeiler.civ@mail.mil).

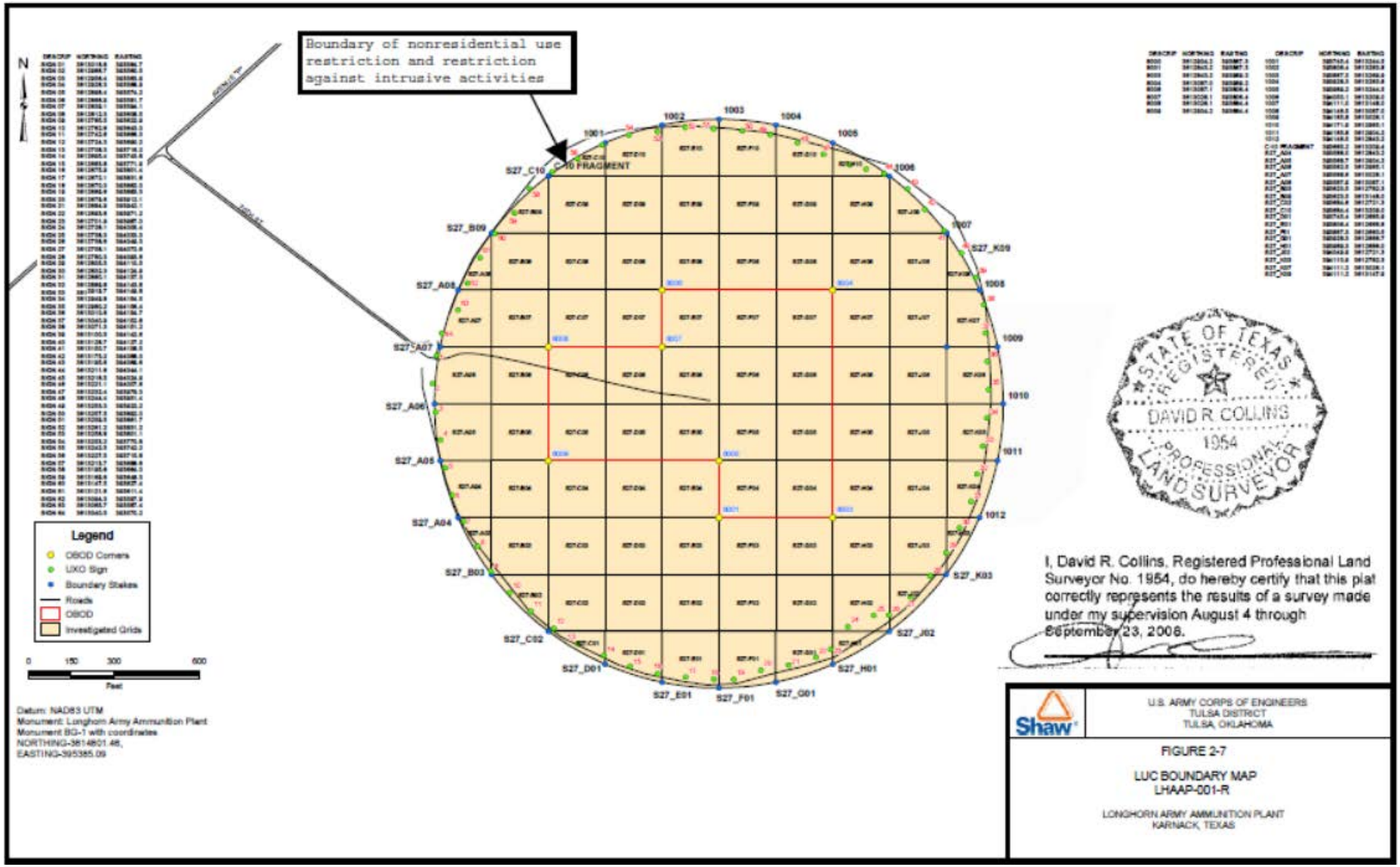
Initial Notice of Land Use Controls

LHAAP-001-R, South Test Area/South Bomb Area and
LHAAP-003-R, Ground Signal Test Area
Longhorn Army Ammunition Plant, Karnack Texas



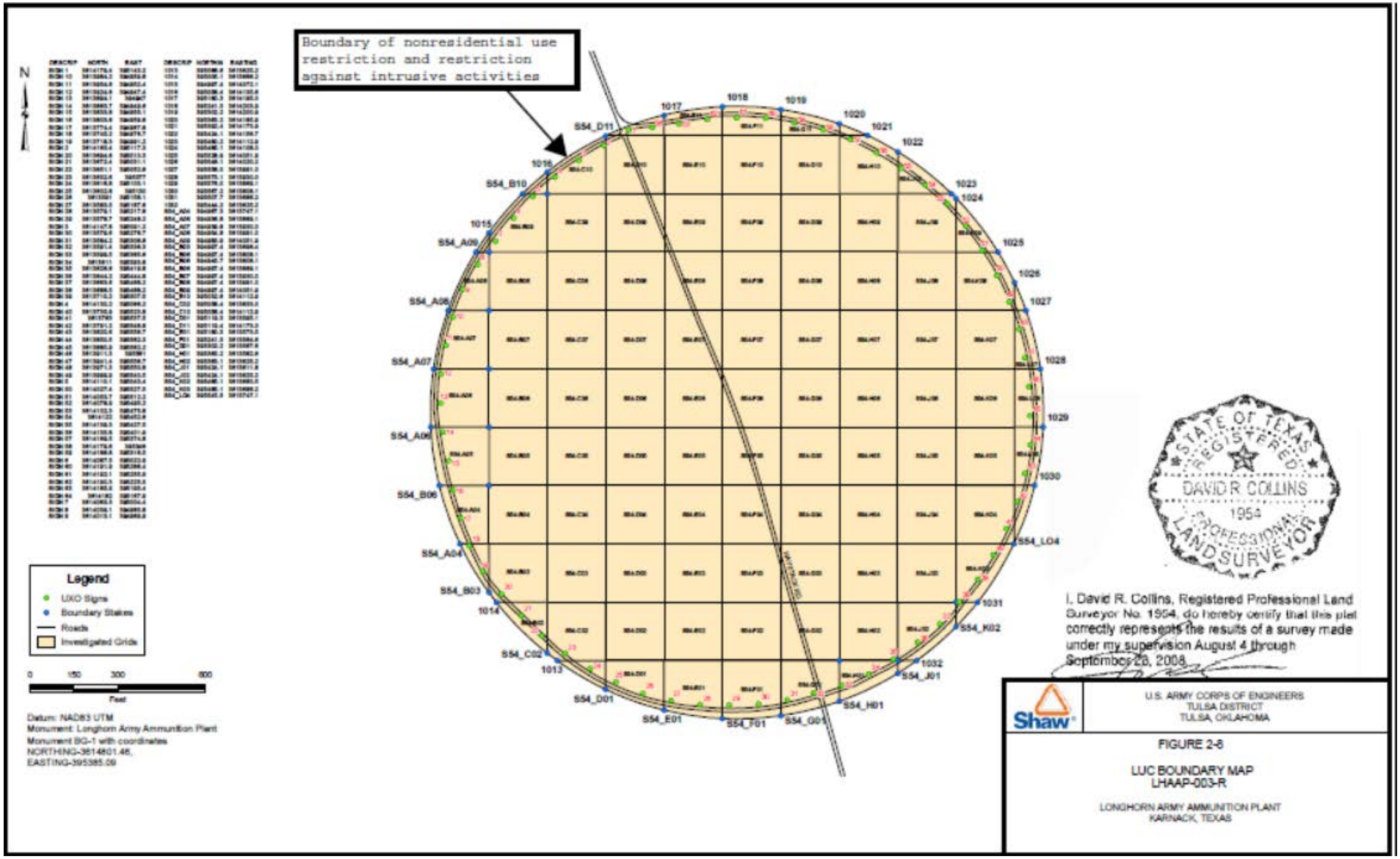
Initial Notice of Land Use Controls

LHAAP-001-R, South Test Area/South Bomb Area and
LHAAP-003-R, Ground Signal Test Area
Longhorn Army Ammunition Plant, Karnack Texas



Initial Notice of Land Use Controls

LHAAP-001-R, South Test Area/South Bomb Area and
LHAAP-003-R, Ground Signal Test Area
Longhorn Army Ammunition Plant, Karnack Texas



LHAAP – 16, 16-4
LAND USE CONTROL COMPLIANCE INSPECTION FORM

November 28, 2017

Annual Land Use Control Compliance Inspection Form

In accordance with the Remedial Design dated _____ for LHAAP-16 an inspection of the site was conducted by _____ [indicate transferee] on _____.

The land use control mechanisms are:

- Groundwater restrictions - prohibit access to the contaminated groundwater except for environmental monitoring and testing only until cleanup goals are met;
- Landfill integrity - preserve the integrity of the landfill cap and restrict intrusive activities (e.g., digging) that would degrade or alter the cap;
- Land use restrictions - restrict land use to nonresidential;
- Integrity of remedial and monitoring systems - maintain the integrity of any current or future remedial or monitoring systems until cleanup goals are met.

No unauthorized activities or uses have occurred. Compliance with land use controls and restrictions is as follows:

- No use of groundwater (other than environmental testing and monitoring), installation of new groundwater wells, or tampering with existing monitoring wells;
- No landfill intrusive activities (e.g., digging) that would degrade or alter the landfill cap; maintenance of vegetative cover and repair of soil subsidence or erosion areas on the cap;
- No land use other than nonresidential; and
- No activities that would compromise the integrity of the remedial or monitoring systems.

I, the undersigned, do document that the inspection was conducted as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title: _____

Signature: _____

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year, retained in the file and provided to Army, EPA and TCEQ upon request.

LHAAP-19

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-19 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2013-000013785

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

5 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 11/14/2013 04:23 PM **Document Number:** 2013-000013785 **Receipt No:** 1313735 **Amount:** $ 28.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AARON WILLIAMS
1645 SOUTH 100 FIRST EAST AVE

TULSA, OK 74128

STATE OF TEXAS
HARRISON COUNTY

INDUSTRIAL SOLID WASTE
CERTIFICATION OF REMEDIATION

KNOW ALL MEN BY THESE PRESENT THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-19, is a C&D Landfill located within the former Longhorn Army Ammunition Plant (LHAAP) in the northeast corner of Harrison County, Texas approximately 14 miles northeast of Marshall, Texas, and approximately 40 miles west of Shreveport, Louisiana. LHAAP was placed on the National Priorities (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-19 is not itself considered an NPL site. The TCEQ, the lead regulatory agency concurs that the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 3.

The C&D landfill, designated LHAAP-19, covers a 7.91 acre tract of land. The maximum depth of the landfill is believed to be less than 15 feet below ground surface. The C&D landfill was sporadically active from 1985 until recent closure activities were conducted. The C&D landfill was permitted by rule to receive non-friable asbestos and other demolition debris. During periods of activity, the monthly disposal rate ranged from 35 to 400 cubic yards of waste. The C&D landfill (formerly referred to as LHAAP-26) was evaluated in 1988. From the landfill evaluation dated 1988, and the buildings description dated 2004, it is concluded that all of the materials deposited in this landfill were what is normally classified as Construction and Demolition Debris (C&D) consisting of wood and metal studs, corrugated metal walls and roofs, concrete rubble, steel re-bar, dry-wall, transite (non-friable asbestos) siding, cardboard, Class 2 paper, packing, plastics, foil, wood packaging, wood debris, bricks, cement and other inert constituents. Records provided by the site manager indicate that hazardous materials such as friable asbestos were disposed of in other permitted landfills. Based on this information and certification of process knowledge by the owner, this landfill is classified as Non-Hazardous Class 2. The final closure assessment report and its supporting documentation demonstrate that the threat to human health or the environment is at or below those required for Risk Reduction Standard Number 2. However, due to the fact that waste was left in place, a cap was constructed to cover the footprint of the landfill and closure of the landfill meets Risk Reduction Standard Number 3.

Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The Texas Commission on Environmental Quality requires certain persons to provide certification and/or recordation in the real property records to notify the public of the conditions of the land and/or the

occurrence of remediation. This certification is not a representation or warranty by the Texas Commission on Environmental Quality of the suitability of this land for any purpose.

II

Being a 7.91 acre tract of land situated in Harrison County, Texas, being out of and a part of a 8,493 acres tract of land known as the former Longhorn Army Ammunition Plant, situated between Highway 43 at Karnack, Texas, and the southwestern shore of Caddo Lake, and being more particularly described by metes and bounds as follows:

(All coordinates shown here on are NAD 83, Texas State Plane North Central Zone 4202, based on GPS Static Processing verified with OPUS).

Beginning at the northwest corner of the herein described tract with coordinates of North: 6951971.54, East: 3316288.74, from which an iron pin set for a GPS Base Point with coordinates of North 6951987.74, East 3316281.35 bears N 24-31-50 E a distance of 17.81 feet;

Thence N 78-23-54 E, 504.61 feet to a point for an angle point with coordinates of North: 6952073.02, East: 3316783.04

Thence S 52-47-27 E, 137.20 feet to a point for an angle point with coordinates of North: 6951990.05, East: 3316892.31;

Thence S 44-12-24 E, 108.04 feet to a point for an angle point with coordinates of North: 6951912.60, East: 3316967.64;

Thence S 01-33-58 W, 110.10 feet to a point for an angle point with coordinates of North: 6951802.55, East: 3316964.63;

Thence S 11-28-04 W, 121.11 feet to a point for an angle point with coordinates of North: 6951683.85, East: 3316940.56;

Thence S 17-11-28 W, 349.04 feet to a point for the southeast corner of the herein described tract with coordinates of North: 6951350.41, East: 3316837.39;

Thence N 89-11-23 W, 294.12 feet to a point for the southwest corner of the herein described tract with coordinates of North: 6951354.57, East: 3316543.30;

Thence N 22-57-01 W, 332.88 feet to an angle point with coordinates of North: 6951661.10, East: 3316413.50;

Thence N 21-53-42 W , 334.57 feet to the place of beginning and containing 7.91 acres of land according to a survey made on the ground on November 12, 2009 by Ace Surveying, Inc.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-19 site and the TCEQ concluded that no further investigation or remedial action is required for LHAAP-19.

Limited monitoring will take place in the form of inspections of the landfill cap and any maintenance required to maintain the cap integrity for a period of five years. The Army shall correct, as needed, erosion of cover material, lack of vegetative growth, and subsidence or ponding of water. If any of these problems occur after the end of the five-year post-closure period or persist for longer than the first five years of post-closure care, the owner or operator shall be responsible for their correction until all problems have been adequately resolved. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences;

child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

Institutional controls placed on the property to ensure appropriate future use include: (1) Use must remain non-residential as described above; and (2) No activity shall be conducted or permitted that would damage the integrity of the landfill cover (i.e. unauthorized digging or disturbing the existing cover or contents of the landfill). These restrictions will be placed in the deed transferring any part of the property out of federal ownership.

III

The owner of the site is the Department of the Army and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington, D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 14th day of December 2013.

STATE OF TEXAS
COUNTY OF Gregg

BEFORE ME, on this the 14th day of Nov, 2013, personally appeared Rose M. Zeiler, of The United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 14th day of Nov, 2013.

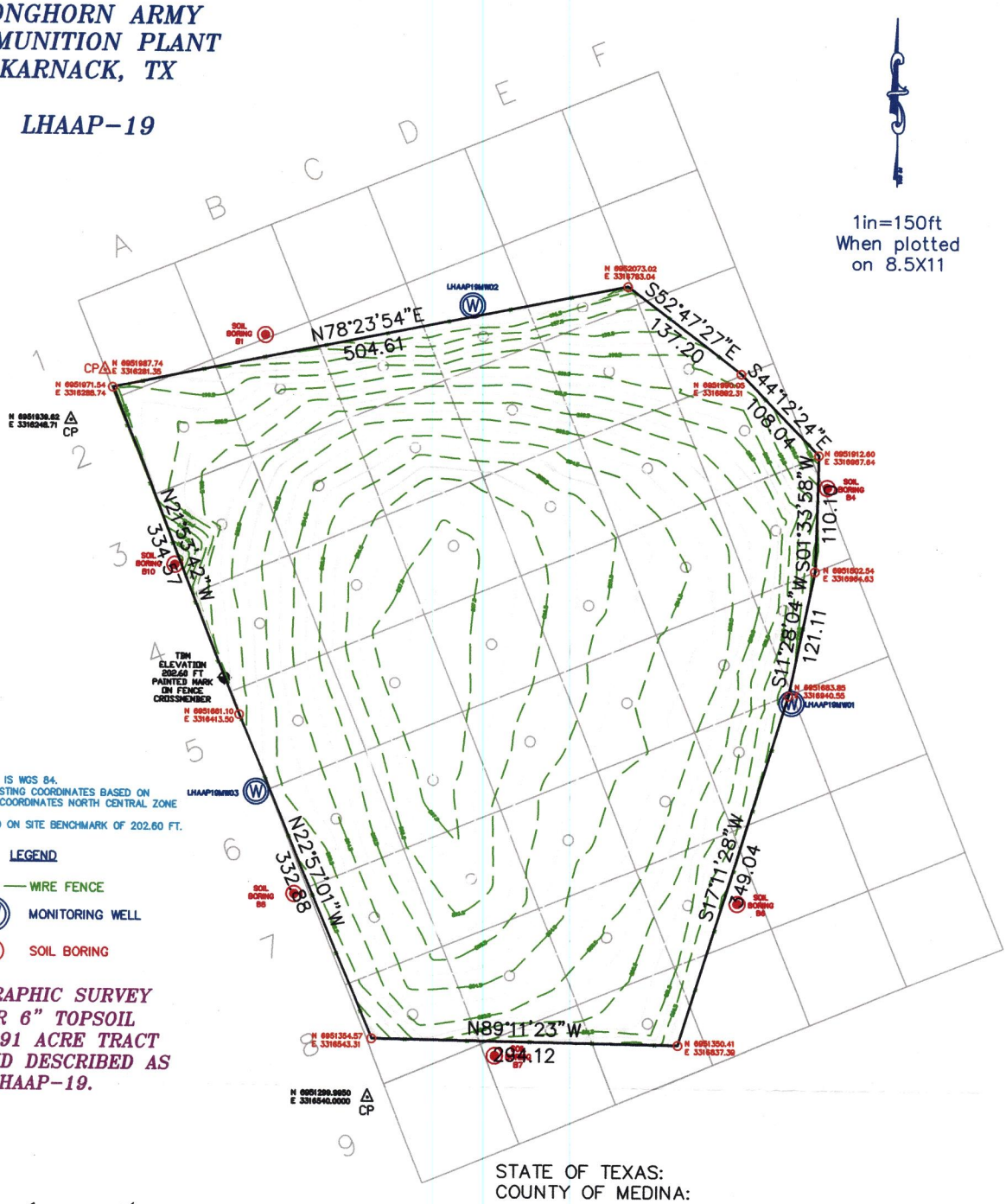
Notary Public in and for the State of Texas,

County of Harrison

BRENDA McBRIDE
Notary Public State of Texas
COMM. EXP. 5-4-2014

LONGHORN ARMY AMMUNITION PLANT KARNACK, TX

LHAAP-19



NOTES:
1) BASIS OF BEARING IS WGS 84.
2) NORTHING AND EASTING COORDINATES BASED ON TEXAS STATE PLANE COORDINATES NORTH CENTRAL ZONE #4202, NAD83.
3) ELEVATIONS BASED ON SITE BENCHMARK OF 202.60 FT.

LEGEND

— x — WIRE FENCE

MONITORING WELL

SOIL BORING

TOPOGRAPHIC SURVEY AFTER 6" TOPSOIL OF A 7.91 ACRE TRACT OF LAND DESCRIBED AS LHAAP-19.

Ace Surveying, Inc.
P. O. BOX 597
DEVINE, TEXAS 78016
830-334-7264
830-665-5796 FAX
acesurveying@sbcglobal.net

THIS DRAWING IS THE PROPERTY OF ACE LAND SERVICES AND SHALL NOT BE USED FOR ANY PURPOSE WITHOUT THE WRITTEN CONSENT OF AN AUTHORIZED AGENT OF ACE LAND SERVICES. ACE LAND SERVICES ACCEPTS NO RESPONSIBILITY FOR THE USE OF THIS DRAWING FOR ANY PURPOSE AFTER SIX MONTHS FROM THE DATE SHOWN HEREON. ALL RIGHTS RESERVED. COPYRIGHT 2009, ACE SURVEYING, INC. ©

STATE OF TEXAS
REGISTERED
RHONDA K. BUTLER
5409
PROFESSIONAL
LAND SURVEYOR

STATE OF TEXAS:
COUNTY OF MEDINA:

I, RHONDA K. BUTLER, DO HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM AN ACTUAL SURVEY MADE ON THE GROUND BY MEN WORKING UNDER MY SUPERVISION.

RHONDA K. BUTLER
REGISTERED PROFESSIONAL LAND SURVEYOR #5409

SURVEYED: NOVEMBER 12, 2009
FILE NO: ALAMO 1, KARNACK

LHAAP-35/36

NOTICE OF NONRESIDENTIAL LAND USE AT SUMPS/WASTE RACK SUMP LOCATIONS (LHAAP-35/36) FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2012-000000706

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000706 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump094 (called Sump 094 on the attached Exhibit A) is part of LHAAP-35/36. Sump094 is a former sump location near Building 16-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump094 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump094) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump094 parcel is 64 square feet, more or less, or 0.00146 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump094 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump094 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump094 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump094 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the ____th day of _____, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 094
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 64.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 07deg59'31"W 569.56' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 8.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 8.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 8.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 8.00' to this POINT OF BEGINNING.

This tract contains 64.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

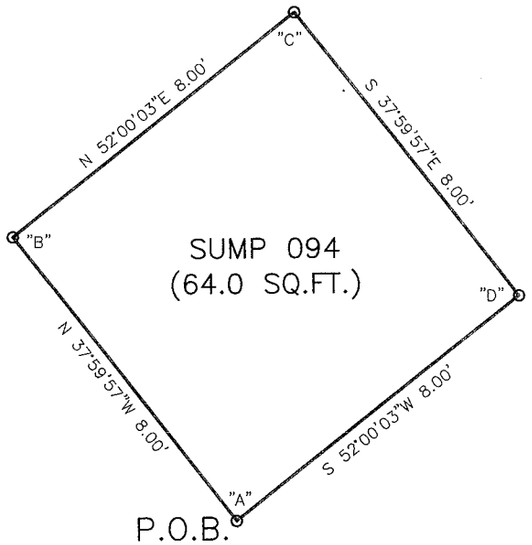
LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP



COORDINATE TABLE

POINT	NORTH	EAST
A	6959071.485	3314200.311
B	6959077.789	3314195.385
C	6959082.715	3314201.689
D	6959076.411	3314206.615



SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE - FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 14, 2011.

N 07°59'31"W 569.56'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 094
(64.0 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	H.PTS H.LEG
03/14/2011	1103025H.DWG	DRAWN BY JTJ

00906143

2012-000000707

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000707 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump095 (called Sump 095 on the attached Exhibit A) is part of LHAAP-35/36. Sump095 is a former sump location near Building 34-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump095 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump095) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump095 parcel is 69.6 square feet, more or less, or 0.00159 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump095 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump095 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump095 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump095 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM- ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 095
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 69.6 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

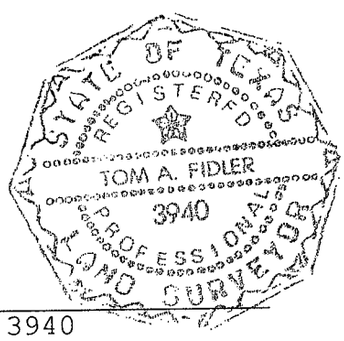
THENCE N 43deg48'28"E 725.22' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following eight courses :

(01)	N 37deg59'57"W	12.00'	to a point for tract corner,
(02)	S 52deg00'03"W	3.10'	to a point for tract corner,
(03)	N 37deg59'57"W	6.00'	to a point for the Westmost corner of this tract,
(04)	N 52deg00'03"E	8.00'	to a point for the Northmost corner of this tract,
(05)	S 37deg59'57"E	6.00'	to a point for tract corner,
(06)	S 52deg00'03"W	3.10'	to a point for tract corner,
(07)	S 37deg59'57"E	12.00'	to a point for the Eastmost corner of this tract,
(08)	S 52deg00'03"W	1.80'	to this POINT OF BEGINNING.

This tract contains 69.6 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

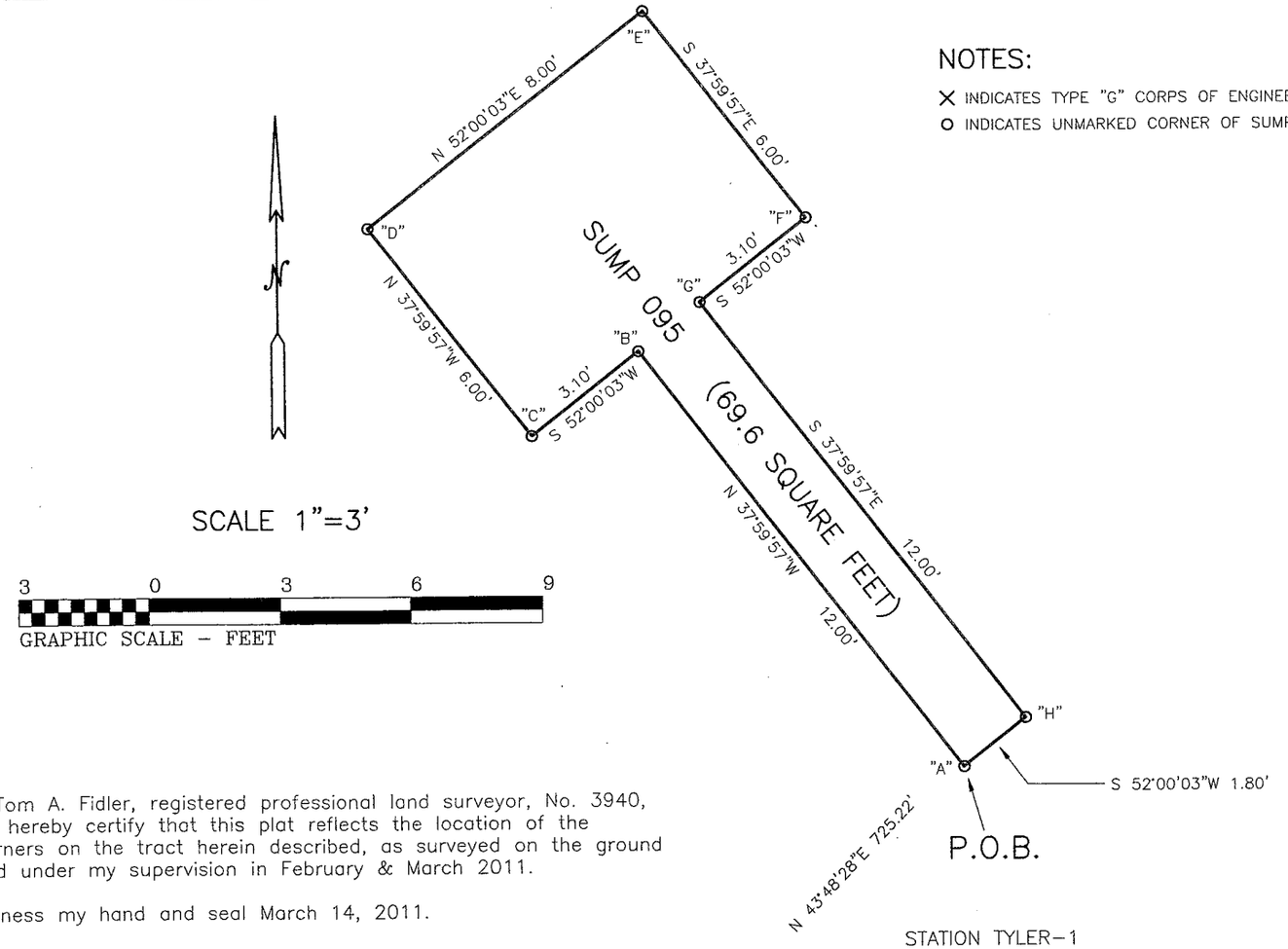


Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP



NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6959030.826	3314781.526
B	6959040.282	3314774.138
C	6959038.373	3314771.695
D	6959043.101	3314768.001
E	6959048.027	3314774.305
F	6959043.299	3314777.999
G	6959041.390	3314775.556
H	6959031.934	3314782.944

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 14, 2011.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET

SUMP 095
(69.6 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	F.PTS F.LEG
03/14/2011	1103025F.DWG	DRAWN BY JTJ

00906149

2012-000000708

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000708 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump096 (called Sump 096 on the attached Exhibit A) is part of LHAAP-35/36. Sump096 is a former sump location near Building 34-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump096 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump096) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump096 parcel is 64 square feet, more or less, or 0.00146 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump096 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump096 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump096 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump096 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM- ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.



Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 096
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 64.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

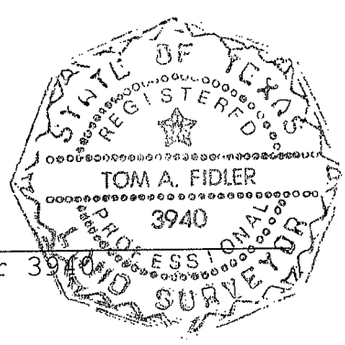
THENCE N 36deg34'53"E 696.04' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 8.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 8.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 8.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 8.00' to this POINT OF BEGINNING.

This tract contains 64.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

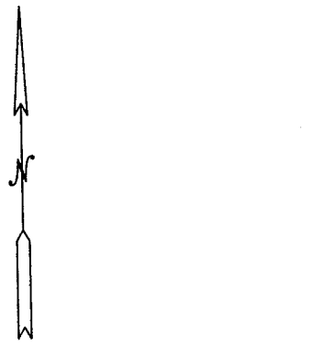


Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

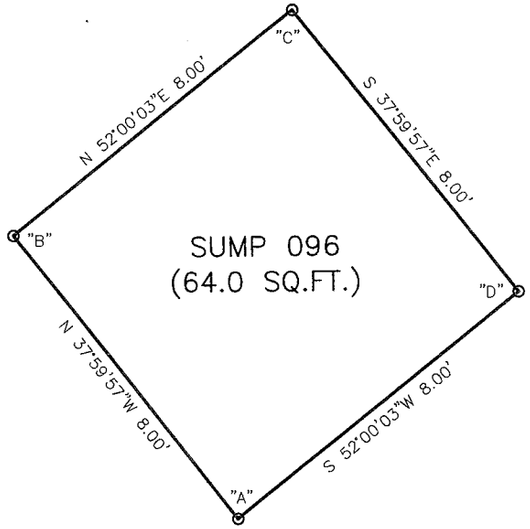
NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP



SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE – FEET



STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6959066.385	3314694.311
B	6959072.689	3314689.385
C	6959077.615	3314695.689
D	6959071.311	3314700.615

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 14, 2011.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 096
(64.0 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	G.PTS G.LEG
03/14/2011	1103025G.DWG	DRAWN BY JTJ

00906155

2012-000000709

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000709 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump097 (called Sump 097 on the attached Exhibit A) is part of LHAAP-35/36. Sump097 is a former sump location near Building 38-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump097 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump097) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump097 parcel is 76.6 square feet, more or less, or 0.00175 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump097 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump097 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump097 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump097 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 097
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 76.6 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

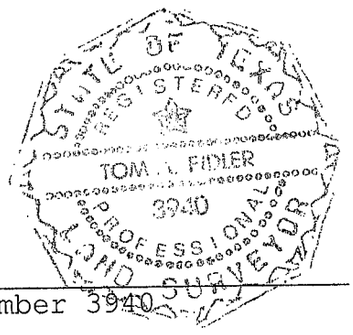
THENCE N 33deg53'28"E 842.86' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete which defines this sump,

THENCE along the external face of the concrete which defines this sump the following four courses, each course ending at a corner of the external face of said concrete :

(01)	N 58deg18'32"W	6.20',	being this sump's Westmost corner,
(02)	N 37deg53'34"E	12.45',	being this sump's Northmost corner,
(03)	S 58deg06'49"E	6.18',	being this sump's Eastmost corner,
(04)	S 37deg47'39"W	12.43',	being the aforementioned POINT OF BEGINNING.

This tract contains 76.6 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

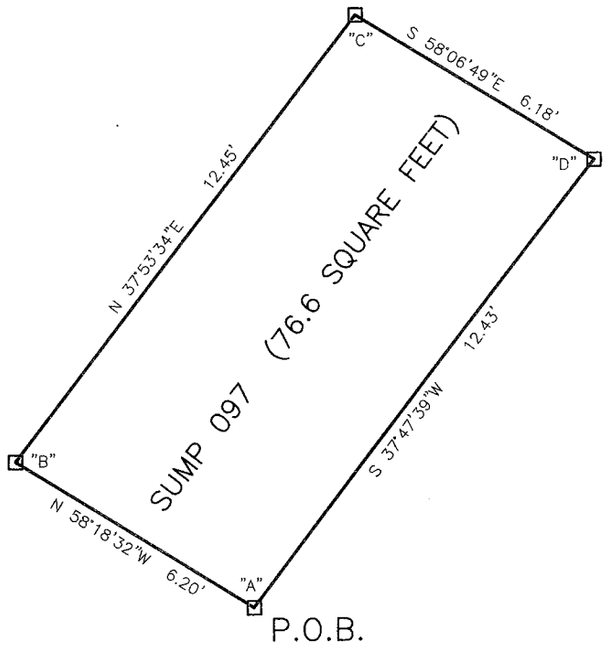
LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE
- O INDICATES UNMARKED POINT

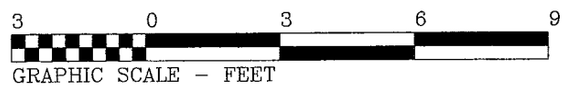


COORDINATE TABLE

POINT	NORTH	EAST
A	6959207.120	3314749.495
B	6959210.377	3314744.219
C	6959220.206	3314751.868
D	6959216.943	3314757.113



SCALE 1"=3'



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 4, 2011.

N 33°53'28"E 842.86'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET



Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 097
(76.6 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	Z.PTS Z.LEG
MAR. 4, 2011	0908074Z.DWG	DRAWN BY JTJ

00906161

2012-000000710

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000710 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump098 (called Sump 098 on the attached Exhibit A) is part of LHAAP-35/36. Sump098 is a former sump location near Building 38-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump098 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump098) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump098 parcel is 39.4 square feet, more or less, or 0.0009 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump098 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump098 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump098 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump098 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 098
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 39.4 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

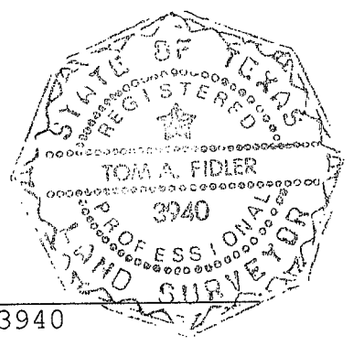
THENCE N 28deg58'18"E 815.98' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete which defines this sump,

THENCE along the external face of the concrete which defines this sump the following four courses, each course ending at a corner of the external face of said concrete :

(01)	N 51deg59'37"W	9.74',	being this sump's Westmost corner,
(02)	N 43deg01'55"E	4.05',	being this sump's Northmost corner,
(03)	S 52deg06'01"E	9.75',	being this sump's Eastmost corner,
(04)	S 43deg15'56"W	4.07',	being the aforementioned POINT OF BEGINNING.

This tract contains 39.4 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

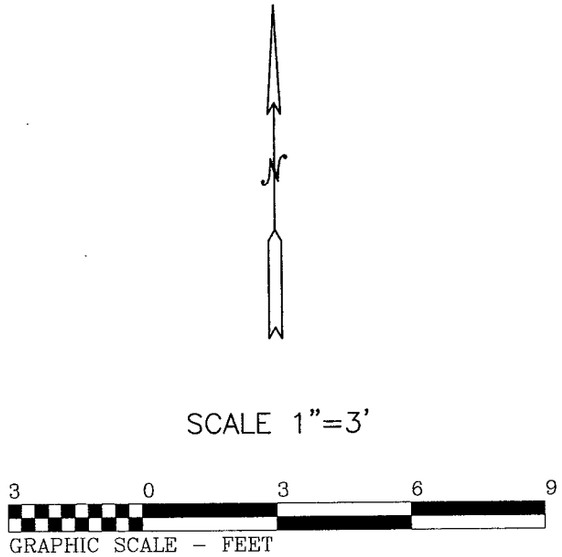


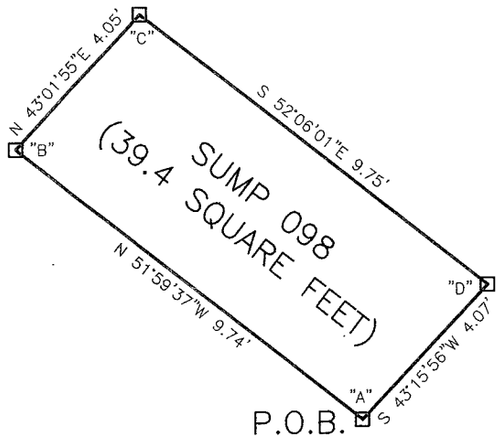
Tom A. Fidler, R.P.L.S. Number 3940

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE
O INDICATES UNMARKED POINT

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com





NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6959221.331	3314674.744
B	6959227.327	3314667.072
C	6959230.288	3314669.837
D	6959224.296	3314677.534

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 4, 2011.

N 28°58'18"E 815.98'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 098
(39.4 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	Y.PTS Y.LEG
MAR. 4, 2011	0908074Y.DWG	DRAWN BY JTJ

00906167

2012-000000711

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000711 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump099 (called Sump 099 on the attached Exhibit A) is part of LHAAP-35/36. Sump099 is a former sump location near Building 38-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump099 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump099) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump099 parcel is 48 square feet, more or less, or 0.0011 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump099 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump099 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump099 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump099 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 099
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 48.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

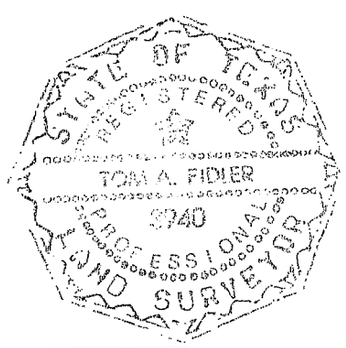
THENCE N 27deg36'35"E 879.49' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 8.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 6.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 8.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 6.00' to this POINT OF BEGINNING.

This tract contains 48.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

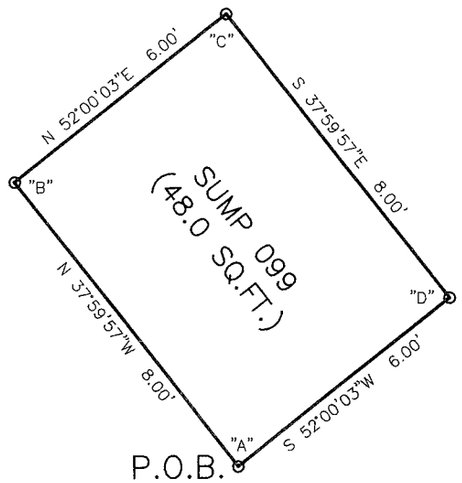
ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

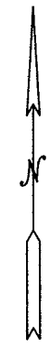
NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP

COORDINATE TABLE

POINT	NORTH	EAST
A	6959286.801	3314687.099
B	6959293.105	3314682.173
C	6959296.799	3314686.901
D	6959290.495	3314691.827





SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE - FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 14, 2011.

N 27°36'35"E 879.49'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 099
(48.0 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	J.PTS J.LEG
03/14/2011	1103025J.DWG	DRAWN BY JTJ

00906173

2012-000000712

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000712 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump100 (called Sump 100 on the attached Exhibit A) is part of LHAAP-35/36. Sump100 is a former sump location near Building 45-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump100 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump100) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump100 parcel is 80 square feet, more or less, or 0.00183 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump100 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump100 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump100 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump100 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of JUNE, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 100
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 80.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 23deg52'16"E 995.90' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 8.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 10.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 8.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 10.00' to this POINT OF BEGINNING.

This tract contains 80.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

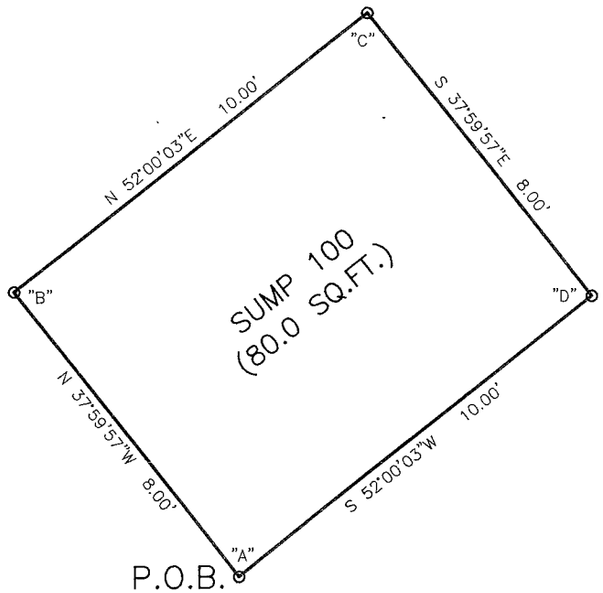
STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.



NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP



COORDINATE TABLE

POINT	NORTH	EAST
A	6959418.170	3314682.523
B	6959424.474	3314677.597
C	6959430.630	3314685.477
D	6959424.326	3314690.403

SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE – FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 14, 2011.

N 23°52'16"E 995.90'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 100
(80.0 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	K.PTS K.LEG
03/14/2011	1103025K.DWG	DRAWN BY JTJ

00906179

2012-000000713

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000713 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump101 (called Sump 101 on the attached Exhibit A) is part of LHAAP-35/36. Sump101 is a former sump location near Building 45-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump101 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump101) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump101 parcel is 67 square feet, more or less, or 0.00153 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump101 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump101 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump101 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump101 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 101
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 67.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

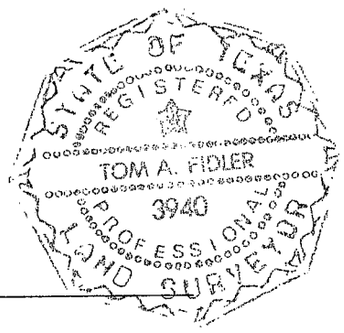
THENCE N 27deg18'47"E 1027.58' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete which defines this sump,

THENCE along the external face of the concrete which defines this sump the following four courses, each course ending at a corner of the external face of said concrete :

(01)	N 38deg59'52"W	11.24',	being this sump's Westmost corner,
(02)	N 57deg48'20"E	5.99',	being this sump's Northmost corner,
(03)	S 39deg05'42"E	11.26',	being this sump's Eastmost corner,
(04)	S 57deg59'19"W	6.01',	being the aforementioned POINT OF BEGINNING.

This tract contains 67.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

NOTES:

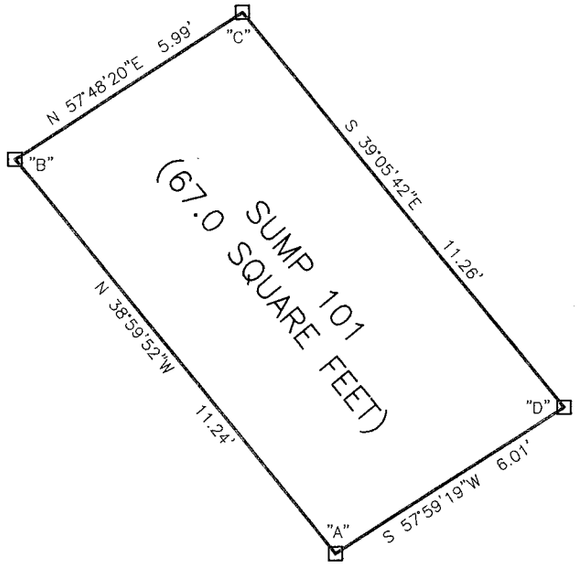
X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE
O INDICATES UNMARKED POINT

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com



SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE – FEET



P.O.B.

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6959420.476	3314751.003
B	6959429.211	3314743.930
C	6959432.404	3314749.001
D	6959423.663	3314756.102

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 4, 2011.

N 27°18'47"E 1027.58'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 101
(67.0 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	A.PTS A.LEG
MAR. 4, 2011	1103025A.DWG	DRAWN BY JTJ

00906185

2012-000000714

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000714 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump102 (called Sump 102 on the attached Exhibit A) is part of LHAAP-35/36. Sump102 is a former sump location near Building 16-T physically located within site boundary of LHAAP-35C(53) of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump102 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump102) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump102 parcel is 154.4 square feet, more or less, or 0.00354 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump102 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump102 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump102 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump102 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 102
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 154.4 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-2" referenced above,

THENCE S 17deg29'41"E 550.28' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following ten courses :

(01)	S 15deg52'38"E	7.67'	to a point for the Eastmost corner of this tract,
(02)	S 74deg07'22"W	6.94'	to a point for tract corner,
(03)	N 15deg52'38"W	5.54'	to a point for tract corner,
(04)	S 74deg07'22"W	12.94'	to a point for tract corner,
(05)	S 36deg37'46"W	24.51'	to a point for tract corner,
(06)	S 53deg22'14"E	7.10'	to a point for tract corner,
(07)	S 36deg37'46"W	2.10'	to a point for the Southmost corner of this tract,
(08)	N 53deg22'14"W	9.25'	to a point for the Westmost corner of this tract,
(09)	N 36deg37'46"E	27.31'	to a point for tract corner,
(10)	N 74deg07'22"E	20.63'	to this POINT OF BEGINNING.

This tract contains 154.4 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

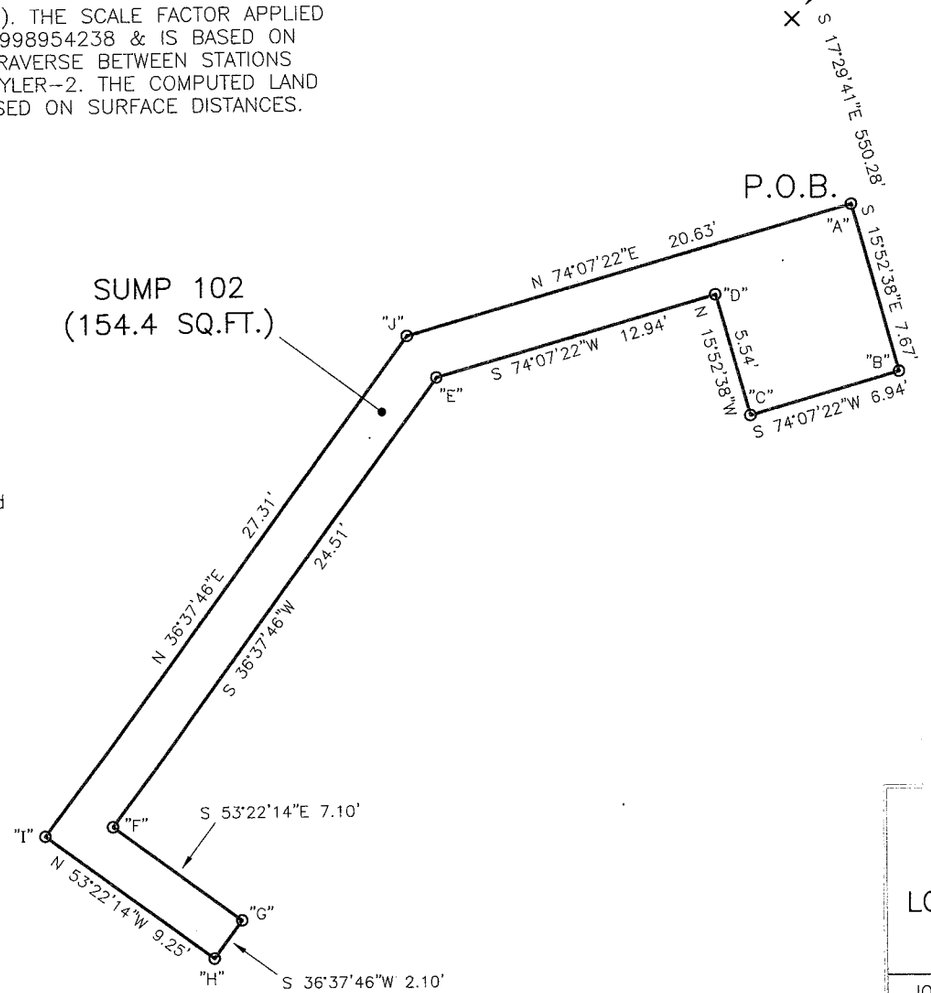
STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

SCALE 1"=6'

6 0 6 12 18
GRAPHIC SCALE - FEET



COORDINATE TABLE

POINT	NORTH	EAST
A	6957307.354	3315333.565
B	6957299.975	3315335.664
C	6957298.077	3315328.991
D	6957303.409	3315327.474
E	6957299.870	3315315.030
F	6957280.203	3315300.409
G	6957275.965	3315306.110
H	6957274.278	3315304.856
I	6957279.797	3315297.433
J	6957301.711	3315313.725

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 11, 2011.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

SUMP 102
(154.4 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1101007	0407088.CRD	B.PTS B.LEG
MAR. 11, 2011	1103025B.DWG	DRAWN BY JTJ

00906191

2012-000000715

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000715 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump103 (called Sump 103 on the attached Exhibit A) is part of LHAAP-35/36. Sump103 is a former sump location near Building 16-T physically located within site boundary of LHAAP-35C(53) of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump103 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump103) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump103 parcel is 209.1 square feet, more or less, or 0.0048 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump103 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump103 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump103 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump103 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 103
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 209.1 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-2" referenced above,

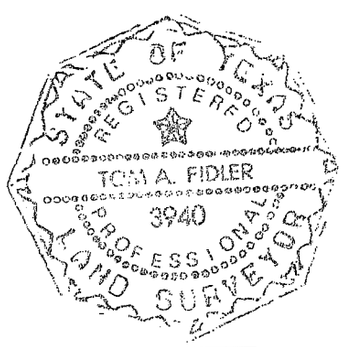
THENCE S 20deg31'34"E 601.43' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following ten courses :

(01)	S 16deg10'14"E	10.01'	to a point for the Eastmost corner of this tract,
(02)	S 73deg49'46"W	9.99'	to a point for tract corner,
(03)	N 16deg10'14"W	2.67'	to a point for tract corner,
(04)	S 36deg37'46"W	27.57'	to a point for the Southmost corner of this tract,
(05)	N 53deg22'14"W	29.02'	to a point for the Westmost corner of this tract,
(06)	N 36deg37'46"E	2.10'	to a point for tract corner,
(07)	S 53deg22'14"E	27.18'	to a point for tract corner,
(08)	N 36deg37'46"E	26.86'	to a point for tract corner,
(09)	N 16deg10'14"W	5.03'	to a point for tract corner,
(10)	N 73deg49'46"E	9.99'	to this POINT OF BEGINNING.

This tract contains 209.1 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 11, 2011.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@coblelynx.com

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

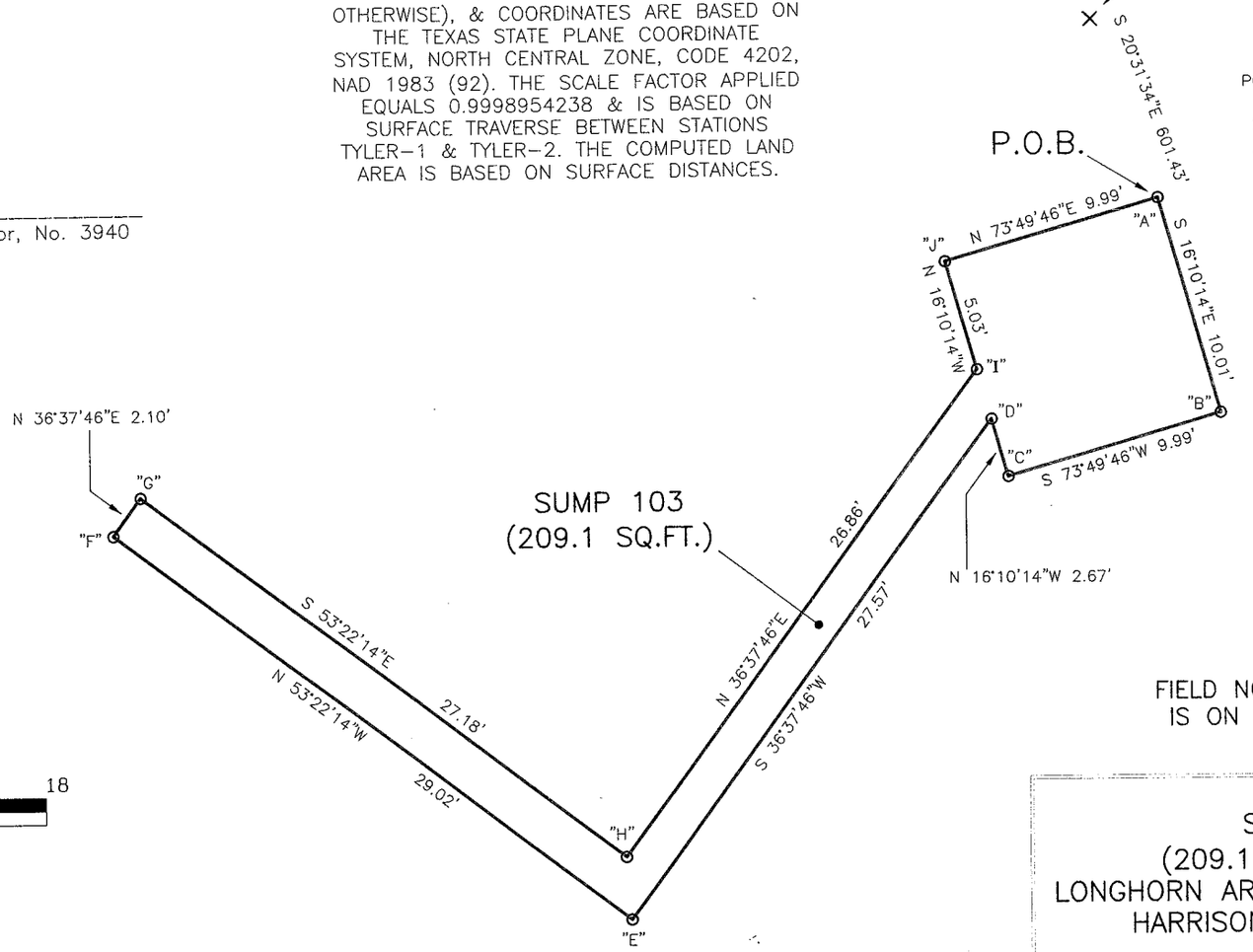
STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6957268.937	3315379.021
B	6957259.319	3315381.810
C	6957256.536	3315372.213
D	6957259.104	3315371.468
E	6957236.982	3315355.021
F	6957254.297	3315331.731
G	6957255.984	3315332.985
H	6957239.765	3315354.800
I	6957261.320	3315370.825
J	6957266.154	3315369.424



FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET

SCALE 1"=6'

6 0 6 12 18
GRAPHIC SCALE - FEET

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP

SUMP 103
(209.1 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1101007	0407088.CRD	C.PTS C.LEG
MAR. 11, 2011	1103025C.DWG	DRAWN BY JTJ

00906197

2012-000000716

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000716 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump104 (called Sump 104 on the attached Exhibit A) is part of LHAAP-35/36. Sump104 is a former sump location near Building 16-T physically located within site boundary of LHAAP-35C(53) of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump104 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump104) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump104 parcel is 149.2 square feet, more or less, or 0.00342 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump104 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump104 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump104 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump104 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of JUNE, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 104
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 149.2 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-2" referenced above,

THENCE S 09deg38'40"E 580.62' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following eight courses :

(01)	S 53deg22'14"E	23.26'	to a point for the Eastmost corner of this tract,
(02)	S 36deg37'46"W	2.24'	to a point for tract corner,
(03)	N 53deg22'14"W	20.93'	to a point for tract corner,
(04)	S 36deg37'46"W	24.04'	to a point for the Southmost corner of this tract,
(05)	N 53deg22'14"W	7.69'	to a point for the Westmost corner of this tract,
(06)	N 36deg37'46"E	7.70'	to a point for tract corner,
(07)	S 53deg22'14"E	5.37'	to a point for tract corner,
(08)	N 36deg37'46"E	18.58'	to this POINT OF BEGINNING.

This tract contains 149.2 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 11, 2011.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

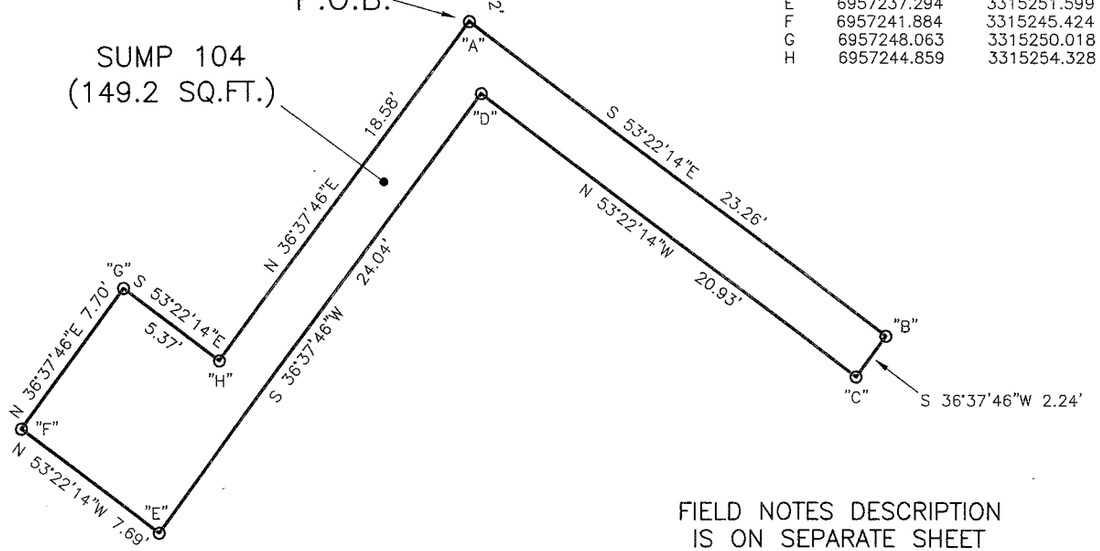
BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

S 09°38'40"E 580.62'

COORDINATE TABLE

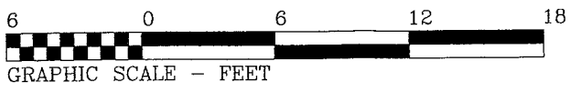
POINT	NORTH	EAST
A	6957259.767	3315265.412
B	6957245.891	3315284.077
C	6957244.097	3315282.743
D	6957256.587	3315265.943
E	6957237.294	3315251.599
F	6957241.884	3315245.424
G	6957248.063	3315250.018
H	6957244.859	3315254.328



FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET



SCALE 1"=6'



NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

SUMP 104
(149.2 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1101007	0407088.CRD	D.PTS D.LEG
MAR. 11, 2011	1103025D.DWG	DRAWN BY JTJ

00906203

2012-000000717

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000717 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump105 (called Sump 105 on the attached Exhibit A) is part of LHAAP-35/36. Sump105 is a former sump location near Building 16-T physically located within site boundary of LHAAP-35C(53) of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump105 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump105) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump105 parcel is 201.7 square feet, more or less, or 0.00463 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump105 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump105 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump105 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump105 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 105
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 201.7 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-2" referenced above,

THENCE S 13deg17'42"E 623.38' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following eight courses :

(01)	S 53deg22'14"E	26.51'	to a point for the Eastmost corner of this tract,
(02)	S 36deg37'46"W	15.65'	to a point for tract corner,
(03)	S 53deg22'14"E	8.85'	to a point for tract corner,
(04)	S 36deg37'46"W	10.63'	to a point for the Southmost corner of this tract,
(05)	N 53deg22'14"W	10.86'	to a point for tract corner,
(06)	N 36deg37'46"E	24.04'	to a point for tract corner,
(07)	N 53deg22'14"W	24.50'	to a point for the Westmost corner of this tract,
(08)	N 36deg37'46"E	2.24'	to this POINT OF BEGINNING.

This tract contains 201.7 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

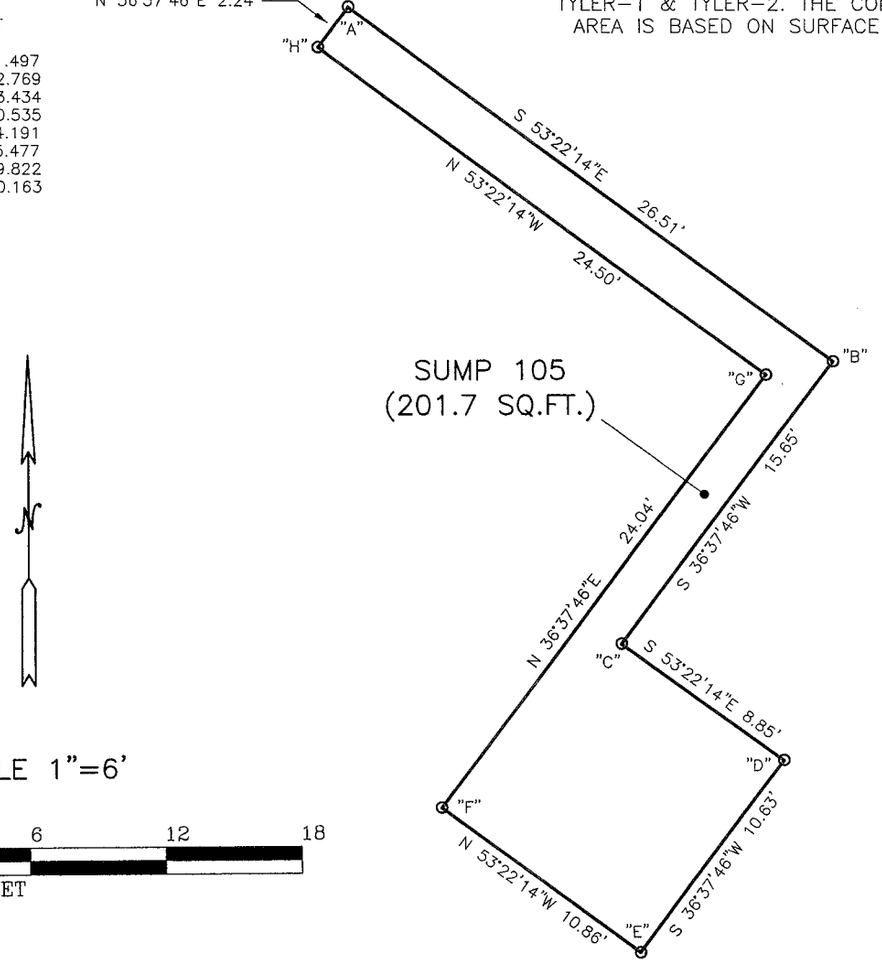
S 13°17'42"E 623.38'

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6957225.505	3315311.497
B	6957209.690	3315332.769
C	6957197.135	3315323.434
D	6957191.856	3315330.535
E	6957183.323	3315324.191
F	6957189.801	3315315.477
G	6957209.095	3315329.822
H	6957223.711	3315310.163



SCALE 1"=6'

6 0 6 12 18
GRAPHIC SCALE - FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 11, 2011.

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

STATE OF TEXAS
REGISTERED
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

SUMP 105
(201.7 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1101007	0407088.CRD	E.PTS E.LEG
MAR. 11, 2011	1103025E.DWG	DRAWN BY JTJ

2012-000000718

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000718 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump123 (called Sump 123 on the attached Exhibit A) is part of LHAAP-35/36. Sump123 is a former sump location near Building 18-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump123 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump123) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump123 parcel is 60 square feet, more or less, or 0.00137 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump123 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump123 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump123 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump123 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
SUMP 123
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 60.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

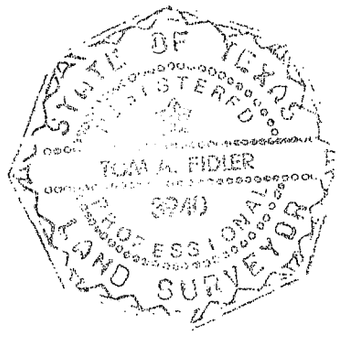
THENCE N 07deg59'31"W 569.56' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 6.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 10.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 6.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 10.00' to this POINT OF BEGINNING.

This tract contains 60.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

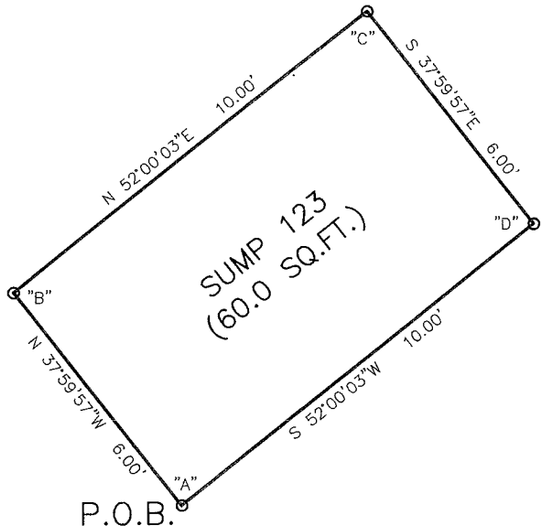
LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP



COORDINATE TABLE

POINT	NORTH	EAST
A	6959122.758	3314187.907
B	6959127.486	3314184.213
C	6959133.642	3314192.093
D	6959128.914	3314195.787



SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE - FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 14, 2011.

N 08°28'00"W 622.08'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 123
(60.0 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	I.PTS I.LEG
03/14/2011	1103025I.DWG	DRAWN BY JTJ

00906215

2012-000000719

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000719 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. WRSump001 (called W.R. Sump 001 on the attached Exhibit A) is part of LHAAP-35/36. WRSump001 is a former waste rack sump location near Building 34-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36 of which WRSump001 is a part is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2, no further action.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps were also associated with wash racks (waste rack sumps including WRSump001) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The WRSump001 parcel is 57.1 square feet, more or less, or 0.00131 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the WRSump001 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from WRSump001 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of WRSump001 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of WRSump001 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
W.R. SUMP 001
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 57.1 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

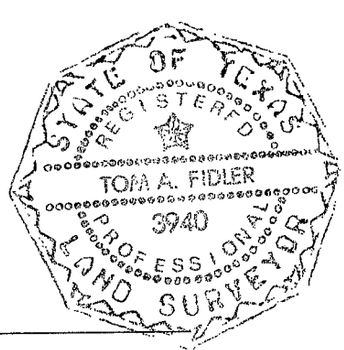
THENCE N 42deg37'08"E 700.32' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete wall which defines this sump,

THENCE along the external face of the concrete wall which defines this sump the following twelve courses, each course ending at a corner of the external face of said concrete wall :

(01)	N 36deg36'16"W	4.50',	
(02)	N 51deg51'25"E	1.07',	
(03)	N 38deg08'35"W	2.46',	
(04)	S 63deg07'08"W	0.85',	
(05)	N 38deg08'35"W	7.98',	being this sump's Westmost corner,
(06)	N 51deg51'25"E	3.70',	being this sump's Northmost corner,
(07)	S 39deg59'44"E	8.17',	
(08)	S 52deg07'09"W	1.00',	
(09)	S 39deg59'44"E	2.34',	
(10)	N 50deg00'16"E	1.14',	
(11)	S 39deg59'44"E	4.67',	being this sump's Eastmost corner,
(12)	S 52deg10'33"W	4.68',	being the aforementioned POINT OF BEGINNING.

This tract contains 57.1 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

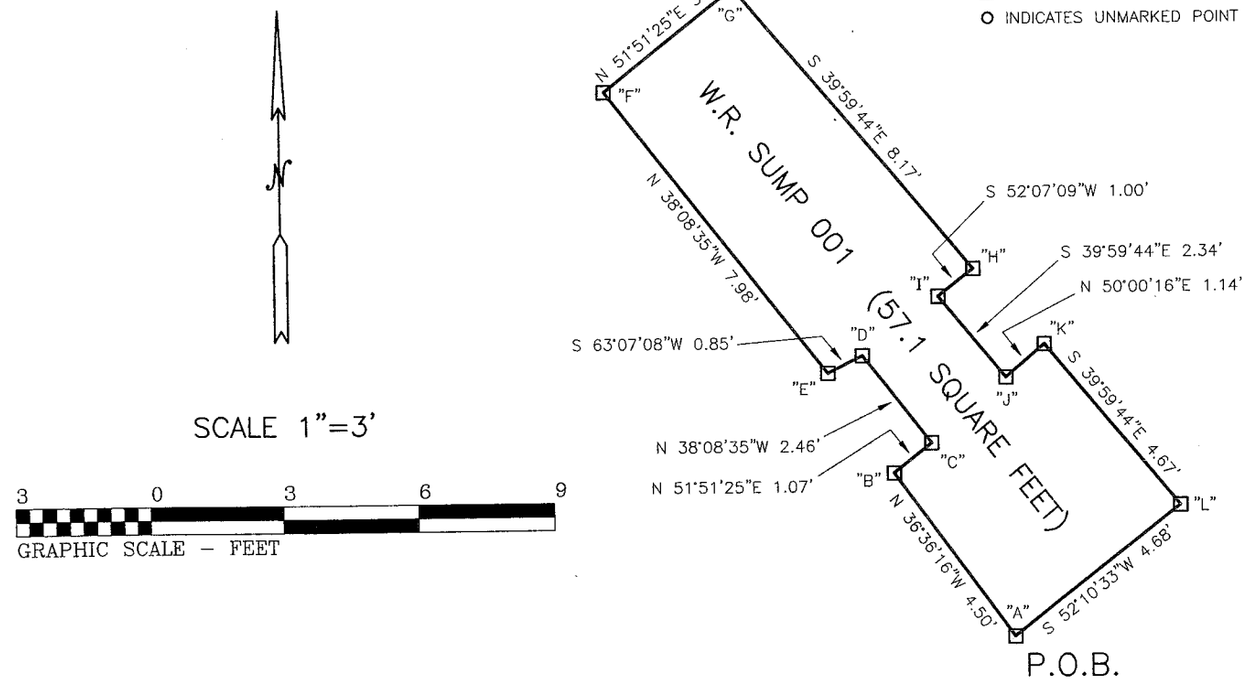


Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE WALL
- O INDICATES UNMARKED POINT



NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6959022.804	3314753.696
B	6959026.415	3314751.014
C	6959027.074	3314751.854
D	6959029.012	3314750.332
E	6959028.627	3314749.573
F	6959034.899	3314744.647
G	6959037.183	3314747.555
H	6959030.925	3314752.805
I	6959030.313	3314752.018
J	6959028.519	3314753.523
K	6959029.252	3314754.396
L	6959025.676	3314757.396
M	6959022.804	3314753.696

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 1, 2011.

N 42°37'08"E 700.32'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

W.R. SUMP 001
(57.1 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	W.PTS W.LEG
MAR. 1, 2011	0908074W.DWG	DRAWN BY JTJ

00906221

2012-000000720

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000720 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. WRSump002 (called W.R. Sump 002 on the attached Exhibit A) is part of LHAAP-35/36. WRSump002 is a former waste rack sump location near Building 38-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which WRSump002 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2, no further action.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps were also associated with wash racks (waste rack sumps including WRSump002) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The WRSump002 parcel is 61.1 square feet, more or less, or 0.00140 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the WRSump002 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from WRSump002 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of WRSump002 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of WRSump002 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
W.R. SUMP 002
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 61.1 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

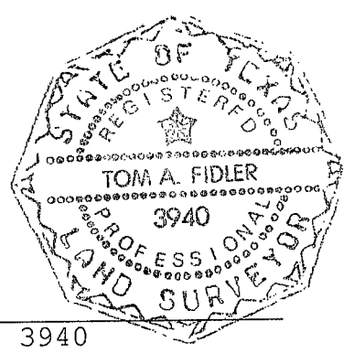
THENCE N 27deg03'19"E 797.78' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete wall which defines this sump,

THENCE along the external face of the concrete wall which defines this sump the following twelve courses, each course ending at a corner of the external face of said concrete wall :

(01)	N 50deg15'02"W	4.01',	being this sump's Westmost corner,
(02)	N 38deg19'51"E	7.83',	
(03)	S 58deg29'13"E	0.84',	
(04)	N 41deg11'11"E	3.09',	
(05)	N 51deg30'19"W	1.32',	
(06)	N 40deg19'40"E	4.55',	being this sump's Northmost corner,
(07)	S 54deg31'45"E	4.65',	being this sump's Eastmost corner,
(08)	S 38deg16'58"W	4.65',	
(09)	N 53deg12'50"W	1.23',	
(10)	S 39deg42'05"W	3.32',	
(11)	S 51deg04'42"E	0.79',	
(12)	S 38deg16'58"W	7.89',	being the aforementioned POINT OF BEGINNING.

This tract contains 61.1 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

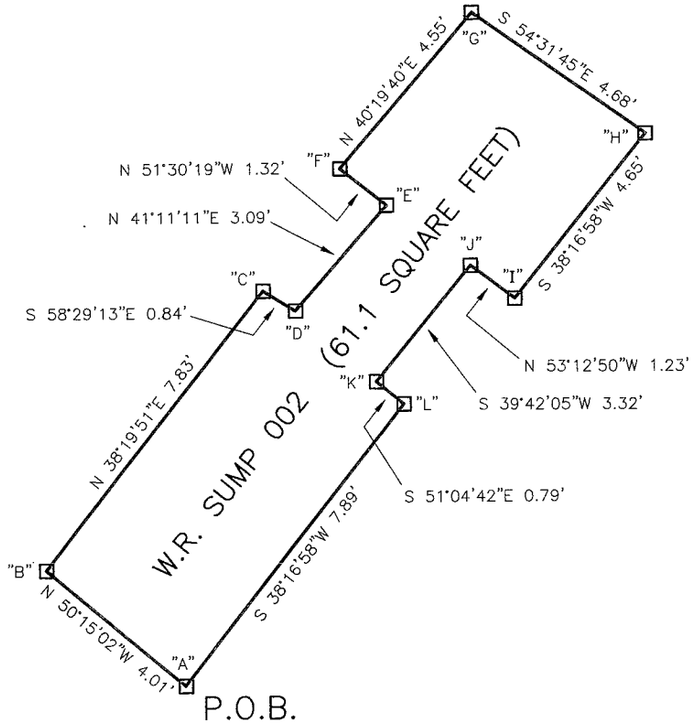
LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE WALL
- O INDICATES UNMARKED POINT



COORDINATE TABLE

POINT	NORTH	EAST
A	6959217.937	3314642.369
B	6959220.500	3314639.287
C	6959226.642	3314644.143
D	6959226.201	3314644.863
E	6959228.524	3314646.896
F	6959229.343	3314645.866
G	6959232.815	3314648.814
H	6959230.097	3314652.628
I	6959226.443	3314649.744
J	6959227.177	3314648.763
K	6959224.624	3314646.643
L	6959224.129	3314647.256
M	6959217.937	3314642.369



N 27°03'19"E 797.78'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE - FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 1, 2011.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

W.R. SUMP 002
(61.1 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	X.PTS X.LEG
MAR. 1, 2011	0908074X.DWG	DRAWN BY JTJ

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2012-000000721

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6 Pages

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On: 01/19/2012 10:41 AM **Document Number:** 2012-000000721 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. WRSump003 (called W.R. Sump 003 on the attached Exhibit A) is part of LHAAP-35/36. WRSump003 is a former waste rack sump location near Building 16-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which WRSump003 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2, no further action.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps were also associated with wash racks (waste rack sumps including WRSump003) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The WRSump003 parcel is 69.5 square feet, more or less, or 0.00159 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the WRSump003 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from WRSump003 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of WRSump003 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of WRSump003 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
W.R. SUMP 003
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 69.5 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 00deg06'48"W 643.61' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete wall which defines this sump,

THENCE along the external face of the concrete wall which defines this sump the following twelve courses, each course ending at a corner of the external face of said concrete wall :

(01)	N 37deg49'35"W 4.09',	being this sump's	Westmost corner,
(02)	N 48deg49'52"E 10.08',		
(03)	S 40deg22'17"E 0.96',		
(04)	N 51deg37'59"E 1.64',		
(05)	N 32deg53'50"W 1.27',		
(06)	N 49deg58'25"E 4.65',	being this sump's	Northmost corner,
(07)	S 41deg50'19"E 4.65',	being this sump's	Eastmost corner,
(08)	S 43deg56'08"W 4.79',		
(09)	N 44deg10'19"W 1.61',		
(10)	S 52deg56'11"W 1.74',		
(11)	S 39deg31'31"E 1.01',		
(12)	S 49deg33'58"W 10.21',	being the aforementioned POINT OF BEGINNING.	

This tract contains 69.5 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

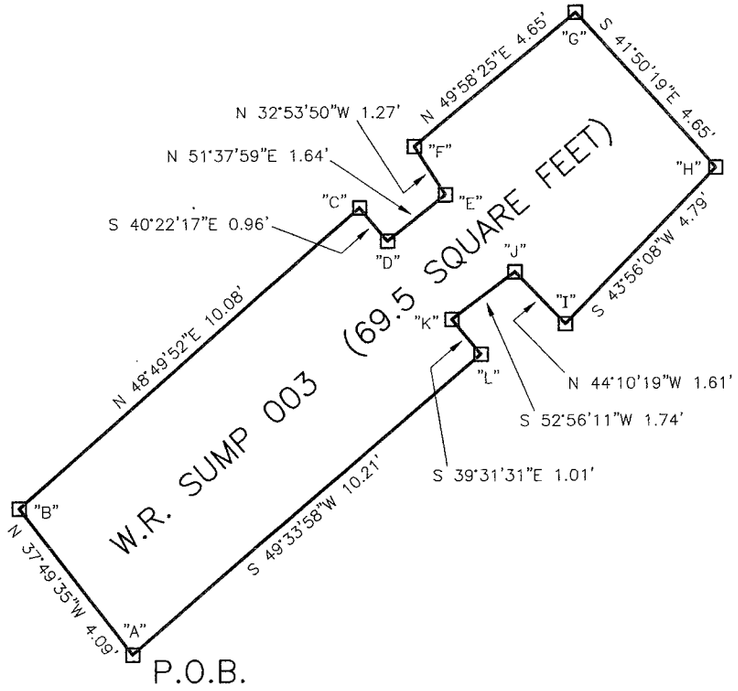
STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.



NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE WALL
- O INDICATES UNMARKED POINT

COORDINATE TABLE

POINT	NORTH	EAST
A	6959151.071	3314278.227
B	6959154.302	3314275.719
C	6959160.937	3314283.306
D	6959160.202	3314283.931
E	6959161.221	3314285.218
F	6959162.288	3314284.528
G	6959165.278	3314288.088
H	6959161.816	3314291.188
I	6959158.365	3314287.863
J	6959159.516	3314286.744
K	6959158.468	3314285.356
L	6959157.691	3314285.996

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 1, 2011.

N 00°06'48"W 643.61'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE - FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

W.R. SUMP 003
(69.5 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	V.PTS V.LEG
MAR. 1, 2011	0908074V.DWG	DRAWN BY JTJ

00906233

LHAAP-37, 37-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

FINAL
REMEDIAL DESIGN
LHAAP-35B (37), CHEMICAL LABORATORY AND LHAAP-67, ABOVEGROUND STORAGE TANK FARM
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS



Prepared by

U.S. Army Corps of Engineers
Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma

August 1, 2011

Table of Contents

List of Figures ii
List of Tables ii
List of Appendices ii
Acronyms and Abbreviations iii

1.0 Purpose 1
2.0 Description of the Site 2
2.1 Hydrogeological Setting 3
2.1.1 Groundwater and Surface Water Interaction 3
3.0 Remedy Performance Objectives 5
4.0 Land Use Controls for the Site 6
5.0 Monitored Natural Attenuation 7
6.0 Remedy Implementation Actions 9
6.1 Design Criteria 9
6.1.1 Basis Of Design 9
6.2 Land Use Control Implementation Actions 11
6.2.1 Comprehensive Land Use Control Management Plan 11
6.2.2 Site Certifications and Reporting 11
6.2.3 Notice of Planned Property Conveyances 12
6.2.4 Opportunity to Review Text of Intended Land Use Controls 12
6.2.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance 12
6.2.6 Land Use Control Enforcement 12
6.2.7 Modification or Termination of Land Use Controls 12
6.3 Monitored Natural Attenuation Implementation Actions 13
6.4 CERCLA Five-Year Reviews 14
7.0 Points of Contact 15
8.0 References 16

4.0 Land Use Controls for the Site

The LUCs to be implemented by the Army or its representatives for LHAAP-35B(37) and LHAAP-67 to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health include:

- Ensure no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup goals are met

Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566.The LUC addresses the areas of LHAAP-35B(37) and LHAAP-67 that include groundwater plumes at LHAAP-35B(37) and LHAAP-67 with levels of contamination that require implementation of a remedy (see **Section 2.0**). The U.S. Army is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the LUC.

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. U.S. Army shall obtain USEPA and TCEQ concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-35B(37) and LHAAP-67 forms the basis for the remedy. The reasonably anticipated future use of the site as part of a national wildlife refuge is consistent with an industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation, will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566 and compliance with the use assumption will be documented in the Five-Year Review reports.

6.2 Land Use Control Implementation Actions

The Army or its representatives will be responsible for LUC implementation and certification, reporting and enforcement. The Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable.

As a condition of property transfer, the Army may require the transferee to assume responsibility for various implementation actions, as indicated below. Although the Army may transfer responsibility for various implementation actions, the Army shall retain its responsibility for remedy integrity. This means that the Army is responsible for addressing substantive violations of performance objectives that would undermine the Army's CERCLA remedy. The Army also will be responsible for: 1) incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation; 2) recording groundwater use restriction and survey plat at the Harrison County Courthouse; and 3) notifying Texas Department of Licensing and Regulation of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ. The following LUC implementation actions shall be undertaken by the Army in order to ensure that the aforementioned LUC performance objectives for LHAAP-35B(37) and LHAAP-67 are met and maintained:

6.2.1 Comprehensive Land Use Control Management Plan

Within 30 days of receiving USEPA and TCEQ approval of this RD, the Army will incorporate this document into the Comprehensive LUC Management Plan. The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUCs being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document is also accessible to regulators, the local government and the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record. As LUC RD documents for additional environmental sites are approved by USEPA and TCEQ, the Army shall likewise add those documents and survey plats to the Comprehensive LUC Management Plan as well as update the previous copy of the plan placed in the Marshall Public Library.

6.2.2 Site Certifications and Reporting

Beginning with finalization of this RD, the Army will undertake annual certifications to confirm continued compliance with the LUC objectives. The Army will retain the annual LUC Compliance Certification documents in the project files for incorporation into the Five-Year Review Reports, and these documents will be made available to USEPA and TCEQ upon request. The certification form will be consistent with the form attached as **Appendix B**. In addition, should any violations be found during the annual certification, the Army will provide to USEPA and TCEQ along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations**.** Upon transfer, such responsibilities may shift to the transferee via

appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental transfer document. The need to continue annual certifications will be revisited at Five-Year Reviews.

6.2.3 Notice of Planned Property Conveyances

The Army shall provide notice to USEPA and TCEQ of plans to convey LHAAP-35B(37) and LHAAP-67 acreage. The notice shall describe the mechanism by which LUCs will continue to be implemented, maintained, inspected, reported, and enforced.

6.2.4 Opportunity to Review Text of Intended Land Use Controls

Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. In addition, the Army will produce an ECP or other environmental document for transfer of LHAAP-35B(37) and LHAAP-67, but before executing transfer, the Army will provide USEPA and TCEQ with a draft copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before document execution, to review all LUC-related provisions.

6.2.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance

Should the Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objectives, the Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 6.2.6** below, the Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

6.2.6 Land Use Control Enforcement

Should the LUC remedy reflected in this LUC RD fail, the Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the owner or violator, to the institution of judicial action under the auspices of Texas property law or CERCLA. Alternatively, should the circumstances warrant such, the Army could choose to exercise its response authorities under CERCLA, and then seek cost recovery after the fact from the person(s) or entity(ies) who violated a given LUC. Should the Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the Army will notify these agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUCs.

6.2.7 Modification or Termination of Land Use Controls

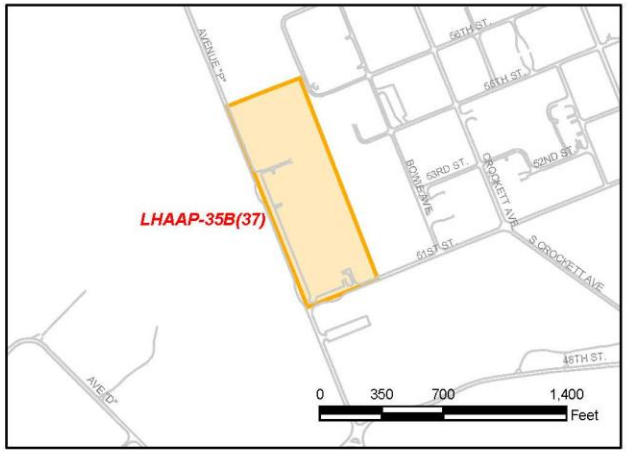
The Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

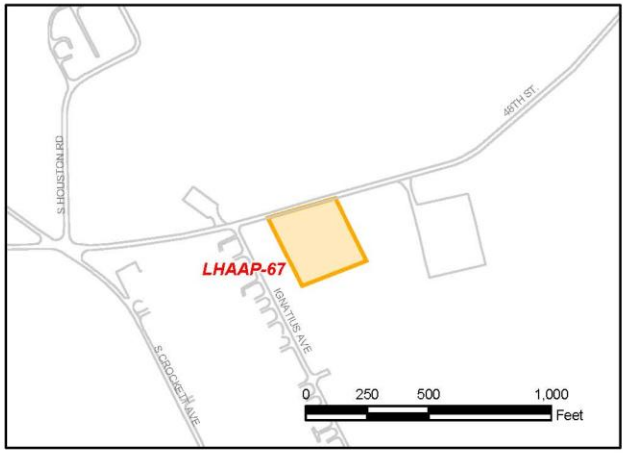
The LUCs shall remain in effect until such time as the Army, TCEQ and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUCs will be terminated as needed. The decision to terminate LUCs will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the Army, TCEQ and USEPA has been made to terminate one or more of the LUCs, the Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

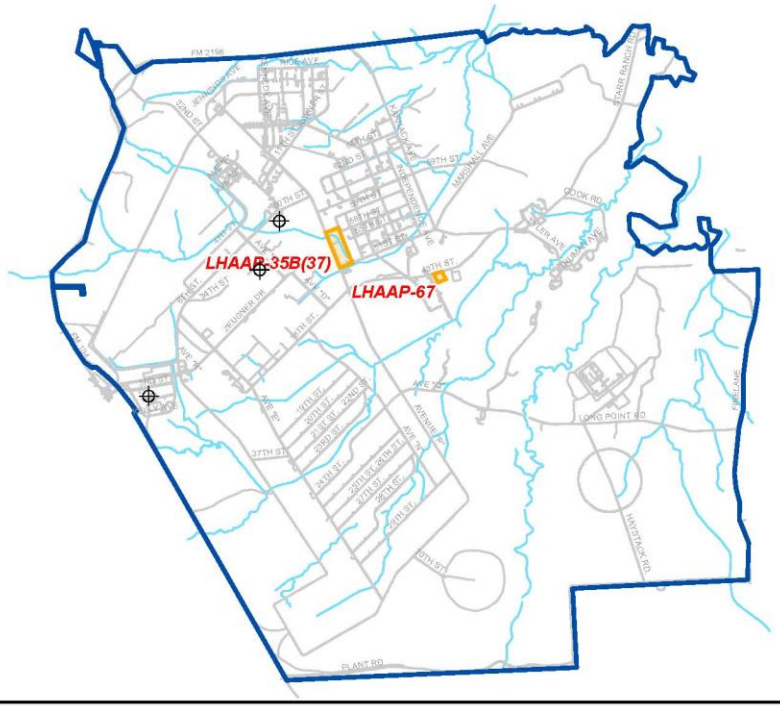
6.3 Monitored Natural Attenuation Implementation Actions

Implementation actions include installation of additional monitoring wells, plugging and abandonment of monitoring wells not designated for long-term monitoring, implementation of a groundwater monitoring plan, monitoring, and reporting. The project schedule and cost summary for implementation actions are provided in **Appendix H**. Groundwater monitoring will be conducted to monitor the effectiveness of MNA in reducing contaminant concentrations over time. Monitoring will also be conducted to evaluate plume migration and ensure that chlorinated solvents-contaminated groundwater does not impact nearby surface water at unacceptable levels. Surface water sampling will be conducted to confirm contaminated groundwater is not migrating to surface water. The Groundwater Monitoring Plan, attached as **Appendix A**, describes the wells, their locations, analytical parameters, the frequency of the monitoring, surface water sampling, and presents a list of the monitored constituents and their respective MCLs. Groundwater monitoring and surface water sampling conducted at LHAAP-35B(37) and LHAAP-67 will follow the Health and Safety Plan (**Appendix E**), the Contractor Quality Control Plan (**Appendix F**), the Chemical Data Acquisition Plan (**Appendix G**), Field Activities (**Appendix C**) and Field Procedures (**Appendix D**) as contained in the appendices of the Remedial Design LHAAP-35B(37) and LHAAP-67.

Annual reports will be prepared for any year in which sampling occurs to document the monitoring program. The first year's annual report will include a review of the first four quarters of data, which include natural attenuation parameters and provide an evaluation for the evidence of MNA as a remedial method and a review of the first year's surface water sample data. The TCEQ provides guidance for MNA as a remedial action in *Monitored Natural Attenuation Demonstrations* (Texas Natural Resource Conservation Commission [TNRCC], RG-366/TRRP-33, October 2001). Although LHAAP is being addressed under the Risk Reduction Standards rather than Texas Risk Reduction Program (TRRP), this guidance is comparable to USEPA guidance and may be used as a guideline for the evaluation of the groundwater data. TRRP guidance specifies recommended lines of evidence to document the occurrence of natural attenuation at a site. For the first annual report, primary and secondary lines of evidence will be evaluated to document that attenuation is occurring at LHAAP-35B(37) and LHAAP-67. The primary line







LEGEND

- Approximate LHAAP Boundary
- Road
- Stream
- Site
- LHAAP Water Supply Well

LEGEND

- Road
- Stream
- Site
- Approximate LHAAP Boundary
- LHAAP Water Supply Well

OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	FILE PATH
Houston, TX	B. Lu 10/12/07	N. Olson 10/31/07	P. Srivastav 10/31/07	T:\GIS\Longhorn\MXD\ST35B67\ROD\SiteLocs.mxd

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 2-2
SITE LOCATION MAP
REMEDIAL DESIGN
LHAAP-35B(37) AND LHAAP-67, GROUP 4
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

LHAAP-37, 37-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-35B (37) FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2015-000002401

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 03/16/2015 11:17 AM **Document Number:** 2015-000002401 **Receipt No:** 1502837 **Amount:** $ 50.00 **By:** Denise Kio, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AECOM
112 E. PECAN ST,STE 400
FED-EX ENVELOPE
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-35B (37)

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-35B (37) (Chemical Laboratory). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-35B (37) were performed in accordance with the FFA requirements.

The LHAAP-35B (37) was built during the construction of Plant 3 (1953-1955) and was originally used to support the production activities at LHAAP. A Record of Decision (ROD) for LHAAP-35B (37) was signed by the USEPA in 2010 establishing the final remedy which consists of land use control (LUC) in conjunction with monitored natural attenuation (MNA). The site was not remediated to levels suitable for unrestricted use. The LUC at LHAAP-35B (37) is required to prevent human exposure to contaminated groundwater. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-35B (37) parcel is a 12.2-acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Within the LHAAP-35B (37) parcel is designated a LUC boundary which is a 16.578-acre tract, more or less, as described in Exhibit A. The LUC boundary is also presented in the attached Figure 1.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12. The United States Department of the Army has undertaken careful environmental study of the LHAAP-35B (37) site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 16.578-acre tract, more or less. Groundwater underlying this land is contaminated with trichloroethene (TCE), tetrachloroethene (PCE), and 1,1-dichloroethene (1,1-DCE) and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

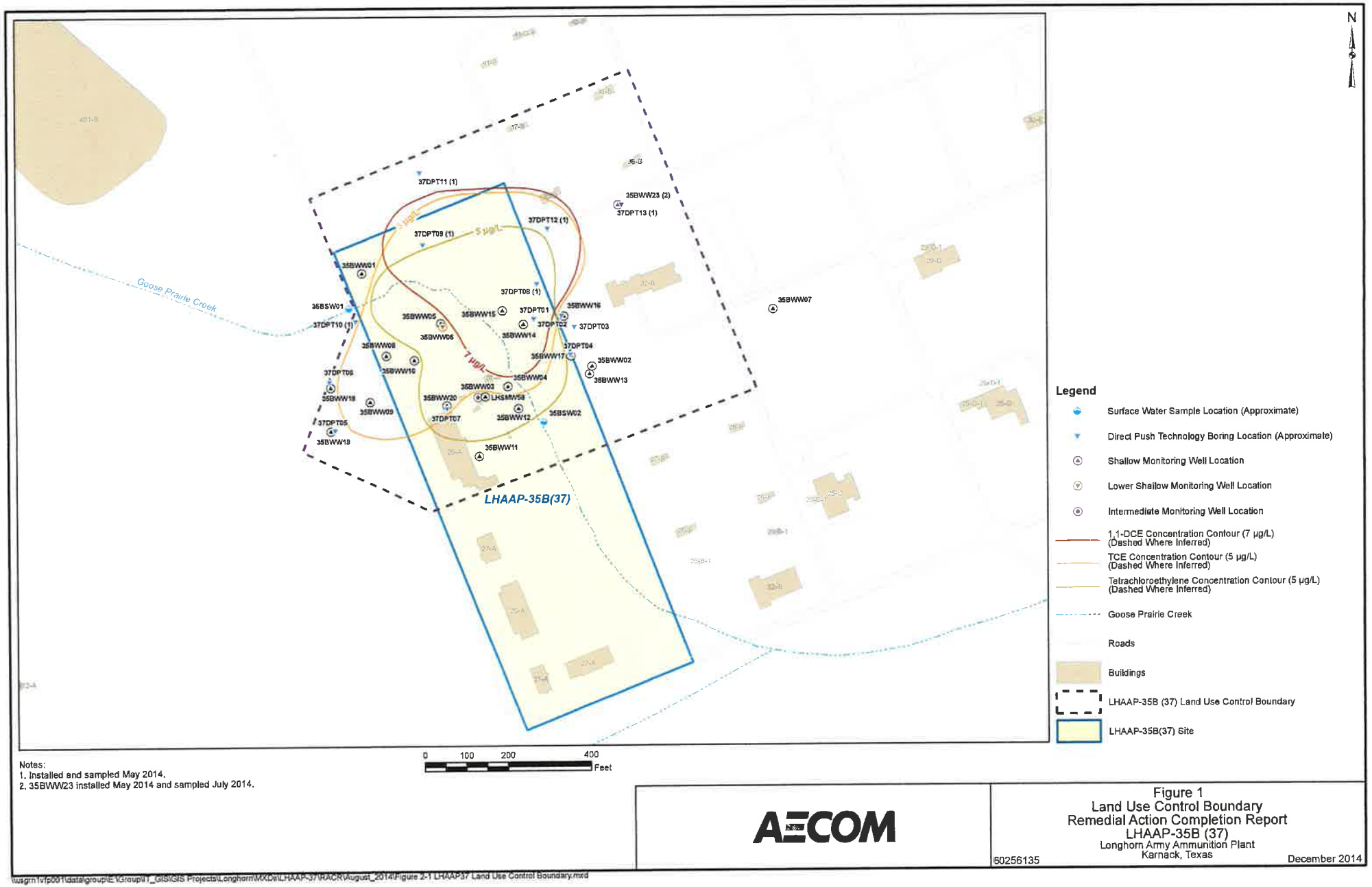
EXECUTED this the 19 th day of February, 2015.

BEFORE ME, on this the 19 th day of February 2015 personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 19th day of February, 2015.

Notary Public in and for the State of Texas,
County of Harrison

GENIE WARNER
Notary Public State of Texas
COMM. EXP. 8/1/2018



Notes:
1. Installed and sampled May 2014.
2. 35BWW23 installed May 2014 and sampled July 2014.

AECOM

Figure 1
Land Use Control Boundary
Remedial Action Completion Report
LHAAP-35B (37)
Longhorn Army Ammunition Plant
Karnack, Texas

60256135 December 2014

\\usgrnlvfp001\data\group\E\Group\IT_GIS\GIS Projects\Longhorn\MXDs\LHAAP-37\RACR\August_2014\Figure 2-1 LHAAP37 Land Use Control Boundary.mxd

EXHIBIT A
SURVEY PLAT

FIELD NOTES DESCRIPTION OF
"LHAAP-35B(37)" LAND USE CONTROL AREA
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-35B(37)" Land Use Control Area being 16.578 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-35B(37)" Land Use Control Area being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.99986172702, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "C-21" (N=6956579.781 feet E=3308499.969 feet) and "X-11" (N=6960733.698 feet E=3304750.367 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on State Plane distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" and "RPLS 3940" .

Commencing at monument "C-21" referenced above,

THENCE N 22deg47'20"W 1290.84' to a concrete nail set (near the centerline of the asphalt pavement of "Avenue P") for the Southmost corner of this tract and this POINT OF BEGINNING,

THENCE N 67deg25'22"W 354.97' along a S.B.L. of this tract to an I.R.O.P.C. set for this tract's Westmost corner,

THENCE N 20deg54'22"E 363.80' along a W.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Avenue P") for this tract's Westerly reentrant corner,

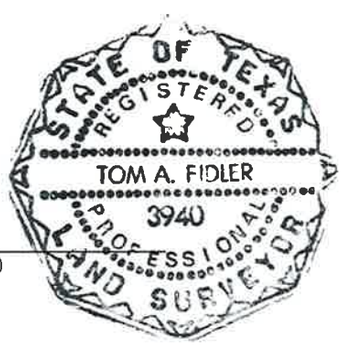
THENCE N 22deg33'04"W 285.83' along a W.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Avenue P") for this tract's N.W.C., said nail being S 52deg54'59"E 3687.90' from the aforementioned "X-11" monument,

THENCE N 68deg33'30"E 817.56' along the N.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Bowie Avenue") for this tract's Northmost corner,

THENCE S 21deg48'41"E 817.92' along the E.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Bowie Avenue") for this tract's Eastmost corner,

THENCE S 69deg44'08"W 807.28' along a S.B.L. of this tract to this POINT OF BEGINNING, containing 16.578 acres, more or less.

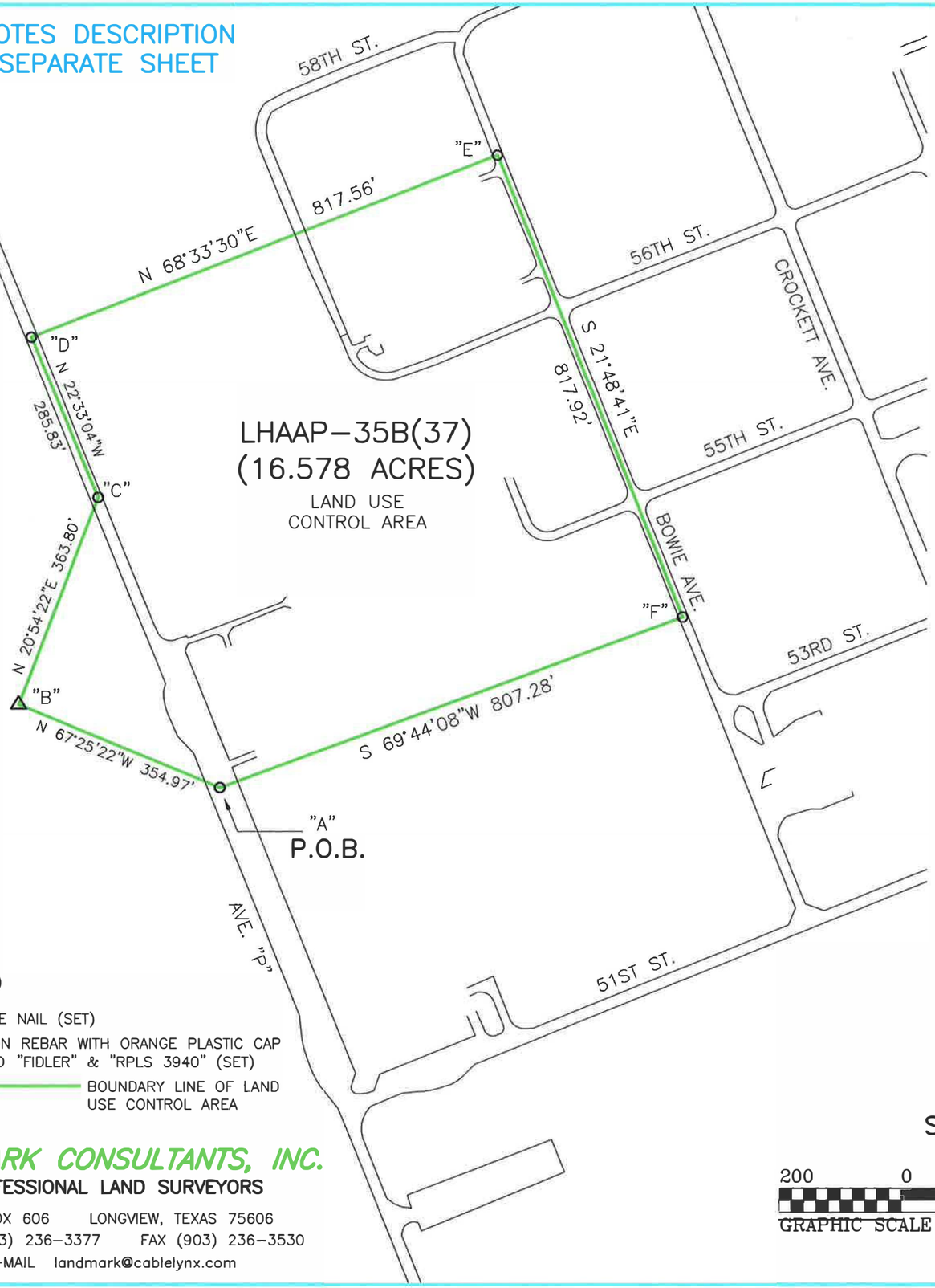
I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

00906250

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in January, 2015.

Witness my hand and seal this the 21st day of January, 2015.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), AND COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.99986172702 & IS BASED ON CALCULATED DISTANCE BETWEEN PUBLISHED STATE PLANE COORDINATES OF STATIONS C-21 & X-11 DIVIDED BY SURFACE TRAVERSE CALCULATED DISTANCE BETWEEN SAME TWO STATIONS. THE COMPUTED LAND AREA IS BASED ON STATE PLANE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6957769.855	3307999.979
B	6957906.138	3307672.216
C	6958245.983	3307802.032
D	6958509.961	3307692.413
E	6958808.823	3308453.390
F	6958049.461	3308757.289

LEGEND

- O CONCRETE NAIL (SET)
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- BOUNDARY LINE OF LAND USE CONTROL AREA

SCALE 1"=200'

200 0 200 400 600

GRAPHIC SCALE - FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-35B(37) L.U.C.A.
(16.578 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	I.PTS I.LEG
01/21/2015	0605063I.DWG	DRAWN BY JTJ

LHAAP-37, 37-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 8/1/11 for LHAAP-35B (37), a certification of site was conducted by _____ [indicate transferee] on _____.

A summary of land use control mechanisms is as follows:

- Groundwater restriction – A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-35B (37)]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35B (37).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title: _____

Signature: _____

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-46, 46-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

Final
Remedial Design
LHAAP-46, Plant 2 Area, Group 4
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared for U.S. Army Corps of Engineers – Tulsa District
1645 South 101st, East Avenue
Tulsa, Oklahoma 74128

Prepared by Shaw Environmental, Inc.
1401 Enclave Parkway, Suite 250
Houston, Texas 77077

Contract No. W912QR-04-D-0027, Task Order No. DS02
Shaw Project No. 117591
Rev 0
September 2011

Shaw® a world of Solutions™

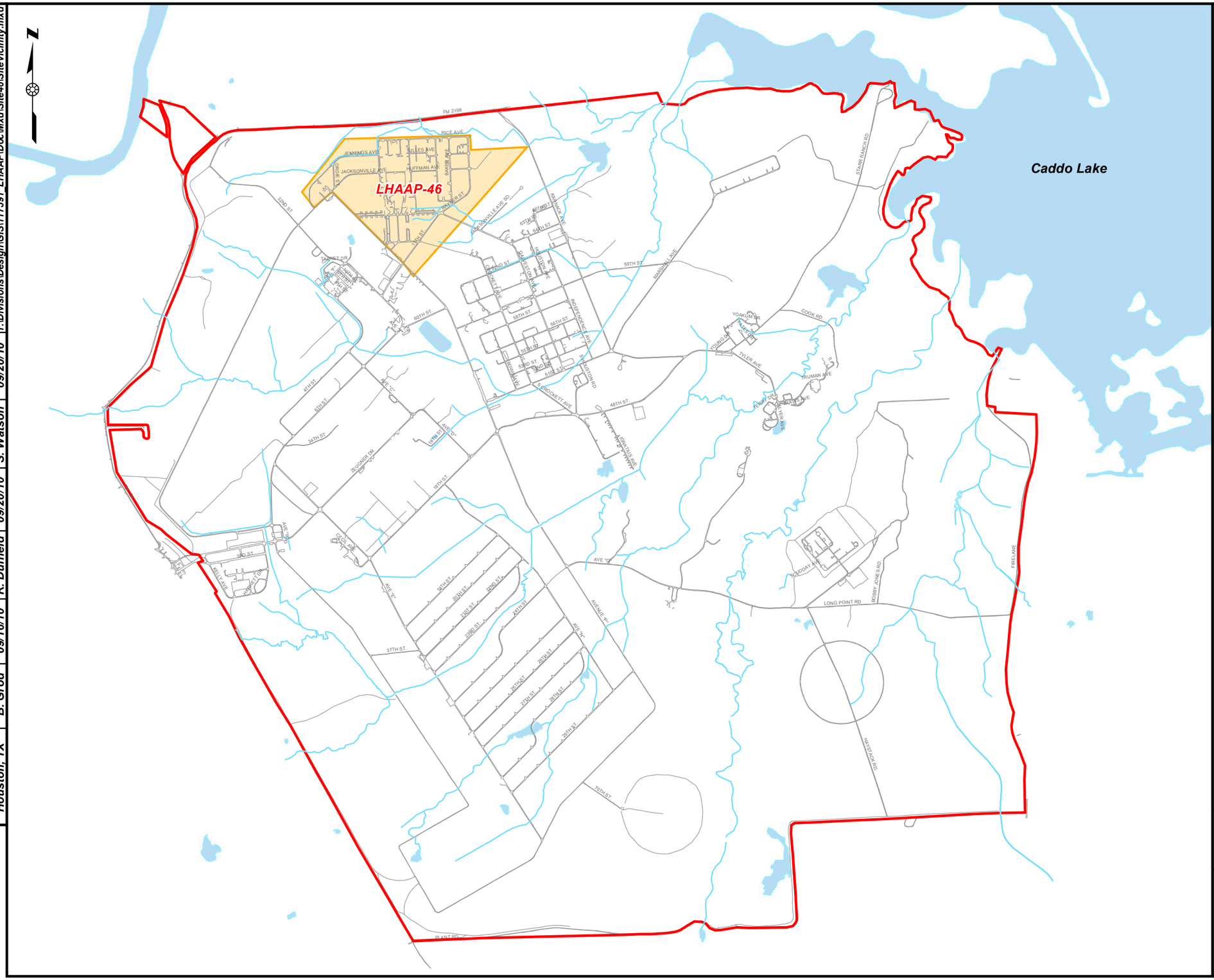
Table of Contents

List of Tables iii
List of Figures iii
List of Appendices iii
Acronyms and Abbreviations iv

1.0 Introduction 1-1
1.1 LHAAP Background 1-1
1.1.1 LHAAP-46 Description 1-1
1.1.2 Remedial Action Objectives 1-2
1.1.3 Planned Remedial Action 1-2
1.2 Cleanup Levels 1-3
1.3 Areas of Contamination 1-3
1.4 Hydrogeology 1-4
2.0 Land Use Control 2-1
3.0 Monitoring System Design 3-1
3.1 MNA Performance Monitoring Well Locations 3-1
3.1.1 Shallow Groundwater Plume 3-1
3.1.2 Intermediate Groundwater Plume 3-2
3.1.3 Vertical Well Cluster 3-3
3.2 MNA Evaluation 3-3
3.3 Long-Term Monitoring 3-3
3.4 Five-Year Reviews 3-3
3.5 Thallium Monitoring 3-4
3.6 Surface Water Monitoring 3-4
4.0 Land Use Control Design and Implementation Plan 4-1
4.1 Land Use Control Implementation 4-1
4.2 Land Use Control Operation and Maintenance 4-2
4.2.1 Site Certification and Reporting 4-2
4.2.2 Notice of Planned Property Conveyances 4-2
4.2.3 Opportunity to Review Text of Intended Land Use Controls 4-3
4.2.4 Notification Should Action(s) which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance 4-3
4.2.5 Land Use Control Enforcement 4-3
4.2.6 Modification or Termination of Land Use Controls 4-4
4.2.7 Comprehensive Land Use Control Management Plan 4-4
5.0 Field Activities 5-1
5.1 Pre-mobilization Activities 5-1
5.2 Preliminary Activities/Mobilization 5-2
5.3 Site Clearing 5-2
5.4 Monitoring Well Installation 5-2
5.5 Groundwater Sampling 5-2
5.5.1 Monitored Natural Attenuation 5-3
5.5.2 Thallium 5-3
5.5.3 Long-Term Monitoring 5-4
5.6 Surface Water Sampling 5-4
5.7 Waste Management 5-4
5.8 Decontamination of Equipment and Personnel 5-5

Contract No. W912QR-04-D-0027, Task Order No. DS02 • Final • Rev 0 • September 2011

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Houston, TX	B. Grod 09/16/10	R. Duffield 09/20/10	S. Watson 09/20/10	T:\Divisions\Design\GIS\117591_LHAAP\Doc\Mxd\Site46\SiteVicinity.mxd



Shaw®

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 1-2

SITE VICINITY MAP
LHAAP-46, REMEDIAL DESIGN

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

2.0 LAND USE CONTROL

The objective of the LUC at LHAAP-46 is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup goals are met Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566. **Appendix A** provides sample LUC compliance certification documentation.

The LUC addresses the area of LHAAP-46 that includes two groundwater plumes at LHAAP-46 with levels of contamination that require implementation of a remedy (see **Section 1.3**). The U.S. Army is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the LUC.

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. U.S. Army shall obtain USEPA and Texas Commission on Environmental Quality (TCEQ) concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-46 forms the basis for the remedy. The future use of the site as part of a national wildlife refuge is consistent with an industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation and will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566. Compliance with the use assumption will be documented in the five-year review reports.

Contract No. W912QR-04-D-0027, Task Order No. DS02 • Final • Rev 0 • September 2011

4.0 LAND USE CONTROL DESIGN AND IMPLEMENTATION PLAN

This section describes the LUC design and implementation activities for LHAAP-46. The activities will result in a surveyed and recorded groundwater use restriction boundary and an operation and maintenance plan for the LUC.

The objective of the LUC at LHAAP-46 is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup goals are met. Notification of the groundwater use restriction will accompany all transfer documents. The U.S. Army is responsible for long-term implementation, maintenance, inspection, reporting, and enforcement of the LUC.

The LUC will address the area of LHAAP-46 that includes two groundwater plumes with levels of contamination that require implementation of a remedy (see **Section 1.3**). The Land Use Control Operation and Maintenance (LUC O&M) Plan will identify the measures required for the monitoring and enforcement of the groundwater use restriction.

Upon review and concurrence of this RD, the LUC O&M Plan will be coordinated with regulators, finalized and distributed as part of the Comprehensive LUC Management Plan.

4.1 Land Use Control Implementation

The U.S. Army will undertake the following actions to implement the groundwater restriction LUC for LHAAP-46:

- Define the Area of the Groundwater Use Restriction. The groundwater use restriction boundary will be defined based on the review of the first round of groundwater sampling data in conjunction with historic data. The extent of plume will be bounded by a buffer and may extend to natural groundwater and surface water boundaries.
- Survey the LUC Boundary. The proposed boundary will be finalized after all wells are installed and sampled. Concurrence by USEPA and TCEQ will be obtained, and the LUC boundary will be surveyed by a State-licensed surveyor. A legal description of the surveyed area will be appended to the survey plat.
- Record the LUC in Harrison County. The LUC plat, legal description and groundwater use restriction language will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.56.

- Notify the Texas Department of Licensing and Regulation of the LUC. The Texas Department of Licensing and Regulation will be notified of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the U.S. Army, the USEPA, and the TCEQ. The survey plat, legal boundary and description of the groundwater restriction, in conjunction with a locator map, will be provided in hard and electronic copy.

- Develop the LUC O&M Plan. A LUC O&M Plan for LHAAP-46 will be developed. It will include the elements presented in **Section 4.2** below, the county recordation of the LUC survey plat, legal description and restriction language and the annual inspection/certification form.

4.2 Land Use Control Operation and Maintenance

The U.S. Army or its representatives will be responsible for the operation and maintenance of the LHAAP-46 LUC. This includes certification, reporting and enforcement activities. The U.S. Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable. To facilitate long-term operation and maintenance of the groundwater use restriction LUC remedy, U.S. Army will develop a plan that will encompass the elements described in the following subsections.

4.2.1 Site Certification and Reporting

Beginning with finalization of this RD and approval of the annual inspection form, the U.S. Army will undertake annual inspections and certify continued compliance with the LUC objectives. The U.S. Army, or the transferee after transfer, will retain the annual LUC Inspection/Certification documents in the project files for incorporation into the Five Year Review Reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the annual certification, the U.S. Army will provide to USEPA and TCEQ along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. The need to continue annual certifications will be revisited at five year reviews.

4.2.2 Notice of Planned Property Conveyances

The U.S. Army shall provide notice to USEPA and TCEQ of plans to convey the LHAAP-46 acreage. The notice shall describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the U.S. Army may transfer responsibility for various implementation actions, the

Contract No. W912QR-04-D-0027, Task Order No. DS02 • Final • Rev 0 • September 2011

U.S. Army shall retain its responsibility for remedy integrity. This means that the U.S. Army is responsible for addressing substantive violations of the LUC performance objective that would undermine the U.S. Army's CERCLA remedy. The U.S. Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation.

4.2.3 Opportunity to Review Text of Intended Land Use Controls

U.S. Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. USEPA will also receive a copy for review. In addition, the U.S. Army will produce an ECP or other environmental document for transfer of LHAAP-46, but before executing transfer, the U.S. Army will provide USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

4.2.4 Notification Should Action(s) which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance

Should the U.S. Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objective, the U.S. Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 4.2.5** below, the U.S. Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the U.S. Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

4.2.5 Land Use Control Enforcement

Should the LUC remedy reflected in this LUC RD fail, the U.S. Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the U.S. Fish and Wildlife Service or its lessee, to the institution of judicial action against nonfederal third parties. Alternatively, should the circumstances warrant such, the U.S. Army could choose to exercise its response authorities under CERCLA. Should the U.S. Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the U.S. Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

4.2.6 Modification or Termination of Land Use Controls

The U.S. Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objective. Likewise, the U.S. Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the U.S. Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

The LUCs shall remain in effect until such time as the U.S. Army and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUC will be terminated as needed. The decision to terminate the LUC will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the U.S. Army and USEPA has been made to terminate the LUC, the U.S. Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

4.2.7 Comprehensive Land Use Control Management Plan

Upon finalization of the LUC O&M Plan a copy will be inserted into the Comprehensive LUC Management Plan for Longhorn. The Comprehensive LUC Management Plan figure and table will be updated to reflect the inclusion of LHAAP-46.

The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUCs being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site-specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document will be provided to USEPA and TCEQ, and will also be accessible to the local government and the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record.

The land use assumption of industrial reuse as part of a national wildlife refuge forms the basis for the remedy at LHAAP-46 and this land use assumption will be in included in the Comprehensive LUC Management Plan with supporting documentation.

LHAAP-46, 46-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-46 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2014-000013307

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 12/09/2014 10:42 AM **Document Number:** 2014-000013307 **Receipt No:** 1415412 **Amount:** $ 50.00 **By:** Pam Rockwell, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AECOM
ATTN: AMANDA LAGARDE (FEDEX ENV)
112 E PECAN ST., SUITE 400
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-46

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-46 (Plant 2 Area). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-46 were performed in accordance with the FFA requirements.

The LHAAP-46 site was used for production of pyrotechnic and illumination devices until 1997. A Record of Decision (ROD) for LHAAP-46 was signed by U.S. Army and USEPA with TCEQ concurrence in 2010 establishing the final remedy which consists of land use control (LUC) in conjunction with monitored natural attenuation (MNA). The LUC will ensure protection of human health by restricting the use of groundwater to environmental monitoring and testing only. MNA will be implemented to establish confidence in attenuation trends and verify that the constituents of concern (COCs) are stable or shrinking and will not migrate to nearby surface water at levels that may present an unacceptable risk to human health or the environment. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at

the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-46 parcel is a 190 acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Within the LHAAP-46 parcel are designated LUC boundaries including a 63.772-acre tract, more or less, as described in Exhibit A. The LUC boundaries are also presented in the attached Figure 1.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. The United States Department of the Army has undertaken careful environmental study of the LHAAP-46 site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 63.772-acre tract, more or less. Groundwater underlying this land is contaminated with trichloroethene (TCE) and other volatile organic compounds (VOCs) and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 20 th day of November, 2014.

BEFORE ME, on this the 20 th day of November, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

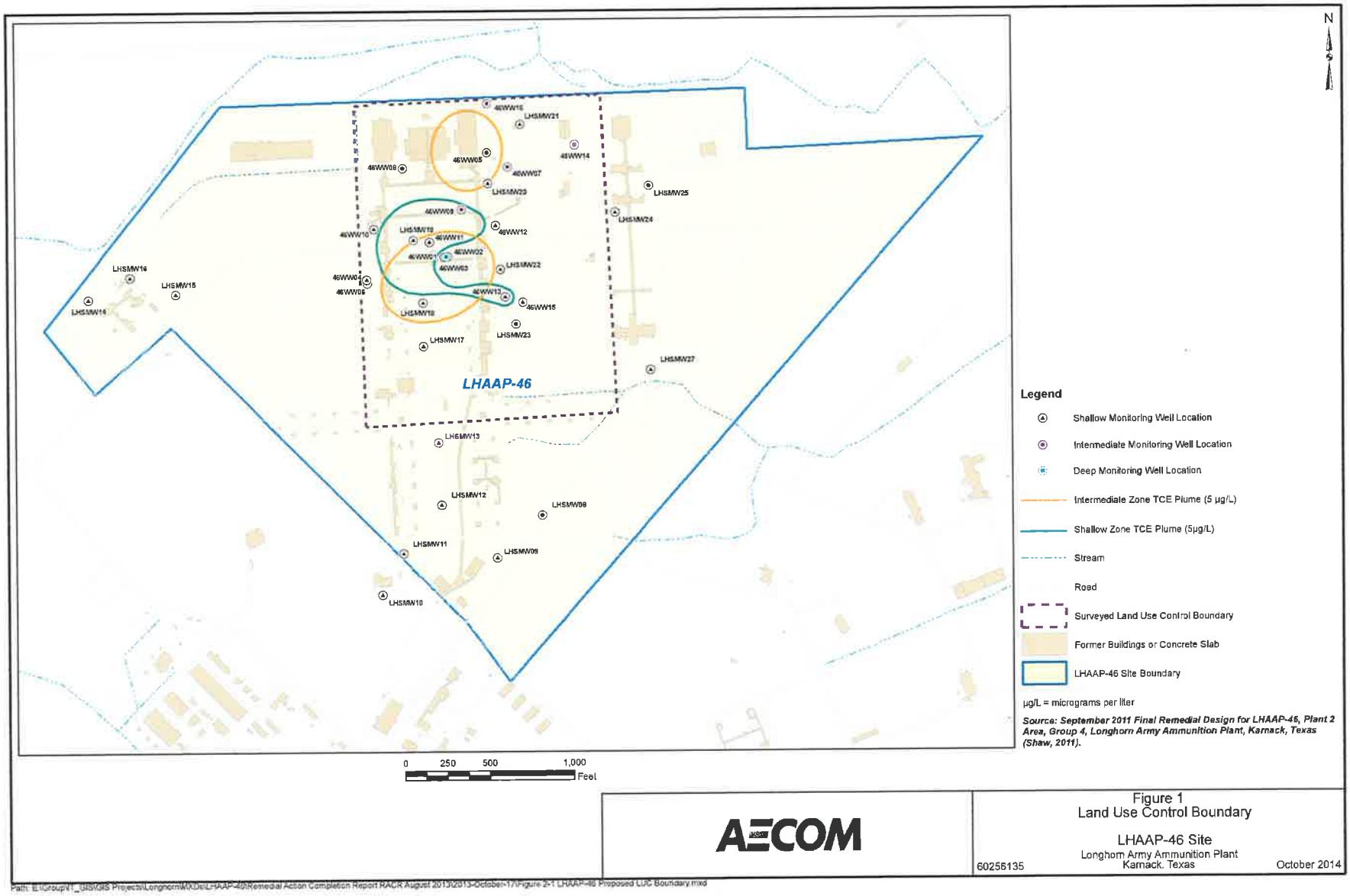
GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 20 day of November, 2014.

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 03-17-2015

Notary Public in and for the State of Texas,
County of Harrison

EXHIBIT A

COUNTY CLERK'S MEMO
PORTIONS OF THIS
DOCUMENT NOT
REPRODUCIBLE
WHEN RECORDED



AECOM

Figure 1
Land Use Control Boundary

LHAAP-46 Site
Longhorn Army Ammunition Plant
Karnack, Texas

60256135 October 2014

Path: E:\Group\1_GIS\GIS Projects\LonghornMXDs\LHAAP-46\Remedial Action Completion Report RACR August 2013\2013-October-17\Figure 2-1 LHAAP-46 Proposed LUC Boundary.mxd

FIELD NOTES DESCRIPTION OF
"LHAAP-46" LAND USE CONTROL AREA
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-46" Land Use Control Area being 63.772 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-46" Land Use Control Area being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861858, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HORSE" (N=6960008.269 feet E=3309591.340 feet). Said traverse indicates a surface distance of 4895.701 feet between said monuments. The computed land area is based on grid distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940" .

Commencing at monument "X-11" referenced above,

THENCE N 36deg34'22"E 1386.89' to a concrete nail set (in white paint on asphalt) for the S.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 01deg52'33"W 1886.35' along the W.B.L. of this tract to an I.R.O.P.C. set (in a 6' tall chain link fence running Easterly and Westerly) for this tract's N.W.C. ,

THENCE along said fence, which defines the Northerly Boundary Lines of this tract, the following eleven courses :

(01) N 86deg41'48"E 82.30' to a fence corner post,
(02) N 39deg20'47"E 18.62' to a bent fence corner post,
(03) N 86deg29'33"E 97.31' to a fence corner post,
(04) S 38deg05'14"E 19.89' to a fence corner post,
(05) N 87deg17'05"E 337.52' to a point in said fence,
(06) N 87deg22'07"E 699.24' to a point in said fence,
(07) N 87deg22'02"E 139.25' to a fence corner post,
(08) S 59deg03'44"E 20.98' to a fence corner post,
(09) N 86deg53'55"E 29.32' to a fence corner post,
(10) N 55deg19'37"E 21.12' to a fence corner post,
(11) N 86deg05'43"E 16.55' to an I.R.O.P.C. set in said fence for this tract's N.E.C. ,

THENCE S 02deg42'36"E 1879.91' along the E.B.L. of this tract to a concrete nail set (in white paint on asphalt) for this tract's S.E.C., from which monument "HORSE" referenced above bears S 52deg51'46"E 3171.37',

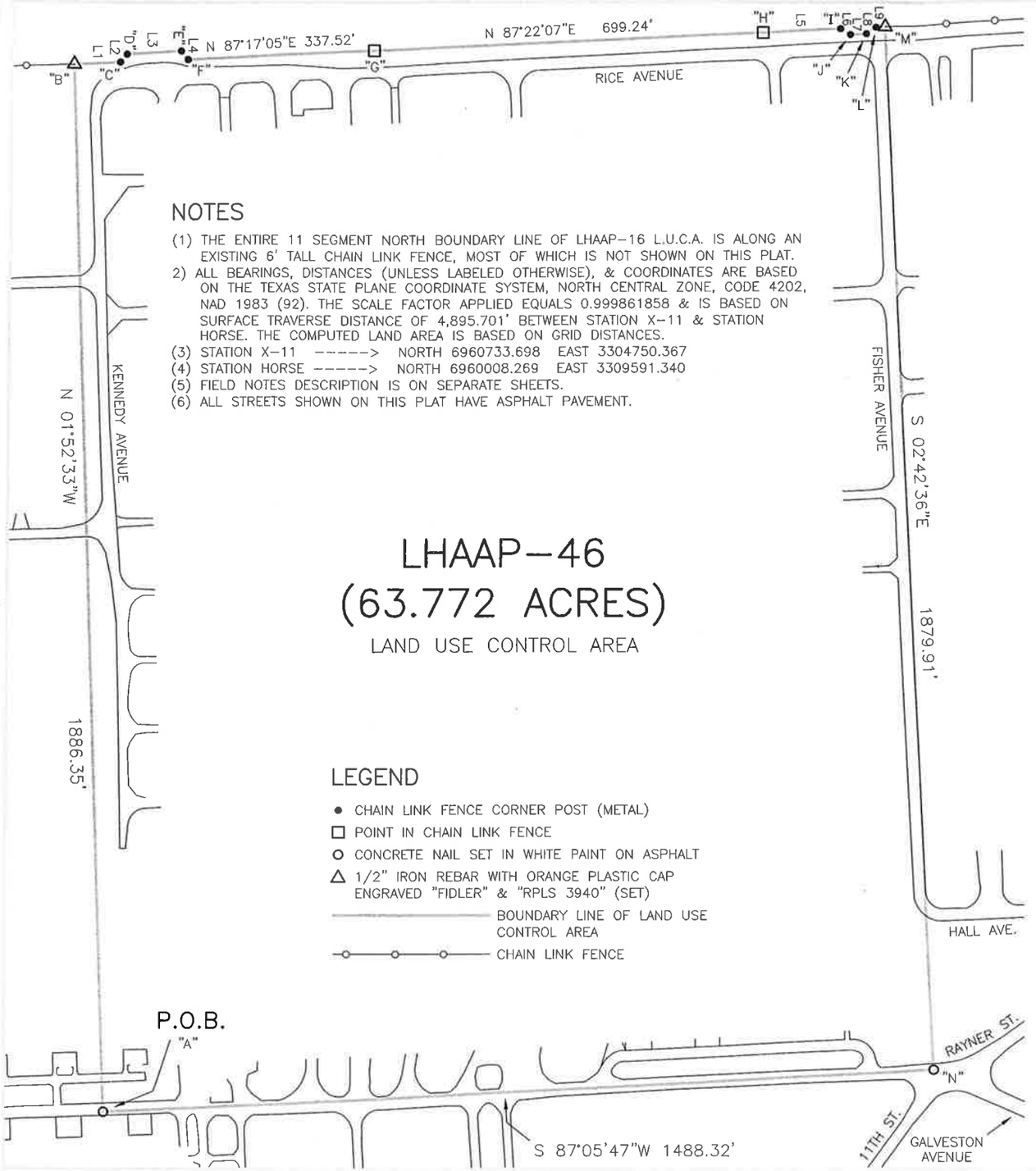
THENCE S 87deg05'47"W 1488.32' along the S.B.L. of this tract to this POINT OF BEGINNING. This tract contains 63.772 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

00906270



NOTES

(1) THE ENTIRE 11 SEGMENT NORTH BOUNDARY LINE OF LHAAP-16 L.U.C.A. IS ALONG AN EXISTING 6' TALL CHAIN LINK FENCE, MOST OF WHICH IS NOT SHOWN ON THIS PLAT.
2) ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861858 & IS BASED ON SURFACE TRAVERSE DISTANCE OF 4,895.701' BETWEEN STATION X-11 & STATION HORSE. THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.
(3) STATION X-11 -----> NORTH 6960733.698 EAST 3304750.367
(4) STATION HORSE -----> NORTH 6960008.269 EAST 3309591.340
(5) FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS.
(6) ALL STREETS SHOWN ON THIS PLAT HAVE ASPHALT PAVEMENT.

LHAAP-46
(63.772 ACRES)
LAND USE CONTROL AREA

LEGEND

- ● CHAIN LINK FENCE CORNER POST (METAL)
- □ POINT IN CHAIN LINK FENCE
- ○ CONCRETE NAIL SET IN WHITE PAINT ON ASPHALT
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- BOUNDARY LINE OF LAND USE CONTROL AREA
- CHAIN LINK FENCE

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in October, 2014.

Witness my hand and seal this the 20th day of October, 2014.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

LINE TABLE

LINE	BEARING	DISTANCE
L1	N 86°41'48"E	82.30'
L2	N 39°20'47"E	18.62'
L3	N 86°29'33"E	97.31'
L4	S 38°05'14"E	19.89'
L5	N 87°22'02"E	139.25'
L6	S 59°03'44"E	20.98'
L7	N 86°53'55"E	29.32'
L8	N 55°19'37"E	21.12'
L9	N 86°05'43"E	16.55'

N

SCALE 1"=200'

200 0 200 400 600
GRAPHIC SCALE - FEET

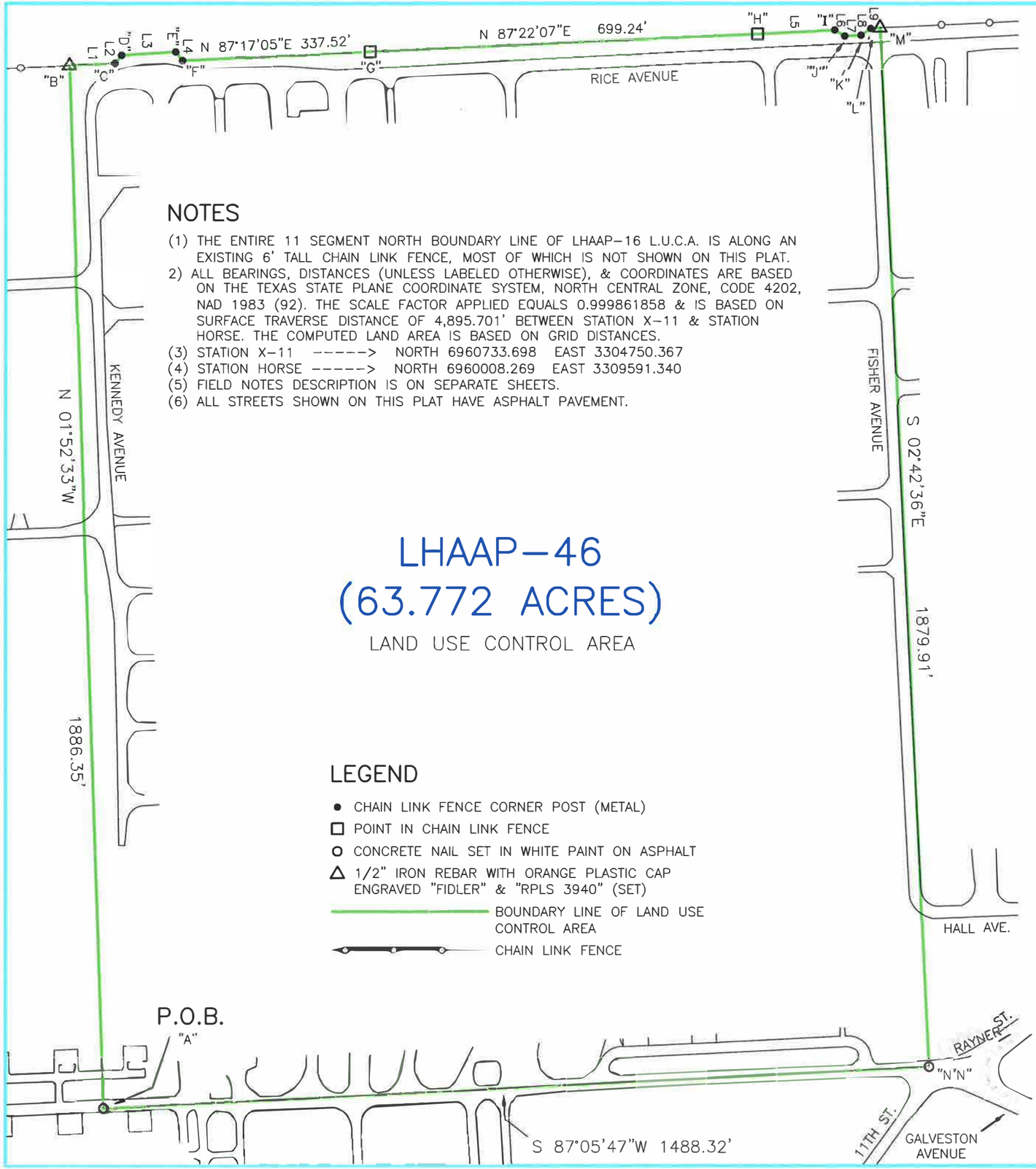
COORDINATE TABLE

POINT	NORTH	EAST
A	6961847.512	3305576.740
B	6963732.849	3305514.995
C	6963737.591	3305597.161
D	6963751.988	3305608.964
E	6963757.942	3305706.095
F	6963742.285	3305718.366
G	6963758.275	3306055.508
H	6963790.379	3306754.008
I	6963796.775	3306893.111
J	6963785.987	3306911.111
K	6963787.573	3306940.387
L	6963799.588	3306957.756
M	6963800.715	3306974.265
N	6961922.907	3307063.146

LHAAP-46 L.U.C.A.
(63.772 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	U.PTS U.LEG
10/20/2014	1103025U.DWG	DRAWN BY JTJ

00906271



LHAAP–46
(63.772 ACRES)
LAND USE CONTROL AREA

NOTES

(1) THE ENTIRE 11 SEGMENT NORTH BOUNDARY LINE OF LHAAP–16 L.U.C.A. IS ALONG AN EXISTING 6' TALL CHAIN LINK FENCE, MOST OF WHICH IS NOT SHOWN ON THIS PLAT.
2) ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861858 & IS BASED ON SURFACE TRAVERSE DISTANCE OF 4,895.701' BETWEEN STATION X–11 & STATION HORSE. THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.
(3) STATION X–11 –––––> NORTH 6960733.698 EAST 3304750.367
(4) STATION HORSE –––––> NORTH 6960008.269 EAST 3309591.340
(5) FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS.
(6) ALL STREETS SHOWN ON THIS PLAT HAVE ASPHALT PAVEMENT.

LEGEND

- ● CHAIN LINK FENCE CORNER POST (METAL)
- □ POINT IN CHAIN LINK FENCE
- ○ CONCRETE NAIL SET IN WHITE PAINT ON ASPHALT
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- BOUNDARY LINE OF LAND USE CONTROL AREA
- CHAIN LINK FENCE

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PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236–3377 FAX (903) 236–3530
E–MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in October, 2014.

Witness my hand and seal this the 20th day of October, 2014.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

LINE TABLE

LINE	BEARING	DISTANCE
L1	N 86°41'48"E	82.30'
L2	N 39°20'47"E	18.62'
L3	N 86°29'33"E	97.31'
L4	S 38°05'14"E	19.89'
L5	N 87°22'02"E	139.25'
L6	S 59°03'44"E	20.98'
L7	N 86°53'55"E	29.32'
L8	N 55°19'37"E	21.12'
L9	N 86°05'43"E	16.55'

N

SCALE 1"=200'

200 0 200 400 600
GRAPHIC SCALE – FEET

COORDINATE TABLE

POINT	NORTH	EAST
A	6961847.512	3305576.740
B	6963732.849	3305514.995
C	6963737.591	3305597.161
D	6963751.988	3305608.964
E	6963757.942	3305706.095
F	6963742.285	3305718.366
G	6963758.275	3306055.508
H	6963790.379	3306754.008
I	6963796.775	3306893.111
J	6963785.987	3306911.111
K	6963787.573	3306940.387
L	6963799.588	3306957.756
M	6963800.715	3306974.265
N	6961922.907	3307063.146

LHAAP–46 L.U.C.A.
(63.772 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	U.PTS U.LEG
10/20/2014	1103025U.DWG	DRAWN BY JTJ

LHAAP-46, 46-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 9/30/11 for LHAAP-46 a certification of site was conducted by _____ [indicate transferee] on _____.

A summary of land use control mechanisms is as follows:

- Groundwater restriction – A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-46]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-46.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title: _____

Signature: _____

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-49

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-49 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2012-000000704

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000704 **Receipt No:** 1200645 **Amount:** $ 36.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas, in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. LHAAP-49 is a former Acid Storage location at the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA) became effective on December 30, 1991. LHAAP-49 is considered an NPL listed site, and remedial activities at LHAAP-49 were performed in accordance with the FFA requirements.

LHAAP-49 is located in the west-central portion of LHAAP. LHAAP-49 is the former Acid Storage Area, which was used from 1942 to 1945 for storage and formulation of acids and acid mixtures in support of trinitrotoluene production during World War II. Nitric acid and sulfuric acid were manufactured and handled in large quantities in this area. A no further action Record of Decision for LHAAP-49 was signed by USEPA in 2010 establishing no remedy was required. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or

in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

LHAAP-49 is a 30.540 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of LHAAP-49 and USEPA and TCEQ concluded that no further investigation or action is required.

Limited monitoring of LHAAP-49 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-49 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

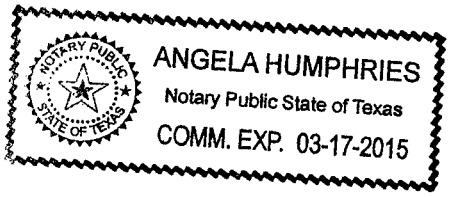
Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 21 th day of July, 2011.

BEFORE ME, on this the 21 th day of July, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 21 day of July, 2011.



Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
LHAAP-49
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 30.540 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998768897, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "HMX-3" (N=6956487.252 feet E=3303483.509 feet) and "HMX-5" (N=6958206.213 feet E=3305201.721 feet). Said traverse indicates a surface distance of 2430.748 feet between said monuments. The computed land area is based on grid (State Plane) distances.

BEGINNING at a 60d nail set for the Southmost corner of this tract, said nail being in asphalt pavement at the intersection of 6th Street and 4th Street, from which nail the monument "HMX-3" referenced above bears N 09deg00'02"E 74.61' ,

THENCE N 46deg42'14"W crossing some of said asphalt pavement, then generally along 4th Street's Northeast edge of asphalt, then crossing a curved section of 4th Street's asphalt, and continuing beyond 4th Street's asphalt, for a total distance of 509.81', to a 60d nail set for the Southmost West corner of this tract,

THENCE N 45deg04'42"E eventually crossing 4th Street's asphalt, then generally along 4th Street's Southeast edge of asphalt, for a total distance of 1323.80', to a 60d nail set (in the Southeast edge of said asphalt pavement) for the Westerly reentrant corner of this tract,

THENCE N 45deg22'03"W crossing 4th Street's asphalt pavement and continuing for a total distance of 308.18' to a point (in the Southeasterly edge of flowing water [May 3, 2011] of Goose Prairie Creek) for the Northmost West corner of this tract, from which point a 1/2" iron rod with Tom Fidler orange plastic cap set for reference bears S 45deg22'03"E 11.34', said rod being at the top of the Southeasterly bank of Goose Prairie Creek,

THENCE N 47deg40'44"E 331.25' along a N.W. B.L. of this tract to a point (in the Southeasterly edge of flowing water [May 3, 2011] of Goose Prairie Creek) for the Westmost North corner of this tract, from which point a 1/2" iron rod with Tom Fidler orange plastic cap set for reference bears S 44deg45'45"E 13.46', said rod being at the top of the Southeasterly bank of Goose Prairie Creek,

THENCE S 44deg45'45"E along a N.E. B.L. of this tract, and eventually crossing 4th Street's asphalt pavement, for a total distance of 292.85' to a 60d nail set in the Southeast edge of said asphalt pavement for the Northerly reentrant corner of this tract,

THENCE N 44deg47'09"E generally along 4th Street's Southeast edge of asphalt pavement, then entering said pavement at the

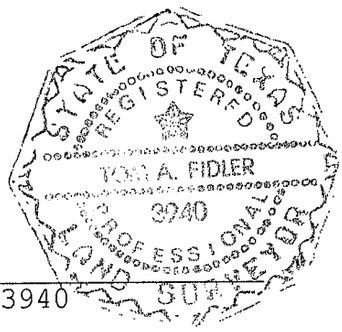
intersection of 4th Street and Avenue "C", for a total distance of 781.21' to a 60d nail set in said asphalt pavement for the Eastmost North corner of this tract,

THENCE S 45deg47'29"E crossing some of said pavement, then generally along the Southwest edge of the asphalt pavement of Avenue "C", then entering said pavement at the intersection of Avenue "C" and 6th Street, for a total distance of 507.27' to a 60d nail set for the Eastmost corner of this tract, from which the monument "HMX-5" referenced above bears N 13deg12'58"E 77.94' ,

THENCE S 44deg55'17"W crossing some of said pavement, then generally along the Northwest edge of the asphalt pavement of 6th Street, then entering said pavement at the aforementioned intersection of 6th Street and 4th Street, for a total distance of 2424.55' to this POINT OF BEGINNING.

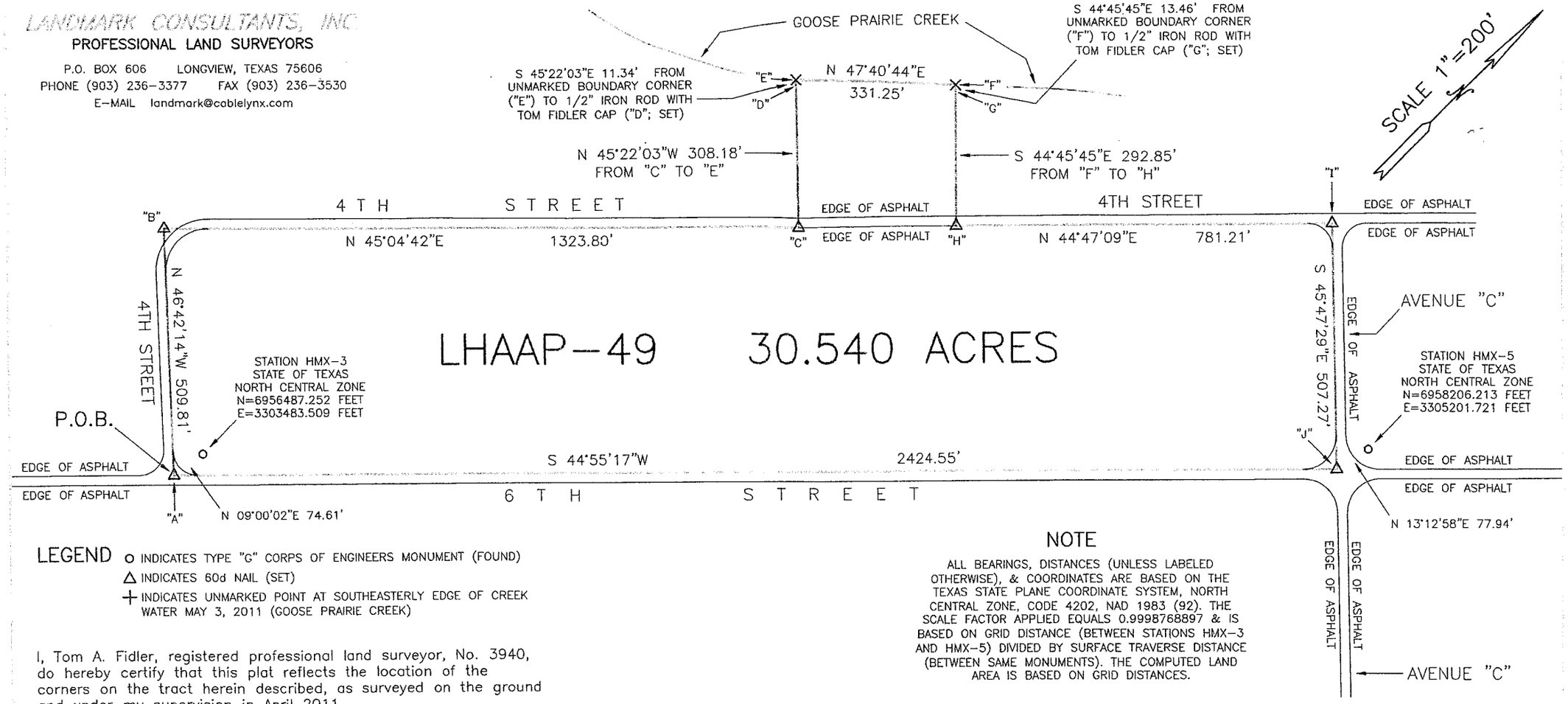
This tract contains 30.540 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com



LEGEND

o INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
△ INDICATES 60d NAIL (SET)
+ INDICATES UNMARKED POINT AT SOUTHEASTERLY EDGE OF CREEK WATER MAY 3, 2011 (GOOSE PRAIRIE CREEK)

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998768897 & IS BASED ON GRID DISTANCE (BETWEEN STATIONS HMX-3 AND HMX-5) DIVIDED BY SURFACE TRAVERSE DISTANCE (BETWEEN SAME MONUMENTS). THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in April 2011.

Witness my hand and seal May 5, 2011.



Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

COORDINATE TABLE

POINT	NORTH	EAST
A	6956413.564	3303471.837
B	6956763.174	3303100.790
C	6957697.967	3304038.137
D(ROD)	6957906.516	3303826.894
E	6957914.483	3303818.824
F	6958137.506	3304063.741
G(ROD)	6958127.951	3304073.216
H	6957929.573	3304269.956
I	6958484.036	3304820.288
J	6958130.332	3305183.901

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LHAAP-49
(30.540 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1104040	0407088.CRD	M.PTS M.LEG
MAY 5, 2011	1103025M.DWG	DRAWN BY JTJ

00906281

LHAAP-50, 50-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

Final
Remedial Design
LHAAP-50
Former Sump Water Tank, Group 4
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared for U.S. Army Corps of Engineers – Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128

Prepared by Shaw Environmental, Inc.
1401 Enclave Parkway, Suite 250
Houston, Texas 77077

Contract No. W912QR-04-D-0027, Task Order No. DS02
Project No. 117591
Rev 0
September 2011

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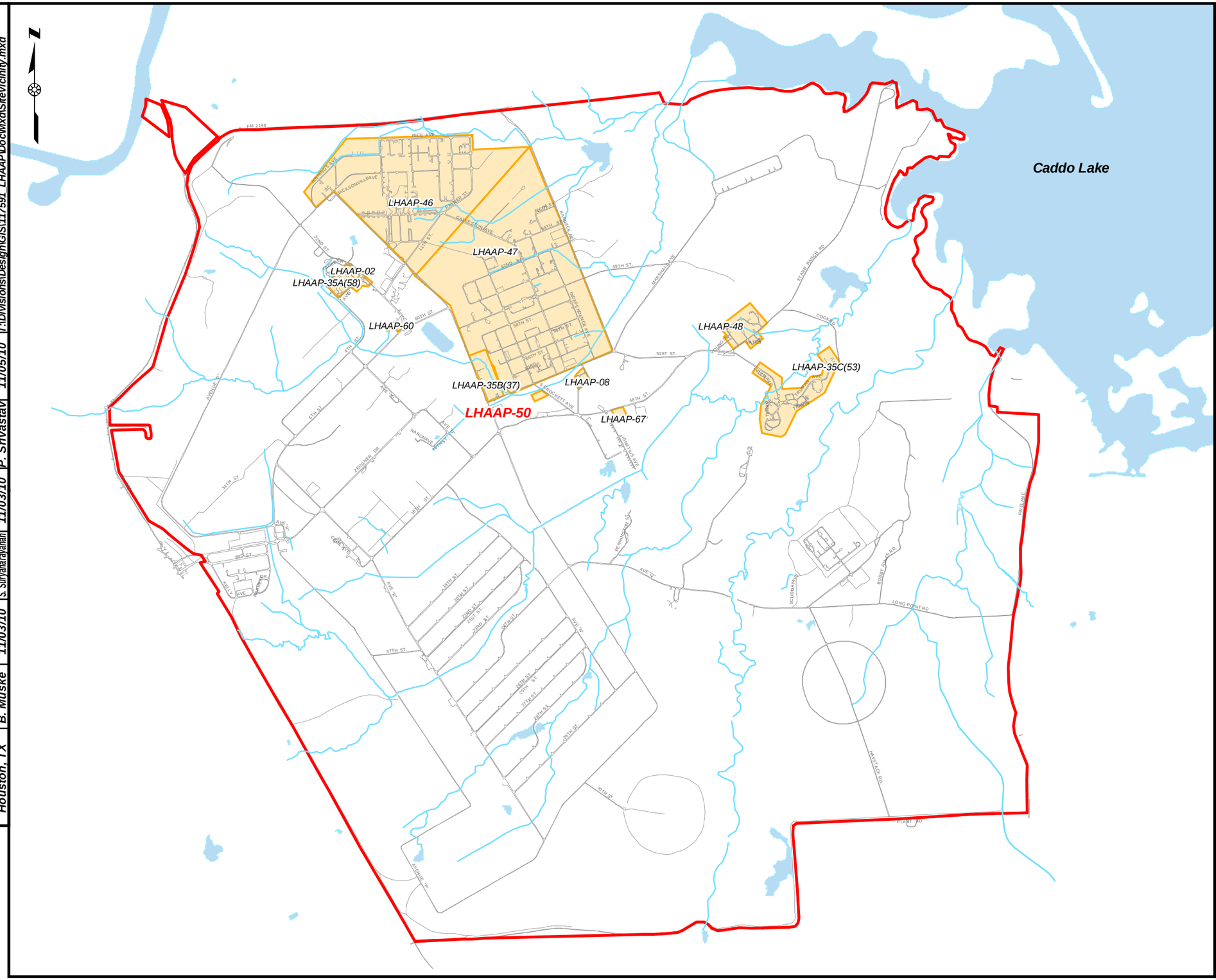
Table of Contents

List of Tables iii
List of Figures iii
List of Appendices iii
Acronyms and Abbreviations iv

1.0 Introduction 1-1
1.1 Background 1-1
1.1.1 Description 1-1
1.1.2 Remedial Action Objectives 1-2
1.1.3 Planned Remedial Action 1-3
1.2 Cleanup Levels 1-4
2.0 Pre-Remediation Activities in August 2010 2-1
2.1 Soil Sampling 2-1
2.2 Groundwater Sampling 2-1
2.3 Areas of Contamination 2-2
3.0 Land Use Control 3-1
4.0 Excavation Design 4-1
4.1 Excavation Area 4-1
4.2 Surface Water Monitoring 4-1
5.0 Monitoring System Design 5-1
5.1 Monitoring Performance Monitoring Well Locations 5-1
5.1.1 Shallow Groundwater Plume and Additional Soil Sampling 5-2
5.1.2 Intermediate Groundwater Plume 5-2
6.0 Land Use Control Design and Implementation Plan 6-1
6.1 Land Use Control Implementation 6-1
6.2 Land Use Control Operation and Maintenance 6-2
6.2.1 Site Certification and Reporting 6-2
6.2.2 Notice of Planned Property Conveyances 6-2
6.2.3 Opportunity to Review Text of Intended Land Use Controls 6-3
6.2.4 Notification Should Action(s) which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance 6-3
6.2.5 Land Use Control Enforcement 6-3
6.2.6 Modification or Termination of Land Use Controls 6-3
6.2.7 Comprehensive Land Use Control Management Plan 6-4
7.0 Field Activities 7-1
7.1 Pre-mobilization Activities 7-1
7.2 Preliminary Activities/Mobilization 7-2
7.3 Site Setup 7-3
7.4 Soil Excavation 7-4
7.5 Confirmation Soil Sampling 7-5
7.6 Soil Sampling 7-5
7.7 Monitoring Well Installation 7-5
7.8 Groundwater Sampling 7-6
7.8.1 Monitored Natural Attenuation 7-6
7.8.2 Intermediate and Deep Zone Groundwater Sampling 7-6
7.8.3 Long-Term Monitoring 7-7

00906285

FILE PATH	T:\Divisions\Design\GIS\117591_LHAAP\Doc\Mxd\SiteVicinity.mxd
APPROVED BY	P. Srivastav 11/05/10
CHECKED BY	S. Suryanarayanan 11/03/10
DRAWN BY	B. Muske 11/03/10
OFFICE	Houston, TX



Shaw

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 1-2

SITE VICINITY MAP
LHAAP-50 REMEDIAL DESIGN

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

3.0 LAND USE CONTROL

The objective of LUC at LHAAP-50 is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup levels are met. Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566. **Appendix B** provides sample LUC compliance certification documentation.

The LUC addresses the area of LHAAP-50 that has groundwater plumes (in both the shallow and intermediate groundwater zones) with levels of contamination that require implementation of a remedy (see **Section 2.3**). The groundwater restriction LUC would be maintained until the concentration of contaminants and by-product contaminants have been reduced to below their respective cleanup levels.

The U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. The U.S. Army shall obtain USEPA and TCEQ concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-50 forms the basis for the remedy. The future use of the site as part of a national wildlife refuge is consistent with an industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation and will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566. Compliance with the use assumption will be documented in the five-year review reports.

Contract No. W912QR-04-D-0027, Task Order No. DS02• Final • Rev 0 • September 2011

6.0 LAND USE CONTROL DESIGN AND IMPLEMENTATION PLAN

This section describes the LUC design and implementation activities for LHAAP-50. The activities will result in a surveyed and recorded groundwater use restriction boundary and an operation and maintenance plan for the LUC.

The objective of the LUC at LHAAP-50 is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until cleanup levels are met. Notification of the groundwater use restriction will accompany all transfer documents. The U.S. Army is responsible for long-term implementation, maintenance, inspection, reporting, and enforcement of the LUC.

The LUC will address the area of LHAAP-50 that includes two groundwater plumes with levels of contamination that require implementation of a remedy (see **Section 1.3**). The Land Use Control Operation and Maintenance Plan (LUC O&M) will identify the measures required for monitoring and enforcement of the groundwater use restriction. Upon review and concurrence of this RD, the LUC O&M Plan will be coordinated with regulators, finalized, and distributed as part of the Comprehensive LUC Management Plan for LHAAP.

6.1 Land Use Control Implementation

The U.S. Army will undertake the following actions to implement the groundwater restriction LUC for LHAAP-50:

- ***Define the Area of the Groundwater Use Restriction.*** The groundwater use restriction boundary will be defined based on the review of the first round of groundwater sampling data in conjunction with historic data. The extent of plume will be bounded by a buffer and may extend to natural groundwater and surface water boundaries.
- ***Survey the LUC Boundary.*** The proposed boundary will be finalized after all wells are installed and sampled. Concurrence by USEPA and TCEQ will be obtained, and the LUC boundary will be surveyed by a State-licensed surveyor. A legal description of the surveyed area will be appended to the survey plat.
- ***Record the LUC in Harrison County.*** The LUC plat, legal description and groundwater use restriction language will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566.

- ***Notify the Texas Department of Licensing and Regulation of the LUC.*** The Texas Department of Licensing and Regulation will be notified of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the U.S. Army, the USEPA, and the TCEQ. The survey plat, legal boundary and description of the groundwater restriction, in conjunction with a locator map, will be provided in hard and electronic copy.
- ***Develop the LUC O&M Plan.*** An LUC O&M Plan for LHAAP-50 will be developed. It will include the elements presented in **Section 6.2**, the county recordation of the LUC survey plat, legal description and restriction language, and the inspection/certification form.

6.2 Land Use Control Operation and Maintenance

The U.S. Army or its representatives will be responsible for the operation and maintenance of the LHAAP-50 LUC. This includes certification, reporting, and enforcement activities. The U.S. Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable. To facilitate long-term operation and maintenance of the groundwater use restriction LUC remedy, the U.S. Army will develop a plan that will encompass the elements described in the following subsections.

6.2.1 Site Certification and Reporting

Beginning with finalization of this RD and approval of the inspection form, the U.S. Army will undertake inspections and certify continued compliance with the LUC objectives. The U.S. Army or the transferee after transfer will retain the LUC Inspection Certification documents in the project files for incorporation into the five-year review reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the certification, the U.S. Army will provide to USEPA and TCEQ, along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. The need to continue certifications will be revisited at five year reviews.

6.2.2 Notice of Planned Property Conveyances

The U.S. Army shall provide notice to USEPA and TCEQ of plans to convey the LHAAP-50 acreage. The notice shall describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the U.S. Army may transfer responsibility for various implementation actions, the U.S. Army shall retain its responsibility for remedy integrity. This means that the U.S. Army

is responsible for addressing substantive violations of the LUC performance objective that would undermine the U.S. Army's CERCLA remedy. The U.S. Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation.

6.2.3 Opportunity to Review Text of Intended Land Use Controls

The U.S. Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. The USEPA will also receive a copy for review. In addition, the U.S. Army will produce an ECP or other environmental document for transfer of LHAAP-50, but before executing transfer, the U.S. Army will provide USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

6.2.4 Notification Should Action(s) which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance

Should the U.S. Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objective, the U.S. Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 6.2.5** below, the U.S. Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the U.S. Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

6.2.5 Land Use Control Enforcement

Should the LUC remedy reflected in this RD fail, the U.S. Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the USFWS or its lessee, to the institution of judicial action against non-federal third parties. Alternatively, should the circumstances warrant such, the U.S. Army could choose to exercise its response authorities under CERCLA. Should the U.S. Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction; the U.S. Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

6.2.6 Modification or Termination of Land Use Controls

The U.S. Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate an LUC, or make a land use change inconsistent with the LUC objective. Likewise, the U.S. Army shall seek prior USEPA and TCEQ concurrence before

commencing actions that may impact remedy integrity. In the case of an emergency action, the U.S. Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

The LUC shall remain in effect until such time as the U.S. Army and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUC will be terminated as needed. The decision to terminate the LUC will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the U.S. Army and USEPA has been made to terminate the LUC, the U.S. Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

6.2.7 Comprehensive Land Use Control Management Plan

Upon finalization of the LUC O&M Plan, a copy will be inserted into the Comprehensive LUC Management Plan for Longhorn. The Comprehensive LUC Management Plan figure and table will be updated to reflect the inclusion of LHAAP-50.

The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUC being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site-specific LUC are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document will be provided to USEPA and TCEQ and is also accessible to the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record.

The land use assumption of industrial use as part of a national wildlife refuge forms the basis for the remedy at LHAAP-50 and this land use assumption will be included in the Comprehensive LUC Management Plan with supporting documentation.

LHAAP-50, 50-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-50 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00906292

2015-000006109

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 06/18/2015 01:32 PM **Document Number:** 2015-000006109 **Receipt No:** 1507040 **Amount:** $ 50.00 **By:** Vickie Gagnard, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

AMANDA LAGARDE
112 EAST PECAN ST
SUITE 400
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-50

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-50 (Former Sump Water Tank). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-50 were performed in accordance with the FFA requirements.

The LHAAP-50 site, when operational, contained a 47,000-gallon capacity aboveground storage tank (AST) which received industrial wastewater from various industrial waste production sumps throughout LHAAP from 1955 to 1988. After the solids were filtered, the storage tank contents were discharged up stream of the bridge on Crockett Avenue, south of 51st Street into Goose Prairie Creek. The AST has been removed. A Record of Decision (ROD) for LHAAP-50 was signed by the U.S. Army and USEPA with TCEQ concurrence in 2010 establishing the final remedy which consists of a land use control (LUC) in conjunction with monitored natural attenuation (MNA) and limited perchlorate-impacted soil removal. The soil was removed to non-residential levels. The site was not remediated to levels suitable for unrestricted use. The LUC at LHAAP-50 will ensure protection of human health by restricting the use of contaminated groundwater to environmental monitoring and testing only. MNA will be implemented to establish confidence in attenuation trends and verify that the constituents of

concern (COCs) are stable or shrinking and will not migrate to nearby surface water at levels that may present an unacceptable risk to human health or the environment. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8:00 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-50 parcel is a 1 acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in **Exhibit A**. Within the LHAAP-50 parcel is designated a LUC boundary which is a 23.891-acre tract, more or less, as described in **Exhibit A**. The LUC boundary is also presented in the attached **Figure 1**.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. For purposes of this certification, residential land use includes, but is not limited to, single family to multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12. The United States Department of the Army has undertaken careful environmental study of the LHAAP-50 site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 23.891-acre tract, more or less. Groundwater underlying this land is contaminated with tetrachloroethylene (PCE), trichloroethylene (TCE), 1,1-dichloroethylene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), cis-1,2-dichloroethylene (cis-1,2-DCE), vinyl chloride and other volatile organic compounds (VOCs) and perchlorate and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

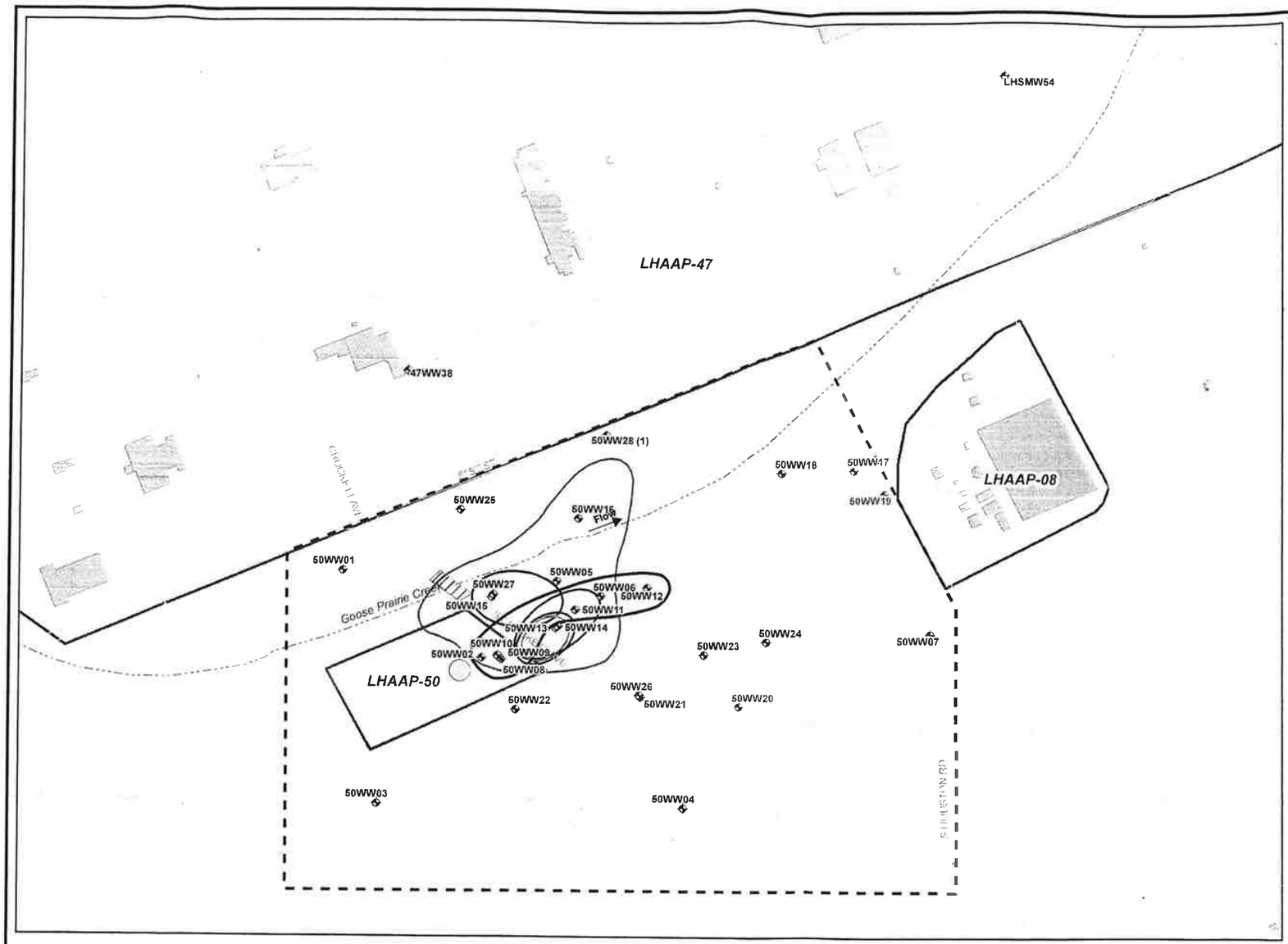
EXECUTED this the 18 th day of June, 2015.

BEFORE ME, on this the 18 th day of June, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 18th day of June, 2015.

GENIE WARNER
Notary Public State of Texas
COMM. EXP. 8/1/2018

Notary Public in and for the State of Texas,
County of Harrison



N

Legend

- Lower Shallow Monitoring Well
- Upper Shallow Monitoring Well
- Fully Penetrating Shallow Monitoring Well
- Intermediate Monitoring Well
- Perchlorate Exceeding GW-Industrial (72 • µg/L)
- cis-1,2-DCE Plume (70 µg/L Extent)
- 1,1-DCE (7 µg/L Extent) and 1,2-DCA (5 µg/L Extent) Plumes
- PCE Plume (5 µg/L Extent)
- TCE Plume (5 µg/L Extent)
- VC Plume (2 µg/L Extent)
- Roads
- Goose Prairie Creek
- Proposed Land Use Control Boundary
- Bridges
- Buildings
- Former Storage Tank Location
- Site Boundaries

Note:
1. 50WW28 installed in May 2014 and sampled in July 2014.

AECOM

Figure 1
Land Use Control Boundary
LHAAP-50 Site
Longhorn Army Ammunition Plant
Karnack, Texas

60256135 June 2015

Path: E:\Group\T_GIS\GIS Projects\Longhorn\MXDs\LHAAP-50\RAO Report\2015-Jan-20\Figure 2-1_LHAAP50_Land Use Control Boundary.mxd

EXHIBIT A

FIELD NOTES DESCRIPTION OF
"LHAAP-50" LAND USE CONTROL AREA
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-50" Land Use Control Area being 23.891 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-50" Land Use Control Area being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999968791070, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "C-21" (N=6956579.781 feet E=3308499.969 feet), "IGNATIUS-1" (N=6957090.304 feet E=3311081.788 feet), and "RACE" (N=6958817.935 feet E=3310081.598 feet). The computed land area is based on State Plane distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" and "RPLS 3940" .

Commencing at monument "C-21" referenced above,

THENCE N 59deg10'26"E 819.91' to an I.R.O.P.C. set for the Southwest corner of this tract and this POINT OF BEGINNING,

THENCE N 00deg00'15"E 644.05' along the W.B.L. of this tract to a concrete nail set in asphalt pavement for this tract's N.W.C.,

THENCE N 67deg57'46"E 1061.76' along the N.W. B.L. of this tract to a 60d nail set in asphalt pavement for the Northmost corner of this tract,

THENCE S 27deg45'58"E 573.94' along the N.E. B.L. of this tract to a 60d nail set for one of this tract's two Eastmost corners,

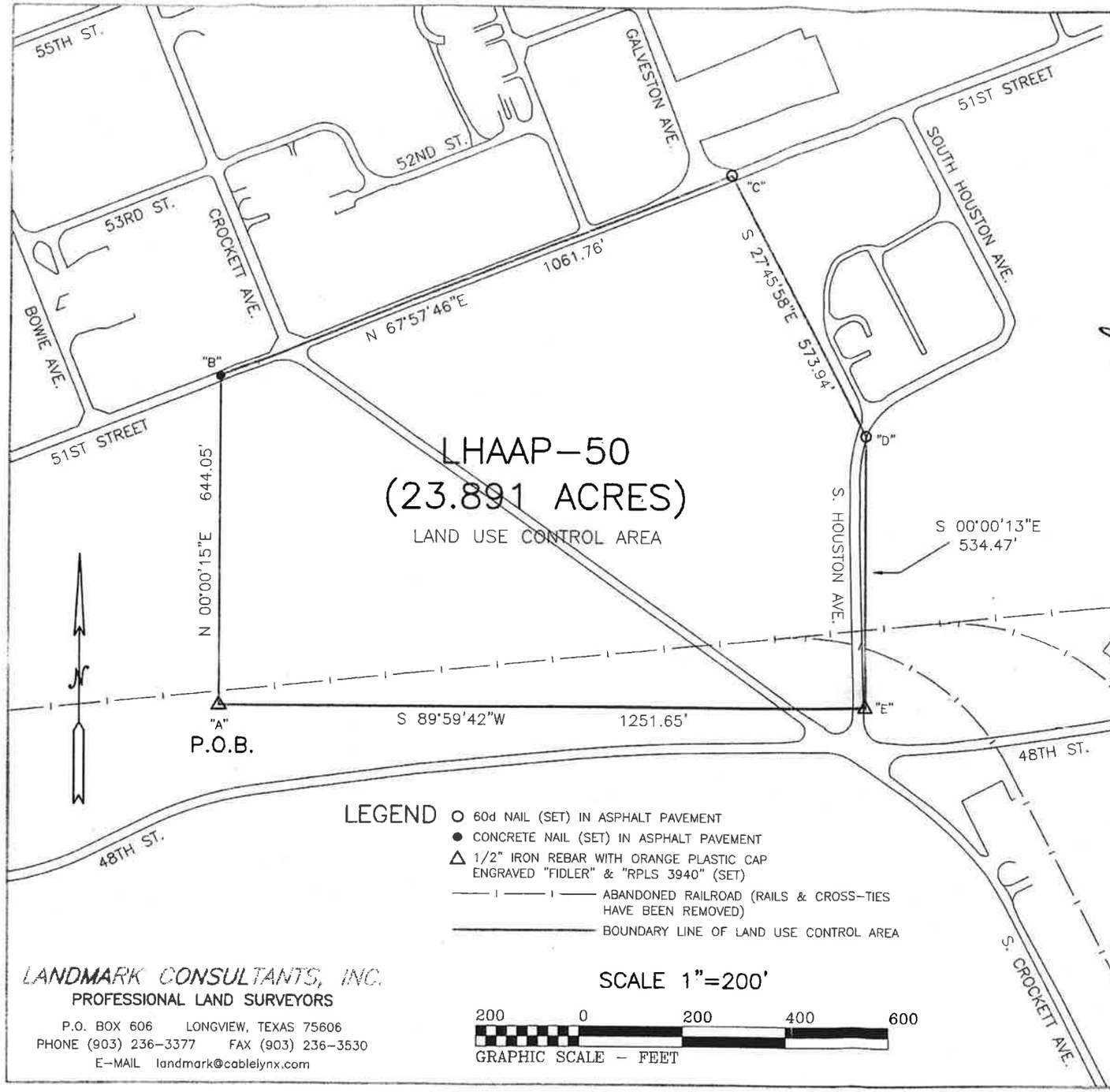
THENCE S 00deg00'13"E 534.47' along the E.B.L. of this tract to an I.R.O.P.C. set for this tract's S.E.C., from which "IGNATIUS-1" referenced above bears N 81deg47'47"E 632.57',

THENCE S 89deg59'42"W 1251.65' along the S.B.L. of this tract to this POINT OF BEGINNING, containing 23.891 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision on April 29 & 30, 2015.

Witness my hand and seal this the 4th day of May, 2015.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), AND COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999968791070 AND IS BASED ON CALCULATED DISTANCE BETWEEN PUBLISHED STATE PLANE COORDINATES (OF STATIONS C-21, IGNATIUS-1, & RACE) DIVIDED BY SURFACE TRAVERSE CALCULATED DISTANCE BETWEEN SAME THREE STATIONS. THE COMPUTED LAND AREA IS BASED ON STATE PLANE DISTANCES.

COORDINATE TABLE

	NORTH	EAST
A	6956999.929	3309204.044
B	6957643.979	3309204.091
C	6958042.360	3310188.284
D	6957534.507	3310455.661
E	6957000.041	3310455.696

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET

LEGEND
- O 60d NAIL (SET) IN ASPHALT PAVEMENT
- ● CONCRETE NAIL (SET) IN ASPHALT PAVEMENT
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- ABANDONED RAILROAD (RAILS & CROSS-TIES HAVE BEEN REMOVED)
- BOUNDARY LINE OF LAND USE CONTROL AREA

SCALE 1"=200'

200 0 200 400 600
GRAPHIC SCALE - FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-50 L.U.C.A.
(23.891 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	W.PTS W.LEG
05/04/2015	1103025W.DWG	DRAWN BY JTJ

LHAAP-50, 50-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 9/30/11 for LHAAP-50 a certification of site was conducted by _____ [indicate transferee] on _____.

A summary of land use control mechanisms is as follows:

- Groundwater restriction – A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-50]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-50.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title: _____

Signature: _____

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-51

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-51 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005557

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005557 **Receipt No:** 1006195 **Amount:** $ 36.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-51, is the area of a demolished building location known as Building 60-B, former photographic lab, located within the Plant 3 production area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-51 is not itself considered an NPL site. Environmental activities at LHAAP-51 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-51 (Building 60-B) was constructed in 1945 for the processing of X-ray film. The building had a concrete floor without a floor drain. Spent developing waste was drummed and transferred to another building for disposal. Small quantities of black and white developer and fixer solutions were generated by the X-ray lab. Activities ceased in the late 1970s or early 1980s. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-51 parcel is 5,754 square foot, more or less, or 0.13209 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-51 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-51. Contaminants in soil samples from LHAAP-51 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-51 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-51 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-51" TRACT
(INCLUDES THE REMAINS OF A DEMOLISHED BUILDING)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-51" including, but not being limited to, the concrete slab of a demolished building in the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-51" being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HORSE" (N=6960008.269 feet E=3309591.340 feet). Said traverse indicates a surface distance of 4895.70 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied (in the form of an Autocad DXF file) by Shaw Environmental & Infrastructure Group.

Commencing at monument "HORSE" referenced above,

THENCE N 86deg33'08"W 1716.42' to a concrete nail with head dimple set for the S.E.C. of this tract and this POINT OF BEGINNING,

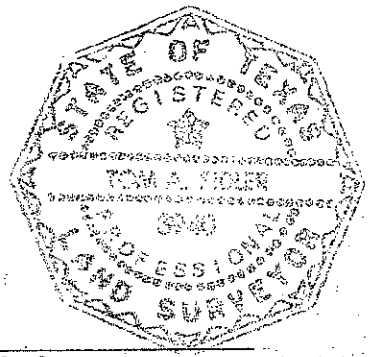
THENCE S 68deg51'01"W 68.17' along the S.B.L. of this tract to a 60d nail set for this tract's S.W.C. ,

THENCE N 21deg08'59"W 84.39' along the W.B.L. of this tract to a 60d nail set for this tract's N.W.C. , said nail being S 79deg23'36"E 3086.37' from said monument "X-11" ,

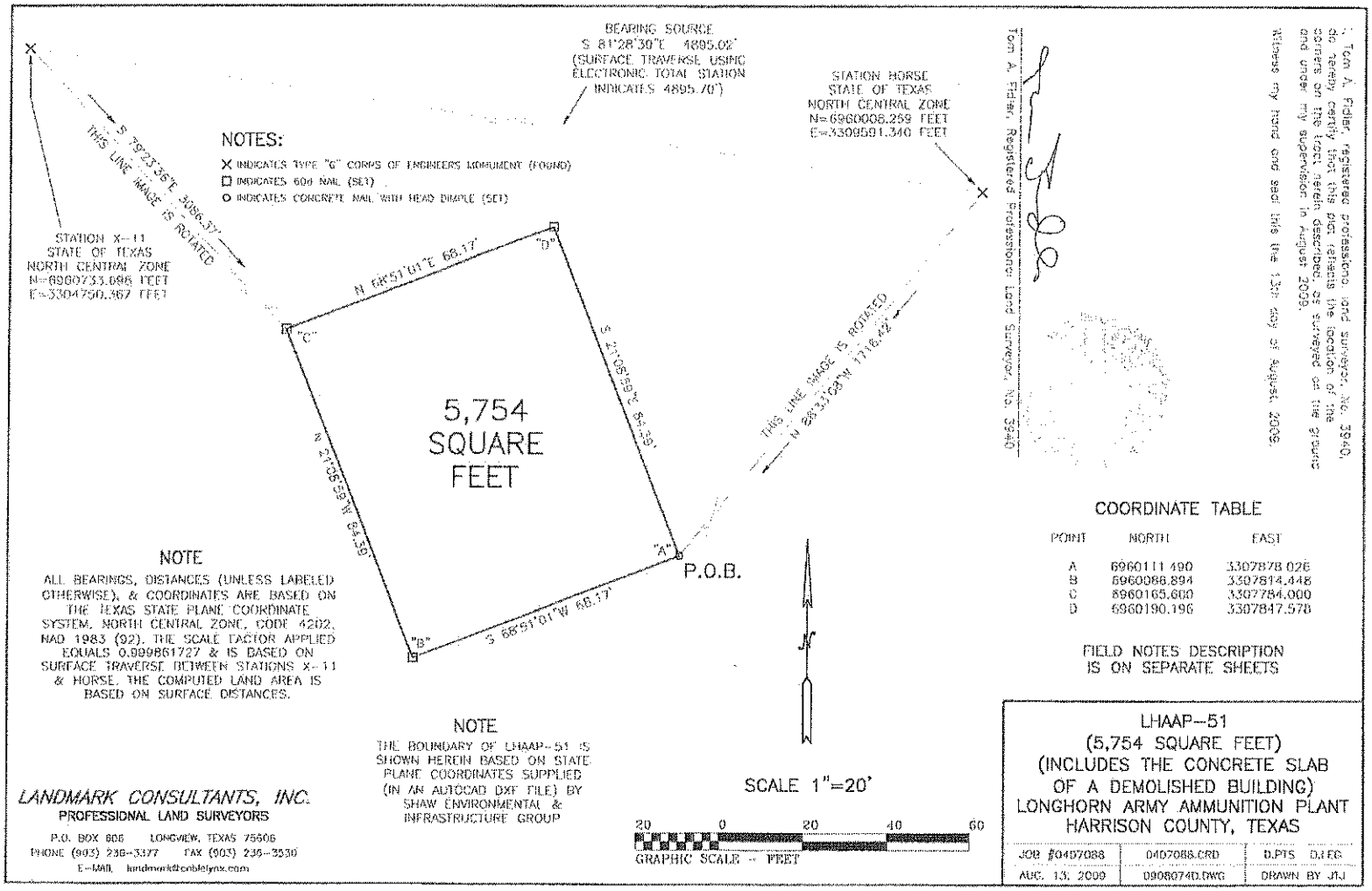
THENCE N 68deg51'01"E 68.17' along the N.B.L. of this tract to a 60d nail set for this tract's N.E.C. ,

THENCE S 21deg08'59"E 84.39' along the E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 5,754 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal this the 13th day of August, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & HORSE. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTE

THE BOUNDARY OF LHAAP-51 IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP

COORDINATE TABLE

POINT	NORTH	EAST
A	6960111.490	3307878.026
B	6960086.894	3307814.448
C	6960165.600	3307784.000
D	6960190.196	3307847.578

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cebridge.net

LHAAP-51
(5,754 SQUARE FEET)
(INCLUDES THE CONCRETE SLAB
OF A DEMOLISHED BUILDING)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	D.PTS	D.FB
AUG. 13, 2009	0906074D.DWG	DRAWN BY	JTJ

LHAAP-55

NOTICE OF NONRESIDENTIAL LAND USE AT SEPTIC TANK LOCATIONS FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005562

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

34 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005562 **Receipt No:** 1006195 **Amount:** $ 144.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-55, consisted of 10 septic tank and leachate field systems that served outlying areas of the former Longhorn Army Ammunition Plant (LHAAP) within or near LHAAP-48 and LHAAP-35C(53). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-55 is not itself considered an NPL site. Environmental activities at LHAAP-55 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-55 consisted of 10 septic tank and leachate field systems that served outlying areas of LHAAP that could not be connected to the plant sanitary sewer system. Although there was no history of industrial waste being placed into these septic tanks, soil samples were collected from borings installed at septic systems that were associated with industrial processes and analyzed for metals, explosives, semi volatile organic compounds, and volatile organic compounds where appropriate. Further information

may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-55 parcel include: ST-01 with 1,807 square feet, more or less, or 0.04148 acre tract; ST-02 with 1,791 square feet, more or less, or 0.04111 acre tract; ST-03 with 1,784 square feet, more or less, or 0.04095 acre tract; ST-04 with 1,789 square feet, more or less, or 0.04106 acre tract; ST-05 with 1,825 square feet more or less, or 0.04189 acre tract; ST-06 with 1,800 square feet, more or less, or 0.04132 acre tract; ST-07 with 1,865 square feet, more or less, or 0.04281 acre tract; ST-08 with 1,785 square feet, more or less, or 0.04097 acre tract; ST-09 with 2,004 square feet, more or less, or 0.04600 acre tract; and ST-10 with 1,804 square feet, more or less, or 0.04141 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-55 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-55. Contaminants in soil samples from LHAAP-55 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-55 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-55 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10 th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-01, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,807 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998636625, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "IGNATIUS-1" (N=6957090.304 feet E=3311081.788 feet) and "IGNATIUS-2" (N=6955582.752 feet E=3311851.704 feet). Said traverse indicates a surface distance of 1693.005 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-01, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "IGNATIUS-1" referenced above,

THENCE S 37deg17'23"E 1017.21' to a 60d nail set for the Westmost N.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 63deg19'52"E 19.74' along a N.B.L. of this tract to a 60d nail set for this tract's Westmost N.E.C. ,

THENCE S 26deg40'08"E 4.90' along an E.B.L. of this tract to a 60d nail set for this tract's Northeast reentrant corner ,

THENCE N 89deg25'37"E 24.40' along a N.B.L. of this tract to a 60d nail set for this tract's Northwest reentrant corner ,

THENCE N 00deg00'00"E 18.03' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost N.W.C. ,

THENCE N 90deg00'00"E 46.53' along a N.B.L. of this tract to a 60d nail set for this tract's Eastmost N.E.C. ,

THENCE S 00deg00'00"E 32.43' along an E.B.L. of this tract to a 60d nail set for this tract's Eastmost S.E.C. ,

THENCE N 90deg00'00"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's Eastmost S.W.C. ,

THENCE N 00deg00'00"E 12.40' along a W.B.L. of this tract to a 60d nail set for this tract's Southwest reentrant corner,

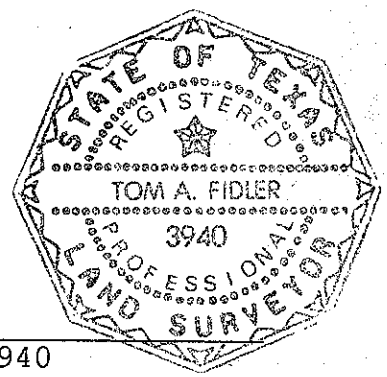
THENCE S 89deg25'37"W 23.40' along a S.B.L. of this tract to a 60d nail set for this tract's Southeast reentrant corner,

THENCE S 26deg40'08"E 5.57' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C. ,

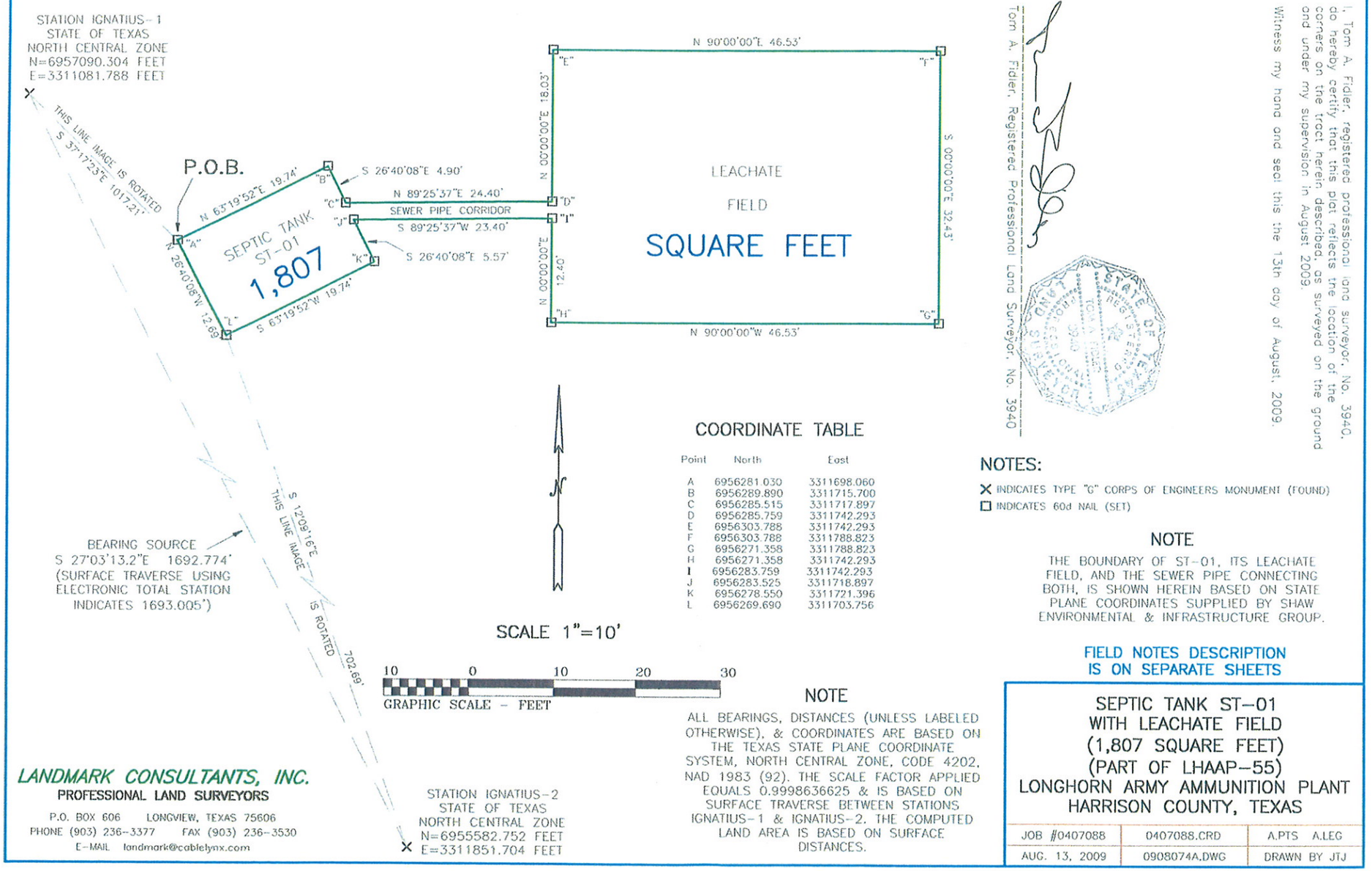
THENCE S 63deg19'52"W 19.74' along a S.B.L. of this tract to a 60d nail set for this tract's Westmost S.W.C., from which station "IGNATIUS-2" referenced above bears S 12deg09'16"E 702.69' ,

THENCE N 26deg40'08"W 12.69' along a W.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,807 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940



SCALE 1"=10'

COORDINATE TABLE

Point	North	East
A	6956281.030	3311698.060
B	6956289.890	3311715.700
C	6956285.515	3311717.897
D	6956285.759	3311742.293
E	6956303.788	3311742.293
F	6956303.788	3311788.823
G	6956271.358	3311788.823
H	6956271.358	3311742.293
I	6956283.759	3311742.293
J	6956283.525	3311718.897
K	6956278.550	3311721.396
L	6956269.690	3311703.756

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998636625 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS IGNATIUS-1 & IGNATIUS-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal this the 13th day of August, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)

☐ INDICATES 60d NAIL (SET)

NOTE

THE BOUNDARY OF ST-01, ITS LEACHATE FIELD, AND THE SEWER PIPE CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

SEPTIC TANK ST-01 WITH LEACHATE FIELD (1,807 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	A.PTS A.LEG
AUG. 13, 2009	0908074A.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-02, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,791 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-02, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-1" referenced above,

THENCE N 05deg57'31"W 746.36' to a 60d nail set for the Eastmost S.E.C. of this tract and this POINT OF BEGINNING,

THENCE N 90deg00'00"W 19.74' along a S.B.L. of this tract to a 60d nail set (in an abandoned utility pole lying on the ground) for this tract's Eastmost S.W.C. ,

THENCE N 00deg00'00"E 5.36' along a W.B.L. of this tract to a 60d nail set for this tract's Southwest reentrant corner,

THENCE N 90deg00'00"W 15.73' along a S.B.L. of this tract to a 60d nail set for this tract's Southeast reentrant corner,

THENCE S 00deg00'00"W 15.91' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C. ,

THENCE N 90deg00'00"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's Westmost S.W.C. ,

THENCE N 00deg00'00"E 32.43' along a W.B.L. of this tract to a 60d nail set for this tract's Westmost N.W.C. ,

THENCE N 90deg00'00"E 46.53' along a N.B.L. of this tract to a 60d nail set for this tract's Westmost N.E.C. ,

THENCE S 00deg00'00"E 14.52' along an E.B.L. of this tract to a 60d nail set for this tract's Northeast reentrant corner,

THENCE S 90deg00'00"E 15.73' along a N.B.L. of this tract to a 60d nail set for this tract's Northwest reentrant corner,

THENCE N 00deg00'00"W 5.33' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost N.W.C. ,

THENCE N 90deg00'00"E 19.74' along a N.B.L. of this tract to a 60d nail set for this tract's Eastmost N.E.C. ,

THENCE S 00deg00'00"E 12.69' along an E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,791 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

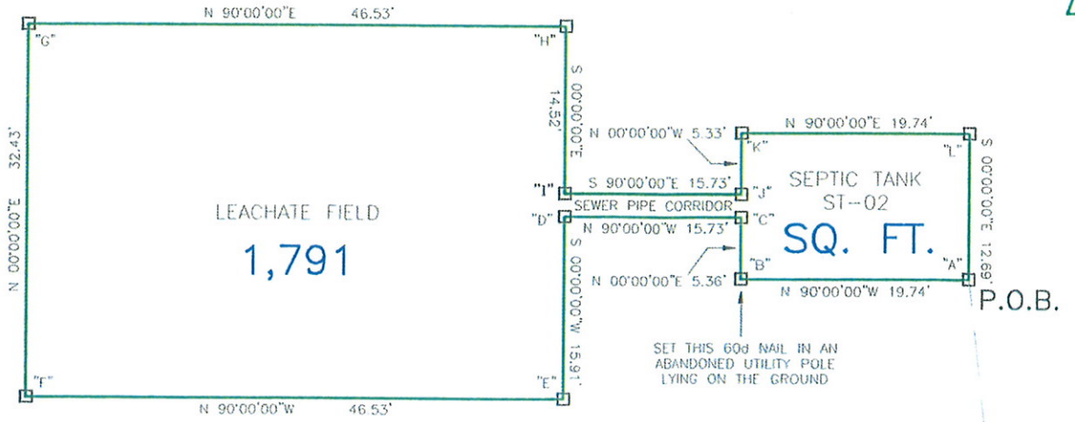
Tom A. Fidler, R.P.L.S. Number 3940

00906320

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P O BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202. NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999895238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.



COORDINATE TABLE

Point	North	East
A	6959249.790	3314202.020
B	6959249.790	3314182.280
C	6959255.150	3314182.280
D	6959255.150	3314166.552
E	6959239.240	3314166.552
F	6959239.240	3314120.022
G	6959271.670	3314120.022
H	6959271.670	3314166.552
I	6959257.150	3314166.552
J	6959257.150	3314182.280
K	6959262.480	3314182.280
L	6959262.480	3314202.020

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES 60d NAIL (SET)
- o INDICATES UNMARKED POINT

NOTE

THE BOUNDARY OF ST-02, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.



SCALE 1"=10'



N 05°57'31"W 746.36'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October 2009.

Witness my hand and seal October 26, 2009.



Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-02 WITH LEACHATE FIELD (1,791 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	J.PTS J.LEG
10/26/2009	0908074J.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-03, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,784 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-03, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-1" referenced above,

THENCE N 24deg50'41"E 537.01' to a 60d nail set for the Southmost South corner of this tract and this POINT OF BEGINNING,

THENCE N 35deg57'31"W 30.43' along a S.W. B.L. of this tract to a 60d nail set for a South reentrant corner of this tract,

THENCE S 54deg02'29"W 1.92' along a S.E. B.L. of this tract to a 60d nail set for a South corner of this tract,

THENCE N 38deg10'26"W 12.26' along a S.W. B.L. of this tract to a 60d nail set for a South reentrant corner of this tract,

THENCE S 50deg49'08"W 5.10' along a S.E. B.L. of this tract to a 60d nail set for this tract's Northmost South corner,

THENCE N 39deg10'52"W 19.74' along a S.W. B.L. of this tract to a 60d nail set for this tract's Westmost corner,

THENCE N 50deg49'08"E 12.69' along a N.W. B.L. of this tract to a 60d nail set for this tract's Westmost North corner,

THENCE S 39deg10'52"E 19.74' along a N.E. B.L. of this tract to a 60d nail set for this tract's Westmost East corner,

THENCE S 50deg49'08"W 5.58' along a S.E. B.L. of this tract to a 60d nail set for this tract's East reentrant corner,

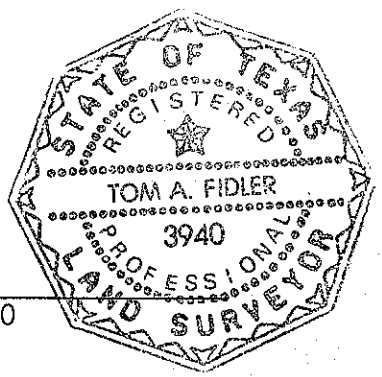
THENCE S 38deg10'26"E 10.37' along a N.E. B.L. of this tract to a 60d nail set for this tract's North reentrant corner,

THENCE N 54deg02'29"E 46.53' along a N.W. B.L. of this tract to a 60d nail set for this tract's Eastmost North corner,

THENCE S 35deg57'31"E 32.43' along a N.E. B.L. of this tract to a 60d nail set for this tract's Eastmost East corner,

THENCE S 54deg02'29"W 46.53' along a S.E. B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,784 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



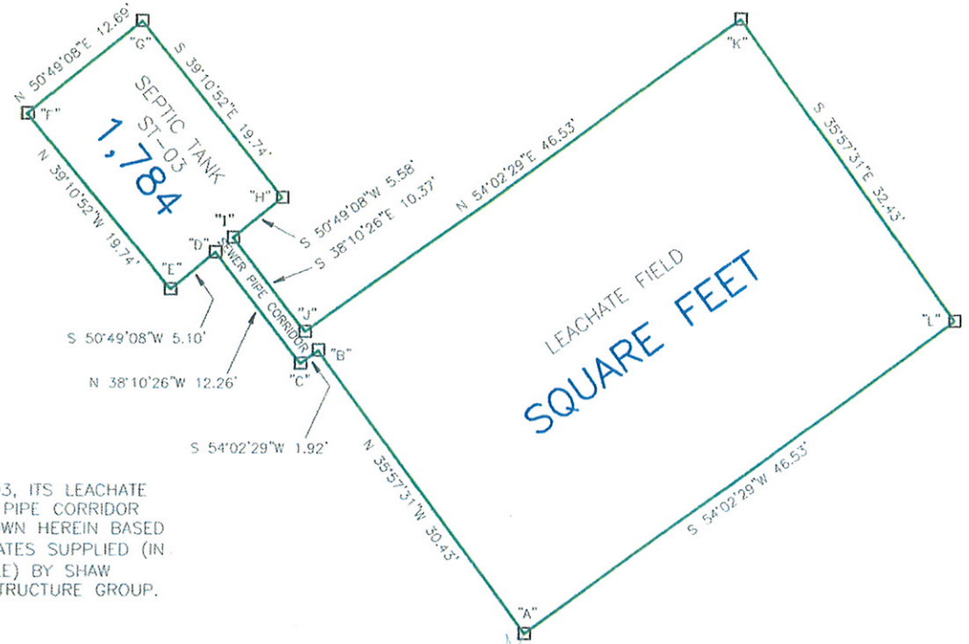
Tom A. Fidler, R.P.L.S. Number 3940

00906323

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.99989542 38 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.



NOTE

THE BOUNDARY OF ST-03, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES 60d NAIL (SET)
- O INDICATES UNMARKED POINT

COORDINATE TABLE

Point	North	East
A	6958994.769	3314505.128
B	6959019.400	3314487.259
C	6959018.270	3314485.702
D	6959027.905	3314478.127
E	6959024.680	3314474.170
F	6959039.982	3314461.699
G	6959047.999	3314471.535
H	6959032.697	3314484.007
I	6959029.169	3314479.678
J	6959021.019	3314486.085
K	6959048.342	3314523.748
L	6959022.091	3314542.791

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October 2009.

Witness my hand and seal October 26, 2009.

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-03 WITH LEACHATE FIELD (1,784 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	K.PTS K.LEG
10/26/2009	0908074K.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-04, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,789 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-04, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-1" referenced above,

THENCE S 64deg44'32"W 426.66' to a 60d nail set for the Southmost S.E.C. of this tract and this POINT OF BEGINNING,

THENCE N 89deg51'08"W 32.43' along a S.B.L. of this tract to a 60d nail set for this tract's Southmost S.W.C. ,

THENCE N 00deg08'52"E 46.53' along a W.B.L. of this tract to a 60d nail set for this tract's Southmost N.W.C. ,

THENCE S 89deg51'08"E 14.56' along a N.B.L. of this tract to a 60d nail set for this tract's Northwest reentrant corner,

THENCE N 00deg00'00"W 14.73' along a W.B.L. of this tract to a 60d nail set for this tract's Southwest reentrant corner,

THENCE N 89deg42'35"W 5.65' along a S.B.L. of this tract to a 60d nail set for this tract's Northmost S.W.C. ,

THENCE N 00deg17'25"E 19.74' along a W.B.L. of this tract to a concrete nail with head dimple set (in old asphalt) for this tract's Northmost N.W.C. ,

THENCE S 89deg42'35"E 12.69' along a N.B.L. of this tract to a 60d nail set for this tract's Northmost N.E.C. ,

THENCE S 00deg17'25"W 19.74' along an E.B.L. of this tract to a 60d nail set for this tract's Northmost S.E.C. ,

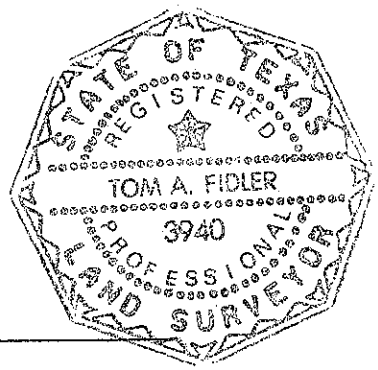
THENCE N 89deg42'35"W 5.04' along a S.B.L. of this tract to a 60d nail set for this tract's Southeast reentrant corner,

THENCE S 00deg00'00"E 14.73' along an E.B.L. of this tract to a 60d nail set for this tract's Northeast reentrant corner,

THENCE S 89deg51'08"E 15.87' along a N.B.L. of this tract to a 60d nail set for this tract's Southmost N.E.C. ,

THENCE S 00deg08'52"W 46.53' along an E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,789 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October 2009.

Witness my hand and seal October 26, 2009.

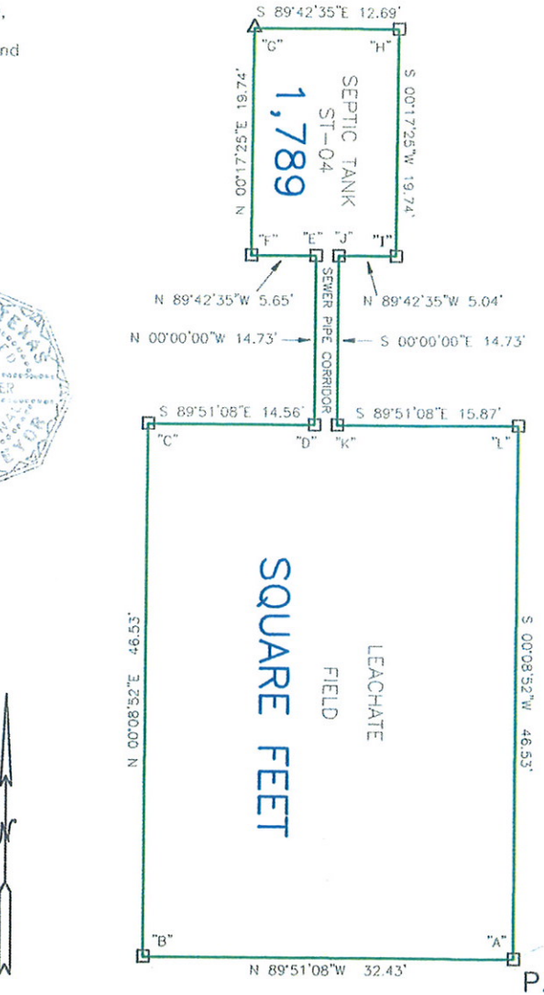
STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
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NOTE

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COORDINATE TABLE

Point	North	East
A	6958325.408	3313893.629
B	6958325.492	3313861.199
C	6958372.022	3313861.319
D	6958371.984	3313875.880
E	6958386.716	3313875.880
F	6958386.744	3313870.230
G	6958406.484	3313870.330
H	6958406.420	3313883.020
I	6958386.680	3313882.920
J	6958386.706	3313877.880
K	6958371.979	3313877.880
L	6958371.938	3313893.749

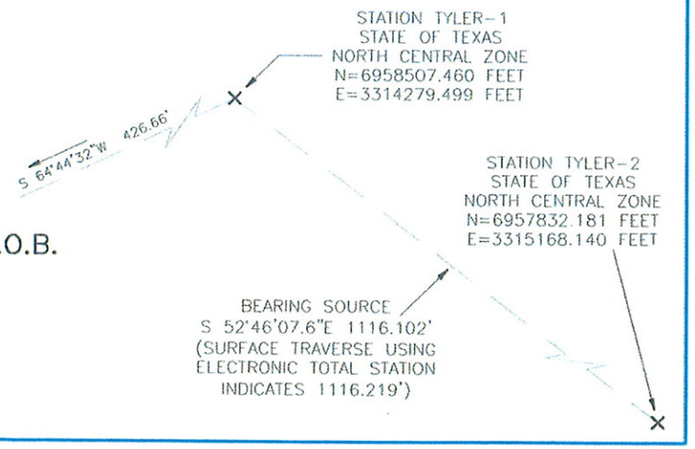
NOTE

THE BOUNDARY OF ST-04, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES 60d NAIL (SET)
- △ INDICATES CONCRETE NAIL WITH HEAD DIMPLE (SET)

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS



SCALE 1"=10'



SEPTIC TANK ST-04
WITH LEACHATE FIELD
(1,789 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	1.PTS 1.LEG
10/26/2009	09080741.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-05, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,825 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-05, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE N 52deg46'07.6"W 36.82' to a point, said point being S 52deg46'07.6"E 1079.28' from said monument "TYLER-1" ,

THENCE S 37deg13'52"W 81.68' to a 60d nail set for the Northmost East corner of this tract and this POINT OF BEGINNING ,

THENCE S 33deg39'28"W 12.69' along a S.E. B.L. of this tract to a 60d nail set for this tract's Northmost South corner,

THENCE N 56deg20'32"W 17.74' along a S.W. B.L. of this tract to a chisled "X" set in concrete for this tract's South reentrant corner,

THENCE S 36deg51'06"W 32.79' along a S.E. B.L. of this tract to a 60d nail set for this tract's East reentrant corner,

THENCE S 57deg33'12"E 44.52' along a N.E. B.L. of this tract to a 60d nail set for this tract's Southmost East corner,

THENCE S 32deg26'48"W 32.43' along a S.E. B.L. of this tract to a 60d nail set for this tract's Southmost South corner,

THENCE N 57deg33'12"W 46.53' along a S.W. B.L. of this tract to a 60d nail set for this tract's West corner,

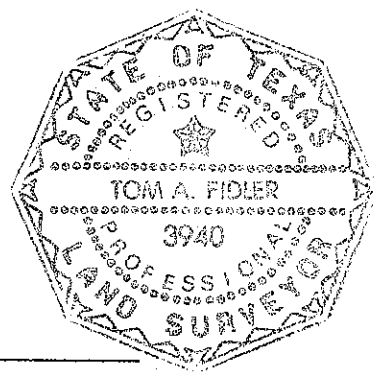
THENCE N 32deg26'48"E 32.43' along a N.W. B.L. of this tract to a 60d nail set for deflection corner,

THENCE N 36deg51'06"E 32.84' along a N.W. B.L. of this tract to a chisled "X" set in concrete for deflection corner,

THENCE N 33deg39'28"E 12.69' along a N.W. B.L. of this tract to a 60d nail set for this tract's North corner,

THENCE S 56deg20'32"E 19.74' along a N.E. B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,825 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

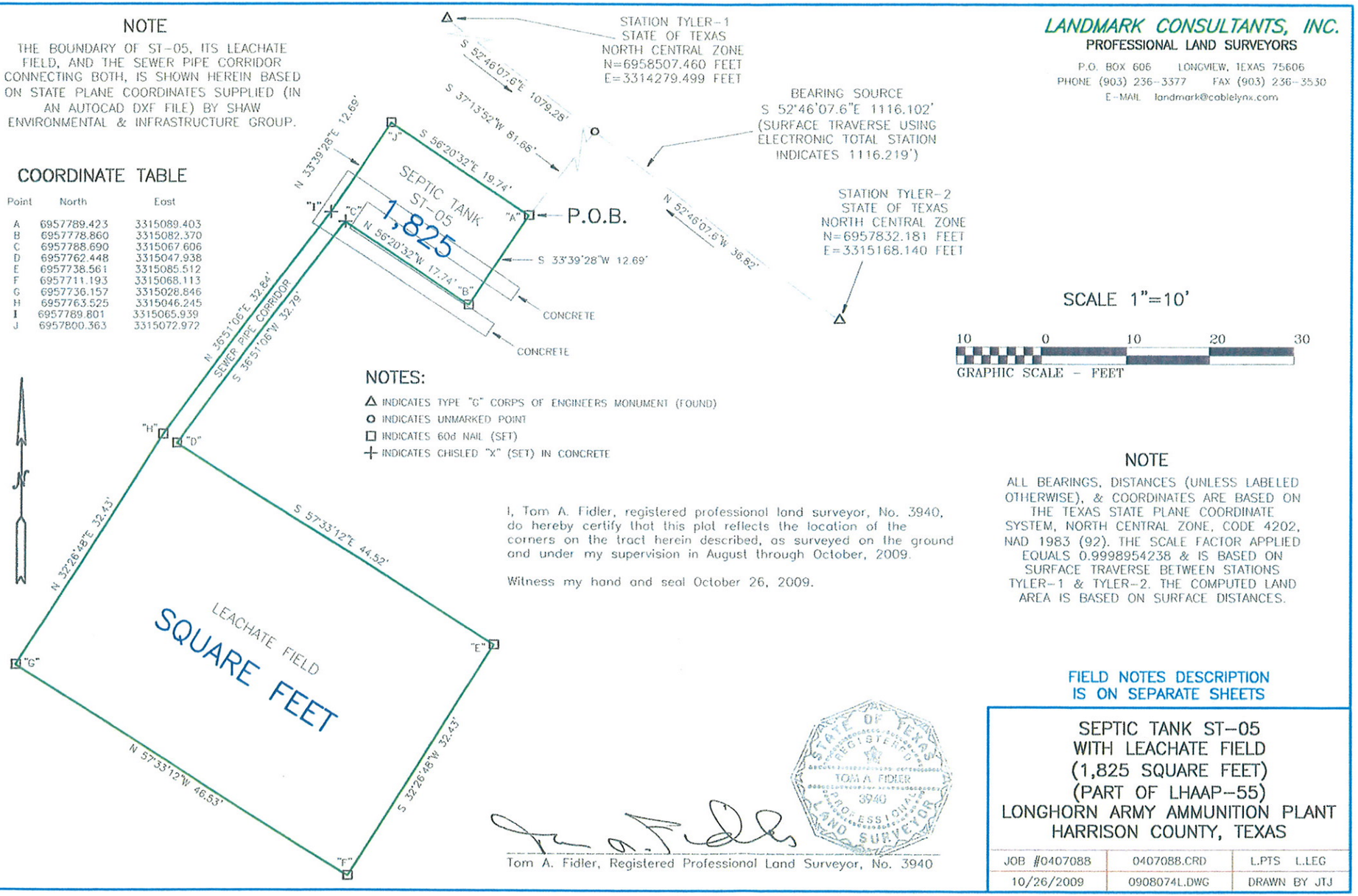
00906329

NOTE

THE BOUNDARY OF ST-05, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

COORDINATE TABLE

Point	North	East
A	6957789.423	3315089.403
B	6957778.860	3315082.370
C	6957788.690	3315067.606
D	6957762.448	3315047.938
E	6957738.561	3315085.512
F	6957711.193	3315068.113
G	6957736.157	3315028.846
H	6957763.525	3315046.245
I	6957789.801	3315065.939
J	6957800.363	3315072.972



NOTES:

- △ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- o INDICATES UNMARKED POINT
- □ INDICATES 60d NAIL (SET)
- + INDICATES CHISLED "X" (SET) IN CONCRETE

SCALE 1"=10'

10 0 10 20 30

GRAPHIC SCALE - FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

SEPTIC TANK ST-05 WITH LEACHATE FIELD (1,825 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	L.PTS L.LEG
10/26/2009	0908074L.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-06, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,800 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-06, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 85deg57'52"E 1425.64' to a 60d nail set for the Northmost N.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 67deg08'12"E 12.69' along a N.B.L. of this tract to a 60d nail set for this tract's Northmost N.E.C. ,

THENCE S 22deg51'48"E 19.74' along an E.B.L. of this tract to a 60d nail set for this tract's Northmost S.E.C. ,

THENCE S 67deg08'12"W 4.97' along a S.B.L. of this tract to a 60d nail set for this tract's S.E. reentrant corner,

THENCE S 22deg49'50"E 19.87' along an E.B.L. of this tract to a 60d nail set for this tract's N.E. reentrant corner,

THENCE N 64deg30'12"E 16.55' along a N.B.L. of this tract to a

60d nail set for this tract's Southmost N.E.C. ,

THENCE S 25deg29'48"E 46.53' along an E.B.L. of this tract to a 60d nail set for this tract's Southmost S.E.C. ,

THENCE S 64deg30'12"W 32.43' along a S.B.L. of this tract to a 60d nail set for this tract's Southmost S.W.C. ,

THENCE N 25deg29'48"W 46.53' along a W.B.L. of this tract to a 60d nail set for this tract's Southmost N.W.C. ,

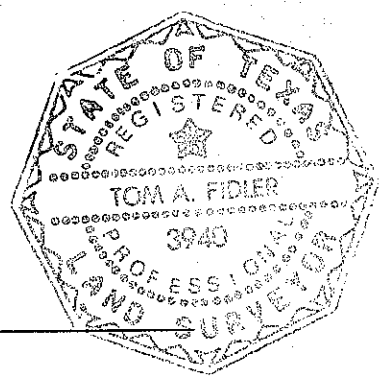
THENCE N 64deg30'12"E 13.88' along a N.B.L. of this tract to a 60d nail set for this tract's N.W. reentrant corner,

THENCE N 22deg49'50"W 19.96' along a W.B.L. of this tract to a 60d nail set for this tract's S.W. reentrant corner,

THENCE S 67deg08'12"W 5.72' along a S.B.L. of this tract to a 60d nail set for this tract's Northmost S.W.C. ,

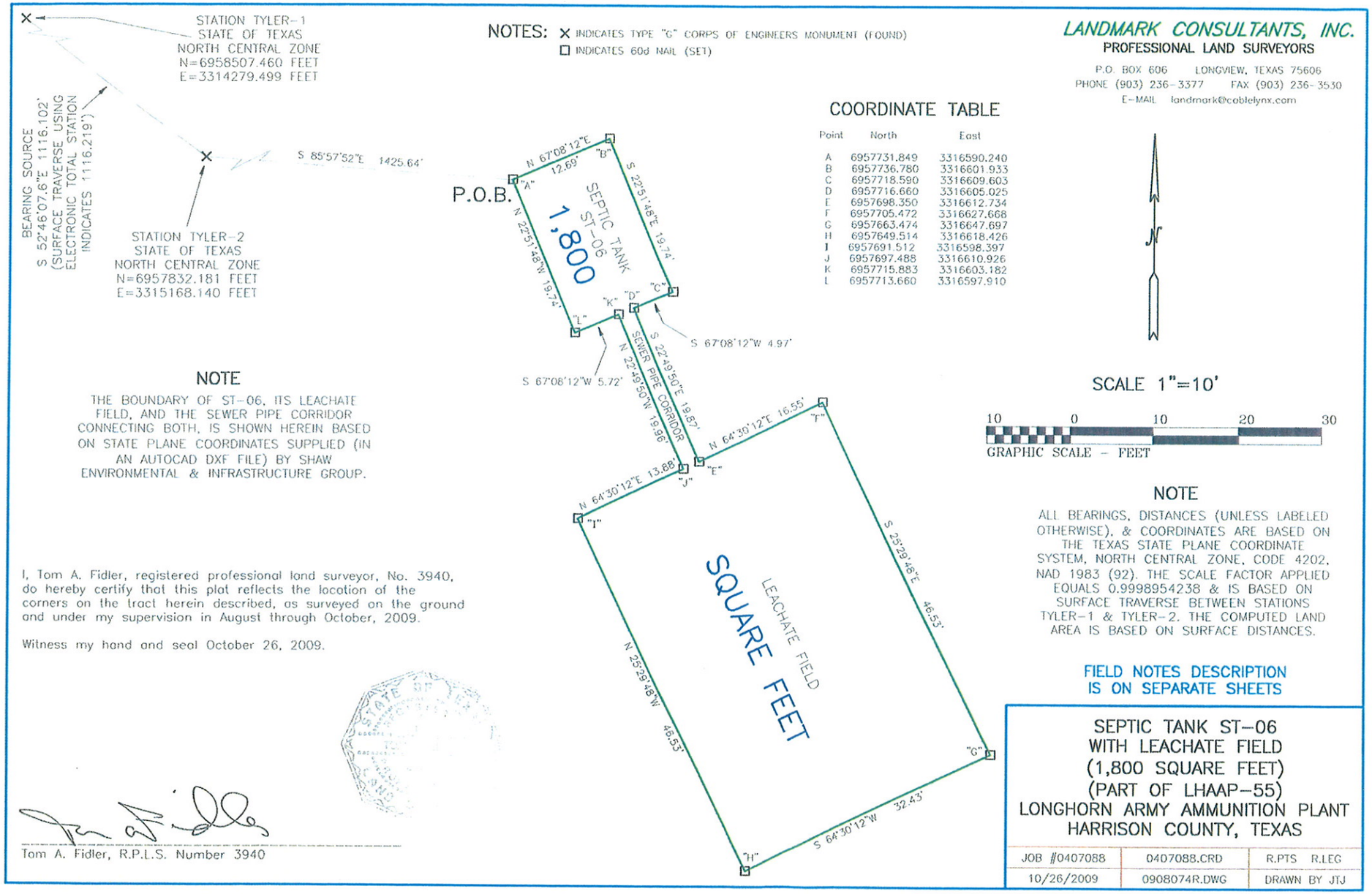
THENCE N 22deg51'48"W 19.74' along a W.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,800 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

00906332



COORDINATE TABLE

Point	North	East
A	6957731.849	3316590.240
B	6957736.780	3316601.933
C	6957718.590	3316609.603
D	6957716.660	3316605.025
E	6957698.350	3316612.734
F	6957705.472	3316627.668
G	6957663.474	3316647.697
H	6957649.514	3316618.426
I	6957691.512	3316598.397
J	6957697.488	3316610.926
K	6957715.883	3316603.182
L	6957713.660	3316597.910

SCALE 1"=10'

10 0 10 20 30

GRAPHIC SCALE - FEET

NOTE

THE BOUNDARY OF ST-06, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, R.P.L.S. Number 3940

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

SEPTIC TANK ST-06 WITH LEACHATE FIELD (1,800 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	R.PTS R.LEG
10/26/2009	0908074R.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-07, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,865 square feet of land out of the Longhorn Ordance Works Reservation , (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-07, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 20deg14'47"E 467.25' to a 60d nail set for the N.E.C. corner of this tract and this POINT OF BEGINNING ,

THENCE S 13deg37'37"E 32.43' along an E.B.L. of this tract to a 60d nail set for this tract's S.E.C. ,

THENCE S 76deg22'23"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's S.W.C. ,

THENCE N 13deg37'37"W 14.74' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost reentrant corner,

THENCE S 77deg04'57"W 23.21' along a S.B.L. of this tract to a 60d nail set for a somewhat reentrant corner of this tract,

THENCE S 29deg56'20"W 28.62' along a S.E. B.L. of this tract

to a 60d nail set for this tract's Southmost reentrant corner,

THENCE S 54deg24'06"E 5.82' along a N.E. B.L. of this tract to a 60d nail set for this tract's East corner,

THENCE S 35deg35'54"W 19.74' along a S.E. B.L. of this tract to a 60d nail set for this tract's South corner,

THENCE N 54deg24'06"W 12.69' along a S.W. B.L. of this tract to a 60d nail set for this tract's West corner,

THENCE N 35deg35'54"E 19.74' along a N.W. B.L. of this tract to a 60d nail set for this tract's North corner,

THENCE S 54deg24'06"E 4.86' along a N.E. B.L. of this tract to a 60d nail set for this tract's Westmost reentrant corner,

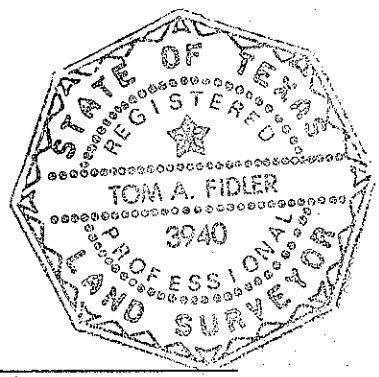
THENCE N 29deg56'20"E 29.29' along a N.W. B.L. of this tract to a 60d nail set for this tract's Southmost N.W.C. ,

THENCE N 77deg04'57"E 24.06' along a N.B.L. of this tract to a 60d nail set for this tract's Northmost reentrant corner,

THENCE N 13deg37'37"W 15.69' along a W.B.L. of this tract to a 60d nail set for this tract's Northmost N.W.C. ,

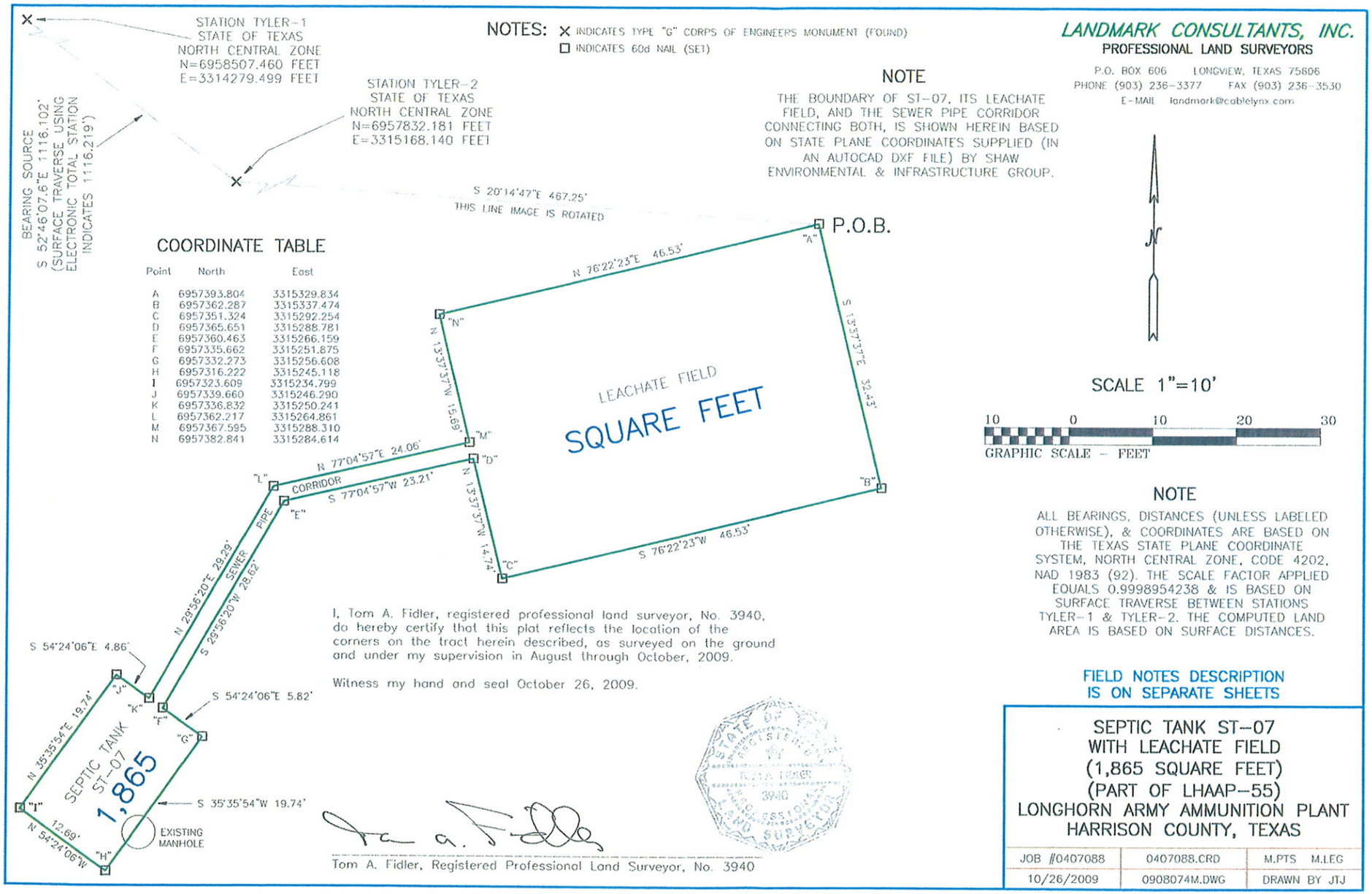
THENCE N 76deg22'23"E 46.53' along a N.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,865 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

00906335



NOTES: × INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES 60d NAIL (SET)

COORDINATE TABLE

Point	North	East
A	6957393.804	3315329.834
B	6957362.287	3315337.474
C	6957351.324	3315292.254
D	6957365.651	3315288.781
E	6957360.463	3315266.159
F	6957335.662	3315251.875
G	6957332.273	3315256.608
H	6957316.222	3315245.118
I	6957323.609	3315234.799
J	6957339.660	3315246.290
K	6957336.832	3315250.241
L	6957362.217	3315264.861
M	6957367.595	3315288.310
N	6957382.841	3315284.614

NOTE

THE BOUNDARY OF ST-07, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

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E-MAIL landmark@cablelynx.com

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-07 WITH LEACHATE FIELD (1,865 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	M.PTS M.LEG
10/26/2009	0908074M.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-08, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,785 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-08, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 37deg52'57"E 620.24' to a 60d nail set for the Northmost N.E.C. corner of this tract and this POINT OF BEGINNING,

THENCE S 16deg08'12"E 46.53' along an E.B.L. of this tract to a 60d nail set for this tract's Eastmost S.E.C. ,

THENCE S 73deg51'48"W 32.43' along a S.B.L. of this tract to a 60d nail set for slight deflection corner,

THENCE S 70deg49'57"W 12.79' along a S.B.L. of this tract to a 60d nail set for this tract's Southmost reentrant corner,

THENCE S 17deg16'09"E 6.37' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C. ,

THENCE S 72deg43'51"W 19.74' along a S.B.L. of this tract to a 60d nail set for this tract's only S.W.C. ,

THENCE N 17deg16'09"W 12.69' along a W.B.L. of this tract to a chisled "X" set in concrete for this tract's Southmost N.W.C. ,

THENCE N 72deg43'51"E 19.74' along a N.B.L. of this tract to a 60d nail set for this tract's Southmost N.E.C. ,

THENCE S 17deg16'09"E 4.32' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost reentrant corner,

THENCE N 70deg49'57"E 12.83' along a N.B.L. of this tract to a 60d nail set for this tract's Eastmost reentrant corner,

THENCE N 16deg08'12"W 44.52' along a W.B.L. of this tract to a 60d nail set for this tract's Northmost N.W.C. ,

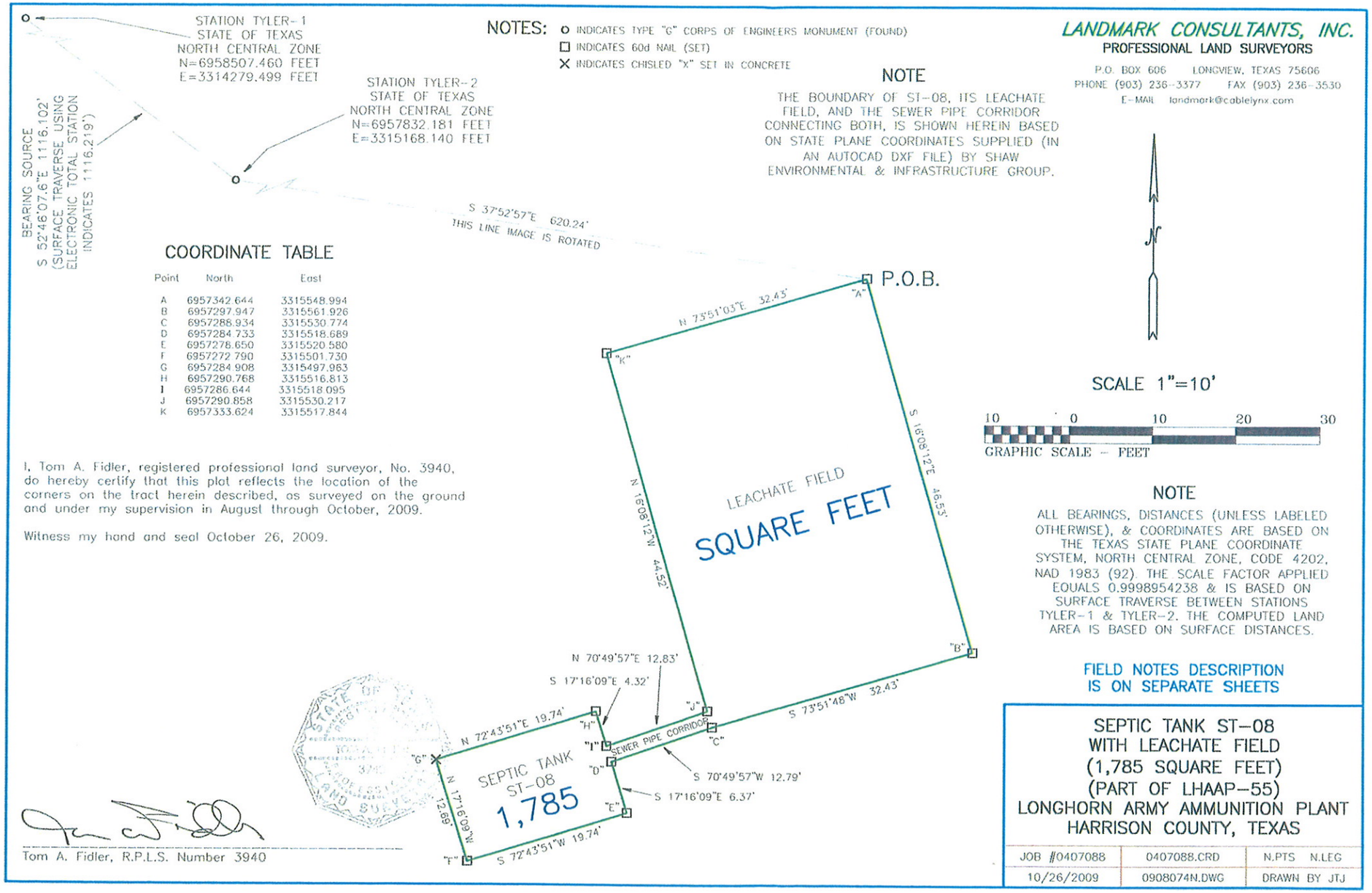
THENCE N 73deg51'03"E 32.43' along a N.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,785 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00906338



NOTES: o INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES 60d NAIL (SET)
X INDICATES CHISLED "X" SET IN CONCRETE

NOTE

THE BOUNDARY OF ST-08, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

COORDINATE TABLE

Point	North	East
A	6957342.644	3315548.994
B	6957297.947	3315561.926
C	6957288.934	3315530.774
D	6957284.733	3315518.689
E	6957278.650	3315520.580
F	6957272.790	3315501.730
G	6957284.908	3315497.963
H	6957290.768	3315516.813
I	6957286.644	3315518.095
J	6957290.858	3315530.217
K	6957333.624	3315517.844

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
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E-MAIL landmark@cablelynx.com

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE – FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-08 WITH LEACHATE FIELD (1,785 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	N.PTS N.LEG
10/26/2009	0908074N.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-09, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 2,004 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-09, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 03deg30'04"E 1101.12' to a 60d nail set for the North corner of this tract and this POINT OF BEGINNING,

THENCE S 47deg56'14"E 12.69' along a N.E. B.L. of this tract to a 60d nail set for this tract's East corner,

THENCE S 42deg03'46"W 19.74' along a S.E. B.L. of this tract to a 60d nail set for this tract's South corner,

THENCE N 47deg56'14"W 4.08' along a S.W. B.L. of this tract to a 60d nail set for this tract's S.E. reentrant corner,

THENCE S 18deg07'53"E 120.09' along an E.B.L. of this tract to a 60d nail set for this tract's N.E. reentrant corner,

THENCE N 67deg40'46"E 15.01' along a N.B.L. of this tract to a

60d nail set for this tract's N.E.C. ,

THENCE S 22deg19'14"E 46.53' along an E.B.L. of this tract to a 60d nail set for this tract's S.E.C. ,

THENCE S 67deg40'46"W 32.43' along a S.B.L. of this tract to a 60d nail set for this tract's S.W.C. ,

THENCE N 22deg19'14"W 46.53' along a W.B.L. of this tract to a 60d nail set for this tract's N.W.C. ,

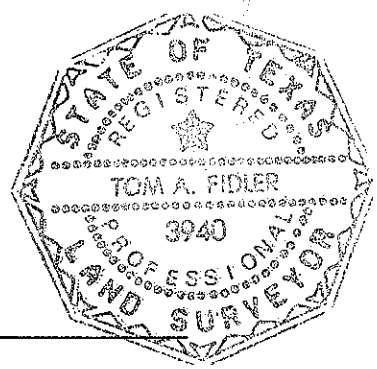
THENCE N 67deg40'46"E 15.42' along a N.B.L. of this tract to a 60d nail set for this tract's N.W. reentrant corner,

THENCE N 18deg07'53"W 123.73' along a W.B.L. of this tract to a 60d nail set for this tract's S.W. reentrant corner,

THENCE N 47deg56'14"W 4.59' along a S.W. B.L. of this tract to a 60d nail set for this tract's West corner,

THENCE N 42deg03'46"E 19.74' along a N.W. B.L. of this tract to this POINT OF BEGINNING. This tract contains 2,004 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

SEPTIC TANK ST-09
WITH LEACHATE FIELD
(2,004 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	P.PTS P.LEG
10/26/2009	0908074P.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, R.P.L.S. Number 3940

STATE OF TEXAS
TOM A. FIDLER
3940
REGISTERED
PROFESSIONAL
LAND SURVEYOR

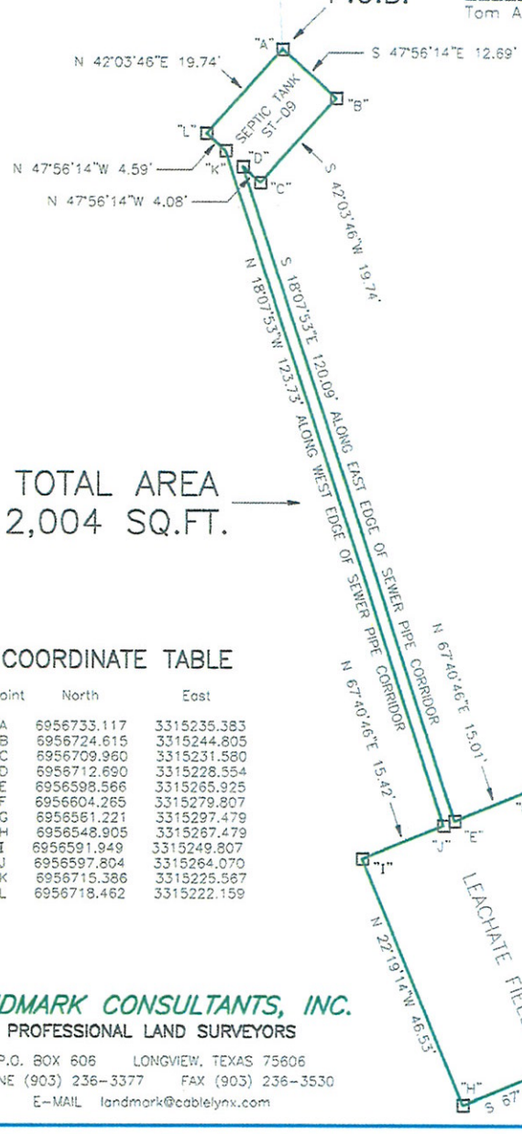
STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

S 03°30'04"E 1101.12'

P.O.B.



TOTAL AREA
2,004 SQ.FT.

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTE

THE BOUNDARY OF ST-09, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

COORDINATE TABLE

Point	North	East
A	6956733.117	3315235.383
B	6956724.615	3315244.805
C	6956709.960	3315231.580
D	6956712.690	3315228.554
E	6956598.566	3315265.925
F	6956604.265	3315279.807
G	6956561.221	3315297.479
H	6956548.905	3315267.479
I	6956591.949	3315249.807
J	6956597.804	3315264.070
K	6956715.386	3315225.567
L	6956718.462	3315222.159

SCALE 1"=20'

20 0 20 40 60
GRAPHIC SCALE - FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTES: × INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES 60d NAIL (SET)

00906341

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-10, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,804 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-10, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 34deg34'49"E 861.93' to a 60d nail set for the Westmost N.W.C. of this tract and this POINT OF BEGINNING,

THENCE S 81deg33'36"E 46.53' along a N.B.L. of this tract to a 60d nail set for this tract's Westmost N.E.C. ,

THENCE S 08deg26'24"W 13.21' along an E.B.L. of this tract to a 60d nail set for this tract's N.E. reentrant corner,

THENCE S 82deg30'08"E 21.87' along a N.B.L. of this tract to a 60d nail set for this tract's N.W. reentrant corner,

THENCE N 08deg55'06"E 4.34' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost N.W.C. ,

THENCE S 81deg04'54"E 19.74' along a N.B.L. of this tract to a 60d nail set for this tract's Eastmost N.E.C. ,

THENCE S 08deg55'06"W 12.69' along an E.B.L. of this tract to a 60d nail set for this tract's Eastmost S.E.C. ,

THENCE N 81deg04'54"W 19.74' along a S.B.L. of this tract to a 60d nail set for this tract's Eastmost S.W.C. ,

THENCE N 08deg55'06"E 6.34' along a W.B.L. of this tract to a 60d nail set for this tract's S.W. reentrant corner,

THENCE N 82deg30'08"W 21.85' along a S.B.L. of this tract to a 60d nail set for this tract's S.E. reentrant corner,

THENCE S 08deg26'24"W 17.22' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C. ,

THENCE N 81deg33'36"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's Westmost S.W.C. ,

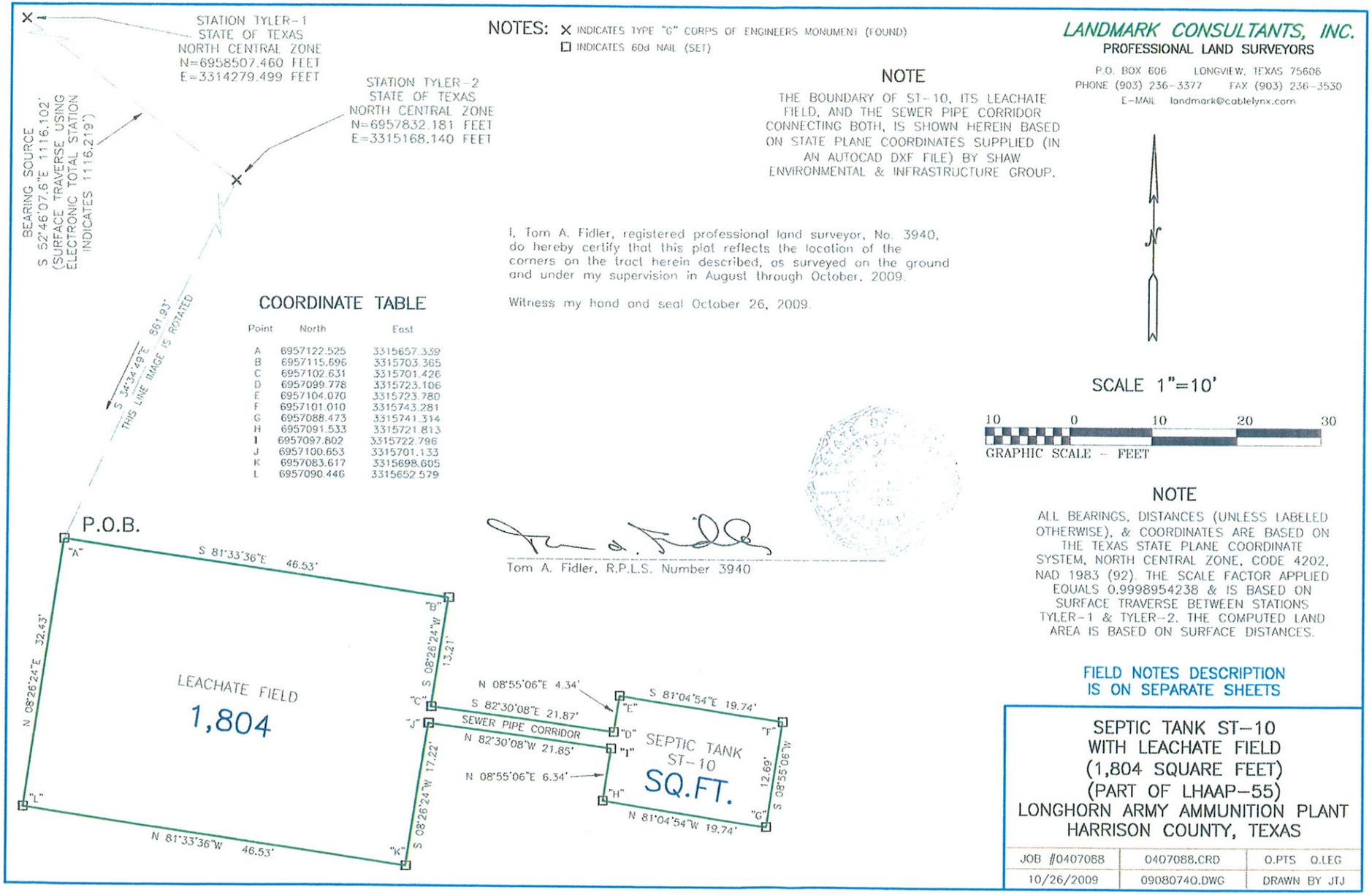
THENCE N 08deg26'24"E 32.43' along a W.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,804 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00906344



NOTES: X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES 60d NAIL (SET)

NOTE

THE BOUNDARY OF ST-10, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

COORDINATE TABLE

Point	North	East
A	6957122.525	3315657.339
B	6957115.696	3315703.365
C	6957102.631	3315701.426
D	6957099.778	3315723.106
E	6957104.070	3315723.780
F	6957101.010	3315743.281
G	6957088.473	3315741.314
H	6957091.533	3315721.813
I	6957097.802	3315722.796
J	6957100.653	3315701.133
K	6957083.617	3315698.605
L	6957090.446	3315652.579

Tom A. Fidler, R.P.L.S. Number 3940

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

SEPTIC TANK ST-10
WITH LEACHATE FIELD
(1,804 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	O.PTS Q.LEG
10/26/2009	09080740.DWG	DRAWN BY JTJ

LHAAP-35A(58), 58-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

Final

Remedial Design
LHAAP-35A(58), Shops Area, Group 4
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared for U.S. Army Corps of Engineers – Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128

Prepared by Shaw Environmental, Inc.
1401 Enclave Parkway, Suite 250
Houston, Texas 77077

Contract No. W912QR-04-D-0027, Task Order No. DS02
Project No. 117591
Rev 0
September 2011

Shaw® a world of Solutions™

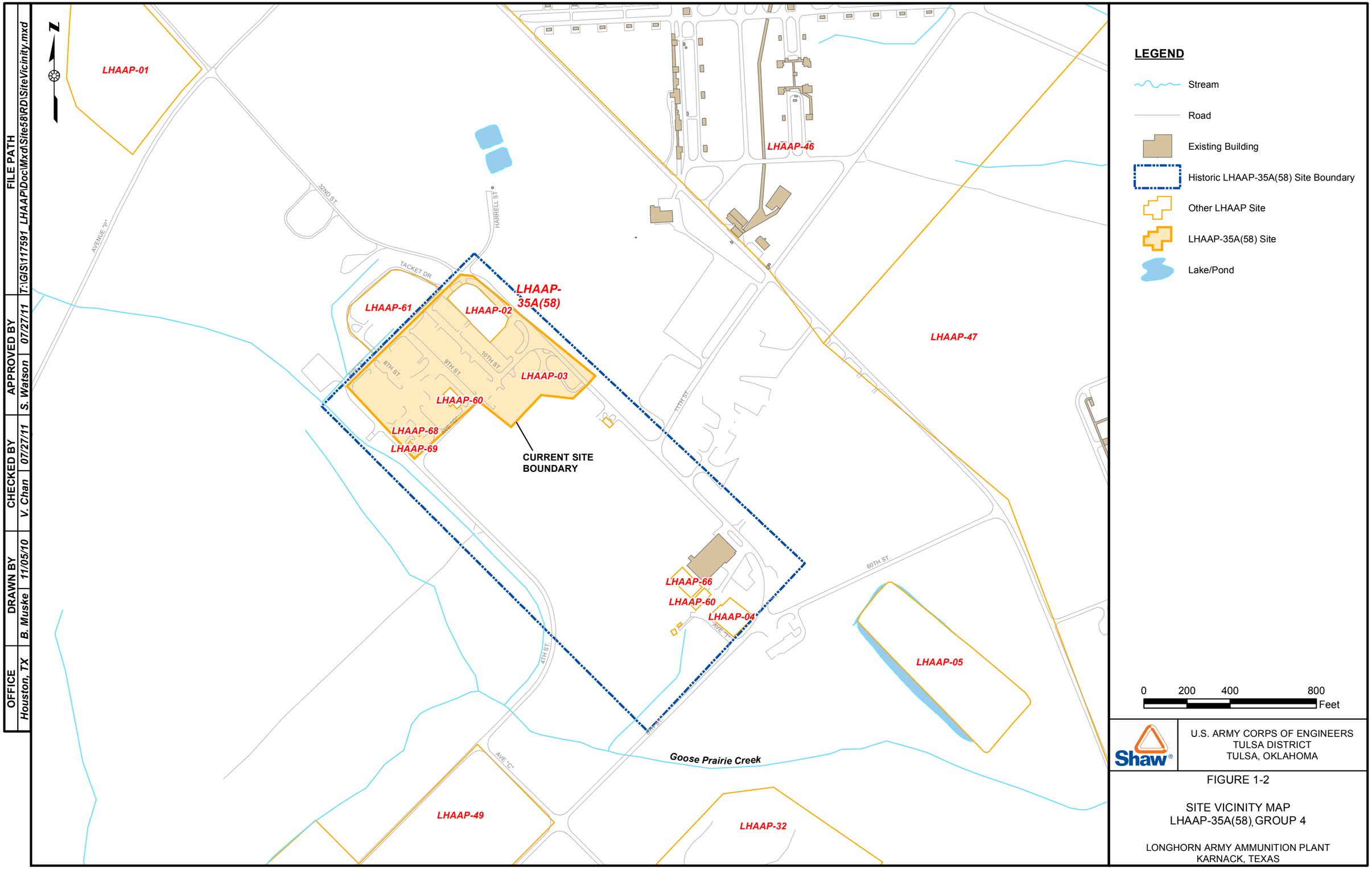
Table of Contents

List of Tables iii
List of Figures iii
List of Appendices iii
Acronyms and Abbreviations iv

1.0 Introduction **1-1**
1.1 Longhorn Army Ammunition Plant Background 1-1
1.1.1 LHAAP-35A(58) Description 1-1
1.2 Remedial Action Objectives 1-2
1.3 Planned Remedial Action 1-3
1.3.1 In Situ Bioremediation (eastern plume target area only) 1-3
1.3.2 Monitored Natural Attenuation (eastern and western plumes) 1-4
1.3.3 Land Use Control (eastern and western plumes) 1-5
1.3.4 Long-Term Monitoring/Five-Year Reviews (eastern and western plumes) 1-5
1.4 Cleanup Levels 1-5
1.5 Areas of Contamination 1-5
1.6 Hydrogeology 1-7
2.0 Land Use Control **2-1**
3.0 Monitored Natural Attenuation Design **3-1**
3.1 Monitored Natural Attenuation Performance Monitoring Well Locations 3-1
3.1.1 Direct-Push Technology Groundwater Sampling and Installation of Monitoring Wells 3-2
3.1.2 Vertical Well Clusters (eastern and western plumes) 3-2
3.2 Monitored Natural Attenuation Evaluation (western plume) 3-3
3.3 Long-Term Monitoring (eastern and western plumes) 3-3
3.4 Five-Year Reviews (eastern and western plumes) 3-3
3.5 Surface Water Monitoring 3-3
4.0 Land Use Control Design and Implementation Plan **4-1**
4.1 Land Use Control Implementation 4-1
4.2 Land Use Control Operation and Maintenance 4-2
4.2.1 Site Certification and Reporting 4-2
4.2.2 Notice of Planned Property Conveyances 4-2
4.2.3 Opportunity to Review Text of Intended Land Use Controls 4-3
4.2.4 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance 4-3
4.2.5 Land Use Control Enforcement 4-3
4.2.6 Modification or Termination of Land Use Controls 4-3
4.2.7 Comprehensive Land Use Control Management Plan 4-4
5.0 In Situ Bioremediation Design (eastern plume target area) **5-1**
5.1 Injections 5-2
5.2 Amendments 5-2
5.2.1 Components 5-2
5.2.2 Treatability Study 5-2
5.3 Performance Monitoring and Transition to Monitored Natural Attenuation 5-3
6.0 Field Activities **6-1**
6.1 Pre-mobilization Activities 6-1

Contract No. W912QR-04-D-0027, Task Order No. DS02• Final • Rev 0 • September 2011

00906348



FILE PATH	
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	APPROVED BY	
	S. Watson	07/27/11

	CHECKED BY	
	V. Chan	07/27/11

	DRAWN BY	
	B. Muske	11/05/10

OFFICE
Houston, TX

Shaw®

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 1-2

SITE VICINITY MAP
LHAAP-35A(58), GROUP 4

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

2.0 LAND USE CONTROL

The objective of the LUC at LHAAP-35A(58) is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until cleanup goals are met. Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566. **Appendix A** provides sample LUC compliance certification documentation.

The LUC addresses the two groundwater plumes at LHAAP-35A(58) with levels of contamination that require implementation of a remedy (see **Section 1.3**). The U.S. Army is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the LUC.

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. U.S. Army shall obtain USEPA and Texas Commission on Environmental Quality (TCEQ) concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-35A(58) forms the basis for the remedy. The future use of the site as part of a national wildlife refuge is consistent with the industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation and will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566. Compliance with the use assumption will be documented in the five-year review reports.

Contract No. W912QR-04-D-0027, Task Order No. DS02• Final • Rev 0 • September 2011

4.0 LAND USE CONTROL DESIGN AND IMPLEMENTATION PLAN

This section describes the LUC design and implementation activities for LHAAP-35A(58). The activities will result in a surveyed and recorded groundwater use restriction boundary and an operation and maintenance plan for the LUC.

The objective of the LUC at LHAAP-35A(58) is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until cleanup goals are met. Notification of the groundwater use restriction will accompany all transfer documents. The U.S. Army is responsible for long-term implementation, maintenance, inspection, reporting, and enforcement of the LUC.

The LUC will address the area of LHAAP-35A(58) that includes two groundwater plumes with levels of contamination that require implementation of a remedy (see **Section 1.3**). The Land Use Control Operation and Maintenance (LUC O&M) Plan will identify the measures required for monitoring and enforcement of the groundwater use restriction. Upon review and concurrence of this RD, the LUC O&M Plan will be coordinated with regulators, finalized, and distributed as part of the Comprehensive LUC Management Plan.

4.1 Land Use Control Implementation

The U.S. Army will undertake the following actions to implement the groundwater restriction LUC for LHAAP-35A(58):

- Define the Area of the Groundwater Use Restriction. The groundwater use restriction boundary will be defined based on the review of the first round of groundwater sampling data in conjunction with historic data. The extent of plume will be bounded by a buffer and may extend to natural groundwater and surface water boundaries.

- Survey the LUC Boundary. The proposed boundary will be finalized after all wells are installed and sampled. Concurrence by USEPA and TCEQ will be obtained, and the LUC boundary will be surveyed by a State-licensed surveyor. A legal description of the surveyed area will be appended to the survey plat.

- Record the LUC in Harrison County. The LUC plat, legal description and groundwater use restriction language will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566.

- Notify the Texas Department of Licensing and Regulation of the LUC. The Texas Department of Licensing and Regulation will be notified of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ. The survey plat, legal boundary and description of the groundwater restriction, in conjunction with a locator map, will be provided in hard and electronic copy.

- Develop the LUC O&M Plan. A LUC O&M Plan for LHAAP-35A(58) will be developed. It will include the elements presented in **Section 4.2**, the county recordation of the LUC survey plat, legal description and restriction language, and the inspection/certification form.

4.2 Land Use Control Operation and Maintenance

The U.S. Army or its representatives will be responsible for the operation and maintenance of the LHAAP-35A(58) LUC. This includes certification, reporting and enforcement activities. The U.S. Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable. To facilitate long-term operation and maintenance of the groundwater use restriction LUC remedy, the U.S. Army will develop a plan that will encompass the elements described in the following subsections.

4.2.1 Site Certification and Reporting

Beginning with finalization of this RD and approval of the inspection form, the U.S. Army will undertake inspections and certify continued compliance with the LUC objectives. The U.S. Army, or the transferee after transfer, will retain the LUC Inspection Certification documents in the project files for incorporation into the five-year review reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the certification, the U.S. Army will provide to USEPA and TCEQ, along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. The need to continue certifications will be revisited at five year reviews.

4.2.2 Notice of Planned Property Conveyances

The U.S. Army shall provide notice to USEPA and TCEQ of plans to convey the LHAAP-35A(58) acreage. The notice shall describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the U.S. Army may transfer responsibility for various implementation actions, the U.S. Army shall retain its responsibility for remedy integrity. This means that the U.S. Army

Contract No. W912QR-04-D-0027, Task Order No. DS02• Final • Rev 0 • September 2011

is responsible for addressing substantive violations of the LUC performance objective that would undermine the U.S. Army's CERCLA remedy. The U.S. Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation.

4.2.3 Opportunity to Review Text of Intended Land Use Controls

U.S. Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. USEPA will also receive a copy for review. In addition, the U.S. Army will produce an ECP or other environmental document for transfer of LHAAP-35A(58), but before executing transfer, the U.S. Army will provide USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

4.2.4 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance

Should the U.S. Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objective, the U.S. Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 4.2.5** below, the U.S. Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the U.S. Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

4.2.5 Land Use Control Enforcement

Should the LUC remedy reflected in this RD fail, the U.S. Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the United States Fish and Wildlife Service (USFWS) or its lessee, to the institution of judicial action against non-federal third-parties. Alternatively, should the circumstances warrant such, the U.S. Army could choose to exercise its response authorities under CERCLA. Should the U.S. Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the U.S. Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

4.2.6 Modification or Termination of Land Use Controls

The U.S. Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC

objective. Likewise, the U.S. Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the U.S. Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

The LUC shall remain in effect until such time as the U.S. Army and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUC will be terminated as needed. The decision to terminate the LUC will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the U.S. Army and USEPA has been made to terminate the LUC, the U.S. Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

4.2.7 Comprehensive Land Use Control Management Plan

Upon finalization of the LUC O&M Plan, a copy will be inserted into the Comprehensive LUC Management Plan for Longhorn. The Comprehensive LUC Management Plan figure and table will be updated to reflect the inclusion of LHAAP-35A(58).

The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUCs being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document will be provided to USEPA and TCEQ, and is also accessible to the local government and the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record.

The land use assumption of industrial use as part of a national wildlife refuge forms the basis for the remedy at LHAAP-35A(58) and this land use assumption will be included in the Comprehensive LUC Management Plan with supporting documentation.

LHAAP-35A(58), 58-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-35A (58) FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00906355

2015-000002402

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 03/16/2015 11:17 AM **Document Number:** 2015-000002402 **Receipt No:** 1502837 **Amount:** $ 50.00 **By:** Denise Kio, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AECOM
112 E. PECAN ST,STE 400
FED-EX ENVELOPE
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-35A (58)

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-35A (58) (Shops Area). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-35A (58) were performed in accordance with the FFA requirements.

The Shops Area now designated as LHAAP-35A (58) was established in 1942 as part of the installation's initial construction (Shaw, 2011). The facility was used to provide plant-operated laundry, automotive, woodworking, metalworking, painting, refrigeration, and electrical services. The site was active throughout LHAAP's mission and was deactivated along with the rest of the installation in 1996-1997. A Record of Decision (ROD) for LHAAP-35A (58) was signed by the U.S. Army and USEPA with TCEQ concurrence in 2010 establishing the final remedy which is separated into two areas: 1) eastern plume; and 2) western plume. The eastern plume remedy includes land use control (LUC); enhanced in-situ bioremediation (EISB) in the area of highest levels of constituents of concern (COCs) followed by monitored natural attenuation (MNA). The western plume remedy consists of LUC and MNA. The site was not remediated to levels suitable for unrestricted use. The LUC at LHAAP-35A (58) is required to prevent human exposure to contaminated groundwater. Further information may be found by

examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-35A (58) parcel is a 11-acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Associated with the LHAAP-35A (58) parcel is designated a LUC boundary which is a 46.524-acre tract, more or less, as described in Exhibit A. The LUC boundary is also presented in the attached Figure 1. Contained within the LHAAP-35A (58) LUC boundary are sites LHAAP-02, LHAAP-03, LHAAP-56, LHAAP-59, LHAAP-60, LHAAP-65, LHAAP-68 and LHAAP-69.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12. The United States Department of the Army has undertaken careful environmental study of the LHAAP-35A (58) site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 46.524-acre tract, more or less. Groundwater underlying this land is contaminated with tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), cis-1,2-DCE), trans-1,2-DCE, and vinyl chloride (VC) and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

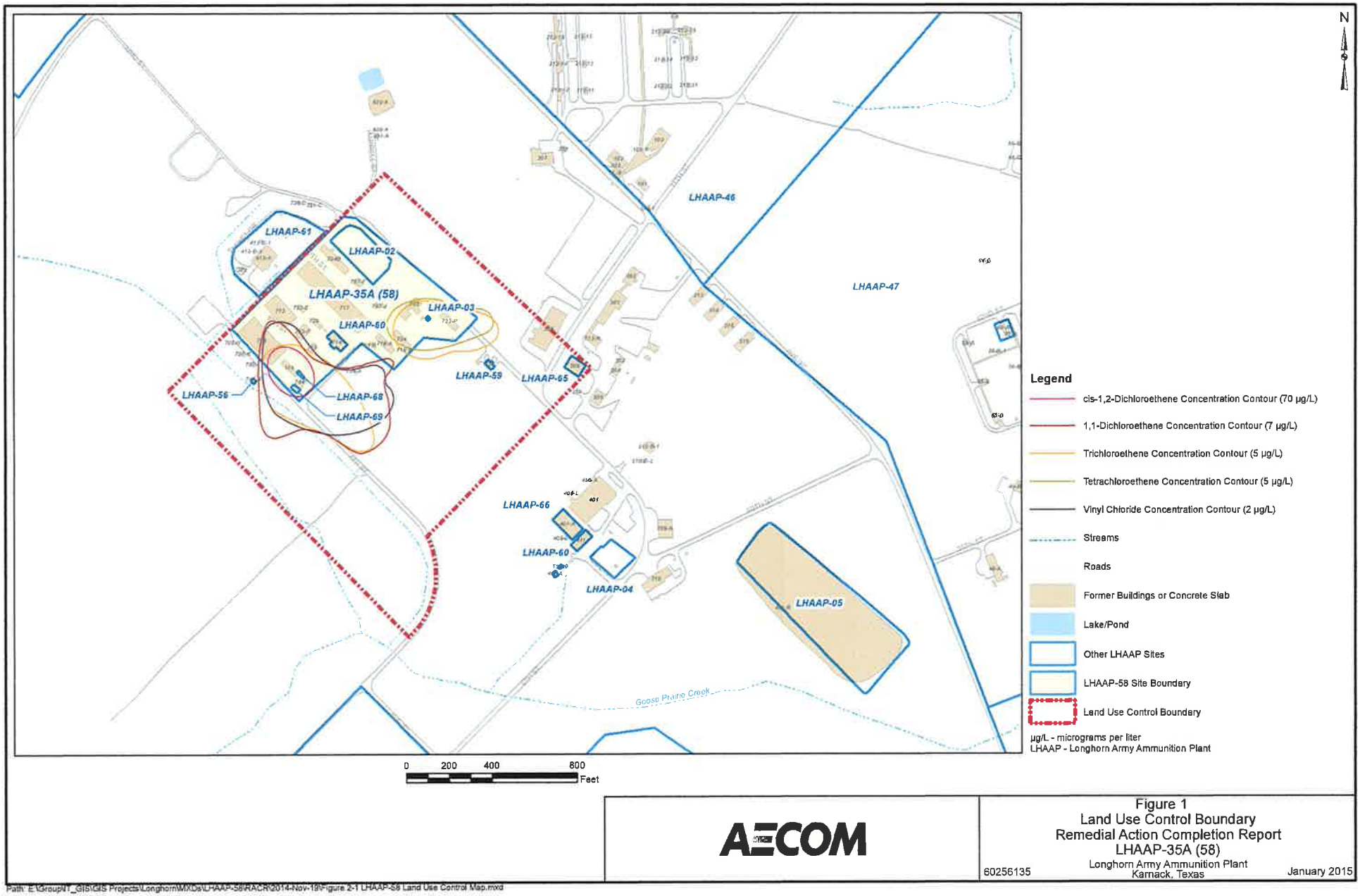
EXECUTED this the ____th day of _____, 2015.

BEFORE ME, on this the 19 th day of February 2015, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 19th day of February, 2015.

Notary Public in and for the State of Texas,
County of Harrison

GENIE WARNER
Notary Public State of Texas
COMM. EXP. 8/1/2018



AECOM

Figure 1
Land Use Control Boundary
Remedial Action Completion Report
LHAAP-35A (58)
Longhorn Army Ammunition Plant
Karnack, Texas

60256135 January 2015

Path: E:\Group\T_GIS\GIS Projects\Longhorn\MXDs\LHAAP-58\RACR\2014-Nov-19\Figure 2-1 LHAAP-58 Land Use Control Map.mxd

EXHIBIT A
SURVEY PLAT

FIELD NOTES DESCRIPTION OF
"LHAAP-35A(58)" LAND USE CONTROL AREA
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-35A(58)" Land Use Control Area being 46.524 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-35A(58)" Land Use Control Area being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.99991470929, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HMX-5" (N=6958206.213 feet E=3305201.721 feet). Said traverse indicates a surface distance of 2567.689 feet between said monuments. The computed land area is based on State Plane distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" and "RPLS 3940" .

Commencing at monument "X-11" referenced above,

THENCE N 52deg16'47"E 216.98' to an I.R.O.P.C. set for the North corner of this tract and this POINT OF BEGINNING,

THENCE S 47deg09'34"E 1327.84' along the N.E. B.L. of this tract to an I.R.O.P.C. set for this tract's East corner,

THENCE S 44deg05'45"W 1089.57' along a S.E. B.L. of this tract to a 60d nail set (near the Easterly edge of the asphalt pavement of "4th Street") for this tract's only reentrant corner,

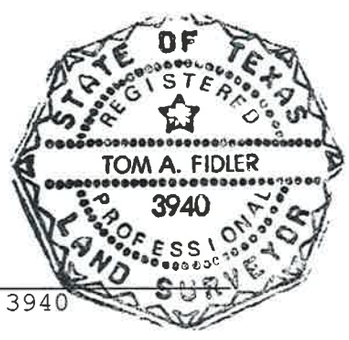
THENCE along a curve to the right (having a radius of 397.10' and an arc length of 496.33', being subtended by a chord of S 09deg27'29"W 464.64') defining this tract's E.B.L., said curve approximating the curved Easterly edge of the asphalt pavement of "4th Street", to a 60d nail found for the South end of said curve,

THENCE S 45deg14'57"W 21.48' along a S.E. B.L. of this tract to a point for this tract's Southmost corner, said point being N 17deg16'14"W 525.07' from the aforementioned "HMX-5" monument and S 44deg25'14"E 8.86' from a concrete nail set for reference near the centerline of the asphalt pavement of "4th Street",

THENCE N 44deg25'14"W 1614.70' along the S.W. B.L. of this tract to an I.R.O.P.C. set for this tract's West corner,

THENCE N 45deg01'15"E 1422.64' along the N.W. B.L. of this tract to this POINT OF BEGINNING, containing 46.524 acres, more or less.

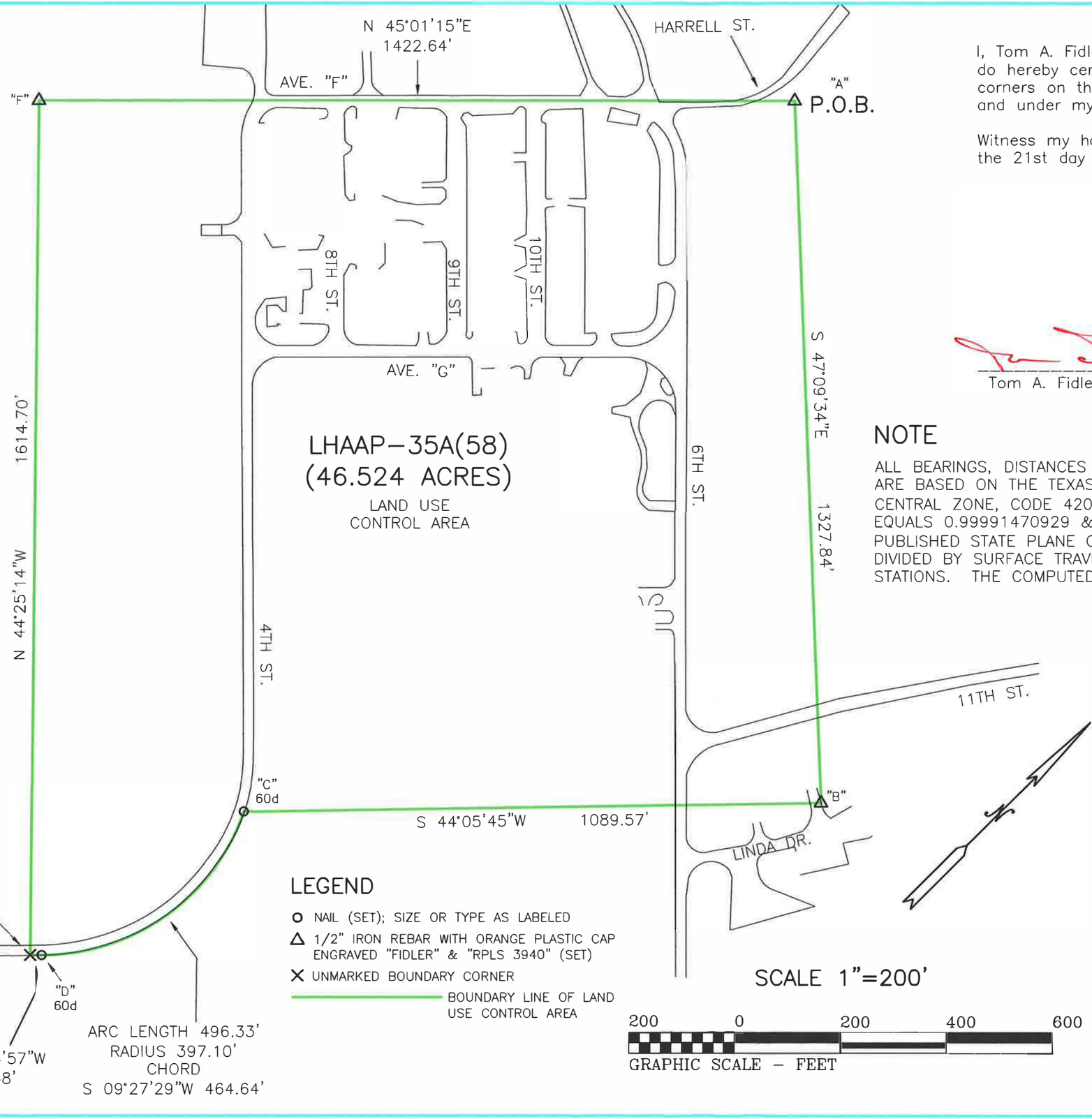
I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

00906362

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com



LEGEND

- O NAIL (SET); SIZE OR TYPE AS LABELED
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- X UNMARKED BOUNDARY CORNER
- BOUNDARY LINE OF LAND USE CONTROL AREA

SCALE 1"=200'

200 0 200 400 600

GRAPHIC SCALE - FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in January, 2015.

Witness my hand and seal this the 21st day of January, 2015.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), AND COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.99991470929 & IS BASED ON CALCULATED DISTANCE BETWEEN PUBLISHED STATE PLANE COORDINATES (OF STATIONS X-11 & HMX-5) DIVIDED BY SURFACE TRAVERSE CALCULATED DISTANCE BETWEEN SAME TWO STATIONS. THE COMPUTED LAND AREA IS BASED ON STATE PLANE DISTANCES.

COORDINATE TABLE

	NORTH	EAST
A	6960866.446	3304921.998
B	6959963.566	3305895.634
C	6959181.058	3305137.444
D	6958722.729	3305061.091
E	6958707.606	3305045.836
F	6959860.854	3303915.676

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

LHAAP-35A(58) L.U.C.A.
(46.524 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	V.PTS V.LEG
01/21/2015	1103025V.DWG	DRAWN BY JTJ

LHAAP-35A(58), 58-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 9/30/11 for LHAAP-35A (58) a certification of site was conducted by _____ [indicate transferee] on _____.

A summary of land use control mechanisms is as follows:

- Groundwater restriction – A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-35A (58)]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35A (58).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title: _____

Signature: _____

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-59

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-59 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00906366

2011-000003378

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

NOTICE

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 03/24/2011 03:52 PM **Document Number:** 2011-000003378 **Receipt No:** 1103745 **Amount:** $ 32.00 **By:** Lauren Boyd, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AARON WILLIAMS EC-ER
1645 SOUTH 101ST EAST AVENUE

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remedial investigation of the land described herein. The site, LHAAP-59, the former Pesticide Storage Building 725, was constructed in 1984 to support maintenance activities at the plant as a pesticide storage building. LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-59 is not itself considered an NPL site. Environmental activities at LHAAP-59 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-59 consists of a Building 725 and the surrounding area. The building, now removed, contained a concrete floor with floor drains that discharged to two nearby sumps. Soil samples were collected near the building and sumps and analyzed for metals, semivolatile organic compounds, volatile organic compounds, dioxins and furans in the 1990s and in 2007 additional samples were collected and analyzed for pesticides and herbicides near the sumps and at the building. Low levels of pesticides were detected. An analysis demonstrated that

these chemicals in soil did not exhibit a potential for release to the groundwater in excess of the groundwater MSC (GW-Ind) and were considered to be protective for nonresidential worker exposure, as specified in 30 TAC §335.559(g)(2)(B). Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-59 parcel is a 0.2537 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-59 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-59. Contaminants in soil samples from LHAAP-59 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-59 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-59 is consistent with the non-residential use scenario evaluated in the risk screening. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 25 th day of January, 2011~~0~~.

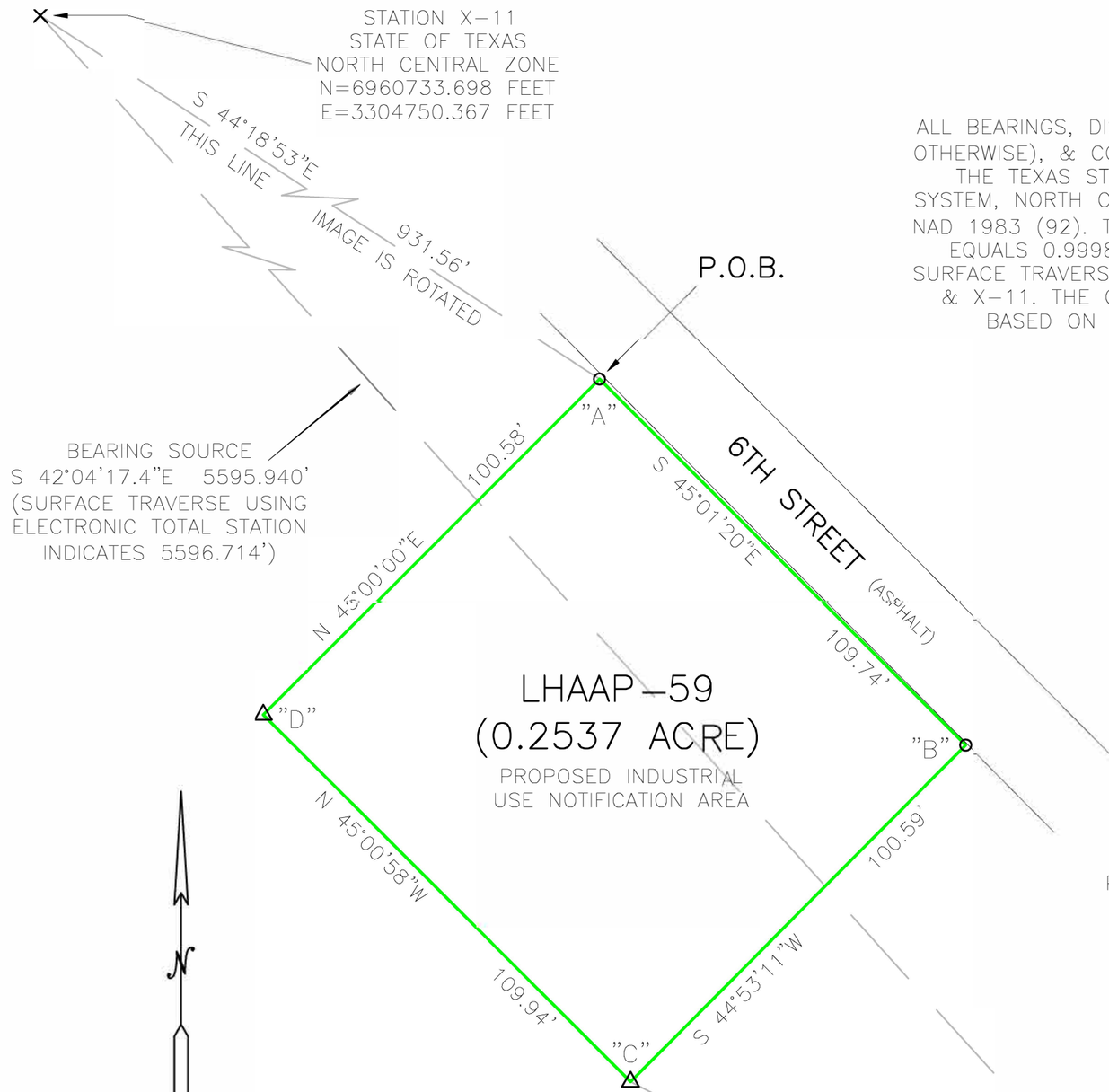
BEFORE ME, on this the 25 th day of Jan 2011, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 25 day of January, 2011~~0~~.

Notary Public in and for the State of Texas,
County of Harrison

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

00906370



NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS C-21 & X-11. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in July 2008.

Witness my hand and seal this the 29th day of July, 2008

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

COORDINATE TABLE

POINT	NORTH	EAST
A	6960067.154	3305401.154
B	6959989.588	3305478.780
C	6959918.320	3305407.794
D	6959996.035	3305330.035

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- O INDICATES CONCRETE NAIL IN BOTTLE CAP (SET IN ASPHALT)
- △ INDICATES 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- ——— INDICATES BOUNDARY OF PROPOSED INDUSTRIAL USE NOTIFICATION AREA

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-59
(0.2537 ACRE)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	0605063D.DWG
07/29/2008	0605063.CRD	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
"LHAAP–59" TRACT
(PROPOSED INDUSTRIAL USE NOTIFICATION AREA)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP–59" being 0.2537 acre of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP–59" being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X–11" (N=6960733.698 feet E=3304750.367 feet) and "C–21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940", and the abbreviation C.N.I.B.C. indicates concrete nail in bottle cap.

Commencing at monument "X–11" referenced above,

THENCE S 44deg18'53"E 931.56' to a C.N.I.B.C. set (in the asphalt pavement of the road known as 6th Street) for the North corner of this tract and this POINT OF BEGINNING,

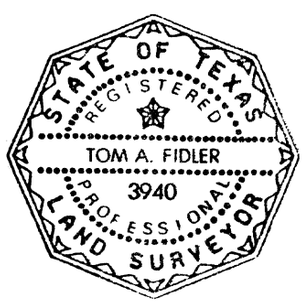
THENCE S 45deg01'20"E 109.74' along the N.E. B.L. of this tract to a C.N.I.B.C. set (in the asphalt pavement of the road known as 6th Street) for this tract's East corner,

THENCE S 44deg53'11"W 100.59' along the S.E. B.L. of this tract to an I.R.O.P.C. set for this tract's South corner, from which the monument "C–21" referenced above bears S 42deg48'22"E 4550.54',

THENCE N 45deg00'58"W 109.94' along the S.W. B.L. of this tract to an I.R.O.P.C. set for this tract's West corner,

THENCE N 45deg00'00"E 100.58' along the N.W. B.L. of this tract to this POINT OF BEGINNING, containing 0.2537 acre, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler

Tom A. Fidler, R.P.L.S. Number 3940

LHAAP-60

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-60 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005561

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

16 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005561 **Receipt No:** 1006195 **Amount:** $ 72.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-60, consisted of four pesticide storage buildings located in the steam plant and shops area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-60 is not itself considered an NPL site. Environmental activities at LHAAP-60 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-60 consisted of buildings 411, 411-A, 714, and shed TS-80, which were located in the northwestern portion of LHAAP near the steam plant and shops area in the general vicinity of sites LHAAP-02, LHAAP-04, LHAAP-35A(58), and LHAAP-66. Pesticides and herbicides were stored in the now demolished buildings. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at

the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-60 parcels include: Building 411 with 4,242 square feet, more or less, or 0.09738 acre tract; Building TS-80 with 186 square feet, more or less, or 0.00426 acre tract; Building 411-A with 484 square feet, more or less, or 0.01111 acre tract; and Building 714 with 4,468 square feet, more or less, or 0.10463 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-60 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-60. Contaminants in soil samples from LHAAP-60 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-60 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-60 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10 th day of March 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-60A" TRACT
(FOUNDATION SLAB OF DEMOLISHED BUILDING 411)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-60A" being the concrete foundation slab of demolished Building 411, "LHAAP-60A" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-60A" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 1875.89' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 3720.05',

(as used below, the abbreviation C.C.F.S. indicates corner of concrete foundation slab)

THENCE S 47deg55'43"W 188.47' to a C.C.F.S. found for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 45deg09'46"E 41.80' along the Northeast B.L. of this tract to a C.C.F.S. found for this tract's Eastmost corner,

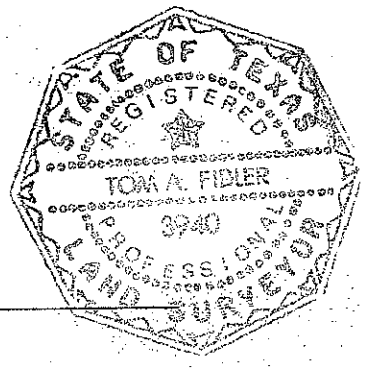
THENCE S 44deg51'53"W 101.29' along the Southeast B.L. of this

tract to a C.C.F.S. found for this tract's Southmost corner,

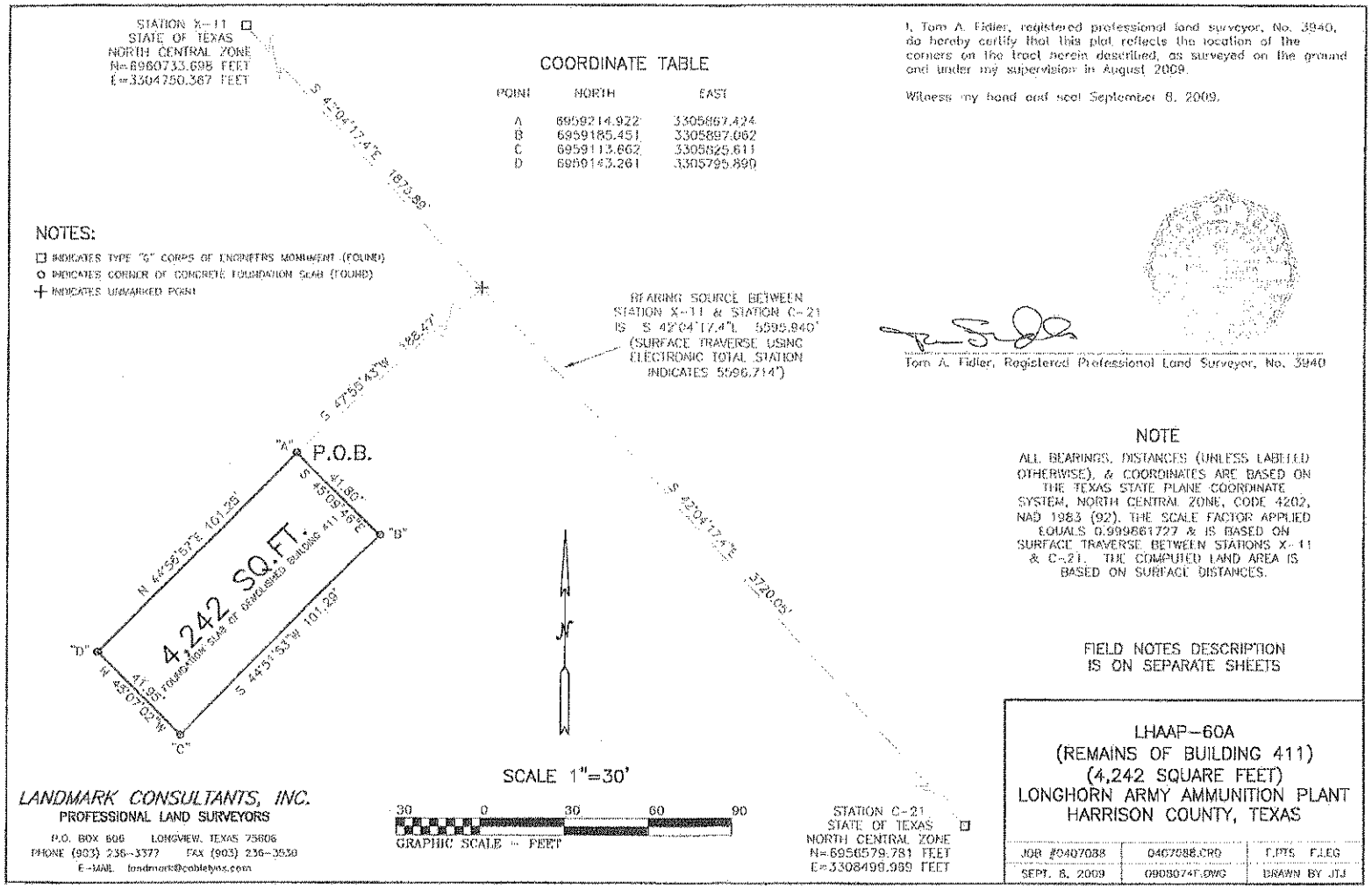
THENCE N 45deg07'02"W 41.95' along the Southwest B.L. of this tract to a C.C.F.S. found for this tract's Westmost corner,

THENCE N 44deg56'57"E 101.25' along the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 4,242 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940



COORDINATE TABLE

POINT	NORTH	EAST
A	6959214.922	3305867.424
B	6959185.451	3305897.062
C	6959113.662	3305825.611
D	6959143.261	3305795.890

NOTES:

- ☐ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- ○ INDICATES CORNER OF CONCRETE FOUNDATION SLAB (FOUND)
- + INDICATES UNMARKED POINT

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal September 8, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.99986727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

SCALE 1"=30'

30 0 30 60 90
GRAPHIC SCALE = FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 806 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cobletyns.com

LHAAP-60A
(REMAINS OF BUILDING 411)
(4,242 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	F.PTS F.LEG
SEPT. 8, 2009	0908074F.DWG	DRAWN BY JTJ

"LHAAP-60B" TRACT
(BUILDING TS-80)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, the perimeter of tract "LHAAP-60B" being defined by the four corners of the external face of the exterior walls of Building TS-80 (said Building is constructed of galvanized corrugated sheet metal), tract "LHAAP-60B" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-60B" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 1919.72' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 3676.22',

(as used below, the abbreviation C.E.F.E.W. indicates Corner of the External Face of the Exterior Walls of Building TS-80)

THENCE S 47deg55'43"W 378.14' to a C.E.F.E.W. found for the Northmost corner of this tract and this description's POINT OF BEGINNING,

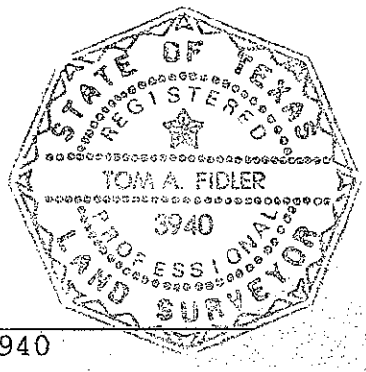
THENCE S 41deg54'33"E 8.55' along the Northeast B.L. of this tract to a C.E.F.E.W. found for this tract's Eastmost corner,

THENCE S 48deg12'22"W 22.54' along the Southeast B.L. of this tract to a C.E.F.E.W. found for this tract's Southmost corner,

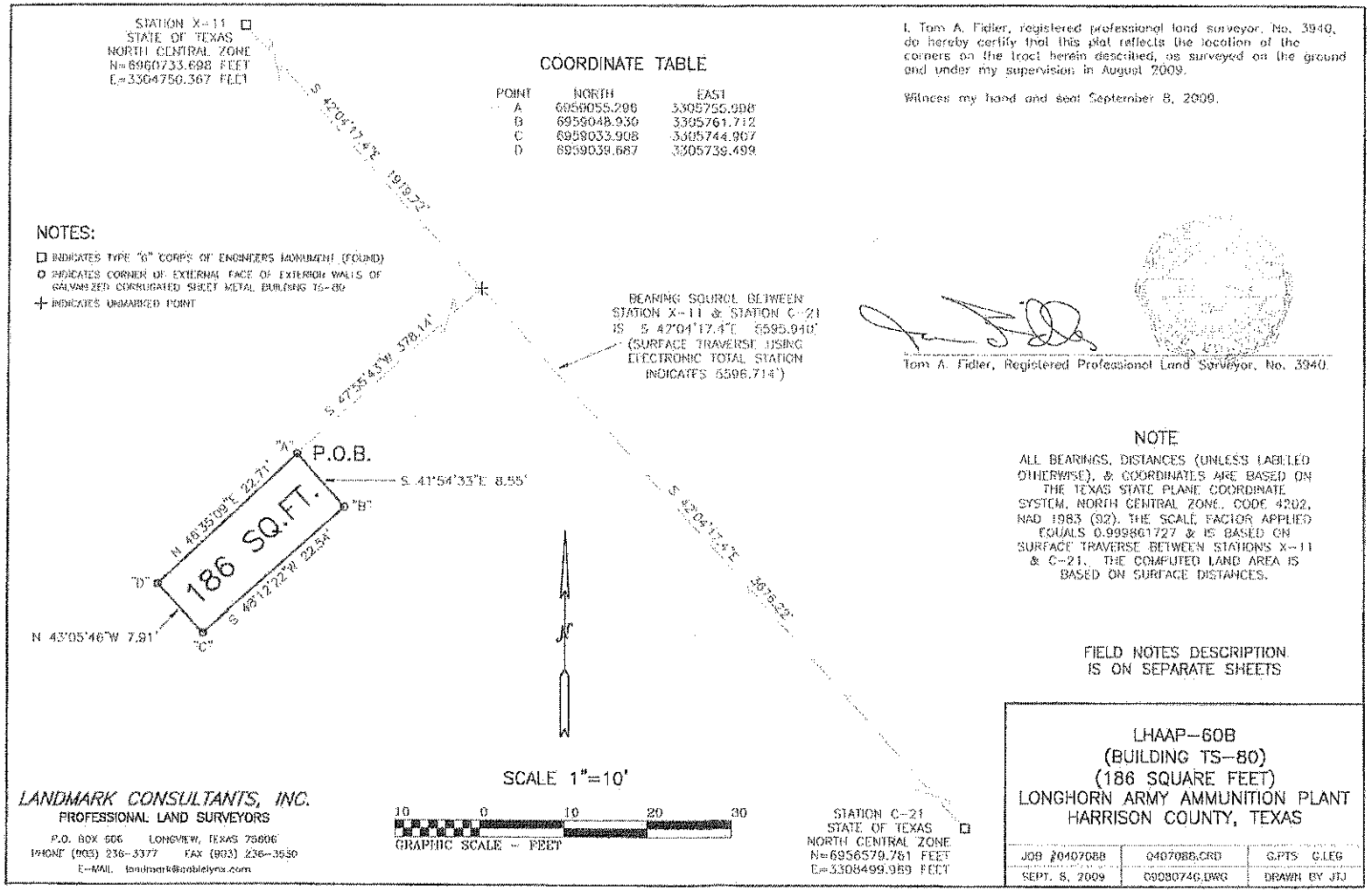
THENCE N 43deg05'46"W 7.91' along the Southwest B.L. of this tract to a C.E.F.E.W. found for this tract's Westmost corner,

THENCE N 46deg35'09"E 22.71' along the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 186 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940



COORDINATE TABLE

POINT	NORTH	EAST
A	6959055.296	3305755.988
B	6959048.930	3305761.712
C	6959033.908	3305744.907
D	6959039.687	3305739.499

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal September 8, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940.

NOTES:

- ☐ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- O INDICATES CORNER OF EXTERNAL FACE OF EXTERIOR WALLS OF GALVANIZED CORRUGATED SHEET METAL BUILDING TS-80
- + INDICATES UNMARKED POINT

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 506 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3550
E-MAIL landmark@cablelynx.com

LHAAP-60B
(BUILDING TS-80)
(186 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	G.PTS C.LEG
SEPT. 8, 2009	0908074C.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
"LHAAP-60C" TRACT
(FOUNDATION SLAB OF DEMOLISHED BUILDING 411-A)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-60C" being the concrete foundation slab of demolished Building 411-A, tract "LHAAP-60C" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-60C" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 1924.12' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 3671.82',

(as used below, the abbreviation C.C.F.S. indicates corner of concrete foundation slab)

THENCE S 47deg55'43"W 418.77' to a C.C.F.S. found for the Northmost corner of this tract and this description's POINT OF BEGINNING,

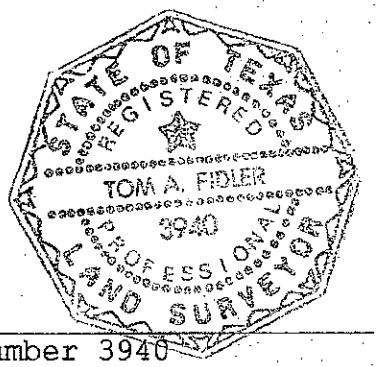
THENCE S 28deg26'16"E 24.08' along the Northeast B.L. of this tract to a C.C.F.S. found for this tract's Eastmost corner,

THENCE S 61deg38'48"W 20.15' along the Southeast B.L. of this tract to a C.C.F.S. found for this tract's Southmost corner,

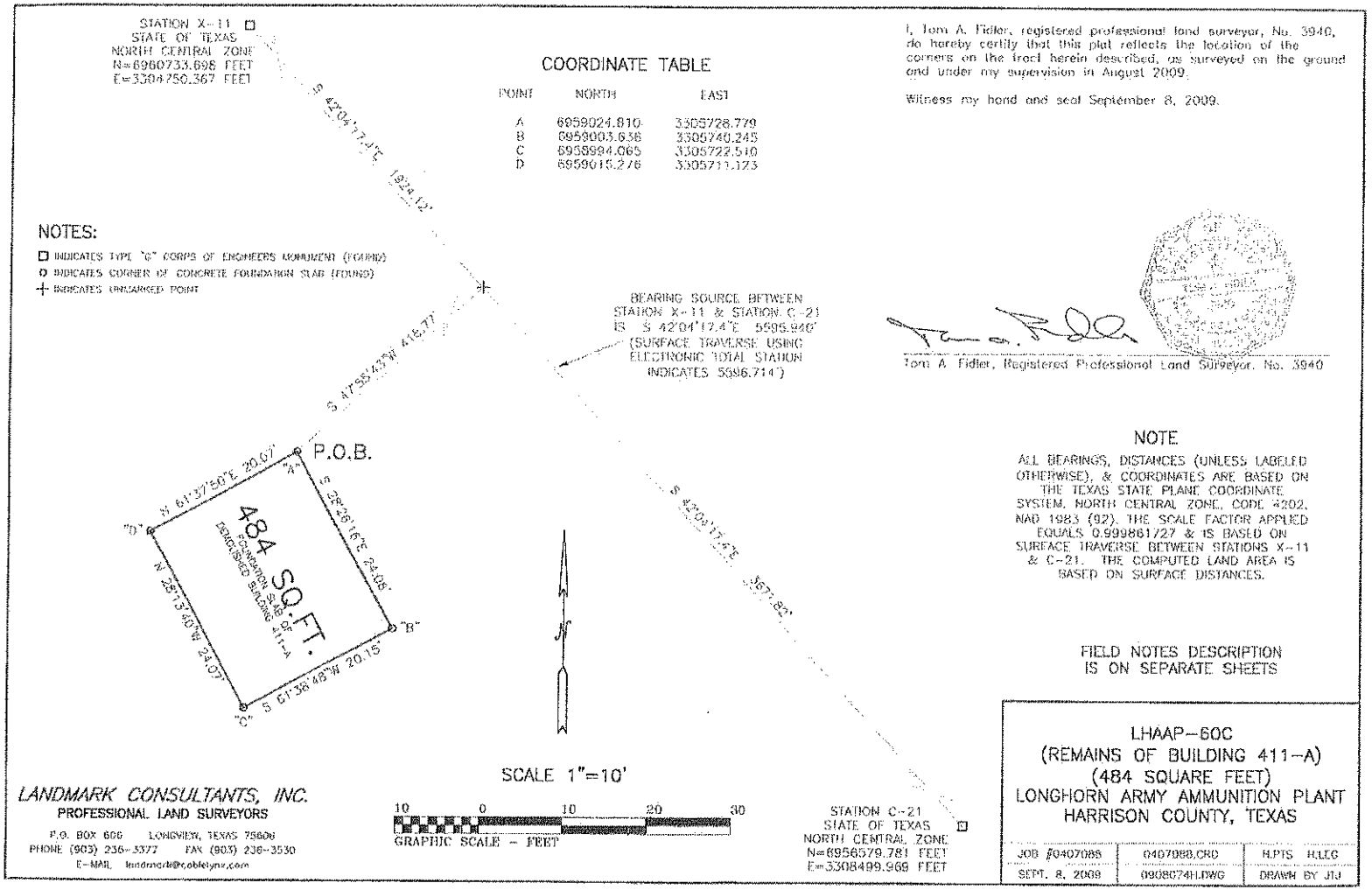
THENCE N 28deg13'40"W 24.07' along the Southwest B.L. of this tract to a C.C.F.S. found for this tract's Westmost corner,

THENCE N 61deg37'50"E 20.07' along the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 484 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940



COORDINATE TABLE

POINT	NORTH	EAST
A	6959024.810	3305728.779
B	6959003.636	3305740.245
C	6958994.065	3305722.510
D	6959015.276	3305711.173

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal September 8, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTES:

- ☐ INDICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
- O INDICATES CORNER OF CONCRETE FOUNDATION SLAB (FOUND)
- ⊕ INDICATES UNMARKED POINT

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cableone.com

LHAAP-60C
(REMAINS OF BUILDING 411-A)
(484 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	H.PTS H.LLG
SEPT. 8, 2009	0908074HLDWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
"LHAAP-60D" TRACT
(INCLUDES FOUNDATION SLAB OF DEMOLISHED BUILDING #714)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-60D" including the concrete foundation slab of demolished Building #714 plus an area adjacent to the Southwest edge of said slab, "LHAAP-60D" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-60D" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 395.512' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 5200.428'

(as used below, the abbreviation C.C.F.S. indicates corner of concrete foundation slab)

THENCE S 47deg55'43"W 442.92' to a C.C.F.S. found for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 44deg51'26"E 91.43' along the Northeast B.L. of this tract, and generally along the Northeast edge of said concrete slab, to a C.C.F.S. found for this tract's Eastmost corner,

THENCE S 44deg50'54"W 44.35' along a Southeast B.L. of this tract, and generally along the Southeast edge of said concrete slab, to a C.C.F.S. found for this tract's Southmost corner,

THENCE N 44deg59'57"W 29.43' along a Southwest B.L. of this tract, and generally along the Southwest edge of said concrete slab, to a point for this tract's Southmost reentrant corner,

THENCE S 45deg00'03"W 14.90' along a Southeast B.L. of this tract to a 60d nail set for this tract's Westmost South corner,

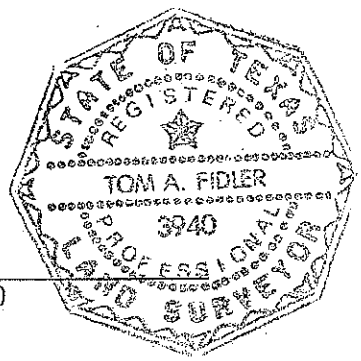
THENCE N 44deg59'57"W 32.36' along a Southwest B.L. of this tract to a 60d nail set for this tract's Southmost West corner,

THENCE N 45deg00'03"E 14.90' along a Northwest B.L. of this tract to a point for this tract's Northmost reentrant corner,

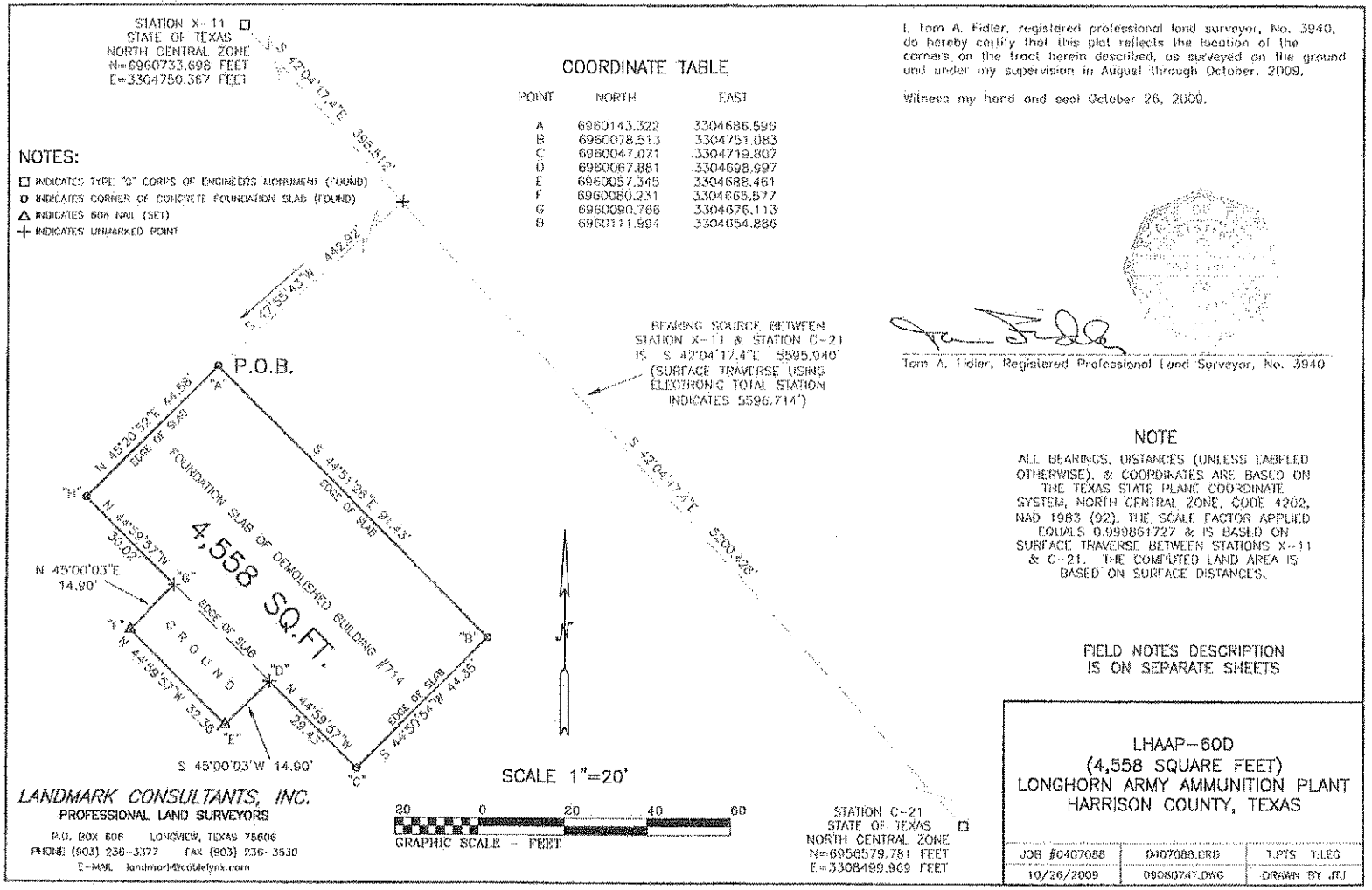
THENCE N 44deg59'57"W 30.02' along a Southwest B.L. of this tract, and generally along the Southwest edge of said concrete slab, to a C.C.F.S. found for this tract's Northmost West corner,

THENCE N 45deg20'52"E 44.58' along a Northwest B.L. of this tract, and generally along the Northwest edge of said concrete slab, to this POINT OF BEGINNING. This tract contains 4,558 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940



NOTES:

- □ INDICATES TYPE "B" CORPS OF ENGINEERS MONUMENT (FOUND)
- O INDICATES CORNER OF CONCRETE FOUNDATION SLAB (FOUND)
- △ INDICATES 60d NAIL (SET)
- ┼ INDICATES UNMARKED POINT

COORDINATE TABLE

POINT	NORTH	EAST
A	6960143.322	3304686.596
B	6960078.513	3304751.083
C	6960047.071	3304719.807
D	6960067.881	3304698.997
E	6960057.345	3304688.461
F	6960080.231	3304665.577
G	6960090.766	3304676.113
B	6960111.994	3304654.886

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cebridgelynx.com

LHAAP-60D
(4,558 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.DRJ	1 PTS 1 LEG
10/26/2009	09080747.DWG	DRAWN BY JRJ

LHAAP-64

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-64 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005558

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005558 **Receipt No:** 1006195 **Amount:** $ 36.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-64, is the location of a former transformer storage area located in the western portion of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-64 is not itself considered an NPL site. Environmental activities at LHAAP-64 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-64 is located next to site LHAAP-29. Polychlorinated biphenyl (PCB)-containing transformers were stored on a pad on Zeugner Drive immediately southwest of Building 707-B. Approximately 20 out-of-service non-PCB transformers were stored on pallets with no curbs or other containment. The site was used for the storage of transformer oil. The contaminants of concern were petroleum and oil lubricants and PCBs. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas

75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-64 parcel is 847 square feet, more or less, or 0.01944 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-64 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-64. Contaminants in soil samples from LHAAP-64 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-64 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-64 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-64" TRACT
(ADJACENT TO FOUNDATION SLAB OF DEMOLISHED BUILDING #707-B)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-64" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), tract "LHAAP-64" being adjacent to the Southwest edge of the concrete foundation slab of demolished Building #707-B, tract "LHAAP-64" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998463585, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "C-1" (N=6955947.067 feet E=3305400.600 feet) and "C-22" (N=6955892.461 feet E=3307823.958 feet). Said traverse indicates a surface distance of 2424.346 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "C-1" referenced above,

THENCE S 32deg52'16"W 338.58' to the West corner of the concrete slab of demolished building 707-B, said slab corner marking the North corner of this tract and this POINT OF BEGINNING,

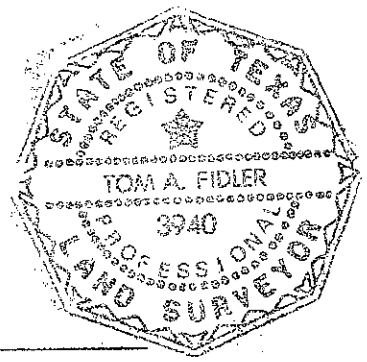
THENCE S 45deg00'47"E 29.76' along the N.E. B.L. of this tract, and generally along the Southwest edge of said concrete slab, to the South corner of said concrete slab, said slab corner marking the East corner of this tract,

THENCE S 44deg55'45"W 28.44' along the S.E. B.L. of this tract to a concrete nail with head dimple set (in asphalt) for the South corner of this tract,

THENCE N 45deg00'47"W 29.75' along the S.W. B.L. of this tract to a concrete nail with head dimple set (in asphalt) for the West corner of this tract,

THENCE N 44deg54'27"E 28.44' along the N.W. B.L. of this tract to this POINT OF BEGINNING. This tract contains 847 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

NOTES:

- ☐ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- O INDICATES CORNER OF CONCRETE FOUNDATION SLAB (FOUND)
- △ INDICATES 60d NAIL (SET)
- ┼ INDICATES CONCRETE NAIL WITH HEAD DIMPLE (SET)

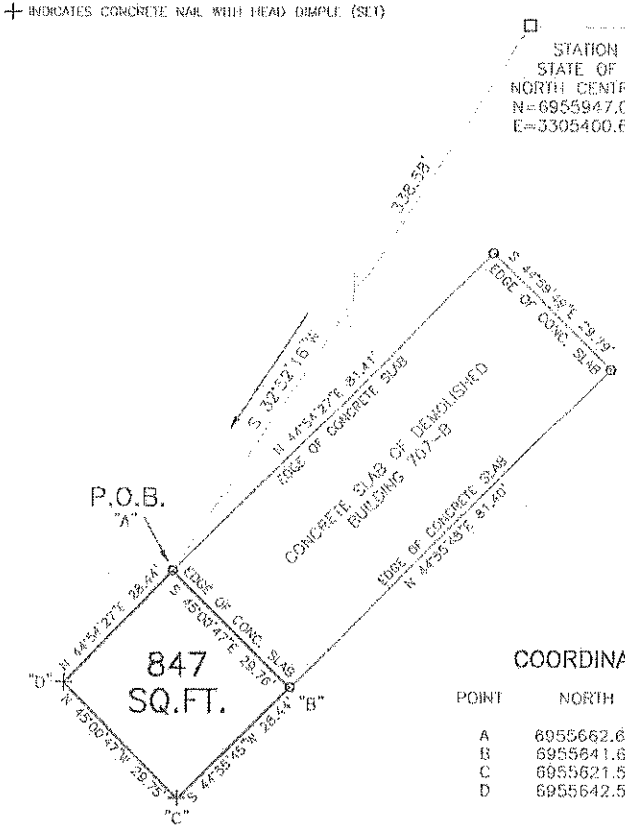
I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through November, 2009.

Witness my hand and seal November 12, 2009.

STATION C-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6955947.067 FEET
E=3305400.600 FEET

BEARING SOURCE BETWEEN STATION C-1 & STATION C-22 IS S 88°42'33.0"E 2423.973' (SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 2424.346')

STATION C-22
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6955892.461 FEET
E=3307823.958 FEET





COORDINATE TABLE

POINT	NORTH	EAST
A	6955662.694	3305216.833
B	6955641.654	3305237.884
C	6955621.519	3305217.798
D	6955642.552	3305196.756

SCALE 1"=20'

20 0 20 40 60
GRAPHIC SCALE – FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999846358S & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS C-1 & C-22. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-5377 FAX (903) 236-3530
E-MAIL landmark@cobleyne.com

LHAAP-64
(847 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	0 PTS 0 LEG
NOV. 12, 2009	090807AU.DWG	DRAWN BY JDJ

LHAAP-66

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-66 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005559

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005559 **Receipt No:** 1006195 **Amount:** $ 36.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-66, is the location of a leaking transformer from the electric power substation and transformer area, near Building 401. Building 401 housed gas-fired boilers that generated steam for distribution throughout the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-66 is not itself considered an NPL site. Environmental activities at LHAAP-66 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-66 is located at the electric power substation and includes several transformers. One of these transformers was reported to be leaking, but subsequent environmental activities confirmed there was no release to the soil from polychlorinated biphenyls. The electric power substation still provides power to parts of LHAAP. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465,

Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-66 parcel is 8,616 square foot, more or less, or 0.19779 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-66 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-66. Contaminants in soil samples from LHAAP-66 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-66 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-66 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D:C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-66" TRACT
(CONTAINS AN ELECTRIC POWER SUBSTATION)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-66" containing an electric power substation, including transformers, "LHAAP-66" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-66" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 1722.19' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 3873.75',

(as used below, the abbreviation F.C.P. indicates 2-1/2" diameter chain link fence corner pipe)

THENCE S 47deg55'43"W 210.22' to an F.C.P. found (leaning approximately 15 degrees) for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 45deg10'23"E 130.14' along a chain link fence found for the Northeast B.L. of this tract to an F.C.P. found for this tract's Eastmost corner,

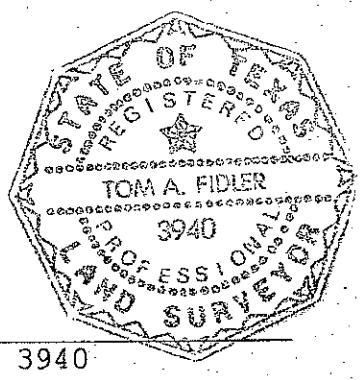
THENCE S 44deg46'19"W 65.93' along a chain link fence found for

the Southeast B.L. of this tract to an F.C.P. found for this tract's Southmost corner,

THENCE N 45deg18'44"W 130.52' along a chain link fence found for the Southwest B.L. of this tract to an F.C.P. found for this tract's Westmost corner,

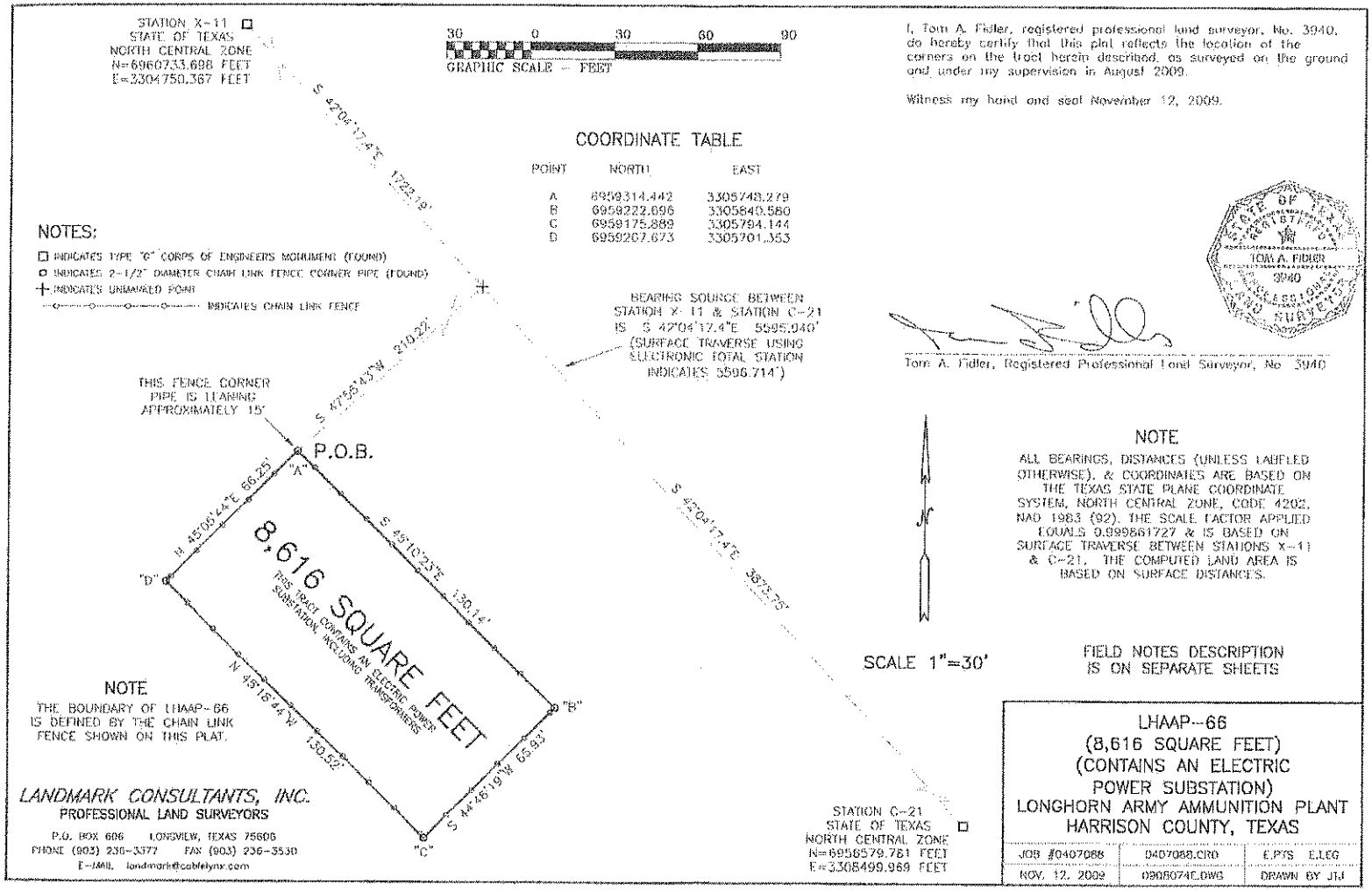
THENCE N 45deg05'44"E 66.25' along a chain link fence found for the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 8,616 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

00906404



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal November 12, 2009.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
LICENSED
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

NOTE

THE BOUNDARY OF LHAAP-66 IS DEFINED BY THE CHAIN LINK FENCE SHOWN ON THIS PLAT.

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-66
(8,616 SQUARE FEET)
(CONTAINS AN ELECTRIC POWER SUBSTATION)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	E.PTS E.LEG
NOV. 12, 2009	0908074C.DWG	DRAWN BY JTJ

LHAAP-67, 67-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

FINAL
REMEDIAL DESIGN
LHAAP-35B (37), CHEMICAL LABORATORY AND LHAAP-67, ABOVEGROUND STORAGE TANK FARM
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS



Prepared by

U.S. Army Corps of Engineers
Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma

August 1, 2011

Table of Contents

List of Figures ii
List of Tables ii
List of Appendices ii
Acronyms and Abbreviations iii

1.0 Purpose 1
2.0 Description of the Site 2
2.1 Hydrogeological Setting 3
2.1.1 Groundwater and Surface Water Interaction 3
3.0 Remedy Performance Objectives 5
4.0 Land Use Controls for the Site 6
5.0 Monitored Natural Attenuation 7
6.0 Remedy Implementation Actions 9
6.1 Design Criteria 9
6.1.1 Basis Of Design 9
6.2 Land Use Control Implementation Actions 11
6.2.1 Comprehensive Land Use Control Management Plan 11
6.2.2 Site Certifications and Reporting 11
6.2.3 Notice of Planned Property Conveyances 12
6.2.4 Opportunity to Review Text of Intended Land Use Controls 12
6.2.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance 12
6.2.6 Land Use Control Enforcement 12
6.2.7 Modification or Termination of Land Use Controls 12
6.3 Monitored Natural Attenuation Implementation Actions 13
6.4 CERCLA Five-Year Reviews 14
7.0 Points of Contact 15
8.0 References 16

4.0 Land Use Controls for the Site

The LUCs to be implemented by the Army or its representatives for LHAAP-35B(37) and LHAAP-67 to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health include:

- Ensure no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup goals are met

Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566.The LUC addresses the areas of LHAAP-35B(37) and LHAAP-67 that include groundwater plumes at LHAAP-35B(37) and LHAAP-67 with levels of contamination that require implementation of a remedy (see **Section 2.0**). The U.S. Army is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the LUC.

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. U.S. Army shall obtain USEPA and TCEQ concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-35B(37) and LHAAP-67 forms the basis for the remedy. The reasonably anticipated future use of the site as part of a national wildlife refuge is consistent with an industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation, will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566 and compliance with the use assumption will be documented in the Five-Year Review reports.

6.2 Land Use Control Implementation Actions

The Army or its representatives will be responsible for LUC implementation and certification, reporting and enforcement. The Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable.

As a condition of property transfer, the Army may require the transferee to assume responsibility for various implementation actions, as indicated below. Although the Army may transfer responsibility for various implementation actions, the Army shall retain its responsibility for remedy integrity. This means that the Army is responsible for addressing substantive violations of performance objectives that would undermine the Army's CERCLA remedy. The Army also will be responsible for: 1) incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation; 2) recording groundwater use restriction and survey plat at the Harrison County Courthouse; and 3) notifying Texas Department of Licensing and Regulation of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ. The following LUC implementation actions shall be undertaken by the Army in order to ensure that the aforementioned LUC performance objectives for LHAAP-35B(37) and LHAAP-67 are met and maintained:

6.2.1 Comprehensive Land Use Control Management Plan

Within 30 days of receiving USEPA and TCEQ approval of this RD, the Army will incorporate this document into the Comprehensive LUC Management Plan. The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUCs being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document is also accessible to regulators, the local government and the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record. As LUC RD documents for additional environmental sites are approved by USEPA and TCEQ, the Army shall likewise add those documents and survey plats to the Comprehensive LUC Management Plan as well as update the previous copy of the plan placed in the Marshall Public Library.

6.2.2 Site Certifications and Reporting

Beginning with finalization of this RD, the Army will undertake annual certifications to confirm continued compliance with the LUC objectives. The Army will retain the annual LUC Compliance Certification documents in the project files for incorporation into the Five-Year Review Reports, and these documents will be made available to USEPA and TCEQ upon request. The certification form will be consistent with the form attached as **Appendix B**. In addition, should any violations be found during the annual certification, the Army will provide to USEPA and TCEQ along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations**.** Upon transfer, such responsibilities may shift to the transferee via

appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental transfer document. The need to continue annual certifications will be revisited at Five-Year Reviews.

6.2.3 Notice of Planned Property Conveyances

The Army shall provide notice to USEPA and TCEQ of plans to convey LHAAP-35B(37) and LHAAP-67 acreage. The notice shall describe the mechanism by which LUCs will continue to be implemented, maintained, inspected, reported, and enforced.

6.2.4 Opportunity to Review Text of Intended Land Use Controls

Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. In addition, the Army will produce an ECP or other environmental document for transfer of LHAAP-35B(37) and LHAAP-67, but before executing transfer, the Army will provide USEPA and TCEQ with a draft copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before document execution, to review all LUC-related provisions.

6.2.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance

Should the Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objectives, the Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 6.2.6** below, the Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

6.2.6 Land Use Control Enforcement

Should the LUC remedy reflected in this LUC RD fail, the Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the owner or violator, to the institution of judicial action under the auspices of Texas property law or CERCLA. Alternatively, should the circumstances warrant such, the Army could choose to exercise its response authorities under CERCLA, and then seek cost recovery after the fact from the person(s) or entity(ies) who violated a given LUC. Should the Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the Army will notify these agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUCs.

6.2.7 Modification or Termination of Land Use Controls

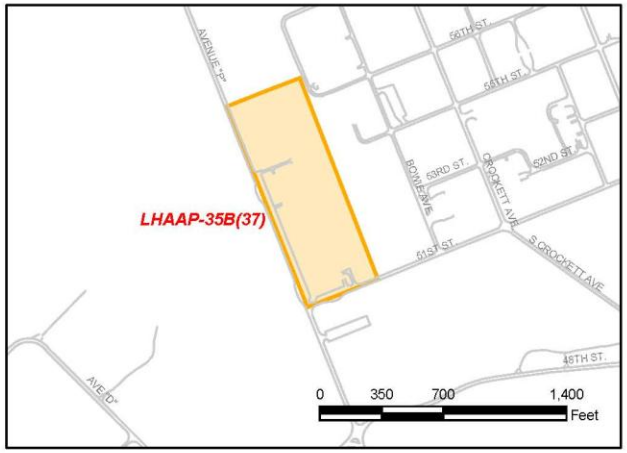
The Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

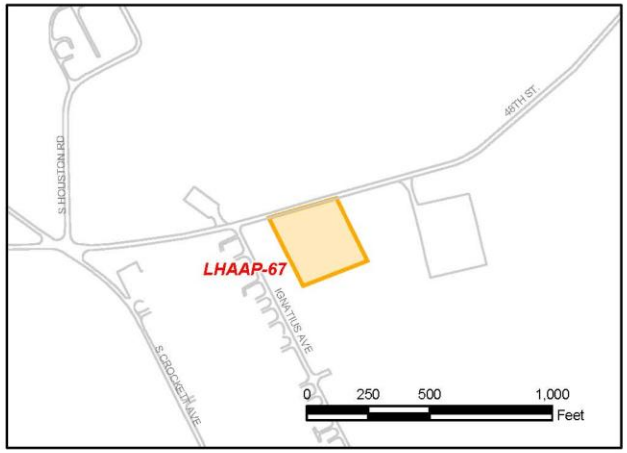
The LUCs shall remain in effect until such time as the Army, TCEQ and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUCs will be terminated as needed. The decision to terminate LUCs will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the Army, TCEQ and USEPA has been made to terminate one or more of the LUCs, the Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

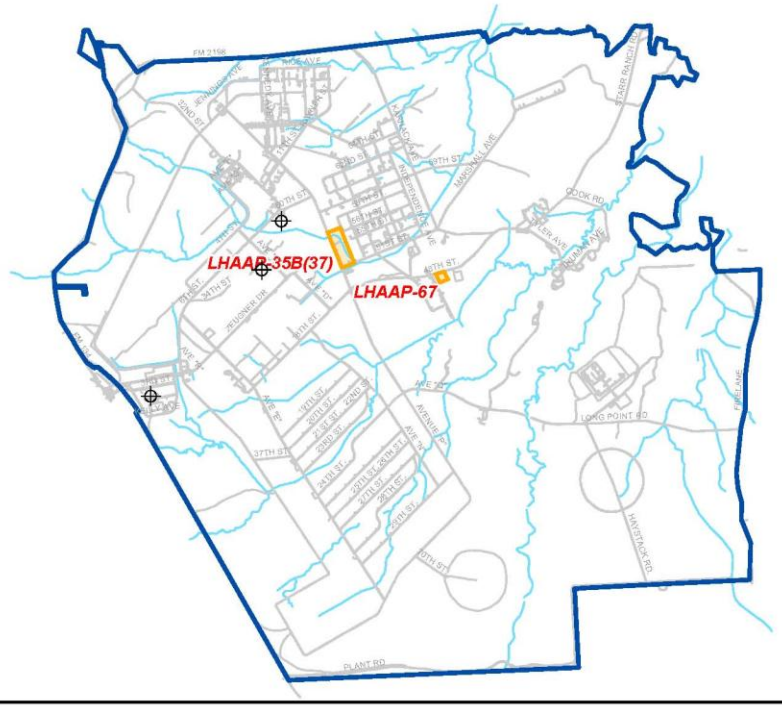
6.3 Monitored Natural Attenuation Implementation Actions

Implementation actions include installation of additional monitoring wells, plugging and abandonment of monitoring wells not designated for long-term monitoring, implementation of a groundwater monitoring plan, monitoring, and reporting. The project schedule and cost summary for implementation actions are provided in **Appendix H**. Groundwater monitoring will be conducted to monitor the effectiveness of MNA in reducing contaminant concentrations over time. Monitoring will also be conducted to evaluate plume migration and ensure that chlorinated solvents-contaminated groundwater does not impact nearby surface water at unacceptable levels. Surface water sampling will be conducted to confirm contaminated groundwater is not migrating to surface water. The Groundwater Monitoring Plan, attached as **Appendix A**, describes the wells, their locations, analytical parameters, the frequency of the monitoring, surface water sampling, and presents a list of the monitored constituents and their respective MCLs. Groundwater monitoring and surface water sampling conducted at LHAAP-35B(37) and LHAAP-67 will follow the Health and Safety Plan (**Appendix E**), the Contractor Quality Control Plan (**Appendix F**), the Chemical Data Acquisition Plan (**Appendix G**), Field Activities (**Appendix C**) and Field Procedures (**Appendix D**) as contained in the appendices of the Remedial Design LHAAP-35B(37) and LHAAP-67.

Annual reports will be prepared for any year in which sampling occurs to document the monitoring program. The first year's annual report will include a review of the first four quarters of data, which include natural attenuation parameters and provide an evaluation for the evidence of MNA as a remedial method and a review of the first year's surface water sample data. The TCEQ provides guidance for MNA as a remedial action in *Monitored Natural Attenuation Demonstrations* (Texas Natural Resource Conservation Commission [TNRCC], RG-366/TRRP-33, October 2001). Although LHAAP is being addressed under the Risk Reduction Standards rather than Texas Risk Reduction Program (TRRP), this guidance is comparable to USEPA guidance and may be used as a guideline for the evaluation of the groundwater data. TRRP guidance specifies recommended lines of evidence to document the occurrence of natural attenuation at a site. For the first annual report, primary and secondary lines of evidence will be evaluated to document that attenuation is occurring at LHAAP-35B(37) and LHAAP-67. The primary line







LEGEND

- Approximate LHAAP Boundary
- Road
- Stream
- Site
- LHAAP Water Supply Well

LEGEND

- Road
- Stream
- Site
- Approximate LHAAP Boundary
- LHAAP Water Supply Well

OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	FILE PATH
Houston, TX	B. Lu 10/12/07	N. Olson 10/31/07	P. Srivastav 10/31/07	T:\GIS\Longhorn\MXD\ST35B67\ROD\SiteLocs.mxd

Shaw

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 2-2
SITE LOCATION MAP
REMEDIAL DESIGN
LHAAP-35B(37) AND LHAAP-67, GROUP 4
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

LHAAP-67, 67-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-67 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2014-000013308

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 12/09/2014 10:42 AM **Document Number:** 2014-000013308 **Receipt No:** 1415412 **Amount:** $ 50.00 **By:** Pam Rockwell, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AECOM
ATTN: AMANDA LAGARDE (FEDEX ENV)
112 E PECAN ST., SUITE 400
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-67

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-67 (Underground Storage Tank Farm Area). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-67 were performed in accordance with the FFA requirements.

The LHAAP-67 site, when operational, consisted of seven aboveground storage tanks used for storage of No. 2 fuel oil, kerosene, and solvents. The tanks were surrounded by earthen dikes designed to contain potential spills. A Record of Decision (ROD) for LHAAP-67 was signed by the U.S. Army and USEPA with TCEQ concurrence in 2010 establishing the final remedy which consists of a land use control (LUC) in conjunction with monitored natural attenuation (MNA). The site was not remediated to levels suitable for unrestricted use. The LUC at LHAAP-67 is required to prevent human exposure to contaminated groundwater. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public

Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-67 parcel is a 4 acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Within the LHAAP-67 parcel is designated a LUC boundary which is a 6.088-acre tract, more or less, as described in Exhibit A. The LUC boundary is also presented in the attached Figure 1.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.The United States Department of the Army has undertaken careful environmental study of the LHAAP-67 site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 6.088-acre tract, more or less. Groundwater underlying this land is contaminated with trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), 1,1,1-trichloroethane (1,1,1-TCA), and 1,1,2-trichloroethane (1,1,2-TCA), and other volatile organic compounds (VOCs) and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 20 th day of November, 2014.

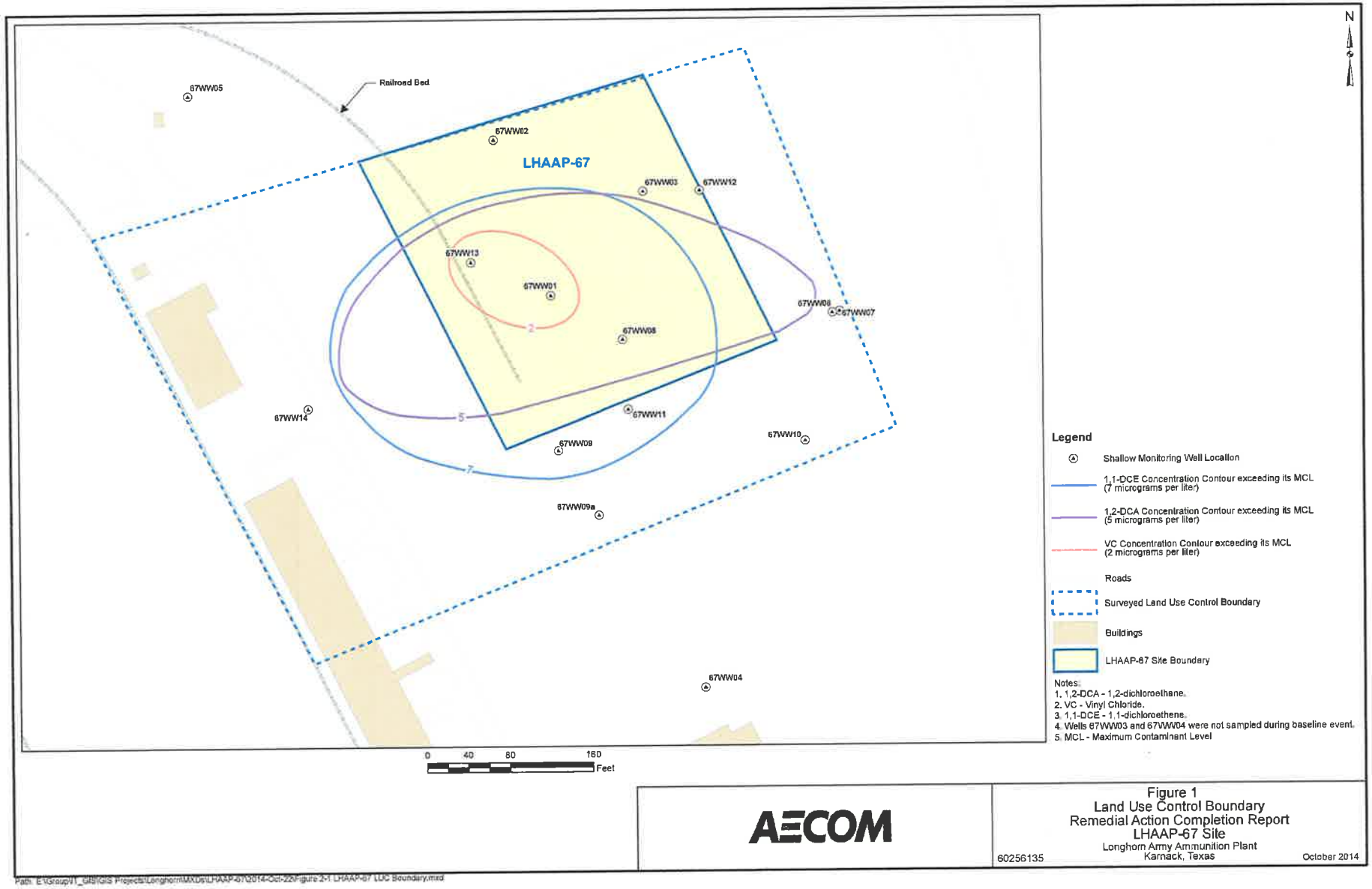
BEFORE ME, on this the 20 th day of November, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 20 day of November, 2014.

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 03-17-2015

Notary Public in and for the State of Texas,
County of Harrison

EXHIBIT A
SURVEY PLAT



AECOM

Figure 1
Land Use Control Boundary
Remedial Action Completion Report
LHAAP-67 Site
Longhorn Army Ammunition Plant
Karnack, Texas

60256135 October 2014

Path: E:\Group\1_GIS\GIS Projects\Longhorn\MXDs\LHAAP-67\2014-Oct-22\Figure 2-1 LHAAP-67 LUC Boundary.mxd

COUNTY CLERK'S MEMO
PORTIONS OF THIS
DOCUMENT NOT
REPRODUCIBLE
WHEN RECORDED

FIELD NOTES DESCRIPTION OF
"LHAAP-67" LAND USE CONTROL AREA
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-67" Land Use Control Area being 6.088 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-67" Land Use Control Area being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998636625, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "IGNATIUS-1" (N=6957090.304 feet E=3311081.788 feet) and "IGNATIUS-2" (N=6955582.752 feet E=3311851.704 feet). Said traverse indicates a surface distance of 1693.005 feet between said monuments. The computed land area is based on grid distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940" .

Commencing at monument "IGNATIUS-1" referenced above,

THENCE S 32deg49'15"W 145.39' to an I.R.O.P.C. set for the N.W.C. of this tract and this POINT OF BEGINNING,

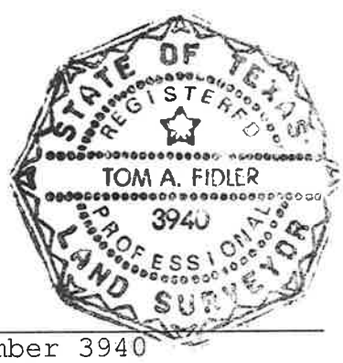
THENCE N 74deg08'33"E 654.97' along the N.B.L. of this tract to an I.R.O.P.C. set for this tract's N.E.C. ,

THENCE S 21deg34'17"E 390.25' along the E.B.L. of this tract to an I.R.O.P.C. set for this tract's S.E.C. ,

THENCE S 68deg21'49"W 605.17' along the S.B.L. of this tract to an I.R.O.P.C. set for this tract's S.W.C., from which monument "IGNATIUS-2" referenced above bears S 33deg05'59"E 1167.80' ,

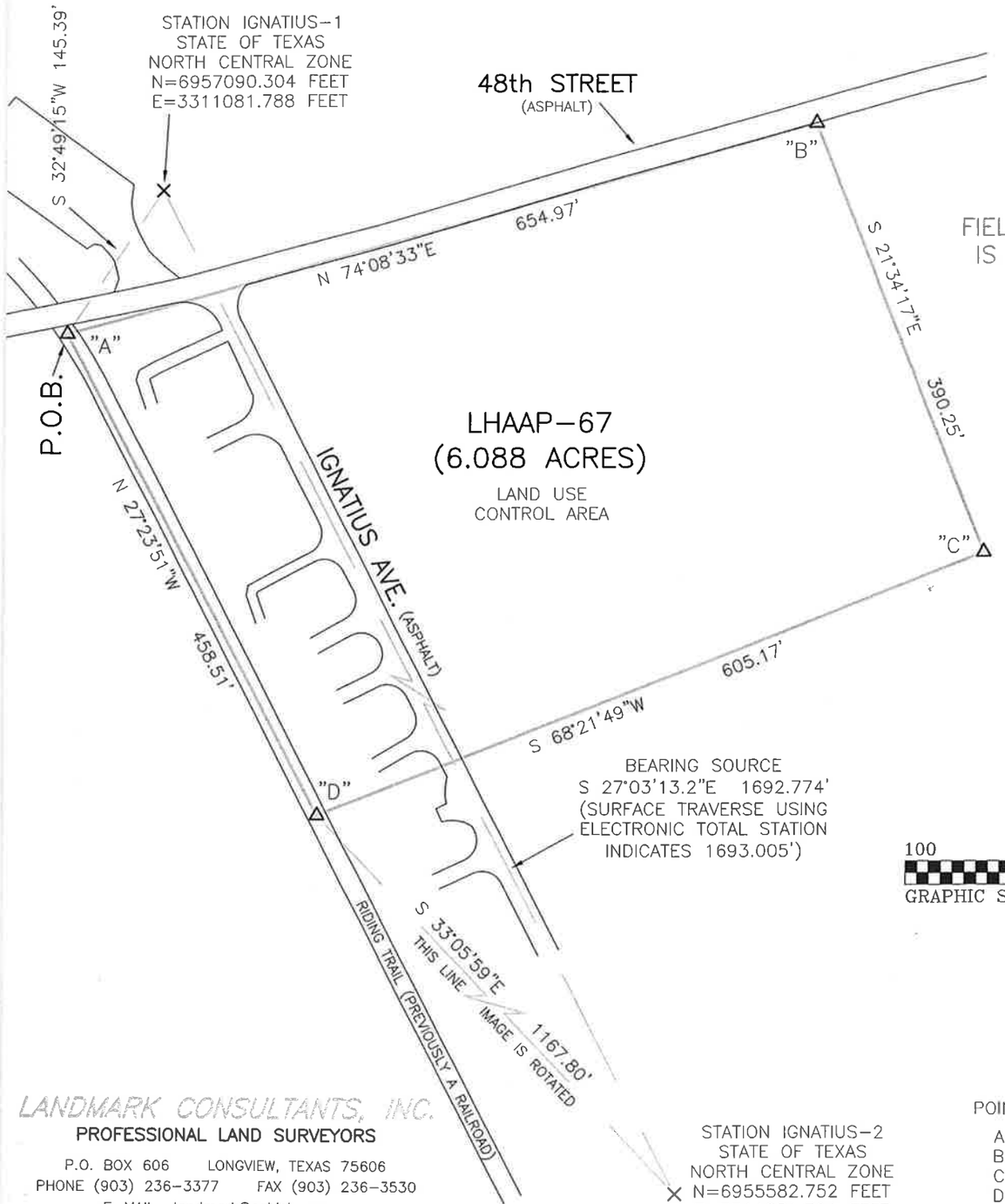
THENCE N 27deg23'51"W 458.51' along the W.B.L. of this tract to this POINT OF BEGINNING, containing 6.088 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

00906421



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in October, 2014.

Witness my hand and seal this the 16th day of October, 2014.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998636625 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS IGNATIUS-1 & IGNATIUS-2. THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.

SCALE 1"=100'

100 0 100 200 300

GRAPHIC SCALE – FEET

LEGEND

- X TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- O CONCRETE NAIL IN BOTTLE CAP (SET IN ASPHALT)
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- BOUNDARY LINE OF LAND USE CONTROL AREA

COORDINATE TABLE

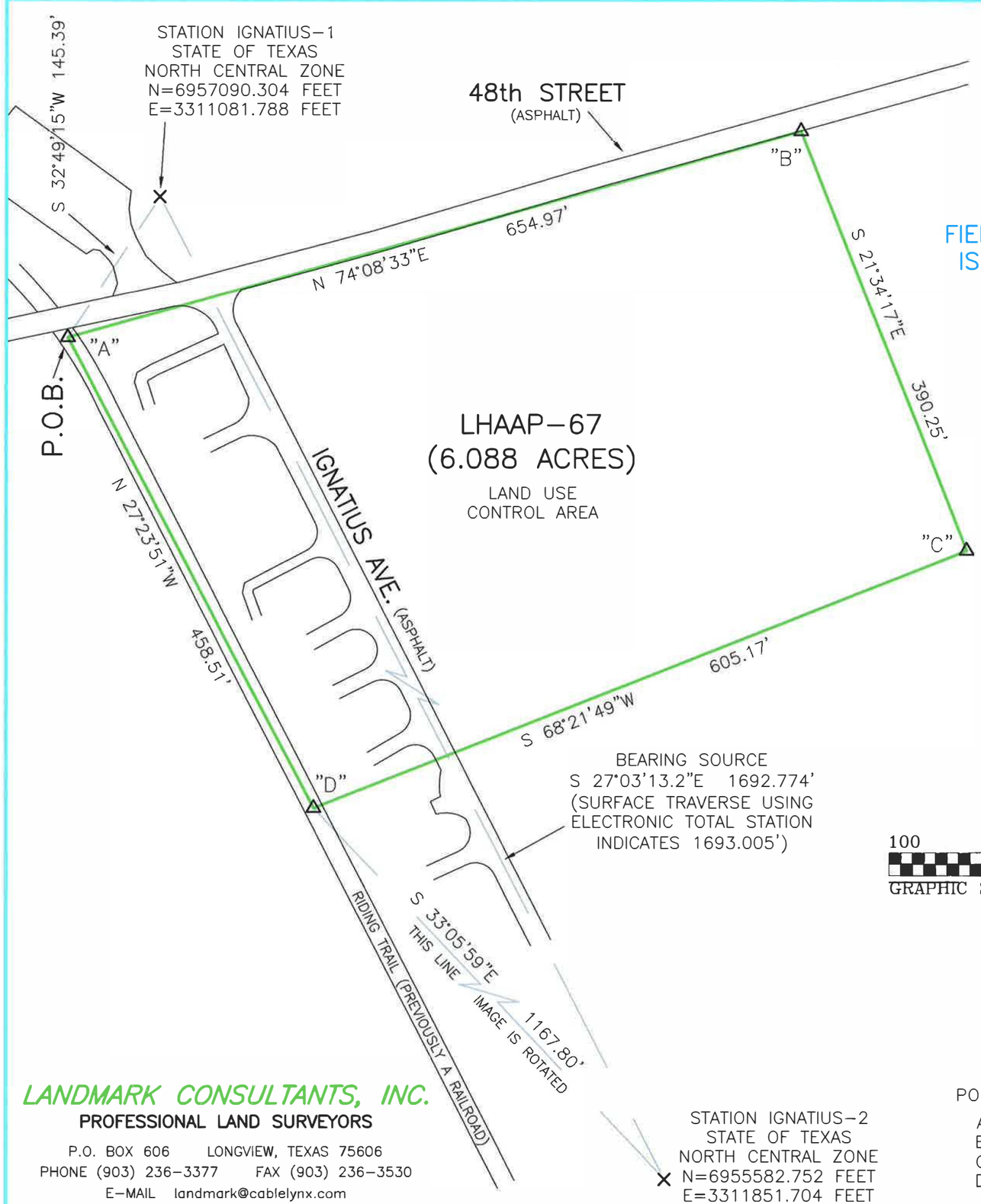
POINT	NORTH	EAST
A	6956968.123	3311002.985
B	6957147.091	3311633.031
C	6956784.178	3311776.509
D	6956561.041	3311213.974

LHAAP-67 L.U.C.A.
(6.088 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	H.PTS H.LEG
10/16/2014	0605063H.DWG	DRAWN BY JTJ

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

00906422



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in October, 2014.

Witness my hand and seal this the 16th day of October, 2014.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998636625 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS IGNATIUS–1 & IGNATIUS–2. THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.

SCALE 1"=100'

100 0 100 200 300
GRAPHIC SCALE – FEET

LEGEND

- X TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- O CONCRETE NAIL IN BOTTLE CAP (SET IN ASPHALT)
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- BOUNDARY LINE OF LAND USE CONTROL AREA

COORDINATE TABLE

POINT	NORTH	EAST
A	6956968.123	3311002.985
B	6957147.091	3311633.031
C	6956784.178	3311776.509
D	6956561.041	3311213.974

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236–3377 FAX (903) 236–3530
E–MAIL landmark@cablelynx.com

LHAAP–67 L.U.C.A.
(6.088 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	H.PTS H.LEG
10/16/2014	0605063H.DWG	DRAWN BY JTJ

LHAAP-67, 67-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 8/1/11 for LHAAP-67, a certification of site was conducted by _____ [indicate transferee] on _____.

A summary of land use control mechanisms is as follows:

- Groundwater restriction - A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-67]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-67.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name/Title: _____

Signature: _____

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-68

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-68 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005560

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005560 **Receipt No:** 1006195 **Amount:** $ 36.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-68, is located near the service station in the maintenance shops and power area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP-68 consisted of two mobile 600-gallon storage tanks on trucks that were parked on the asphalt surface at the service station of the maintenance complex. LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-68 is not itself considered an NPL site. Environmental activities at LHAAP-68 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-68 is located at the maintenance complex next to the service station. Two mobile 600-gallon storage tanks on trucks were parked on the asphalt surface with no curb or other containment present. The mobile storage tanks contained No. 2 diesel and gasoline fuel. In 2006, six soil samples were collected, two from each of three borings that were installed at the site, and analyzed for semi volatile organic compounds, volatile organic compounds, and total petroleum hydrocarbons. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday

through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-68 parcel is 426 square foot, more or less, or 0.00977 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-68 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-68. Contaminants in soil samples from LHAAP-68 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-68 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-68 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10 th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-68" TRACT
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-68" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-68" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 428.46' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 5167.48',

THENCE S 47deg55'43"W 686.07' to a concrete nail (with head dimple) set in asphalt for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 44deg35'24"E 41.58' along the Northeast B.L. of this tract to an "X" set (chisled in concrete) for this tract's Eastmost corner,

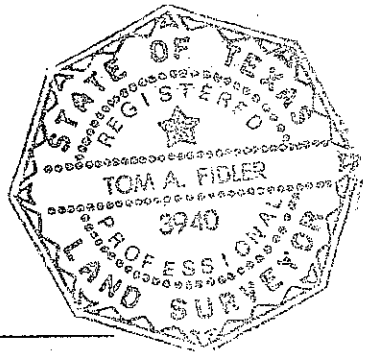
THENCE S 41deg38'18"W 9.34' along the Southeast B.L. of this tract to an "X" set (chisled in concrete) for this tract's Southmost corner,

THENCE N 46deg59'28"W 41.90' along the Southwest B.L. of this tract to a concrete nail (with head dimple) set in asphalt for this tract's Westmost corner,

THENCE N 43deg41'50"E 11.08' along the Northwest B.L. of this

tract to this POINT OF BEGINNING. This tract contains 426 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

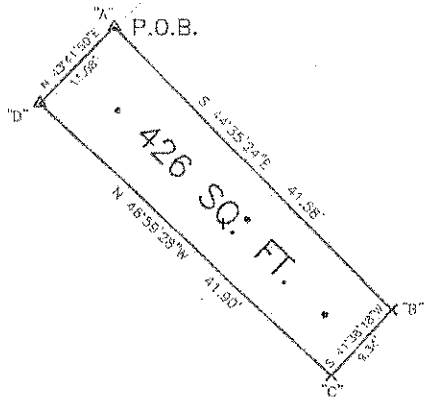
STATION X-11 □
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6960733.696 FEET
E=3304750.367 FEET

S 42°04'17.4"E 428.46'

COORDINATE TABLE

POINT	NORTH	EAST
A	6959955.942	3304528.186
B	6959926.330	3304557.376
C	6959919.350	3304551.170
D	6959947.931	3304520.531

S 47°55'43"W 686.07'



BEARING SOURCE BETWEEN
STATION X-11 & STATION C-21
IS S 42°04'17.4"E 5595.940'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 5596.714')

S 42°04'17.4"E 5167.48'

NOTES:

□ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
△ INDICATES CONCRETE NAIL WITH LEAD DIMPLE (SET)
X INDICATES X CHISLED IN CONCRETE (SET)
O INDICATES UNMARKED POINT
* INDICATES BORE HOLE AS MARKED BY SHAW ENVIRONMENTAL

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE – FEET

STATION C-21
STATE OF TEXAS □
NORTH CENTRAL ZONE
N=6956579.781 FEET
E=3308490.969 FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plot reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-5377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-68
(426 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	S.PTS S.LEG
10/26/2009	09080745.DWG	DRAWN BY JTF

PISTOL RANGE

NOTICE OF NONRESIDENTIAL LAND USE AT PISTOL RANGE FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2012-000000705

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM **Document Number:** 2012-000000705 **Receipt No:** 1200645 **Amount:** $ 32.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas, in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, the former Pistol Range is located at the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA) became effective on December 30, 1991. The former Pistol Range is an NPL site and a removal action was performed in 2009 in accordance with the FFA requirements. As a result of the removal action, the lead agency has determined that no further CERCLA action is necessary at the former Pistol Range to protect public health, welfare or the environment.

The former Pistol Range is located in the southeastern portion of LHAAP, approximately 280 feet south of Avenue Q at the end of Robert Avenue. The site is the eastern portion of a rectangular field and is approximately 110 feet north to south by 150 feet east to west. The former Pistol Range was known to have been used by LHAAP security personnel for small arms target qualification and recertification. The former Pistol Range was established in the 1950s and was used intermittently through 2004. A no further action Record of Decision for the former Pistol Range was signed by USEPA in 2010

establishing no remedy was required. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The former Pistol Range is a 0.3879 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the former Pistol Range and USEPA and TCEQ concluded that no further investigation or action is required.

Limited monitoring of the former Pistol Range will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of the former Pistol Range is consistent with the nonresidential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 21 th day of July, 2011.

BEFORE ME, on this the 21 th day of July, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 21 day of July, 2011.

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 03-17-2015

Notary Public in and for the State of Texas,
County of Harrison

FIELD NOTES DESCRIPTION OF
FORMER PISTOL RANGE
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 16,897 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9999146277, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "C-19-2" (N=6952844.320 feet E=3312839.019 feet) and "3-95" (N=6952411.298 feet E=3314136.438 feet). Said traverse indicates a surface distance of 1367.890 feet between said monuments. The computed land area is based on grid (State Plane) distances.

Commencing at monument "3-95" referenced above,

(As used herein, the abbreviation I.R.C. indicates 1/2" iron rod with R.P.L.S. #3940 orange plastic cap)

THENCE S 45deg51'27"E 855.98' to an I.R.C. set for the S.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 00deg00'20"W 107.99' along the W.B.L. of this tract to an I.R.C. set for this tract's N.W.C. ,

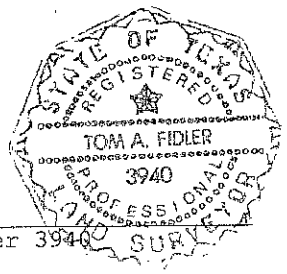
THENCE N 89deg59'47"E 155.96' along the N.B.L. of this tract to an I.R.C. set for this tract's N.E.C. ,

THENCE S 00deg32'56"E 107.99' along the E.B.L. of this tract to an I.R.C. set for this tract's S.E.C. ,

THENCE S 89deg59'43"W 156.98' along the S.B.L. of this tract to this POINT OF BEGINNING.

This tract contains 16,897 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

STATION C-19-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6952844.320 FEET
E=3312839.019 FEET

BEARING SOURCE BETWEEN
STATION C-19-2 & STATION 3-95
IS S 71°32'35.6"E 1367.773'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1367.890')

STATION 3-95
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6952411.298 FEET
E=3314136.438 FEET

S 45°51'27"E 855.98'

COORDINATE TABLE

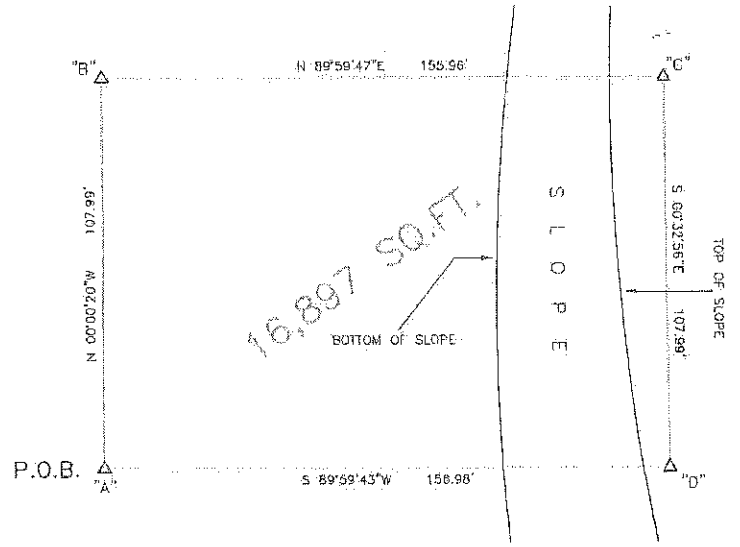
POINT	NORTH	EAST
A	6951923.143	3314750.686
B	6951815.153	3314750.697
C	6951815.166	3314907.681
D	6951923.153	3314906.647

LEGEND

□ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
△ INDICATES 1/2" IRON ROD WITH R.P.L.S. #3940 CAP (SET)

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999914277 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS C-19-2 AND 3-95. THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.



LANDMARK SURVEYS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in April 2011.

Witness my hand and seal May 2, 2011.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

N

SCALE 1"=30'

30 0 30 60 90
GRAPHIC SCALE - FEET

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

FORMER PISTOL RANGE
(16,897 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1104040	0407088.CRD	L.PTS L.LEG
MAY 2, 2011	1103025L.DWG	DRAWN BY JTJ

LHAAP-001-R-01/LHAAP-003-R-01South Test Area (LHAAP-001-R-01) and Ground Signal Test Area (LHAAP-003-R-01), MMRP-1

LONG TERM MANAGEMENT INSPECTION AND MAINTENANCE CHECKLIST

October 15, 2018

LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	
Inspector's Name	
Inspector's Title	
Inspector's Signature	
Inspector's Contact Number	
Inspection Date	
Type of Inspection	☐ Quarterly ☐ Semiannual ☐ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

	Description	Yes	No	N/A	**Comments** (Attach photos/location sketches)	**Corrective Action** (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?					
A.2	Are there any missing signs?					
A.3	Are all signs legible?					
A.4	Is perimeter boundary mowed?					

A.5	Are signs visible from one sign to the next sign?					
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?					
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?					

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LHAAP-001-R-01/LHAAP-003-R-01
South Test Area (LHAAP-001-R-01) and Ground Signal Test Area (LHAAP-003-R-01), MMRP-2
LUCs FROM FINAL REMEDIAL DESIGN

October 15, 2018

FINAL
LAND USE CONTROL REMEDIAL DESIGN/ REMEDIAL ACTION CONSTRUCTION REPORT LHAAP-001-R-01 AND LHAAP-003-R-01 LONGHORN ARMY AMMUNITION PLANT

May 2018

Contract Number: W9128F-13-D-0012
Task Order Number: W912BV17F0150

Performance Based Remediation (PBR)
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared For:

Longhorn Army Ammunition Plant
Karnack, Texas

Under Contract To:

U.S. Army Corps of Engineers
Tulsa District
Tulsa, Oklahoma

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TABLE OF CONTENTS

Acronyms and Abbreviations iii

1 Introduction 1-1

1.1 Facility Background 1-1
1.2 Munitions Response Sites LHAAP-001-R and LHAAP-003-R Site Descriptions 1-1
1.3 Land Use Control Remedial Action Objective 1-3
1.4 Land Use Control Remedial Action 1-4

2 Site Characteristics 2-1

2.1 Geology and Hydrogeology 2-1
2.2 Current and Future Land Use 2-2
2.3 Nature and Extent of MEC 2-2
2.3.1 LHAAP-001-R 2-2
2.3.2 LHAAP-003-R 2-4

3 Land Use Control Remedial Design/Remedial Action Construction 3-1

3.1 LUC Implementation (Completed) 3-1
3.2 Maintenance and Monitoring 3-2
3.2.1 Maintenance of Existing MEC Warning Signs 3-2
3.2.2 Administrative Maintenance 3-3
3.3 Reporting of LUC Inspection and Monitoring 3-4
3.3.1 Notice of Planned Property Conveyances 3-4
3.3.2 Opportunity to Review Text of Intended LUCs 3-4
3.3.3 Notification Should Action(s) which Interfere with LUC Effectiveness be Discovered Subsequent to Conveyance 3-5
3.3.4 LUC Enforcement 3-5
3.3.5 Modification or Termination of LUCs 3-5

4 References 4-1

Figures

Figure 1-1 LHAAP Site Map
Figure 1-2 LHAAP-001-R and LHAAP-003-R Site Location Map with LUC Boundaries
Figure 3-1 Danger UXO Warning Sign

Attachment

Attachment 1 - Initial Notice of Land Use Controls Including 2008 LUC Boundary Maps for LHAAP-001-R and LHAAP-003-R
Attachment 2 - Initial Notice of Land Use Controls for Four Environmental Sites at Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas Transmittal Letters

Attachment 3 - Notice of Land Use Controls Including Final LUC Boundary Maps for LHAAP-001-R and LHAAP-003-R
Attachment 4 - Notice of Land Use Controls for Two Environmental Sites at Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas Transmittal Letters

Appendices

Appendix A LTM Inspection and Maintenance Checklist
Appendix B LUC Compliance Certification Form
Appendix C Recordation of Land Use Controls for LHAAP-001-R and LHAAP-003-R

ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
BIP	Blow-in-place
CD	Cultural debris
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CTT	Closed, Transferring, and Transferred
DNT	Dinitrotoluene
DoD	Department of Defense
ECP	Environmental Condition of Property
EE/CA	Engineering Evaluation/Cost Analysis
e2M	Engineering-Environmental Management
FFA	Federal Facility Agreement
GW-Ind	Groundwater-Industrial
HMX	1,3,5,7-Tetranitro-1,3,5,7-tetrazocane
IRP	Installation Restoration Program
LHAAP	Longhorn Army Ammunition Plant
LUC	Land use control
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
MC	Munitions constituent
MCL	Maximum Contaminant Level
MD	Munitions debris
MEC	Munitions and Explosives of Concern
mm	Millimeter
MMRP	Military Munitions Response Program
MOA	Memorandum of Agreement
MPPEH	Material potentially presenting explosive hazard
MRS	Munitions response site
MSC	Medium Specific Concentration
NCP	National Contingency Plan
NFA	No Further Action
NPL	National Priorities List
OB/OD	Open burn/open detonation
O&M	Operation and maintenance
PCL	Protective Concentration Level
RACR	Remedial Action Completion Report
RAO	Remedial action objective
RD	Remedial design
RDX	1,3,5-Trinitro-1,3,5-triazinane
ROD	Record of Decision

SARA	Superfund Amendments and Reauthorization Act
§	Section
SI	Site Inspection
STEP	Solutions to Environmental Problems
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TNT	Trinitrotoluene
TRRP	Texas Risk Reduction Program
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UU/UE	Unlimited Use/Unlimited Exposure
UXO	Unexploded Ordnance
WP	White phosphorus

3 LAND USE CONTROL REMEDIAL DESIGN/REMEDIAL ACTION CONSTRUCTION

The remedial action objective for LHAAP-001-R and LHAAP-003-R is protection of human health and safety from explosive hazards that may have remained at the sites after the MEC removal action. The duration for the LUCs specified in the MEC ROD for this purpose must remain in place until it is demonstrated that the MEC no longer presents a threat to public/human safety.

This section describes the LUC RD/RAC for LHAAP-001-R and LHAAP-003-R. Per the Final ROD, the LUCs' performance objectives are to:

- Prohibit the development and use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds.
- Restrict land use to nonresidential
- Prohibit intrusive activities such as digging or any other activity which could result in explosive safety risk.
- Maintain existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas.

The implementation, maintenance, and inspection requirements associated with each of the performance objectives that comprise this LUC RD/RAC are described below. The actions taken to implement the LUC objectives during the remedial action phase, as well as ongoing maintenance, monitoring, and reporting requirements are presented in Section 3.1 below. Upon regulatory review and concurrence with the final LUC RD/RACR, it will be distributed as part of the Comprehensive LUC Management Plan.

For portions of LHAAP-001-R and LHAAP-003-R subject to LUCs that are not owned by the Army, the Army will monitor and report on the implementation, maintenance, and enforcement of LUCs, and coordinate with federal, state, and local governments and owners and occupants of properties subject to LUCs. The Army remains responsible for ensuring that the remedy remains protective of human health and safety.

3.1 LUC Implementation (Completed)

The actions required to implement the LUCs for LHAAP-001-R and LHAAP-003-R are described below. An initial notice of LUCs, was completed on December 8, 2016 (**Attachments 1 and 2**), within 90 days of ROD signature as required. The notice of LUCs including the final LUC boundary maps and description of the LUCs were completed on May 9, 2018 (**Attachments 3 and 4**). The preliminary LUC boundaries presented in the initial notice are considered the final LUC boundaries presented in the notice of final LUCs and are presented on **Figure 1-2.** The following actions were undertaken to implement LUCs for LHAAP-001-R and LHAAP-003-R:

- Finalize the boundaries of the LUCs as part of the remedial action (completed). The preliminary LUC boundaries are considered the final LUC boundaries, as referenced on **Figure 1-2**.
- Survey the LUC boundaries (completed). The boundaries were finalized based on USEPA and TCEQ concurrence, and the LUC boundaries were surveyed by a State of Texas licensed surveyor. A legal description of the surveyed area accompanies the survey plat.
- Record the LUCs in Harrison County. The LUC plats and legal descriptions and LUC restriction language was recorded in the Harrison County Courthouse in accordance with Title 30 TAC §335.566 on April 19, 2018 (**Appendix C**).
- Provide notice of LUCs with finalization of the RD/RACR (completed).
    - Prepare the notice of land use restrictions including prohibiting development/use for residential housing, elementary and secondary schools, child care facilities and play grounds; prohibit intrusive activities, and maintenance of existing MEC warning signs along the perimeter of each site to physically demarcate controlled areas. The notice consists of a brief description of the LUCs and a figure depicting the LUC boundaries.
    - Transmit the notice to federal, state, and local governments involved at LHAAP-001-R and LHAAP-003-R and owners and occupants of the property subject to restrictions and LUCs. The notices have been sent to federal, state, and local officials including: State Representatives, the Harrison County Judge, Harrison County Historical Courthouse, the City of Uncertain Mayor, and Caddo Lake and Leigh Water Supply Corporations' Presidents. Notice has also been sent to the Caddo Lake National Wildlife Refuge Manager, as a representative of the USFWS, the future transferee of the property.

3.2 Maintenance and Monitoring

Components of the final remedy at LHAAP-001-R and LHAAP-003-R require repair and maintenance and those activities are described in this section, along with other routine maintenance activities. The following subsections present the maintenance and monitoring requirements of the final remedy.

3.2.1 Maintenance of Existing MEC Warning Signs

MEC warning signs have been installed at the perimeter of LHAAP-001-R and LHAAP-003-R (64 signs at each site), that serve as a physical demarcation of the controlled areas. The signs have visibility from one sign to the next with a maximum spacing of 100 feet. The signs include warning of potential presence of MEC and state the restriction against intrusive activities.

These signs will be visually inspected annually, or as needed, to ensure they remain intact, undamaged, and visible from one sign to the next. Maintenance will be conducted, as needed, and may include the following activities:

- Mowing and brush clearing around MEC warning signs to ensure that they are visible from one sign location to the next sign location.
- Rehanging/affixing MEC warning signs or replacing MEC warning sign(s), if they become damaged or illegible. Figure 3-1 presents an example of the Unexploded Ordnance (UXO) Danger signs that are required. The specifications for sign replacement are found in Appendix N of the MEC Removal Action report (EODT, 2009).
- Repairing existing MEC warning sign posts, which may require the reestablishment of the concrete base or post replacement.

The Inspection and Maintenance Checklist is provided in **Appendix A.** Repairs will also be documented via photographs and field notes.

3.2.2 Administrative Maintenance

Administrative maintenance required to ensure LUCs remain in place and effective include:

- Annual field inspections of LHAAP-001-R and LHAAP-003-R to confirm that no violations of the LUCs have occurred. Documentation of the inspection will be included on the Inspection and Maintenance Checklist (see **Appendix A**).
- Annual certifications that no LUC-restricted activities have been authorized and that LHAAP-001-R and LHAAP-003-R conditions and use are consistent with the LUCs. The Annual LUC Compliance Certification Form is presented in **Appendix B**.
- Periodic transmittal of a LUC Notice to federal, State, and local authorities and to owners and occupants of LHAAP-001-R and LHAAP-003-R. The notice will include the land use restrictions referenced in the ROD, a written description of the LUCs, and a figure depicting the LUC boundaries. The transmittal will coincide with each Five Year Review and will be documented in the report.
- The final LUC RD/RACR will be added to the Comprehensive LUC Management Plan and the plan will be provided to the owner or occupant of LHAAP-001-R and LHAAP-003-R. This update to the Comprehensive LUC Management Plan will be completed during the next annual update, which will be in the fourth quarter of 2018.

The U.S. Army will address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable.

3.3 Reporting of LUC Inspection and Monitoring

Beginning with finalization of this RD/RACR and approval of the Inspection and Maintenance forms and the Annual Certification Form, the U.S. Army will undertake inspections and certify continued compliance with the LUC objectives. The U.S. Army, or the transferee after transfer, will retain the LUC Inspection and Certification documents in the project files for incorporation into the Five Year Review reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the certification, the U.S. Army will provide to USEPA and TCEQ, along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. The need to continue inspections and certifications will be revisited during each Five Year Review.

3.3.1 Notice of Planned Property Conveyances

Upon transfer of Army-owned property, the Army will provide written notice of the LUCs to the transferee of the potential presence of MEC and any land use restrictions referenced in the ROD. Within 15 days of transfer, the U.S. Army will provide written notice to USEPA and TCEQ of the division of implementation, maintenance, and enforcement responsibilities unless such information has already been provided in the LUC RD/RACR. The notice will describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the U.S. Army may transfer responsibility for various implementation actions, the U.S. Army will also retain ultimate responsibility for the remedy integrity. This means that the U.S. Army is responsible for addressing substantive violations of the LUC performance objectives that would undermine the U.S. Army's CERCLA remedy. The U.S. Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation. In the event property is transferred out of Federal control, the LUCs relating to property restrictions shall be recorded in the deed and shall be enforceable by the U.S. and the state of Texas.

3.3.2 Opportunity to Review Text of Intended LUCs

The U.S. Army provided a copy of the land use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. The USEPA also received a copy for review. The U.S. Army will produce an ECP or other environmental document for transfer of LHAAP-001-R and LHAAP-003-R, but before executing transfer, the U.S. Army will provide the USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

3.3.3 Notification Should Action(s) which Interfere with LUC Effectiveness be Discovered Subsequent to Conveyance

Should the U.S. Army discover, after conveyance of the site, any activity on the property inconsistent with the LUC performance objectives, the U.S. Army shall notify the USEPA and TCEQ within 72 hours of such discovery. Consistent with Section 4.3.4 below, the U.S. Army will then work with the USEPA, TCEQ, and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the U.S. Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health and safety.

3.3.4 LUC Enforcement

Should the LUC remedy reflected in this LUC RD/RACR fail, the U.S. Army will coordinate with the USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the USFWS or its lessee, to the institution of judicial action against non-federal third parties. Alternatively, should the circumstances warrant such, the U.S. Army could choose to exercise its response authorities under CERCLA. Should the U.S. Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the U.S. Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

3.3.5 Modification or Termination of LUCs

The LUCs shall remain in effect until such time as the U.S. Army and USEPA agree that it has been demonstrated that MEC no longer presents a threat to public/human safety, allowing unrestricted property use. When this occurs, the LUCs will be terminated, as needed. The decision to terminate the LUC will be documented consistent with the National Contingency Plan (NCP) process for post-ROD changes, potentially including an explanation of significant differences or a RACR. If the property has been transferred and a determination by the U.S. Army and USEPA has been made to terminate the LUC, the U.S. Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

LHAAP-001-R-01/LHAAP-003-R-01 South Test Area (LHAAP-001-R-01) and Ground Signal Test Area (LHAAP-003-R-01), MMRP-3 NOTICE OF LAND USE CONTROL AND NONRESIDENTIAL LAND USE FOR LHAAP-001-R-01/LHAAP-003-R-01 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

October 15, 2018

2018-000004040

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/19/2018 02:27 PM **Document Number:** 2018-000004040 **Receipt No:** 1804258 **Amount:** $ 42.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

KIM NEMMERS
4085 ASPEN LANE

EVERGREEN, CO 80439

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROLS

KNOW ALL MEN BY THESE PRESENTS THAT:
Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a removal of munitions and explosives of concern on the land described herein. Longhorn Army Ammunition Plant (LHAAP) Munition Response Sites (MRSs) LHAAP-001-R (South Test Area/Bomb Test Area) and LHAAP-003-R (Ground Signal Test Area) are former military test areas located in the southern and southeastern portions of LHAAP, respectively. LHAAP was placed on the National Priorities List (NPL) in August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA) and the TCEQ entered into an agreement under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. MRSs LHAAP-001-R and LHAAP-003-R are co-located with NPL sites LHAAP-27 and LHAAP-54, respectively and are also considered NPL sites. Remedial activities at these sites were performed in accordance with the FFA requirements.

MRS LHAAP-01-R was constructed in 1954 and was used for testing photoflash bombs produced at the facility until approximately 1956. During the late 1950s, illuminating signal devises were also demilitarized within pits excavated in the vicinity of the test pad. During the 1960s, leaking production items may have been demilitarized by detonation. LHAAP-001-R was identified as an MRS based on the visual confirmation of MEC.

MRS LHAAP-003-R was used intermittently in April 1963 for aerial and on-ground testing and destruction of a variety of devices, including pyrotechnic signal devices, red phosphorus smoke wedges, infrared flares, illuminating mortar shells and cartridges, button bombs and various types of explosive simulators. The site was used intermittently over a 20-year period for testing and burn-out of rocket motors. From late 1988 through 1991, the site was used for the burn-out of Pershing missile rocket motors and, occasionally, leaking white phosphorus munitions were burned at the site as a demilitarization activity. LHAAP-003-R was identified as an MRS based on the reported presence of MEC.

Non-time critical removal actions (NTCRAs) for MEC removal were conducted at both sites in 2008. A Final Record of Decision (ROD) for LHAAP-001-R and LHAAP-003-R was issued in August 2016, which documents the final selected remedy for the sites, including the implementation of Land Use Controls (LUCs) designed to promote ongoing protection of human safety against potential explosive hazards that may have remained at the sites following the MEC removal actions. The LUCs' performance objectives are to prohibit residential use, to restrict land use to non-residential, and to prohibit intrusive activities such as digging or any other activity which could result in explosive safety risks.

Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E (Room 103. first floor) 12100 Park 35 Circle, Austin, Texas 78753, (512) 239-2900, Monday through Friday 8:00 am to 5:00 pm, or the Administrative Record available at the Marshall Public Library, 300 South Alamo Boulevard, Marshall, Texas 75670, (903) 935-4465, Monday, Tuesday and Thursday 9:30AM – 7:30PM, Wednesday and Friday 9:30AM – 5:30PM, and Saturday 9:30AM – 3:30PM.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public on the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

MRS LHAAP-001-R covers an area of approximately 72.14 acre-tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in **Exhibit A**. The entire LHAAP-001-R parcel is within a LUC boundary which is described in **Exhibit A**.

MRS LHAAP-003-R covers an area of approximately 79.53 acre-tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in **Exhibit B**. The entire LHAAP-003-R parcel is within a LUC boundary which is described in **Exhibit B**.

The United States Department of the Army has undertaken careful environmental study of MRSs LHAAP-001-R and LHAAP-003-R and the USEPA and TCEQ concluded that LUCs should remain in place until it is demonstrated that MEC no longer presents an explosive hazard.

Future use of these sites is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. The LUCs placed on the property to ensure appropriate future use include:

(1) Use must remain non-residential as described above. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences, child care facilities, nursing home or assisted living facilities, and any type of educational purpose for children/young adults in grades kindergarten through 12. This LUC will remain in place until it is demonstrated that the MEC no longer present a threat to human safety/health.

(2) No intrusive activity shall be permitted, which includes digging or any other activity which could result in explosive safety risks, without prior consent. This LUC will remain in place until it is demonstrated that the MEC no longer present an explosive hazard. Intrusive subsurface activities may occur provided that the Army and the EPA approve such intrusive subsurface activities before they are commenced and provided that they are undertaken by qualified personnel who are trained in explosives safety measures.

III

The owner of these sites is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post office Box 220
Ratcliff, AR 72951
Or
Assistant Chief of Staff for Installation Management
ATN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington, D.C. 20310-0600

Rose M. Zeiler
Longhorn AP Site Manager

EXECUTED this the 19th day of April, 2018.

BEFORE ME, on this 19th day of April personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 19th day of April, 2018.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 1/3/2019
NO. 128484987

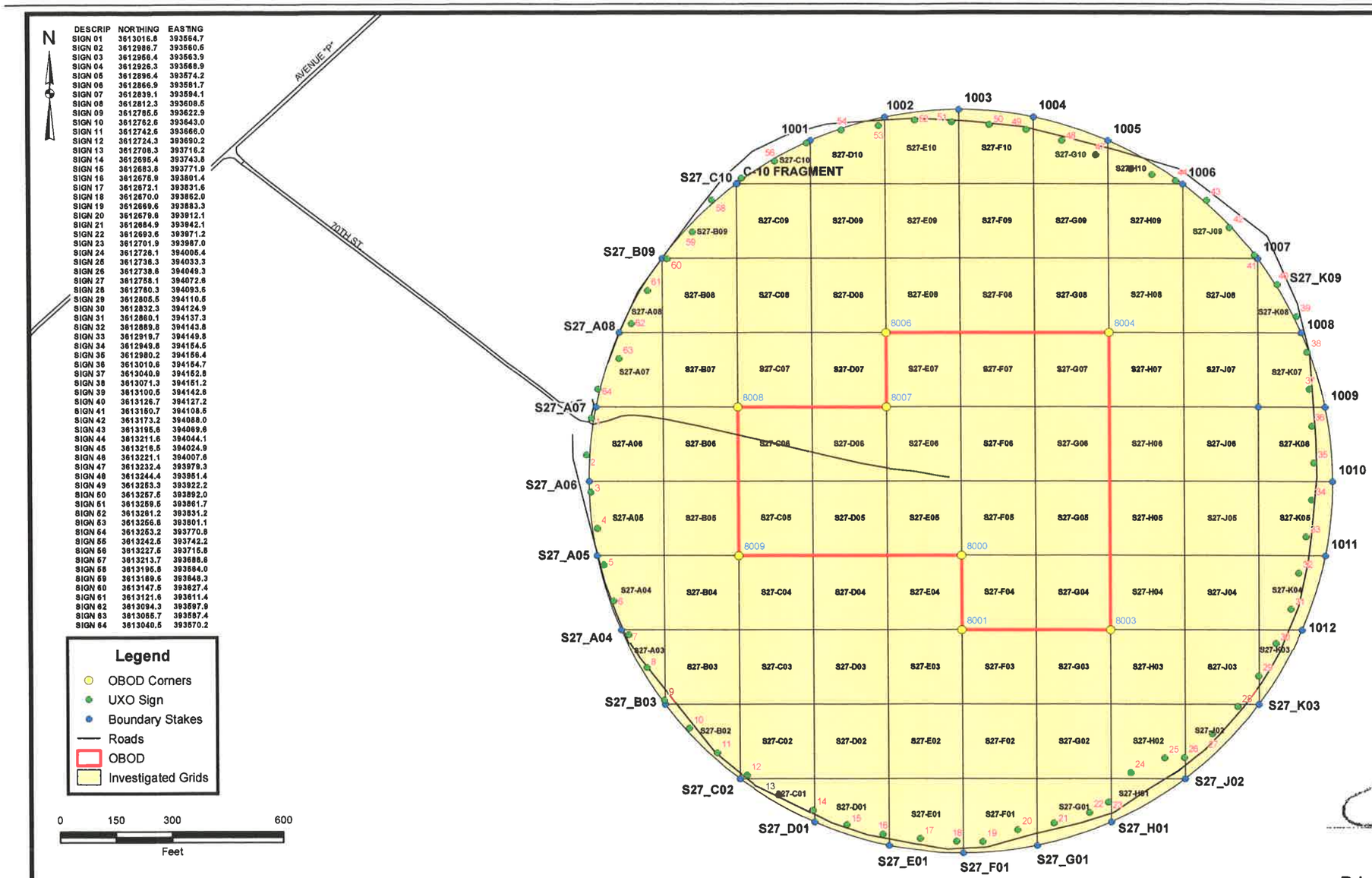
Notary Public in and for the State of Texas,
County of Harrison

Exhibit A
LHAAP-001-R, South Test Area/South Bomb Area
Longhorn Army Ammunition Plant, Karnack, Texas

DESCRIP	NORTHING	EASTING
SIGN 01	3613016.8	393564.7
SIGN 02	3612986.7	393560.5
SIGN 03	3612956.4	393563.9
SIGN 04	3612926.3	393568.9
SIGN 05	3612896.4	393574.2
SIGN 06	3612866.9	393581.7
SIGN 07	3612839.1	393594.1
SIGN 08	3612812.3	393608.5
SIGN 09	3612785.6	393622.9
SIGN 10	3612762.6	393643.0
SIGN 11	3612742.6	393666.0
SIGN 12	3612724.3	393690.2
SIGN 13	3612708.3	393716.2
SIGN 14	3612695.4	393743.6
SIGN 15	3612683.8	393771.9
SIGN 16	3612676.9	393801.4
SIGN 17	3612672.1	393831.6
SIGN 18	3612670.0	393862.0
SIGN 19	3612669.6	393893.3
SIGN 20	3612679.6	393912.1
SIGN 21	3612684.9	393942.1
SIGN 22	3612693.6	393971.2
SIGN 23	3612701.9	393987.0
SIGN 24	3612726.1	394005.4
SIGN 25	3612736.3	394033.3
SIGN 26	3612738.6	394049.3
SIGN 27	3612758.1	394072.6
SIGN 28	3612780.3	394093.5
SIGN 29	3612805.5	394110.5
SIGN 30	3612832.3	394124.9
SIGN 31	3612860.1	394137.3
SIGN 32	3612889.8	394143.8
SIGN 33	3612918.7	394149.8
SIGN 34	3612949.8	394154.5
SIGN 35	3612980.2	394156.4
SIGN 36	3613010.6	394154.7
SIGN 37	3613040.9	394152.8
SIGN 38	3613071.3	394151.2
SIGN 39	3613100.5	394142.6
SIGN 40	3613126.7	394127.2
SIGN 41	3613150.7	394108.5
SIGN 42	3613173.2	394088.0
SIGN 43	3613195.6	394069.6
SIGN 44	3613211.6	394044.1
SIGN 45	3613216.5	394024.9
SIGN 46	3613221.1	394007.6
SIGN 47	3613232.4	393979.3
SIGN 48	3613244.4	393951.4
SIGN 49	3613253.3	393922.2
SIGN 50	3613257.5	393892.0
SIGN 51	3613259.5	393861.7
SIGN 52	3613261.2	393831.2
SIGN 53	3613256.6	393801.1
SIGN 54	3613253.2	393770.8
SIGN 55	3613242.5	393742.2
SIGN 56	3613227.5	393715.6
SIGN 57	3613213.7	393688.6
SIGN 58	3613195.8	393664.0
SIGN 59	3613189.5	393648.3
SIGN 60	3613147.5	393627.4
SIGN 61	3613121.6	393611.4
SIGN 62	3613094.3	393597.9
SIGN 63	3613065.7	393587.4
SIGN 64	3613040.5	393570.2

DESCRIP	NORTHING	EASTING
8000	3612904.2	393867.3
8001	3612843.2	393867.3
8003	3612843.2	393989.2
8004	3613087.0	393989.2
8006	3613087.1	393806.4
8007	3613026.1	393806.4
8008	3613026.1	393684.4
8009	3612904.2	393684.4

DESCRIP	NORTHING	EASTING
1001	393745.4	3613244.5
1002	393806.4	3613263.8
1003	393867.3	3613269.9
1004	393928.3	3613263.8
1005	393989.2	3613244.5
1006	394050.1	3613209.0
1007	394111.0	3613148.0
1008	394146.5	3613087.0
1009	394165.8	3613026.1
1010	394171.9	3612965.1
1011	394165.8	3612904.2
1012	394146.5	3612843.2
C-10 FRAGMENT	393685.2	3613209.4
S27_A04	393568.0	3612843.2
S27_A05	393568.7	3612904.2
S27_A06	393562.5	3612965.1
S27_A07	393568.6	3613026.1
S27_A08	393687.9	3613087.1
S27_B03	393623.8	3612782.3
S27_B09	393623.8	3613148.0
S27_C02	393684.6	3612721.3
S27_C10	393684.4	3613209.0
S27_D01	393745.4	3612885.9
S27_E01	393806.4	3612666.6
S27_F01	393867.3	3612660.5
S27_G01	393928.3	3612666.7
S27_H01	393989.3	3612886.0
S27_J02	394049.9	3612721.3
S27_K03	394110.9	3612782.3
S27_K07	394111.2	3613026.1
S27_K09	394111.2	3613147.9



Legend

- OBOD Corners
- UXO Sign
- Boundary Stakes
- Roads
- OBOD
- Investigated Grids

0 150 300 600
Feet

Datum: NAD83 UTM
Monument: Longhorn Army Ammunition Plant
Monument BG-1 with coordinates
NORTHING-3614801.46,
EASTING-395385.09

STATE OF TEXAS
REGISTERED
DAVID R COLLINS
1954
PROFESSIONAL
LAND SURVEYOR

I, David R. Collins, Registered Professional Land Surveyor No. 1954, do hereby certify that this plat correctly represents the results of a survey made under my supervision August 4 through September 23, 2008.

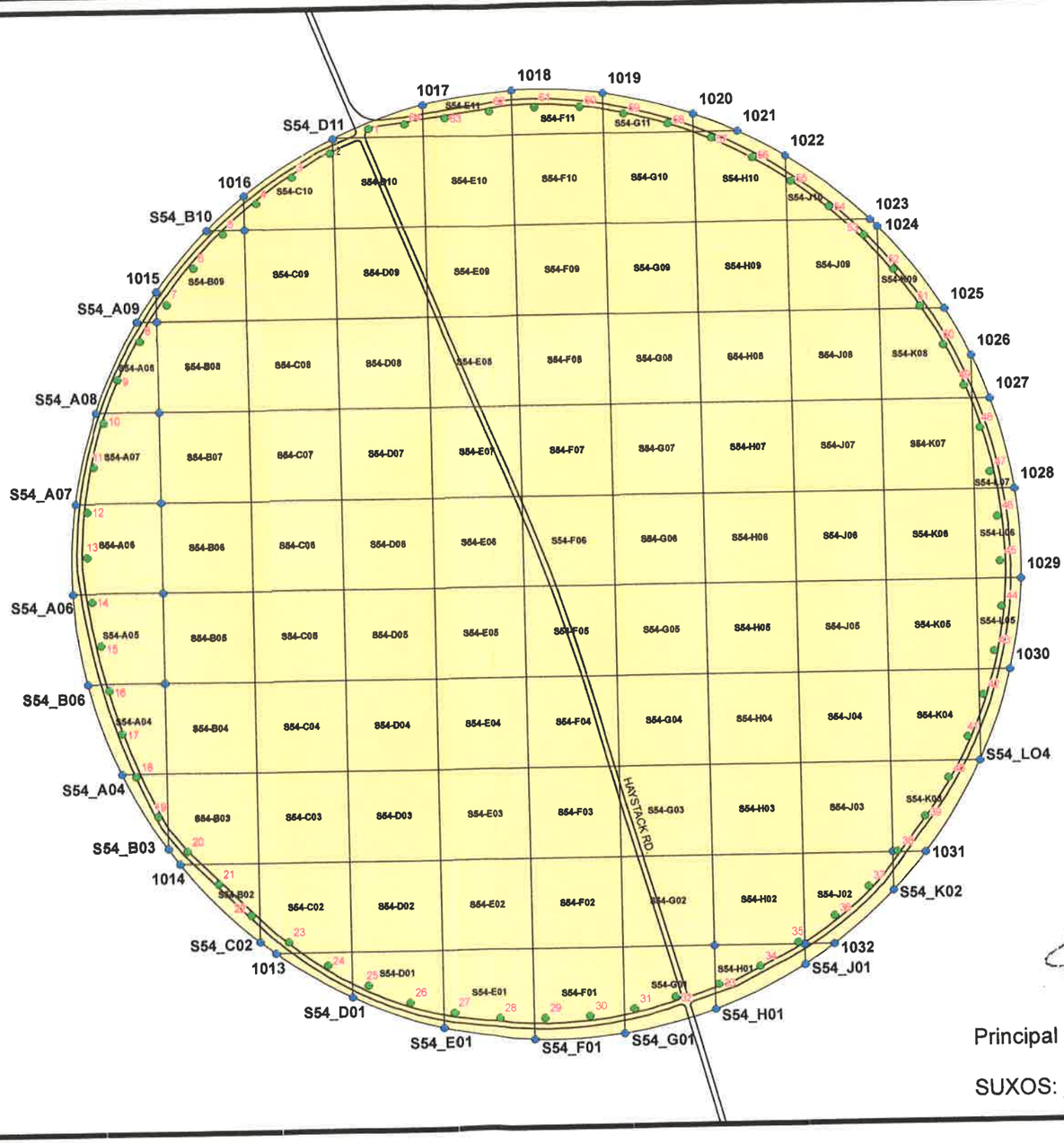
Principal of the firm: _____

SUXOS: _____

Exhibit B
LHAAP-003-R, Ground Signal Test Area
Longhorn Army Ammunition Plant, Karnack, Texas

DESCRIP	NORTH	EAST
SIGN 1	3614179.4	395143.2
SIGN 10	3613984.2	394959.8
SIGN 11	3613954.6	394952.4
SIGN 12	3613924.6	394947.4
SIGN 13	3613894.1	394947
SIGN 14	3613863.7	394949.6
SIGN 15	3613833.8	394956.1
SIGN 16	3613803.8	394959.8
SIGN 17	3613774.4	394967.8
SIGN 18	3613745.2	394976.7
SIGN 19	3613718.3	394991.2
SIGN 2	3614163.4	395117.3
SIGN 20	3613694.6	395010.3
SIGN 21	3613672.4	395031.1
SIGN 22	3613651.1	395052.8
SIGN 23	3613632.6	395077
SIGN 24	3613616.8	395103.1
SIGN 25	3613602.8	395130
SIGN 26	3613591	395158.1
SIGN 27	3613583.5	395187.5
SIGN 28	3613579.1	395217.8
SIGN 29	3613578.7	395248.2
SIGN 3	3614147.8	395091.2
SIGN 30	3613579.8	395278.7
SIGN 31	3613584.2	395308.8
SIGN 32	3613591.4	395336.3
SIGN 33	3613599.6	395365.6
SIGN 34	3613611	395393.8
SIGN 35	3613626.8	395419.8
SIGN 36	3613644.2	395444.8
SIGN 37	3613663.5	395469.2
SIGN 38	3613686.5	395488.2
SIGN 39	3613710.2	395507.8
SIGN 4	3614130.2	395066.2
SIGN 40	3613735.9	395523.8
SIGN 41	3613763	395537.5
SIGN 42	3613791.2	395546.8
SIGN 43	3613820.6	395556.7
SIGN 44	3613850.5	395562.3
SIGN 45	3613880.9	395562.2
SIGN 46	3613911.3	395561
SIGN 47	3613941.4	395556.7
SIGN 48	3613971.3	395550.8
SIGN 49	3613999.9	395540.6
SIGN 5	3614110.1	395043.4
SIGN 50	3614027.4	395527.6
SIGN 51	3614053.7	395512.2
SIGN 52	3614076.9	395498.2
SIGN 53	3614102.3	395478.8
SIGN 54	3614122	395452.6
SIGN 55	3614139.3	395427.5
SIGN 56	3614155.8	395401.9
SIGN 57	3614169.5	395374.8
SIGN 58	3614179.6	395346
SIGN 59	3614186.8	395316.6
SIGN 6	3614087.5	395032.9
SIGN 60	3614191.9	395286.4
SIGN 61	3614192.1	395255.9
SIGN 62	3614190.3	395226.5
SIGN 63	3614186.9	395195.4
SIGN 64	3614182	395167.9
SIGN 7	3614063.3	395004.4
SIGN 8	3614039.1	394988.8
SIGN 9	3614013.1	394969.9

DESCRIP	NORTHIN	EASTING
1013	395068.8	3613625.2
1014	395005.1	3613686.2
1015	394997.4	3614072.1
1016	395058.4	3614135.6
1017	395180.3	3614195.0
1018	395241.3	3614203.9
1019	395302.2	3614200.9
1020	395363.2	3614185.9
1021	395392.4	3614173.9
1022	395424.1	3614156.7
1023	395480.2	3614112.9
1024	395485.1	3614108.0
1025	395528.9	3614061.9
1026	395546.1	3614020.2
1027	395558.0	3613991.0
1028	395573.1	3613930.0
1029	395576.0	3613869.1
1030	395567.2	3613808.1
1031	395507.7	3613686.2
1032	395444.2	3613625.2
S54_A04	394967.3	3613747.1
S54_A06	394936.8	3613869.1
S54_A07	394939.8	3613930.0
S54_A08	394954.8	3613991.0
S54_A09	394983.9	3614051.9
S54_B03	394997.4	3613998.4
S54_B06	394997.4	3613808.1
S54_B06	394997.4	3613869.1
S54_B07	394997.4	3613930.0
S54_B08	394997.4	3613991.0
S54_B09	394997.4	3614051.9
S54_B10	395032.6	3614112.9
S54_C02	395068.4	3613633.0
S54_C10	395058.4	3614112.9
S54_D01	395119.3	3613696.1
S54_D11	395119.4	3614173.3
S54_E01	395180.3	3613573.5
S54_F01	395241.3	3613564.6
S54_G01	395302.2	3613567.6
S54_H01	395363.2	3613582.6
S54_H02	395363.1	3613625.2
S54_J01	395424.1	3613611.8
S54_J02	395424.1	3613625.2
S54_K02	395485.1	3613680.5
S54_K03	395485.1	3613686.2
S54_L04	395545.5	3613747.1



Legend
- UXO Signs
- Boundary Stakes
- Roads
- Investigated Grids

0 150 300 600
Feet

Datum: NAD83 UTM
Monument: Longhorn Army Ammunition Plant
Monument BG-1 with coordinates
NORTHING-3614801.46,
EASTING-395385.09

STATE OF TEXAS
REGISTERED
DAVID R COLLINS
1954
PROFESSIONAL
LAND SURVEYOR

I, David R. Collins, Registered Professional Land Surveyor No. 1954, do hereby certify that this plat correctly represents the results of a survey made under my supervision August 4 through September 28, 2008.

Principal of the firm: _____

SUXOS: _____

South Test Area (LHAAP-001-R-01) and Ground Signal Test Area (LHAAP-003-R-01), MMRP-4

LAND USE CONTROL COMPLIANCE INSPECTION FORM

October 15, 2018

LAND USE CONTROL COMPLIANCE CERTIFICATION FORM

In accordance with the LUC Plan dated _____ for LHAAP-001-R and LHAAP-003-R, an inspection of the sites was conducted by _____ on _____.

A summary of land use control mechanisms is as follows:

- Land use restrictions - restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained at LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are being used to educate visitors.

I, the undersigned, do document that the inspections were performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _____

Name: _____

Signature: _____

Completed annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed on site.

APPENDIX A

GSA TRANSFER LETTERS

GSA Public Buildings Service
Tel: (817) 978-3856
Fax: (817) 978-2063
melvin.freeman@gsa.gov

February 21, 2014

Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
600 Army Pentagon
Washington D.C. 20310-0600

Dear Mr. Lederle:

Your report of excess dated July 29, 2002, covered 8,492.02 acres of land (later corrected to 8,416 acres), more or less, and improvements at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. GSA Control No. 7-D-TX-0692.

As set forth in the enclosed letter, an additional 50.54 acres of land, more or less, of the LHAAP property known as Tract No. 7 – Landfill 12 Area, described in Attachment 1 of the transfer letter has been transferred without reimbursement to the U.S. Department of the Interior, Fish and Wildlife Service (FWS) under the authority of 16 U.S.C. 667b. Additional transfers will be made when approvals are obtained from the Army on lands currently not suitable for transfer. Future requests for transfers will identify requested land by legal description or map overlay.

Upon finalization of transfer of the total land requested by FWS, a complete boundary legal description will be provided by FWS identifying all former Army land that had been transferred. Any map overlays used in the interim to identify previously transferred land will be voided for use to identify former Army land at LHAAP subsequently controlled by FWS.

Custody and accountability of the property identified by legal description in Attachment 1 to the transfer letter, together with any necessary documentation, should be transferred to FWS by your agency as soon as practicable. We will appreciate your prompt advice as to the date such action is accomplished. We understand that the FWS, Region 2 Acting Regional Director, Ms. Joy Nicholopoulos, P.O. Box 1306, Albuquerque, NM 87103 will represent the FWS in this matter.

Please acknowledge receipt of this communication in the space provided on the enclosed copy of this letter and return it to this office. You may contact Veronica Capron Vorva, Realty Specialist at telephone 817-978-4246 if there are questions.

U.S. General Services Administration
Real Property Utilization and Disposal
Division (7PZ)
819 Taylor Street, Room 11A30
Fort Worth, TX 76102-6112

Sincerely,

Melvin E. Freeman, Director
Real Property Utilization and Disposal
Division (7PZ)

Enclosures

Receipt acknowledged:

Name THOMAS E LEDERLE

Title Chief, ACSIM BRAC DIV

Date 03/07/2014

cc: Ms. Joy Nicholopoulos, Acting Regional Director
U.S. Fish and Wildlife Service, Region 2
Division of Realty
P.O. Box 1306
Albuquerque, NM 87103-1306

GSA Public Buildings Service
Tel. (817) 978-3856
Fax (817) 978-2063
melvin.freeman@gsa.gov

February 21, 2014

Joy Nicholopoulos, Acting Regional Director
U.S. Fish and Wildlife Service, Region 2
Division of Realty
P.O. Box 1306
Albuquerque, NM 87103-1306

RE: Transfer of 50.54 acres of land at the Longhorn Army Ammunition Plant, Harrison County, Texas

Dear Ms. Nicholopoulos:

Your letter of April 27, 2004, requested transfer to the U.S. Department of the Interior, Fish and Wildlife Service (FWS), under the authority of P.L. 80-537, 16 U.S.C. 667b, a total of 8,404 acres of land (later corrected to 8,416 acres, more or less), at the Longhorn Army Ammunition Plant (LHAAP), City of Karnack, Harrison County, State of Texas, together with all the improvements found on the real estate, and all related personal property located thereon (hereinafter referred to as the "Property"), reported July 29, 2002, as excess to the needs of the U.S. Army. The first transfer of 5,031.75 acres was accepted into primary jurisdiction by FWS on April 30, 2004. It was agreed that as parcels met the specifications of transfer, additional parcels would be transferred by means of a letter request, a map, and a legal description to GSA.

All the rights to be transferred herein have heretofore been declared excess to the needs of the United States Department of the Army. The respective interests to be transferred hereby have been reported to the General Services Administration (GSA) and have been determined to be excess for disposal pursuant to P.L. 107-217, (40 U.S.C. §§550, et. seq.) as amended.

In accordance with your subsequent letter of February 4, 2014, an additional 50.54 acres, more or less, known as Tract No. 7 – Landfill 12 Area (hereinafter referred to as the "Property") are now suitable for transfer to add to the 6,364.35 acres, more or less, previously transferred on nine separate occasions. A true and complete legal description of Tract No. 7 – Landfill 12 Area is included in **Attachment 1**.

Accordingly, pursuant to 40 U.S.C. 501, et seq. and Public Law 80-537, 16 U.S.C. 667b, and acting under authority delegated to me, I hereby transfer 50.54 acres, more

U.S. General Services Administration
Real Property Utilization and Disposal Division (7PZ)
819 Taylor Street, Room 11A30
Fort Worth, TX 76102-6112

or less, as described in **Attachment 1** to the custody and accountability of the U.S. Department of Interior, Fish and Wildlife Service.

Additional transfers covering the remainder of the real estate comprising the LHAAP will be made when approvals are obtained from the Army on lands currently not suitable for transfer. Future requests for other transfers will specifically identify such requested land by legal description and/or map overlay.

This transfer is expressly made subject to all environmental notices, exceptions, restrictions, agreements, and covenants affecting the Property identified in the Environmental Condition of Property V, Longhorn Army Ammunition Plant, Karnack, Texas, dated September 2007 and revised December 6, 2013, (hereinafter referred to as the "ECOP V") which is incorporated herein by reference and amends the "ECOP" previously described in and made a part of the original transfer of April 26, 2004, and subsequent transfers, and the "ECOP II" dated October 2004, "ECOP III" dated August 2005, and "ECOP IV" dated March 2007 to the extent and only to the extent the same are valid and affect the Property conveyed herein. FWS covenants and agrees that the Property is hereby transferred subject to the use restrictions and covenants which run with the land as identified in Attachment 2 of the ECOP V previously described. FWS further covenants and agrees that in the event that the Property, or any part thereof, is sold, conveyed, transferred, leased, or otherwise disposed of, the following notices, covenants, and restrictions shall be inserted in any instrument of conveyance.

Upon finalization of transfer of the total land requested by FWS, a complete boundary legal description will be provided by FWS identifying all former Army land that had been transferred. Any map overlays used in the interim to identify previously transferred land will be voided for use to identify former Army land at LHAAP subsequently controlled by FWS.

The property transferred is subject to compliance by the FWS with the provisions of the National Environmental Policy Act of 1969, as amended, including the preparation of an environmental impact statement if required. The Property is transferred subject to compliance by the FWS with Section 106 of the National Historic Preservation Act of 1966, and Executive Order 11593.

Mr. Thomas E. Lederle, Chief, ACSIM BRAC Division, U.S. Army, 600 Army Pentagon, Washington D.C. 20310 will act for the U.S. Army in arranging for the transfer of custody and accountability of the Property and in other matters related to the transfer.

A copy of our letter of same date to the U.S. Army is enclosed for your information. It is requested that you acknowledge receipt of this communication on the enclosed copy of this letter in the space provided, return it to this office, and that such steps as necessary be taken by your Agency to consummate the transaction.

Sincerely,

Melvin E. Freeman

Melvin E. Freeman, Director
Real Property Utilization and Disposal
Division (7PZ)

Enclosures

Receipt acknowledged:

Name Robert R. Brewer

Title Realty Officer

Date 3-3-2014

cc: Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
600 Army Pentagon
Washington D.C. 20310-0600

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
DIVISION OF REALTY

TRACT REPORT

OF THE

UNITED STAES OF AMERICA

TRACT (100q)

CONTAINING 50.54 ACRES

CADDO LAKE NATIONAL WILDLIFE REFUGE

HARRRISON COUNTY, TEXAS

Report Prepared By

Louis J. duBois, Jr.
Land Surveyor

January 2014

Tract Description of the
United States of America Tract (100q)
Caddo Lake National Wildlife Refuge
Harrison County, Texas

The hereinafter described tract of land is located in Harrison County, Texas, near the town of Karnack, tract (100q) being 50.54 acres of land out of the Longhorn Ordnance Works Reservation, also known as the Longhorn Army Ammunition Plant, Karnack, Texas, said 50.54 acres of land being that certain 50.54 acre tract described as Parcel No. 7 – Landfill 12 Area excepted from United States of America tract (100a) as surveyed by Entz Engineering and Associates, Inc. & Huffman Surveying Company, A Joint Venture, of Muskogee, Oklahoma, delineated on a map tracing designated "United States of America Tracts (100a,b)" bearing the date of May, 2004, of record in the files of the United States Department of the Interior, Fish and Wildlife Service, Region 2, Albuquerque, New Mexico, said tract (100q) being more particularly described by metes and bounds as follows:

SURVEYOR'S NOTE:

All bearings and distances are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92), Survey Feet. The average Combined Scale Factor applied equals 0.99988410; Convergence equals 02° 21' 53". The computed land area is based on surface distances.

Parcel No. 7 - Landfill 12 Area

BEGINNING at the southwest corner of the Landfill 12 Area, described as Parcel No. 7, said point being described as "Landfill 12 Area Point No. 1" and having a coordinate value of N=6953300.238, E=3311087.540;

THENCE, along the boundary line of said Parcel No. 7,

N. 03°15'36" W., 1741.41 feet

to a point for a corner of this tract, said point being described as "Landfill 12 Area Point No. 2";

THENCE, along the boundary line of said Parcel No. 7,

N. 62°03'32" E., 1151.75 feet

to a point for a corner of this tract, said point being described as "Landfill 12 Area Point No. 3";

THENCE, along the boundary line of said Parcel No. 7,

S. 15°55'59" E., 1311.85 feet

to a point for a corner of this tract, said point being described as "Landfill 12 Area Point No. 4";

THENCE, along the boundary line of said Parcel No. 7,

S. 35°09'33" W., 1306.48 feet

to a point for a corner of this tract, said point being described as "Landfill 12 Area Point No. 5";

THENCE, along the boundary line of said Parcel No. 7,

N. 84°25'54" W., 528.74 feet

to the **POINT OF BEGINNING**, and containing 50.54 acres, more or less.

Bounded on the north, east, south and west by USA tract (100a).

The hereinbefore-described tract of land is delineated on a plat designated "United States of America Tract (100q)" bearing the date of January 15, 2014, of record in the files of the United States Department of the Interior, Fish and Wildlife Service.

GSA Public Buildings Service
Tel: (817) 978-3856
Fax: (817) 978-2063
melvin.freeman@gsa.gov

January 29, 2015

Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
600 Army Pentagon
Washington D.C. 20310-0600

Dear Mr. Lederle:

Your report of excess dated July 29, 2002, covered 8,492.02 acres of land (later corrected to 8,416 acres), more or less, and improvements at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. GSA Control No. 7-D-TX-0692.

As set forth in the enclosed letter, an additional 109.91 acres of land, more or less, in five parcels of the LHAAP property, described in Attachment 1 and Attachment 2 of the transfer letter, including: three portions of the "Production Area Parcel," consisting of Tract 100r, containing 31.73 acres in and around the Former Acid Storage Area, Tract 100s, containing 18.80 acres in and around the Former TNT Waste Disposal Plant, and Tract 100t, containing 3.82 acres in and around the Former Sewage Treatment Plant; the "Y-Area Parcel," Tract 100u, containing 17.24 acres; and a portion of the 40.37 acre "Static Test Area Parcel," Tract 100v, containing 38.32 acres, have been transferred without reimbursement to the U.S. Department of the Interior, Fish and Wildlife Service (FWS) under the authority of 16 U.S.C. 667b. Additional transfers will be made when approvals are obtained from the Army on lands currently not suitable for transfer. Future requests for transfers will identify requested land by legal description or map overlay.

Upon finalization of transfer of the total land requested by FWS, a complete boundary legal description will be provided by FWS identifying all former Army land that had been transferred. Any map overlays used in the interim to identify previously transferred land will be voided for use to identify former Army land at LHAAP subsequently controlled by FWS.

Custody and accountability of the property identified by legal description in Attachment 1 and Attachment 2 to the transfer letter, together with any necessary documentation, should be transferred to FWS by your agency as soon as practicable. We will appreciate your prompt advice as to the date such action is accomplished. We understand that the FWS, Region 2 Acting Regional Director, Ms. Joy Nicholopoulos, P.O. Box 1306, Albuquerque, NM 87103 will represent the FWS in this matter.

U.S. General Services Administration
Real Property Utilization and Disposal Division (7PZ)
819 Taylor Street, Room 11A30
Fort Worth, TX 76102-6112

Please acknowledge receipt of this communication in the space provided on the enclosed copy of this letter and return it to this office. You may contact Veronica Vorva, Realty Specialist, at telephone 817-978-4246 if there are questions.

Sincerely,

Melvin E. Freeman

Melvin E. Freeman, Director
Real Property Utilization and Disposal
Division (7PZ)

Enclosures

Receipt acknowledged:

Name THOMAS E LEDERLE

Title Chief, ACSIM BRAC DIV

Date 20 APR 2015

cc: Ms. Joy Nicholopoulos, Acting Regional Director
U.S. Fish and Wildlife Service, Region 2
Division of Realty
P.O. Box 1306
Albuquerque, NM 87103-1306



GSA Public Buildings Service
Tel: (817) 978-3856
Fax: (817) 978-2063
melvin.freeman@gsa.gov

January 29, 2015

Joy Nicholopoulos, Acting Regional Director
U.S. Fish and Wildlife Service, Region 2
Division of Realty
P.O. Box 1306
Albuquerque, NM 87103-1306

RE: Transfer of 109.91 acres of land at the Longhorn Army Ammunition Plant, Karnack, Harrison County, Texas

Dear Ms. Nicholopoulos:

Your letter of April 27, 2004, requested transfer to the U.S. Department of the Interior, Fish and Wildlife Service (FWS), under the authority of P.L. 80-537, 16 U.S.C. 667b, a total of 8,404 acres of land (later corrected to 8,416 acres, more or less), at the Longhorn Army Ammunition Plant (LHAAP), City of Karnack, Harrison County, State of Texas, together with all the improvements found on the real estate, and all related personal property located thereon (hereinafter referred to as the "Property"), reported July 29, 2002, as excess to the needs of the U.S. Army. The first transfer of 5,031.75 acres was accepted into primary jurisdiction by FWS on April 30, 2004. It was agreed that as parcels met the specifications of transfer, additional parcels would be transferred by means of a letter request, a map, and a legal description to GSA.

All the rights to be transferred herein have heretofore been declared excess to the needs of the United States Department of the Army. The respective interests to be transferred hereby have been reported to the General Services Administration (GSA) and have been determined to be excess for disposal pursuant to P.L. 107-217, (40 U.S.C. §§550, et. seq.) as amended.

In accordance with your subsequent letter of December 2, 2014, an additional 109.91 acres, more or less, in five parcels of the LHAAP property including: three portions of the "Production Area Parcel," consisting of Tract 100r, containing 31.73 acres in and around the Former Acid Storage Area, Tract 100s, containing 18.80 acres in and around the Former TNT Waste Disposal Plant, and Tract 100t, containing 3.82 acres in and around the Former Sewage Treatment Plant; the "Y-Area Parcel," Tract 100u, containing 17.24 acres; and a portion of the 40.37 acre "Static Test Area Parcel," Tract 100v, containing 38.32 acres (hereinafter referred to as the "Properties") is now suitable

U.S. General Services Administration
Real Property Utilization and Disposal
Division (7PZ)
819 Taylor Street, Room 11A30
Fort Worth, TX 76102-6112

for transfer to add to the 6,414.89 acres, more or less, previously transferred on ten separate occasions. True and complete legal descriptions of the Properties are included in **Attachment 1** and **Attachment 2**.

Accordingly, pursuant to 40 U.S.C. 501, et seq. and Public Law 80-537, 16 U.S.C. 667b, and acting under authority delegated to me, I hereby transfer 109.91 acres, more or less, as described in **Attachment 1** and **Attachment 2** to the custody and accountability of the U.S. Department of Interior, Fish and Wildlife Service.

Additional transfers covering the remainder of the real estate comprising the LHAAP will be made when approvals are obtained from the Army on lands currently not suitable for transfer. Future requests for other transfers will specifically identify such requested land by legal description and/or map overlay.

This transfer is expressly made subject to all environmental notices, exceptions, restrictions, agreements, and covenants affecting the Property identified in the Environmental Condition of Property VI, Longhorn Army Ammunition Plant, Karnack, Texas, dated January 2014, (hereinafter referred to as the "ECOP VI") which is incorporated herein by reference and amends the "ECOP" previously described in and made a part of the original transfer of April 26, 2004, and subsequent transfers, and the "ECOP II" dated October 2004, "ECOP III" dated August 2005, "ECOP IV" dated March 2007, and "ECOP V" dated September 2007 and revised December 6, 2013 to the extent and only to the extent the same are valid and affect the Property conveyed herein. FWS covenants and agrees that the Property is hereby transferred subject to the use restrictions and covenants which run with the land as identified in Attachment 3 of the ECOP VI previously described. FWS further covenants and agrees that in the event that the Property, or any part thereof, is sold, conveyed, transferred, leased, or otherwise disposed of, the following notices, covenants, and restrictions shall be inserted in any instrument of conveyance.

Upon finalization of transfer of the total land requested by FWS, a complete boundary legal description will be provided by FWS identifying all former Army land that had been transferred. Any map overlays used in the interim to identify previously transferred land will be voided for use to identify former Army land at LHAAP subsequently controlled by FWS.

The property transferred is subject to compliance by the FWS with the provisions of the National Environmental Policy Act of 1969, as amended, including the preparation of an environmental impact statement if required. The Property is transferred subject to compliance by the FWS with Section 106 of the National Historic Preservation Act of 1966, and Executive Order 11593.

Mr. Thomas E. Lederle, Chief, ACSIM BRAC Division, U.S. Army, 600 Army Pentagon, Washington D.C. 20310 will act for the U.S. Army in arranging for the transfer of custody and accountability of the Property and in other matters related to the transfer.

A copy of our letter of same date to the U.S. Army is enclosed for your information. It is requested that you acknowledge receipt of this communication on the enclosed copy of this letter in the space provided, return it to this office, and that such steps as necessary be taken by your Agency to consummate the transaction.

Sincerely,

Melvin E. Freeman, Director
Real Property Utilization and Disposal
Division (7PZ)

Enclosures

Receipt acknowledged:

Name David Allard

Title Realty Specialist

Date 2/2/2015

cc: Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
600 Army Pentagon
Washington D.C. 20310-0600

Subject: Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting
Longhorn Army Ammunition Plant (LHAAP)
Location of Meeting: Karnack Community Center, Karnack, Texas
Date of Meeting: July 19, 2018, 6:00-7:15 PM Central Daylight Time (CDT)

Meeting Participants:

Army BRAC:	Rose M. Zeiler and Tom Lederle
USACE:	Aaron Williams
USAEC:	Nicholas Smith
Bhate:	Kim Nemmers
APTIM:	William (Bill) Foss
USEPA Region 6:	Rich Mayer, Dorelle Harrison
TCEQ:	April Palmie
RAB:	Present: Paul Fortune, Judy VanDeventer, Tom Walker, and Richard Le Tourneau Absent: Carol Fortune; Charles Dixon; Terry Britt; John Pollard, Jr.; and Nigel R. Shivers
Public:	Laura-Ashley Overdyke, Kathy and Calvin Witt, Beth and Mark Hammett, Daren Horton, and Hattie Hackler

An agenda for the RAB meeting, a color copy of the Bhate Environmental Associates, Inc. (Bhate) slide presentation, and handouts (see list at end of meeting minutes) were provided for meeting attendees.

Welcome and Introduction

Mr. Paul Fortune, RAB Co-Chair, called the RAB meeting to order at 6:05 pm CDT. Mr. Fortune welcomed everyone. Mr. Calvin Witt and his wife Kathy, Mark and Beth Hammett, and Tom Lederle were welcomed.

Mr. Fortune also noted that Mr. Tom Lederle, who is with the U.S. Army and visits the RAB from time to time, was present. Mr. Lederle stated that he has visited annually since approximately 2001 and has had a relatively long involvement at Longhorn AAP. Mr. Lederle, who is chief of the Army BRAC Division, stated that he tries to visit at least one a year. Mr. Lederle explained that the Base Realignment and Closure (BRAC) process for installations began in 1988 with realignment and/or closure.

Open Items

Rose M. Zeiler, Longhorn Site Manager, explained that the purpose of the RAB meetings is to promote community awareness and obtain constructive community review and comments on environmental restoration activities at the former LHAAP. Ms. Zeiler explained that the RAB meetings are held every three months. Ms. Zeiler stated that the RAB members are a liaison from the Army to the community and noted that applications to become a RAB member are available on the Longhorn Army Ammunition Plant (LHAAP) website. Ms. Zeiler explained that

handouts from the meeting and the Administrative Record are also present on the LHAAP website.

Ms. Zeiler noted that the RAB meeting minutes had been sent out in May 2018. Ms. Judy VanDeventer made a motion to approve the April 2018 RAB Meeting minutes. Mr. Richard Le Tourneau seconded the motion.

Mr. Darren Horton of Caddo Lake asked how many RAB members are currently active and how many are allowed. Mr. Horton also asked if there are RAB member openings. Ms. Zeiler stated that there are currently 9 members and that we have had no reason to limit the number of RAB members. Mr. Fortune stated that new members are always welcome.

Defense Environmental Restoration

Overview of Hydrology

Ms. Zeiler explained that due to prior meeting questions, Bhate is presenting information about how groundwater and plumes move. Mr. Bill Foss explained which sites are covered under the Bhate contract. Ms. Zeiler noted that several sites are not under Bhate's contract and these do not have Records of Decision (RODs) yet. Mr. Foss provided an explanation of hydrogeology, the terms used, how an aquifer works, and how a plume moves. Mr. Foss explained that soils are made up of different size grains. The larger the grain size, the easier for groundwater to move within the soils. Mr. Foss explained hydrology terms first. Aquifer is a water bearing layer that produces water in usable quantities. Permeability is how fast something can flow through the material (e.g. gravel has a higher permeability than a clay). Aquitards are lower permeability layers such as a clay, shale or siltstone. Potentiometric surface is the top elevation of the water table measured in monitoring wells and the groundwater elevations in the potentiometric surface are used to determine the groundwater flow direction. A plume is a body of fluid that doesn't belong (has a different chemistry) in the groundwater. DNAPL is an acronym for free product or dense non-aqueous phase liquid, which is a very high concentration of a chemical that has not dissolved, is more dense than water, and is sitting on the bottom of the aquifer. DNAPL may follow a different flow direction than the overall groundwater flow since it sits on the bottom and flows in direction of the bottom of the aquifer. Hydrogeology is distinct from geology because it is the study of groundwater flow through soils and not just soils. Vadose zone soils do not have any groundwater present. Mr. Foss then explained how the different groundwater and soil zones interlace and how a plume might move through an aquifer. Mr. Foss explained that you can have contamination move with the groundwater in a dissolved phase plume, but you can also have contamination stay behind (e.g. DNAPL that sinks). The residual contamination is considered the "source material" because it feeds the dissolved phase plume. Mr. Foss noted that the dissolved phase plume can be very low concentrations. The goal of remediation is typically to remediate both the source material and the dissolved phase plume.

Site LHAAP-0003

Mr. Foss explained that the ROD for LHAAP-03 has been finalized and is awaiting Regulatory signature and concurrence. The remedy has been selected (excavation of soils contaminated with arsenic and lead to prevent leaching to groundwater) and the remedial design will be prepared in the coming months. Mr. Foss explained that LHAAP-03 is a site where the focus is on soils only. The site stored paint shop wastes, including primers containing heavy metals and solvents. The groundwater is being managed under Site LHAAP-58, which is a much larger site in which LHAAP-03 is a small part. LHAAP-03 groundwater is being addressed under Site LHAAP-58 and this is being formally documented via an Explanation of Significant Difference (ESD). Mr. Foss explained that the contaminants of concern are arsenic and lead in soils and that the depth to groundwater is 12 to 16 feet below ground surface (bgs). The groundwater at Site LHAAP-03 is indistinguishable from LHAAP-58. Mr. Foss explained that the contaminated soil will be excavated and disposed of at a properly licensed landfill. Mr. Foss explained that most of the excavation is approximately 2 feet bgs, but there are a couple of deeper areas (approximately 7 feet bgs). The excavation area is approximately 25 feet by 30 feet in area. Mr. Foss explained that additional sampling will be completed to further refine the area of excavation and then a Remedial Design and Remedial Action Work Plan will be prepared. Once the excavation is completed, then a Remedial Action Completion Report (RACR) will be prepared to document the removal action and associated sampling results and other activities.

Mr. Horton asked where the excavated soil goes when it is removed. Mr. Foss explained that the soil will be disposed at a non-hazardous landfill where the soil will likely be used as cover by the landfill to keep odors down. The type of landfill will be determined based upon the waste characterization.

Mr. Fortune asked if the painters were dumping waste, which created this issue. Mr. Foss stated that the area was a waste storage pad and that some of the best practices used today such as secondary containment and keeping containers in a covered area were perhaps not used back then. Mr. Foss stated that spillage and overflow are most likely causes of the contamination and not dumping. Mr. Horton then clarified that this was not a typical LHAAP munitions production site to which Ms. Zeiler concurred.

Mr. Fortune then asked if the former gas station within the maintenance complex had been remediated. Ms. Zeiler stated that a gas station in the LHAAP-58 area had been remediated.

Mr. Le Tourneau asked how many different classes of waste have gone offsite (e.g. Class 1, Class 2 and Class 3). Ms. Zeiler stated that most of the waste goes off as special, non-hazardous waste. Ms. Zeiler stated that some waste has been disposed of as hazardous waste and then explained that a rule called the “mixture rule” had changed such that waste from the filter press at the groundwater treatment plant is now being disposed of as special waste. Waste characterization was then discussed including evaluating for ignitability, toxicity, flashpoint etc. Ms. Zeiler explained that special waste is a term for waste that is non-hazardous but has some known contaminants present. Ms. Nemmers stated that there are two codes for non-

hazardous wastes in Texas. Ms. Overdyke asked if at this stage in the cleanup if more special waste is being disposed of compared to more hazardous waste earlier on in the remediation process. Ms. Zeiler stated that large amounts of soil have been disposed as special waste at LHAAP. Mr. Le Tourneau then asked about the rule change and what distance waste is now being transported for disposal. Mr. Foss stated that most hazardous waste disposed of during remediation is due to a characteristic of a high contamination present. Mr. Foss stated that waste is rarely disposed of due to ignitability or some of the other characteristics. Ms. Nemmers stated that all of the waste currently being disposed of from LHAAP is going off as special waste, but that the waste streams are tested just to make sure that the water is properly disposed. Ms. Nemmers explained that the waste streams are re-tested annually or when a new waste stream is generated. Mr. Foss stated that hazardous waste may have to go a longer distance to find a licensed facility, but that non-hazardous waste typically is transported to a nearby landfill. Ms. Zeiler stated that some waste from Site LHAAP-18/24 may have gone to a hazardous waste landfill though most of the soils that were removed years ago were thermally treated onsite and placed back onto the site. Mr. Richard Mayer stated that it is unlikely that the soils from Site LHAAP-03 will be hazardous waste given the low level detections of the metals. Mr. Fortune asked where a leaking gasoline tank waste would go. Mr. Mayer stated that testing would be completed to determine where and how to dispose of the waste. Ms. April Palmie stated that the waste would probably go to either a Class I or Class II landfill as non-hazardous characterized waste. Mr. Fortune asked where the soils would go if the gasoline was leaded. Mr. Foss and Mr. Mayer stated that it was possible that the waste could be hazardous due to concentration of benzene or lead. Ms. Zeiler then explained that petroleum sites fall under a different regulatory program.

Overview of Sites

Ms. Nemmers explained the document process under Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Ms. Nemmers explained that the sites managed under the Bhate contract already have a Record of Decision (ROD) in place and that Aaron Williams would be discussing the three sites that do not currently have a ROD later on. Ms. Nemmers explained that an ESD is used when minor changes to the ROD are needed to adjust the remedy selected but that many of the LHAAP RODs have contingency remedies. Ms. Nemmers then explained that once the remedy is implemented, the monitoring or what we call Remedial Action – Operations is completed to evaluate the remedy. Ms. Nemmers explained that most of the sites at LHAAP are in the Remedial Design or later states. Ms. Nemmers explained that many of the RODs for LHAAP have a contingent remedy as part of the foresight for the site.

Ms. Nemmers explained that LHAAP-16 and LHAAP-17 have remedial designs being developed. Ms. Nemmers stated that the injections were completed at LHAAP-58 and that a Remedial Action Completion Report (RACR) was prepared to document implementation of the remedy. The groundwater treatment plant (GWTP) regularly has quarterly reports prepared.

Ms. Nemmers explained that field work started at LHAAP-16 and LHAAP-17 was completed to move forward with the remedies. The wet weather conditions previously have not allowed all of the field work to be completed. However, the areas have dried up and the work will be completed soon. LHAAP-16 requires additional groundwater sampling and installation of injection wells in an area that was not previously accessible. LHAAP-17 requires surface soil samples to be collected in area that is often wet so the samples could not be collected. Ms. Nemmers stated that these additional soil samples will be used to further define the excavation area.

Ms. Nemmers explained that the LHAAP-58 groundwater sampling that was just completed will provide information about how the recent injections did to remediate the solvent plume. Ms. Nemmers then explained that the observed groundwater conditions at LHAAP-58 showed that the monitored wells received treatment. Ms. Nemmers explained that there were two different carbon substrates used at LHAAP-58. One part of LHAAP-58 was treated with sodium lactate (eastern plume) which has shown good results. Emulsified vegetable oil (EVO) was used in the other portion of the site. EVO typically lasts longer but takes a bit longer than sodium lactate to get working. Based upon the groundwater conditions observed, both injection areas look and smell like treatment is occurring. Ms. Nemmers explained that the groundwater was tested prior to the injections for microbes, and the necessary microbes are present naturally. Ms. Nemmers explained that this was good news even though additional microbes were added during the injections. Ms. Nemmers explained that using the two different carbon substrates will help to evaluate which eventually works best. Ms. Zeiler clarified that the eastern plume is continuing to remediate the solvents to which Ms. Nemmers concurred explaining that significant microbial growth has been observed. Ms. Nemmers explained that when microbial growth occurs that solvent concentrations decrease.

Ms. Nemmers then explained that the upcoming field work will lead to documentation that will be prepared in the next few months. This includes the reports for LHAAP-17 and LHAAP-16. Site LHAAP-58 will have quarterly sampling completed in the western plume where the injections were completed to evaluate the remedy. The other activities at LHAAP are ongoing.

Groundwater Treatment Plant

Ms. Nemmers discussed the handouts for the groundwater treatment plant (GWTP). Ms. Nemmers explained that the dry conditions have reduced what is being discharged at the GWTP from earlier in the quarter when the wet conditions allowed for discharge to the Harrison Bayou. Currently, the discharge is to the holding pond. Ms. Nemmers explained that maintenance is being planned for the perchlorate treatment system to improve the effectiveness. Ms. Nemmers explained that the treatment of groundwater is via a batch system using a holding tank to store extracted groundwater from LHAAP-18/24 and to a lesser extent from LHAAP-16 that is then treated by the system. Use of the holding tank allows for continued pumping of the extraction wells even if maintenance is occurring at the GWTP. Ms. Nemmers

explained that the purpose of the treatment system is to control the plume at LHAAP-18/24 and not necessarily remediate the plume. Ms. Nemmers stated that pump and treat takes a much longer time to remediate a site than in situ technologies. Ms. Nemmers explained that extraction also increases with precipitation due to percolation from the ground surface. Ms. Zeiler explained that a ROD is being prepared to further address LHAAP-18/24.

Surface Water Sampling

Ms. Nemmers explained that no surface water was sampled in June 2018 due to dry conditions. Ms. Laura-Ashley Overdike asked if there is any plan to adjust the sampling during a quarter for when there is flow in the creeks. Ms. Palmie explained that no sample is not necessarily bad since the sample is collected to assess whether groundwater is entering the surface water. If the bayou is dry, then groundwater is not discharging into the surface. Ms. Palmie explained that the chart with the discharge information is interesting because it tells whether the GWTP is operating properly, if the bayou is flowing and how much moisture is in the ground so it is hard to really draw conclusions with the information. Ms. Overdike asked what conclusions could be drawn from the chart showing the perchlorate detections in the surface water. Ms. Palmie explained that the spike shown on the figure was not an exceedance because the discharge criteria was higher when the detection occurred.

Site LHAAP-18/24, LHAAP-29 and LHAAP-47

Mr. Aaron Williams explained that HDR is completing work on the sites that don't have a ROD, which are sites LHAAP-18/24, LHAAP-29 and LHAAP-47. For Sites LHAAP-18 and LHAAP-29, Mr. Williams explained that the proposed plan (PP) is being prepared and then there will be a public comment period along with a public meeting. The Feasibility Study (FS) from January 2017 is the basis of the PP for Site LHAAP-18/24.

Mr. Williams explained that Site LHAAP-47 had a PP prepared but the site was impacted by the 2013 dispute which ended in 2016. So the site got held up and now the Army is re-evaluating the site. Mr. Williams explained that the last sampling completed at LHAAP-47 was in 2010 and now it is 2018. Ms. Zeiler stated that there were ten (10) dry wells present in 2010. Mr. Williams explained that the first step was to evaluate the wells and determine if they are still dry. If those wells were still dry, then the wells will be replaced. Mr. Williams explained that the Army also wanted to complete direct push technology (DPT) sampling where no data was present to fully define the plume. Mr. Williams explained the planned remedy was shown as in situ injections at MW-25 where trichloroethylene (TCE) was detected at 13,000 and downgradient where elevated TCE was also present. The dashed line on the figure of the intermediate plume is where further plume definition is needed. Ms. Overdike clarified whether the slides were showing current data. Mr. Williams stated that the first two slides showed historical data. Ms. Zeiler explained that the contractor is currently in the field.

The dry wells are in a very shallow, thin sand lens. Mr. Williams explained that there is a steady decline in shallow groundwater elevations in the area, including LHAAP-46 to the north that Mr.

Foss discussed. Mr. Williams stated that the wells that were dry in 2010 are still dry today. Mr. Williams explained that when the contractor was using the DPT to collect samples that more than one sample was supposed to be collected but the first interval was dry so only one water sample was collected.

Ms. Overdike asked about the possible reason. Mr. Foss discussed the assessment that has been done on LHAAP-46 to the north of LHAAP-47. Mr. Foss explained that the reason for this decline may be due to decreases in past mounding from leaky water pipes from the production areas and/or drought but that the increase in precipitation does not seem to be eliminating the dry wells.

Mr. Williams explained that the purple marks are the wells being installed and sampled. Mr. Williams explained that there was a surprise detection in the intermediate aquifer, so more wells are being added and the remedy design may be adjusted.

Ms. Zeiler asked if the stream sampling had taken place. Mr. Williams explained that there were to be four stream samples collected. Ms. Overdike asked if the stream testing locations and results could be shared at the next meeting.

Mr. Fortune asked about whether part of the three-year dispute was regarding setting a precedence for all other cleanups under Superfund. Ms. Palmie explained that it is unusual for a state to have its own cleanup standards and that it is even more unusual that these standards were superseded by other standards. Ms. Palmie stated that while there are take aways that could maybe translate to other sites, the overall issue was unique to LHAAP. Ms. Zeiler explained that for certain contaminants and pathways, the USEPA didn't have standards so TCEQ standards were evaluated. Ms. Palmie explained that usually the EPA values are used and that TCEQ values usually don't supersede EPA values and that TCEQ values fill in the gaps.

Next RAB Meeting Schedule and Closing Remarks

Ms. Zeiler then discussed the next meeting. The next RAB meeting will be held on **October 18, 2018,** with a **meeting starting at 6:00 pm CDT** at the Karnack Community Center.

Adjourn

Mr. Fortune motioned to adjourn. Ms. VanDeventer seconded the motion. Meeting adjourned 6:23 pm CDT.

July 2018 Meeting Attachments and Handouts:

- Meeting Agenda
- Color Copy of Bhate Presentation Slides
- Groundwater Treatment Plant (GWTP) – Processed Groundwater Volumes Handout

LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD
Karnack, Texas
(479) 635-0110

AGENDA

DATE:	Thursday, July 19, 2018
TIME:	6:00 – 7:00 PM
PLACE:	Karnack Community Center, Karnack, Texas

06:00 **Welcome and Introduction**

06:05 **Open Items {RMZ}**
- Purpose of the RAB Meeting
- RAB Administrative Issues
- Minutes (April 2018 RAB Meeting)
- Ongoing Outreach/Website

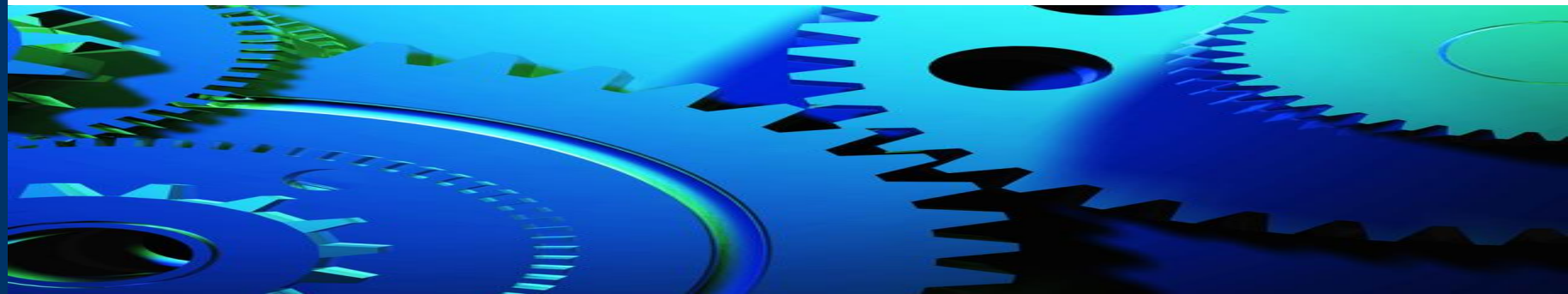
06:15 **Defense Environmental Restoration Program (DERP) Update {Bhate}**
- LHAAP Geology and Hydrology Discussion
- LHAAP-03 ROD and LHAAP-35A(58) ESD Status Update
- Documents and Field Work Completed in 2nd Quarter 2018
- Three Month Lookahead
- Groundwater Treatment Plant (GWTP) Update

06:45 **Other Defense Environmental Restoration Program (DERP) Update {RMZ}**

06:50 **Next RAB Meeting Schedule and Closing Remarks {RMZ}**

Longhorn Army Ammunition Plant Quarterly Restoration Advisory Board Meeting

Karnack Community Center
July 19, 2018
6:00 PM CDT



Restoration Advisory Board (RAB) Meeting

Agenda

06:00 Welcome and Introduction

06:05 Open Items {RMZ}
- Purpose of the RAB Meeting
- RAB Administrative Issues
- Minutes (April 2018 RAB Meeting)
- Ongoing Outreach/Website

06:15 Defense Environmental Restoration Program (DERP) Update {Bhate}
- LHAAP Geology and Hydrology Discussion
- LHAAP-03 ROD and LHAAP-35A(58) ESD Status Update
- Documents and Field Work Completed in 2nd Quarter 2018
- Three Month Lookahead
- Groundwater Treatment Plant (GWTP) Update

06:45 Other Defense Environmental Restoration Program (DERP) Update {RMZ}

06:50 Next RAB Meeting Schedule and Closing Remarks {RMZ}

Abbreviations and Acronyms

µg/L	micrograms per liter
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DERP	Defense Environmental Restoration Program
DNAPL	Dense non-aqueous phase liquid
ESD	Explanation of Significant Difference
ft bgs	feet below ground surface
GWTP	groundwater treatment plant
LHAAP	Longhorn Army Ammunition Plant
LNAPL	Light non-aqueous phase liquid
MNA	monitored natural attenuation
MW	monitoring well
PDI	Pre-Design Investigation
RAB	Restoration Advisory Board
RA-O	Remedial Action - Operation
RACR	Remedial Action Completion Report
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
VOCs	Volatile organic compounds

Purpose of the RAB Meeting

- Held every three months
- The mission of the Longhorn Army Ammunition Plant (LHAAP) Restoration Advisory Board (RAB) is to promote community awareness and obtain constructive community review and comments on environmental restoration activities at the former LHAAP

The Army Wants You to be Informed

- The Army is committed to protecting human health and the environment; key to that commitment is engaging the community and increasing public participation in environmental restoration at LHAAP

- You are encouraged to:
  - Attend RAB Meetings and/or become a member of the RAB
  - Visit the Longhorn environmental website at www.longhornaap.com
    - Website is regularly updated to indicate the upcoming field events at each site including groundwater sampling, monitoring well installations, soil sampling, or remediation activities
  - Make suggestions for improving communication – the Army welcomes and appreciates community feedback

RAB Administrative Issues

RAB Membership

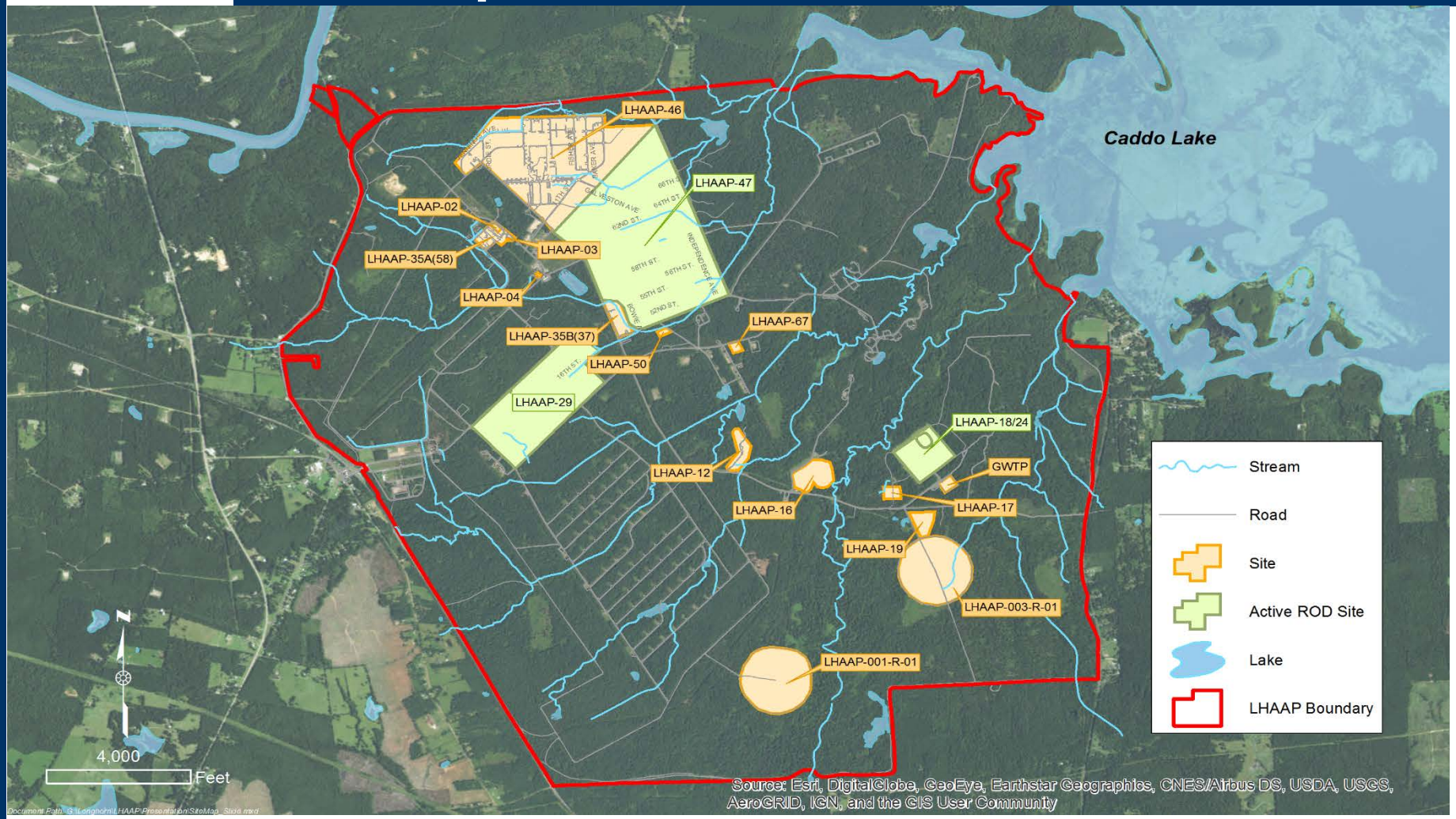
Discussion of April 2018 RAB Meeting minutes/motion to accept

Outreach

- **Website Address: http://www.longhornaap.com/**

Restoration Advisory Board Meeting

Site Map



Restoration Advisory Board Meeting

Hydrogeology 101: Definitions

Permeability: Permeability is a material's ability to allow fluids to pass through it. Permeable materials, such as gravel and sand, allow water to move quickly through them, whereas impermeable material, such as clay, doesn't allow water to flow freely

Aquifer: a water bearing consolidated or unconsolidated geologic unit (such as fractured rock, gravel, or sand) or set of connected units that yields a useable quantity of water

Aquitard: a geologic material, stratum, or formation of low permeability such as clay (also called a confining unit) that impedes movement of water vertically or horizontally

Potentiometric Surface: a map of water-table elevations in an aquifer unit used to identify potential groundwater flow directions and pathways

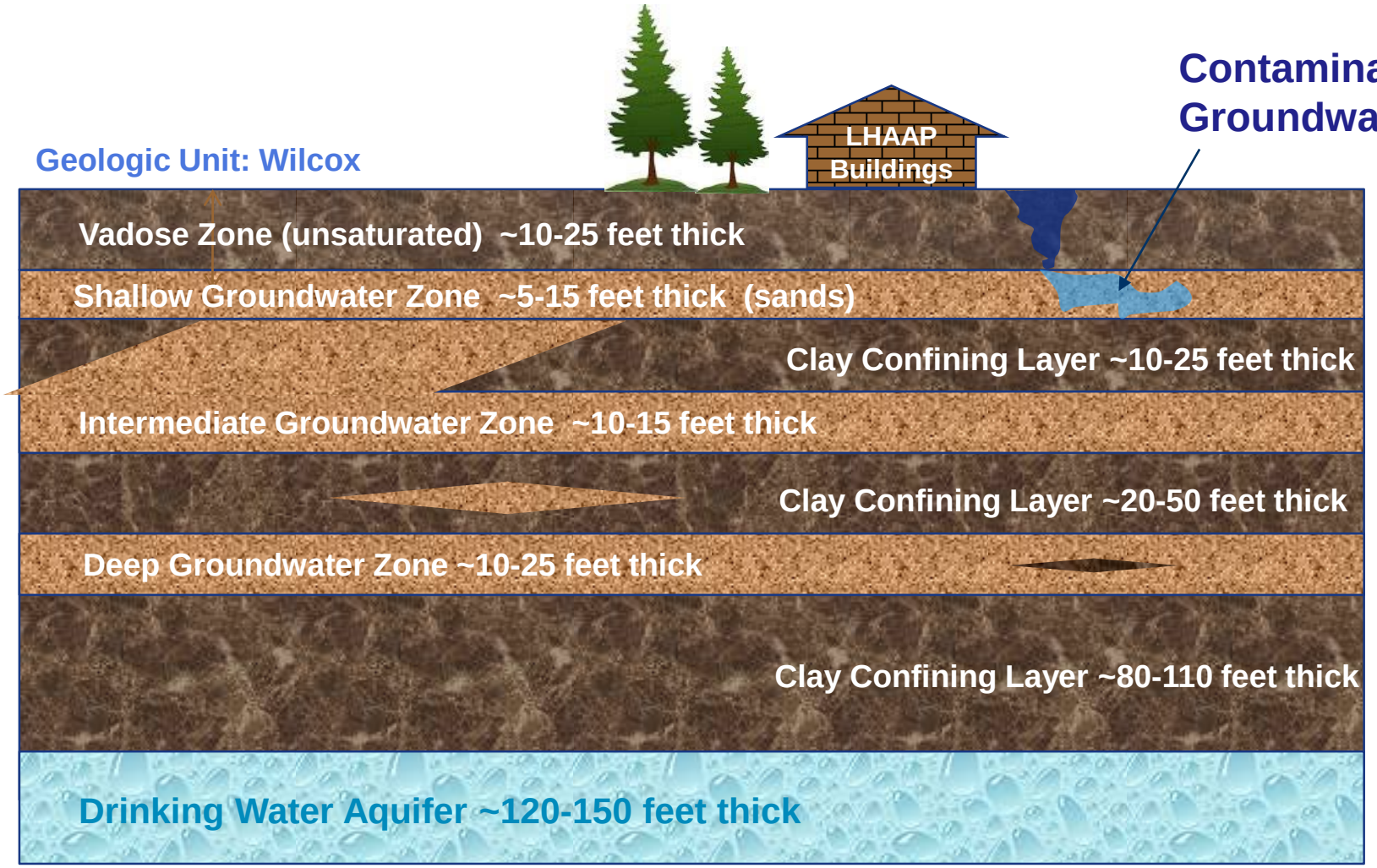
Plume: a three-dimensional body of fluid emanating from source or sources with a chemistry or physical composition differing from the background groundwater

DNAPL: Dense non-aqueous phase liquid. Forms from high concentrations of a contaminant denser than water that will sink when released into a groundwater aquifer

Hydrogeology: The study of the distribution and movement of fluids through geologic formations

Restoration Advisory Board Meeting

Hydrogeology 101: Groundwater Zones at LHAAP



Restoration Advisory Board Meeting

Hydrogeology 101: Contaminant Plume Migration

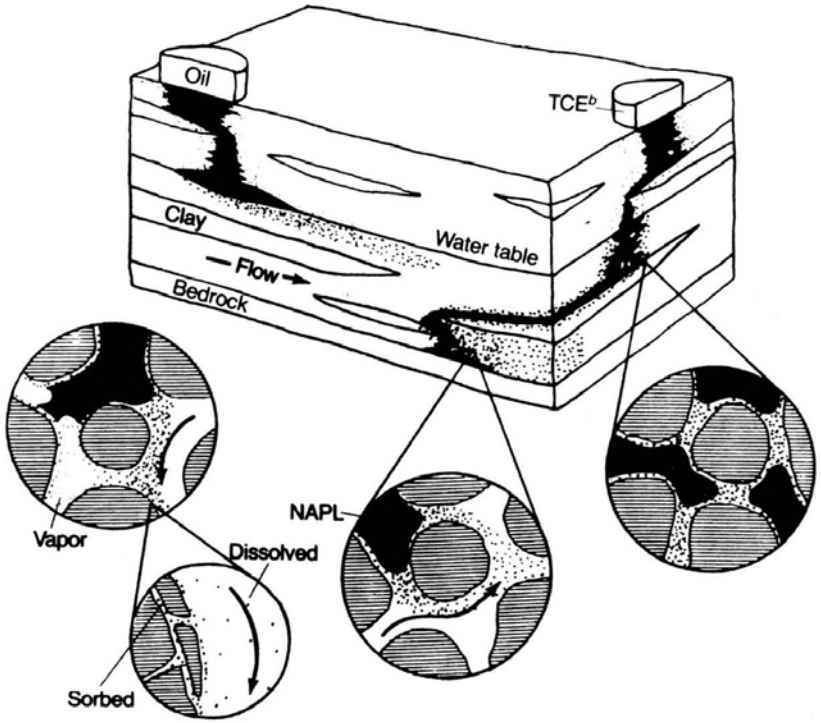


Figure 2.1 Schematic illustration of a DNAPL and a LNAPL in a porous medium, showing geologic and pore scales. A low-permeability clay layer deflects the DNAPL. DNAPL dissolution causes a plume (from Mackay and Cherry, 1989).

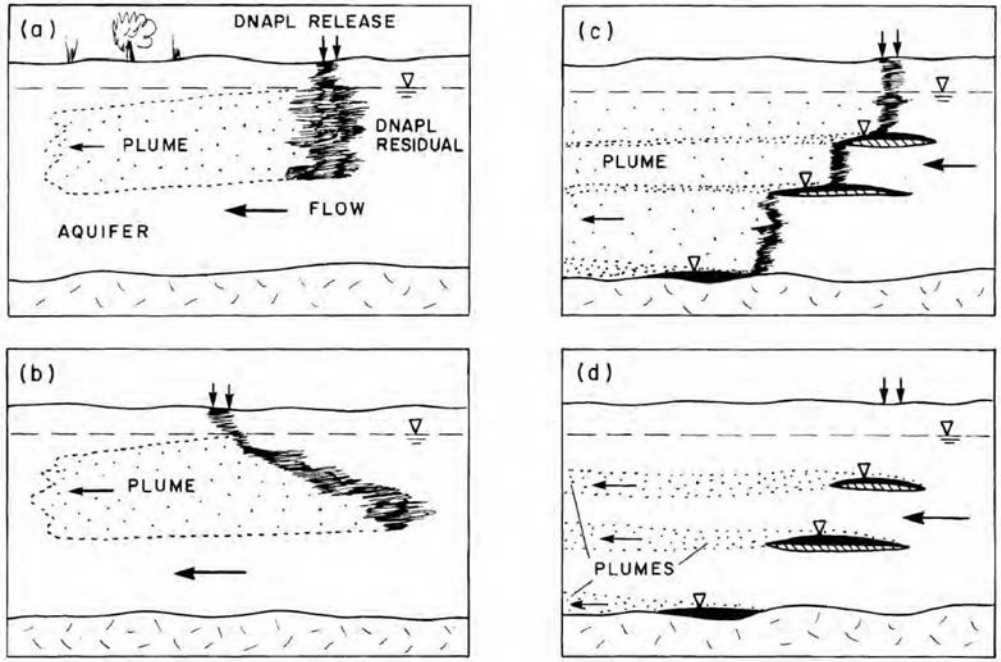


Figure 2.5 Conceptual scenarios for a DNAPL in the groundwater zone in granular aquifers: a) partial penetration; b) partial penetration with offset; c) full penetration with offset; and d) same as part c, but at a later stage after DNAPL residual has disappeared due to dissolution in flowing groundwater. (Pankow and Cherry, 1996)

Restoration Advisory Board Meeting

LHAAP-03 Final Record of Decision

Site Background

- LHAAP-03 was a waste collection site (approx. 16-feet x 15-feet) outside of the paint shop located within the boundary of LHAAP-35A(58) VOC plume
- Heavy metal-based primers, other waste paint, waste solvents and contaminated rags were collected in a 55-gallon drum on a gravel pad in an open-sided shed
- Soil is contaminated with various heavy metals, but only arsenic and lead are present at concentrations of concern for leaching to groundwater
- Groundwater is generally encountered 12 to 16 feet (ft) below ground surface (bgs) and is indistinguishable from that of LHAAP-35A(58)
- The groundwater contaminated with volatile organic compounds (VOCs) under LHAAP-03 is not site related and is being addressed as part of the remedy for site LHAAP-35A(58)

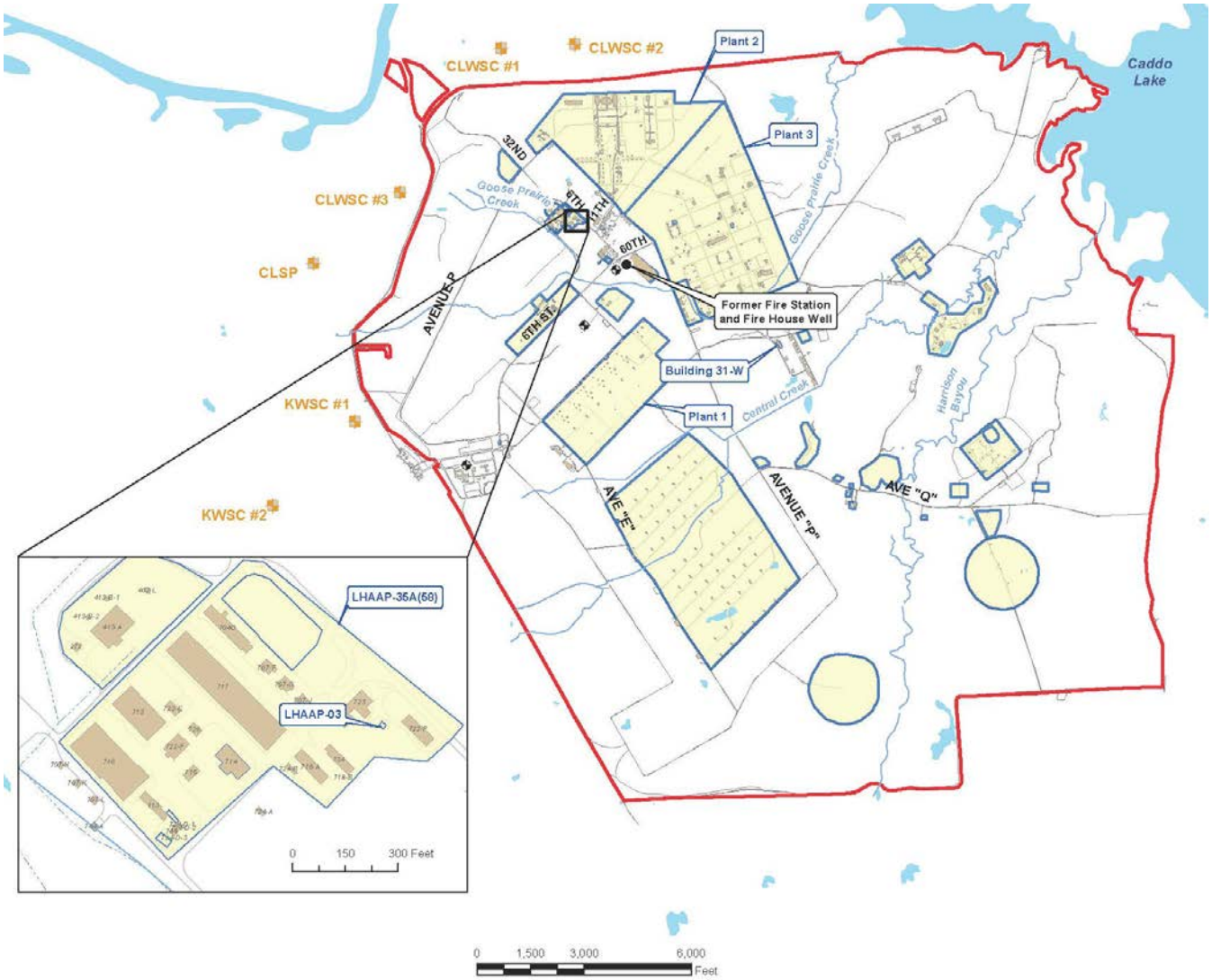
Investigation Summary

- Human Health Risk Assessment completed in 2003
- Baseline Ecological Risk Assessment completed in 2007 (updated 2014)
- Remedial Investigation/Focused Feasibility Study completed in 2013
- Proposed Plan published for Public Comment in 2013
- Record of Decision (ROD) awaiting regulatory signature/concurrence in July 2018
- ESD is being routed for signatures/concurrence in July 2018

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LHAAP-03 Location



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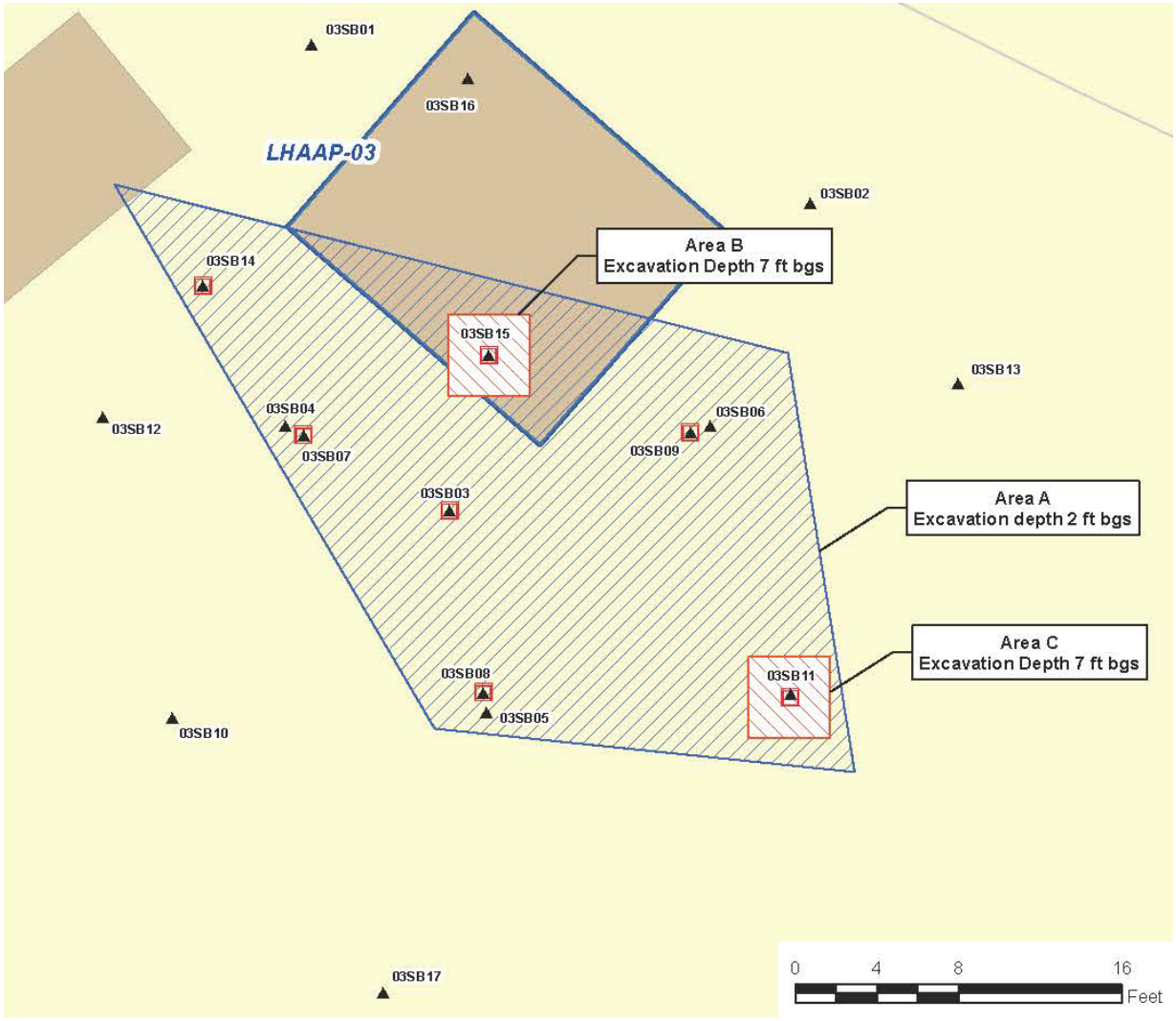
Restoration Advisory Board Meeting

LHAAP-03 Selected Remedy

- **Selected Remedy**
  - Soil contaminated with lead and arsenic above groundwater protective cleanup values will be excavated and disposed of offsite at an appropriately licensed disposal facility
  - Excavation area will be backfilled with compacted clean fill and re-seeded
- **Remedial Path Forward**
  - Pre-excavation sampling to refine the extent of excavation
  - Prepare a Remedial Design/Remedial Action Work Plan
  - Implement Remedial Action
  - Prepare Remedial Action Completion Report (RACR)

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LHAAP-03 Target Remediation Area



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Documents in Process

Site	Document
LHAAP-03	Record of Decision (ROD)
LHAAP-03/58	Explanation of Significant Difference (ESD) to address groundwater under LHAAP-03
LHAAP-12	Annual Remedial Action – Operation (RA-O) Report
LHAAP-16	Remedial Action Work Plan (RAWP)
LHAAP-17	Pre-Design Investigation (PDI) Report
LHAAP-50	Year 3 RA-O Report
LHAAP-58	RACR
GWTP, LHAAP-18/24 and Surface Water	Quarterly Evaluation Report First Quarter (January –March (2018

Restoration Advisory Board Meeting

Completed Field Work

Site	Activity
LHAAP-02	Groundwater Sampling – April 2018
LHAAP-16	Began installation of monitoring and injection wells – April/May 2018; Installation suspended because of wet conditions
LHAAP-17	Pre-Design Investigation (PDI) – Installed new shallow well (April 2018) and sampled. Because of wet soil, soil sampling has not been completed. Waiting for field conditions to change.
LHAAP-19	Repairs to landfill cover
LHAAP-37	Remedial Action – Operation (RA-O) Sampling – May 2018
LHAAP-50	RA-O Sampling – May 2018
LHAAP-58	RA-O Sampling – July 2018
LHAAP-67	RA-O Sampling – July 2018
Surface Water	Surface Water Sampling – June 2018

Restoration Advisory Board Meeting

3 Month Look Ahead - Documents

Site	Document
LHAAP-02	Technical Memo-Semi-Annual Compliance Sampling
LHAAP-03	FINAL ROD; Remedial Design (RD)/Remedial Action Work Plan (RAWP)
LHAAP-03/58	FINAL ESD
LHAAP-12	Annual RA-O Report for 2017 (Year 3)
LHAAP-17	PDI Report
LHAAP-50	Year 3 RA-O Report
LHAAP-58	RACR and Year 4 RA-O Report
GWTP, LHAAP-18/24, LHAAP-16, Surface Water	Quarterly Evaluation Reports: First Quarter (January – March) 2018 and Second Quarter (April – June) 2018

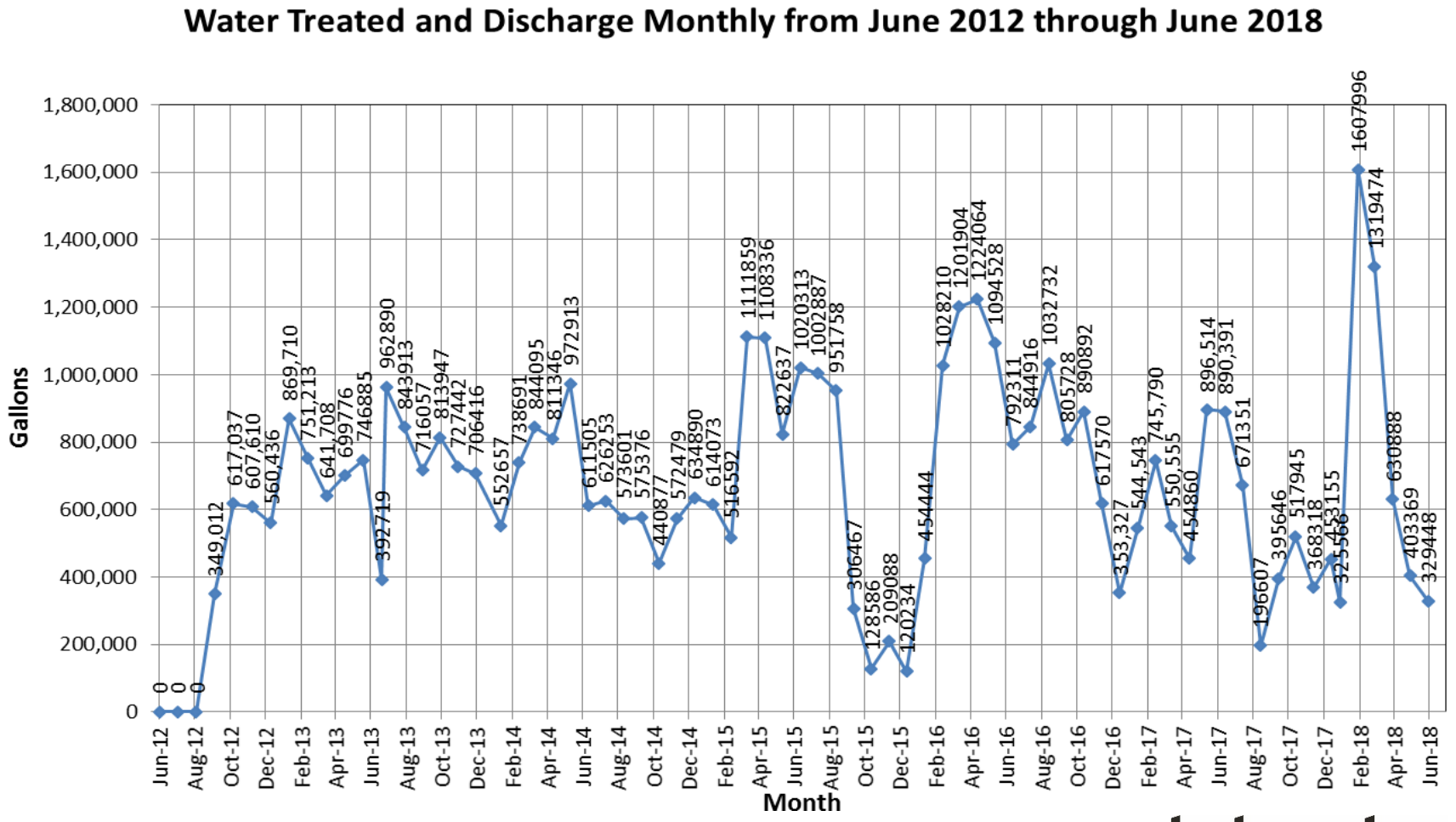
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3 Month Look Ahead - Field Work

Site	Activity
LHAAP-16	Once field conditions become dry, completion of monitoring well and injection well installation, pre-remedy groundwater sampling, in-situ bioremediation injections
LHAAP-17	PDI – If site conditions dry up - complete soil sampling
LHAAP-37	RA-O Sampling – August 2018
LHAAP-46	RA-O Sampling – August 2018
LHAAP-58	RA-O of Western Plume Only – September 2018
Surface Water	Collect Surface Water samples

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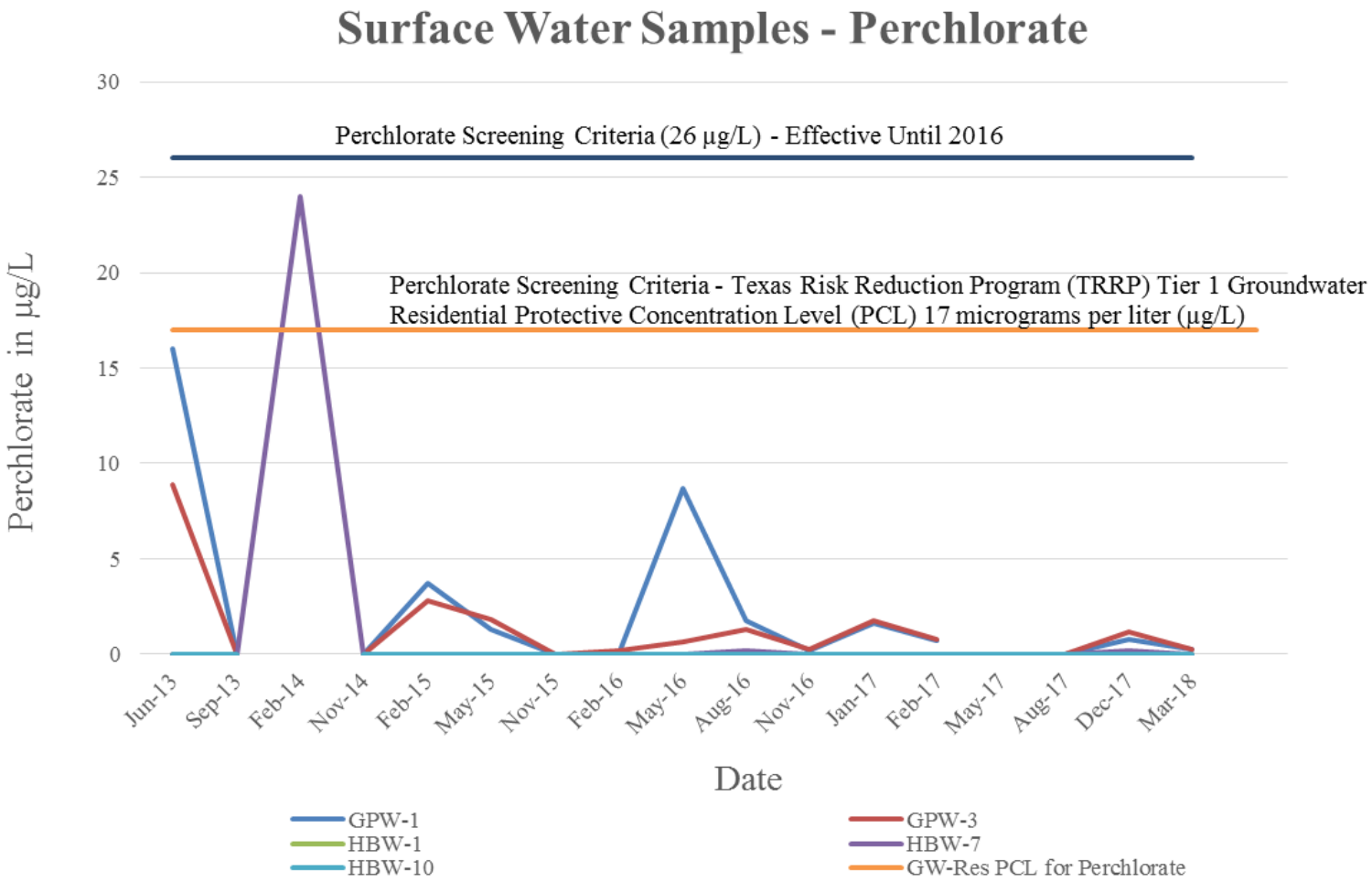
GWTP Update



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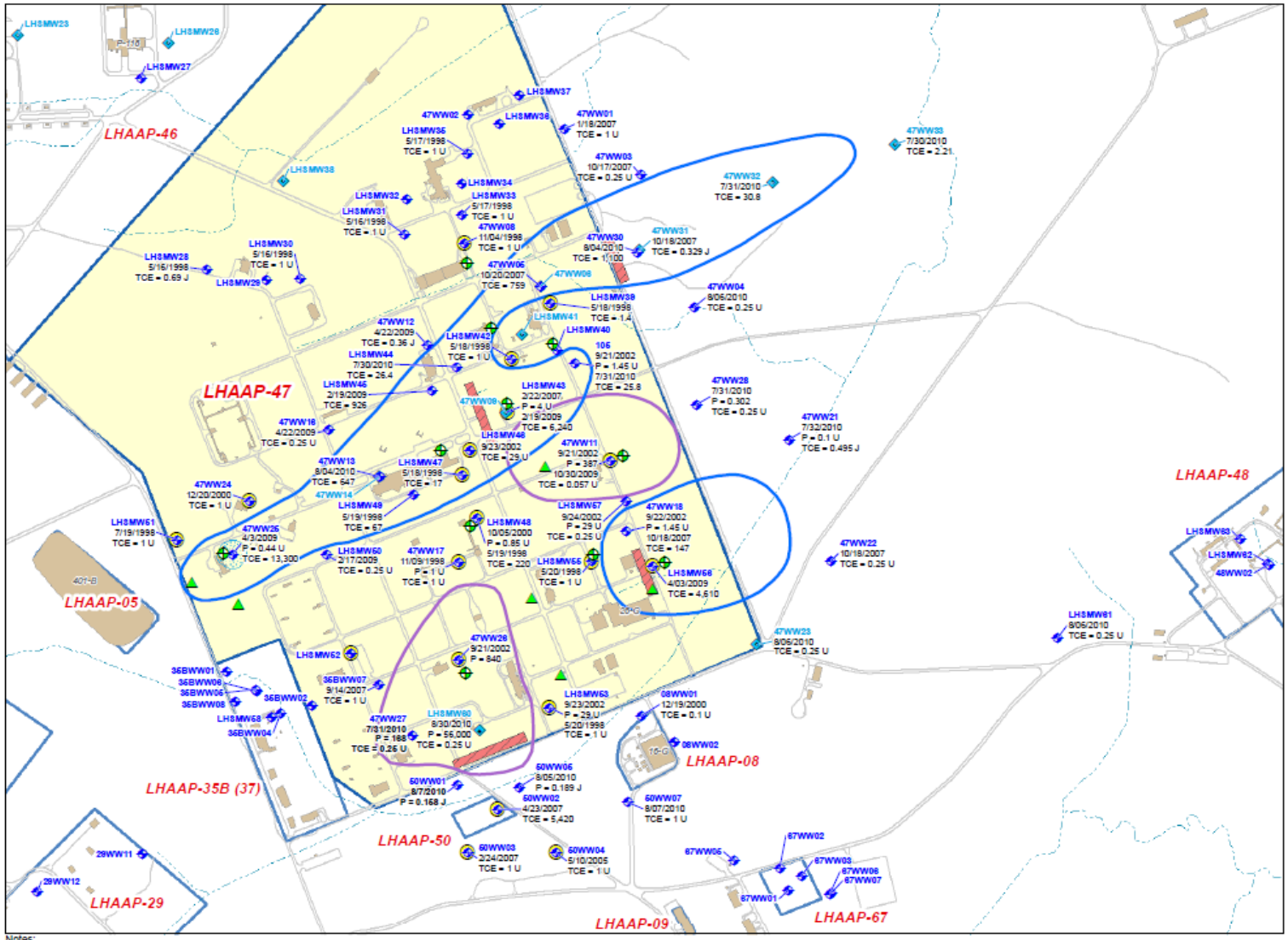
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Surface Water Sample Results



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Legend

- Shallow Monitoring Well
- Shallow/Intermediate Monitoring Well
- Well Dry in 2010
- Proposed Shallow Monitoring Well
- Proposed Soil Boring Location
- Perchlorate Exceeding Shallow Zone T
- Trichloroethene Exceeding Shallow Zor
- Stream
- Road
- Hot Spot DPT Grid ISEB
- ISEB Biobarrier Shallow
- Former Buildings or Concrete Slab
- LHAAP-47 Site Boundary
- Other LHAAP Sites

Source: July 2011 Final Feasibility Study Report Plant 3 Area, Group 4, Longhorn Army Ammunit Karnack, Harrison County, Texas (Shaw, 2011)

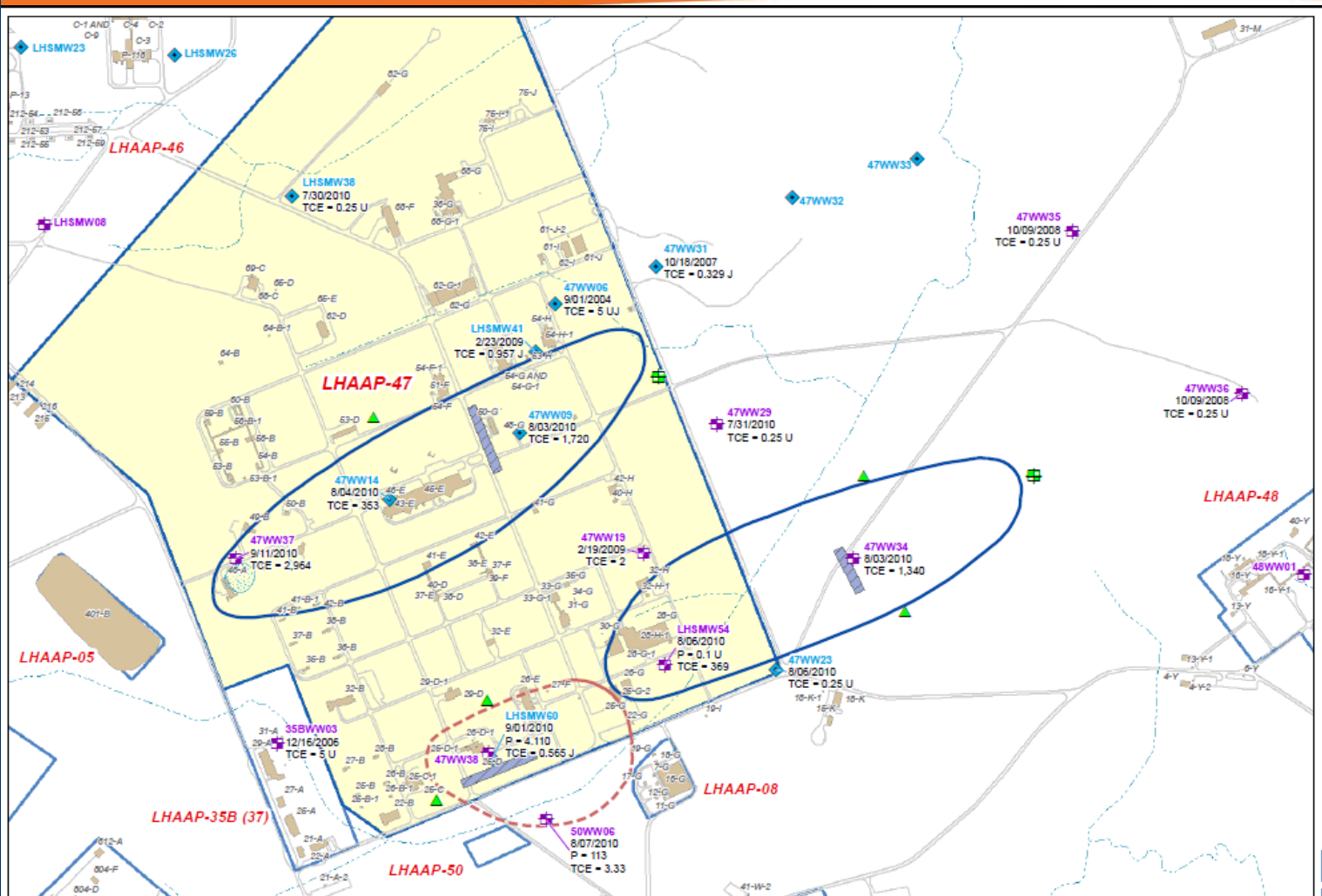
Notes:
1. MCL - maximum contaminant level
2. Results reported in micrograms per liter (µg/L).
3. Most recent results are shown (1998 - 2010).
4. Plumes shown are in the interconnected shallow/intermediate zones and use the combined well data of both zones.
5. Biobarriers tied to 500 µg/L trichloroethene.
6. TRRP PCL is the Texas Risk Reduction Program Protective Concentration Level for residential groundwater through ingestion ($^{GW}GW_{ing}$).
7. P = Perchlorate.
8. TCE = Trichloroethene.
9. U = Concentration below detection.
10. J = Concentration estimated.

AECOM

Figure 3
Proposed Soil Boring and Monitor Well
in Shallow Groundwater Zone
Post Screening Investigation Work
LHAAP-47
Longhorn Army Ammunition Plant
Karnack, Texas

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Restoration Advisory Board Meeting



Source: July 2011 Final Feasibility Study Report
Plant 3 Area, Group 4, Longhorn Army Ammuniti
Karnack, Harrison County, Texas (Shaw, 2011)

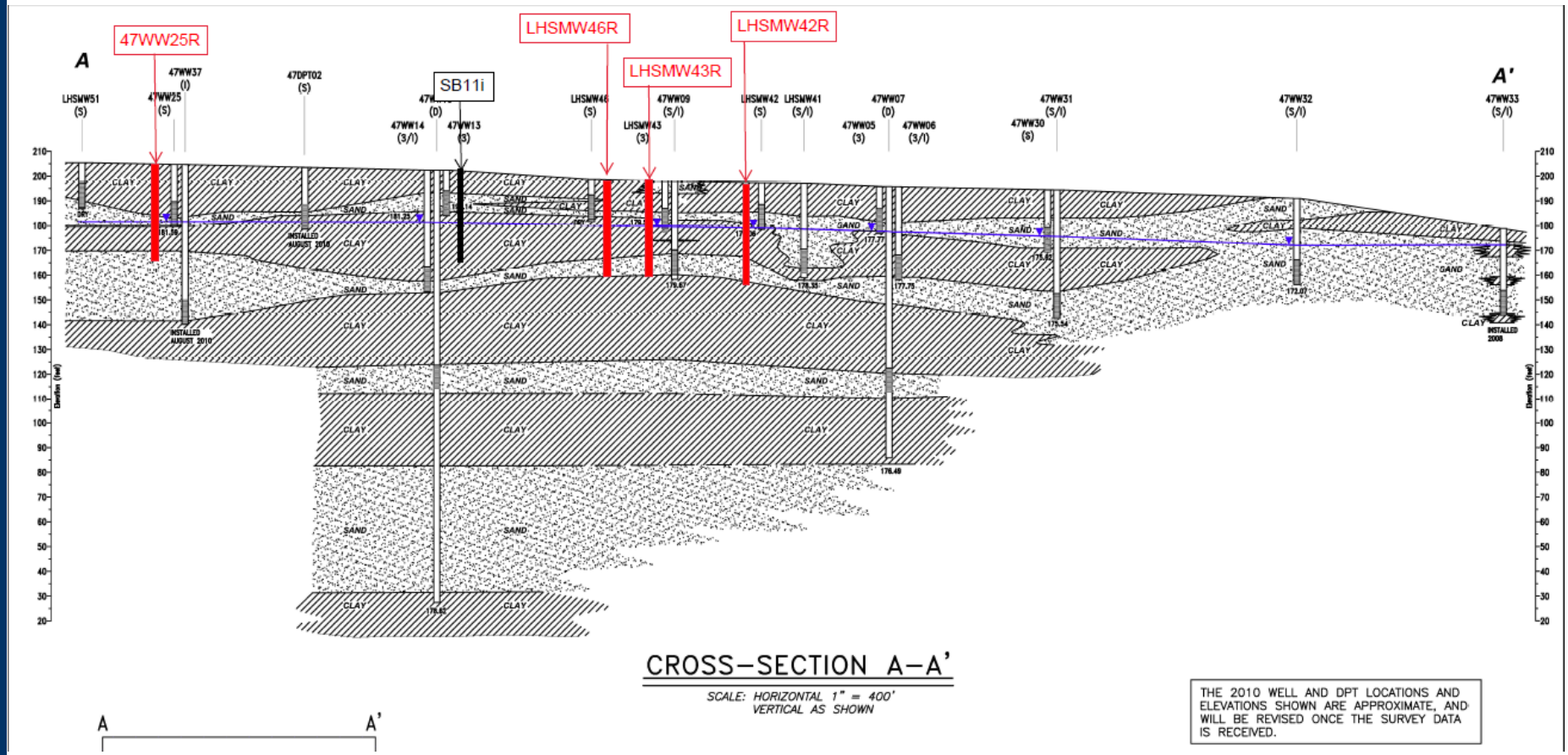
Notes:
1. MCL - maximum contaminant level
2. Results reported in micrograms per liter (µg/L).
3. Most recent results are shown (1998 - 2010).
4. Plumes shown are in the interconnected shallow/intermediate zones and use the combined well data of both zones.
5. Biobarriers tied to 500 µg/L trichloroethene.
6. TRRP PCL is the Texas Risk Reduction Program Protective Concentration Level for residential groundwater through ingestion ($^{GW}GW_{ing}$).
7. P = Perchlorate.
8. TCE = Trichloroethene.
9. U = Concentration below detection.
10. J = Concentration estimated.

AECOM

Figure 4
Proposed Soil Boring and Monitor Well L
in Intermediate Groundwater Zor
Post Screening Investigation Work
LHAAP-47
Longhorn Army Ammunition Plant
Karnack, Texas

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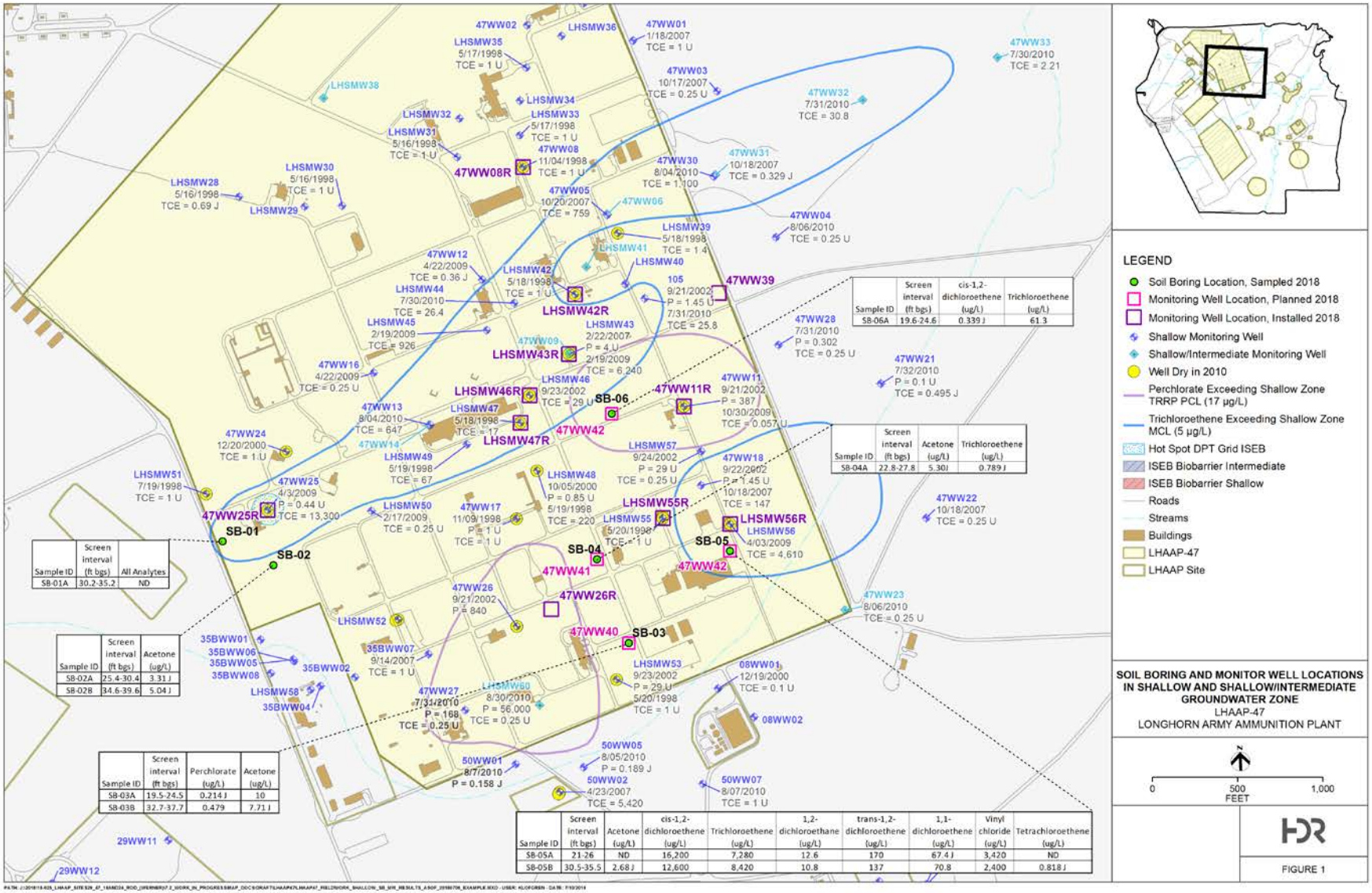
CROSS–SECTION A–A'

SCALE: HORIZONTAL 1" = 400'
VERTICAL AS SHOWN

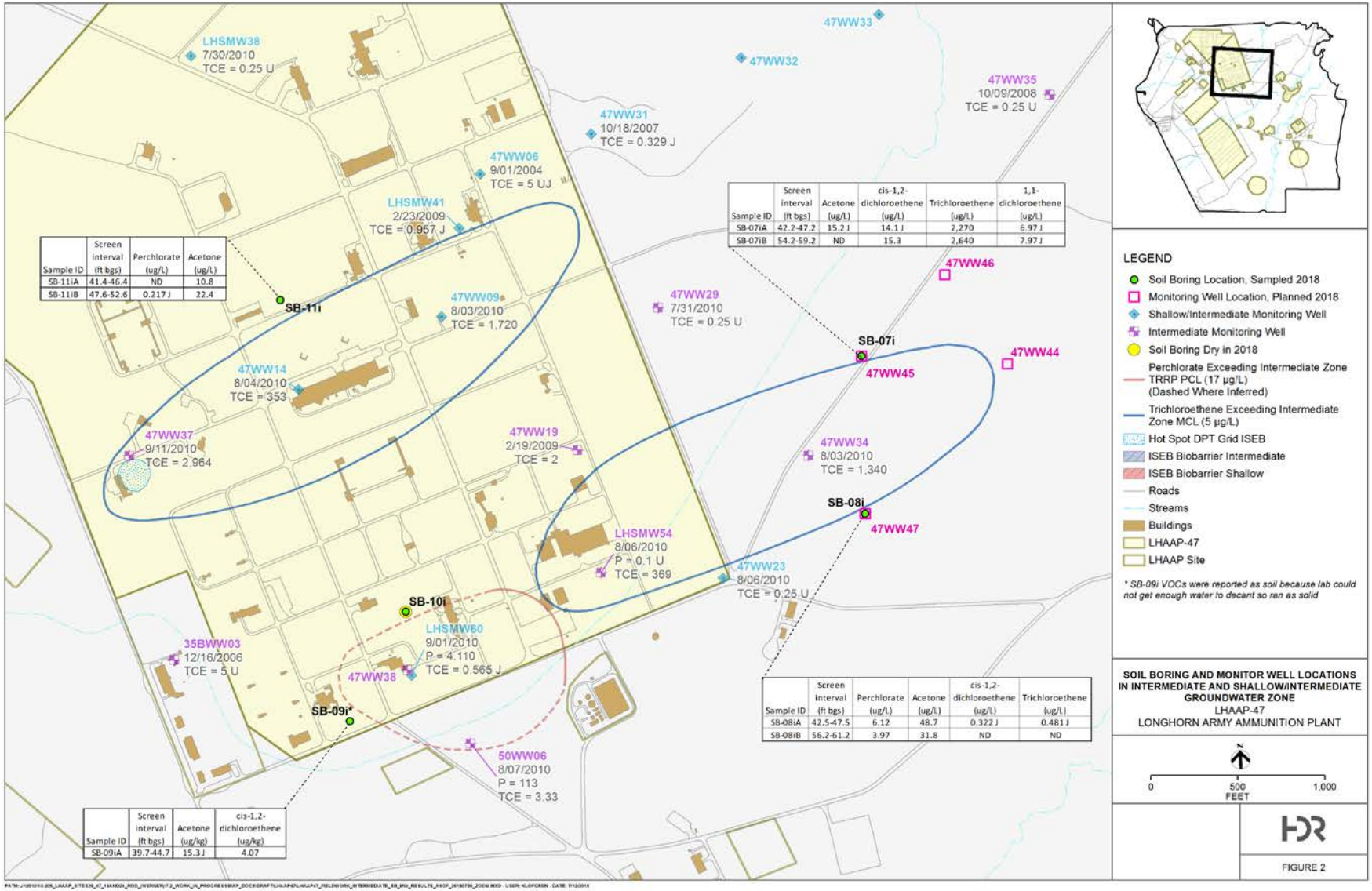
A A'

THE 2010 WELL AND DPT LOCATIONS AND ELEVATIONS SHOWN ARE APPROXIMATE, AND WILL BE REVISED ONCE THE SURVEY DATA IS RECEIVED.

Restoration Advisory Board Meeting



Restoration Advisory Board Meeting



Next RAB Meeting Schedule & Closing Remarks

- Schedule October 2018 RAB Meeting
- Other Issues/Remarks
- Thank you for coming

Groundwater Treatment Plant - Processed Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of processed water.

Processed Water Data

(in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199

Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716

Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547

Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456

Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012

Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719	962,890	843,913	716,057

Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
813,974	727,442	706,416	552,657	738,691	844,095	811,346	972,913	611,505	626,253	573,601	575,376

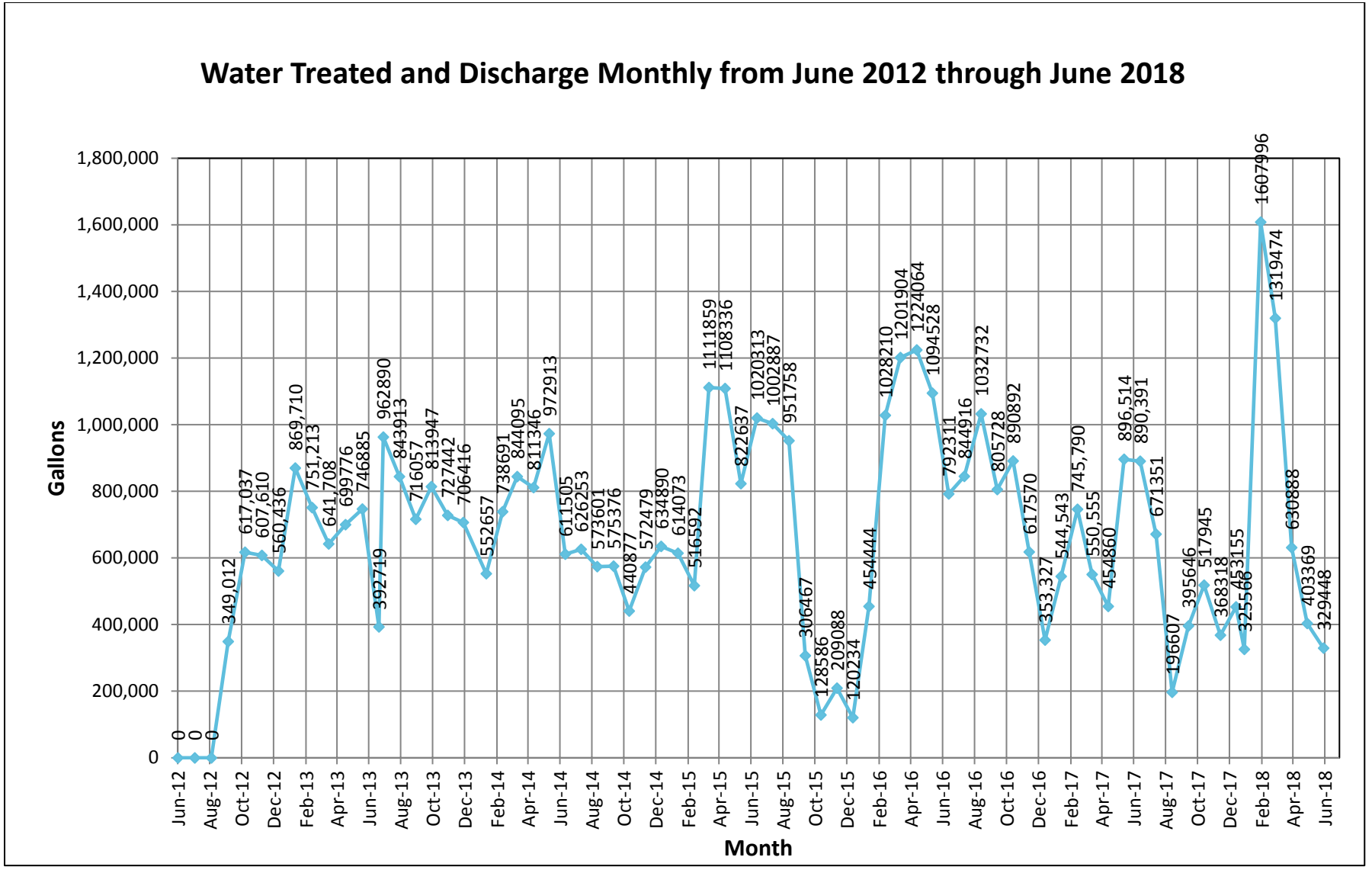
Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
440,877	572,479	634,890	614,073	516,592	1,111,859	1,108,336	822,637	1,020,313	1,002,887	951,758	306,467

Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728

Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
890,892	617,570	353,327	544,543	745,790	550,555	454,860	896,514	890,391	528,538	195,198	961,324

Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18
517,945	368,318	453,155	325,566	1,607,996	1,319,474	630,888	403,369	329,448

*Indicates Estimate


Water Treated and Discharge Monthly from June 2012 through June 2018
Gallons
Month
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Jun-12
Aug-12
Oct-12
Dec-12
Feb-13
Apr-13
Jun-13
Aug-13
Oct-13
Dec-13
Feb-14
Apr-14
Jun-14
Aug-14
Oct-14
Dec-14
Feb-15
Apr-15
Jun-15
Aug-15
Oct-15
Dec-15
Feb-16
Apr-16
Jun-16
Aug-16
Oct-16
Dec-16
Feb-17
Apr-17
Jun-17
Aug-17
Oct-17
Dec-17
Feb-18
Apr-18
Jun-18
0
0
0
349,012
617,037
607,610
560,436
869,710
751,213
641,708
699,776
746885
392719
962890
843913
716057
813947
727442
706416
552657
738691
844095
811346
972913
611505
626253
573601
575376
440877
572479
634890
614073
516592
1111859
1108336
822637
1020813
1002887
951758
306467
128586
209088
120234
454444
1028210
1201904
1224064
1094528
792311
844916
1032732
805728
890892
617570
353,327
544,543
745,790
550,555
454860
896,514
890,391
671351
196607
395646
517945
368318
453155
325568
1607996
1319474
630888
403369
329448

Water Discharge Location and Volume (Gallons)

Month	Harrison Bayou	LHAAP-18/24 Sprinklers	INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
Dec-16	0	236,688	0	0	0
Jan-17	0	0	0	0	0
Feb-17	0	0	0	0	14,355
Mar-17	127,242	0	0	0	14,400
Apr-17	113,038	0	236,821	0	0
May-17	205,665	0	534,155	0	0
Jun-17	467,830	0	294,550	490,574	0
Jul-17	0	0	528,538	0	0
Aug-17	0	0	195,197	0	0
Sep-17	0	0	309,980	651,434	0
Oct-17	0	0	517,945	0	0
Nov-17	0	0	368,318	0	0
Dec-17	0	0	453,155	560,350	0
Jan-18	325,566	0	253,177	325,566	0
Feb-18	1,607,996	0	62,017	1,430,634	0
Mar-18	1,319,474	0	0	870,816	0
Apr-18	630,888	0	0	630,888	0
May-18	403,369	0	0	403,369	0
June-18	193,669	0	135,779	0	0

Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Surface water samples are collected quarterly from each location in Harrison Bayou and Goose Prairie Creek, unless the sampling location is dry.

Surface Water Sample Data (in micrograms per liter)

Quarter	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
Creek Sample ID	**Jul 1999**	**Sep 1999**	**Feb 2000**	**Apr 2000**	**Aug 2000**	**Dec 2000**	**Feb 2001**	**Apr 2001**	**July 2001**	**Oct 2001**	**Jan 2002**
GPW-1	<1.0U	-	4	<4.0 U	<4.0 U	<4.0 U	-	2.65	<4.0 U	<4.0 U	<4.0 U
GPW-3	<1.0U	<4.0 U	17	8	<4.0 U	<4.0 U	-	2.28	<4.0 U	<4.0 U	<4.0 U
HBW-1	-	<80.0 U	310	23	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-7	-	<8.0 U	370	110	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-10	-	<8.0 U	905	650	<4.0 U	-	<4.0 U	-	<4.0 U	-	-

Quarter	2nd	3rd	4th	1st	2nd	3rd	3rd	4th	2nd	3rd	4th
Creek Sample ID	**June 2002**	**Sept 2002**	**Dec 2002**	**Feb 2003**	**June 2003**	**Aug 2003**	**July 2004**	**Dec 2006**	**May 2007**	**Aug 2007**	**Dec 2007**
GPW-1	<4.0 U	<4.0 U	18.3	18.6	59.9	-	2.25	-	<1.0 U	<1.0 U	10.7
GPW-3	<4.0 U	<4.0 U	5.49	12.6	14.7	-	2.2	-	<1.0 U	<1.0 U	7.48
HBW-1	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	99.3	<0.2U	<1.0 U	<1.0 U	122	<1.0 U
HBW-7	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	<4.0 U	<0.2U	<1.0 U	<1.0 U	1.02	<1.0 U
HBW-10	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	-	<0.2U	<1.0 U	<1.0 U	<1.0 U	<1.0 U

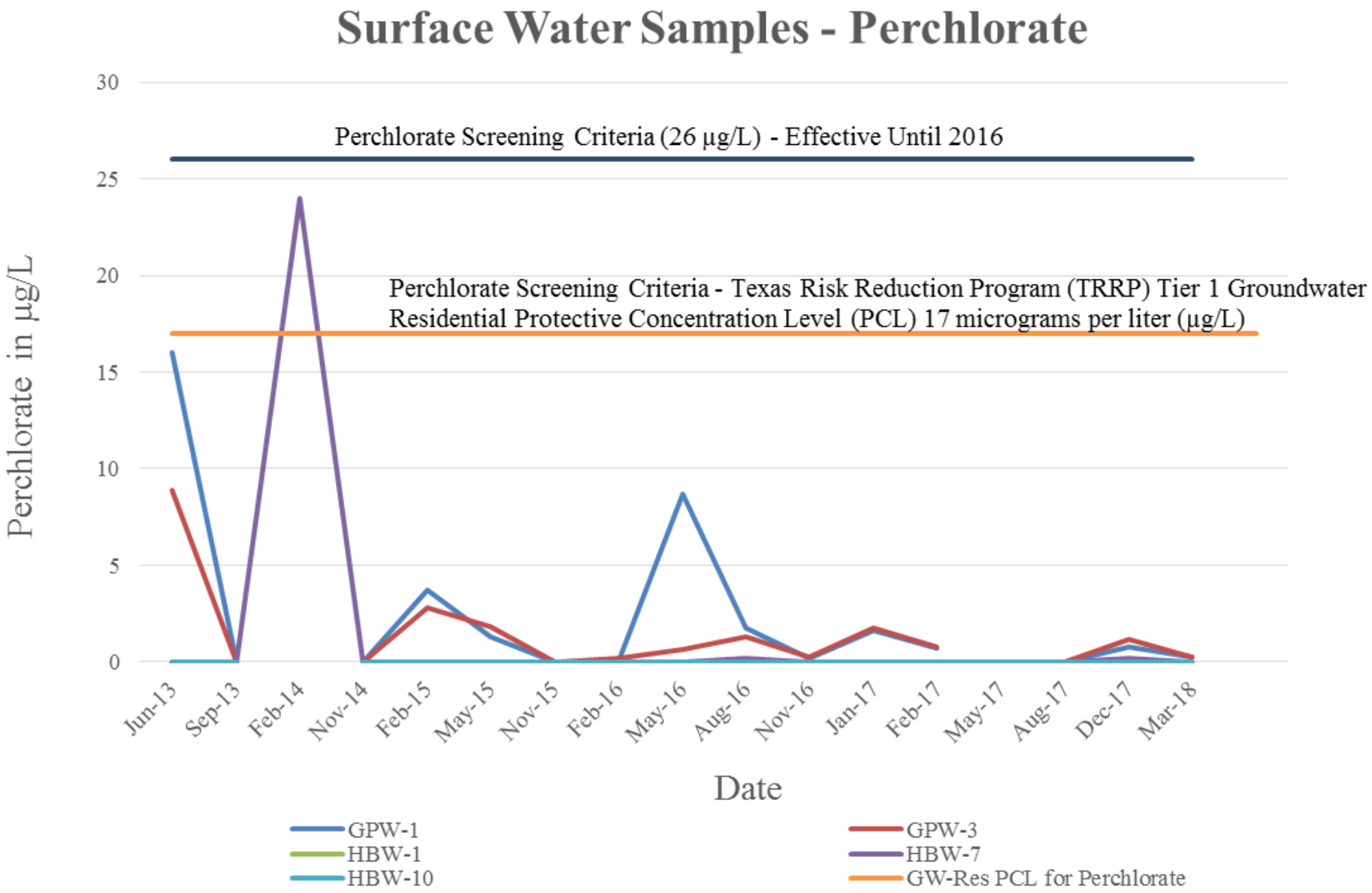
Quarter	1st	2nd	3rd	4th	2nd	3rd	3rd	3rd	4th	1st	2nd
Creek Sample ID	**Mar 2008**	**Jun 2008**	**Sep 2008**	**Dec 2008**	**May 2009**	**Jul 2009**	**Aug 2009**	**Sep 2009**	**Dec 2009**	**Mar 2010**	**Jun 2010**
GPW-1	27	<0.5U	<0.5U	<0.22U	16	<4U	NS	<1.2U	3.7	1.3J	<0.6U
GPW-3	21.9	9.42	1.1	<0.22U	8.9	<4U	NS	<0.6U	2.8	1.8J	<0.6U
HBW-1	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.5U	<0.6U
HBW-7	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	24	<1.2U	<0.275U	1.5U	<0.6U
HBW-10	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.2U	<0.6U

Quarter	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
Creek Sample ID	**Sep 2010**	**Dec 2010**	**Mar 2011**	**Jun 2011**	**Sep 2011**	**Dec 2011**	**Mar 2012**	**Jun 2012**	**Not Applicable**	**Jan & Feb 2013**	**Mar 2013**
GPW-1	dry	<0.1U	8.7	dry	dry	1.76	0.163J	dry	NS	1.65	0.735
GPW-3	dry	0.199J	0.673	dry	dry	1.31	0.261	dry	NS	1.74	0.754
HBW-1	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U
HBW-7	dry	<0.1U	<0.2U	dry	dry	0.171J	0.1U	dry	NS	<0.2U	<0.2U
HBW-10	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U

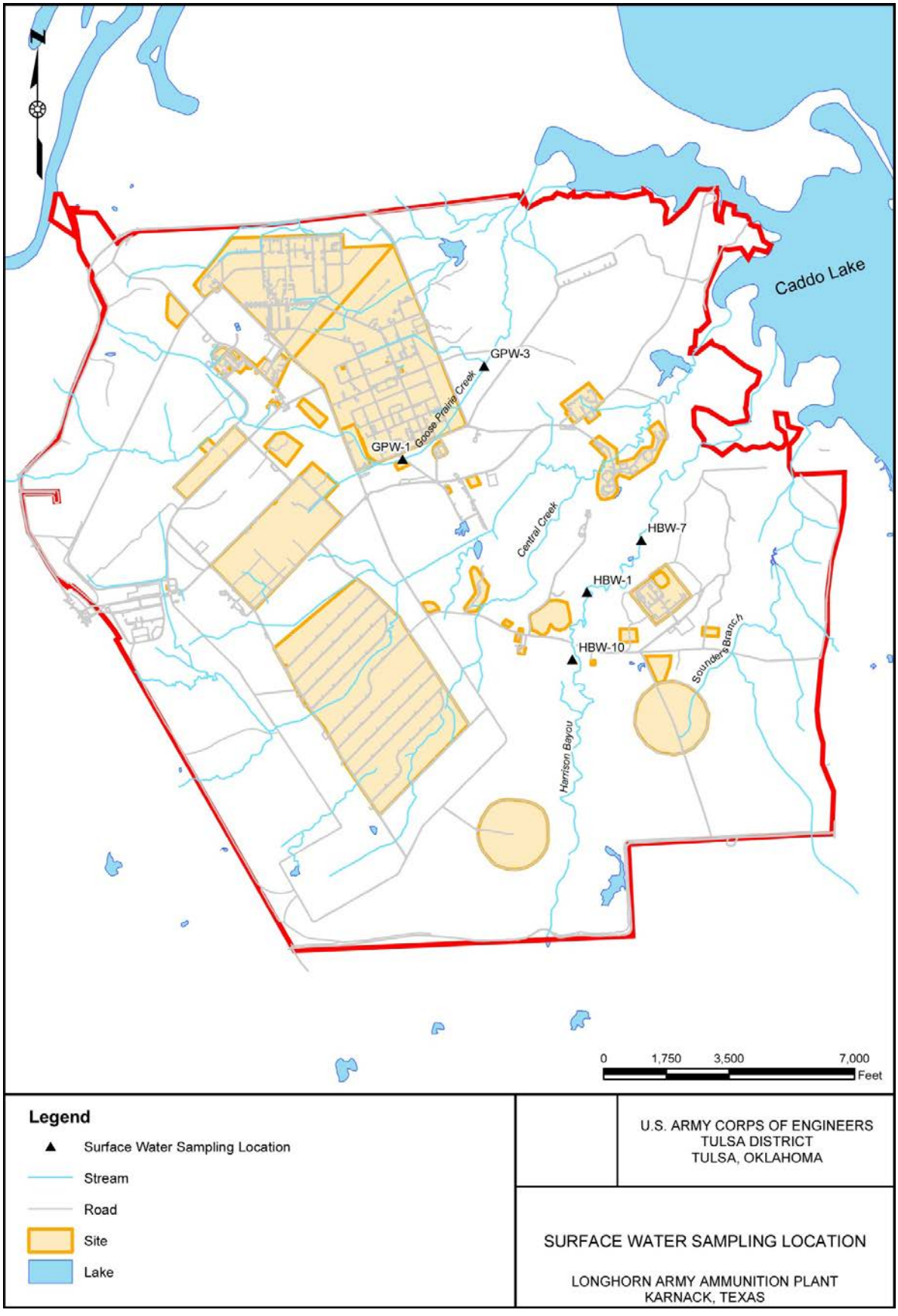
Quarter	2nd	3rd	4th	1st	2nd	3nd	4th	1st	2nd	3rd	4th
Creek Sample ID	**Jun 2013**	**Sept 2013**	**Dec 2013**	**Feb 2014**	**May 2014**	**Aug 2014**	**Nov 2014**	**Feb 2015**	**May 2015**	**Aug 2015**	**Nov 2015**
GPW-1	dry	<0.2 U	dry	0.766	dry	dry	0.244 J	0.311 J	0.156J	dry	0.142 J
GPW-3	dry	<0.2 U	dry	1.15	dry	dry	0.276 J	0.344 J	dry	dry	0.311 J
HBW-1	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U
HBW-7	<0.2U	<0.2 U	dry	0.201 J	dry	dry	<0.2 U	0.124 J	dry	dry	<0.2 U
HBW-10	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U

Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd
Creek Sample ID	**Feb 2016**	**May 2016**	**Aug 2016**	**Nov 2016**	**Feb 2017**	**May 2017**	**Aug 2017**	**Dec 2017**	**Mar 2018**	**Jun 2018**
GPW-1	0.447	6.59	<0.2 U	0.301 J	<1 U	0.263	dry	<4.0 U	<4.0 U	dry
GPW-3	0.474	0.457	0.141	0.563	<1 U	0.274	dry	<4.0 U	<4.0 U	dry
HBW-1	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	<0.2 U	1.1 J	<4.0 U	dry
HBW-7	<0.2 U	<0.2 U	<0.2 U	0.318 J	<1 U	0.155	<0.2 U	<4.0 U	<4.0 U	dry
HBW-10	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	0.111J	<4.0 U	<4.0 U	dry

NS – not sampled U – non-detect J – Estimated Dry – no surface water


Surface Water Samples - Perchlorate
Perchlorate Screening Criteria (26 µg/L) - Effective Until 2016
Perchlorate Screening Criteria - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL) 17 micrograms per liter (µg/L)
Perchlorate in µg/L
30
25
20
15
10
5
0
Jun-13
Sep-13
Feb-14
Nov-14
Feb-15
May-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Jan-17
Feb-17
May-17
Aug-17
Dec-17
Mar-18
Date
GPW-1
GPW-3
HBW-1
HBW-7
HBW-10
GW-Res PCL for Perchlorate

Longhorn Army Ammuntion Plant Creek Sampling Locations



DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

October 23, 2018

DAIM-ODB-LO

Mr. Rich Mayer
US Environmental Protection Agency
Federal Facilities Section R6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Draft Final 4th Annual Remedial Action Operations Report (November 2017 and June/July 2018) LHAAP-35A (58), Shops Area Longhorn Army Ammunition Plant, Karnack, Texas, October 2018

Dear Mr. Mayer,

The above-referenced document is being transmitted to you for your records and includes revisions based upon your comments on the Draft. In accordance with the FFA, the Draft Final will be considered Final after 30 days without further comment.

The document was revised by Bhate Environmental Associates, Inc., (Bhate) on behalf of the Army as part of Bhate's Performance Based Remediation contract for the facility. I ask that Kim Nemmers, Bhate's Project Manager, be copied on any communications related to the project.

The point of contact for this action is the undersigned. I may be contacted at 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
A. Palmie, TCEQ, Austin, TX
P. Bruckwicki, Caddo Lake NWR, TX
A. Williams, USACE, Fort Worth District (Located in Tulsa, OK)
N. Smith, USAEC, San Antonio, TX
K. Nemmers, Bhate, Lakewood, CO (for project files)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

October 23, 2018

DAIM-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Draft Final 4th Annual Remedial Action Operations Report (November 2017 and June/July 2018) LHAAP-35A (58), Shops Area Longhorn Army Ammunition Plant, Karnack, Texas, October 2018

Dear Ms. Palmie,

The above-referenced document is being transmitted to you for your records and includes revisions based upon your comments on the Draft. In accordance with the FFA, the Draft Final will be considered Final after 30 days without further comment.

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Sincerely,

Rose M. Zeiler, Ph.D.
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Copies furnished:
R. Mayer, USEPA Region 6, Dallas, TX
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K. Nemmers, Bhate, Lakewood, CO (for project files)

Responses to Comments on
Draft 4th Annual Remedial Action Operations (November 2017 to June/July 2018) at LHAAP-35A(58), Shops Area
Longhorn Ammunition Plant, Karnack, Texas
September 2018

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X).
2. Commenter Agrees (A) with response or Does not Agree (D) with response.

Comment #	Section/ Paragraph	Comment (October 16, 2018)	C, D, E or X[1]	Response (October 18, 2018)	A or D[2]	Comment	C, D, E or X[1]	Response	A or D[2]
Reviewer: April Palmie, TCEQ **Respondent:** Kim Nemmers, Bhate									
1	1.2, 1-2	First paragraph, sentence beginning "This ESD…" This sentence is overly specific. I suggest using just the final date of the ESD (not signature dates). If you choose not to simplify the sentence, add TCEQ concurrence date.	C	The following sentence will be added to the paragraph: *The Texas Commission on Environmental Quality provided a concurrence letter for the ESD on 23 April 2018.*					
2	1.4, 1-6	Last paragraph I think the reference should be revised to point to the ROD for 03 and ESD for 35A(58).	C	The LHAAP-03 ROD will be added to Sections 1.1, 1.4, and 6.					
3	Figure 2	Add the Land Use Control (LUC) boundary to the legend and remove the pop-out label.	C	The LUC boundary will be presented in the legend instead of as a pop-out label.					
4	Figure 8	LHSMW07 – Please revise the scales for groundwater level so they are the same range.	C	The scales will be revised to be the same for LHSMW07.					
		END of TCEQ Comments							

Responses to Comments on
Draft 4th Annual Remedial Action Operations (November 2017 to June/July 2018) at LHAAP-35A(58), Shops Area
Longhorn Ammunition Plant, Karnack, Texas
September 2018

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X).
2. Commenter Agrees (A) with response or Does not Agree (D) with response.

Comment #	Section/ Paragraph	Comment (October 10, 2018)	C, D, E or X[1]	Response (October 18, 2018)	A or D[2]	Comment	C, D, E or X[1]	Response	A or D[2]
Reviewer: Richard Mayer, USEPA, Region 6 **Respondent:** Kim Nemmers, Bhate									
1	Appendix C	The groundwater sample collection forms indicate that for most the wells sampled the contaminant 1,4-dioxane was analyzed; however, there are no results shown for this contaminant in the tables. Please include the results for 1,4-dioxane. Also, please include the pump placement vertical depth for each well. This information has been included in previous groundwater sampling events.	D	The 1,4-dioxane data was collected in support of the Five Year Review for LHAAP-58 and was not presented in the 4th Year RAO Report. The data will be evaluated during the 2018 Five Year Review process to determine whether the LHAAP-58 remedy remains protective. Pump placement vertical depth was not recorded during the Year 4 RA-O sampling but will be documented in future years.					
2	Appendix F	EPA did not see the regression analysis for monitoring wells 35AWW20 and LHSMW07.	C	The regression analysis for wells 35AWW20 and LHSMW07 will be included in Appendix F of the Draft Final Report.					
		END of EPA Comments							

DRAFT FINAL
4TH ANNUAL REMEDIAL ACTION OPERATION REPORT (NOVEMBER 2017 AND JUNE/JULY 2018) LHAAP-35A (58) SHOPS AREA LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

October 2018

Prepared For:

U.S. Army Corps of Engineers
Tulsa District
1645 S 101 E Avenue
Tulsa, Oklahoma 74128-4609

Contract No: W9128F-13-D-0012
Delivery Order No: W912BV17F0150
Bhate Project No.: NWO1312.0150.012.0001.03

Prepared By:

1608 13th Avenue South, Suite 300
Birmingham, Alabama 35205
1-800-806-4001 • www.bhate.com

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4TH ANNUAL REMEDIAL ACTION OPERATION REPORT (NOVEMBER 2017 AND JUNE/JULY 2018) LHAAP-35A (58) SHOPS AREA LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

TABLE OF CONTENTS

Acronyms and Abbreviations v

1 Introduction 1-1

1.1 Remedial Action Objectives 1-2
1.2 Performance Objectives 1-2
1.3 Site Description 1-4
1.4 Conceptual Site Model 1-5

2 Site Activities At LHAAP-35A (58) 2-1

2.1 Annual LUC Compliance Inspection, Maintenance, and Repairs 2-1
2.1.1 Annual LUC Compliance Inspection 2-1
2.1.2 Well Field Operation & Maintenance 2-1
2.2 Groundwater Monitoring for MNA 2-1
2.2.1 Groundwater Elevation and Flow Direction 2-3
2.2.2 Vertical Gradient 2-4
2.3 Groundwater Analytical Results 2-4
2.3.1 Shallow Zone 2-4
2.3.2 Intermediate Zone 2-5
2.3.3 Deep Zone 2-5
2.3.4 Arsenic Monitoring 2-6
2.4 Surface Water Sampling 2-7
2.5 Well Abandonment 2-7

3 Performance Monitoring of EISB 3-1

3.1 Analysis of VOCs 3-1
3.1.1 Eastern Plume 3-1
3.1.2 Western Plume 3-1
3.2 Analysis of Field Parameters 3-2
3.3 TOC Levels 3-2
3.3.1 Eastern Plume 3-2
3.3.2 Western Plume 3-2
3.4 Analysis of Anions 3-3

3.4.1 Eastern Plume 3-3
3.4.2 Western Plume 3-3
3.5 Dissolved Gases 3-3
3.5.1 Eastern Plume 3-3
3.5.2 Western Plume 3-3
3.6 Dechlorinating Bacteria 3-4
3.6.1 Eastern Plume 3-4
3.6.2 Western Plume 3-4
3.7 Summary 3-4

4 Natural Attenuation Evaluation 4-1

4.1 First Line of Evidence: Change in COC Concentrations over Time and with Distance 4-1
4.1.1 Eastern Plume 4-3
4.1.2 Western Plume 4-5
4.1.3 Plume Stability 4-6
4.2 Second Line of Evidence: Geochemical Indicators 4-8
4.2.1 Eastern Plume 4-8
4.2.2 Western Plume 4-12
4.3 Third Line of Evidence: Predictive Modeling and Microbial Analysis 4-15

5 Conclusions and Recommendations 5-1

6 References 6-1

Figures

Figure 1 Longhorn Army Ammunition Plant Location and Site Vicinity Map
Figure 2 LHAAP-58 Monitoring Well Location Map
Figure 3 Conceptual Site Model
Figure 4 LHAAP-58 November 2017 Shallow Potentiometric Map
Figure 5 LHAAP-58 July 2018 Shallow Potentiometric Map
Figure 6 COC Concentrations in Shallow Groundwater (November 2017 and July 2018)
Figure 7 COC Concentrations in Intermediate Groundwater (November 2017 and July 2018)
Figure 8 LHAAP-58 COC Concentration Trends
Figure 9 LHAAP-58 Lateral Extent of Plume Comparison (October 2016 and July 2018)

Tables

Table 1 Groundwater Elevation Data
Table 2 Groundwater Validated Analytical Data (November 2017)
Table 3 Groundwater Validated Analytical Data (June/July 2018)
Table 4 Historic Monitoring Well COC Concentrations
Table 5 Enhanced In-Situ Bioremediation Performance Data Summary-Eastern Plume
Table 6 Enhanced In-Situ Bioremediation Performance Data Summary-Western Plume

Appendices

Appendix A Annual Land Use Control Compliance Certification Document
Appendix B Photographic Log
Appendix C Monitoring Well Sample Collection Forms
Appendix D Laboratory Analytical Results (Provided on CD)
Appendix E Mann-Kendall Trend Test Results
Appendix F Regression Analysis

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ACRONYMS AND ABBREVIATIONS

<	Less than
%	Percent
AECOM	AECOM Technical Services, Inc.
APTIM	APTIM Federal Services, LLC
bgs	Below ground surface
Bhate	Bhate Environmental Associates, Inc.
COC	Contaminant of concern
CSM	Conceptual Site Model
DCA	Dichloroethane
DCE	Dichloroethene
DHB	Dehalobacter
DHC	Dehalococcoides
DO	Dissolved oxygen
EISB	Enhanced In-situ Bioremediation
ESD	Explanation of Significant Differences
ft	Feet (or foot)
HPLC	High Performance Liquid Chromatography
IWWP	Installation-Wide Work Plan
J	Data qualifier denoting an estimated concentration
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MC	Methylene chloride
MCL	Maximum contaminant level
µg/L	Micrograms per liter
mg/L	Milligrams per liter
mL	Milliliter
MNA	Monitored Natural Attenuation
MSC	Medium-specific concentration

msl	Mean sea level
mV	Millivolt
No.	Number
ORP	Oxidation-reduction potential
PCE	Tetrachloroethene
PCB	Polychlorinated biphenyls
pH	Potential of hydrogen
RA(O)	Remedial Action Operation
RAO	Remedial Action Objective
RACR	Remedial Action Completion Report
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
Shaw	Shaw Environmental, Inc.
SIM	Selected Ion Monitoring
SVOC	Semi-volatile Organic Compound
TCA	Trichloroethane
TCE	Trichloroethene
TOC	Total organic carbon
U.S.	United States
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VC	Vinyl chloride
VFA	Volatile Fatty Acids
VOC	Volatile Organic Compound

1 INTRODUCTION

The United States (U.S.) Army Corps of Engineers (USACE), Tulsa District, contracted Bhate Environmental Associates, Inc. (Bhate), to perform remedial actions at multiple sites at the former Longhorn Army Ammunition Plant (LHAAP) in Karnack, Texas, under the Huntsville District's Architect-Engineer Indefinite Delivery Contract Number (No.) W9128F-13-D-0012, Delivery Order No. W912BV17F0150. Bhate is performing groundwater and surface water monitoring as part of Remedial Action Operations (RA(O)s) for the Enhanced In-situ Bioremediation (EISB) and Monitored Natural Attenuation (MNA) groundwater remedy at site LHAAP-35A (58). Remedial activities are required under the Record of Decision (ROD) issued for the LHAAP-35A (58) site in September 2010 (Shaw Environmental, Inc. [Shaw], September 2010).

The Remedial Action Work Plan (RAWP) for the entire site was prepared in August 2013 in accordance with the ROD and was implemented in September 2013 (AECOM Technical Services, Inc. [AECOM], August 2013). Within the eastern plume, EISB was performed in September 2013. The MNA remedy for the western plume at this site, as presented in the ROD, calls for an evaluation of the remedy after 2 years of implementation. The ROD also provides for implementation of a contingency remedy to enhance MNA if MNA is found to be ineffective. RA(O) implementation for the western plume was completed between October 2013 and October 2015 and the 2nd year RA(O) report was finalized in May 2016 (AECOM, May 2016). After 2 years of MNA, the 2nd year RA(O) report concluded that MNA is ineffective and implementation of a contingency remedy is appropriate. A RAWP for the contingency remedy for the western plume was developed and finalized (Bhate, January 2018). The contingency remedy for the western plume is EISB injections, which were completed in March and April 2018 as documented in the Remedial Action Completion Report (RACR) (Bhate, August 2018).

Groundwater monitoring at LHAAP-35A (58) was conducted quarterly following EISB injections at the eastern plume for 2 years and is now semi-annual. The contingency remedy within the western plume requires that quarterly sampling be completed in select performance monitoring wells for 2 years. This report includes the first quarterly sampling event in the western plume completed in July 2018, with future quarterly events to be included in the Annual RA(O) Reports. This RA(O) report documents the 4th year of RA(O) implementation and summarizes the Land Use Control (LUC) compliance inspection; monitoring well inspection, maintenance, and repair activities; results of groundwater and surface water sampling; and an evaluation of EISB and MNA between November 2017 and July 2018.

LHAAP is located in east-central Texas in the northeastern corner of Harrison County between State Highway 43 in Karnack, Texas, and the western shore of Caddo Lake (**Figure 1**). The nearest cities are Marshall, Texas, approximately 14 miles to the southwest, and Shreveport, Louisiana, approximately 40 miles to the east. Caddo Lake is a large freshwater lake that bounds LHAAP to the north and east. The eastern fence of the LHAAP installation is 3.5 miles from the Texas-Louisiana border (AECOM, May 2016).

1.1 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for LHAAP-35A (58), consistent with the reasonably anticipated future use of the site as a national wildlife refuge, are:

- Protection of human health by preventing human exposure to the contaminated groundwater;
- Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water; and,
- Returning groundwater to its potential beneficial use as a drinking water source, wherever practicable.

An Explanation of Significant Differences (ESD) was prepared and finalized for LHAAP-35A (58), Shops Area, Group 4 (Bhate/APTIM Federal Services, LLC [APTIM], July 2018) to formalize that the LUCs and groundwater monitoring required for LHAAP-03, a small site entirely contained in the LHAAP-35A (58) eastern Volatile Organic Compound (VOC) and LUC boundaries, will be captured under LHAAP-35A (58). The soil at LHAAP-03 is addressed in the Final ROD for LHAAP-03 (Bhate/APTIM, June 2018). Specifically, arsenic will be sampled as a component of the LHAAP-35A (58) groundwater monitoring program and evaluated to determine if arsenic is present due to a release or due to geochemical conditions. The ESD identifies that well 03WW01 be sampled for arsenic within the LHAAP-35A (58) RA(O). The ESD also clarifies that LUCs will remain in place until the levels of the contaminants of concern (COCs) in soil and groundwater allow for unrestricted use and unlimited exposure. The ESD was signed by the Army on 19 July 2018, and by the U.S. Environmental Protection Agency (USEPA) on 5 September 2018 (Bhate/APTIM, July 2018).

1.2 Performance Objectives

The LHAAP-35A (58) site has groundwater plumes in two distinct areas: 1) eastern plume and 2) western plume. The current remedies selected for the two areas are: LUC; EISB in the area of highest levels of contamination; and MNA for the remainder of the plume, beyond the influence of the EISB treatment area. The ROD for LHAAP-35A (58) specified the implementation of MNA as the selected remedy for the western plume and that if MNA is found to be ineffective, a contingency remedy of EISB to enhance MNA would be implemented and documented in an ESD (Shaw, September 2010). Per the 2nd Annual RA(O) Report for LHAAP-35A (58) (AECOM, May 2016), an ESD was prepared for implementation of the contingency remedy of EISB within the western plume (Bhate, March 2018). This ESD was signed by the Army on 27 March 2018, and the USEPA on 13 April 2018. The Texas Commission on Environmental Quality provided a concurrence letter for the ESD on 23 April 2018. EISB was implemented as a contingency remedy within the western plume during this 4th year of RA(O). EISB was previously completed in the eastern plume in 2013.

The performance objectives at LHAAP-35A (58) consist of two components: physical inspections and groundwater/surface water monitoring. As a component of the LUC implementation, a civil survey of the LUC boundary was conducted in November 2014 and recorded in the Harrison County Courthouse in March 2015 (AECOM, May 2016). Physical inspections are conducted annually to confirm compliance with the LUC objectives. These objectives include preventing human exposure to groundwater contamination at levels that pose an unacceptable risk to a future maintenance worker and ensuring that there is no withdrawal or use of groundwater from the site for anything other than environmental monitoring and testing until the cleanup levels are attained. Groundwater monitoring conducted at the site since October 2013 will be included in the facility-wide Longhorn Five-Year Review.

Groundwater and surface water monitoring is being performed to demonstrate that EISB in conjunction with MNA of the eastern and western plumes are effective remedies to:

- Detect changes in environmental conditions that may reduce the efficacy of the remedial processes,
- Identify potentially toxic and/or mobile transformation products,
- Verify that the plumes are not expanding,
- Verify that no unacceptable impacts to downgradient receptors are occurring, such as discharges of contaminated groundwater to surface water,
- Detect new releases of contaminants to the environment that could impact the effectiveness of the remedies, and
- Verify attainment of the RAOs.

Groundwater monitoring completed as part of the 4th year of RA(O) activities consisted of two semi-annual groundwater sampling events at 21 wells in the shallow zone and 2 wells in the intermediate zone. During the June/July 2018 sampling event, two additional, newly installed shallow monitoring wells (35AWW23 and 35AWW24) were also sampled per the Western Plume Contingency RAWP (Bhate, January 2018). As documented in the Draft Final Western Plume Contingency RACR (Bhate, August 2018), the western plume received EISB treatment in the March and April 2018 timeframe. The data collected in November 2017 was prior to the western plume receiving this treatment; however, the June/July 2018 data is post-EISB treatment. In March 2018, baseline groundwater samples were collected within the western plume per the Western Plume Contingency RAWP (Bhate, January 2018) and as documented in the RACR (Bhate, August 2018). Quarterly sampling of the western plume is required for 2 years following the EISB treatment and will continue for those 2 years while semi-annual groundwater sampling will continue within the eastern plume. Semi-annual surface water sampling at 35ASW03, located adjacent to the western groundwater plume in a ditch that runs parallel to 4th Street, was not completed due to dry conditions in this creek during the period included in this 4th Year RA(O). Further, surface water samples are only collected if groundwater elevation is at or above the bottom of the ditch, which was not supported by groundwater level measurements.

1.3 Site Description

The LHAAP-35A (58) site, also known as the Shops Area, is located in the north-central portion of LHAAP and currently covers an area of approximately 11 acres (**Figure 1**) (Shaw, September 2010). The surface features include asphalt-paved roads, a parking area, and areas that are wooded and overgrown with grasses and other vegetation (**Figure 2**). The topography is relatively flat with the surface drainage flowing into the tributaries of Goose Prairie Creek, which eventually discharges into Caddo Lake.

The Shops Area, which is now designated as LHAAP-35A (58), was established in 1942 as part of the installation's initial construction (Shaw, September 2011). The facility was used to provide plant-operated laundry, automotive, woodworking, metalworking, painting, refrigeration, and electrical services. The site was active throughout the LHAAP's mission and was deactivated along with the rest of the installation in 1996-1997. The LHAAP-35A (58) site boundary has changed over the years. Earlier investigations for LHAAP-35A (58) were performed in areas to the south that are no longer included within the site boundary (AECOM, May 2016). LHAAP-35A (58) encompasses the following sites:

- LHAAP-02, vacuum truck overnight parking
- LHAAP-03, the Paint Shop Building 722 (waste collection)
- LHAAP-60, Former Storage Building 714
- LHAAP-68, a mobile storage tank parking area
- LHAAP-69, service station with underground storage tanks

The following sites were within the historical LHAAP-35A (58) site boundary, but are not included within the current site boundary:

- LHAAP-04, former Pilot Wastewater Treatment Plant
- LHAAP-56, a vehicle wash rack and oil/water separator, Building 744-A
- LHAAP-59, Storage Building 725
- LHAAP-60, Building 411
- LHAAP-61, Water Treatment Plant
- LHAAP-66, 405-L Transformer Yard

The following sites are within the LUC boundary for LHAAP-35A (58):

- LHAAP-02, vacuum truck overnight parking
- LHAAP-03, the Paint Shop Building 722 (waste collection)
- LHAAP-56, a vehicle wash rack and oil/water separator, Building 744-A
- LHAAP-59, Storage Building 725
- LHAAP-60, Former Storage Building 714

- LHAAP-65, Former Building 209 (flammable materials storehouse)
- LHAAP-68, a mobile storage tank parking area
- LHAAP-69, service station with underground storage tanks

LHAAP-60, Building 411, which is located within the historical site boundary of LHAAP-35A (58) is included within the LUC boundary for LHAAP-04.

1.4 Conceptual Site Model

Much of the following conceptual site model (CSM) information has previously been presented in the 2nd Annual RA(O) Report (January 2015 – October 2015) (AECOM, May 2016). No changes to this CSM were identified based upon the 4th Annual RA(O) Report. **Figure 3** presents the CSM from the ROD (Shaw, September 2010). Between 1992 and 2008, multiple investigations were conducted in a phased approach to evaluate the nature and extent of contamination at the LHAAP-35A (58) site. The findings from these investigations were that the shallow zone groundwater was impacted with VOCs, while the soil and former sump/waste rack sump areas (LHAAP-56) posed no unacceptable threat to human health or the environment (Shaw, September 2011). **Figure 2** shows the locations of all the shallow, intermediate, and deep zone monitoring wells, as well as surface water sampling locations, present at the site. The sources of contamination at LHAAP-35A (58) were surface spills associated with the various support services that occurred in the area. The spills resulted in minor soil contamination and the COCs released to the surface soil subsequently migrated downward through leaching, to the groundwater.

Overland flow does not appear to be a complete pathway for migration of contaminants to surface water, as none of the COCs (VOCs, Semi-volatile Organic Compounds [SVOCs], explosives, pesticides, or polychlorinated biphenyls [PCBs]) were detected in water samples from the on-site ditch. Likewise, no VOCs, SVOCs, explosives, or pesticides were detected in samples of the ditch sediment. Some metals were detected in surface water and sediment at concentrations in the naturally occurring background range.

Investigation results indicate that the shallow zone groundwater is impacted with VOCs, but soil and former sump/waste rack areas pose no unacceptable risk to human health or the environment (Shaw, September 2011). There have been no previous remedial actions at LHAAP-35A (58). The nearest surface water body to LHAAP-35A (58) is a ditch that runs parallel to 4th Street on the western boundary of the site and flows to the southeast. The depth of groundwater in wells adjacent to the ditch is well below the bottom of the ditch at 18 to 25 feet below ground surface (ft bgs) (e.g., in wells 35AWW16, 35AWW18, and LHSMW07).

The potentially complete exposure pathways are groundwater use as drinking water and potential migration of impacted groundwater into surface water. Shallow groundwater is not used as drinking water at the refuge and this potential exposure pathway is eliminated from any hypothetical future receptor because LUCs are in place that prohibit the use of groundwater for any purpose other than for environmental monitoring and testing. **Figure 2** shows the

groundwater use restrictions area established for this site. The exposure pathway from drinking water continues to be incomplete based on the site inspection completed in August 2018 (documented in **Appendix A**). Based upon groundwater elevation data collected, surface water is not being impacted by the groundwater.

The hydrogeology beneath the site, as presented in the Draft Final RACR (AECOM, October 2015), consists of three water-bearing zones; identified as shallow, intermediate, and deep. The shallow zone extends to approximately 40 ft bgs. The lithology of the shallow zone is characterized by discontinuous layers of fine grained soils consisting of interbedded silt, sand, and clay. According to the groundwater gauging data conducted in October 2013 (First Performance Monitoring Sampling Event), the depth to groundwater ranged from 17.53 ft bgs to 30.13 ft bgs. Groundwater elevations in the shallow zone in October 2013 ranged from 184.21 ft above mean sea level (msl) to 202.32 ft above msl.

Data from boring log 35AWW02, which was drilled in the deep zone to a depth of 140 ft bgs, and 35AWW05, which was drilled in the intermediate zone to a depth of 75.75 ft bgs, indicate the soils in the intermediate and deep zones consist mostly of clay with the occasional presence of silt and sand layers. The occurrence of predominantly clay soil beneath the shallow zone impedes the vertical migration of groundwater, which is corroborated by the difference in groundwater elevations between the shallow zone and the intermediate and deep zones (AECOM, May 2016). Based on groundwater surface measurements obtained in October 2013, groundwater elevation for the intermediate zone was approximately 178 ft above msl, and the elevation of deep zone groundwater was 175.75 ft above msl.

Based on previous investigations, the shallow groundwater COCs at LHAAP-35A (58) are tetrachloroethene (PCE); trichloroethene (TCE); 1,1,2-trichloroethane (TCA); 1,1-dichloroethene (1,1-DCE); 1,2-dichloroethane (1,2-DCA); cis-1,2-dichloroethene (cis-1,2-DCE); trans-1,2-dichloroethene (trans-1,2-DCE); vinyl chloride (VC); methylene chloride (MC); and benzene. In addition, low concentrations of 1,1-DCA were detected in the shallow zone groundwater, but were below the groundwater medium-specific concentration (MSC) so 1,1-DCA is not considered a groundwater COC at this site. No COCs were detected in samples from the intermediate and deep groundwater zones.

Although arsenic has not been designated as a COC, it is included in the shallow zone groundwater monitoring program in accordance with the Revised Technical Memorandum, Steps to Remedy-in-Place for LHAAP-03/LHAAP-58 (AECOM, November 2012) and the 2013 RAWP (AECOM, August 2013). As noted previously in Section 1.1, arsenic will also be included in the groundwater monitoring program per the LHAAP-35A(58) Final ESD for LHAAP-03 groundwater (Bhate/APTIM, July 2018) and Final ROD for LHAAP-03 (Bhate/APTIM, June 2018).

2 SITE ACTIVITIES AT LHAAP-35A (58)

2.1 Annual LUC Compliance Inspection, Maintenance, and Repairs

2.1.1 Annual LUC Compliance Inspection

The objectives of the LUCs at LHAAP-35A (58) are to prevent human exposure to groundwater contamination presenting an unacceptable risk to human health, and to ensure that there is no withdrawal or use of groundwater beneath the site for any purpose other than environmental monitoring and testing until the cleanup levels are attained (AECOM, August 2013). A restriction prohibiting residential use of groundwater will remain in effect until COC concentrations in groundwater and soil are reduced to levels that allow unrestricted use and unlimited exposure. Notices of the groundwater use restrictions accompany all property transfer documents and were recorded at the Harrison County Courthouse in March 2015 in accordance with the Texas Administrative Code Title 30, §335.566. Additional details regarding the implementation of the LUC are presented in the RACR (AECOM, October 2015).

The annual LUC compliance inspection for LHAAP-35A (58) was performed on August 15, 2018. The Annual Land Use Control Compliance Certification Documentation form for the 4th year RA(O) period is presented in **Appendix A**. Aside from minor painting of one monitoring well, no compliance issues or concerns were noted during the annual inspection in 2018.

2.1.2 Well Field Operation & Maintenance

Inspections of the conditions/integrity of monitoring wells are conducted during each sampling event and the information is recorded on the field sampling forms. Maintenance or repairs are performed as needed, based on observed conditions. For the 4th annual reporting period, monitoring well 35AWW04 requires painting. Mowing the area to control brush and weeds is conducted on a routine basis and as needed to allow access to the wells, typically before sampling events. During the 4th annual reporting period, mowing was conducted twice, in November 2017 and in June 2018. **Appendix B** provides photos of the current monitoring well conditions, and **Appendix C** provides information about the individual well surface conditions observed during the two sampling events during this reporting period.

2.2 Groundwater Monitoring for MNA

During the 4th year RA(O), 26 monitoring wells were gauged for depth to water in November 2017 and 24 monitoring wells were gauged for depth to water in June/July 2018. The RAWP (AECOM, August 2013) proposed inclusion of 20 monitoring wells in the MNA program (18 shallow groundwater zone wells [35AWW06, 35AWW08, 35AWW10, 35AWW11, 35AWW12, 35AWW13, 35AWW14, 35AWW15, 35AWW16, 35AWW17, 35AWW18, 35AWW19, 35AWW20, 35AWW21,

35AWW22, LHSMW04, LHSMW06, and LHSMW07] and 2 intermediate groundwater zone wells [35AWW01 and 35AWW05]).

The following 22 shallow zone wells were sampled in November 2017: 03WW01, 1004TW001, 35AWW06, 35AWW07R, 35AWW08, 35AWW09, 35AWW10, 35AWW11, 35AWW12, 35AWW13, 35AWW14, 35AWW15, 35AWW16, 35AWW17, 35AWW18, 35AWW19, 35AWW20, 35AWW21, 35AWW22, LHSMW03, LHSMW06, and LHSMW07. Monitoring wells 03WW01 and 35AWW09 were not included in the monitoring program per the RAWP (AECOM, August 2013). These wells are located within the EISB treatment area of the eastern groundwater plume and were added to the monitoring program during the 1st year monitoring period. LHSMW04 was dry in November 2017 and June/July 2018 and, therefore, not sampled during the Year 4 RA(O) event. LHSMW04 was also dry the previous year in October 2016, and as a result wasn't sampled in 2016 either. Two intermediate groundwater zone wells (35AWW01 and 35AWW05) were sampled in November 2017. Before collecting groundwater samples, the wells were gauged using a water level probe and the depth to water was recorded to the nearest 0.01 ft from the top of casing. Groundwater samples were collected using the low-flow sampling technique described in the Groundwater Sampling Procedures in the Installation-Wide Work Plan (IWWP) (AECOM, July 2014) for the November 2017 sampling event. After water quality parameters stabilized and were within acceptable ranges, samples were collected at the same low flow rate. The samples were analyzed by ALS Environmental for alkalinity (SM2320B); phosphorus (E365.3); dissolved gases (RSK-175); Total Organic Carbon (E415.1); VOCs (SW8260C); ferrous iron (SM3500-Fe); total and dissolved metals (iron and manganese) and total arsenic (SW6020A); chloride, nitrate, nitrite, and sulfate (SW9056A); sulfide (E376.1); Volatile Fatty Acids (VFAs) (High Performance Liquid Chromatography [HPLC]-METACIDS); dechlorinating bacteria (dehalococcoides [DHC]/dehalobacter [DHB]) (CENSUS); and 1,4-dioxane (SW8270D Selected Ion Monitoring [SIM]).

The following 21 shallow zone wells were sampled in June/July 2018: 03WW01, 35AWW06, 35AWW08, 35AWW09, 35AWW10, 35AWW11, 35AWW12, 35AWW13, 35AWW14, 35AWW15, 35AWW16, 35AWW17, 35AWW18, 35AWW19, 35AWW20, 35AWW21, 35AWW22, LHSMW06, LHSMW07, and newly installed wells 35AWW23 and 35AWW24. Two intermediate groundwater zone wells (35AWW01 and 35AWW05) were sampled in July 2018. Per the Year 3 RA(O) Report (Bhate, April 2018), monitoring wells 1004TW001, 35AWW07R, and LHSMW03 are excluded from continued RA(O) sampling following approval of that report in Spring 2018. Before collecting groundwater samples, the wells were gauged using a water level probe and the depth to water was recorded to the nearest 0.01 ft from the top of casing. Groundwater samples were collected using the low-flow sampling technique described in the Groundwater Sampling Procedures in the IWWP (Bhate, May 2018) for the June/July 2018 sampling event. After water quality parameters stabilized and were within acceptable ranges, samples were collected at the same low flow rate. The samples were analyzed by ALS Environmental for alkalinity (SM2320B); phosphorus (E365.3); dissolved gases (RSK-175); Total Organic Carbon (E415.1); VOCs (SW8260C); ferrous iron (SM3500-Fe); total and dissolved metals (iron and manganese) and total arsenic (SW6020A);

chloride, nitrate, nitrite, and sulfate (SW9056A); sulfide (E376.1); VFAs (HPLC-METACIDS); dechlorinating bacteria (DHC/DHB) (CENSUS); and 1,4-dioxane (SW8270D SIM).

A total of six wells within the western plume are required to be sampled quarterly for 2 years. Per the Western Plume RAWP (Bhate, January 2018), these wells include 35AWW06, 35AWW11, 35AWW19, 35AWW20, 35AWW23, and LHSMW07. Each of the western plume wells are analyzed for VOCs, MNA parameters, volatile fatty acids, DHB/DHC. These monitoring wells, including new monitoring wells 35AWW23 and 35AWW24, were sampled in March 2018 and July 2018. The March 2018 groundwater sampling event was presented in the RACR (Bhate, August 2018), as the baseline groundwater sampling event completed prior to the Western Plume EISB injections. The results of the March 2018 baseline sampling is described in the remedy performance discussions presented in Section 4 of this report. The July 2018 sampling event is the first quarterly sampling event of the required eight events following EISB completed in the western plume.

All LHAAP-35A (58) monitoring wells are depicted in **Figure 2**. **Table 1** presents the monitoring wells that were gauged during the 4th year RA(O) period. Each of the monitoring wells were secure and sampled with no technical issues encountered.

During the 4 years of RA(O) sampling, only monitoring well LHSMW04, located to the east of the eastern groundwater plume, has been periodically dry. However, the absence of data from this well has had no effect on evaluating EISB or MNA. Monitoring well LHSMW04 is located between 35AWW09 and 35AWW12 and the results for these two wells provide ample data to evaluate this area.

Groundwater sampling forms are presented in **Appendix C**. In accordance with the IWWP (Bhate, May 2018), photoionization detector readings were not collected during the groundwater sampling events. Chain of custody forms, laboratory reports, and quality control summary reports are presented with the laboratory results in **Appendix D**.

2.2.1 Groundwater Elevation and Flow Direction

2.2.1.1 Shallow Groundwater Zone

Groundwater levels for the 4th year RA(O) were measured in November 2017 and July 2018. The groundwater flow direction in the shallow water bearing unit during the 4th year RA(O) monitoring period at LHAAP-35A (58) is interpreted to the southeast in the western portion of the site and to the east-southeast in the eastern portion of the site (see **Figures 4 and 5**). This corresponds well with the flow directions presented in the Remedial Design (RD) document (Shaw, September 2011), which was interpreted to the southeast in the westernmost area, and to the east for the remainder of the site. Groundwater elevation data are presented in **Table 1**.

The shallow zone groundwater elevations increased slightly across the site in the majority of monitoring wells between November 2017 and June/July 2018. The greatest increase occurred in shallow monitoring well 35AWW18. A total of six wells had a decrease in groundwater elevation with monitoring well LHSMW03 having the greatest decrease. One monitoring well, 35AWW21, had no increase or decrease in the groundwater elevation over this same time period.

2.2.1.2 Intermediate Groundwater Zone

Wells 35AWW01 and 35AWW05 (**Figure 2**) are completed in the intermediate groundwater zone. Groundwater elevations in each well increased (approximately 1.29 feet or less) between November 2017 and July 2018. The groundwater elevations are presented in **Table 1**.

2.2.1.3 Deep Groundwater Zone

Well 35AWW02 (**Figure 2**) is screened in the deep groundwater zone. This well is not included in the sampling program, in accordance with the RAWP (AECOM, August 2013). Therefore, this monitoring well was not gauged during the Year 4 RA(O) sampling events. The groundwater elevation at 35AWW02 was relatively static (within 0.44 feet) in measurements between October 2013 and October 2016 (**Table 1**).

2.2.2 Vertical Gradient

There are two pairs of shallow and intermediate zone co-located wells, which include monitoring wells 35AWW08 (shallow) and 35AWW01 (intermediate); and LHSMW07 (shallow) and 35AWW05 (intermediate). During the 4th year RA(O) monitoring period, the elevation difference between wells 35AWW08 and 35AWW01 was 13.86 in November 2017 and 12.47 in July 2018, and between wells LHSMW07 and 35AWW05 was over 26 ft. These elevation differences are consistent with those observed in the first 3 years of RA(O) monitoring. This difference in elevation between the shallow groundwater zone and the intermediate groundwater zone indicates that there is hydraulic separation between these two water bearing zones. Because the potentiometric level of the shallow zone groundwater is higher than the potentiometric level of the intermediate zone groundwater, a potential downward vertical gradient exists at this site.

2.3 Groundwater Analytical Results

2.3.1 Shallow Zone

The COCs for shallow zone groundwater are 1,1,2-TCA; 1,1-DCE; 1,2-DCA; benzene; cis-1,2-DCE; trans-1,2-DCE; TCE; PCE; methylene chloride, and VC (AECOM, May 2016). Analytical results for the November 2017 semi-annual samples are presented in **Table 2**, and analytical results for the July 2018 sampling event are presented in **Table 3**. **Figures 6** display the COC analytical data for November 2017 and July 2018.

Twenty-four wells were sampled for COCs during the 4th year RA(O), with the exception of well LHSMW04, which was dry during the Year 4 RA(O) sampling events. Monitoring well 35AWW03 was also noted as dry but was not planned for sampling. Select wells were also sampled for MNA parameters per the RAWP during the Year 4 RA(O) sampling events. Further, select wells were sampled for 1,4-dioxane and arsenic during the Year 4 RA(O) sampling events. It should be noted that 1,4-dioxane is not a site COC and was analyzed to support the Five Year Review. Therefore, this data is not included in **Table 2** but the data is included in the November 2017 laboratory data packages.

During the November 2017 event, wells 35AWW06, 35AWW08, 35AWW09, 35AWW11, 35AWW14, 35AWW19, 35AWW20, LHSMW06, and LHSMW07 had one or more COCs reported at concentrations above the laboratory detection limits. Only wells 35AWW08, 35AWW09, 35AWW11, 35AWW14, 35AWW19, 35AWW20, LHSMW06, and LHSMW07 had concentrations of COCs exceeding the maximum contaminant levels (MCLs). In addition, arsenic was analyzed in selected wells and was detected above the MCL of 0.01 mg/L in monitoring wells 03WW01 and 35AWW08.

During the June/July 2018 event, monitoring wells 03WW01, 35AWW08, 35AWW09, 35AWW11, 35AWW14, 35AWW18, 35AWW19, 35AWW20, 35AWW23, LHSMW06, and LHSMW07 had one or more COCs listed above reported at concentrations above laboratory detection limits. Only wells 03WW01, 35AWW08, 35AWW09, 35AWW11, 35AWW14, 35AWW19, 35AWW20, and LHSMW07 had concentrations exceeding COC MCLs. The only other MCL exceedances were for the volatile fatty acid, propionic acid (51 milligrams per liter [mg/L]) in 35AWW06, 35AWW11, 35AWW23, and LHSMW07. Propionic acid is present due to fermentation of the carbon substrate as part of the reductive dechlorination process.

Groundwater monitoring well sampling forms were completed for each well sampled and are included in **Appendix C**. The laboratory analytical results are included in **Appendix D**.

2.3.2 Intermediate Zone

Wells 35AWW01 and 35AWW05 (**Figure 2**) are completed in the intermediate groundwater zone. Both wells were sampled during the 4th year RA(O) monitoring period. Analytical results for these two wells were below laboratory detection limits for all analytes in both the November 2017 and July 2018 events. The laboratory analytical results are shown in **Tables 2 and 3** and laboratory analytical reports are included in **Appendix D**.

2.3.3 Deep Zone

Well 35AWW02 is completed in the deep groundwater zone. This well is not included in the sampling program in accordance with the 2013 RAWP (AECOM, August 2013) and was not sampled during the 4th year RA(O). Deep well 35AWW02 was sampled only during the October 2013 sampling event and the COC concentrations were below the laboratory detection limits.

The laboratory analytical results for 35AWW02 are included in **Table 4** (Historic Monitoring Well COC Concentrations).

2.3.4 Arsenic Monitoring

Although arsenic has not been designated as a COC, groundwater was analyzed for arsenic from the 1st Year RA(O) monitoring period through July 2015 of the 2nd Year RA(O) monitoring period, as described in the Revised Technical Memorandum, Steps to Remedy-in-Place for LHAAP-03/LHAAP-58 (AECOM, November 2012). The four quarters of arsenic monitoring were completed to be compliant with the 2013 RAWP (AECOM, August 2013). However, per the Year 2 RA(O) Report (AECOM, May 2016), monitoring arsenic was recommended for wells within the eastern plume (03WW01, 35AWW08, and 35AWW09). Continuation of the arsenic sampling program during the period of implementation and monitoring of EISB effectiveness within the western plume was also recommended based upon the recommendation to implement EISB for the western plume and the ESD (Bhate/APTIM, July 2018).

However, arsenic sampling at LHAAP-58 was inadvertently left out of the Year 3 RA(O) monitoring period and no arsenic monitoring was conducted during the 3rd Year reporting period. During the Year 4 RA(O) monitoring period, arsenic sampling was completed in select monitoring wells. In November 2017, groundwater from the following monitoring wells were analyzed for arsenic: 03WW01, 35AWW01, 35AWW06, 35AWW07, 35AWW08, 35AWW09, LHSMW03, LHSMW06, LHSMW07, and 1004TW001. In June/July 2018, groundwater from the following monitoring wells were analyzed for arsenic: 35AWW01, 35AWW08, 35AWW09, and LHSMW06.

Arsenic was reported at concentrations above the MCL during the 1st year RA(O) monitoring period and during the July 2015 sampling event of the 2nd year RA(O) monitoring period in wells 03WW01, 1004TW001, 1004TW006, 35AWW08, 35AWW20 and LHSMW07 (AECOM, May 2016). Background concentrations of arsenic at LHAAP were reported up to 0.0621 mg/L in November 2008 for perimeter well 110 in a filtered sample that was collected on December 16, 2004 (Shaw, June 2007). Therefore, the presence of arsenic in site groundwater cannot be attributed solely to reductive conditions caused by EISB, although these conditions could have contributed to an increase in arsenic concentrations in groundwater observed in the first 2 years of RA(O).

In November 2017, monitoring wells 35AWW08 (0.148 mg/L) and 03WW01 (0.035 mg/L) exceeded the MCL of 0.010 mg/L (**Table 2**). The eight other monitoring wells sampled did not have arsenic detected in the groundwater above the MCL. In July 2018, monitoring well 03WW01 was not analyzed for arsenic. The detected arsenic in July 2018 at monitoring well 35AWW08 decreased to 0.122 mg/L (**Table 3**). Only three other monitoring wells were sampled for arsenic and those wells did not have groundwater with arsenic detected above the MCLs. Note that wells 03WW01 and 35AWW08 were sampled by bailing due to the inability of the wells to recharge quickly enough during low-flow sampling, which likely resulted in the relatively high turbidity levels in the collected samples.

Arsenic concentrations detected in samples below the MCL in November 2017 ranged from non-detect in monitoring wells LHSMW06 (shallow monitoring well) and 35AWW01 (intermediate monitoring well) and 0.000850 J mg/L in monitoring well 1004TW001 (recommended for removal from monitoring program in Year 3 RA(O) Report). The arsenic detections below the MCL in July 2018 ranged from 0.000648 J mg/L in intermediate monitoring well 35AWW01 to 0.00198 J mg/L in shallow monitoring well 35AWW09. The low levels of arsenic detected in untreated portions of the plume indicates that arsenic is present only in areas of the site that have been treated using EISB, which likely mobilizes arsenic into groundwater.

As presented in Section 1.1, sampling at well 03WW01 will be conducted per the ESD for LHAAP-35A (58) that requires the groundwater underlying LHAAP-03 be included with the LHAAP-35A (58) groundwater remedy. Based on these results and the ESD (Bhate/APTIM, July 2018), it is recommended to continue monitoring arsenic in eastern plume monitoring wells 03WW01, 35AWW08, and 35AWW09 and western plume monitoring wells 35AWW20 and LHSMW06.

2.4 Surface Water Sampling

The 2013 RAWP (AECOM, August 2013) specifies that surface water monitoring for VOCs (1,1,2-TCA; 1,1-DCA; 1,1-DCE; 1,2-dichloroethane; benzene; cis-1,2-DCE; TCE; PCE; and VC) will be performed at surface water sample location 35ASW03, which is in a ditch that runs parallel to 4th Street, on the western boundary of the site and adjacent to the western groundwater plume. **Figure 2** depicts the surface water sampling location. Surface water samples are only collected if groundwater elevation is at or above the bottom of the ditch, which was not supported by groundwater level measurements.

The Draft Final RACR for LHAAP-35A (58) (AECOM, October 2015) states that *the water level in 35AWW18 will be gauged for comparison with the ditch bottom elevation at 35BSW03*. The surveyed bottom of the ditch at the lowest point is 213.58 ft above msl. The gauged water levels in the nearest upgradient monitoring well 35AWW18 in November 2017 and June 2018 were 195.90 ft above msl and 197.20 ft above msl, respectively. Therefore the groundwater surface is below the base of the ditch and groundwater is not discharging to surface water in the ditch. In addition, the ditch was dry during both the November 2017 and June 2018 sampling events.

2.5 Well Abandonment

No additional wells are recommended for abandonment beyond those previously recommended in the Year 3 RA(O) Report (Bhate, April 2018).

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3 PERFORMANCE MONITORING OF EISB

The EISB target area is located within the vicinity of wells 03WW01 and 35AWW08 within the eastern groundwater plume. Well 35AWW10 is considered an upgradient clean well and well 35AWW09 is located downgradient of the EISB area, but within the groundwater plume. Groundwater monitoring was performed in August 2013 prior to EISB implementation (baseline event), in October 2013 after the EISB injections, and in January 2014, May 2014, October 2014, January 2015, April 2015, July 2015, October 2015, April 2016, October 2016, November 2017, and June/July 2018. Within the western groundwater plume, groundwater sampling completed in July 2018 is the first sampling event following EISB implementation. A total of six monitoring wells will be evaluated via a total of eight quarterly performance monitoring events over the next 2 years to assess the EISB in the western plume (Bhate, January 2018). The EISB performance and key parameters are discussed below and much of the information is provided in **Tables 2, 3, and 5**.

3.1 Analysis of VOCs

3.1.1 Eastern Plume

Major reductions are observed in PCE in the eastern two monitoring wells, 03WW01 and 35AWW08, located within the influence of the EISB treatment area. In the July 2018 sampling event, PCE was no longer at detectable levels in either well. TCE, a degradation product of PCE, initially decreased between August 2013 and October 2013 but subsequently increased (due to reduction of PCE into TCE) indicating the occurrence of early stages of dechlorination. In monitoring well, 03WW01, TCE is no longer detected. TCE detected in monitoring well 35AWW08 decreased in both the November 2017 sampling event (33 micrograms per liter [µg/L]) and then again in the July 2018 sampling event (19 J µg/L; J is a data qualifier denoting an estimated concentration). The concentrations of cis-1,2-DCE and VC, degradation products of TCE, decreased or remained stable during the November 2017 and July 2018 sampling events. During this 4th year monitoring period, TCE has continued to decrease. The lack of increase in the cis-1,2-DCE and VC is likely due to the low levels of TCE currently degrading to these daughter products. Ethene is being produced which indicates that complete degradation is occurring.

3.1.2 Western Plume

The EISB injections were conducted following the sampling event completed in March 2018, which was considered the baseline sampling event. PCE was not detected in the western plume. TCE was detected in March 2018 in monitoring wells 35AWW20 and LHSMW07 at 330 µg/L and 34 µg/L, respectively. These TCE detections were comparable to the results from the November 2017 sampling event. Following the EISB treatment completed in March and April 2018, TCE reduced in both monitoring wells 35AWW20 and LHSMW07 to 270 µg/L and 12 µg/L, respectively. In monitoring well 35AWW20, TCE degradation products cis-1,2-DCE and VC were

detected at levels that appear to be stable and comparable to pre-EISB treatment levels. However, in LHSMW07, both cis-1,2-DCE and VC decreased following the EISB treatment.

3.2 Analysis of Field Parameters

The field parameters (potential of hydrogen [pH], dissolved oxygen [DO], oxidation-reduction potential [ORP], temperature, and specific conductivity) were measured in the LHAAP-35A (58) wells during the monitoring events. However, because wells 03WW01 and 35AWW08 were sampled using a bailer, the ORP and DO concentrations are not considered accurate though the information is recorded on the field forms, as these concentrations are not representative and so are not included in **Table 5**. In the future, the field parameters will be collected, when able, prior to using the bailer to collect the rest of the sample. The pH in these two wells initially decreased, potentially related to substrate fermentation and organic acid production. However, since October 2014, and continuing through this 3rd year monitoring period, the pH in both wells has increased, indicating a self-buffering capacity of the aquifer.

3.3 TOC Levels

Total organic carbon (TOC) is an indicator of the presence of carbon substrate. The background levels of TOC are typically less than 10 mg/L. Therefore, TOC present above these levels are indicative of the substrates presence in groundwater near the sampled monitoring well.

3.3.1 Eastern Plume

After injection of the carbon substrate, there was an initial spike of the TOC levels in both wells (03WW01 and 35AWW08), indicating effective substrate distribution from the injection points to the impacted zone. TOC levels have since decreased. Over the course of the 4th year monitoring period, the TOC levels have continued to decrease, which is expected as the carbon substrate is consumed and due to migration away from the injection area. The most recent residual TOC levels (July 2018) of 118 J mg/L in 03WW01 and 484 J mg/L in 35AWW08 indicate that TOC remains at sufficiently high concentrations to support reductive dechlorination, albeit at much reduced amounts compared to the period immediately after injection in October 2013. The July 2018 TOC levels were higher than background TOC concentrations in nearby wells such as 35AWW09 and 35AWW10 with October 2016 TOC concentrations of 5.76 mg/L and 3.21 mg/L, respectively.

3.3.2 Western Plume

Within the western plume, TOC increased in all of the monitoring wells following the EISB injections, compared to the baseline sampling results, within the influence of the injection points with the exception of 35AWW19. The greatest increases were observed in 35AWW06 and 35AWW11.

3.4 Analysis of Anions

Although sulfate reduction occurs through competing reactions to reductive dechlorination, the decrease in sulfate concentration is indicative of reducing aquifer conditions.

3.4.1 Eastern Plume

Decreased sulfate concentrations in the two EISB wells relative to levels in nearby wells that did not receive EISB treatment such as 35AWW09 and 35AWW10, indicate the development of reducing conditions conducive to reductive dechlorination. Monitoring well 03WW01 had similar detections of sulfate in November 2017 (40.8 mg/L) and July 2018 (161 mg/L) and decreased slightly in 35AWW08 from 2.03 mg/L in November 2017 to 0.9 mg/L in July 2018.

3.4.2 Western Plume

Following the EISB injections, sulfate decreased in each of the wells influenced by the EISB injections by approximately 50 percent (%). Monitoring well 35AWW19 was the exception with a decrease in sulfate but to a lesser extent than observed in the other wells.

3.5 Dissolved Gases

3.5.1 Eastern Plume

The methane concentration during the 4th year monitoring period in 03WW01 decreased to the lowest detections since 2014 (**Table 5**). However, the methane concentration at 03WW01 remains well above the baseline methane concentration observed in August 2013 of 3.22 µg/L. The methane concentration in 35AWW08 also decreased to the lowest detections since January 2015. Methane concentrations are still representative of strong reducing conditions due to methanogenesis. However, the reduction in methane production is indicative of a slowing of methanogenesis as both the electron donor and chlorinated VOCs are depleted.

Concurrently, carbon dioxide levels increased in both 03WW01 and 35AWW08, supporting the continued metabolism of the carbon substrate. Ethene was detected at low levels in both 03WW01 and 35AWW08, indicating that complete dechlorination is occurring.

3.5.2 Western Plume

Methane following the EISB treatment of the western plume remained stable or decreased. Carbon dioxide levels increased or remained stable in each of the monitoring wells in July 2018 (**Table 6**). Given the limited data for dissolved gases in the western plume, further information will be needed to determine trending. Ethene and ethane were not detected or detected at very low levels within the monitoring wells.

3.6 Dechlorinating Bacteria

3.6.1 Eastern Plume

The dechlorinating bacteria count spiked after the bioaugmentation event (November 2013) in wells 03WW01 and 35AWW08, indicating effective distribution of the introduced culture within the eastern plume per the RAWP. The introduced bacterial cultures then decreased in October 2014, in particular the concentrations of DHC species, the bacteria responsible for degrading cis-1,2-DCE to VC, which decreased to 10.9 cells/milliliter (mL) in 03WW01 and to 70.4 cells/mL in 35AWW08. However, during the 3rd year RA(O) sampling event, DHC species spiked to the highest levels yet observed, to 9,460,000 cells/mL in 03WW01 and to 25,600,000 cells/mL in 35AWW08. During the 4th year RA(O) sampling event, DHC species decreased in 03WW01 to 35,300 cells/mL in November 2017 and to 7.5 cells/mL in July 2018 and in 35AWW08 to 3,060,000 cells/mL in November 2017 and 1,410,000 cells/mL in July 2018. While DHC species are reducing within the eastern plume, the dechlorinating bacteria counts are still adequate for the continued degradation of PCE/TCE to VC.

3.6.2 Western Plume

The DHB increased significantly in the western plume in each of the monitoring wells influenced by the EISB treatment. DHC increased in a few of the monitoring wells but not significantly. The carbon substrate used within the western plume was selected due to longevity; however, microbial growth can be slower initially than with other substrates. Further monitoring will allow for trend analysis.

3.7 Summary

In summary, the EISB treatment has been effective in reducing the VOC concentrations and the conditions are still conducive for continued reductions. The eastern plume will likely become substrate limited in the near future which will need to be assessed in future RA(O) reports. Further monitoring of the western plume will allow for trends and analysis of EISB performance to be fully assessed. However, reductions of VOCs were observed throughout both the eastern and western plume areas as presented on **Figure 9**.

4 NATURAL ATTENUATION EVALUATION

This section presents the results of the natural attenuation evaluation in accordance with the three lines of evidence discussed in the Final Remedial Design (Shaw, September 2011) for LHAAP-35A (58) groundwater COCs. The discussion below pertains only to the shallow aquifer where COCs are detected above cleanup levels.

4.1 First Line of Evidence: Change in COC Concentrations over Time and with Distance

Natural attenuation is the combination of multiple mechanisms, including biodegradation, volatilization, dilution, advection, and absorption that reduce contaminant concentrations. The decrease of COC concentrations over time and distance in the absence of any other treatment is evidence of natural attenuation (AECOM, May 2016). The change in groundwater COC concentrations over time and with distance was evaluated at LHAAP-35A (58). VOC concentrations for the 4th year RA(O) monitoring period are identified on **Figure 6** (November 2017 and July 2018).

Eighteen monitoring wells are included in the MNA monitoring program for VOCs (35AWW01, 35AWW05, 35AWW06, 35AWW11, 35AWW12, 35AWW13, 35AWW14, 35AWW15, 35AWW16, 35AWW17, 35AWW18, 35AWW19, 35AWW20, 35AWW21, 35AWW22, 35AWW23, LHSMW04, LHSMW06, and LHSMW07). Wells 35AWW01 and 35AWW05 are screened in the intermediate groundwater zone; all other wells are screened in the shallow groundwater zone. Note that LHSMW04 was not sampled because it was dry.

The only wells where COCs were detected above their respective MCLs during the November 2017 groundwater sampling event are 35AWW08, 35AWW09, 35AWW11, 35AWW14, 35AWW19, 35AWW20, LHSMW06, and LHSMW07 (**Table 2**). The only wells where COCs were detected above their respective MCLs during the July 2018 groundwater sampling event are 03WW01, 35AWW08, 35AWW09, 35AWW11, 35AWW14, 35AWW19, 35AWW20, and LHSMW07 (**Table 3**). During the baseline groundwater sampling event completed in March 2018, 35AWW23 did have COC exceedances but no COCs exceeded during the July 2018 sampling event. Monitoring well 35AWW23 was installed in February 2018 per the Western plume RAWP (Bhate, January 2018). No COCs were detected above the MCLs in any of the other monitored wells during the 4th year RA(O) monitoring events.

Several wells exceeded the MCL for propionic acid in July 2018, which is not a COC. Arsenic was analyzed in November 2017 within the western plume but did not exceed the MCL of 0.01 mg/L. Arsenic was not analyzed in the June/July 2018 sampling event with the western plume. However, analysis of groundwater from select monitoring wells for arsenic is recommended for future RA(O) of the western plume.

The Draft Final RACR for LHAAP-35A (58) (AECOM, October 2015) states that historical groundwater data indicates that monitoring wells 35AWW20 and LHSMW07 in the western plume, and wells 35AWW08 and 35AWW09 in the eastern plume, will be the primary focus of COC trend analysis as they contain the highest relative COC concentrations. Additionally, well 03WW01, located in the eastern plume, had COC exceedances during this monitoring period and is therefore discussed herein.

Mann-Kendall analysis for the available historical data in each well (typically starting in 2008) through the end of the 4th year RA(O) period (July 2018) was completed for various COCs for monitoring wells 03WW01, 35AWW08, 35AWW09, 35AWW20, LHSMW06, and LHSMW07. The results are presented in **Appendix E** in graphical format with statistical results presented on the right hand side. The USEPA's ProUCL version 5.1 software was used for this analysis. Data used to generate the Mann-Kendall analysis is presented in **Tables 2 through 4.** The dates are displayed in numerical format (elapsed days) rather than in a date format as required by the program. The concentration of COCs are presented on the data points on the graph in µg/L. The level of significance was 5 %. A summary table of the Mann-Kendall results is presented below.

Mann-Kendall Trend Summary

Monitoring Well	PCE	TCE	cis-1,2-DCE	1,1-DCE	VC
03WW01	**Significant Decrease***	**Significant Decrease***	No significant trend*	--	--
35AWW08	**Significant Decrease***	**Significant Decrease**	No significant trend*	--	--
35AWW09	**Significant Increase**	**Significant Increase**	No significant trend*	--	--
35AWW20	--	**Significant Decrease**	No significant trend*	**Significant Decrease**	No significant trend
LHSMW06	--	**Significant Increase***	--	**Significant Increase***	**Significant Increase***
LHSMW07	--	**Significant Increase***	--	No significant trend*	No significant trend*

Note:
* Most recent concentrations already achieve MCLs

Of the analyzed parameters and wells using Mann-Kendall statistical analysis set, three monitoring wells, 03WW01 and 35AWW08 within the eastern plume and 35AWW20 in the western plume, showed a significant decrease in concentration over time. ProUCL software was used to determine the best fit regression curve for the dataset from which the first order rate constant was determined (**Appendix F**). PCE at 03WW01, has achieved the MCL of 5 µg/L as of

October 2016 (reported as non-detect). For 35AWW08, PCE was not detected and below the MCL for the first time in July 2018.

4.1.1 Eastern Plume

Well 03WW01

This well is located within the active EISB area. PCE and TCE previously detected in this well at concentrations above their respective MCLs were not detected during the 3rd or 4th year RA(O) monitoring periods. PCE concentrations during the 2nd Year RA(O) reporting period decreased rapidly after the introduction of the carbon substrate and bacterial augmentation. PCE concentrations, continued decreasing during the 2016 (3rd year) reporting period to 6.49 J µg/L in April 2016, and below the method detection limit in October 2016. PCE was not detected in the November 2017 or July 2018 sampling events. The decrease in PCE concentration is nearly 100% since October 2013. TCE concentrations increased after substrate injection and more rapidly after bioaugmentation, reaching a peak of 223 µg/L in October 2014 but has since decreased to < 5 µg/L in October 2016 and remained non-detect in the Year 4 RA(O) sampling results. The initial increase in TCE concentrations is a reflection of PCE degradation.

Degradation of TCE resulted in the accumulation of cis-1,2-DCE to a high of 117 µg/L in April 2016. The increase in cis-1,2-DCE indicates that cis-1,2-DCE has been biodegrading as well, as a result of introduction of KB-1® bacteria. Accumulation of VC was also not observed, likely because VC degradation was taking place, noting that the reporting limit for VC (12.5 µg/L) in April 2016 may have masked the presence of VC in this well. During the Year 4 RA(O) sampling event in November 2017, cis-1,2-DCE was not detected above the laboratory detection limit of 5 µg/L. However, both cis-1,2-DCE and VC were detected in the July 2018 at 5.3 J µg/L and 4.8 J µg/L respectively.

The Mann-Kendall trend analysis in 03WW01 was conducted for PCE; TCE; and cis-1,2-DCE for analytical results from 2008 through the end of the 4th year RA(O) period (July 2018). The Mann-Kendall results indicate statistically significant evidence of a decreasing trend in concentrations for PCE and TCE. The cis-1,2-DCE results indicate an insufficient statistical change and are below the MCLs.

Well 35AWW08

This well is located within the active EISB area. PCE concentrations during the 4th year RA(O) reporting period continued to decrease rapidly after the introduction of the carbon substrate and bacterial augmentation, with no detection above the detection limit of 2.5 µg/L in July 2018. TCE concentrations increased after substrate injection and more rapidly after bioaugmentation, reaching a peak of 953 µg/L in May 2014 followed by a decrease to 19 J µg/L in July 2018, which exceeds the associated MCL. The increase in TCE concentrations is a reflection of PCE degradation.

Degradation of TCE has resulted in an overall increase in cis-1,2-DCE concentrations, especially during the 2nd year monitoring period, reaching a high of 79.6 µg/L in October 2015. Although, cis-1,2-DCE decreased to 12 J µg/L in July 2018, the data indicates that active degradation of TCE has continued through the end of the 4th year monitoring period. An increase in VC indicates that cis-1,2-DCE has been biodegrading as well, as a result of introduction of KB-1® bacteria. Accumulation of VC was observed during the 4th year reporting period as the cis-1,2-DCE biodegraded. VC was not detected above the detection limit of 5 µg/L in November 2017 and was detected at 9.0 J µg/L in July 2018.

The Mann-Kendall trend analysis in 35AWW08 was conducted for PCE; TCE; and cis-1,2-DCE for analytical results from 2008 through the end of the 4th year RA(O) period (July 2018) (**Appendix E**). The results provide statistically significant evidence of a decreasing trend in concentrations for PCE and in TCE. The cis-1,2-DCE results indicate an insufficient statistical change and are below the MCLs.

Well 35AWW09

This well is located downgradient of the active EISB area. PCE and TCE were detected in this well at concentrations above their respective MCLs throughout the 4-year monitoring period. PCE concentrations have increased from 57.6 J µg/L in October 2013 to 350 µg/L in November 2017, but have decreased in July 2018 to 140 µg/L. Similarly, TCE concentrations exhibited a 10-fold increase over the initial 3 years of RA(O) sampling from 8.97 J µg/L in October 2013 to 97 µg/L in November 2017, but decreased during the second sampling event of the 4th year monitoring period back to 51 µg/L. A slight increase in cis-1,2-DCE was observed in this well from non-detect in October 2013 to 0.78 J µg/L in November 2017. However, cis-1,2-DCE was not detected in the July 2018 sampling event.

The Mann-Kendall trend analysis in 35AWW09 was conducted for PCE; TCE; and cis-1,2-DCE for analytical results from 2008 through the end of the 4th year RA(O) monitoring period (July 2018) (**Appendix E**). The results provide statistically significant evidence of an increasing trend in PCE and TCE concentrations, but no statistically significant change in cis-1,2-DCE concentrations, which are below the MCLs.

Well 35AWW09 was installed in August 2013 and sampled the same month. PCE and TCE were detected at concentrations of 21.9 µg/L and 11.9 µg/L, respectively. Samples were collected approximately quarterly through 2016. **Table 4** includes the historical COC concentrations.

The cause of the increase in COCs in well 35AWW09 is the migration of COCs in groundwater from the upgradient highly contaminated area (e.g., 35AWW08 and 03WW01). The initial increase in concentrations in 35AWW09 is likely associated with continued plume migration downgradient. The influence of biodegradation associated with EISB appears to remain within the area targeted for EISB (area of monitoring wells 35AWW08 and 03WW01) with little to no influence observed in 35AWW09.

Figure 8 shows COC concentration profiles in wells 03WW01, 35AWW08, 35AWW09, 35AWW20, and LHSMW07 and the table above summarizes the Mann-Kendall trend results for these same wells. Total VOCs were determined by adding the concentrations of the PCE, TCE, and cis-DCE shown on **Figure 8** in micromoles per liter as well as micrograms per liter. Other detected VOCs not shown on **Figure 8** were not included in the calculations.

4.1.2 Western Plume

Well 35AWW20

The COCs 1,1-DCE; cis-1,2-DCE; TCE; and VC were all detected in this well at concentrations above their respective MCLs during both Year 4 RA(O) monitoring events (**Tables 2 and 3**). Concentrations of cis-1,2-DCE; 1,1-DCE; and TCE have fluctuated between October 2013 and November 2017, but have remained relatively stable. The fluctuations in cis-1,2-DCE; 1,1-DCE; and TCE concentrations appear to be related to groundwater level changes. EISB injections were completed in the Western Plume in March and April 2018 (Bhate, August 2018). Concentrations of TCE have decreased by approximately 47 % between October 2013 and July 2018, while the concentrations of 1,1-DCE and cis-1,2-DCE have decreased by 57% and 37%, respectively, during this same period. Degradation product VC decreased 32% between October 2013 and July 2018.

In addition to the above constituents, well 35AWW20 contained 1,1,2-TCA and 1,2-DCA (daughter product of degradation of 1,1,2-TCA) above the MCLs throughout the 4-year monitoring period. The COC, 1,1,2-TCA fluctuated between a minimum of 48.3 µg/L in February 2014 and a maximum of 82.7 µg/L in October 2016. Additionally, the 1,1,2-TCA daughter product, 1,2-DCA fluctuated between a minimum of 13.2 µg/L in February 2014 and a maximum of 20.3 µg/L in October 2013. Conversely, increasing trends following EISB treatment (November 2017 compared to July 2018) were observed for both 1,1,2-TCA and 1,2-DCA with an increase of 33% and 84%, respectively.

The Mann-Kendall trend analysis in 35AWW20 was conducted for TCE; cis-1,2-DCE; 1,1-DCE; and VC for analytical results from 2008 through the end of the 4-year RA(O) period (July 2018). The results indicate no significant trend in concentrations for cis-1,2-DCE and VC over time with the general trend lines pointing slightly upward. Conversely, concentrations of TCE and 1,1-DCE indicate significant evidence of a decreasing trend over time at 35AWW20. These results indicate there is attenuation occurring in the vicinity of 35AWW20.

Well LHSMW06

The COCs TCE; 1,1-DCE; and VC slightly exceeded the MCLs in the November 2017 sampling event (**Table 2**) and were below their respective MCLs during July 2018 event (**Table 3**). All three COCs had increased to historically high concentrations in October 2016 but were non-detect or below the MCLs in July 2018.

The Mann-Kendall trend analysis in LHSMW06 was conducted for TCE; 1,1-DCE; and VC for analytical results from 2008 through the end of the 4-year RA(O) period (July 2018). The results indicate statistically significant increasing trends in concentrations for TCE; 1,1-DCE; and VC over time. However, each of these COCs are below the associated MCLs in July 2018.

Well LHSMW07

The COCs 1,1-DCE; TCE; and VC were detected in this well at concentrations above their respective MCLs during the entire 3-year monitoring period as well as the first sampling event in year 4 (November 2017). In July 2018, only 1,1-DCE and TCE exceeded their respective MCLs with VC not being detected. Concentrations of TCE have experienced an overall increase between October 2013 and October 2016, with TCE increasing from 23.9 µg/L to 71.6 µg/L in October 2016. However, a decreasing trend in TCE was observed during the 4th Year RA(O) with TCE detected at 39 µg/L in November 2017 and 12 µg/L in July 2018. Concentrations of 1,1-DCE and VC also experienced an overall increase between October 2013 and October 2016 with peak concentrations occurring in July 2015. However, a similar decreasing trend for both 1,1-DCE and VC were observed in Year 4 RA(O). The Mann-Kendall trend analysis in LHSMW07 was conducted for TCE; 1,1-DCE; and VC for analytical results from 2008 through the end of the 4-year RA(O) period (July 2018). The results indicate a statistically significant evidence of an increasing trend in concentrations for TCE over time but no significant trend for 1,1-DCE or VC. The recently observed decrease in concentration of COCs in LHSMW07 indicates successful implementation of EISB in the area of 35AWW20 and LHSMW07.

The COC, 1,1,2-TCA was detected above the MCL of 5 µg/L for the first time in April 2014 at 5.68 µg/L and was also above the MCL in October 2016 at a concentration of 7.72 µg/L. However, 1,1,2-TCA was detected at 3.6 µg/L in November 2017 and 1.3 µg/L in July 2018. The 1,1,2-TCA decreased 83% from October 2016 to July 2018, following EISB treatment. The 1,1,2-TCA daughter product, 1,2-DCA while detected below the MCL, had concentrations between 6.1 µg/L in October 2013 and 2.56 J µg/L in October 2016, but decreased in November 2017 to non-detect and then increased in July 2018 to 1.2 µg/L, with an overall decrease of 80% during the 4-year monitoring period.

4.1.3 Plume Stability

Contaminant plume maps completed for the November 2017 and July 2018 sampling events are presented as **Figures 6 and 7**, respectively. EISB treatment of the western plume was implemented in March and April 2018, which has resulted in a decreasing shift compared to previous RA(O) events trends.

4.1.3.1 Western Plume

Based on the southeasterly direction of groundwater flow, the following wells can be considered to be along the groundwater flow path: 35AWW15, 35AWW20, 35AWW23, LHSMW07, and 35AWW19. The COC concentrations in upgradient well 35AWW15 have remained below

detection limits throughout the reporting period. The in-plume well (35AWW20) exhibits the highest levels of COCs, which have generally decreased over the 4-year RA(O) monitoring period, with the exception of VC, which exhibited a slight overall increasing trend during this time period. The concentrations of COCs in the in-plume, downgradient well LHSMW07 have slightly increased since October 2013. The increase in concentrations of COCs in LHSMW07 likely indicates migration of COCs from the upgradient area of 35AWW20 to the area of LHSMW07. However, significant decreases in COCs detected in LHSMW07 have occurred following the EISB treatment in 2018 as evidenced by the July 2018 groundwater results.

The 1,1-DCE concentrations in monitoring wells 35AWW14 and 35AWW19, both of which are located in a downgradient direction of the western plume, have increased from below the MCL in October 2013 to above the MCL in October 2016, November 2017, and July 2018. Monitoring well 35AWW24 was non-detect for the COCs such that the plume is now defined. Further, detections of 1,1-DCE in monitoring wells 35AWW14 and 35AWW19 remains stable in the Year 4 RA(O) sampling events suggesting that migration of the plume is no longer occurring following EISB treatment of the western plume.

Evidence that plume expansion is no longer occurring is the decrease in concentrations of 1,1-DCE; TCE; and VC in LHSMW06, located east and cross-gradient of 35AWW20, to below their MCLs in July 2018. Further, concentrations of COCs in perimeter wells, including boundary area wells 35AWW15, 35AWW16, 35AWW17, and 35AWW18, exhibited no detections of COCs.

A review of the data for individual wells over the course of the monitoring period for the western plume suggests that there may be a correlation between groundwater elevations and COC concentrations. **Figure 8** provides concentration profiles with groundwater levels for monitoring wells 35AWW20 and LHSMW07, located in the western plume.

4.1.3.2 Eastern Plume

Based on the southeasterly direction of groundwater flow over the 4-year RA(O) monitoring period, the following wells are considered to be along the groundwater flow path: 35AWW10, 35AWW08, 03WW01, 35AWW09, and 35AWW21. The COC concentrations in the upgradient well, 35AWW10, remained below detection limits. The in-plume wells (35AWW08 and 35AWW09) exhibit the highest concentrations of COCs in the eastern plume. It should be noted that 03WW01 which is hydraulically downgradient of 35AWW08 and upgradient of 35AWW09 had no detections of COCs above the method detection limits in November 2017 but did have a detection of VC above the MCL with a detection of 4.8 J µg/L. This area of the eastern plume near 03WW01 was targeted for EISB. PCE concentrations detected during the 4-year RA(O) reporting period decreased significantly at 03AWW08 and 35AWW09 and were not detected and 140 µg/L, respectively, in July 2018. Since 2014, TCE has decreased to 19 J µg/L (35AWW08) and 51 µg/L (35AWW09), respectively, in July 2018. Concentrations of cis-1,2-DCE have also increased in 35AWW08, from October 2013 through October 2015 before tapering off during the

current reporting period, as a result of biodegradation of TCE to cis-1,2-DCE, the main TCE degradation daughter product.

There is a statistically significant increasing trend in concentrations of PCE and TCE in 35AWW09. Monitoring well 35AWW09 is located approximately 75 ft downgradient from 03WW01. The increase in concentrations in 35AWW09 is likely associated with downstream plume migration from highly impacted area well 35AWW08 and formerly impacted well 03WW01.

LHSMW04, which had been dry since 2008 was sampled in March and April 2016. However, the well was again dry in both November 2017 and July 2018. PCE was detected at 419 µg/L and TCE was detected at 106 µg/L in March 2016. However, the concentrations of COCs in the downgradient wells 35AWW12 and 35AWW21 remained below the detection limits. Monitoring well LHSMW04 is located between 35AWW09 and 35AWW12 and presents the lateral extent of the eastern plume. No increased concentrations or detections of new COCs at boundary area wells 35AWW10, 35AWW13, 35AWW22, 35AWW12, and 35AWW21 occurred, therefore, the extent of the eastern plume is stable.

A review of the data in 35AWW09 over the course of the monitoring period does not indicate any correlation between groundwater elevations and COC concentrations. COC concentration changes in 03WW01 and 35AWW08 could not be correlated with groundwater elevation because of EISB implementation in this area of the plume. **Figure 8** provides plots of groundwater COC concentrations and groundwater elevation changes over time in wells 03WW01, 35AWW08, and 35AWW09.

4.2 Second Line of Evidence: Geochemical Indicators

Table 2 includes the geochemical indicator parameters that are useful for MNA evaluation. Some geochemical parameters are measured in the field and are recorded for all sampling events for all wells. The field parameters for LHAAP-35A (58) wells include: DO, ORP, pH, conductivity, turbidity, and temperature. DO and ORP measurements from bailed wells are not considered representative and not included in **Tables 5 and 6**. The other geochemical indicators analyzed in the laboratory include: alkalinity, chloride, nitrate, nitrite, iron, sulfate, sulfide, methane, ethane, ethene, TOC, phosphorous, manganese, and dechlorinating bacteria. The following discussion examines the geochemical indicators recorded during the 4th year RA(O) monitoring period.

4.2.1 Eastern Plume

- Alkalinity – There is a positive correlation between zones of microbial activity and increased alkalinity (USEPA, September 1998). During the 4th year reporting period, alkalinity levels in the shallow zone groundwater at the eastern plume ranged between 62.1 mg/L (35AWW10) and 4,360 mg/L (35AWW08) in November 2017 and between 98.9 mg/L (35AWW10) and 3,050 mg/L (35AWW08). Monitoring wells, 35AWW08 and 03WW01, within the EISB area had the highest alkalinity readings onsite during the Year 4 RA(O) monitoring. Outside the EISB area, alkalinity levels were generally lower, ranging between

62.1 mg/L to 98.9 mg/L in 35AWW10. The higher alkalinity in 03WW01 and 35AWW08 is associated with biodegradation of organic substrate added to the groundwater and generation of carbon dioxide.

- Chloride – During biodegradation of chlorinated hydrocarbons in groundwater, chloride is released to groundwater. This results in higher chloride concentrations in the contaminant plume as compared to background levels in upgradient wells or in unimpacted downgradient wells (USEPA, September 1998). Chloride levels in the shallow zone ranged between 6.86 mg/L in background well 35AWW10 and 2,060 mg/L in impacted well 35AWW08 in November 2017 and then 7.51 mg/L in background well 35AWW10 and 2,460 mg/L in impacted well 35AWW08 in July 2018. Additionally, chloride levels within the eastern plume EISB treatment area wells 03WW01 (1,020 mg/L in November 2017 and 977 mg/L in July 2018) and 35AWW09 (1,520 mg/L in November 2017 and 1,470 in July 2018) provide evidence of biodegradation in the eastern plume. These levels can be compared to background chloride concentrations in upgradient wells such as 35AWW10 with a chloride concentration below 20 mg/L.
- Dissolved Oxygen – DO is the most thermodynamically favored electron acceptor used by microbes for biodegradation of organic carbon, whether natural or anthropogenic (USEPA, September 1998). Anaerobic bacteria generally cannot function at DO concentrations greater than about 0.5 mg/L and hence, reductive dechlorination will not occur. During the course of the monitoring period, the wells in the eastern plume (03WW01 and 35AWW08) were bailed, making the DO measurements in these wells unreliable. The DO levels observed in eastern plume well 35AWW09 were 0.74 mg/L (November 2017) and 1.09 mg/L (July 2018). These 4th year reporting period DO levels are not low enough to adequately support anaerobic conditions outside of the EISB treatment area (35AWW09).
- Oxidation-Reduction Potential – The ORP levels indicate how oxidative or reductive the groundwater is in the aquifer matrix and provide real-time data to determine if conditions are conducive for anaerobic biodegradation. ORP values less than 50 millivolts (mV) indicate that the aquifer is reaching anaerobic conditions that are favorable for the biological reductive dechlorination of chlorinated ethenes and ethanes. During the monitoring period, wells in the eastern plume (03WW01 and 35AWW08) were bailed, making the ORP measurements in these wells unreliable. The ORP measurements at LHAAP-35A (58) during the 4th year monitoring period were as follows: 360 mV (November 2017) and 293 mV (July 2018) in 35AWW09 (eastern plume downgradient of EISB area). These results indicate that conditions in the eastern plume outside of the EISB treatment area (35AWW09), are generally aerobic and not supportive of anaerobic degradation.
- Nitrate and Nitrite – After DO has been depleted in the microbiological treatment zone, nitrate may be used as an electron acceptor for anaerobic biodegradation of organic carbon by denitrification. In order for reductive dechlorination to occur, nitrate concentrations in the contaminated portion of the aquifer must be less than 1.0 mg/L (USEPA, September 1998). **Tables 2 and 3** indicate that nitrite concentrations were below the laboratory detection limit in 03WW01 and 35AWW08 in the November 2017 and July 2018 LHAAP 35A

(58) groundwater samples. Nitrate was detected in 35AWW08 at 0.249 mg/L in November 2017 but non-detect in 03WW01. Nitrate was not detected in 03WW01 nor in 35AWW08 during the July 2018 groundwater sampling event. Based on these observations, nitrate reduction in the shallow aquifer is not a likely mode of microbial respiration at the site, and the lack of nitrate is favorable for achieving the reducing conditions ideal for anaerobic reductive dechlorination.

- Iron – In some cases, iron (III) (ferric iron) is used as an electron acceptor during anaerobic biodegradation of organic carbon. During this process, iron (III) is reduced to iron (II) (ferrous iron), which may be soluble in water. Ferrous iron concentrations can be used as an indicator of anaerobic degradation of organic compounds. Ferrous iron concentrations in LHAAP-35A (58) wells during the November 2017 sampling event were as follows: 18.9 J mg/L in 03WW01; 17.4 J mg/L in 35AWW08; 0.06 J mg/L in 35AWW09; and 0.07 J mg/L in 35AWW10. Ferrous iron concentrations in LHAAP-35A (58) wells during the July 2018 sampling event were as follows: 40 J mg/L in 03WW01; 13.7 J mg/L in 35AWW08; 0.16 J mg/L in 35AWW09; and 0.21 J mg/L in 35AWW10. The relatively high concentrations of ferrous iron in monitoring wells 03WW01 and 35AWW08 indicate active reductive conditions in the eastern plume around these wells as a result of EISB. However, ferrous iron concentrations in the remaining wells indicate limited reductive conditions in the portion of the eastern plume outside the influence of EISB.
- Sulfate and Sulfide – After DO and nitrate have been depleted in the microbiological treatment zone, sulfate may be used as an electron acceptor for anaerobic biodegradation. This process is termed “sulfate reduction” and results in the production of sulfide. Concentrations of sulfate greater than 20 mg/L may cause competitive exclusion of dechlorination. However, in many plumes with high concentrations of sulfate, reductive dechlorination still occurs (USEPA, September 1998). **Tables 2 and 3** indicate sulfate concentrations in 03WW01 of 40.8 mg/L in November 2017 and 161 mg/L in July 2018. Sulfate was detected in 35AWW08 at 2.03 mg/L in November 2017 and 0.900 mg/L in July 2018. The sulfate concentration in 35AWW09, outside the influence of EISB, was 1,010 mg/L in November 2017 and 940 mg/L in July 2018. Sulfate levels were well above 20 mg/L in the majority of wells within the eastern plume of LHAAP-35A (58) except in the wells that were influenced by EISB.
- Dissolved gasses – Methanogenesis occurs in highly reducing conditions and generally occurs after oxygen, nitrate, and sulfate have been depleted. Ethane and ethene are the end products of reductive dechlorination of chlorinated VOCs and their levels increase if complete reductive dechlorination takes place. Methane levels above 500 µg/L are considered to indicate methanogenic conditions (USEPA, September 1998). Methane concentrations in the well 03WW01 decreased from 5,950 µg/L in October 2016 to 620 mg/L in November 2017 and in 35AWW08 from 7,350 µg/L in October 2016 to 670 µg/L in November 2017 (**Table 5**). Methane detected in 35AWW08 did increase slightly in July 2018 to 920 µg/L; however, the detected methane in 03WW01 decreased to 590 µg/L in July 2018. These wells are influenced by EISB and the production of methane is a strong indicator of anaerobic conditions. Methane concentrations in the remaining wells were

below 500 µg/L, indicating limited anaerobic conditions in the aquifer. Ethene was detected at low levels within both 03WW01 and 35AWW08 in November 2017 and July 2018.

- Total Organic Carbon – Regardless of the electron acceptor being used, organic carbon is a required source of reduced carbon and energy to sustain microbial activity. TOC is utilized as a carbon and energy source to support the reductive dechlorination of the chlorinated COCs. TOC concentrations greater than 20 mg/L are considered adequate to support microbial activity (USEPA, September 1998). TOC concentrations in eastern plume area wells, 03WW01 and 35AWW08, influenced by injected substrate slightly exceeded this threshold, with November 2017 concentrations of 191 mg/L and 581 mg/L respectively. The TOC decreased in the July 2018 sampling event with detections for 03WW01 and 35AWW08 being 118 J mg/L and 484 J mg/L respectively. These concentrations indicate that sufficient TOC remains in the aquifer to support reductive dechlorination in the eastern plume. However, TOC is decreasing towards the lower end of the threshold. The remaining wells had TOC concentrations below 20 mg/L.
- Phosphorus – Phosphorus in groundwater is a nutrient available to microbes for their metabolic processes during reductive dechlorination. Phosphorus is generally present at very low concentrations in the aquifer. However, phosphorus was introduced with the injected substrate in the area of 03WW01 and 35AWW08. In 03WW01, phosphorous was reported at 243 mg/L in October 2013 but decreased to 2.70 mg/L in November 2017 and 1.89 mg/L in July 2018, indicating consumption of phosphorous by bacteria. Similarly, phosphorous was detected at 361 mg/L in 35AWW08 in October 2013, but decreased to 3.55 mg/L in November 2017 and 4.23 in July 2018. These levels continue to support microbial activities, but could become rate limiting quickly. Detected phosphorus levels in other sampled wells were generally low or were less than the laboratory detection limit, indicating that groundwater does not have naturally available phosphorus to support biological degradation.
- Manganese – Manganese is a naturally occurring potential electron acceptor under anaerobic conditions. During anaerobic biological activity, manganese is solubilized from the aquifer matrix material. Dissolved manganese concentrations in November 2017 were relatively low ranging from 0.0662 mg/L in 35AWW10 to 8.54 mg/L in 03WW01. Wells 03WW01 (8.54 mg/L in November 2017) and 35AWW08 (5.70 mg/L in November 2017), which are inside the EISB treatment area, were the only wells that had dissolved manganese concentrations greater than 1.0 mg/L, suggesting no significant biological activity outside of the EISB treatment area. Dissolved manganese was detected at similar concentrations in July 2018 ranging from 0.0580 mg/L in 35AWW10 to 7.42 mg/L in 03WW01.
- Dechlorinating bacteria – Dechlorinating bacteria, dehalococcoides ethenogenes, dehalobacter, and associated functional genes were analyzed in groundwater samples from wells 03WW01, 35AWW08, 35AWW09, and 35AWW10, within and outside the eastern plume. Generally, the microbial population counts and the functional gene counts were below the laboratory reporting limits in areas not influenced by bioaugmentation (35AWW09 and 35AWW10), indicating a limited natural population of the bacteria and the

absence of gene expression necessary for anaerobic biological degradation of the COCs. At monitoring well 35AWW08, the microbial population counts were high, indicating the rapid proliferation of the microbial population during the 4th year reporting period. The microbial population count in 03WW01 was present but low. The presence of the VC reductase in both 03WW01 and 35AWW08 indicates that complete reductive dechlorination can occur to allow VC to reduce to ethane over time.

The qualitative assessment of geochemical indicators in the shallow groundwater zone at LHAAP-35A (58) indicates naturally occurring geochemical conditions are not supportive of MNA. However, the areas influenced by the EISB treatment continue to allow for MNA.

4.2.2 Western Plume

- Alkalinity – There is a positive correlation between zones of microbial activity and increased alkalinity (USEPA, September 1998). During the 4th year reporting period, alkalinity levels in the shallow zone groundwater at the western plume ranged between 452 mg/L (35AWW11) and 834 mg/L (35AWW20) in November 2017 and between 52.4 mg/L (35AWW24 – new monitoring well) and 1,990 mg/L (LHSMW07) in July 2018. Monitoring wells, 35AWW20 and LHSMW07, within the EISB area had the highest alkalinity readings onsite during the July 2018 sampling event. Monitoring well 35AWW24 is outside of the treatment area and had the lowest, detected alkalinity of 52.4 mg/L. The higher alkalinity following the EISB treatment is associated with biodegradation of organic substrate added to the groundwater and generation of carbon dioxide.
- Chloride – During biodegradation of chlorinated hydrocarbons in groundwater, chloride is released to groundwater. This results in higher chloride concentrations in the contaminant plume as compared to background levels in upgradient wells or in unimpacted downgradient wells (USEPA, September 1998). Prior to EISB injection, the chloride levels in the shallow zone detected in November 2017 ranged from 1,040 mg/L in 35AWW06 to 2,650 mg/L in 35AWW11. Following EISB treatment, the chloride levels in the shallow zone detected in July 2018 ranged from 117 mg/L in new monitoring well 35AWW24 (used to define the plume extent) to 2,440 mg/L in 35AWW11. Additionally, chloride levels within the other western plume EISB treatment area wells provide evidence of biodegradation in the western plume. These levels can be compared to background chloride concentrations in downgradient wells such as 35AWW24 with a chloride concentration below 120 mg/L.
- Dissolved Oxygen – DO is the most thermodynamically favored electron acceptor used by microbes for biodegradation of organic carbon, whether natural or anthropogenic (USEPA, September 1998). Anaerobic bacteria generally cannot function at DO concentrations greater than about 0.5 mg/L and hence, reductive dechlorination will not occur. The DO levels observed in the western plume generally went from less than 1.0 mg/L to 0.0 mg/L (**Table 6**). These 4th year reporting period DO levels are adequate to support anaerobic conditions within the EISB treatment area.
- Oxidation-Reduction Potential – The ORP levels indicate how oxidative or reductive the groundwater is in the aquifer matrix and provide real-time data to determine if conditions

are conducive for anaerobic biodegradation. ORP values less than 50 mV indicate that the aquifer is reaching anaerobic conditions that are favorable for the biological reductive dechlorination of chlorinated ethenes and ethanes. During the monitoring period, wells within the EISB treatment area (35AWW06, 35AWW11, 35AWW14, 35AWW19, 35AWW20, and LHSMW07) went from >100 mV to a negative ORP following the injections completed in March and April 2018. Areas outside of the treatment area (LHSMW06, 35AWW15, 35AWW16, 5AWW17, 35AWW018, and 35AWW24) continued to have a positive ORP. These results indicate that conditions in the western plume outside of the EISB treatment area are generally aerobic and not supportive of anaerobic degradation. However, the recent western plume EISB treatment area has achieved reducing conditions.

- Nitrate and Nitrite – After DO has been depleted in the microbiological treatment zone, nitrate may be used as an electron acceptor for anaerobic biodegradation of organic carbon by denitrification. In order for reductive dechlorination to occur, nitrate concentrations in the contaminated portion of the aquifer must be less than 1.0 mg/L (USEPA, September 1998). **Table 6** indicates that nitrite concentrations were below the laboratory reporting limits in the November 2017 and July 2018 LHAAP 35A (58) groundwater samples. Nitrate was detected during the November 2017 sampling event prior to the injections but was non-detect within the western plume monitoring wells in July 2018. Monitoring well 35AWW24 is located south of the western plume and did have nitrate detected at 0.064 J mg/L in July 2018. Based on these observations, nitrate reduction in the shallow aquifer is not a likely mode of microbial respiration at the site, and the lack of nitrate is favorable for achieving the reducing conditions ideal for anaerobic reductive dechlorination.
- Iron – In some cases, iron (III) (ferric iron) is used as an electron acceptor during anaerobic biodegradation of organic carbon. During this process, iron (III) is reduced to iron (II) (ferrous iron), which may be soluble in water. Ferrous iron concentrations can be used as an indicator of anaerobic degradation of organic compounds. Ferrous iron concentrations in LHAAP-35A (58) wells during the November 2017 sampling event were lower than following the EISB injections as represented by the increase in the July 2018 results (**Table 6**). The greatest increases in ferrous iron was observed in 35AWW06, 35AWW11, and 35AWW23. The relatively high concentrations of ferrous iron in these monitoring wells indicates active reductive conditions in the western plume around these wells as a result of EISB. However, ferrous iron concentrations in the remaining wells (e.g. 35AWW24) indicate limited reductive conditions in the portion of the western plume outside the influence of EISB.
- Sulfate and Sulfide – After DO and nitrate have been depleted in the microbiological treatment zone, sulfate may be used as an electron acceptor for anaerobic biodegradation. This process is termed “sulfate reduction” and results in the production of sulfide. Concentrations of sulfate greater than 20 mg/L may cause competitive exclusion of dechlorination. However, in many plumes with high concentrations of sulfate, reductive dechlorination still occurs (USEPA, September 1998). **Table 6** indicates that the sulfate concentrations decreased significantly in July 2018 within the area influenced from the EISB

treatment completed in March and April 2018. There was no appreciable change in the sulfate concentration in outside of the influence of EISB, based upon monitoring well 35AWW24 and presented in **Table 6.**

- Dissolved gasses – Methanogenesis occurs in highly reducing conditions and generally occurs after oxygen, nitrate, and sulfate have been depleted. Ethane and ethene are the end products of reductive dechlorination of chlorinated VOCs and their levels increase if complete reductive dechlorination takes place. Methane levels above 500 µg/L are considered to indicate methanogenic conditions (USEPA, September 1998). Methane concentrations in the western plume generally decreased from the November 2017 to the July 2018 sampling events. Methane in new well 35AWW23 went from non-detect in the baseline groundwater sampling event in March 2018 to 49 µg/L in July 2018. Methane concentrations within the western plume were below 250 µg/L, indicating limited anaerobic conditions in the aquifer. Ethene was not detected within the western plume, with the exception of a low level detection of 0.38 J µg/L at 35AWW23 and 0.58 J µg/L in 35AWW06 in July 2018.
- Total Organic Carbon – Regardless of the electron acceptor being used, organic carbon is a required source of reduced carbon and energy to sustain microbial activity. TOC is utilized as a carbon and energy source to support the reductive dechlorination of the chlorinated COCs. TOC concentrations greater than 20 mg/L are considered adequate to support microbial activity (USEPA, 1998). TOC concentrations in the western plume increased following EISB injections, which is to be expected. However, the detection of TOC varied throughout the plume from 43 mg/L in 35AWW20 to 4,200 J in 35AWW06. These concentrations indicate that sufficient TOC is present within the aquifer to support reductive dechlorination in the western plume following EISB treatment. However, TOC distribution varied likely due to the soil formation. Wells outside of the EISB treatment area have TOC concentrations below 20 mg/L.
- Phosphorus – Phosphorus in groundwater is a nutrient available to microbes for their metabolic processes during reductive dechlorination. Phosphorus is generally present at very low concentrations in the aquifer. The detected phosphorous levels within the western plume at LHAAP-58 following EISB treatment varied from 3.9 mg/L in monitoring well 35AWW06 to 0.061 mg/L in monitoring well 35AWW24. While phosphorus increased in wells sampled in November 2017 to July 2018, the detection of phosphorous within the residual western plume is relatively low and could be rate limiting.
- Manganese – Manganese is a naturally occurring potential electron acceptor under anaerobic conditions. During anaerobic biological activity, manganese is solubilized from the aquifer matrix material. Dissolved manganese increased from November 2017 to July 2018 following EISB injections. Therefore biological activity associated with the treatment appears to be occurring.
- Dechlorinating bacteria – Dechlorinating bacteria, dehalococcoides ethenogenes, dehalobacter, and associated functional genes were analyzed in groundwater samples from wells within and outside the western plume. Following the EISB treatment, dehalobacter

increased significantly in each of the wells influenced by the injections. Monitoring wells 35AWW20 and LHSMW07 had the most significant increase with July 2018 detections of DHB of over 5.9 million cells/mL in each of these two monitoring wells. DHC were observed to increase in monitoring wells 35AWW11, 35AWW23, and LHSMW07 based upon the baseline groundwater sampling completed in March 2018. The presence of the VC reductase in 35SWW11, 35AWW23, and LHSMW07 indicates that complete reductive dechlorination can occur to allow VC to reduce to ethane over time.

The qualitative assessment of geochemical indicators in the shallow groundwater zone at LHAAP-35A (58) indicates naturally occurring geochemical conditions are not supportive of MNA. However, the areas influenced by the EISB treatment continue to allow for MNA.

4.3 Third Line of Evidence: Predictive Modeling and Microbial Analysis

If the first two lines of evidence for MNA are deemed inadequate or inconclusive, and/or if the need for a contingency remedy is evaluated, data from field or microcosm studies will be necessary to establish the third line of evidence for MNA.

Dechlorinating bacteria, dehalococcoides ethenogenes, and associated functional genes were analyzed in wells within and outside the eastern and western plumes. Generally, outside the bioaugmentation area (35AWW09 and 35AWW10), the microbial population count and the functional gene counts were very low (less than 100 cells/mL) and in most cases below the laboratory reporting limits, indicating a limited population of the bacteria and an absence of gene expression necessary for anaerobic biological degradation of the COCs. Areas that were bioaugmented reflected higher concentrations of microbial population.

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5 CONCLUSIONS AND RECOMMENDATIONS

COC concentration data and geochemical indicator measurements were collected over the course of the monitoring period at LHAAP-35A (58) to evaluate the effectiveness of EISB and MNA as the LHAAP-35A (58) groundwater remedy. A tiered approach based on assessment of three lines of evidence was used to evaluate the occurrence of natural attenuation in site groundwater. The first line of evidence evaluated reductions in COC concentrations over time and with increasing distance from source areas, including evaluation of Mann-Kendall tests for trends; the second line of evidence evaluated geochemical indicators; and the third line of evidence evaluated microbial conditions in the aquifer. The results of the tiered evaluation and the conclusions are summarized below.

Data for 4th year RA(O) were collected in November 2017 and July 2018. Groundwater data from the western plume was also collected in March 2018 as part of the baseline sampling prior to the EISB injections. The groundwater flow direction at the site is interpreted to the southeast in the western portion of the site and to the east-southeast in the eastern portion of the site (see **Figures 4 and 5**).

The EISB treatment in the eastern and western plume area appears to be effectively reducing the VOC concentrations and the current groundwater conditions are conducive to continued reductions of VOCs. **Figure 8** presents the graphical depiction of the decreasing trends of the COCs of various monitoring wells within LHAAP-58. **Figure 9** presents the change in the plumes from October 2016 to July 2018, which demonstrates the reduced lateral extent of the plumes.

The primary initial influence of EISB within the eastern plume was a reduction of PCE in 03WW01 and 35AWW08. TCE concentrations were observed to increase at each well after substrate injection, as PCE was degraded to TCE, followed by a decrease in concentration as the rate of TCE formation became lower than the rate of TCE biodegradation. Generally, cis-1,2-DCE was observed to increase in these two wells due to formation of cis-1,2-DCE from biodegradation of TCE. COCs had reduced to not detected at well 03WW01 by the end of the Year 3 RA(O) but VC increased to 4.8 J µg/L in July 2018 indicating limited continued dechlorination. A significant reduction in PCE and TCE was observed in well 35AWW08, with PCE below detection limits at the end of the reporting period (July 2018). VC was also detected in July 2018 at 35AWW08 as well, indicating the degradation of TCE to cis-1,2-DCE and then VC. Based upon detections of ethane and presence of DHC, complete degradation is occurring.

Concentrations of PCE and TCE in 35AWW09, located within the eastern plume but outside the EISB area, have fluctuated since July 2015. The Mann-Kendall trend analysis for analytical results from 2008 through the end of the 4th year RA(O) monitoring period (July 2018) (**Appendix E**) indicate statistically significant evidence of an increasing trend in PCE and TCE concentrations, but no statistically significant change in cis-1,2-DCE concentrations, which are below the MCLs. However, the July 2018 results are the lowest PCE results in the past 3 years, which may indicate

residual benefit of upgradient EISB treatment from monitoring well 35AWW08. This decrease could also be indicative of plume migration which will be evaluated during future RA(O) Reports. The concentrations of COCs in downgradient well 35AWW21, which is located outside the eastern plume, have remained below the detection limits. Therefore, based on the inferred east-southeastern groundwater flow path, COC levels are not increasing with distance from the source area. Concentrations of COCs away from the most impacted wells, 35AWW08, 03WW01, and 35AWW09, have exhibited no increase in COC concentrations or new detections of COCs at boundary area wells 35AWW10, 35AWW13, 35AWW22, 35AWW12, and 35AWW21. Therefore, it appears that the lateral extent of the eastern plume is stable.

In the western plume, the EISB treatment was completed in March and April 2018 per the Final RAWP (Bhate, January 2018). COC concentrations in upgradient well 35AWW15 have remained below detection limits during this monitoring period. Concentrations of COCs in perimeter wells, 35AWW15, 35AWW16, 35AWW17, and 35AWW18, which are located well away from the most impacted wells, 35AWW20 and LHSMW07, have not increased and no new COCs were detected during the monitoring period. In addition, the new downgradient monitoring well 35AWW24 had no COCs detected, which supports that the lateral extent of the western plume is now defined. The wells within the influence of the EISB treatment decreased in detections of COCs following the injections based upon the July 2018 data. The distribution of the injectate varied, which is likely due to the heterogeneous nature of the soils. The July 2018 sampling event represents the first quarterly performance monitoring event following the injections. Future, quarterly groundwater sampling events will be required to evaluate the EISB treatment completed in the western plume.

The qualitative assessment of geochemical indicators and the absence of dechlorinating bacteria in the shallow groundwater zone (outside of EISB zone) at LHAAP-35A (58) indicates current naturally occurring geochemical conditions are not optimal for MNA.

Arsenic sampling at LHAAP-58 was inadvertently left out of the Year 3 RA(O) monitoring period. However, historically the highest arsenic concentrations were detected in samples from 03WW01 at 0.0891 mg/L in May 2014, and from 35AWW08 at 0.160 mg/L in January 2014. These wells are within the EISB area in the eastern groundwater plume. The presence of arsenic in groundwater above the MCL was reported in the past in samples from onsite wells and background wells, up to a maximum concentration of 0.0621 mg/L in a filtered sample collected on December 16, 2004, from perimeter well 110. Therefore, the presence of arsenic in groundwater cannot be attributed solely to reductive conditions caused by EISB, although it may have contributed to an increase in arsenic concentrations. In November 2017 and July 2018, select monitoring wells were analyzed for arsenic. Both 03WW01 and 35AWW08, within the eastern plume, were the only wells that exceeded the MCL of 0.01 mg/L. Per the ESD for LHAAP-35A (58) that incorporates groundwater sampling for arsenic and applies LHAAP-35A (58) LUCs to LHAAP-03, monitoring for arsenic in the eastern plume is included in the 5th year RA(O) monitoring plan.

Groundwater monitoring continues to be performed at LHAAP-35A (58) on a semi-annual basis in compliance with the 2013 RAWP (AECOM, August 2013). However, performance monitoring of the western plume will continue with quarterly sampling for 2 years per the Western Plume RAWP (Bhate, January 2018). No change in land or groundwater use has occurred at the site, and current land use complies with the ROD.

No water sample was collected at surface water sample location 35ASW03 during the 4th year RA(O) monitoring period due to lack of water present in the creek and groundwater elevation measurements below the bottom of the ditch. Continuing surface water sampling will be evaluated during the on-going five year review.

A LUC compliance inspection was conducted on August 15, 2018. No compliance issues or concerns were noted during the annual inspection (**Appendix A**). Specifically, no potable water wells or similar unauthorized use of groundwater were identified. The site continues to be used for non-residential land use per the LUCs. Well conditions, as of August 2018, are documented in the photographic log presented in **Appendix B**. The operation and maintenance inspection information is documented in the well field sampling forms (**Appendix C**). Monitoring well 35AWW04 was identified as needing new paint, but otherwise, no damage to bollards, pads, or protective well casings was observed and minimal encroachment of weeds or brush on the well pads was observed. It is recommended that repainting of well 35AWW04 be conducted during the next reporting period in 2018. Mowing the well areas is conducted regularly, as part of routine maintenance at the site, particularly before sampling events.

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FIGURES

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Longhorn Army Ammunition Plant
Location and Site Vicinity Map

Figure 1

4th Annual Remedial Action Operation Report (November 2017 – July 2018)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

PROJECT NO:	DATE:	DRAWN BY:
NWO1312.0150.012.0001.03	9/19/2018	MRM

SCALE: As Shown

bhate

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LHAAP-58 Monitoring Well Location Map

Figure 2

4th Annual Remedial Action Operation Report (November 2017 – July 2018)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 10/18/2018

SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.03

bhate

LHAAP-61
LHAAP-02
LHAAP-35A (58)
LHAAP-03
LHAAP-60D
LHAAP-68
LHAAP-69
LHAAP-56
LHAAP-59
LHAAP-65

35AWW03
35AWW13
35AWW22
35AWW07
35AWW07R
35AWW15
35AWW10
35AWW01
35AWW02
03WW01
LHSMW04
35AWW12
LHSMW05
35AWW08
35AWW09
LHSMW06
1004TW001
35AWW11
35AWW21
35AWW20
1004TW006
LHSMW03
35AWW16
35AWW14
35AWW05
LHSMW07
35AWW23
35AWW06
35ASW03
35AWW18
35AWW17
35AWW19
35AWW24
35AWW04

32ND ST.
HARRELL ST.
TACKET DR.
TYNER PL.
10TH ST.
9TH ST.
8TH ST.
AVE "G"
11TH ST.
6TH ST.
4TH ST.

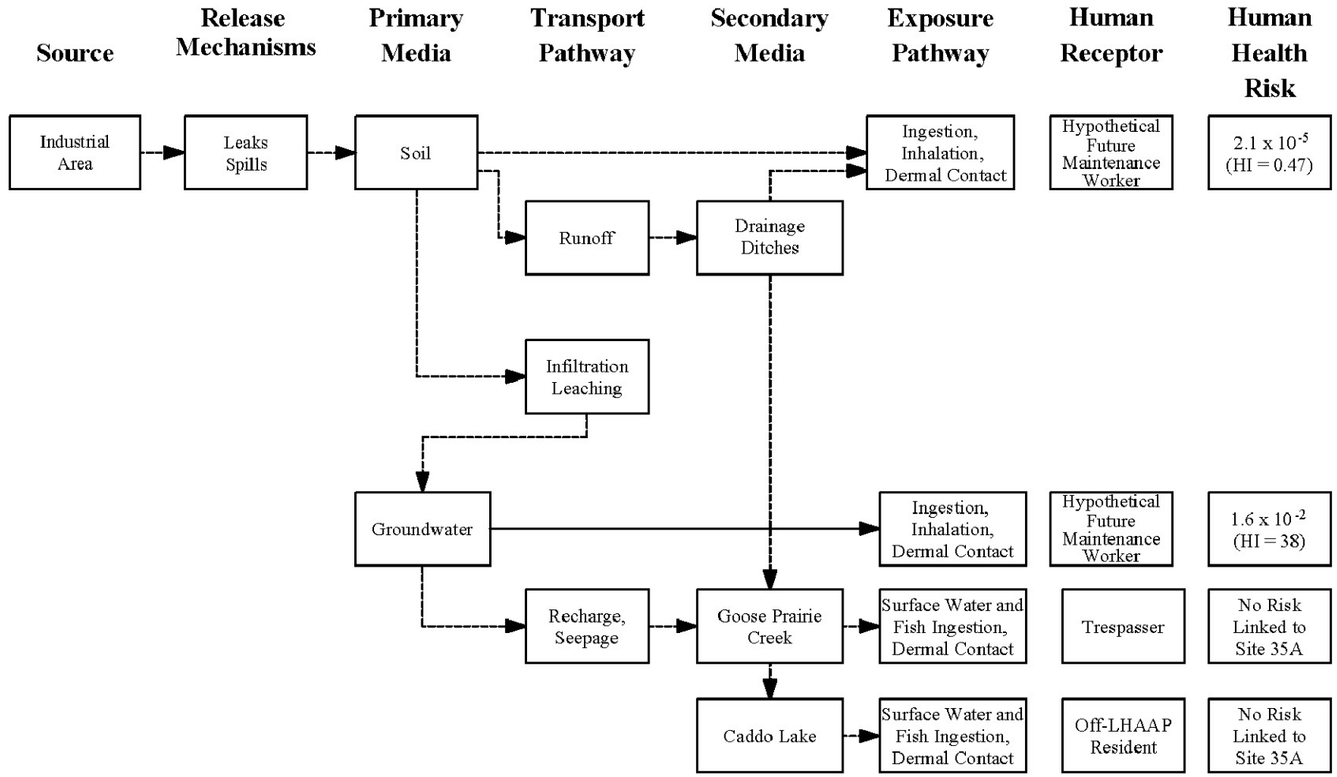
0 75 150 300 Feet

Legend:

- Shallow Monitoring Well Location
- Shallow Temporary Monitoring Well Location
- Intermediate Monitoring Well Location
- Deep Monitoring Well Location
- Surface Water Sample Location
- Groundwater Use Restrictions Area
- Installation Restoration Program (IRP) Area
- Stream
- 401 Building Number

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Pathway considered for remediation

Pathway *not* considered for remediation

Source: Shaw, May 2010

Conceptual Site Model

Figure 3

4th Annual Remedial Action Operation Report (November 2017 – July 2018)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 9/19/2018

SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.03

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LHAAP-58 November 2017 Shallow Potentiometric Map

Figure 4

4th Annual Remedial Action Operation Report (November 2017 – July 2018)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 9/19/2018

SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.03

bhate

LHAAP-35A (58)

32ND ST.
HARRELL ST
TACKET DR
AVE "F"
AVE "G"
5TH ST.
6TH ST.
7TH ST.
8TH ST.
9TH ST.
10TH ST.

35AWW03 (Dry)
35AWW13 (194.06)
35AWW22 (186.67)
35AWW15 (203.25)
35AWW10 (201.08)
35AWW07R (185.97)
LHSMW04 (Dry)
35AWW12 (186.02)
LHSMW05 (NM)
03WW01 (186.54)
35AWW09 (185.56)
35AWW08 (187.60)
LHSMW06 (203.87)
1004TW001 (NM)
35AWW21 (185.28)
1004TW006 (NM)
35AWW20 (203.18)
35AWW11 (189.24)
LHSMW03 (185.90)
35AWW16 (202.36)
35AWW14 (188.78)
LHSMW07 (202.27)
35AWW06 (200.65)
35AWW18 (195.90)
35AWW17 (196.57)
35AWW19 (191.90)

203.00
202.00
201.00
200.00
199.00
198.00
197.00
196.00
195.00
194.00
193.00
192.00
191.00
190.00
189.00
188.00
187.00
186.00

0 75 150 300 Feet

Legend:

- Shallow Monitoring Well Location
- Shallow Temporary Monitoring Well Location
- (185.90) Potentiometric Surface Elevation in Feet Above Mean Sea Level
- (NM) Not Measured
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- *401* Building Number

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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LHAAP-58 July 2018 Shallow Potentiometric Map

Figure 5

4th Annual Remedial Action Operation Report (November 2017 – July 2018)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 9/19/2018

SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.03

bhate

LHAAP-35A (58)

32ND ST.
HARRELL ST
TACKET DR
AVE 'F'
10TH ST.
9TH ST.
8TH ST.
AVE 'G'
4TH ST.
11TH ST.
6TH ST.

35AWW03 (NM)
35AWW13 (194.75)
35AWW22 (185.34)
35AWW07R (NM)
35AWW15 (203.47)
35AWW10 (201.81)
LHSMW04 (Dry)
35AWW12 (185.94)
LHSMW05 (NM)
03WW01 (186.33)
35AWW09 (185.25)
35AWW08 (187.50)
LHSMW06 (204.38)
1004TW001 (NM)
35AWW21 (185.28)
35AWW11 (189.55)
1004TW006 (NM)
35AWW20 (203.74)
LHSMW03 (NM)
35AWW16 (202.78)
35AWW14 (188.83)
LHSMW07 (202.52)
35AWW23 (199.52)
35AWW06 (200.76)
35AWW18 (197.20)
35AWW17 (196.37)
35AWW19 (192.34)
35AWW24 (192.44)

204.00
203.00
202.00
201.00
200.00
199.00
198.00
197.00
196.00
195.00
194.00
193.00
192.00
191.00
190.00
189.00
188.00
187.00
186.00

0 75 150 300 Feet

Legend:

- Shallow Monitoring Well Location
- Shallow Temporary Monitoring Well Location
- (185.28) Potentiometric Surface Elevation in Feet Above Mean Sea Level
- (NM) Not Measured
- Potentiometric Surface Contour
- Direction of Groundwater Flow
- Installation Restoration Program (IRP) Area
- *401* Building Number

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Legend
J = Estimated value
U = Result is less than the laboratory detection limit
< = less than
COC = Contaminant of Concern
MCL = Maximum Contaminant Level
DCE = Dichloroethene
PCE = Tetrachloroethene
TCE = Trichloroethene
VC = Vinyl Chloride
NS = Not Sampled
Bold Red values exceed the United States Environmental Protection Agency MCL
All results and MCLs are reported in micrograms per liter (µg/L)

35AWW10		11/15/2017	7/12/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 U	<0.5 U
cis-1,2-DCE	70	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U

35AWW13		11/16/2017	6/29/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 U	<0.5 U
cis-1,2-DCE	70	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U

03WW01		11/15/2017	7/18/2018
COC	MCL	Result	Result
1,1-DCE	7	<2.5 U	<0.5 UJ
cis-1,2-DCE	70	<2.5 U	5.3 J
PCE	5	<2.5 U	<0.5 UJ
trans-1,2-DCE	100	<2.5 U	<0.5 UJ
TCE	5	<2.5 U	<0.5 UJ
VC	2	<2.5 U	4.8 J

35AWW22		11/17/2017	7/18/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 U	<0.5 UJ
cis-1,2-DCE	70	<0.5 U	<0.5 UJ
PCE	5	<0.5 U	<0.5 UJ
trans-1,2-DCE	100	<0.5 U	<0.5 UJ
TCE	5	<0.5 U	<0.5 UJ
VC	2	<0.5 U	<0.5 UJ

35AWW15		11/16/2017	7/18/2018	7/18/2018
COC	MCL	Result	Result	Duplicate Result
1,1-DCE	7	<0.5 U	<0.5 UJ	<0.5 UJ
cis-1,2-DCE	70	<0.5 U	<0.5 UJ	<0.5 UJ
PCE	5	<0.5 U	<0.5 UJ	<0.5 UJ
trans-1,2-DCE	100	<0.5 U	<0.5 UJ	<0.5 UJ
TCE	5	<0.5 U	<0.5 UJ	<0.5 UJ
VC	2	<0.5 U	<0.5 UJ	<0.5 UJ

LHSMW06		11/17/2017	7/2/2018
COC	MCL	Result	Result
1,1-DCE	7	12	2.3
cis-1,2-DCE	70	14	12
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	5.8	2.8
VC	2	2.2	<0.5 U

35AWW09		11/15/2017	7/16/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 U	2.7
cis-1,2-DCE	70	0.78 J	<0.5 U
PCE	5	350	140
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	97	51
VC	2	<0.5 U	<0.5 U

35AWW20		11/14/2017	11/14/2017	7/16/2018
COC	MCL	Result	Duplicate Result	Result
1,1-DCE	7	1,900	2,000	1,400
cis-1,2-DCE	70	53	50	69
PCE	5	0.80 J	0.77 J	<0.5 U
trans-1,2-DCE	100	6.7	5.6	2.9
TCE	5	320	320	270
VC	2	78	75	71

35AWW16		11/13/2017	11/13/2017	6/29/2018	6/29/2018
COC	MCL	Result	Duplicate Result	Result	Duplicate Result
1,1-DCE	7	<0.5 U	<0.5 U	<0.5 U	<0.5 U
cis-1,2-DCE	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U

35AWW12		11/16/2017	6/29/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 UJ	<0.5 U
cis-1,2-DCE	70	<0.5 UJ	<0.5 U
PCE	5	<0.5 UJ	<0.5 U
trans-1,2-DCE	100	<0.5 UJ	<0.5 U
TCE	5	<0.5 UJ	<0.5 U
VC	2	<0.5 U	<0.5 U

35AWW21		11/13/2017	6/29/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 U	<0.5 U
cis-1,2-DCE	70	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U

LHSMW07		11/14/2017	7/17/2018
COC	MCL	Result	Result
1,1-DCE	7	600	56
cis-1,2-DCE	70	11	5.0
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	39	12
VC	2	15	<0.5 U

35AWW08		11/15/2017	7/18/2018
COC	MCL	Result	Result
1,1-DCE	7	<5 U	<2.5 UJ
cis-1,2-DCE	70	38	12 J
PCE	5	12	<2.5 UJ
trans-1,2-DCE	100	<5 U	<2.5 UJ
TCE	5	33	19 J
VC	2	<5 U	9.0 J

35AWW11		11/14/2017	7/16/2018
COC	MCL	Result	Result
1,1-DCE	7	12	9.3
cis-1,2-DCE	70	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U

35AWW06		11/14/2017	7/18/2018
COC	MCL	Result	Result
1,1-DCE	7	3.9	<0.5 UJ
cis-1,2-DCE	70	<0.5 U	<0.5 UJ
PCE	5	<0.5 U	<0.5 UJ
trans-1,2-DCE	100	<0.5 U	<0.5 UJ
TCE	5	<0.5 U	<0.5 UJ
VC	2	<0.5 U	<0.5 UJ

35AWW17		11/13/2017	6/29/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 U	<0.5 U
cis-1,2-DCE	70	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U

35AWW24		7/17/2018
COC	MCL	Result
1,1-DCE	7	<0.5 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

35AWW18		11/13/2017	6/29/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 U	1.2
cis-1,2-DCE	70	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U

35AWW23		7/17/2018
COC	MCL	Result
1,1-DCE	7	2.1
cis-1,2-DCE	70	12
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	2.6
VC	2	<0.5 U

35AWW19		11/17/2017	7/18/2018
COC	MCL	Result	Result
1,1-DCE	7	7.7	13 J
cis-1,2-DCE	70	<0.5 U	<0.5 UJ
PCE	5	<0.5 U	<0.5 UJ
trans-1,2-DCE	100	<0.5 U	<0.5 UJ
TCE	5	<0.5 U	<0.5 UJ
VC	2	<0.5 U	<0.5 UJ

35AWW14		11/17/2017	7/18/2018
COC	MCL	Result	Result
1,1-DCE	7	8.7	9.7 J
cis-1,2-DCE	70	3.5	4.0 J
PCE	5	<0.5 U	<0.5 UJ
trans-1,2-DCE	100	<0.5 U	<0.5 UJ
TCE	5	7.4	8.4 J
VC	2	<0.5 U	<0.5 UJ

35AWW03 (NS)
35AWW04 (NS)
35AWW07R (NS)
LHSMW03 (NS)
LHSMW04 (NS)
LHSMW05 (NS)
LHAAP-35A (58)

32ND ST.
TACKET DR
10TH ST.
9TH ST.
8TH ST.
6TH ST.
4TH ST.
AVE "G"
AVE "P"
L-6
102
102-R
103
101
GH-1
401

0 100 200 400 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend:
- Shallow Monitoring Well Location
- 1,1-DCE Concentration ≥ 7 µg/L (July 2018)
- PCE Concentration ≥ 5 µg/L (July 2018)
- TCE Concentration ≥ 5 µg/L (July 2018)
- VC Concentration ≥ 2 µg/L (July 2018)
- Installation Restoration Program (IRP) Area
- Stream
- 401 Building Number

COC Concentrations in Shallow Groundwater (November 2017 and July 2018)

Figure 6

4th Annual Remedial Action Operation Report (November 2017 – July 2018)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM
DATE: 9/19/2018
SCALE: As Shown
PROJECT NO: NWO1312.0150.012.0001.03

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Legend
U = Result is less than the laboratory detection limit
< = less than
COC = Contaminant of Concern
MCL = Maximum Contaminant Level
DCE = Dichloroethene
PCE = Tetrachloroethene
TCE = Trichloroethene
VC = Vinyl Chloride
All results and MCLs are reported in micrograms per liter (µg/L)

35AWW01		11/16/2017	7/2/2018
COC	MCL	Result	Result
1,1-DCE	7	<0.5 U	<0.5 U
cis-1,2-DCE	70	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U

35AWW05		11/13/2017	7/2/2018	7/2/2018
COC	MCL	Result	Result	Duplicate Result
1,1-DCE	7	<0.5 U	<0.5 U	<0.5 U
cis-1,2-DCE	70	<0.5 U	<0.5 U	<0.5 U
PCE	5	<0.5 U	<0.5 U	<0.5 U
trans-1,2-DCE	100	<0.5 U	<0.5 U	<0.5 U
TCE	5	<0.5 U	<0.5 U	<0.5 U
VC	2	<0.5 U	<0.5 U	<0.5 U

HARRELL ST.
32ND ST.
TACKET DR
AVE "P"
AVE "G"
8TH ST.
9TH ST.
10TH ST.
11TH ST.
6TH ST.
4TH ST.
LHAAP-35A (58)
207
103
102
102-R
L-6
101
GH-1
401

0 100 200 400 Feet

Legend:
Intermediate Monitoring Well Location
Installation Restoration Program (IRP) Area
Stream
401 Building Number

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

COC Concentrations in Intermediate Groundwater (November 2017 and July 2018)

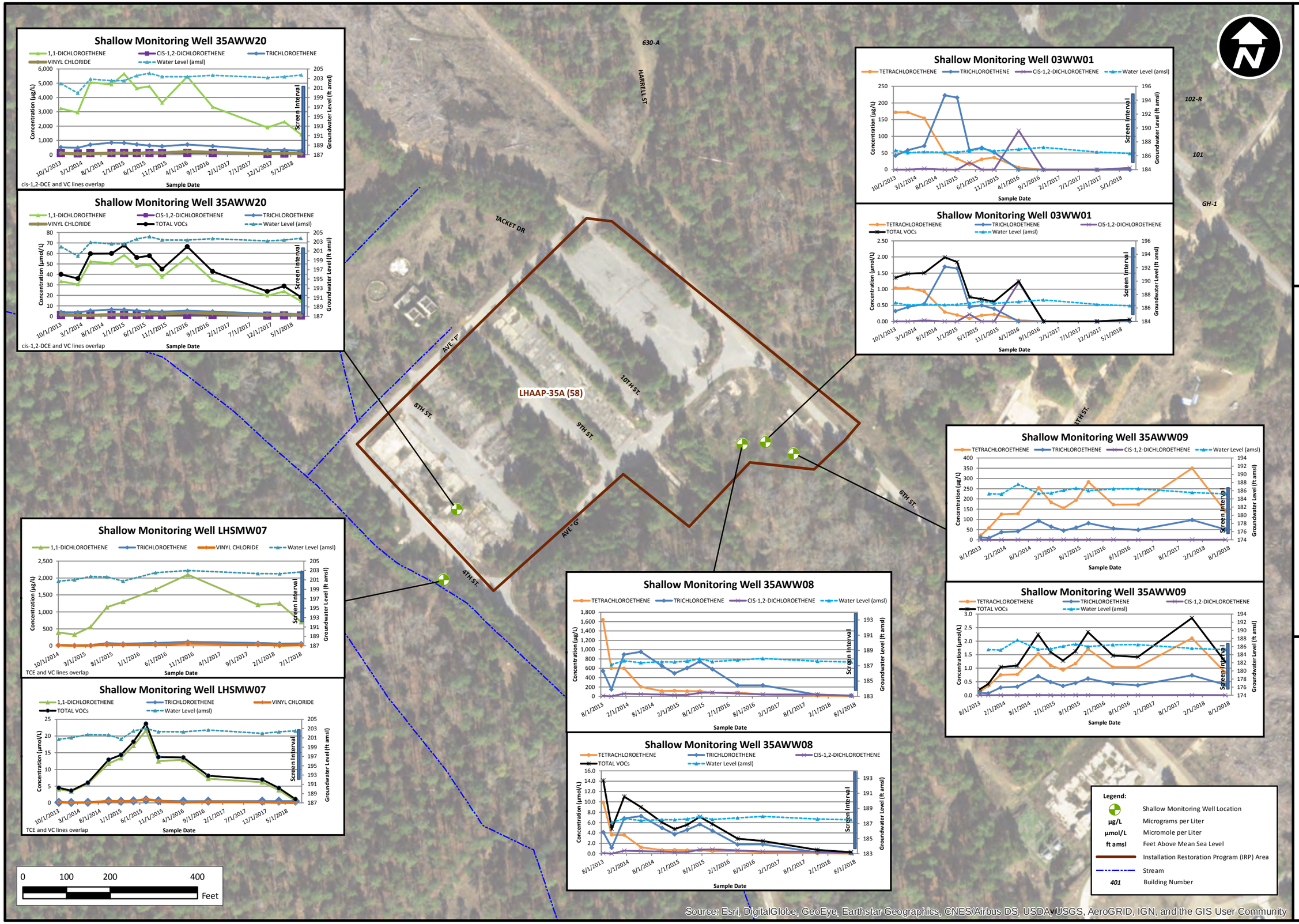
Figure 7

4th Annual Remedial Action Operation Report (November 2017 – July 2018)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM
DATE: 9/19/2018
SCALE: As Shown
PROJECT NO: NWO1312.0150.012.0001.03

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Shallow Monitoring Well 35AWW20

Shallow Monitoring Well 35AWW20

Shallow Monitoring Well 03WW01

Shallow Monitoring Well 03WW01

Shallow Monitoring Well 35AWW09

Shallow Monitoring Well 35AWW09

Shallow Monitoring Well LHSMW07

Shallow Monitoring Well LHSMW07

Shallow Monitoring Well 35AWW08

Shallow Monitoring Well 35AWW08

Legend:

- Shallow Monitoring Well Location
- µg/L — Micrograms per Liter
- µmol/L — Micromole per Liter
- ft amsl — Feet Above Mean Sea Level
- Installation Restoration Program (IRP) Area
- Stream
- *401* — Building Number

LHAAP-58 COC Concentration Trends

Figure 8

4th Annual Remedial Action Operation Report (November 2017 – July 2018)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

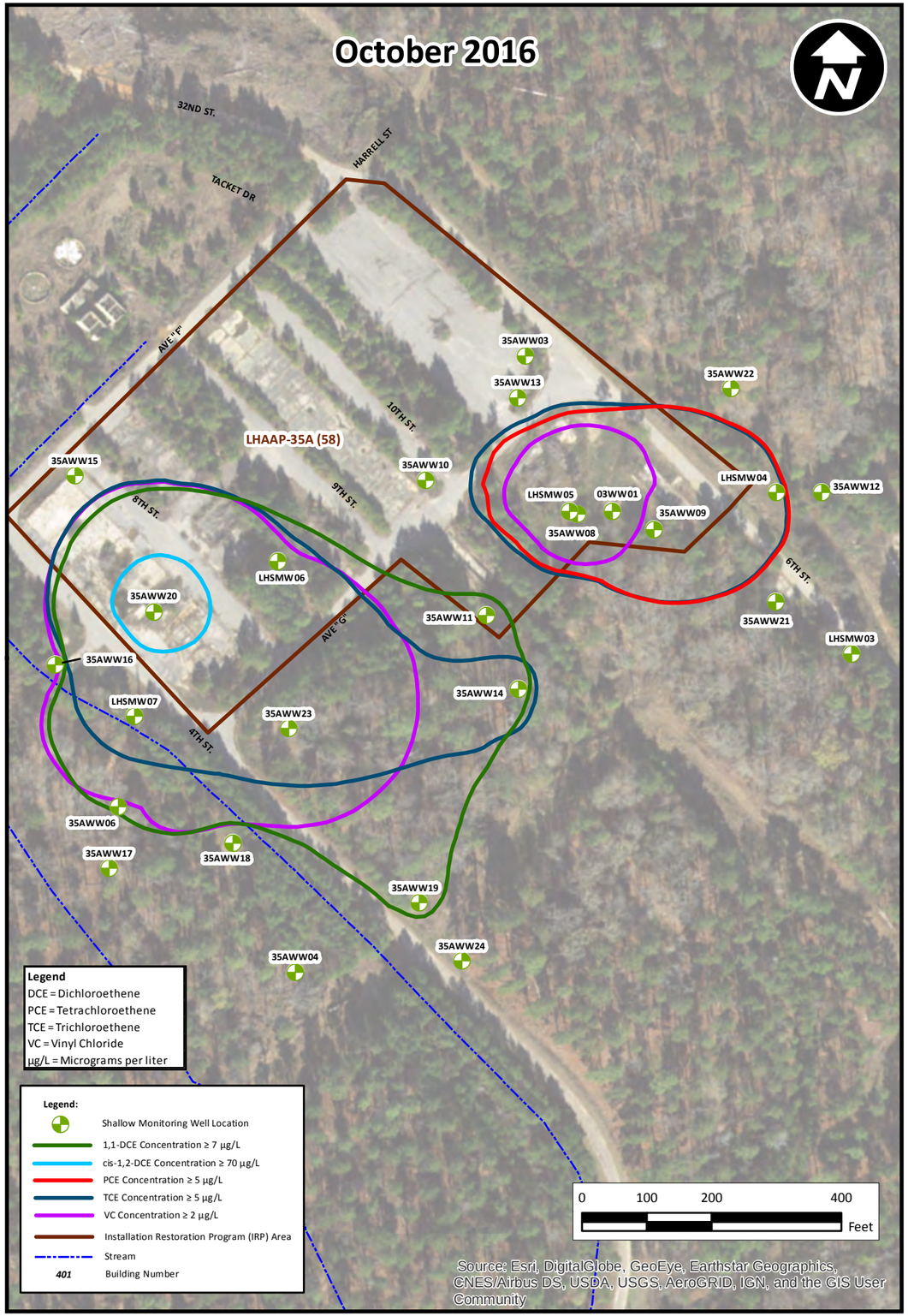
DATE: 10/18/2018

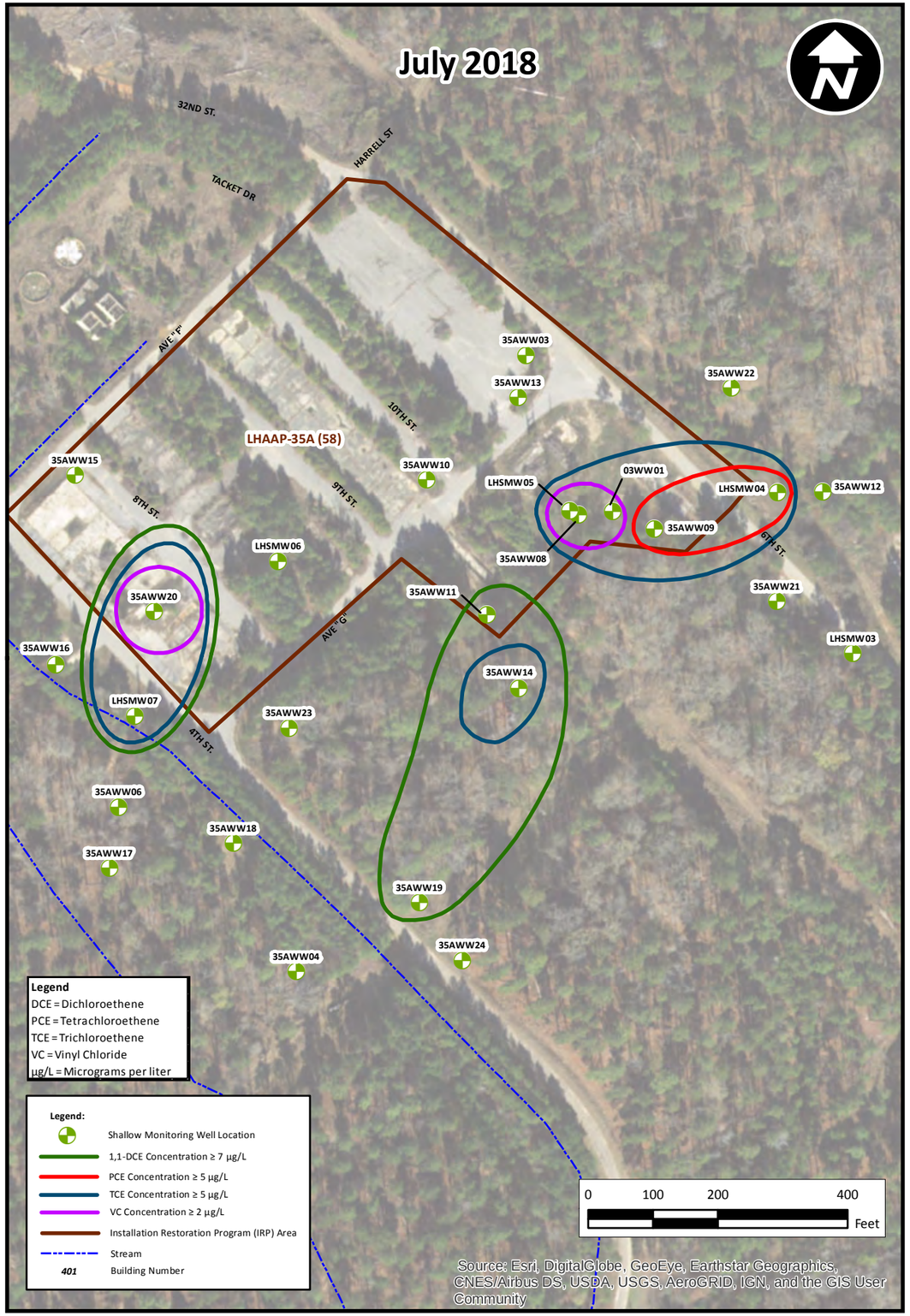
SCALE: As Shown

PROJECT NO: NW01312.0150.012.0001.03

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LHAAP-58 Lateral Extent of Plume Comparison (October 2016 and July 2018)

Figure 9

LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 9/19/2018

SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.03

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TABLES

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Table 1
Groundwater Elevation Data
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Well Identification	Aquifer	Sampling Date	Screen Intervals (ft from Top of Casing)	Top of Casing Elevation (ft)	Depth to Water (ft from Top of Casing)	Groundwater Elevation (ft above msl)
03WW01	Shallow	10/9/2013	21.53 - 31.53	216.29	29.51	186.78
		1/29/2014	21.53 - 31.53	216.29	29.86	186.43
		5/20/2014	21.53 - 31.53	216.29	29.72	186.57
		10/27/2014	21.53 - 31.53	216.29	29.81	186.48
		1/20/2015	21.53 - 31.53	216.29	29.75	186.54
		4/14/2015	21.53 - 31.53	216.29	29.60	186.69
		7/7/2015	21.53 - 31.53	216.29	29.25	187.04
		10/7/2015	21.53 - 31.53	216.29	29.60	186.69
		4/12/2016	21.53 - 31.53	216.29	29.36	186.93
		10/3/2016	21.53 - 31.53	216.29	29.09	187.20
		11/15/2017	21.53 - 31.53	216.29	29.75	186.54
		7/18/2018	21.53 - 31.53	216.29	29.96	186.33
1004TW001	Shallow	5/28/2014	NA	NM	18.05	NC
		10/30/2014	NA	NM	18.40	NC
		7/8/2015	NA	NM	17.00	NC
		4/14/2016	NA	NM	17.75	NC
		10/4/2016	NA	NM	17.46	NC
		11/17/2017	NA	NM	17.84	NC
1004TW006	Shallow	1/31/2014	NA	NM	19.17	NC
35AWW01	Intermediate	10/11/2013	62.69 - 72.69	218.03	40.58	177.45
		1/31/2014	62.69 - 72.69	218.03	40.21	177.82
		5/29/2014	62.69 - 72.69	218.03	39.31	178.72
		10/31/2014	62.69 - 72.69	218.03	40.17	177.86
		1/27/2015	62.69 - 72.69	218.03	39.40	178.63
		4/10/2015	62.69 - 72.69	218.03	40.06	177.97
		7/10/2015	62.69 - 72.69	218.03	39.10	178.93
		10/6/2015	62.69 - 72.69	218.03	39.79	178.24
		4/12/2016	62.69 - 72.69	218.03	38.86	179.17
		10/5/2016	62.69 - 72.69	218.03	39.01	179.02
		11/16/2017	62.69 - 72.69	218.03	44.29	173.74
		7/2/2018	62.69 - 72.69	218.03	43.00	175.03
35AWW02	Deep	10/22/2013	128.59 - 138.59	218.05	42.30	175.75
		4/13/2016	128.59 - 138.59	218.05	42.26	175.79
		10/4/2016	128.59 - 138.59	218.05	42.70	175.35
35AWW03	Shallow	2/1/2014	11.75 - 21.75	219.66	DRY	NC
		5/29/2014	11.75 - 21.75	219.66	DRY	NC
		10/30/2014	11.75 - 21.75	219.66	DRY	NC
		7/9/2015	11.75 - 21.75	219.66	DRY	NC
		4/13/2016	11.75 - 21.75	219.66	DRY	NC
		10/4/2016	11.75 - 21.75	219.66	DRY	NC
		11/16/2017	11.75 - 21.75	219.66	DRY	NC
35AWW05	Intermediate	10/16/2013	62.4 - 72.4	221.41	43.70	177.71
		2/1/2014	62.4 - 72.4	221.41	37.70	183.71
		5/22/2014	62.4 - 72.4	221.41	43.12	178.29
		10/21/2014	62.4 - 72.4	221.41	43.60	177.81
		1/23/2015	62.4 - 72.4	221.41	42.90	178.51
		4/8/2015	62.4 - 72.4	221.41	42.55	178.86
		7/10/2015	62.4 - 72.4	221.41	42.67	178.74
		10/5/2015	62.4 - 72.4	221.41	43.31	178.10
		4/14/2016	62.4 - 72.4	221.41	41.40	180.01
		10/5/2016	62.4 - 72.4	221.41	42.43	178.98
		11/13/2017	62.4 - 72.4	221.41	45.72	175.69
		7/2/2018	62.4 - 72.4	221.41	45.47	175.94

Table 1
Groundwater Elevation Data
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Well Identification	Aquifer	Sampling Date	Screen Intervals (ft from Top of Casing)	Top of Casing Elevation (ft)	Depth to Water (ft from Top of Casing)	Groundwater Elevation (ft above msl)
35AWW06	Shallow	10/15/2013	19.05 - 29.05	220.43	21.50	198.93
		1/30/2014	19.05 - 29.05	220.43	21.14	199.29
		5/21/2014	19.05 - 29.05	220.43	20.65	199.78
		10/29/2014	19.05 - 29.05	220.43	20.55	199.88
		1/28/2015	19.05 - 29.05	220.43	20.58	199.85
		4/15/2015	19.05 - 29.05	220.43	18.95	201.48
		7/7/2015	19.05 - 29.05	220.43	19.47	200.96
		10/7/2015	19.05 - 29.05	220.43	19.97	200.46
		4/11/2016	19.05 - 29.05	220.43	19.95	200.48
		10/3/2016	19.05 - 29.05	220.43	19.53	200.90
		11/14/2017	19.05 - 29.05	220.43	19.78	200.65
		7/18/2018	19.05 - 29.05	220.43	19.67	200.76
35AWW07R	Shallow	10/16/2013	21.55 - 31.25	212.11	27.90	184.21
		2/3/2014	21.55 - 31.25	212.11	28.90	183.21
		5/29/2014	21.55 - 31.25	212.11	25.83	186.28
		10/30/2014	21.55 - 31.26	212.11	26.55	185.56
		7/10/2015	21.55 - 31.26	212.11	24.08	188.03
		4/13/2016	21.55 - 31.26	212.11	24.34	187.77
		10/4/2016	21.55 - 31.26	212.11	24.82	187.29
		11/17/2017	21.55 - 31.26	212.11	26.14	185.97
35AWW08	Shallow	10/9/2013	21.83 - 31.83	216.95	29.80	187.15
		1/29/2014	21.83 - 31.83	216.95	29.30	187.65
		5/20/2014	21.83 - 31.83	216.95	29.55	187.40
		10/27/2014	21.83 - 31.83	216.95	29.43	187.52
		1/20/2015	21.83 - 31.83	216.95	29.45	187.50
		4/14/2015	21.83 - 31.83	216.95	29.35	187.60
		7/7/2015	21.83 - 31.83	216.95	29.05	187.90
		10/7/2015	21.83 - 31.83	216.95	29.41	187.54
		4/12/2016	21.83 - 31.83	216.95	29.20	187.75
		10/3/2016	21.83 - 31.83	216.95	29.00	187.95
		11/15/2017	21.83 - 31.83	216.95	29.35	187.60
		7/18/2018	21.83 - 31.83	216.95	29.45	187.50
35AWW09	Shallow	10/10/2013	26.69 - 41.29	217.47	32.21	185.26
		1/29/2014	26.69 - 41.29	217.47	32.32	185.15
		5/20/2014	26.69 - 41.29	217.47	29.87	187.60
		10/27/2014	26.69 - 41.29	217.47	32.15	185.32
		1/21/2015	26.69 - 41.29	217.47	32.04	185.43
		4/14/2015	26.69 - 41.29	217.47	31.38	186.09
		7/7/2015	26.69 - 41.29	217.47	30.87	186.60
		10/7/2015	26.69 - 41.29	217.47	31.46	186.01
		4/12/2016	26.69 - 41.29	217.47	31.02	186.45
		10/3/2016	26.69 - 41.29	217.47	31.00	186.47
		11/15/2017	26.69 - 41.29	217.47	31.91	185.56
		7/16/2018	26.69 - 41.29	217.47	32.22	185.25
35AWW10	Shallow	10/10/2013	18.16 - 32.76	220.76	20.15	200.61
		1/29/2014	18.16 - 32.76	220.76	18.85	201.91
		5/20/2014	18.16 - 32.76	220.76	17.10	203.66
		10/28/2014	18.16 - 32.76	220.76	19.55	201.21
		1/27/2015	18.16 - 32.76	220.76	17.78	202.98
		4/14/2015	18.16 - 32.76	220.76	16.45	204.31
		7/7/2015	18.16 - 32.76	220.76	17.17	203.59
		10/7/2015	18.16 - 32.76	220.76	19.45	201.31
		4/13/2016	18.16 - 32.76	220.76	17.41	203.35
		10/3/2016	18.16 - 32.76	220.76	18.98	201.78
		11/15/2017	18.16 - 32.76	220.76	19.68	201.08
		7/12/2018	18.16 - 32.76	220.76	18.95	201.81

Table 1
Groundwater Elevation Data
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Well Identification	Aquifer	Sampling Date	Screen Intervals (ft from Top of Casing)	Top of Casing Elevation (ft)	Depth to Water (ft from Top of Casing)	Groundwater Elevation (ft above msl)
35AWW11	Shallow	10/15/2013	22.24 - 36.84	220.15	31.36	188.79
		2/3/2014	22.24 - 36.84	220.15	31.80	188.35
		5/21/2014	22.24 - 36.84	220.15	31.55	188.60
		10/29/2014	22.24 - 36.84	220.15	31.73	188.42
		1/27/2015	22.24 - 36.84	220.15	31.60	188.55
		4/14/2015	22.24 - 36.84	220.15	31.25	188.90
		7/8/2015	22.24 - 36.84	220.15	30.72	189.43
		10/7/2015	22.24 - 36.84	220.15	31.20	188.95
		4/12/2016	22.24 - 36.84	220.15	31.03	189.12
		10/3/2016	22.24 - 36.84	220.15	30.48	189.67
		11/14/2017	22.24 - 36.84	220.15	30.91	189.24
		7/16/2018	22.24 - 36.84	220.15	30.60	189.55
35AWW12	Shallow	10/18/2013	22.17 - 36.77	215.99	30.05	185.94
		1/31/2014	22.17 - 36.77	215.99	28.10	187.89
		5/29/2014	22.17 - 36.77	215.99	29.00	186.99
		10/30/2014	22.17 - 36.77	215.99	30.11	185.88
		1/28/2015	22.17 - 36.77	215.99	29.45	186.54
		4/7/2015	22.17 - 36.77	215.99	28.70	187.29
		7/9/2015	22.17 - 36.77	215.99	28.22	187.77
		10/5/2015	22.17 - 36.77	215.99	29.35	186.64
		4/12/2016	22.17 - 36.77	215.99	28.54	187.45
		10/5/2016	22.17 - 36.77	215.99	28.87	187.12
		11/16/2017	22.17 - 36.77	215.99	29.97	186.02
		6/29/2018	22.17 - 36.77	215.99	30.05	185.94
35AWW13	Shallow	10/11/2013	24.72 - 39.32	219.12	25.07	194.05
		2/3/2014	24.72 - 39.32	219.12	24.91	194.21
		5/22/2014	24.72 - 39.32	219.12	23.80	195.32
		10/21/2014	24.72 - 39.32	219.12	24.85	194.27
		1/23/2015	24.72 - 39.32	219.12	24.70	194.42
		4/8/2015	24.72 - 39.32	219.12	23.72	195.40
		7/9/2015	24.72 - 39.32	219.12	23.39	195.73
		10/6/2015	24.72 - 39.32	219.12	24.61	194.51
		4/13/2016	24.72 - 39.32	219.12	24.10	195.02
		10/6/2016	24.72 - 39.32	219.12	24.41	194.71
		11/16/2017	24.72 - 39.32	219.12	25.06	194.06
		6/29/2018	24.72 - 39.32	219.12	24.37	194.75
35AWW14	Shallow	10/18/2013	17.06 - 31.76	218.41	30.80	187.61
		1/31/2014	17.06 - 31.76	218.41	30.95	187.46
		5/28/2014	17.06 - 31.76	218.41	30.57	187.84
		10/29/2014	17.06 - 31.76	218.41	31.00	187.41
		1/20/2015	17.06 - 31.76	218.41	30.85	187.56
		4/7/2015	17.06 - 31.76	218.41	30.48	187.93
		7/8/2015	17.06 - 31.76	218.41	29.75	188.66
		10/1/2015	17.06 - 31.76	218.41	30.19	188.22
		4/12/2016	17.06 - 31.76	218.41	29.67	188.74
		10/5/2016	17.06 - 31.76	218.41	29.31	189.10
		11/16/2017	17.06 - 31.76	218.41	29.63	188.78
		7/18/2018	17.06 - 31.76	218.41	29.58	188.83

Table 1
Groundwater Elevation Data
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Well Identification	Aquifer	Sampling Date	Screen Intervals (ft from Top of Casing)	Top of Casing Elevation (ft)	Depth to Water (ft from Top of Casing)	Groundwater Elevation (ft above msl)
35AWW15	Shallow	10/16/2013	25.67 - 40.37	222.97	20.65	202.32
		2/1/2014	25.67 - 40.37	222.97	20.40	202.57
		5/28/2014	25.67 - 40.37	222.97	19.64	203.33
		10/21/2014	25.67 - 40.37	222.97	20.18	202.79
		1/23/2015	25.67 - 40.37	222.97	20.15	202.82
		4/10/2015	25.67 - 40.37	222.97	19.31	203.66
		7/10/2015	25.67 - 40.37	222.97	18.95	204.02
		10/6/2015	25.67 - 40.37	222.97	19.56	203.41
		4/14/2016	25.67 - 40.37	222.97	19.51	203.46
		10/5/2016	25.67 - 40.37	222.97	19.34	203.63
		11/16/2017	25.67 - 40.37	222.97	19.72	203.25
		7/18/2018	25.67 - 40.37	222.97	19.50	203.47
35AWW16	Shallow	10/22/2013	21.75 - 36.45	220.88	19.58	201.30
		1/31/2014	21.75 - 36.45	220.88	19.28	201.60
		5/28/2014	21.75 - 36.45	220.88	18.60	202.28
		10/30/2014	21.75 - 36.45	220.88	19.96	200.92
		1/27/2015	21.75 - 36.45	220.88	18.90	201.98
		4/7/2015	21.75 - 36.45	220.88	18.22	202.66
		7/9/2015	21.75 - 36.45	220.88	17.79	203.09
		10/6/2015	21.75 - 36.45	220.88	18.20	202.68
		4/12/2016	21.75 - 36.45	220.88	18.43	202.45
		10/4/2016	21.75 - 36.45	220.88	17.90	202.98
		11/13/2017	21.75 - 36.45	220.88	18.52	202.36
		6/29/2018	21.75 - 36.45	220.88	18.10	202.78
35AWW17	Shallow	10/18/2013	26.97 - 41.67	221.44	28.00	193.44
		2/1/2014	26.97 - 41.67	221.44	36.90	184.54
		5/29/2014	26.97 - 41.67	221.44	26.60	194.84
		10/31/2014	26.97 - 41.67	221.44	26.80	194.64
		1/28/2015	26.97 - 41.67	221.44	26.00	195.44
		4/10/2015	26.97 - 41.67	221.44	25.65	195.79
		7/10/2015	26.97 - 41.67	221.44	25.42	196.02
		10/5/2015	26.97 - 41.67	221.44	25.93	195.51
		4/11/2016	26.97 - 41.67	221.44	25.60	195.84
		10/3/2016	26.97 - 41.67	221.44	25.30	196.14
		11/13/2017	26.97 - 41.67	221.44	24.87	196.57
		6/29/2018	26.97 - 41.67	221.44	25.07	196.37
35AWW18	Shallow	10/18/2013	26.85 - 41.55	221.75	28.35	193.40
		2/1/2014	26.85 - 41.55	221.75	27.90	193.85
		5/29/2014	26.85 - 41.55	221.75	27.65	194.10
		10/31/2014	26.85 - 41.55	221.75	27.50	194.25
		1/28/2015	26.85 - 41.55	221.75	27.11	194.64
		4/10/2015	26.85 - 41.55	221.75	25.90	195.85
		7/10/2015	26.85 - 41.55	221.75	26.42	195.33
		10/5/2015	26.85 - 41.55	221.75	26.67	195.08
		4/11/2016	26.85 - 41.55	221.75	26.40	195.35
		10/5/2016	26.85 - 41.55	221.75	25.93	195.82
		11/13/2017	26.85 - 41.55	221.75	25.85	195.90
		6/29/2018	26.85 - 41.55	221.75	24.55	197.20

Table 1
Groundwater Elevation Data
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Well Identification	Aquifer	Sampling Date	Screen Intervals (ft from Top of Casing)	Top of Casing Elevation (ft)	Depth to Water (ft from Top of Casing)	Groundwater Elevation (ft above msl)
35AWW19	Shallow	10/22/2013	16.99 - 31.09	219.71	30.65	189.06
		1/31/2014	16.99 - 31.09	219.71	30.68	189.03
		5/28/2014	16.99 - 31.09	219.71	30.30	189.41
		10/29/2014	16.99 - 31.09	219.71	30.45	189.26
		1/20/2015	16.99 - 31.09	219.71	30.15	189.56
		4/7/2015	16.99 - 31.09	219.71	29.84	189.87
		7/8/2015	16.99 - 31.09	219.71	29.16	190.55
		10/1/2015	16.99 - 31.09	219.71	29.46	190.25
		4/12/2016	16.99 - 31.09	219.71	28.87	190.84
		10/5/2016	16.99 - 31.09	219.71	28.13	191.58
		11/17/2017	16.99 - 31.09	219.71	27.81	191.90
		7/18/2018	16.99 - 31.09	219.71	27.37	192.34
35AWW20	Shallow	10/15/2013	20.94 - 35.64	223.05	21.12	201.93
		2/3/2014	20.94 - 35.64	223.05	23.12	199.93
		5/21/2014	20.94 - 35.64	223.05	20.18	202.87
		10/29/2014	20.94 - 35.64	223.05	20.50	202.55
		1/27/2015	20.94 - 35.64	223.05	20.50	202.55
		4/15/2015	20.94 - 35.64	223.05	19.45	203.60
		7/8/2015	20.94 - 35.64	223.05	18.95	204.10
		10/8/2015	20.94 - 35.64	223.05	19.67	203.38
		4/13/2016	20.94 - 35.64	223.05	19.69	203.36
		10/4/2016	20.94 - 35.64	223.05	19.38	203.67
		11/14/2017	20.94 - 35.64	223.05	19.87	203.18
		7/16/2018	20.94 - 35.64	223.05	19.31	203.74
35AWW21	Shallow	10/16/2013	27.56 - 42.26	219.05	34.36	184.69
		2/4/2014	27.56 - 42.26	219.05	33.55	185.50
		5/22/2014	27.56 - 42.26	219.05	32.40	186.65
		10/21/2014	27.56 - 42.26	219.05	33.90	185.15
		1/23/2015	27.56 - 42.26	219.05	33.06	185.99
		4/8/2015	27.56 - 42.26	219.05	31.73	187.32
		7/9/2015	27.56 - 42.26	219.05	31.11	187.94
		10/6/2015	27.56 - 42.26	219.05	32.74	186.31
		4/13/2016	27.56 - 42.26	219.05	31.44	187.61
		10/4/2016	27.56 - 42.26	219.05	32.10	186.95
		11/13/2017	27.56 - 42.26	219.05	33.77	185.28
		6/29/2018	27.56 - 42.26	219.05	33.77	185.28
35AWW22	Shallow	10/22/2013	22.27 - 36.77	219.14	32.13	187.01
		1/31/2014	22.27 - 36.77	219.14	32.08	187.06
		5/28/2014	22.27 - 36.77	219.14	32.00	187.14
		10/29/2014	22.27 - 36.77	219.14	32.45	186.69
		1/20/2015	22.27 - 36.77	219.14	33.32	185.82
		4/8/2015	22.27 - 36.77	219.14	32.09	187.05
		7/9/2015	22.27 - 36.77	219.14	31.72	187.42
		10/5/2015	22.27 - 36.77	219.14	32.30	186.84
		4/12/2016	22.27 - 36.77	219.14	32.00	187.14
		10/5/2016	22.27 - 36.77	219.14	31.91	187.23
		11/17/2017	22.27 - 36.77	219.14	32.47	186.67
		7/18/2018	22.27 - 36.77	219.14	33.80	185.34
35AWW23	Shallow	7/17/2018	25.2 - 40.2	223.07	23.55	199.52
35AWW24	Shallow	7/17/2018	22.10 - 32.10	219.04	26.60	192.44

Table 1
Groundwater Elevation Data
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Well Identification	Aquifer	Sampling Date	Screen Intervals (ft from Top of Casing)	Top of Casing Elevation (ft)	Depth to Water (ft from Top of Casing)	Groundwater Elevation (ft above msl)
LHSMW03	Shallow	10/9/2013	22.54 - 35.54	217.26	DRY	NC
		2/3/2014	22.54 - 35.54	217.26	31.00	186.26
		5/28/2014	22.54 - 35.54	217.26	29.40	187.86
		10/29/2014	22.54 - 35.54	217.26	31.20	186.06
		7/8/2015	22.54 - 35.54	217.26	28.21	189.05
		4/13/2016	22.54 - 35.54	217.26	28.75	188.51
		10/4/2016	22.54 - 35.54	217.26	29.51	187.75
		11/17/2017	22.54 - 35.54	217.26	31.36	185.90
LHSMW04	Shallow	10/9/2013	21.11 - 31.11	216.95	DRY	NC
		1/31/2014	21.11 - 31.11	216.95	DRY	NC
		5/20/2014	21.11 - 31.11	216.95	DRY	NC
		10/30/2014	21.11 - 31.11	216.95	DRY	NC
		1/20/2015	21.11 - 31.11	216.95	DRY	NC
		4/7/2015	21.11 - 31.11	216.95	DRY	NC
		7/8/2015	21.11 - 31.11	216.95	DRY	NC
		10/1/2015	21.11 - 31.11	216.95	DRY	NC
		3/28/2016	21.11 - 31.11	216.95	29.72	187.23
		4/12/2016	21.11 - 31.11	216.95	29.65	187.30
		10/4/2016	21.11 - 31.11	216.95	DRY	NC
		11/16/2017	21.11 - 31.11	216.95	DRY	NC
		7/17/2018	21.11 - 31.11	216.95	DRY	NC
LHSMW05	Shallow	10/9/2013	14.08 - 24.08	217.59	DRY	NC
		1/31/2014	14.08 - 24.08	217.59	DRY	NC
		5/20/2014	14.08 - 24.08	217.59	DRY	NC
		10/30/2014	14.08 - 24.08	217.59	DRY	NC
		1/20/2015	14.08 - 24.08	217.59	DRY	NC
		4/7/2015	14.08 - 24.08	217.59	DRY	NC
		7/10/2015	14.08 - 24.08	217.59	DRY	NC
		10/1/2015	14.08 - 24.08	217.59	DRY	NC
		4/12/2016	14.08 - 24.08	217.59	DRY	NC
		10/4/2016	14.08 - 24.08	217.59	DRY	NC
LHSMW06	Shallow	10/16/2013	13.32 - 23.32	223.18	20.97	202.21
		1/30/2014	13.32 - 23.32	223.18	20.50	202.68
		5/28/2014	13.32 - 23.32	223.18	19.30	203.88
		10/29/2014	13.32 - 23.32	223.18	19.81	203.37
		1/20/2015	13.32 - 23.32	223.18	19.92	203.26
		4/7/2015	13.32 - 23.32	223.18	18.92	204.26
		7/8/2015	13.32 - 23.32	223.18	18.21	204.97
		10/1/2015	13.32 - 23.32	223.18	18.98	204.20
		4/12/2016	13.32 - 23.32	223.18	19.11	204.07
		10/5/2016	13.32 - 23.32	223.18	18.91	204.27
		11/17/2017	13.32 - 23.32	223.18	19.31	203.87
		7/2/2018	13.32 - 23.32	223.18	18.80	204.38
LHSMW07	Shallow	10/15/2013	19.73 - 29.73	221.27	20.55	200.72
		1/30/2014	19.73 - 29.73	221.27	20.25	201.02
		5/22/2014	19.73 - 29.73	221.27	19.55	201.72
		10/29/2014	19.73 - 29.73	221.27	19.63	201.64
		1/28/2015	19.73 - 29.73	221.27	20.53	200.74
		4/15/2015	19.73 - 29.73	221.27	18.75	202.52
		7/7/2015	19.73 - 29.73	221.27	18.27	203.00
		10/8/2015	19.73 - 29.73	221.27	18.94	202.33
		4/14/2016	19.73 - 29.73	221.27	18.97	202.30
		10/4/2016	19.73 - 29.73	221.27	18.58	202.69
		11/14/2017	19.73 - 29.73	221.27	19.00	202.27
		7/17/2018	19.73 - 29.73	221.27	18.75	202.52

Notes:
ft - feet
msl = mean sea level
NA - not available
NC - not calculated
NM - not measured

Table 2
Groundwater Validated Analytical Data (November 2017)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17	35AWW13_111617 11/16/17	35AWW14_111717 11/17/17	35AWW15_111617 11/16/17	35AWW16-111317 11/13/17	35AWW16-111317_a 11/13/17	35AWW17-111317 11/13/17	35AWW18-111317 11/13/17	35AWW19_111717 11/17/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.	Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.
Location Depth			Shallow	Intermediate	Intermediate	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Lab Package			HS17110813	HS17111049	HS17110800	HS17110732	HS17111044	HS17110813	HS17110816	HS17110816	HS17110731	HS17111049	HS17111049	HS17111044	HS17111049	HS17110800	HS17110800	HS17110800	HS17110800	HS17111044
Alkalinity (310.2/SM2320B)																				
Alkalinity, Total	mg/L	NV	**3,310**	NA	NA	**666**	NA	**4,360**	**286**	**62.1**	**452**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus (365.3)																				
Phosphorus	mg/L	NV	**2.70**	NA	NA	**0.022 J**	NA	**3.55**	**0.0660**	**0.322**	**0.0500**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (415.1)																				
Total Organic Carbon	mg/L	NV	**191**	NA	NA	**2.29**	NA	**581**	**6.79**	**3.89**	**5.05**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals (6020A)																				
Total Arsenic	mg/L	0.01	**0.0350**	< 0.00200 U	NA	**0.000590 J**	**0.000814 J**	**0.148**	**0.000468 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Iron	mg/L	NV	**45.8**	NA	NA	**0.175 J**	NA	**31.6**	**0.315**	**0.593**	**0.632**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Manganese	mg/L	14	**7.11**	NA	NA	**0.422**	NA	**3.58**	**0.442**	**0.0641**	**0.487**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Iron	mg/L	NV	**42.5**	NA	NA	**0.0617 J**	NA	**31.6**	**0.0307 J**	< 0.200 U	< 0.200 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Manganese	mg/L	14	**8.54**	NA	NA	**0.403**	NA	**5.70**	**0.128**	**0.0662**	**0.468**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (8260C)																				
1,1,1,2-Tetrachloroethane	µg/L	110	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,1-Trichloroethane	µg/L	200	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	10,000	< 2.5 U	< 0.5 U	< 0.5 U	**0.78 J**	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	**7.3**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**1.4**
1,1-Dichloroethene	µg/L	7	< 2.5 U	< 0.5 U	< 0.5 U	**3.9**	NA	< 5.0 U	< 0.5 U	< 0.5 U	**12**	< 0.5 UJ	< 0.5 U	**8.7**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**7.7**
1,1-Dichloropropene	µg/L	2.9	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,3-Trichlorobenzene	µg/L	310	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,3-Trichloropropane	µg/L	0.041	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,4-Trichlorobenzene	µg/L	70	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,4-Trimethylbenzene	µg/L	5,100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dibromoethane	µg/L	0.05	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichlorobenzene	µg/L	600	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	5	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**1.9**
1,2-Dichloropropane	µg/L	5	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3,5-Trimethylbenzene	µg/L	5,100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3-Dichlorobenzene	µg/L	3,100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3-Dichloropropane	µg/L	29	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,4-Dichlorobenzene	µg/L	75	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2,2-Dichloropropane	µg/L	42	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Butanone	µg/L	61,000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Chlorotoluene	µg/L	2,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Hexanone	µg/L	6,100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Chlorotoluene	µg/L	2,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U

Table 2
Groundwater Validated Analytical Data (November 2017)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17	35AWW13_111617 11/16/17	35AWW14_111717 11/17/17	35AWW15_111617 11/16/17	35AWW16-111317 11/13/17	35AWW16-111317_a 11/13/17	35AWW17-111317 11/13/17	35AWW18-111317 11/13/17	35AWW19_111717 11/17/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.	Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.
4-Isopropyltoluene	µg/L	10,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
4-Methyl-2-pentanone	µg/L	8,200	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	**12 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Acetone	µg/L	92,000	**71**	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Benzene	µg/L	5	< 2.5 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 5.0 U	< 0.5 U	< 1.0 U	< 1.0 U	< 0.5 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromobenzene	µg/L	2,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromochloromethane	µg/L	4,100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromodichloromethane	µg/L	4.6	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromoform	µg/L	36	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromomethane	µg/L	140	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Carbon disulfide	µg/L	10,000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 0.5 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon tetrachloride	µg/L	5	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chlorobenzene	µg/L	100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroethane	µg/L	41,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroform	µg/L	1,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloromethane	µg/L	220	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
cis-1,2-Dichloroethene	µg/L	70	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	**38**	**0.78 J**	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	**3.5**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
cis-1,3-Dichloropropene	µg/L	5.3	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dibromochloromethane	µg/L	34	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dibromomethane	µg/L	380	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dichlorodifluoromethane	µg/L	20,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	µg/L	700	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Hexachlorobutadiene	µg/L	20	< 2.5 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 5.0 U	< 0.5 U	< 1.0 U	< 0.5 U	< 0.5 UJ	< 1.0 U	< 0.5 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.5 U
Isopropylbenzene	µg/L	10,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	10,000*	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	5	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Naphthalene	µg/L	2,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
n-Butylbenzene	µg/L	4,100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
n-Propylbenzene	µg/L	4,100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
o-Xylene	µg/L	10,000*	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
sec-Butylbenzene	µg/L	4,100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Styrene	µg/L	100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
tert-Butylbenzene	µg/L	4,100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	5	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	**12**	**350**	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Toluene	µg/L	1,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	µg/L	100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,3-Dichloropropene	µg/L	29	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	5	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	**33**	**97**	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	**7.4**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Trichlorofluoromethane	µg/L	31,000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Vinyl chloride	µg/L	2	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U

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4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17	35AWW13_111617 11/16/17	35AWW14_111717 11/17/17	35AWW15_111617 11/16/17	35AWW16-111317 11/13/17	35AWW16-111317_a 11/13/17	35AWW17-111317 11/13/17	35AWW18-111317 11/13/17	35AWW19_111717 11/17/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.	Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.
Metabolic Acids (HPLC-METACIDS)																				
Acetic Acid	mg/L	NV	**8.8**	NA	NA	NA	NA	**43**	< 2.0 U	< 2.0 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyric Acid	mg/L	NV	< 1.0 U	NA	NA	NA	NA	< 1.0 U	< 1.0 U	< 1.0 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	mg/L	NV	**3.4**	NA	NA	NA	NA	**26**	< 1.0 U	< 1.0 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	51	**8.2**	NA	NA	NA	NA	**24**	< 1.0 U	< 1.0 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvic Acid	mg/L	NV	< 0.10 U	NA	NA	NA	NA	**3.7**	< 0.10 U	< 0.10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anions (9056A)																				
Chloride	mg/L	NV	**1,020**	NA	NA	**1,040**	NA	**2,060**	**1,520**	**6.86**	**2,650**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	mg/L	10	< 0.050 U	NA	NA	**2.12**	NA	**0.249**	< 0.050 U	< 0.050 U	< 0.050 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/L	1	< 0.050 U	NA	NA	< 0.050 U	NA	< 0.050 U	< 0.050 U	< 0.050 U	< 0.050 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/L	NV	**40.8**	NA	NA	**1,560**	NA	**2.03**	**1,010**	**59.4**	**1,290**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Gases (RSK-175)																				
Carbon Dioxide	µg/L	NV	**310,000**	NA	NA	**200,000**	NA	**190,000**	**290,000**	**340,000**	**230,000**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	µg/L	NV	< 0.23 U	NA	NA	< 0.23 U	NA	< 0.23 U	< 0.23 U	< 0.23 U	< 0.23 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	µg/L	NV	**1.2**	NA	NA	< 0.22 U	NA	**0.56 J**	< 0.22 U	< 0.22 U	< 0.22 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	µg/L	NV	**620**	NA	NA	**0.32 J**	NA	**670**	**1.5**	< 0.63 U	< 0.63 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ferrous Iron (SM3500Fe)																				
Ferrous Iron	mg/L	NV	**18.9 J**	NA	NA	**0.09 J**	NA	**17.4 J**	**0.06 J**	**0.07 J**	**0.08 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide (376.1)																				
Sulfide	mg/L	NV	**10.4**	NA	NA	< 1.0 U	NA	**30.4**	< 1.0 U	**1.24**	< 1.0 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria																				
BAV1 Vinyl Chloride Reductase	cells/mL	NV	< 2.10 U	NA	NA	NA	NA	< 3.80 U	< 0.50 U	< 0.90 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dehalobacter spp.	cells/mL	NV	< 20.8 U	NA	NA	NA	NA	< 38.5 U	**1.40 J**	< 9.10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dehalococoides	cells/mL	NV	**35,300**	NA	NA	NA	NA	**3,060,000**	**1.5**	< 0.90 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tceA Reductase	cells/mL	NV	< 2.10 U	NA	NA	NA	NA	< 3.80 U	< 0.50 U	< 0.90 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride Reductase	cells/mL	NV	**53,200**	NA	NA	NA	NA	**4,720,000**	**2.2**	< 0.90 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed, NV - No value

µg/L - micrograms per liter, mg/L - milligrams per liter

cells/mL - cells per milliliter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected and reported to limit of detection.

* Value is for total xylenes

[1] 100x and 500x dilution, respectively due to matrix interference

Table 2
Groundwater Validated Analytical Data (November 2017)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	35AWW20-111417 11/14/17	35AWW20-111417-a 11/14/17	35AWW21-111317 11/13/17	35AWW22_111717 11/17/17	LHSMW03_111717 11/17/17	LHSMW06_111717 11/17/17	LHSMW07-111417 11/14/17	1004TW001_111717 11/17/17
Location Description			Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.	Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Lab Package			HS17110731	HS17110731	HS17110800	HS17111044	HS17111044	HS17111044	HS17110732	HS17111044
Alkalinity (310.2/SM2320B)										
Alkalinity, Total	mg/L	NV	**831**	**834**	NA	NA	NA	NA	**750**	NA
Phosphorus (365.3)										
Phosphorus	mg/L	NV	**0.0580**	**0.0750**	NA	NA	NA	NA	**0.0250 J**	NA
Total Organic Carbon (415.1)										
Total Organic Carbon	mg/L	NV	**13.7**	**13.8**	NA	NA	NA	NA	**6.81**	NA
Metals (6020A)										
Total Arsenic	mg/L	0.01	NA	NA	NA	NA	**0.000499 J**	< 0.00100 U	**0.000724 J**	**0.000850 J**
Total Iron	mg/L	NV	**0.531**	**0.650**	NA	NA	NA	NA	**1.13**	NA
Total Manganese	mg/L	14	**1.47**	**1.43**	NA	NA	NA	NA	**0.131**	NA
Dissolved Iron	mg/L	NV	**0.309**	**0.311**	NA	NA	NA	NA	**0.310**	NA
Dissolved Manganese	mg/L	14	**1.53**	**1.54**	NA	NA	NA	NA	**0.134**	NA
Volatile Organic Compounds (8260C)										
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,1,2,2-Tetrachloroethane	µg/L	14	< 1.0 U	< 1.0 U	< 0.5 UJ	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,1,2-Trichloroethane	µg/L	5	**48**	**45**	< 0.5 U	< 0.5 U	NA	< 0.5 U	**3.6**	NA
1,1-Dichloroethane	µg/L	10,000	**320**	**320**	< 0.5 U	< 0.5 U	NA	**4.2**	**50**	NA
1,1-Dichloroethene	µg/L	7	**1,900**	**2,000**	< 0.5 U	< 0.5 U	NA	**12**	**600**	NA
1,1-Dichloropropene	µg/L	2.9	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2,3-Trichlorobenzene	µg/L	310	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2,3-Trichloropropane	µg/L	0.041	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2,4-Trichlorobenzene	µg/L	70	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2-Dibromoethane	µg/L	0.05	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2-Dichlorobenzene	µg/L	600	**8.0**	**7.7**	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2-Dichloroethane	µg/L	5	**9.1**	**8.7**	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,3-Dichlorobenzene	µg/L	3,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,3-Dichloropropane	µg/L	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,4-Dichlorobenzene	µg/L	75	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
2,2-Dichloropropane	µg/L	42	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
2-Butanone	µg/L	61,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
2-Chlorotoluene	µg/L	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
2-Hexanone	µg/L	6,100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
4-Chlorotoluene	µg/L	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA

Table 2
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LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

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Location Description			Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.	Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
4-Isopropyltoluene	µg/L	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
4-Methyl-2-pentanone	µg/L	8,200	< 0.5 U	< 0.5 U	< 1.0 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Acetone	µg/L	92,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Benzene	µg/L	5	**3.1**	**2.9**	< 0.5 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Bromobenzene	µg/L	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Bromochloromethane	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Bromodichloromethane	µg/L	4.6	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Bromoform	µg/L	36	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Bromomethane	µg/L	140	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Carbon disulfide	µg/L	10,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Carbon tetrachloride	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Chlorobenzene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Chloroethane	µg/L	41,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Chloroform	µg/L	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Chloromethane	µg/L	220	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
cis-1,2-Dichloroethene	µg/L	70	**53**	**50**	< 0.5 U	< 0.5 U	NA	**14**	**11**	NA
cis-1,3-Dichloropropene	µg/L	5.3	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Dibromochloromethane	µg/L	34	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Dibromomethane	µg/L	380	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Dichlorodifluoromethane	µg/L	20,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Ethylbenzene	µg/L	700	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Hexachlorobutadiene	µg/L	20	< 0.5 U	< 0.5 U	< 0.5 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Isopropylbenzene	µg/L	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
m,p-Xylene	µg/L	10,000*	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Methylene chloride	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Naphthalene	µg/L	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
n-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
n-Propylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
o-Xylene	µg/L	10,000*	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
sec-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Styrene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
tert-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Tetrachloroethene	µg/L	5	**0.80 J**	**0.77 J**	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Toluene	µg/L	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
trans-1,2-Dichloroethene	µg/L	100	**6.7**	**5.6**	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
trans-1,3-Dichloropropene	µg/L	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Trichloroethene	µg/L	5	**320**	**320**	< 0.5 U	< 0.5 U	NA	**5.8**	**39**	NA
Trichlorofluoromethane	µg/L	31,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Vinyl chloride	µg/L	2	**78**	**75**	< 0.5 U	< 0.5 U	NA	**2.2**	**15**	NA

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Groundwater Validated Analytical Data (November 2017)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	35AWW20-111417 11/14/17	35AWW20-111417-a 11/14/17	35AWW21-111317 11/13/17	35AWW22_111717 11/17/17	LHSMW03_111717 11/17/17	LHSMW06_111717 11/17/17	LHSMW07-111417 11/14/17	1004TW001_111717 11/17/17
Location Description			Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.	Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
Metabolic Acids (HPLC-METACIDS)										
Acetic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA
Butyric Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	51	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA
Anions (9056A)										
Chloride	mg/L	NV	**1,730**	**1,630**	NA	NA	NA	NA	**2,540**	NA
Nitrate	mg/L	10	< 0.050 U	< 0.050 U	NA	NA	NA	NA	< 0.050 U	NA
Nitrite	mg/L	1	< 0.050 U	< 0.050 U	NA	NA	NA	NA	< 0.050 U	NA
Sulfate	mg/L	NV	**2,150**	**1,850**	NA	NA	NA	NA	**2,940**	NA
Dissolved Gases (RSK-175)										
Carbon Dioxide	µg/L	NV	**230,000**	**230,000**	NA	NA	NA	NA	**220,000**	NA
Ethane	µg/L	NV	< 0.23 U	< 0.23 U	NA	NA	NA	NA	< 0.23 U	NA
Ethene	µg/L	NV	**0.38 J**	**0.41 J**	NA	NA	NA	NA	< 0.22 U	NA
Methane	µg/L	NV	**17**	**18**	NA	NA	NA	NA	**18**	NA
Ferrous Iron (SM3500Fe)										
Ferrous Iron	mg/L	NV	**0.45 J**	**0.43 J**	NA	NA	NA	NA	**0.4 J**	NA
Sulfide (376.1)										
Sulfide	mg/L	NV	< 1.0 U	< 1.0 U	NA	NA	NA	NA	< 1.0 U	NA
Dechlorinating Bacteria										
BAV1 Vinyl Chloride Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA
Dehalobacter spp.	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA
Dehalococoides	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA
tceA Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed, NV - No value

µg/L - micrograms per liter, mg/L - milligrams per liter

cells/mL - cells per milliliter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected and reported to limit of detection.

* Value is for total xylenes

[1] 100x and 500x dilution, respectively due to matrix interference

Table 3
Groundwater Validated Analytical Data (June/July 2018)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	03WW01_071818 7/18/18	35AWW01_070218 7/2/18	35AWW05_070218 7/2/18	35AWW05_070218_a 7/2/18	35AWW06_071818 7/18/18	35AWW08_071818 7/18/18	35AWW09_071618 7/16/18	35AWW10_071218 7/12/18	35AWW11_071618 7/16/18	35AWW12_062918 6/29/18	35AWW13_062918 6/29/18
Location Description			Site 58 - SE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - S, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.
Location Depth			Shallow	Intermediate	Intermediate	Intermediate	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Lab Package			HS18070996	HS18070079	HS18070079	HS18070079	HS18070996	HS18070996	HS18070743	HS18070607	HS18070743	HS18070002	HS18070002
Alkalinity (310.2/SM2320B)													
Alkalinity, Total	mg/L	NV	**2,290**	NA	NA	NA	**386**	**3,050 J**	**290**	**98.9**	**649**	NA	NA
Phosphorus (365.3)													
Phosphorus	mg/L	NV	**1.89**	NA	NA	NA	**3.90**	**4.23**	**0.122**	**0.314**	**0.500**	NA	NA
Total Organic Carbon (415.1)													
Total Organic Carbon	mg/L	NV	**118 J**	NA	NA	NA	**4,200 J**	**484 J**	**5.76**	**3.21**	**1,650**	NA	NA
Metals (6020A)													
Total Arsenic	mg/L	0.01	NA	**0.000648 J**	NA	NA	NA	**0.122**	**0.00198 J**	NA	NA	NA	NA
Total Iron	mg/L	NV	**42.4**	NA	NA	NA	**9.27**	**40.5**	**6.31**	**0.859**	**25.6**	NA	NA
Total Manganese	mg/L	14	**8.64**	NA	NA	NA	**9.11**	**4.52**	**0.162**	**0.0648**	**5.18**	NA	NA
Dissolved Iron	mg/L	NV	**43**	NA	NA	NA	**15.4**	**39.6**	**0.334**	< 0.100 U	**25.5**	NA	NA
Dissolved Manganese	mg/L	14	**7.42**	NA	NA	NA	**9.52**	**4.41**	**0.119**	**0.0580**	**5.18**	NA	NA
Volatile Organic Compounds (8260C)													
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,1-Trichloroethane	µg/L	200	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	5	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	10,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1-Dichloroethene	µg/L	7	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	**2.7**	< 0.5 U	**9.3**	< 0.5 U	< 0.5 U
1,1-Dichloropropene	µg/L	2.9	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,3-Trichlorobenzene	µg/L	310	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,3-Trichloropropane	µg/L	0.041	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,4-Trichlorobenzene	µg/L	70	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dibromoethane	µg/L	0.05	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichlorobenzene	µg/L	600	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	5	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3-Dichloropropane	µg/L	29	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,4-Dichlorobenzene	µg/L	75	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2,2-Dichloropropane	µg/L	42	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Butanone	µg/L	61,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**100 J**	< 5.0 UJ	< 1.0 U	< 1.0 U	**140**	< 1.0 U	< 1.0 U
2-Chlorotoluene	µg/L	2,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Hexanone	µg/L	6,100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 5.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Chlorotoluene	µg/L	2,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
4-Isopropyltoluene	µg/L	10,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
4-Methyl-2-pentanone	µg/L	8,200	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 5.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

Table 3
Groundwater Validated Analytical Data (June/July 2018)
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Location Description			Site 58 - SE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - S, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.
Location Depth			Shallow	Intermediate	Intermediate	Intermediate	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Acetone	µg/L	92,000	**18 UB**	< 1.0 U	< 1.0 U	< 1.0 U	**600 J**	< 10 UJ	< 1.0 U	< 1.0 U	**170**	< 1.0 U	< 1.0 U
Benzene	µg/L	5	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromobenzene	µg/L	2,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromochloromethane	µg/L	4,100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromodichloromethane	µg/L	4.6	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromoform	µg/L	36	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromomethane	µg/L	140	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Carbon disulfide	µg/L	10,000	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 5.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon tetrachloride	µg/L	5	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chlorobenzene	µg/L	100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroethane	µg/L	41,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroform	µg/L	1,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloromethane	µg/L	220	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
cis-1,2-Dichloroethene	µg/L	70	**5.3 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**12 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
cis-1,3-Dichloropropene	µg/L	5.3	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dibromochloromethane	µg/L	34	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dibromomethane	µg/L	380	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U

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Location Depth			Shallow	Intermediate	Intermediate	Intermediate	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Dichlorodifluoromethane	µg/L	20,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	µg/L	700	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Hexachlorobutadiene	µg/L	20	< 1.0 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 5.0 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Isopropylbenzene	µg/L	10,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	10,000*	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 5.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	5	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 5.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Naphthalene	µg/L	2,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	**0.53 J**	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
n-Butylbenzene	µg/L	4,100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
n-Propylbenzene	µg/L	4,100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
o-Xylene	µg/L	10,000*	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
sec-Butylbenzene	µg/L	4,100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Styrene	µg/L	100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
tert-Butylbenzene	µg/L	4,100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	5	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	**140**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Toluene	µg/L	1,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	µg/L	100	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,3-Dichloropropene	µg/L	29	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	5	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**19 J**	**51**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Trichlorofluoromethane	µg/L	31,000	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 2.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Vinyl chloride		2	**4.8 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**9.0 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Volatile Fatty Acids (HPLC-METACIDS)													
Acetic Acid	mg/L	NV	**2.9 J**	NA	NA	NA	**1,100**	**66**	< 2.0 U	< 2.0 U	**960**	NA	NA
Butyric Acid	mg/L	NV	**21**	NA	NA	NA	**2,300**	**50**	< 1.0 U	< 1.0 U	**880**	NA	NA
Lactic Acid	mg/L	NV	**6.6**	NA	NA	NA	< 20 U	**55**	< 1.0 U	< 1.0 U	< 10 U	NA	NA
Propionic Acid	mg/L	51	< 1.0 U	NA	NA	NA	**270**	< 1.0 U	< 1.0 U	< 1.0 U	**350**	NA	NA
Pyruvic Acid	mg/L	NV	< 0.10 U	NA	NA	NA	< 2.0 U	< 0.10 U	< 0.10 U	< 0.10 U	< 1.0 U	NA	NA
Anions (9056A)													
Chloride	mg/L	NV	**977**	NA	NA	NA	**904**	**2,460**	**1,470**	**7.51**	**2,440**	NA	NA
Nitrate	mg/L	10	< 0.200 UJ	NA	NA	NA	< 0.200 UJ	< 0.200 UJ	**0.0590 J**	**0.0690 J**	< 0.100 U	NA	NA
Nitrite	mg/L	1	< 0.200 UJ	NA	NA	NA	< 0.200 UJ	< 0.200 UJ	< 0.100 U	< 0.100 U	< 0.100 U	NA	NA
Sulfate	mg/L	NV	**161**	NA	NA	NA	**811**	**0.900**	**940**	**63.8**	**652**	NA	NA
Dissolved Gases (RSK-175)													
Carbon Dioxide	µg/L	NV	**490,000**	NA	NA	NA	**780,000 J**	**350,000**	**340,000**	**380,000**	**450,000**	NA	NA
Ethane	µg/L	NV	< 0.47 U	NA	NA	NA	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	NA	NA
Ethene	µg/L	NV	**0.89 J**	NA	NA	NA	**0.58 J**	**0.49 J**	< 0.55 U	< 0.55 U	< 0.55 U	NA	NA
Methane	µg/L	NV	**590**	NA	NA	NA	< 1.0 U	**920**	< 1.0 U	< 1.0 U	**0.80 J**	NA	NA
Ferrous Iron (SM3500Fe)													
Ferrous Iron	mg/L	NV	**40 J**	NA	NA	NA	**14 J**	**13.7 J**	**0.16 J**	**0.21 J**	**27.6 J**	NA	NA
Sulfide (376.1)													
Sulfide	mg/L	NV	**24.4**	NA	NA	NA	**4.04**	< 1.00 U	< 1.00 U	**5.84**	**8.04**	NA	NA
Dechlorinating Bacteria													
BAV1 Vinyl Chloride Reductase	cells/mL	NV	< 0.5 U	NA	NA	NA	< 1.8 U	< 3.8 U	< 0.5 U	< 1.10 U	**0.7 J**	NA	NA

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LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	03WW01_071818 7/18/18	35AWW01_070218 7/2/18	35AWW05_070218 7/2/18	35AWW05_070218_a 7/2/18	35AWW06_071818 7/18/18	35AWW08_071818 7/18/18	35AWW09_071618 7/16/18	35AWW10_071218 7/12/18	35AWW11_071618 7/16/18	35AWW12_062918 6/29/18	35AWW13_062918 6/29/18
Location Description			Site 58 - SE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - S, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.
Location Depth			Shallow	Intermediate	Intermediate	Intermediate	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Dehalobacter spp.	cells/mL	NV	**5.5**	NA	NA	NA	**52,900**	**47,000**	**0.8 J**	< 10.6 U	**910,000**	NA	NA
Dehalococoides	cells/mL	NV	**7.5**	NA	NA	NA	< 1.8 U	**1,410,000**	< 0.5 U	< 1.10 U	**4.60**	NA	NA
tceA Reductase	cells/mL	NV	< 0.5 U	NA	NA	NA	< 1.8 U	**333,000**	< 0.5 U	< 1.10 U	< 1.30 U	NA	NA
Vinyl Chloride Reductase	cells/mL	NV	**10.9**	NA	NA	NA	< 1.8 U	**428,000**	< 0.5 U	< 1.10 U	**1.90**	NA	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed, NV - No value

µg/L - micrograms per liter

mg/L - milligrams per liter

cells/mL - cells per milliliter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected and reported to limit of detection.

UB - considered an artifact of blank contamination

* Value is for total xylenes

Table 3
Groundwater Validated Analytical Data (June/July 2018)
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Location Description			Site 58 - S, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - W, inside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary.	Site 58 - S, outside site boundary.	Site 58 - SW, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - E, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Lab Package			HS18070996	HS18070996	HS18070996	HS18070002	HS18070002	HS18070002	HS18070002	HS18070996	HS18070743	HS18070002	HS18070996
Alkalinity (310.2/SM2320B)													
Alkalinity, Total	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	**199**	**1,450**	NA	NA
Phosphorus (365.3)													
Phosphorus	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	**0.0780**	**0.144**	NA	NA
Total Organic Carbon (415.1)													
Total Organic Carbon	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	**2.38 J**	**43.0**	NA	NA
Metals (6020A)													
Total Arsenic	mg/L	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Iron	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	**3.26**	**1.12**	NA	NA
Total Manganese	mg/L	14	NA	NA	NA	NA	NA	NA	NA	**4.56**	**8.43**	NA	NA
Dissolved Iron	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	**3.54**	**0.917**	NA	NA
Dissolved Manganese	mg/L	14	NA	NA	NA	NA	NA	NA	NA	**3.32**	**9.00**	NA	NA
Volatile Organic Compounds (8260C)													
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,1,1-Trichloroethane	µg/L	200	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,1,2-Trichloroethane	µg/L	5	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**60**	< 0.5 U	< 0.5 UJ
1,1-Dichloroethane	µg/L	10,000	**10 J**	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**2.5 J**	**300**	< 0.5 U	< 0.5 UJ
1,1-Dichloroethene	µg/L	7	**9.7 J**	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	**1.2**	**13 J**	**1,400**	< 0.5 U	< 0.5 UJ
1,1-Dichloropropene	µg/L	2.9	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,2,3-Trichlorobenzene	µg/L	310	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,2,3-Trichloropropane	µg/L	0.041	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,2,4-Trichlorobenzene	µg/L	70	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,2-Dibromoethane	µg/L	0.05	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,2-Dichlorobenzene	µg/L	600	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**8.3**	< 0.5 U	< 0.5 UJ
1,2-Dichloroethane	µg/L	5	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**3.2 J**	**16**	< 0.5 U	< 0.5 UJ
1,2-Dichloropropane	µg/L	5	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,3-Dichlorobenzene	µg/L	3,100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,3-Dichloropropane	µg/L	29	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
1,4-Dichlorobenzene	µg/L	75	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**1.3**	< 0.5 U	< 0.5 UJ
2,2-Dichloropropane	µg/L	42	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
2-Butanone	µg/L	61,000	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 UJ
2-Chlorotoluene	µg/L	2,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
2-Hexanone	µg/L	6,100	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 UJ
4-Chlorotoluene	µg/L	2,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
4-Isopropyltoluene	µg/L	10,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
4-Methyl-2-pentanone	µg/L	8,200	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 UJ

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Location Description			Site 58 - S, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - W, inside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary.	Site 58 - S, outside site boundary.	Site 58 - SW, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - E, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Acetone	µg/L	92,000	**20 UB**	**7.1 UB**	**12 UB**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 UJ
Benzene	µg/L	5	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**4.4**	< 0.5 U	< 0.5 UJ
Bromobenzene	µg/L	2,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Bromochloromethane	µg/L	4,100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Bromodichloromethane	µg/L	4.6	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Bromoform	µg/L	36	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Bromomethane	µg/L	140	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Carbon disulfide	µg/L	10,000	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 UJ
Carbon tetrachloride	µg/L	5	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Chlorobenzene	µg/L	100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Chloroethane	µg/L	41,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Chloroform	µg/L	1,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Chloromethane	µg/L	220	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
cis-1,2-Dichloroethene	µg/L	70	**4.0 J**	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**69**	< 0.5 U	< 0.5 UJ
cis-1,3-Dichloropropene	µg/L	5.3	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Dibromochloromethane	µg/L	34	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Dibromomethane	µg/L	380	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ

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Location Description			Site 58 - S, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - W, inside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary.	Site 58 - S, outside site boundary.	Site 58 - SW, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - E, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Dichlorodifluoromethane	µg/L	20,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Ethylbenzene	µg/L	700	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Hexachlorobutadiene	µg/L	20	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Isopropylbenzene	µg/L	10,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
m,p-Xylene	µg/L	10,000*	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 UJ
Methylene chloride	µg/L	5	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 UJ
Naphthalene	µg/L	2,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
n-Butylbenzene	µg/L	4,100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
n-Propylbenzene	µg/L	4,100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
o-Xylene	µg/L	10,000*	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
sec-Butylbenzene	µg/L	4,100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Styrene	µg/L	100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
tert-Butylbenzene	µg/L	4,100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Tetrachloroethene	µg/L	5	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Toluene	µg/L	1,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
trans-1,2-Dichloroethene	µg/L	100	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**2.9**	< 0.5 U	< 0.5 UJ
trans-1,3-Dichloropropene	µg/L	29	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Trichloroethene	µg/L	5	**8.4 J**	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**270**	< 0.5 U	< 0.5 UJ
Trichlorofluoromethane	µg/L	31,000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ
Vinyl chloride		2	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	**71**	< 0.5 U	< 0.5 UJ
Volatile Fatty Acids (HPLC-METACIDS)													
Acetic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	< 2.0 U	**240**	NA	NA
Butyric Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	< 1.0 U	< 5.0 U	NA	NA
Lactic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	< 1.0 U	< 5.0 U	NA	NA
Propionic Acid	mg/L	51	NA	NA	NA	NA	NA	NA	NA	< 1.0 U	**6.6 J**	NA	NA
Pyruvic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	< 0.10 U	< 0.5 U	NA	NA
Anions (9056A)													
Chloride	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	**1,370**	**1,420**	NA	NA
Nitrate	mg/L	10	NA	NA	NA	NA	NA	NA	NA	< 0.200 UJ	< 0.100 U	NA	NA
Nitrite	mg/L	1	NA	NA	NA	NA	NA	NA	NA	< 0.200 UJ	< 0.100 U	NA	NA
Sulfate	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	**983**	**882**	NA	NA
Dissolved Gases (RSK-175)													
Carbon Dioxide	µg/L	NV	NA	NA	NA	NA	NA	NA	NA	**180,000**	**360,000**	NA	NA
Ethane	µg/L	NV	NA	NA	NA	NA	NA	NA	NA	< 0.47 U	< 0.47 U	NA	NA
Ethene	µg/L	NV	NA	NA	NA	NA	NA	NA	NA	< 0.55 U	< 0.55 U	NA	NA
Methane	µg/L	NV	NA	NA	NA	NA	NA	NA	NA	**0.65 J**	**0.93 J**	NA	NA
Ferrous Iron (SM3500Fe)													
Ferrous Iron	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	**2.78 J**	**1.18 J**	NA	NA
Sulfide (376.1)													
Sulfide	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	< 1.0 U	**13.0**	NA	NA
Dechlorinating Bacteria													
BAV1 Vinyl Chloride Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	< 0.5 U	< 0.9 U	NA	NA

Table 3
Groundwater Validated Analytical Data (June/July 2018)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	35AWW14_071818 7/18/18	35AWW15_071818 7/18/18	35AWW15_071818_a 7/18/18	35AWW16_062918 6/29/18	35AWW16_062918_a 6/29/18	35AWW17_062918 6/29/18	35AWW18_062918 6/29/18	35AWW19_071818 7/18/18	35AWW20_071618 7/16/18	35AWW21_062918 6/29/18	35AWW22_071818 7/18/18
Location Description			Site 58 - S, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - W, inside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary.	Site 58 - S, outside site boundary.	Site 58 - SW, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - E, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Dehalobacter spp.	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	**20,400**	**5,970,000**	NA	NA
Dehalococoides	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	**0.30 J**	**1.50**	NA	NA
tceA Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	**0.097 J**	< 0.9 U	NA	NA
Vinyl Chloride Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	< 0.5 U	< 0.9 U	NA	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed, NV - No value

µg/L - micrograms per liter

mg/L - milligrams per liter

cells/mL - cells per milliliter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected and reported to limit of detection.

UB - considered an artifact of blank contamination

* Value is for total xylenes

Table 3
Groundwater Validated Analytical Data (June/July 2018)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	35AWW23_071718 7/17/18	35AWW24_071718 7/17/18	LHSMW06_070218 7/2/18	LHSMW07_071718 7/17/18
Location Description			New Wells South of Avenue G in center of Western Plume	Downgradient Western Plume well	Site 58 - SW, inside site boundary.	Site 58 - SW, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow
Lab Package			HS18070846	HS18070846	HS18070079	HS18070846
Alkalinity (310.2/SM2320B)						
Alkalinity, Total	mg/L	NV	**914**	**52.4**	NA	**1,990**
Phosphorus (365.3)						
Phosphorus	mg/L	NV	**3.56**	**0.0610**	NA	**0.307**
Total Organic Carbon (415.1)						
Total Organic Carbon	mg/L	NV	**856**	**1.58**	NA	**321**
Metals (6020A)						
Total Arsenic	mg/L	0.01	NA	NA	**0.00186 J**	NA
Total Iron	mg/L	NV	**21.1**	**18.0**	NA	**6.44**
Total Manganese	mg/L	14	**3.53**	**0.197**	NA	**13.7**
Dissolved Iron	mg/L	NV	**23.9**	**12.9**	NA	**0.29**
Dissolved Manganese	mg/L	14	**4.68**	**0.190**	NA	**13.4**
Volatile Organic Compounds (8260C)						
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,1-Trichloroethane	µg/L	200	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	**1.3**
1,1-Dichloroethane	µg/L	10,000	**3.1**	< 0.5 U	**2.2**	**24**
1,1-Dichloroethene	µg/L	7	**2.1**	< 0.5 U	**2.3**	**56**
1,1-Dichloropropene	µg/L	2.9	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,3-Trichlorobenzene	µg/L	310	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,3-Trichloropropane	µg/L	0.041	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,4-Trichlorobenzene	µg/L	70	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dibromoethane	µg/L	0.05	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichlorobenzene	µg/L	600	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	**1.2**
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3-Dichloropropane	µg/L	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,4-Dichlorobenzene	µg/L	75	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2,2-Dichloropropane	µg/L	42	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Butanone	µg/L	61,000	**47**	< 1.0 U	< 1.0 U	**31**
2-Chlorotoluene	µg/L	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Hexanone	µg/L	6,100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Chlorotoluene	µg/L	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
4-Isopropyltoluene	µg/L	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
4-Methyl-2-pentanone	µg/L	8,200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

Table 3
Groundwater Validated Analytical Data (June/July 2018)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	35AWW23_071718 7/17/18	35AWW24_071718 7/17/18	LHSMW06_070218 7/2/18	LHSMW07_071718 7/17/18
Location Description			New Wells South of Avenue G in center of Western Plume	Downgradient Western Plume well	Site 58 - SW, inside site boundary.	Site 58 - SW, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow
Acetone	µg/L	92,000	**9.2**	< 1.0 U	< 1.0 U	**31**
Benzene	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	**0.26 J**
Bromobenzene	µg/L	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromochloromethane	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromodichloromethane	µg/L	4.6	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromoform	µg/L	36	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromomethane	µg/L	140	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Carbon disulfide	µg/L	10,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon tetrachloride	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chlorobenzene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroethane	µg/L	41,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroform	µg/L	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloromethane	µg/L	220	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
cis-1,2-Dichloroethene	µg/L	70	**12**	< 0.5 U	**12**	**5.0**
cis-1,3-Dichloropropene	µg/L	5.3	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dibromochloromethane	µg/L	34	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dibromomethane	µg/L	380	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U

Table 3
Groundwater Validated Analytical Data (June/July 2018)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	35AWW23_071718 7/17/18	35AWW24_071718 7/17/18	LHSMW06_070218 7/2/18	LHSMW07_071718 7/17/18
Location Description			New Wells South of Avenue G in center of Western Plume	Downgradient Western Plume well	Site 58 - SW, inside site boundary.	Site 58 - SW, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow
Dichlorodifluoromethane	µg/L	20,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	µg/L	700	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Hexachlorobutadiene	µg/L	20	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Isopropylbenzene	µg/L	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	10,000*	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Naphthalene	µg/L	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
n-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
n-Propylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
o-Xylene	µg/L	10,000*	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
sec-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Styrene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
tert-Butylbenzene	µg/L	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Toluene	µg/L	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,3-Dichloropropene	µg/L	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	5	**2.6**	< 0.5 U	**2.8**	**12**
Trichlorofluoromethane	µg/L	31,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Vinyl chloride		2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Volatile Fatty Acids (HPLC-METACIDS)						
Acetic Acid	mg/L	NV	**580**	< 2.0 U	NA	**460**
Butyric Acid	mg/L	NV	**180**	< 1.0 U	NA	< 5.0 U
Lactic Acid	mg/L	NV	< 5.0 U	< 1.0 U	NA	< 5.0 U
Propionic Acid	mg/L	51	**580**	< 1.0 U	NA	**190**
Pyruvic Acid	mg/L	NV	< 0.5 U	< 0.10 U	NA	< 0.5 U
Anions (9056A)						
Chloride	mg/L	NV	**482**	**117**	NA	**2,270**
Nitrate	mg/L	10	< 0.100 U	**0.0640 J**	NA	< 0.200 U
Nitrite	mg/L	1	< 0.100 U	< 0.100 U	NA	< 0.200 U
Sulfate	mg/L	NV	< 0.500 U	**73.6**	NA	**1,090**
Dissolved Gases (RSK-175)						
Carbon Dioxide	µg/L	NV	**370,000**	**430,000**	NA	**540,000**
Ethane	µg/L	NV	< 0.47 U	< 0.47 U	NA	< 0.47 U
Ethene	µg/L	NV	**0.38 J**	< 0.55 U	NA	< 0.55 U
Methane	µg/L	NV	**49**	< 1.0 U	NA	**1.4**
Ferrous Iron (SM3500Fe)						
Ferrous Iron	mg/L	NV	**25.1 J**	**0.16 J**	NA	**2.58 J**
Sulfide (376.1)						
Sulfide	mg/L	NV	< 1.00 U	< 1.00 U	NA	**42.6**
Dechlorinating Bacteria						
BAV1 Vinyl Chloride Reductase	cells/mL	NV	**1.7 J**	< 1.90 U	NA	**1.30 J**

Table 3
Groundwater Validated Analytical Data (June/July 2018)
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
4th Year RA(O) Report

Location Identification: / Sample Date:	Units	MCL/MSC	35AWW23_071718 7/17/18	35AWW24_071718 7/17/18	LHSMW06_070218 7/2/18	LHSMW07_071718 7/17/18
Location Description			New Wells South of Avenue G in center of Western Plume	Downgradient Western Plume well	Site 58 - SW, inside site boundary.	Site 58 - SW, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow
Dehalobacter spp.	cells/mL	NV	**9,530**	**137**	NA	**6570000**
Dehalococoides	cells/mL	NV	**45.1**	< 1.90 U	NA	**17.2**
tceA Reductase	cells/mL	NV	< 2.5 U	< 1.90 U	NA	< 1.30 U
Vinyl Chloride Reductase	cells/mL	NV	**12.7**	< 1.90 U	NA	**3.9**

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed, NV - No value

µg/L - micrograms per liter

mg/L - milligrams per liter

cells/mL - cells per milliliter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected and reported to limit of detection.

UB - considered an artifact of blank contamination

* Value is for total xylenes

Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	03WW01-112408 11/24/2008	03WW01-110509 5/9/2011	03WW01-082013 8/20/2013	03WW01-101013 10/10/2013	03WW01-12914 1/29/2014	03WW01-052114 5/21/2014	03WW01-102814 10/28/2014	03WW01-012115 1/21/2015	03WW01-041515 4/15/2015	03WW01-070815 7/8/2015	03WW01-100815 10/8/2015	03WW01-041316 4/13/2016	03WW01-100416 10/4/2016	35ASW03-101713 10/17/2013	35ASW03-020314 2/3/2014	35ASW03-052814 5/28/2014
1,1-DICHLOROETHENE	µg/L	7	<20 U	<2.5 U	<2 U	<5 U	<10 U	<10 U	<100 U	<100 U	<50 U	<100 U	<100 U	<25 U	<10 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<20 U	1.1 J	0.978 J	<2.5 U	<5 U	3.3 J	<50 U	<50 U	21.4 J	<50 U	<50 U	117	<5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	2,570	418	368	172 J	172	154	48.6 J	32.8 J	15.9 J	31.4 J	36.4 J	6.49 J	<5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<20 U	<2.5 U	<1 U	<2.5 U	<5 U	<5 U	<50 U	<50 U	<25 U	<50 U	<50 U	<12.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	196	69.1	94.8	42.1 J	58.4	71.2	223	216	131	65.6 J	51.8 J	<12.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<20 U	<2.5 U	<1 U	<2.5 U	<5 U	<5 U	<50 U	<50 U	<25 U	<50 U	<50 U	<12.5 U	<5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL

J - Estimated value; analyte concentration was less than the limit of quantification

MCL - Maximum Contaminant Level

NA - not analyzed

U - Analyte was not detected.

UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

µg/L - micrograms per liter

Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35ASW03-012315 1/23/2015	35ASW03-041015 4/10/2015	35ASW03-041316 4/13/2016	35AWW01-981108 11/8/1998	35AWW01-981108FD 11/8/1998	35AWW01-040909 9/9/2004	35AWW01-020608 2/6/2008	35AWW01-111908 11/19/2008	35AWW01-101113 10/11/2013	35AWW01-013114 1/31/2014	35AWW01FD-013114 1/31/2014	35AWW01-052914 5/29/2014	35AWW01-103114 10/31/2014	35AWW01-012715 1/27/2015	35AWW01-041015 4/10/2015	35AWW01FD-041015 4/10/2015
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<5 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	0.259 J	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL

J - Estimated value; analyte concentration was less than the limit of quantification

MCL - Maximum Contaminant Level

NA - not analyzed

U - Analyte was not detected.

UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

µg/L - micrograms per liter

Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW01-071015 7/10/2015	35AWW01FD-071015 7/10/2015	35AWW01-100615 10/6/2015	35AWW01FD-100615 10/6/2015	35AWW01-041216 4/12/2016	35AWW01FD-041216 4/12/2016	35AWW01-100516 10/5/2016	35AWW02-981108 11/8/1998	35AWW02-040910 9/10/2004	35AWW02-112608 11/26/2008	35AWW02-112608-FD 11/26/2008	35AWW02-102213 10/22/2013	35AWW05-040908 9/8/2004	35AWW05-112108 11/21/2008	35AWW05-101613 10/16/2013	35AWW05-020114 2/1/2014
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<5 U	<1 U	<1 U	<1 U	<5 U	0.551 J	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL

J - Estimated value; analyte concentration was less than the limit of quantification

MCL - Maximum Contaminant Level

NA - not analyzed

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µg/L - micrograms per liter

Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW05-052214 5/22/2014	35AWW05FD-052214 5/22/2014	35AWW05-102114 10/21/2014	35AWW05-012315 1/23/2015	35AWW05FD-012315 1/23/2015	35AWW05-040815 4/8/2015	35AWW05-071015 7/10/2015	35AWW05-100515 10/2/2015	35AWW05-041416 4/14/2016	35AWW05-100516 10/5/2016	35AWW06-120308 12/3/2008	35AWW06-110509 5/9/2011	35AWW06-101513 10/15/2013	35AWW06-013014 1/30/2014	35AWW06-052114 5/21/2014	35AWW06-102914 10/29/2014
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	57.6	21.3	15.8	14.2	12	16
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.37 J	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	7.19	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.811 J	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL

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Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW06-012815 1/28/2015	35AWW06-041515 4/15/2015	35AWW06-070715 7/7/2015	35AWW06-100715 10/7/2015	35AWW06-041116 4/11/2016	35AWW06-100316 10/3/2016	35AWW07R-101613 10/16/2013	35AWW08-112408 11/24/2008	35AWW08-110509 5/9/2011	35AWW08-082013 8/20/2013	35AWW08-101013 10/10/2013	35AWW08-012914 1/29/2014	35AWW08-052014 5/20/2014	35AWW08-102714 10/27/2014	35AWW08-012115 1/21/2015	35AWW08-041515 4/15/2015
1,1-DICHLOROETHENE	µg/L	7	13.5	4.17	18.6	12.8	13	7.48	<1 U	<100 U	<25 U	<10 U	<10 U	<10 U	<10 U	<50 U	<50 U	<50 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.709 J	<100 U	13.4 J	9.35 J	<5 U	55.9	47.2	38.6 J	27.2 J	30.7 J
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.586 J	9,590	6,480	1,640	603 J	599	204	112	119	110
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<100 U	<25 U	<5 U	<5 U	<5 U	2.82 J	<25 U	<25 U	<25 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.03	675	1,150	544	149 J	895	953	653	491	607
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<100 U	<25 U	<5 U	<5 U	<5 U	<5 U	<25 U	<25 U	<25 U

Notes:

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µg/L - micrograms per liter

Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW08-070815 7/8/2015	35AWW08-100815 10/8/2015	35AWW08-041316 4/13/2016	35AWW08-100416 10/4/2016	35AWW09-082913 8/29/2013	35AWW09-101013 10/10/2013	35AWW09-012914 1/29/2014	35AWW09-052014 5/20/2014	35AWW09-102714 10/27/2014	35AWW09-012115 1/21/2015	35AWW09-041415 4/14/2015	35AWW09-070715 7/7/2015	35AWW09-100715 10/7/2015	35AWW09-041216 4/12/2016	35AWW09-100316 10/3/2016	35AWW10-082913 8/29/2013
1,1-DICHLOROETHENE	µg/L	7	<100 U	<25 U	<25 U	<10 U	<1 U	<1 UJ	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	73.5 J	79.6	60.9	41.7	<0.5 U	<0.5 UJ	0.317 J	0.502 J	0.703 J	0.486 J	0.483 J	0.622 J	0.717 J	0.515 J	0.437 J	<0.5 U
TETRACHLOROETHENE	µg/L	5	110	79	80.1	36.9	21.9	57.6 J	125	128	254	183	155	194	283	172	173	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<50 U	<12.5 U	<12.5 U	<5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	746	581	234	235	11.9	8.97 J	37.3	41.7	93	64.3	45	59.5	81.3	55.7	48.2	<0.5 U
VINYL CHLORIDE	µg/L	2	<50 U	<12.5 U	14.2 J	7.46 J	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL

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µg/L - micrograms per liter

Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW10-101013 10/10/2013	35AWW10-012914 1/29/2014	35AWW10-052014 5/20/2014	35AWW10-102814 10/28/2014	35AWW10-012715 1/27/2015	35AWW10-041415 4/14/2015	35AWW10-070715 7/7/2015	35AWW10-100715 10/7/2015	35AWW10-041316 4/13/2016	35AWW10-100316 10/3/2016	35AWW11-101513 10/15/2013	35AWW11-020314 2/3/2014	35AWW11-052114 5/21/2014	35AWW11-102914 10/29/2014	35AWW11-012715 1/27/2015	35AWW11-041415 4/14/2015
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	7.7	10.1	11.6	21.9	12.5	13.5
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	0.401 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.442 J	<0.5 U	<0.5 U	0.369 J	<0.5 U	0.273 J

Notes:

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µg/L - micrograms per liter

Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW11-070815 7/8/2015	35AWW11-100715 10/7/2015	35AWW11-041216 4/12/2016	35AWW11-100316 10/3/2016	35AWW12-101813 10/18/2013	35AWW12FD-101813 10/18/2013	35AWW12-013114 1/31/2014	35AWW12FD-013114 1/31/2014	35AWW12-052914 5/29/2014	35AWW12-103014 10/30/2014	35AWW12-012815 1/28/2015	35AWW12-040715 4/7/2015	35AWW12FD-040715 4/7/2015	35AWW12-070915 7/9/2015	35AWW12-100515 10/5/2015	35AWW12FD-100515 10/5/2015
1,1-DICHLOROETHENE	µg/L	7	16.8	14.7	21.3	16	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	0.292 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.343 J	0.326 J	0.279 J	0.251 J	<0.5 U	0.511 J	0.426 J
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	0.532 J	0.328 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL

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µg/L - micrograms per liter

Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW12-041216 4/12/2016	35AWW12-100516 10/5/2016	35AWW12FD-100516 10/5/2016	35AWW13-101113 10/11/2013	35AWW13FD-101113 10/11/2013	35AWW13-020314 2/3/2014	35AWW13-052214 5/22/2014	35AWW13-102114 10/21/2014	35AWW13FD-102114 10/21/2014	35AWW13-012315 1/23/2015	35AWW13-040815 4/8/2015	35AWW13-070915 7/9/2015	35AWW13-100615 10/6/2015	35AWW13-041316 4/13/2016	35AWW13-100616 10/6/2016	35AWW14-101813 10/18/2013
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	1.63 J
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.04
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.663 J
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.272 J

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µg/L - micrograms per liter

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Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW14-013114 1/31/2014	35AWW14-052814 5/28/2014	35AWW14FD-052814 5/28/2014	35AWW14-103014 10/30/2014	35AWW14-012115 1/21/2015	35AWW14-040715 4/7/2015	35AWW14-070915 7/9/2015	35AWW14-100215 10/2/2015	35AWW14-041316 4/13/2016	35AWW14-100616 10/6/2016	35AWW15-101613 10/16/2013	35AWW15FD-101613 10/16/2013	35AWW15-020114 2/1/2014	35AWW15-052814 5/28/2014	35AWW15-102114 10/21/2014	35AWW15-012315 1/23/2015
1,1-DICHLOROETHENE	µg/L	7	1.63 J	1.22 J	1.07 J	1.57 J	1.8 J	1.78 J	1.7 J	2.47	3.25	10.4	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	1.75	1.46	1.47	1.94	1.91	2.08	1.7	1.96	1.78	5.09	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	0.669 J	0.612 J	0.565 J	0.806 J	0.707 J	0.786 J	0.632 J	1.06	1.79	10.2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.303 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

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Table 4
Historic Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW15-041015 4/10/2015	35AWW15-071015 7/10/2015	35AWW15-100615 10/6/2015	35AWW15-041416 4/14/2016	35AWW15-100516 10/5/2016	35AWW16-102213 10/22/2013	35AWW16-013114 1/31/2014	35AWW16-052814 5/28/2014	35AWW16-103014 10/30/2014	35AWW16-012715 1/27/2015	35AWW16FD-012715 1/27/2015	35AWW16-040715 4/7/2015	35AWW16-070915 7/9/2015	35AWW16FD-070915 7/9/2015	35AWW16-100615 10/6/2015	35AWW16-041216 4/12/2016
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL

J - Estimated value; analyte concentration was less than the limit of quantification

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4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW16-100416 10/4/2016	35AWW16FD-100416 10/4/2016	35AWW17-101813 10/18/2013	35AWW17-020114 2/1/2014	35AWW17-052914 5/29/2014	35AWW17-103114 10/31/2014	35AWW17-012815 1/28/2015	35AWW17-041015 4/10/2015	35AWW17-071015 7/10/2015	35AWW17-100515 10/2/2015	35AWW17-041116 4/11/2016	35AWW17-100316 10/3/2016	35AWW18-101813 10/18/2013	35AWW18-020114 2/1/2014	35AWW18-052914 5/29/2014	35AWW18-103114 10/31/2014
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 UJ	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	0.792 J
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

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4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW18-012815 1/28/2015	35AWW18-041015 4/10/2015	35AWW18-071015 7/10/2015	35AWW18-100515 10/2/2015	35AWW18-041116 4/11/2016	35AWW18FD-041116 4/11/2016	35AWW18-100516 10/5/2016	35AWW19-102213 10/22/2013	35AWW19-013114 1/31/2014	35AWW19-052814 5/28/2014	35AWW19-103014 10/30/2014	35AWW19-012115 1/21/2015	35AWW19-040715 4/7/2015	35AWW19-070915 7/9/2015	35AWW19FD-070915 7/9/2015	35AWW19-100215 10/2/2015
1,1-DICHLOROETHENE	µg/L	7	0.726 J	0.78 J	<1 UJ	<1 U	2.13	2.09	0.97 J	6.45	9.31	9.98	10.9	17.4	17.5	13.4	11.7	14.7
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.379 J	0.619 J	0.596 J	0.81 J	0.941 J	1.13	0.807 J	0.751 J	0.939 J
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

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4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW19-041216 4/13/2016	35AWW19-100616 10/6/2016	35AWW20-101513 10/15/2013	35AWW20-020314 2/3/2014	35AWW20-052114 5/21/2014	35AWW20-102914 10/29/2014	35AWW20-012715 1/27/2015	35AWW20-041515 4/15/2015	35AWW20-070815 7/8/2015	35AWW20-100815 10/8/2015	35AWW20-041316 4/13/2016	35AWW20-100416 10/4/2016	35AWW21-101613 10/16/2013	35AWW21-020414 2/4/2014	35AWW21-052214 5/22/2014	35AWW21-102114 10/21/2014
1,1-DICHLOROETHENE	µg/L	7	13.5	12.9	3,230	2,950	5,060	4,910	5,660	4,640	4,780	3,630	5,460	3,440	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	110	87.7	110	119	123	120	118	105	126	115	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	1.65	1.53	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	<12.5 U	<10 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	3.77	3.52	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	5.16 J	<10 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	0.899 J	0.754 J	513	479	695	843	820	718	636	582	707	594	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	105	62.4	65.7	102	122	90.6	151	126	216	166	<0.5 U	<0.5 U	<0.5 U	<0.5 U

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4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW21-012315 1/23/2015	35AWW21-040815 4/8/2015	35AWW21-070915 7/9/2015	35AWW21-100615 10/6/2015	35AWW21-041316 4/13/2016	35AWW21FD-041316 4/13/2016	35AWW21-100416 10/4/2016	35AWW21FD-100416 10/4/2016	35AWW22-102213 10/22/2013	35AWW22-013114 1/31/2014	35AWW22-052914 5/29/2014	35AWW22-103014 10/30/2014	35AWW22FD-103014 10/30/2014	35AWW22-012115 1/21/2015	35AWW22FD-012115 1/21/2015	35AWW22-040715 4/7/2015
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

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4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW22-070915 7/9/2015	35AWW22-100515 10/5/2015	35AWW22-041316 4/13/2016	35AWW22-100616 10/6/2016	LHSMW04-941201 12/1/1994	LHSMW04-960812 8/12/1996	LHSMW04-980513 5/13/1998	LHSMW04-040909 9/9/2004	LHSMW04-FEB2007 2/20/2007	LHSMW04-013008 1/30/2008	LHSMW04-112508 11/25/2008	LHSMW04-032916 3/29/2016	LHSMW04-041316 4/13/2016	LHSMW05-941201 12/1/1994	LHSMW05-960131 1/31/1996
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<5 U	<0.2 U	<1 U	<5 U	<2 U	<1 U	<1 U	<1 U	<2.5 U	<5 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.2 U	<1 U	<5 U	<2 U	<1 U	0.292 J	0.666 J	0.851 J	NA	<1 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.25 U	<1 U	<5 U	6.4	8.74	25.7	419	397	870	4,884
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.29 U	<1 U	<5 U	<2 U	<1 U	<1 U	<0.5 U	<1.25 U	NA	<1 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.25 U	<1 U	<5 U	4.6	5.74	11.3	106	86.1	49	99
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.24 U	<1 U	<5 U	<2 U	<1 U	<1 U	<0.5 U	<1.25 U	NA	<1 U

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4th Year RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	LHSMW05-960812 8/12/1996	LHSMW05-980513 5/13/1998	LHSMW05-040909 9/9/2004	LHSMW06-941201 12/1/1994	LHSMW06-960813 8/13/1996	LHSMW06-980513 5/13/1998	LHSMW06-040908 9/8/2004	LHSMW06-FEB2007 2/21/2007	LHSMW06-111908 11/19/2008	LHSMW06-101713 10/17/2013	LHSMW06-013114 1/31/2014	LHSMW06-052814 5/28/2014	LHSMW06-103014 10/30/2014	LHSMW06-012115 1/21/2015	LHSMW06-040715 4/7/2015	LHSMW06-070915 7/9/2015
1,1-DICHLOROETHENE	µg/L	7	<0.2 U	<40 U	<5 U	<5 U	2	1.3	<5 U	<2 U	<1 U	1.23 J	0.884 J	1.68 J	4.03	3.28	5.95	8.2
CIS-1,2-DICHLOROETHENE	µg/L	70	0.21	<40 U	<5 U	NA	0.98	1.4	<5 U	5.1	2.26	4.01	1.85	2.59	5.2	3.25	5.52	7.24
TETRACHLOROETHENE	µg/L	5	2,700	4,900	5,100 J	<5 U	0.27	0.69	2 J	<2 U	<1 U	0.663 J	<0.5 U	0.255 J	0.381 J	0.255 J	0.454 J	0.443 J
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.29 U	<40 U	<5 U	NA	<0.29 U	<1 U	<5 U	<2 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	39.7	160	230 J	<5 U	0.43	0.53	<5 U	0.77 J	0.486 J	1.87	0.751 J	1.41	2.77	1.75	3.02	3.23
VINYL CHLORIDE	µg/L	2	<0.24 U	<40 U	<5 U	NA	0.62	<1 U	<5 U	<2 U	<1 U	0.627 J	0.5 J	0.597 J	1.15	0.924 J	0.967 J	1.36

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4th Year RA(O) Report

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1,1-DICHLOROETHENE	µg/L	7	12.1	13.7	19.2	750	660	1,341	311	950	590 J	394	576	669	396	334	558 J	1,140
CIS-1,2-DICHLOROETHENE	µg/L	70	10.4	11.9	19	NA	NA	NA	2.5	11	6	3.6	7.96	10.1	6.1	4.66	7.17	21
TETRACHLOROETHENE	µg/L	5	0.518 J	0.563 J	0.9 J	<5 U	<5 U	7	2.7	<1 U	<5 U	<2 U	<1 U	0.253 J	<0.5 U	<1 U	<0.5 U	<1 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	0.391 J	NA	NA	NA	<0.29 U	0.73	<5 U	<2 U	0.421 J	0.384 J	0.282 J	<1 U	0.296 J	1.06 J
TRICHLOROETHENE	µg/L	5	5.66	6.5	9.06	16	19	24	5.9	25	24	15.8	25	41.3	23.9	17.6	23.1	78.1
VINYL CHLORIDE	µg/L	2	2.1	2.38	2.94	NA	NA	10	1.1	7.2	9	3	14.4	9.47	15.9	5.43	7.98	35.4

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1,1-DICHLOROETHENE	µg/L	7	1,300	1,660	2,100	1,210	1,250	701
CIS-1,2-DICHLOROETHENE	µg/L	70	19.3	31.4	32.4	22.5	19.6	22.1
TETRACHLOROETHENE	µg/L	5	<2.5 U	<5 U	<2.5 U	<2.5 U	0.397 J	<2.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<2.5 U	<5 U	1.29 J	<2.5 U	0.681 J	<2.5 U
TRICHLOROETHENE	µg/L	5	64.3	82.1	118	84.9	67.5	71.6
VINYL CHLORIDE	µg/L	2	28.8	34.1	69.4 J	37.1	10.8	21.8

Notes:

Blue Highlighting Indicates Analyte Detected Above MCL

J - Estimated value; analyte concentration was less than the limit of quantification

MCL - Maximum Contaminant Level

NA - not analyzed

U - Analyte was not detected.

UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

µg/L - micrograms per liter

¢I-ōfŠ p
9yKI-yÕŠŘ Ly-ăĺúdz .ł2ЦŠY ŠŘłИ-úł2y t ŠЦтf2ЦYI-yÕŠ 5I-úI· {dzY YI-Ц\ê - 9I-ăúŠЦy ttdzY Ŝ
[I ! ! t-pyΣ [2yЭK2Цy ! ЦY ë ! YY dzyЉúł2y tfI-yΰΣ YI-Цy I-Ô]Σ ¢ŜЁI-ă
n^{ÚK} ¸ŜI-Ц w ! óhú wŜLJ2Цú

a 2yЉú2ЦЦyЭ [2ôI-úł2y	{I-YLJtŜ 5I-úŜ	CŁŠfŘ t I-ЦI-YŠúŠЦă					9fŠÔúЦ2y 52y2Ц	Ô±h / ă				5Ц ă ł2Ø ŠR DI-ăŠă				² ŠЦ / KSY ĺăúЦ\ê						5ŠÔKf2ЦЦyI-úłyЭ . I-ÔúŠЦI-	
		LJ I	5h	hwt	{LJŜÔ / 2yŘ	¢dzlÔ	¢h /	t / 9	¢ / 9	Õ5 / 9	±/	9úKI-yŠ	a ŠúKI-yŠ	9úKŠyŠ	/ $h_н$	ČŠ^{Нb}	bh_o	$bh_н$	{$h_п$	/f	!f[	5 I /	5 I . ů
		{ ¦	Y Эk[	Y ±	Y ăkÔY	b¢ ¦	Y Эk[	ҡЭk[	ҡЭk[	ҡЭk[	ҡЭk[	ҡЭk[	ҡЭk[	ҡЭk[	ҡЭk[	Y Эk[	Y Эk[	Y Эk[	Y Эk[	Y Эk[	Y Эk[	ÔŠffăkY [	ÔŠffăkY [
	укнлкнлмо	c!лр	bw	bw	уº но	нсΦ	мсºр	мĈспл	рпп	ф°ор Ⅱ	ғр	ғн	млºм	ғн	поĨллл	лº лп	ғп	ғп	мĨпул	нĨрмл	мтп	ғлΦ	ғрº о
	млкмлкнлмо	cº т	bw	bw	пт º т	пº м	ссĨллл	сло Ⅱ	мпф Ⅱ	ғр	ғр	ғн	рº оу	ғн	b !	рнº п	мнº О Ⅱ	ғнл	тло	флр	орĨслл	о º с	мĨолл
	мкнфкнлмп	c!cу	bw	bw	ноº п	тфº у	поĨрлл	рфф	уфр	ррΦ	ғр	ғн	опр	ғн	пнуĨллл	мпп	ғмл	ғмл	нур	нÜмфл	нтĨтлл	ғлº у	мнΦлл
	ркнлкнлмп	pº рт	bw	bw	муº н	флº п	мсĈфлл	нлп	фро	пт º н	ғр	ғн	b !	ғн	b !	ғуллл	ғмл	ғмл	нсн	мĪрфл	муĨоллл	пĨуул	ртпĨллл
	млкнткнлмп	c!yс	bw	bw	мфºр	нмо	моĨфллл	ммн	сро	оуºс Ⅱ	ғнр	ғн	пĨпнл	ғн	рлрĨллл	пту	ғнл	ғнл	ғмлл	нÜлнл	ммĨуллл Ⅱ	тлºп	оĨлрлĨллл Ⅱ
	мкнмкнлмр	c!ун	bw	bw	муº м	ннр	сĨлол	ммф	пфм	нтº н Ⅱ	ғнр	ғпл	нÜрпл	ғпл	мрнĨллл Ⅱ	млΦ Ⅱ	ғо	ғо	ғмр	мΦфлл	нлĨллл	b !	b !
	пкмркнлмр	y!лс	bw	bw	мсº п	ппу	уĨоол	ммл	слт	олº т Ⅱ	ғнр	ғнл	оĨоул	ғнл	нпΦĨллл	ғул	ғн	ғн	ғмл	нÜнрл	муĨуллл Ⅱ	b !	b !
	ткукнлмр	y!лт	bw	bw	моΦ	онр	нÜрпл	ммл	тпс	тоºр Ⅱ	ғрл	ғнл	рĨслл	ғнл	отлĨллл	мно	ғн	ғн	ғмл	нÜнрл	млĨмлл Ⅱ	b !	b !
	млкукнлмр	tº нн	bw	bw	ммº о	олл	нÜнпл	тф	рум	тфΦс	ғмнºр	ғнл	рÜрмл	ғнл	отпĨллл	нмºм	ғр	ғр	ғнр	нÜмол Ⅱ	нлĨслл	ппу	тнΦлл
	млкпкнлмс	cº фн	bw	bw	ммº у	рлºп	фму	осΦ	нор	пмº т	тºпс Ⅱ	ғнл	тĨорл	ғнл	пнпĨллл	мтºс	ғн	ғн	ғмл	нÜллл	фĪмсл Ⅱ	нрĨслллллл	снрĨллл
	ммкмркнлмт	cº ру	bw º	bw º	ммº у	со º с	рум	мн	оо	оу	ғ р ¦	ғлºно ¦	стл	лºрс Ⅱ	мфлĨллл	мтºн Ⅱ	лºнпф	ғлºлр ¦	нºло	нÜлсл	пĪосл	оĨлслĨллл	ғоуºр ¦
	ткмукнлму	tº мр	bw º	bw º	мпΦ	омºп	пуп Ⅱ	ғнºр ¦ Ⅱ	мф Ⅱ	мн Ⅱ	фºл Ⅱ	ғлºпт ¦	фнл	лºпф Ⅱ	орлĨллл	моºт Ⅱ	ғ лºнлл ¦ Ⅱ	ғлºннлл ¦ Ⅱ	лΦ	нÜпсл	оĨлрл Ⅱ	мĪпмлĨллл	птĨллл
	укнлкнлмо	c!му	bw	bw	оº сп	оо	млºр	осу	фпº у	лΦфту Ⅱ	ғм	ғн	оº нн	ғн	поĨллл	лº лп	ғм	ғм	роп	уфн	мпн	мº н	лºпⅡ
	млкмлкнлмо	cº рр	bw	bw	оΦº н	мл	пΦĨнлл	мтн	пнº м	ғнºр	ғнºр	ғн	пº ор	ғн	b !	орº п	ғнл	ғнл	пут	офу	офĪтлл	ғнº м	мрºтⅡ
	мкнфкнлмп	c!ру	bw	bw	нлº н	нрс	олĨнлл	мтн	руº п	ғр	ғр	ғн	рºлф	ғн	оотĨллл	ммл	ғмл	ғмл	прт	флс	нтĨрлл	ғлΦ	соΦллл
	ркнмкнлмп	pº рн	bw	bw	мс	мрн	нΦĨмлл	мрп	тмº н	оº о Ⅱ	ғр	ғн	птф	ғн	рспĨллл	лºлнмт	ғмл	ғмл	отс	тул	нрĨтлл	нĪутл	нĪтллĨллл
	млкнукнлмп	pº ут	bw	bw	мпº н	мтм	уĨппл	пуº с Ⅱ	ннο	ғрл	ғрл	ғн	фмл	ғн	рспĨллл Ⅱ	млт	ғм	ғм	мм	фпл	мнĪоллл Ⅱ	млΦ	мфнĪллл
	мкнмкнлмр	cº рм	bw	bw	моºс	фоº о	тĪтнл	онº у Ⅱ	нмс	ғрл	ғрл	ғмл	офо	ғмл	оооĨллл	плΦс	ғн	ғн	млº н	уум	мΦĪллл Ⅱ	b !	b !
	пкмркнлмр	tº мм	bw	bw	мнº у	оут	тĪуллл	мрΦ Ⅱ	мом	нмº п Ⅱ	ғнр	ғнл	оĨмтл	ғнл	офсĨллл	нтºуⅡ	ғм	ғм	му	фтс	нпĪмлл	b !	b !
	ткукнлмр	tº сн	bw	bw	ммº у	уп т	оĨспл	омº п Ⅱ	срº с Ⅱ	ғрл	ғрл	ғнл	мсĈмлл	ғнл	плуĨллл	фсº м	ғм	ғм	оº снⅡ	мĪнлл	мнĪллл Ⅱ	b !	b !
	млкукнлмр	cº ср	bw	bw	ммº п	рнр	мĪтллл	осº п Ⅱ	рмº у Ⅱ	ғрл	ғрл	ғнл	рĪуул	ғнл	рллĨллл	лº уор	ғр	ғр	ғнр	мÜнлл	нлĪоллл	ту	уĪулл
	млкпкнлмс	cº ум	bw	bw	сº оу	тл	нфн	ғр	ғр	ғр	ғр	ғнл	рÜррл	ғнл	сртĨллл	уº лн	ғм	ғм	ғм	тсн	рĪрлл Ⅱ	фĪпслĨллл	роĨолл
	ммкмркнлмт	tº нр	bw º	bw º	сº рф	мор	мфм	ғнºр ¦	ғнºр ¦	ғнºр ¦	ғнºр ¦	ғлºно ¦	снл	мºн	омлĨллл	муΦ Ⅱ	ғлºлр ¦	ғлºлр ¦	плºу	мĪлнл	оĪомл	орĪолл	ғнлºу ¦
	ткмукнлму	cº у	bw º	bw º	сº но	фºр	ммУ Ⅱ	ғлºр ¦ Ⅱ	ғлºр ¦ Ⅱ	рºо Ⅱ	пºу Ⅱ	ғлºпт ¦	рΦл	лºуΦ Ⅱ	пфлĨллл	пл Ⅱ	ғлºнлл ¦ Ⅱ	ғлºннлл ¦ Ⅱ	мсм	фтт	нÜнфл	тºр	рºр



{fI3Kú ŘŠÔłŠłăŠ lyΥLJ I yΣłŠŘ ŘdzЦyЭ a tтè нлмп ăł-YLJtłyЭ ŠØŠyΰΣ LJ2úŠyΰł-ffë ЦŠf-úŠŘ úΣ ŠÈÔŠăăłØŠ ădzΘăΰЦł-úŠ tŠЦYŠyΰł-úł2y´ł-yŘ 2ЦЭł-yÍÔ ł-ÔłŘ LJЦ2ŘdzÔΰЦ2yΣ yŠŠŘ úΣ Y´2yłúΣ2Ц Ôf2ăŠfë» {ëăúŠY´ K ł-ă Ô2yΰłyΰzŠŘ úΣ ăŠfΣ ÔdzΤfŠЦŠŘ 2ØŠЦ úłYŠ»

-łyΰЦł-f ăLJЦ]Š ły´¢h / łyŘłÔ-łŰŠă ŠΤfŠÔúłØŠ ădzΘăΰЦł-úŠ Ř1ăΰЦЦΘdzΰЦ2yΠ -wŠăłŘdzł-f ŠtŠÔúЦ2y´ Ř2y2Ц LJЦŠăŠyΰ úΣ ădzLJLJ2ЦΰŘŠăЦЦŠŘ ôЦ2ΣЭŠ2ÔKSY´łÔł-f ЦŠł-Ôúł2yăł -5ŠÔΠłyЭ ¢h / Ô2yÔŠyΰЦł-Цł2yă 2ØŠЦ ΰłY´Š łyŘłÔł-ΰłØŠ 2ł ădzΘăΰЦł-úŠ Ô2yădzY´LJúł2yΠ -9tŠÔúЦ2y´Ř2y2Ц yŠł-ЦΠê ŘŠLJtŠł-úŠŘ»

t / 9 łă ŘŠΣЦł-ŘłyЭ ΤdzffΘ úΣ ± / ª wŠăłŘdzł-f ŘŠΣЦł-Ř łł-úł2y´LJЦ2ŘdzÔΰă 2Τ ¢ / 9£ Õ5 / 9£ łyŘ ± / Ô2yΰłyΠzŠ úΣ ŘŠΣЦł-ŘŠ»

wŠŘdzÔŠŘ Y´ŠúK łyŠ łyŘ ŠúKŠyŠ łyŘłÔł-úŠă ăf2 ø łyЭ 2Τ ЦŠŘdzÔΰЦØŠ ŘŠÔKf2ЦyΠ-úł2y´ŘdzŠ úΣ ΠY´łΰŠŘ ădzΘăΰЦł-úŠ łyŘ ŠtŠΰЦ2yΠ-ÔÔŠLJΰΣЦă ЦSY´łłyłyΣ»

yÔΰЦŠł-łyЭ ădzfΤł-úŠ Ô2yÔŠyΰЦł-Цł2y´łyŘłÔł-ΰŠă ăΤ2ø łyЭ ăúł-ΰłyЭ úΣ ăúł-ffë

LyΰЦł-f ăLJЦ]Š ły´ŘŠÔKfΣЦЦyΠ-úłyЭ ô ł-ÔúŠЦł- Ô2dzyΰă ădzΣЭŠăΰ ŠΤfŠÔúłØŠ Ř1ăΰЦЦΘdzΰЦ2y´2Τ ΰŘŠ ôł2ł-dzΣY´ŠyΰЦł-Цł2y´Ôdzfΰdzz ЦŠ -{dzăΰł-łyŠŘ ŠtŠØł-ΰŠŘ Ô2dzyΰă łyŘłÔł-ΰŠ ădzЦØłØł-f łyŘ LJ2ăăłÔtŠ LJЦ2ΒfŠЦł-Цł2y´2Τ ΰŘŠ ôł2ł-dzΣY´ŠyΰЦł-Цł2y´Ôdzfΰdzz ЦŠ» -9tŠØł-ΰŠŘ ŘŠÔKf2ЦyΠ-úłyЭ ô ł-ÔúŠЦł- Ô2dzyΰă ły´нлмс łyŘłÔł-ΰŠ ЦłLJłŘ LJЦ2ΒfŠЦł-Цł2y´łă 2yЭ2łyЭ»

b2ΰŠă'
мª 9fŠÔúЦ2y´Ř2y2Ц łyŘŠÔúЦ2yă Ô2Y´LJfŠΰŠŘ ły´{ŠLJΰ» нлмо
нª . ł2ł-dzΣY´ŠyΰЦł-Цł2y´LJŠЦf2ЦY´ŠŘ ły´b2Ø» нлмо
oł 5 łΰЦł- ЦŠÔ2ЦŘŠŘ ΰdzΰ y2ΰ dzăŠŘ ăłyÔŠ ôЦłfŠЦ ØłădzăŠŘ úΣ Ô2ffŠÔΰ úKŠ ăł-Y´LJfŠ»
LJ I Γ LJ2ΰŠyΰЦł-f 2Τ KëŘЦΣ3Š y´
{ ¦ Γ áΰł-yŘłЦŘ dzyΰЦă
5 h Γ ŘłăăΣfØŠŘ 2ĒΣ3Š y´
Y Эk[Γ Y´łfЦЦЦł-Y´ă LJŠЦ ΰЦŠЦ

Y ± Γ Y´łfЦØΣfΰă
{LJŠÔ / 2yŘ Γ ăLJŠÔłΤЦÔ Ô2yŘdzÔΰЦØdzÔe
Y´ăkÔY Γ Y´łfЦăłŠY´ŠyΰЦ LJŠЦ ÔŠyΰЦY´ŠΰЦ
¢dzlÔ Γ ΰdzЦÔłŘЦÔe
b¢ ¦ Γ y´ŠLJKŠtΣ2Y´ŠúЦÔ ΰdzЦÔłŘЦÔe dzyΰЦă
¢h / Γ ΰ2ΰł-f 2ЦΣł-yÍÔ Ô łÔ2y´
Ô±h / Γ ÔKfΣЦЦyΠ-úŠŘ Ø2fł-ΰłŠ 2ЦΣł-yÍÔ Ô2Y´LJΣdzyŘă

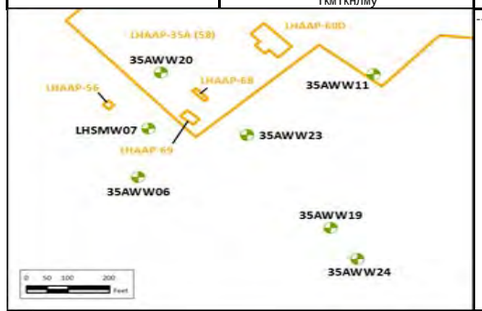
t / 9 Γ ŠúЦł-ÔKf2ЦΣŠúKŠyŠ
¢ / 9 Γ ΰЦÔKfΣЦΣŠúKŠyŠ
Õ5 / 9 Γ Ôłă-мΠ-ŘłÔKf2ЦΣŠúKŠyŠ
±/ Γ ØłyŘt ÔKfΣЦЦŘŠ
ҡЭk[Γ Y´łÔЦΣ3Ц-Y´ă LJŠЦ ΰЦŠЦ
/ $h_н$ Γ Ôł-Ц\ôΣy´Ř1ΣŘŠ
ČŠ^{Нb} Γ tŠЦ\ê2dză Ц\ê2y´

bh_o Γ yΰЦł-ΰŠ
$bh_н$ Γ yΰЦΰЦŠ
{$h_п$ Γ ădzfΤł-ΰŠ
/ f Γ ÔKfΣЦЦŘŠ
! f[Γ łf[ł-fłyŘЦ\ê
5 I / Γ ŘŠKł-fΣÔΣÔÔΣłŘŠă
5 I . ů Γ ŘŠKł-fΣôł-ÔúŠЦ ăLJLJ»

ÔŠffăkY [Γ ÔŠffă LJŠЦ Y´łfЦΰЦŠЦ
b ! Γ y´ΣΰЦ łył-fΣÎŠŘ
bw Γ y´ΣΰЦ ЦŠÔ2ЦŘŠŘ
¦ - ¦ yŘŠЦŠÔЦŠŘł ¢KŠ łył-fΣΰŠ ø łă łył-fΣÎŠŘ Τ2ЦΣ ôdzΰ y2ΰ ŘŠЦŠÔЦŠŘ łyŘ ЦŠLJ2ЦЦŠŘ ΰ2 úKŠ ΰłY´łΰ 2Τ ŘŠЦŠÔЦŠŘ2y´
¦ - ¢KŠ łył-fΣÎŠ ø łă y2ΰ ŘŠЦŠÔЦŠŘł K2øŠØŠЦΣ úKŠ Ц\Šădzfΰ łă ŠăЦłY´ł-ЦŠŘ ŘdzŠ ΰ2 ŘłăÔЦŠLJł-yÔЦŠă łyˇY´ŠŠЦłyΣ ÔŠЦΰł-łyˇ
ł-ył-fΣÎŠ-ăLJŠÔłΤłÔ ljdzł-ΰΰΣ Ô2yΰЦΣΤ ÔЦΰЦŠЦł-ł
Ⅱ - 9ăЦłY´ł-ΰŠŘ´ . ŠΰøŠŠyΰKŠ Y´ŠúK2Ř ŘŠЦŠÔЦ2y´ΰY´ΰ łyŘ ЦŠLJ2ЦЦyΣ ΰY´ΰ łyŘκ2Ц ŘdzŠ ΰ2 ŘłăÔЦŠLJł-yÔЦŠă łyˇY´ŠŠЦłyΣ ÔŠЦΰł-łyˇ

¢I-õfŠ c
9yKI-yÔŠŘ Ly˙-ăĺúdz ˛ł2ШŠY ŠŘłI-úł2y˙ tŠШтł2ШY I-yÔŠ 5I-úl· {dzY Y I-ЧЁ- ² ŠáúŠШy˙ tťdzY Ŝ
[l ! ! t-pyΣ [2yƎK2Шy˙ ! ШY ě ! YY dzyЛúł2y˙ tfI-yűz YI-ШyI-Ô]Σ ¢ŜĖI-ă
n ЩK ¸ŜI-Ш w ! óhú wŜLJ2Шú

a 2yúł2ШyƎ [2ÓI-úł2y˙	{I-YLłŠ 5I-íŠ	CŁŠfŘ tIчШ-YŠúŠЧă					9fŠÔúł2y˙ 52y2ш	Ô±h / ă				5Iăă2fØŠŘ DI-ăŠă				² Šů /KŠY˙łáúЧЁ						5ŠÔKf2ШyI-úlyƎ . I-ÓúŠЧI-	
		LJ I	5h	hwt	{LJŠÔ / 2yŘ	¢dzЧÖ	¢h /	t / 9	¢ / 9	Ô5 / 9	± /	9úKI-yŠ	a ŠúKI-yŠ	9úKŠyŠ	/ h$_н$	ĆŠ^{Нb}	bh$_о$	bh$_н$	{h$_п$	/ť	!ť[	5 I /	5 I . ú
		{¦	Y Ǝк[	Y±	Y˙ăkÔY	b¢¦	Y Ǝк[	ҡЭк[	ҡЭк[	ҡЭк[	ҡЭк[	ҡЭк[	ҡЭк[	ҡЭк[	ҡЭк[	Y Ǝк[	Y Ǝк[	Y Ǝк[	Y Ǝк[	Y Ǝк[	Y Ǝк[	ÕŠťăkY˙[	ÕŠťăkY˙[
[l { a ² лт	ммкмпкнлмт	pťфn	лťлф	мрф	мм	плťф	cŷум	ғлřр ¦	оф	мм	мр	ғлřно ¦	му	ғлřнн ¦	ннлЛллл	лřп Ш	ғлřлрлл ¦	ғлřмлл ¦	нЁфпл	нЁрпл	трл	b !	b !
	окткнлму	cŷм	лřср	мул	мнřм	pŷм	cŷст	ғмřл ¦	оп	мм	p	ғлřпт ¦	о	ғлřрр ¦	орлЛллл	лřлт Ш	ғлřлрлл ¦	ғлřлрлл ¦	нЁтлл	нЁпнл	трт	ммŷу	ғпŷу ¦
	ткмткнлму	cŷно	л	-оуф	мпřм	моŷн	онм	ғлřр ¦	мн	р	ғлřр ¦	ғлřпт ¦	мřп	ғлřрр ¦	рплЛллл	нŷру Ш	ғлřнлл ¦	ғлřнлл ¦	мЁлфл	нЁнтл	мЁффл	мтřн	cЁртлЁллл
op ! ² ² лс	ммкмпкнлмт	pŷус	лřлс	мфт	pŷут	уфт	нřнф	ғлřр ¦	ғлřр ¦	ғлřр ¦	ғлřр ¦	ғлřно ¦	лřон Ш	ғлřнн ¦	нлплЛллл	лřлф Ш	нřмн	ғлřлрлл ¦	мЁрсл	мЁллл	ссс	b !	b !
	окукнлму	pŷст	лřнс	мос	pŷфм	пřп	нřон	ғмřл ¦	ғмřл ¦	ғмřл ¦	ғмřл ¦	ғлřпт ¦	ғмřл ¦	ғлřрр ¦	рллЛллл Ш	лřмн Ш	ғлřлрлл ¦	ғлřлрлл ¦	мЁпул	мЁллл	ссс	мřр	нфм
	ткнкнлму	пфр	л	-ор	pŷус	фсŷт	пЁнлл Ш	ғ лřр ¦Ш	ғ лřр ¦Ш	ғ лřр ¦Ш	ғ лřр ¦Ш	ғлřпт ¦	ғмřл ¦	лřру Ш	тулЛллл Ш	мп Ш	ғлřнлл ¦Ш	ғлřнлл ¦Ш	умм	флп	оус	ғмŷу ¦	рнЁфлл
op ! ² ² мм	ммкмпкнлмт	pŷсп	лřот	нту	уŷуу	срŷн	pŷлр	ғлřр ¦	ғлřр ¦	ғлřр ¦	ғлřр ¦	ғлřно ¦	ғлřсо ¦	ғлřнн ¦	нолЛллл	лřлу Ш	ғлřлрлл ¦	ғлřлрлл ¦	мЁнфл	нЁсрл	прн	b !	b !
	окткнлму	pŷфп	лřрф	ннм	фřпф	флřу	pŷну	ғмřл ¦	ғмřл ¦	ғмřл ¦	ғмřл ¦	ғлřпт ¦	мс	лřоу Ш	ослЛллл	лřмл Ш	ғлřлрлл ¦	ғлřлрлл ¦	мЁнсл	нЁрол	ппс	лřс	ғрřл ¦
	ткмскнлму	pŷом	л	-рс	уŷтт	мрŷр	мЁсрл	ғ лřр ¦	ғ лřр ¦	ғ лřр ¦	ғ лřр ¦	ғ лřпт ¦	лřул Ш	ғлřрр ¦	прлЛллл	нтЁс Ш	ғ лřмлл ¦	ғ лřмлл ¦	срн	нЁппл	спф	пЁсл	фмлЛллл
op ! ² ² мф	ммкмткнлмт	pŷнт	bw^{o}	bw^{o}	pŷфт	нсŷр	b !	ғлřр ¦	ғлřр ¦	ғлřр ¦	ғлřр ¦	b !	b !	b !	b !	b !	b !	b !	b !	b !	b !	b !	b !
	окукнлму	pŷну	b !	b !	cŷлу	нсŷп	нřрм	ғмřл ¦	ғмřл ¦	ғмřл ¦	ғмřл ¦	ғлřпт ¦	ғмřл ¦	ғлřрр ¦	фтЛллл	мřмл Ш	ғлřлрлл ¦	ғлřлрлл ¦	мЁннл	мЁпол	мрф	лřп Ш	ғммфр ¦
	ткмукнлмф	cŷлу	bw^{o}	bw^{o}	pŷст	мн	нŷоу Ш	ғлřр ¦Ш	ғлřр ¦Ш	ғлřр ¦Ш	ғлřр ¦Ш	ғлřпт ¦	лřср Ш	ғлřрр ¦	мулЛллл Ш	нŷту Ш	ғлřнлл ¦Ш	ғлřнлл ¦Ш	фуо	мЁотл	мфф	лřол Ш	нлЁплл
op ! ² ² нл	ммкмпкнлмт	pŷфт	лřлп	моу	тřтм	нтřр	моŷу	лřул Ш	онл	ро	ту	ғлřно ¦	му	лřпм Ш	нолЛллл	лřпр Ш	ғ лřлрлл ¦	ғ лřлрлл ¦	нЁмрл	мЁтол	уоп	b !	b !
	окткнлму	cŷмс	лřс	млс	тŷфт	нмřо	мпřр	ғрŷл ¦	оол	тс	ммл	ғлřпт ¦	ғмřо ¦	ғлřрр ¦	отлЛллл	лřсф Ш	ғлřлрлл ¦	ғлřлрлл ¦	мЁупл	мЁрмл	упу	pŷр	мЁмнл
	ткмскнлму	cŷму	л	-орт	тřмф	л	по	ғлřр ¦	нтл	сф	тм	ғлřпт ¦	лřфо Ш	ғлřрр ¦	ослЛллл	мřму Ш	ғ лřмлл ¦	ғ лřмлл ¦	уун	мЁпнл	мЁпрл	мřрл	рŷфтлЁллл
op ! ² ² но	окукнлму	pŷфн	лřтс	мур	оŷру	уфŷр	оŷом	ғмřл ¦	нт	нм	оřм	ғлřпт ¦	ғмřл ¦	ғлřрр ¦	рллЛллл	лřмо Ш	мřн	ғлřлрлл ¦	тсм	пут	слу	ғлřр ¦	ғпŷу ¦
	ткмткнлму	pŷст	л	-мст	оřп	мту	урсŷл	ғлřр ¦	нŷс	мн	ғлřр ¦	ғлřпт ¦	пф	лřоу Ш	отлЛллл	нрřм Ш	ғлřмлл ¦	ғлřмлл ¦	ғлřрлл ¦	пун	фмп	прřм	фŷрол
op ! ² ² нп	окукнлму	pŷом	лŷсс	ннп	лřпут	ффŷр	мřпр	ғмřл ¦	ғмřл ¦	ғмřл ¦	ғмřл ¦	ғлřпт ¦	ғмřл ¦	ғлřрр ¦	нфлЛллл	лřоо Ш	лřмм	ғлřлрлл ¦	урŷт	ммф	ссŷр	ғнřл ¦	тфřф
	ткмткнлму	пфŷу	л	тм	лřпуп	ппф	мřру	ғ лřр ¦	ғ лřр ¦	ғ лřр ¦	ғ лřр ¦	ғлřпт ¦	ғмřл ¦	ғлřрр ¦	полЛллл	лřмс Ш	лŷлспл Ш	ғ лřмлл ¦	тоŷс	ммт	рнЁп	ғмřл ¦	мот



-{fl ƎKú lyÔúŠI-ăŠ ly˙LJ I ŕ2ŕf2ø łyƎ łyŷŠÔúł2y˙lă ŕI-Ø2ШI-ôfŠ»

-Lyŭúł-ŕ ăLJłŢŠ ly˙¢h / lyŘłÓI-úŠă ŠŕŕŠÔúØŠ ădzôăúШ-úŠ Řlăúl Шödzúł2y˙ú2 ăŠØŠШ-ŕ 2ŕ úKŠ I-łШŠI-ă» -Lú Y˙I-ě ú-łŢŠ úlY˙Š ŕ2Ш úKŠ ădzôăúШ-úŠ ú2 łШŠI-ÔK úKŠ Y˙2yúł2ШyƎ óŠťă»

-5ŠÔШŠI-ăIyƎ ădzŕf-úŠ ly˙¢h / ă» ! ŘŘúł2ył-ŕ úlY˙ŠkY˙2yúł2ШyƎ yŠÔŠăăI-ЧЁ ú2 2ôăŠШØŠ Ô2Y˙LJŕŠÚŠ ŘŠÔKf2ШyI-úł2y˙I-ú op ! ² ² нл»

-LyÔШŠI-ăIyƎ ădzŕf-úŠ Ô2yÔSyÚШI-úł2y˙lyŘłÓI-úŠă ÚKŠ 2yăŠúκŘSØŠf2LJY˙ŠyÚ 2ŕ łŠŘdzÔIyƎ Ô2yŘúł2yă Ô2yŘdzÔłØŠ úł2 łŠŘdzÔúØŠ ŘŠÔKf2ШyI-úł2y»

-Lyŭúł-ŕ ăLJłŢŠ ly˙ŘŠÔKf2ШyI-úlyƎ ôI-ÔúŠШI- Ô2dzyÚłă ădzƎƎŠăú ŠŕŕŠÔúØŠ Řlăúl Шödzúł2y˙2ŕ úKŠ ólł2I-dzƎY˙SyÚI-úł2y˙Ódzŕúdzł Š»

b2úŠă?

мº 9fŠÔúł2y˙Ř2y2Ш lyŷŠÔúł2yă Ô2Y˙LJŕŠúŠŘ ly˙ a I-ЧÓK нлму
нº .ł2I-dzƎY˙SyÚI-úł2y˙LJŠIIŕ2ШY˙ŠŘ ly˙ ! LJШŕ нлму
o» 5I-úI- łŠÔ2ШŘŠŘ Ódzú y2ú dzăŠŘ ălyÔŠ ôI-łŠIu ø I-ă dzăŠŘ úł2 Ô2ŕfŠÔú úKŠ ăI-Y˙LJŕŠ»
LJ I ŕ˙LJ2ÚŠyÚI-ŕ 2ŕ ŘĚŘШ2ăSy˙
{ ¦ ŕ˙áúł-yŘ-łÚŘ dzyÚúă
5h ŕ˙Řlăă2fØŠŘ 2ĚèƎSy˙
Y Ǝк[ŕ˙Y˙łfШIШI-Y˙ă LJŠШ ÚúŠШ
hwt ŕ˙ 2ĚlŘ˙I-úł2y˙ШŠŘdzÔúł2y˙LJ2úSyÚIł-ŕ

Y˙± ŕ˙Y˙łfШØ2fúă
{LJŠÔ / 2yŘ ŕ˙ ăLJŠÒłIIÔ Ô2yŘdzÔúØúÚè
Y˙ăkÔY ŕ˙ Y˙łfIăłŠY˙Šyă LJŠШ ÔŠyÚł˙Y˙ŠúŠШ
¢dzШÖ ŕ˙ údzШÖłŘÚúè
bc¦ ŕ˙ yŠLJKŠf2Y˙SúШÖ údzШÖłŘÚúè dzyÚúă
¢h / ŕ˙ úł2úł-ŕ 2ШƎI-yIÔ Ô˙I-Ш2y˙
Ô±h / ŕ˙ ÔKf2ШyI-úŠŘ Ø2ŕł-úłtŠ 2ШƎI-yIÔ Ô2Y˙LJ2dzyŘă

t / 9 ŕ˙ úŠúI-ÔKf2Ш2ŠúKŠyŠ
¢ / 9 ŕ˙ úlúÔKf2Ш2ŠúKŠyŠ
Ô5 / 9 ŕ˙ Ôlă-мŭн-ŘIÔKf2Ш2ŠúKŠyŠ
± / ŕ˙ ØlyŶŕ ÔKf2ШŘŠ
ҡЭк[ŕ˙ Y˙łÓIШ2ƎШI-Y˙ă LJŠШ ÚúŠШ
/ h$_н$ ŕ˙ ÔI-Ш2y˙ŘIzĚIŘŠ
ĆŠ^{Нb} ŕ˙ tŠШ2dză Ш©y˙

bh$_о$ŕ˙ yúШI-úŠ
bh$_н$ŕ˙ yúШúŠ
{h$_п$ŕ˙ ădzfI-úŠ
/ŕ˙ŕ˙ ÔKf2ШŘŠ
!ť[ŕ˙ łŕ[I-fłyúè
5 I / ŕ˙ ŘŠKI-łź0ł-fźÔŽÔ2IŘŠă
5 I . ú ŕ˙ ŘŠKI-łź0ł-ÔúŠШ ălJLJ»

ÕŠťăkY˙[ŕ˙ ÔŠťă LJŠШ Y˙łfШúŠШ
b ! ŕ˙ y2ú I-yI-fĚĬŠŘ
bw ŕ˙ y2ú шŠÔ2ШŘŠŘ
¦ - ¦ yŘŠúŠÓúŠŘY ¢KŠ I-yI-fĚúŠ ø I-ă y2ú ŘŠúŠÓúŠŘ˙I-yI-fĚúŠ ŕ2ШĚ ÕdzÚ y2ú ŘŠúŠÓúŠŘ I-yŘ шŠLJ2úШúŠŘ úł2 úKŠ ŧIY˙Iú 2ŕ ŘŠúŠÓúł2y˙
¦ - ¢KŠ I-yI-fĚúŠ ø I-ă y2ú ŘŠúŠÓúŠŘ˙K2ø ŠØŠШ úKŠ шŠădzfÚ łă ŠăúIY˙I-úŠŘ ŘdzŠ úł2 ŘłăÓIŠLJI-yÔIŠă lyˇY˙ŠŠúIyƎ ÔŠШú-łyˇ
I-yI-fĚúŠ-ăLJŠÔłIIÔ Ijdzł-ŧúĕè Ô2yÚШŧŕ ÓШúŠШI-I-»
Ш - 9ăúIˇY˙I-úŠŘˇ . ŠúøŠŠyˇúKŠ YˇŠúK2Ř ŘŠúŠÓúł2yˇŧIYˇIú I-yŘ шŠLJ2ШúlyƎ ŧIYˇIú I-yŘk2Ш ŘdzŠ úł2 ŘłăÓIŠLJI-yÔIŠă lyˇY˙ŠŠúIyƎ ÔŠШú-łyˇ
I-yI-fĚúŠ-ăLJŠÔłIIÔ Ijdzł-ŧúĕè Ô2yÚШŧŕ ÓШúŠШI-I-»

APPENDIX A
ANNUAL LAND USE CONTROL COMPLIANCE CERTIFICATION DOCUMENTATION

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Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011, for LHAAP-58, a certification of site was conducted by Bhate Environmental Associates, Inc. on August 15, 2018

A summary of land use control mechanism is as follows:

- Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met

A Summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-58.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information and belief.

Date: August 15, 2018

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

APPENDIX B
PHOTOGRAPHIC LOG

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Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 1: 03WW01 in good condition.



Photo 2: Temporary well 1004TW001

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 3: Dry surface water sampling location 35ASW03.



Photo 4: 35AWW01 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 5: 35AWW02 in good condition.



Photo 6: 35AWW03 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 7: 35AWW04 needs repainting.



Photo 8: 35AWW05 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 9: 35AWW06 in good condition.



Photo 10: 35AWW07R in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 11: 35AWW08 in good condition.



Photo 12: 35AWW09 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 13: 35AWW10 in good condition.



Photo 14: 35AWW11 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 15: 35AWW12 in good condition.



Photo 16: 35AWW13 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 17: 35AWW14 in good condition.



Photo 18: 35AWW15 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 19: 35AWW16 in good condition.



Photo 20: 35AWW17 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 21: 35AWW18 in good condition.



Photo 22: 35AWW19 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 23: 35AWW20 in good condition.



Photo 24: 35AWW21 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 25: 35AWW22 in good condition.



Photo 26: LHSMW03 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 27: LHSMW04 in good condition.



Photo 28: LHSMW05 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 29: LHSMW06 in good condition.



Photo 30: LHSMW07 in good condition.

Longhorn Army Ammunition Plant Site LHAAP-58 Photograph Log August 2018



Photo 31: AWW023 in good condition.



Photo 32: AWW024 in good condition.

APPENDIX C
MONITORING WELL SAMPLE COLLECTION FORMS

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58		Location ID: 03WW01		Date: 11/14/17
	Project Name: LHAAP		Project No./Phase: NWO1312.0150		Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bailer		Water Quality Meter/ID#: U-52 Horiba/21354		PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101		Other Equipment/ID#: NA		Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): NA		Other Equipment/ID#: NA		PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"		Unit Casing Volume (gal/lin ft) (A): 0.160		Initial Depth to Water (ft) (B): 29.75
	Total Well Depth (ft) (C): ~~33.40~~		Water Column Thickness (ft) (C-B): 3.65		Well Volume (gal) (A*(C-B)): .54
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA		System Volume (gal): NA
	Weather: CLEAR / SUNNY		Well Condition: GOOD		Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/14/17	1242	29.75	.								Bailing WELL
11/14/17	1247	33.35	.75								WELL RAN DRY
11/15/17	0845	29.75	—	—	20.00	7.25	6.59	8.58	135	-85	

Colorimeter Results					No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
Time	Analyte	Dilution	Result	Units		3	40 mL Glass	HCL	N	8260	VOC
						2	40 mL ~~Amber~~	H2SO4	N		TOC
						2	40 mL Glass	HCL	N		Gases & CO2
						1	60 mL Plastic	HNO3	N		Total Metals
Conversions	**Stabilization Criteria**					1	60 mL Plastic	HNO3	Y		Dissolved Metals
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%		1	1 Liter Amber	NA	N	8270	1,4-Dioxane
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%		1	500 mL Plastic	NaOH ZnAc	N		Sulfide
	Cond	+/- 10%	ORP	+/- 10	Sample ID: 03WW01_111517				Sample Time: 0845		

more on Back

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58		Location ID: 35AWW01		Date: 11/16/17
	Project Name: LHAAP		Project No./Phase: NWO1312.0150		Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BLADDER Pump / SAMPLE PRO		Water Quality Meter/ID#: U-52 HORIBA / 21854		PID Type/ID#: NA
	Water Level Indicator Type/ID#: SOLINST 101		Other Equipment/ID#: NA		Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"		Other Equipment/ID#: NA		PPE: Level D
WELL INFO	Casing Type / ID (in): SS / 4"		Unit Casing Volume (gal/lin ft) (A): 0.652		Initial Depth to Water (ft) (B): 44.29
	Total Well Depth (ft) (C): 72.48		Water Column Thickness (ft) (C-B): 28.19		Well Volume (gal) (A*(C-B)): 18.38
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA		System Volume (gal):
	Weather: OVERCAST		Well Condition: GOOD		Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	0835	44.35	.13	100	20.14	6.99	0.871	1.71	112	24	
	0840	44.40	.26	100	20.28	6.21	0.681	0.70	81.7	92	
	0845	44.43	.39	100	20.29	5.80	0.617	0.34	95.6	129	
	0850	44.45	.52	100	20.30	5.69	0.604	0.10	94.9	140	
	0855	44.46	.65	100	20.33	5.68	0.604	0.10	94.5	141	
	0900	44.46	.78	100	20.36	5.67	0.603	0.10	93.8	142	
	0905	44.46	.91	100	20.38	5.67	0.603	0.09	93.2	143	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40 mL GLASS		HCL	N	8260	VOC
1	60 mL PLASTIC		HNO3	N	6020	ARSENIC
1	1 LITER AMBER		NA	N	8270	1,4-DIOXANE

Sample ID: 35AWW01-111617 Sample Time: 0905

00906654

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58			Location ID: 35AWW03				Date: 11/16/17			
	Project Name: LHAAP			Project No./Phase: NWO1312.0150				Recorded By: Scott Beesinger			
EQUIPMENT	Pump Type/ID#: NA			Water Quality Meter/ID#: U-52 HORIBA / 21854				PID Type/ID#: NA			
	Water Level Indicator Type/ID#: Solinist 101			Other Equipment/ID#:				Decon Method: Liquinox & DI water			
	Tubing Type/Diameter (in): NA			Other Equipment/ID#:				PPE: Level D			
WELL INFO	Casing Type / ID (in): SS / 4"			Unit Casing Volume (gal/lin ft) (A): 0.652				Initial Depth to Water (ft) (B): DRY			
	Total Well Depth (ft) (C): 22.02			Water Column Thickness (ft) (C-B): NA				Well Volume (gal) (A*(C-B)): NA			
	Ambient PID (ppm): NA			Well Mouth PID (ppm): NA				System Volume (gal): NA			
	Weather: Cloudy			Well Condition: GOOD				Comments:			

CASING INFO	Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
	Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)

DRY WELL

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Method	Parameter(s)
Sample ID:		Sample Time:		

No Sample Collected

00906655

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW05	Date: 11/13/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BLADDER Pump/Sampler	Water Quality Meter/ID#: U-52 HORIBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: SOLINST 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 4"	Unit Casing Volume (gal/lin ft) (A): 0.652	Initial Depth to Water (ft) (B): 45.72
	Total Well Depth (ft) (C): 72.26	Water Column Thickness (ft) (C-B): 26.54	Well Volume (gal) (A*(C-B)): 17.30
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/13/17	1040	45.77	.13	100	19.06	6.87	2.80	1.55	27.1	7	
11/13/17	1045	45.80	.26	100	19.60	6.38	2.63	0.64	23.6	6	
11/13/17	1050	45.83	.39	100	19.81	6.18	2.61	0.41	22.2	60	
11/13/17	1055	45.85	.52	100	19.95	6.00	2.59	0.29	21.5	73	
11/13/17	1100	45.85	.65	100	19.96	5.99	2.59	0.28	21.0	74	
11/13/17	1105	45.85	.78	100	19.92	5.98	2.58	0.27	20.2	75	
11/13/17	1110	45.85	.91	100	19.90	5.97	2.58	0.27	19.9	76	

Colorimeter Results					No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
Time	Analyte	Dilution	Result	Units		3	40 mL GLASS	HCL	N	8260	HCL
						1	1 Liter Amber	NA	N	8270	1,4-Dioxane

Conversions	Stabilization Criteria										
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%							
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%							
	Cond	+/- 10%	ORP	+/- 10	Sample ID: 35AWW05-111317				Sample Time: 1110		

00906656

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW06	Date: 11/14/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 HORIBA / 21854	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 4"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 19.78
	Total Well Depth (ft) (C): 30.33	Water Column Thickness (ft) (C-B): 10.55	Well Volume (gal) (A*(C-B)): 1.68
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: Cloudy / Cool	Well Condition: Good	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/14/17	0700	19.87	.13	100	17.89	6.25	5.80	1.78	40.1	238	
11/14/17	0705	19.92	.26	100	18.53	6.15	5.81	0.62	11.8	204	
11/14/17	0710	19.95	.39	100	18.64	6.05	5.86	0.29	10.7	202	
11/14/17	0715	19.97	.52	100	18.78	5.87	5.87	0.07	9.5	201	
11/14/17	0720	19.98	.65	100	18.73	5.87	5.87	0.07	9.2	199	
11/14/17	0725	19.99	.78	100	18.74	5.86	5.88	0.06	9.0	198	
11/14/17	0730	20.00	.91	100	18.75	5.86	5.87	0.06	8.7	197	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	3	40mL Glass	HCl	N	8260	VOC
	2	40mL Amber	H2SO4	N	TOC	TOC
	2	40mL Glass	HCl	N	GASES	GASES: CO2
	1	50mL Plastic	HNO3	N		TOTAL metals
	1	50mL Plastic	HNO3	Y		Dissolved metals
	1	1 Liter Amber	NA	N	8270	1,4-Dioxane
	1	500mL Plastic	NaOH ZnAc	NO		Sulfide → ON BATCH

Sample ID: 35AWW06-111417

Sample Time: 0730

00906657

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58		Location ID: 35AWW07		Date: 11/17/17
	Project Name: LHAAP		Project No./Phase: NWO1312.0150		Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump/Sample Pro		Water Quality Meter/ID#: U-52-HORIBA/21354		PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinst 101		Other Equipment/ID#: NA		Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"		Other Equipment/ID#: NA		PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"		Unit Casing Volume (gal/lin ft) (A): 0.160		Initial Depth to Water (ft) (B): 26.14
	Total Well Depth (ft) (C): 32.35		Water Column Thickness (ft) (C-B): 6.31		Well Volume (gal) (A*(C-B)): 1.00
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA		System Volume (gal): NA
	Weather: Overcast		Well Condition: Good		Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/17/17	0915	26.20	.13	100	21.10	6.52	0.360	1.44	254	225	
	0920	26.25	.26	100	21.82	5.46	0.243	0.67	207	292	
	0925	26.30	.39	100	21.86	5.39	0.225	0.29	186	318	
	0930	26.33	.52	100	21.84	5.30	0.220	0.29	49.0	318	
	0935	26.35	.65	100	21.87	5.28	0.219	0.30	48.5	320	
	0940	26.36	.78	100	21.91	5.27	0.218	0.30	47.9	321	
↓	0945	26.37	.91	100	21.92	5.27	0.219	0.30	47.6	321	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	1	60mL Plastic	HNO3	N		Arsenic

Sample ID: 35AWW07_111717

Sample Time: 0945

00906658

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW08	Date: 11/14/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BAILER	Water Quality Meter/ID#: U-52 HORIBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: SOLINST (01)	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): NA	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 29.35
	Total Well Depth (ft) (C): 33.35	Water Column Thickness (ft) (C-B): 4.00	Well Volume (gal) (A*(C-B)): 0.64
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/14/17	1228	29.35									BAILING WELL
11/14/17	1235	33.30	.75								WELL RAN DRY
11/15/17	0740	29.35	—	—	19.75	6.58	11.8	8.29	63.6	-98	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type		Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40 mL Glass	HCL	N	8260	VOC
2	40mL Amber	H2SO4	N		TOC
2	40mL Glass	HCL	N		GASES & CO2
1	60mL Plastic	HNO3	N		TOTAL METALS
1	60 mL Plastic	HNO3	Y		DISSOLVED METALS
1	1 Liter Amber	N	N		1,4-DIOXANE
1	500 mL Plastic	NAOH ZACE	N		Sulfide

MORE ON BACK

Sample ID: 35AWW08_111517

Sample Time: 0740

00906659

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58		Location ID: 35AWW09		Date: 11/15/17
	Project Name: LHAAP		Project No./Phase: NWO1312.0150		Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / Sample Pro		Water Quality Meter/ID#: U-52 Horiba / 21354		PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101		Other Equipment/ID#: NA		Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"		Other Equipment/ID#: NA		PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"		Unit Casing Volume (gal/lin ft) (A): 0.160		Initial Depth to Water (ft) (B): 31.91
	Total Well Depth (ft) (C): 42.16		Water Column Thickness (ft) (C-B): 10.25		Well Volume (gal) (A*(C-B)): 1.64
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA		System Volume (gal): NA
	Weather: Cloudy / Overcast		Well Condition: Good		Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/15/17	0940	31.98	.13	100	20.09	6.92	5.14	1.66	162	181	
	0945	32.05	.26	100	20.04	6.01	5.16	1.18	126	258	
	0950	32.09	.39	100	20.01	5.70	5.45	0.77	98.7	344	
	0955	32.12	.52	100	19.98	5.67	5.58	0.76	92.0	355	
	1000	32.14	.65	100	19.96	5.66	5.59	0.75	91.5	357	
	1005	32.16	.78	100	19.94	5.66	5.60	0.75	90.9	359	
	1010	32.18	.91	100	19.93	5.66	5.60	0.74	90.4	360	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	3	40 mL Glass	HCL	N	8260	VOC
	2	40 mL Amber	H2SO4	N		TOC
	2	40 mL Glass	HCL	N		Gases & CO2
	1	60 mL Plastic	HNO3	N		Total Metals
	1	60 mL Plastic	HNO3	Y		Dissolved Metals
	1	1 Liter Amber	NA	N	8270	1,4-Dioxane
	1	500 mL Plastic	NaOH Rach	N		Sulfide

Sample ID: 35AWW09_111517

Sample Time: 1010

MORE ON BACK

00906660

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58		Location ID: 35AWW10	Date: 11/15/17	
	Project Name: LHAAP		Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger	
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro		Water Quality Meter/ID#: U-52 Horiba / 21354	PID Type/ID#: NA	
	Water Level Indicator Type/ID#: Solinst 101		Other Equipment/ID#: NA	Decon Method: Liquinox & DI water	
	Tubing Type/Diameter (in): 1/4"		Other Equipment/ID#: NA	PPE: Level D	
WELL INFO	Casing Type / ID (in): PVC / 2"		Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 19.68	
	Total Well Depth (ft) (C): 33.70		Water Column Thickness (ft) (C-B): 14.02	Well Volume (gal) (A*(C-B)): 2.24	
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA	System Volume (gal): NA	
	Weather: Overcast		Well Condition: Good	Comments:	

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/15/17	1050	19.75	.13	100	21.46	5.31	0.269	1.85	39.4	321	
	1055	19.80	.26	100	22.29	5.11	0.217	0.95	36.7	345	
	1100	19.84	.39	100	22.81	4.99	0.206	0.66	35.3	375	
	1105	19.88	.52	100	22.97	4.99	0.206	0.52	35.0	400	
	1110	19.90	.65	100	22.99	5.00	0.206	0.51	34.9	401	
	1115	19.91	.78	100	23.01	5.00	0.206	0.51	34.5	402	
	1120	19.92	.91	100	23.03	5.00	0.206	0.50	34.2	403	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40 ml Glass		HCl	N	8260	VOC
2	40 ml Amber		H2SO4	N		TOC
2	40 ml Glass		HCl	N		Gases & CO2
1	60 ml Plastic		HNO3	N		TOTAL METALS
1	60 ml Plastic		HNO3	Y		~~Dissolved~~ Dissolved metals
1	1 Liter Amber		NA	N	8270	1,4-Dioxane
1	500 ml Plastic		NONE (CHECK)	N		Sulfide

Sample ID: 35A WW10_111517

Sample Time: 1120

more on BACK

00906661

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW11	Date: 11/14/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BLADDER Pump / SamplePRO	Water Quality Meter/ID#: U-52 HORIBA / 21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 30.91
	Total Well Depth (ft) (C): 38.10	Water Column Thickness (ft) (C-B): 7.19	Well Volume (gal) (A*(C-B)): 1.15
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / COOL	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/14/17	1000	31.00	.13	100	18.43	6.29	9.09	1.98	180	220	
	1005	31.05	.26	100	18.91	5.77	8.95	0.60	160	245	
	1010	31.10	.34	100	19.24	5.59	8.88	0.49	[redacted]932	268	
	1015	31.13	.52	100	19.30	5.62	8.88	0.38	66.9	275	
	1020	31.15	.65	100	19.32	5.63	8.88	0.38	66.0	276	
	1025	31.17	.78	100	19.34	5.63	8.88	0.37	65.7	277	
	1030	31.18	.91	100	19.36	5.64	8.88	0.37	65.2	278	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type		Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40 mL GLASS	HCL	N	8260	VOC
2	40 mL AMBER	H2SO4	N		TOC
2	40 mL GLASS	HCL	N		GASES & CO2
1	50mL PLASTIC	HNO3	N		TOTAL METALS
1	50mL PLASTIC	HNO3	Y		DISSOLVED METALS
1	1 Liter Amber	NA	N	8270	1,4-DIOXANE ON BACK
1	500mL PLASTIC	CAOH	N		Sulfide

Sample ID: 35AWW11-111417

Sample Time: 1030

00906662

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW12	Date: 11/16/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump/SamplePro	Water Quality Meter/ID#: U-52 HoRiBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC/2"	Unit Casing Volume (gal/lin ft) (A):	Initial Depth to Water (ft) (B): 29.97
	Total Well Depth (ft) (C): 37.61	Water Column Thickness (ft) (C-B):	Well Volume (gal) (A*(C-B)):
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
		30.05									
11/16/17	1040	~~30.09~~	.13	100	20.33	6.05	1.82	2.13	52.7	218	
	1045	30.11	.26	100	19.99	5.37	1.84	0.52	51.9	296	
	1050	30.15	.39	100	19.99	5.25	1.85	0.22	35.3	321	
	1055	30.19	.52	100	19.98	5.25	1.86	0.14	27.1	329	
	1100	30.21	.65	100	19.97	5.25	1.87	0.14	26.5	330	
	1105	30.22	.78	100	19.96	5.25	1.87	0.14	25.8	330	
	1110	30.23	.91	100	19.96	5.25	1.87	0.13	25.2	331	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	9	40ml GLASS	HCl	N	8260	VOC
	3	1 Liter Amber	NA	N	8270	1,4-Dioxane

Sample ID: 35AWW12-111617

Sample Time: 1110

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW13	Date: 11/16/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump/SamplePro	Water Quality Meter/ID#: U-52/Horiba/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinst 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A):	Initial Depth to Water (ft) (B): 25.06
	Total Well Depth (ft) (C): 40.26	Water Column Thickness (ft) (C-B):	Well Volume (gal) (A*(C-B)):
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	0935	25.12	.13	100	21.83	6.18	1.08	1.93	128	160	
	0940	25.17	.26	100	22.70	5.89	1.19	0.82	183	188	
	0945	25.21	.39	100	23.00	5.80	1.30	0.36	148	205	
	0950	25.24	.52	100	23.25	5.79	1.63	0.13	128	205	
	0955	25.26	.65	100	23.28	5.78	1.64	0.12	127	205	
	1000	25.28	.78	100	23.30	5.78	1.65	0.12	126	205	
	1005	25.29	.91	100	23.31	5.77	1.65	0.12	126	205	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			**Preserv.**	**Filter (Y/N)**	**Method**	**Parameter(s)**
3	40mL Glass		HCL	N	8260	VOC
1	1 Liter Amber		NA	N	8270	1,4-Dioxane
4	60mL Plastic	FOR ST202	HNO3	N		TOTAL METALS

Sample ID: 35AWW13_111617

Sample Time: 1005

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58			Location ID: 35AWW14					Date: 11/16/17			
	Project Name: LHAAP			Project No./Phase: NWO1312.0150					Recorded By: Scott Beesinger			
EQUIPMENT	Pump Type/ID#: NA			Water Quality Meter/ID#: U-52 HORIBA/21354					PID Type/ID#: NA			
	Water Level Indicator Type/ID#: Solinist 101			Other Equipment/ID#: Bailer					Decon Method: Liquinox & DI water			
	Tubing Type/Diameter (in): NA			Other Equipment/ID#: NA					PPE: Level D			
WELL INFO	Casing Type / ID (in): PVC / 2"			Unit Casing Volume (gal/lin ft) (A): 0.160					Initial Depth to Water (ft) (B): 29.63			
	Total Well Depth (ft) (C): 32.31			Water Column Thickness (ft) (C-B): 2.68					Well Volume (gal) (A*(C-B)): .43			
	Ambient PID (ppm): NA			Well Mouth PID (ppm): NA					System Volume (gal): NA			
	Weather: OVERCAST			Well Condition: GOOD					Comments:			

CASING INFO	Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
	Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	1317	29.63		NA							BAILING WELL
11/16/17	1323	32.24	.50	NA							WELL RAN DRY
11/17/17	0810	29.69	NA	NA	19.65	7.15	6.95	8.82	0.0	163	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3		40mL GLASS	HCL	N	8260	VOC
1		1 Liter Amber	NA	N	8270	1,4-Dioxane
Sample ID: 35AWW14-111717				Sample Time: 0810		

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35A MW15	Date: 11/16/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BLADDER Pump/SamplePro	Water Quality Meter/ID#: U-52 HoriBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinst 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 19.72
	Total Well Depth (ft) (C): 41.46	Water Column Thickness (ft) (C-B): 21.74	Well Volume (gal) (A*(C-B)): 3.48
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: Cloudy	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	0710	19.79	* .13	100	21.77	6.04	12.4	1.83	287	128	
	0715	19.85	.26	100	22.25	5.97	13.0	0.64	290	133	
	0720	19.90	.39	100	22.38	5.85	13.1	0.28	301	131	
	0725	19.93	.52	100	22.40	5.84	13.0	0.10	282	130	
	0730	19.95	.65	100	22.42	5.83	13.0	0.10	281	130	
	0735	19.96	.78	100	22.44	5.83	12.9	0.09	280	129	
	0740	19.96	.91	100	22.45	5.82	12.9	0.09	279	129	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40 mL GLASS		HCL	N	~~8260~~ 8260	VOC
1	1 Liter AMBER		NA	N	8270	1,4-Dioxane

Sample ID: 35AMW15-111617

Sample Time: 0740

00906666

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW16	Date: 11/13/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump/Sample Pro	Water Quality Meter/ID#: U-52 HoriBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 18.52
	Total Well Depth (ft) (C): 37.46	Water Column Thickness (ft) (C-B): 18.94	Well Volume (gal) (A*(C-B)): 3.03
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/13/17	1250	18.60	.13	100	18.93	6.39	7.49	3.75	241	122	
11/13/17	1255	18.65	.26	100	19.46	6.05	10.7	0.90	195	128	
11/13/17	1300	18.69	.39	100	19.51	5.81	10.6	0.30	161	150	
11/13/17	1305	18.71	.52	100	19.50	5.80	10.5	0.10	128	146	
11/13/17	1310	18.72	.65	100	19.57	5.80	10.5	0.10	127	145	
11/13/17	1315	18.73	.78	100	19.60	5.80	10.4	0.09	126	144	
11/13/17	1320	18.74	.91	100	19.58	5.80	10.5	0.09	126	144	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
6	40 mL GLASS		HCL	N	8260	VOC
2	1 Liter AMBER		NA	N	8270	1,4-Dioxane

Sample ID: 35AWW16-111317

Sample Time: 1320

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW17	Date: 11/13/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BLADDER Pump	Water Quality Meter/ID#: 21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinst 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 24.87
	Total Well Depth (ft) (C): 42.50	Water Column Thickness (ft) (C-B): 17.63	Well Volume (gal) (A*(C-B)): 2.82
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal):
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed ~~(Gals)~~ GAL	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/13/17	0840	24.95	~~.13~~	100	17.78	5.74	10.2	2.92	16.9	264	
11/13/17	0845	24.99	~~0.26~~	100	18.17	6.20	10.4	0.97	16.3	159	
11/13/17	0850	25.02	~~0.39~~	100	18.42	6.02	10.~~4~~	0.65	15.3	162	
11/13/17	0855	25.03	0.52	100	18.42	5.81	10.4	0.50	12.1	175	
11/13/17	0900	25.04	0.65	100	18.46	5.80	10.4	0.34	9.3	180	
11/13/17	0905	25.04	0.78	100	18.50	5.79	10.4	0.33	9.1	182	
11/13/17	0910	25.05	0.91	100	18.53	5.78	10.4	0.32	8.4	184	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40mL GLASS		HCL	N	8260	VOC
1	1 Liter Amber		NA	N	8270	1,4-Dioxane

Sample ID: 35AWW17-111317 Sample Time: 0910

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW18	Date: 11/13/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BLADDER Pump	Water Quality Meter/ID#: U-52 HORIBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinst 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): ~~3~~ PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 2.61	Initial Depth to Water (ft) (B): 25.85
	Total Well Depth (ft) (C): 42.18	Water Column Thickness (ft) (C-B): 16.33	Well Volume (gal) (A*(C-B)): 42.66
	Ambient PID (ppm):	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO	Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
	Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/13/17	0940	25.95	.13	100	17.42	6.52	10.2	1.97	85.2	157	
11/13/17	0945	25.99	.26	100	17.55	6.13	10.4	0.91	73.2	155	
11/13/17	0950	26.02	.39	100	17.61	5.95	10.6	0.55	61.3	154	
11/13/17	0955	26.05	.52	100	17.76	5.59	10.5	0.25	~~42.2~~	180	
11/13/17	1000	26.05	.65	100	17.80	5.61	10.5	0.24	42.9	181	
11/13/17	1005	26.05	.78	100	17.83	5.62	10.5	0.24	43.5	180	
11/13/17	1010	26.05	.91	100	17.85	5.63	10.5	0.23	44.1	182	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40mL GLASS		HCl	N	8260	VOC
1	1 Liter AMBER		NA	N	8270	1,4-DIOXANE

Sample ID: 35AWW18-111317 Sample Time: 1010

00906669

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW19	Date: 11/16/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: NA	Water Quality Meter/ID#: U-52 HoriBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: Bailer	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): NA	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC/2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 27.81
	Total Well Depth (ft) (C): 32.45	Water Column Thickness (ft) (C-B): 4.64	Well Volume (gal) (A*(C-B)): .74
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	1240	27.81	.	NA							Bailing well
11/16/17	1248	32.40	1.5	NA							well ran dry
11/17/17	0725	27.85	NA	NA	20.12	5.27	5.97	8.82	26.5	248	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40ml Glass		HCl	N	8260	VOC
1	1 Liter Amber		NA	N	8270	1,4-Dioxane

Sample ID: 35AWW19-111717 Sample Time: 0725

00906670

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW20	Date: 11/14/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump/SamplePro	Water Quality Meter/ID#: U-52 HoriBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 19.87
	Total Well Depth (ft) (C): 36.10	Water Column Thickness (ft) (C-B): 16.23	Well Volume (gal) (A*(C-B)): 2.63
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/14/17	1115	19.95	.13	~~200~~ 100	22.21	6.36	8.01	1.38	139	89	
	1120	20.01	.26	100	22.82	6.17	7.99	0.46	85.6	110	
	1125	20.05	.39	100	22.95	6.02	7.83	0.25	29.3	132	
	1130	20.08	.52	100	22.97	5.99	7.72	0.05	28.7	136	
	1135	20.10	.65	100	22.99	5.98	7.72	0.05	28.3	137	
	1140	20.12	.78	100	~~23~~.02	5.97	7.71	0.04	27.9	138	
	1145	20.13	.91	100	23.04	5.97	7.71	0.04	27.5	138	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	6	40 mL GLASS	HCL	N	8260	VOC
	4	40 mL Amber	H2SO4	N		TOC
	4	40 mL GLASS	HCL	N		GASES & CO2
	1	50 mL PLASTIC	HNO3	N		TOTAL METALS
	1	50 mL PLASTIC	HNO3	Y		DISSOLVED METALS
	1	1 Liter Amber	NA	N	8270	1,4-DIOXANE — ON BAL
	1	500 mL PLASTIC	NAOH ZACH	N		SULFIDE

Sample ID: 35AWW20_111417

Sample Time: 1145

00906671

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW21	Date: 11/13/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BLADDER PUMP / SAMPLE PRO	Water Quality Meter/ID#: U-52 HORIBA / 21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: SOLINIST 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 33.77
	Total Well Depth (ft) (C): 42.88	Water Column Thickness (ft) (C-B): 9.11	Well Volume (gal) (A*(C-B)): 1.46
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/13/17	1350	33.85	.13	100	19.20	6.72	2.48	1.44	213	180	
11/13/17	1355	33.90	.26	100	19.52	5.16	2.27	0.95	382	268	
11/13/17	1400	33.93	.39	100	19.79	4.81	2.21	0.34	235	305	
11/13/17	1405	33.95	.52	100	19.93	4.54	2.04	0.13	144	346	
11/13/17	1410	33.97	.65	100	19.95	4.53	2.03	0.13	143	347	
11/13/17	1415	33.99	.78	100	19.97	4.52	2.02	0.12	142	348	
11/13/17	1420	34.00	.91	100	19.99	4.52	2.02	0.12	141	349	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40 mL GLASS		HCL	N	8260	VOC
1	1 LITER AMBER		NA	N	8270	1,4-DIOXANE

Sample ID: 35AWW21-111317

Sample Time: 1420

00906672

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW22	Date: 11/16/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: NA	Water Quality Meter/ID#: U-52 HORIBA / 21854	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinst 101	Other Equipment/ID#: BAILER	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): NA	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 32.47
	Total Well Depth (ft) (C): 37.74	Water Column Thickness (ft) (C-B): 5.27	Well Volume (gal) (A*(C-B)): .84
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: Cloudy	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	1348	32.47		NA							BAILING WELL
11/16/17	1357	37.67	2.25	NA							WELL RAN DRY
11/17/17	0840	32.47	NA	NA	19.92	6.92	8.91	8.46	81.0	171	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40ml Glass		HCL	N	8260	VOC
1	1 Liter Amber		NA	N	8270	1,4-DIOXANE

Sample ID: 35AWW22_111717 Sample Time: 0840

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 1004TW001	Date: 11/16/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: NA	Water Quality Meter/ID#: U-52 Horiba/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist (01)	Other Equipment/ID#: Bailer	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): NA	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 1"	Unit Casing Volume (gal/lin ft) (A): 0.043	Initial Depth to Water (ft) (B): 17.84
	Total Well Depth (ft) (C): [redacted]24.92	Water Column Thickness (ft) (C-B): [redacted]7.08	Well Volume (gal) (A*(C-B)): .30
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	1253	17.84		NA							Bailing well
11/16/17	1258	24.85	.25	NA							well ran dry
11/17/17	0740	17.90	NA	NA	22.93	6.19	5.61	8.13	0.0	136	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	1	60 mL Plastic	HNO3	N		ARSENIC
Sample ID: [redacted]1004TW001-111717					Sample Time:	0740

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58		Location ID: LHSmw03		Date: 11/16/17
	Project Name: LHAAP		Project No./Phase: NWO1312.0150		Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: NA		Water Quality Meter/ID#: U-52 Horiba/21354		PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101		Other Equipment/ID#: Bailer		Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): NA		Other Equipment/ID#: NA		PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 4"		Unit Casing Volume (gal/lin ft) (A): 0.652		Initial Depth to Water (ft) (B): 31.36
	Total Well Depth (ft) (C): 35.51		Water Column Thickness (ft) (C-B): 4.15		Well Volume (gal) (A*(C-B)): 2.70
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA		System Volume (gal): NA
	Weather: Cloudy		Well Condition: Good		Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	1336	31.36		NA							Bailing well
11/16/17	1342	35.45	2.5	NA							Ran Dry
11/17/17	0830	31.53	NA	NA	19.99	7.95	106	8.85	187	112	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	1	60mL Plastic	HNO3	N		Arsenic
Sample ID: LHSmw03_111717				Sample Time: 0830		

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58			Location ID: LHSMW04				Date: 11/16/17			
	Project Name: LHAAP			Project No./Phase: NWO1312.0150				Recorded By: Scott Beesinger			
EQUIPMENT	Pump Type/ID#: NA			Water Quality Meter/ID#: U-52 HORIBA/21354				PID Type/ID#: NA			
	Water Level Indicator Type/ID#: Solinst 101			Other Equipment/ID#:				Decon Method: Liquinox & DI water			
	Tubing Type/Diameter (in): NA			Other Equipment/ID#:				PPE: Level D			
WELL INFO	Casing Type / ID (in): PVC / 4"			Unit Casing Volume (gal/lin ft) (A): 0.652				Initial Depth to Water (ft) (B): DRY			
	Total Well Depth (ft) (C): 31.04			Water Column Thickness (ft) (C-B): NA.				Well Volume (gal) (A*(C-B)): NA			
	Ambient PID (ppm): NA			Well Mouth PID (ppm): NA				System Volume (gal): NA			
	Weather: Cloudy			Well Condition: GOOD				Comments:			

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)

DRY WELL

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Method	Parameter(s)
NO SAMPLE COLLECTED				
Sample ID:		Sample Time:		

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: LHSmw06	Date: 11/16/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: NA	Water Quality Meter/ID#: U-52 HORIBA/22354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: BAILER	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): NA	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 4"	Unit Casing Volume (gal/lin ft) (A): 0.652	Initial Depth to Water (ft) (B): 19.31
	Total Well Depth (ft) (C): 23.53	Water Column Thickness (ft) (C-B): 4.22	Well Volume (gal) (A*(C-B)): 2.75
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: OVERCAST	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/16/17	1304	19.31		NA							BAILING WELL
11/16/17	1312	23.45	2.0	NA							WELL RAN DRY
	0850										
11/17/17	[redacted]	19.31	NA	NA	20.77	7.12	3.11	8.20	0.0	150	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40mL GLASS		HCl	N	8260	VOC
1	60mL PLASTIC		HNO3	N		ARSENIC
1	1 LITER AMBER		NA	N	8270	1,4-DIOXANE

Sample ID: LHSmw06-111717

Sample Time: [redacted] 0750

00906677

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of

LOCATION	Site: LHAAP - 58	Location ID: LHSmw07	Date: 11/14/17
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: BLADDER Pump/SamplePro	Water Quality Meter/ID#: U-52 HoRiBA/21354	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 4"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 19.00
	Total Well Depth (ft) (C): 30.50	Water Column Thickness (ft) (C-B): 11.50	Well Volume (gal) (A*(C-B)): 1.84
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather:	Well Condition:	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
11/14/17	0810	19.08	.13	100	17.10	6.46	10.9	1.20	80.7	125	
11/14/17	0815	19.15	.26	100	17.63	6.11	11.0	0.25	60.9	145	
11/14/17	0820	19.18	.39	100	17.82	5.97	11.0	0.10	41.3	155	
11/14/17	0825	19.20	.52	100	17.93	5.96	11.0	0.10	40.8	157	
11/14/17	0830	19.22	.65	100	17.94	5.95	11.0	0.09	41.7	158	
11/14/17	0835	19.24	.78	100	17.96	5.94	11.0	0.09	40.9	159	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	3	40mL GLASS	HCL	N	8260	VOC
	2	40mL Amber	H2SO4	N		TOC
	2	40mL GLASS	HCL	N		GASES & CO2
	1	50mL Plastic	HNO3	N		TOTAL METALS
	1	50mL Plastic	HNO3	Y		Dissolved metals
	1	1 Liter Amber	NA	N		1,4-Dioxane
	1	500mL Plastic	NaOH ZnAc	N		Sulfide

Sample ID: LHSmw07_111417 Sample Time: 0835

on BALL

00906678

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: ~~35~~ 03WW01	Date: 7/17/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 29.96
	Total Well Depth (ft) (C): ~~38~~43	Water Column Thickness (ft) (C-B): 3.47	Well Volume (gal) (A*(C-B)): 0.56
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO	Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
	Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/17/18	1213	29.96									Bailing well
7/17/18	1217	33.35	.75								Bailed. Total Bailed DRY
7/18/18	1035	29.96	NA	NA	28.63	6.80	6.23	7.29	9.5	-210	

Colorimeter Results					No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
Time	Analyte	Dilution	Result	Units							

Conversions	Stabilization Criteria									
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%						
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%						
	Cond	+/- 10%	ORP	+/- 10	Sample ID: 03WW01_071818				Sample Time: 1035	

bhate ENVIRONMENT INFRASTRUCTURE

GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW01	Date: 7/2/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): SS 4"	Unit Casing Volume (gal/lin ft) (A): 0.652	Initial Depth to Water (ft) (B): 43.00
	Total Well Depth (ft) (C): 72.55	Water Column Thickness (ft) (C-B): 29.55	Well Volume (gal) (A*(C-B)): 19.27
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/2/18	1055	43.05	.13	100	25.28	6.26	0.584	0.89	270	[redacted]21	
	1100	43.10	.26	100	25.20	5.85	0.577	0.23	193	[redacted]39	
	1105	43.13	.39	100	24.91	5.45	0.572	0.00	139	57	
	1110	43.15	.52	100	24.85	5.75	0.571	0.00	138	58	
	1115	43.16	.65	100	24.79	5.44	0.571	0.00	137	59	
	1120	43.16	.78	100	24.73	5.44	0.571	0.00	136	60	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type		Preserv.	Filter (Y/N)	Method	Parameter(s)
9	40 ml Glass	HCl	N		VOC
3	60 ml plastic	HNO3	N		ARSENIC

Sample ID: 35AWW01-070218 Sample Time: 1120

00906680

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW05	Date: 7/2/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 2/101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 4"	Unit Casing Volume (gal/lin ft) (A): 0.652	Initial Depth to Water (ft) (B): 45.47
	Total Well Depth (ft) (C): 72.19	Water Column Thickness (ft) (C-B): 26.72	Well Volume (gal) (A*(C-B)): 17.42
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/2/18	1155	45.52	.13	100	28.43	6.44	2.69	1.24	24.0	21	
	1200	45.57	.26	100	27.51	5.85	2.75	0.34	17.3	[redacted]35	
	1205	45.60	.39	100	27.18	5.59	2.76	0.00	14.4	47	
	1210	45.62	.52	100	27.10	5.60	2.76	0.00	14.1	48	
	1215	45.64	.65	100	27.03	5.60	2.76	0.00	13.8	49	
	1220	45.65	.78	100	26.94	5.60	2.76	0.00	13.5	49	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	6	40 ml GLASS	HCl	N		VOC

Sample ID: 35AWW05_070218 Sample Time: 1220

00906681

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58		Location ID: 35AWW06	Date: 7/18/18	
	Project Name: LHAAP		Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger	
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro		Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA	
	Water Level Indicator Type/ID#: Solinist 101		Other Equipment/ID#: NA	Decon Method: Liquinox & DI water	
	Tubing Type/Diameter (in): 1/4"		Other Equipment/ID#: NA	PPE: Level D	
WELL INFO	Casing Type / ID (in): PVC 4"		Unit Casing Volume (gal/lin ft) (A): 0.652	Initial Depth to Water (ft) (B): 19.67	
	Total Well Depth (ft) (C): 30.35		Water Column Thickness (ft) (C-B): 10.68	Well Volume (gal) (A*(C-B)): 6.96	
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA	System Volume (gal): NA	
	Weather: CLEAR SUNNY		Well Condition: GOOD	Comments:	

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/18/18	1315	19.75	.13	100	25.10	5.06	6.10	0.44	53.6	-54	
	1320	19.80	.26	100	24.25	5.00	5.96	0.03	75.6	-41	
	1325	19.84	.39	100	23.44	4.92	5.87	0.00	94.9	-37	
	1330	19.87	.52	100	23.39	4.91	5.86	0.00	95.5	-36	
	1335	19.89	.65	100	23.33	4.90	5.86	0.00	96.1	-35	
	1340	19.90	.78	100	23.27	4.90	5.86	0.00	96.7	-35	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Method	Parameter(s)
Sample ID: 35AWW06-071818		Sample Time: 1340		

00906682

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW08	Date: 7/17/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba Z1101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 29.45
	Total Well Depth (ft) (C): 33.35	Water Column Thickness (ft) (C-B): 3.90	Well Volume (gal) (A*(C-B)): 0.62
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: Clear / Sunny	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/17/18	1157	29.45									Bailing well
7/17/18	1204	33.28	1.0								Bailed 1 gal RANDY
7/18/18	0445	29.45			27.85	7.15	14.9	7.79	31.4	[illegible] -265	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Method	Parameter(s)

Sample ID: 35AWW08-071818 Sample Time: 0945

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW09	Date: 7/16/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 32.22
	Total Well Depth (ft) (C): 42.16	Water Column Thickness (ft) (C-B): 9.94	Well Volume (gal) (A*(C-B)): 1.59
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR | SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/16/18	0915	32.29	.13	100	24.66	5.72	5.56	1.44	243	284	
	0920	32.35	.26	100	24.13	5.60	5.77	1.18	175	287	
	0925	32.40	.39	100	24.00	5.61	5.91	1.11	167	290	
	0930	32.42	.52	100	23.94	5.62	5.92	1.10	166	291	
	0935	32.44	.65	100	23.86	5.62	5.93	1.09	165	292	
	0940	32.45	.78	100	23.81	5.62	5.93	1.09	164	293	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
Sample ID: 35AWW09-071618				Sample Time: 0940		

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW10	Date: 7/12/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 2101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.652	Initial Depth to Water (ft) (B): 18.95
	Total Well Depth (ft) (C): 33.68	Water Column Thickness (ft) (C-B): 14.73	Well Volume (gal) (A*(C-B)): 9.60
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / Sunny	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/12/18	1100	19.03	.13	100	27.83	5.32	0.266	1.28	14.9	207	
	1105	19.09	.26	100	27.12	4.78	0.248	0.40	14.4	249	
	1110	19.12	.39	100	26.72	4.64	0.248	0.18	14.3	269	
	1115	19.14	.52	100	26.49	4.68	0.249	0.00	14.2	297	
	1120	19.15	.65	100	26.43	4.69	0.250	0.00	14.5	298	
	1125	19.15	.78	100	26.39	4.70	0.250	0.00	14.7	299	
	1130	19.15	.91	100	26.35	4.70	0.250	0.00	14.9	300	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

Sample ID: 35AWW10_071218 Sample Time: 1130

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW11	Date: 7/16/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 30.60
	Total Well Depth (ft) (C): 38.06	Water Column Thickness (ft) (C-B): 7.46	Well Volume (gal) (A*(C-B)): 1.19
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR/SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/16/18	1105	30.67	.13	100	24.93	5.42	8.77	0.51	35.5	-71	
	1110	30.74	.26	100	24.79	5.35	8.76	0.05	20.1	-61	
	1115	30.78	.39	100	24.89	5.33	8.77	0.00	16.9	-57	
	1120	30.80	.52	100	24.95	5.32	8.77	0.00	16.4	-57	
	1125	30.82	.65	100	25.01	5.31	8.77	0.00	15.9	-56	
	1130	30.84	.78	100	25.07	5.31	8.77	0.00	15.5	-56	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Method	Parameter(s)
Sample ID: 35AWW11_071618		Sample Time: 1130		

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW12	Date: 6/29/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 30.05
	Total Well Depth (ft) (C): 37.63	Water Column Thickness (ft) (C-B): 7.58	Well Volume (gal) (A*(C-B)): 1.21
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: Clear/Sunny	Well Condition: Good	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
6/29/18	1130	30.12	.13	100	24.29	5.27	2.33	1.23	7.8	184	
	1135	30.19	.26	100	23.91	5.00	2.11	0.20	7.9	199	
	1140	30.24	.39	100	23.52	5.03	2.04	0.00	3.1	195	
	1145	30.27	.52	100	23.45	5.03	2.03	0.00	2.0	194	
	1150	30.28	.65	100	23.42	5.03	2.03	0.00	1.0	193	
	1155	30.29	.78	100	23.39	5.04	2.03	0.00	0.0	193	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	3	40mL Glass	HCl	N		VOC

Sample ID: 35AWW12_062918 Sample Time: 1155

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW13	Date: 6/29/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 24.37
	Total Well Depth (ft) (C): 40.33	Water Column Thickness (ft) (C-B): 15.96	Well Volume (gal) (A*(C-B)): 2.55
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR/SUNNY	Well Condition: Good	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
6/29/18	0815	24.43	.13	100	25.89	5.68	1.32	0.85	54.5	258	
	0820	24.49	.26	100	25.65	5.63	1.62	0.11	49.5	213	
	0825	24.53	.39	100	25.60	5.63	1.97	0.00	33.0	195	
	0830	24.56	.52	100	25.57	5.63	1.97	0.00	32.8	194	
	0835	24.58	.65	100	25.53	5.63	1.98	0.00	32.1	193	
	0840	24.60	.78	100	25.49	5.63	1.98	0.00	31.7	192	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	3	40ml Glass	HCl	N		VOC

Sample ID: 35AWW13-062918 Sample Time: 0840

bhate ENVIRONMENT INFRASTRUCTURE

GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW14	Date: 7/17/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 29.58
	Total Well Depth (ft) (C): 32.53	Water Column Thickness (ft) (C-B): 2.95	Well Volume (gal) (A*(C-B)): .48
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR/SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/17/18	1255	29.58									BAILING WELL
7/17/18	1300	32.40	.50								BAILED .50 gal. RAN DRY
7/18/18	1115	29.58	NA	NA	26.06	6.80	6.48	9.03	0.0	-36	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

Sample ID: 35AWW14-0718B Sample Time: 1115

00906689

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW15	Date: 7/18/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 19.50
	Total Well Depth (ft) (C): 41.43	Water Column Thickness (ft) (C-B): 21.93	Well Volume (gal) (A*(C-B)): 3.51
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/18/18	1220	19.58	.13	100	28.33	6.01	17.9	0.56	154	51	
	1225	19.64	.26	100	28.02	5.85	17.8	0.09	153	80	
	1230	19.67	.39	100	27.95	5.85	17.7	0.00	165	86	
	1235	19.70	.52	100	27.90	5.85	17.7	0.00	166	86	
	1240	19.72	.65	100	27.86	5.85	17.17	0.00	166	87	
	1245	19.73	.78	100	27.81	5.85	17.7	0.00	167	87	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	6	40ml GLASS	HCL	N		VOC
Sample ID: 35AWW15-071818				Sample Time: 1245		

00906690

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW16	Date: 6/29/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 18.10
	Total Well Depth (ft) (C): 37.55	Water Column Thickness (ft) (C-B): 19.45	Well Volume (gal) (A*(C-B)): 3.11
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR/SUNNY	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
6/29/18	0905	18.16	.13	100	26.35	5.97	14.7	1.74	635	209	
	0910	18.22	.26	100	24.90	5.70	15.4	0.15	545	184	
	0915	18.26	.39	100	24.05	5.62	15.2	0.00	494	147	
	0920	18.28	.52	100	23.98	5.61	15.2	0.00	493	146	
	0925	18.30	.65	100	23.90	5.61	15.2	0.00	492	146	
	0930	18.31	.78	100	23.84	5.61	15.2	0.00	491	145	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	6	40mL GLASS	HCL	N		VOC

Sample ID: 35AWW16_062918

Sample Time: 0930

00906691

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW17	Date: 6/29/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 25.07
	Total Well Depth (ft) (C): 42.38	Water Column Thickness (ft) (C-B): 17.31	Well Volume (gal) (A*(C-B)): 2.77
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
6/29/18	1045	25.15	.13	100	23.04	5.64	13.9	0.34	10.9	119	
	1050	25.20	.26	100	22.94	5.57	13.6	0.09	7.9	109	
	1055	25.23	.39	100	22.70	5.54	13.6	0.00	5.0	105	
	1100	25.25	.52	100	22.65	5.54	13.6	0.00	3.1	104	
	1105	25.26	.65	100	22.59	5.54	13.6	0.00	2.5	104	
	1110	25.26	.78	100	22.53	5.54	13.6	0.00	1.8	104	

Colorimeter Results					**No. Containers/Volume/Type**			**Preserv.**	**Filter (Y/N)**	**Method**	**Parameter(s)**
Time	**Analyte**	**Dilution**	**Result**	**Units**		3	40mL GLASS	HCL	N		VOC

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

Sample ID: 35AWW17_062918 Sample Time: 1110

00906692

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW18	Date: 6/29/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 24.55
	Total Well Depth (ft) (C): 42.20	Water Column Thickness (ft) (C-B): 17.65	Well Volume (gal) (A*(C-B)): 2.82
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR/SUNNY	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
6/29/18	0955	24.53	.13	100	23.77	5.89	13.8	1.28	89.9	149	
	1000	24.68	.26	100	22.89	5.64	13.8	0.12	61.4	130	
	1005	24.71	.39	100	22.77	5.59	13.8	0.00	55.1	120	
	1010	24.73	.52	100	22.70	5.58	13.8	0.00	54.6	119	
	1015	24.74	.65	100	22.66	5.58	13.8	0.00	53.9	118	
	1020	24.75	.78	100	22.63	5.58	13.8	0.00	53.4	117	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	3	40 mL GLASS	HCL	N		VOC

Sample ID: 35AWW18-062918 Sample Time: 1020

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35A WW19	Date: 7/17/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 27.37
	Total Well Depth (ft) (C): 32.48	Water Column Thickness (ft) (C-B): 5.11	Well Volume (gal) (A*(C-B)): 0.82
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR/SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/17/18	1024	27.37		NA							Bailing well
7/17/18	1029	32.37	1.0	NA							Bailed 1 gal. RAN DRY
7/18/18	0855	27.37	NA	NA	25.61	6.08	5.67	7.93	12.0	-89	

Colorimeter Results				
Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Method	Parameter(s)
Sample ID: 35AWW19-071818		Sample Time: 0855		

00906694

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW20	Date: 7/16/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 19.31
	Total Well Depth (ft) (C): 36.08	Water Column Thickness (ft) (C-B): 16.77	Well Volume (gal) (A*(C-B)): 2.68
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/16/18	1305	19.38	.13	100	28.42	6.26	7.14	0.59	2.8	-293	
	1310	19.45	.26	100	27.64	6.21	7.17	0.11	0.7	-324	
	1315	19.49	.39	100	27.57	6.20	7.19	0.00	0.2	-353	
	1320	19.52	.52	100	27.52	6.19	7.19	0.00	0.0	-354	
	1325	19.53	.65	100	27.47	6.18	7.19	0.00	0.0	-356	
	1330	19.54	.78	100	27.41	6.18	7.19	0.00	0.0	-357	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
Sample ID: 35AWW20_071618				Sample Time: 1330		

00906695

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58	Location ID: 35AWW21	Date: 6/29/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 33.77
	Total Well Depth (ft) (C): 42.88	Water Column Thickness (ft) (C-B): 9.11	Well Volume (gal) (A*(C-B)): 1.46
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO										
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
6/29/18	0725	33.85	.13	100	25.94	4.77	1.99	1.80	171	287	
	0730	33.91	.26	100	23.90	4.58	2.01	0.37	700	289	
	0735	33.95	.39	100	23.85	4.56	1.93	0.00	57.9	288	
	0740	33.98	.52	100	23.80	4.55	1.93	0.00	57.3	287	
	0745	33.99	.65	100	23.77	4.55	1.92	0.00	56.6	286	
	0750	34.00	.78	100	23.74	4.55	1.92	0.00	56.0	285	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
	3	40ml Glass	HCl	N		VOC

Sample ID: 35AWW21-062918 Sample Time: 0750

00906696

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GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW22	Date: 7/17/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba Z1101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 33.80
	Total Well Depth (ft) (C): 37.78	Water Column Thickness (ft) (C-B): 3.98	Well Volume (gal) (A*(C-B)): 0.64
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/17/18	1223	33.80									BAILING WELL
7/17/18	1228	37.65	1.25								BAILED 1.25 gal. RAN DRY
7/18/18	1135	33.80	NA	NA	25.50	6.41	8.75	9.06	18.5	8	

Colorimeter Results				
Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40mL GLASS		HCl	N		VOC

Sample ID: 35AWW22-071818 Sample Time: 1135

00906697

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 2

LOCATION	Site: LHAAP - 58	Location ID: 35AWW23	Date: 7/17/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC / 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 23.55
	Total Well Depth (ft) (C): 43.78	Water Column Thickness (ft) (C-B): 20.23	Well Volume (gal) (A*(C-B)): 3.24
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/17/18	0920	23.62	.13	100	24.71	5.82	3.50	0.42	264	-118	
	0925	23.68	.26	100	24.18	5.70	3.40	0.10	204	-148	
	0930	23.71	.39	100	23.97	5.68	3.40	0.00	180	-164	
	0935	23.73	.52	100	23.88	5.67	3.40	0.00	180	-165	
	0940	23.75	.65	100	23.81	5.67	3.40	0.00	179	-166	
	0945	23.77	.78	100	23.76	5.67	3.40	0.00	178	-167	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)

Sample ID: 35AWW23-071718 Sample Time: 0945

bhate ENVIRONMENT INFRASTRUCTURE

GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: 35AWW24	Date: 7/17/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 2"	Unit Casing Volume (gal/lin ft) (A): 0.160	Initial Depth to Water (ft) (B): 26.60
	Total Well Depth (ft) (C): 35.06	Water Column Thickness (ft) (C-B): 8.46	Well Volume (gal) (A*(C-B)): 1.35
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR / SUNNY	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/17/18	1050	26.68	.13	100	23.79	5.17	0.496	0.71	471	70	
	1055	26.75	.26	100	23.00	5.00	0.488	0.03	465	69	
	1100	26.79	.39	100	22.96	4.99	0.484	0.00	453	70	
	1105	26.82	.52	100	22.92	4.98	0.484	0.00	451	71	
	1110	26.84	.65	100	22.88	4.98	0.484	0.00	450	71	
	1115	26.86	.78	100	22.85	4.98	0.484	0.00	449	71	

Colorimeter Results				
Time	Analyte	Dilution	Result	Units

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type	Preserv.	Filter (Y/N)	Method	Parameter(s)

Sample ID: 35AWW24_071718 Sample Time: 1115

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GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58		Location ID: LHSmw04		Date: 7/17/18
	Project Name: LHAAP		Project No./Phase: NWO1312.0150		Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro		Water Quality Meter/ID#: U-52 Horiba 21101		PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101		Other Equipment/ID#: NA		Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"		Other Equipment/ID#: NA		PPE: Level D
WELL INFO	Casing Type / ID (in): 4"		Unit Casing Volume (gal/lin ft) (A): 0.652		Initial Depth to Water (ft) (B): [redacted] DRY
	Total Well Depth (ft) (C): 31.16		Water Column Thickness (ft) (C-B):		Well Volume (gal) (A*(C-B)):
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA		System Volume (gal): NA
	Weather: CLEAR / SUNNY		Well Condition: GOOD		Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
			DRY		Well						

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
Sample ID:				Sample Time:		

00906700

bhate ENVIRONMENT INFRASTRUCTURE

GROUNDWATER SAMPLE COLLECTION FORM

Page 1 of 1

LOCATION	Site: LHAAP - 58		Location ID: LHSMW06		Date: 7/2/18
	Project Name: LHAAP		Project No./Phase: NWO1312.0150		Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro		Water Quality Meter/ID#: U-52 Horiba 2110		PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101		Other Equipment/ID#: NA		Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"		Other Equipment/ID#: NA		PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 4"		Unit Casing Volume (gal/lin ft) (A): 0.652		Initial Depth to Water (ft) (B): 18.80
	Total Well Depth (ft) (C): 23.46		Water Column Thickness (ft) (C-B): 4.66		Well Volume (gal) (A*(C-B)): 3.04
	Ambient PID (ppm): NA		Well Mouth PID (ppm): NA		System Volume (gal): NA
	Weather: CLEAR/SUNNY		Well Condition: GOOD		Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/2/18	1245	18.86	.13	100	27.00	6.36	3.07	1.66	18.8	101	
	1250	18.92	.26	100	25.46	5.82	3.08	0.38	37.3	125	
	1255	18.96	.39	100	24.79	5.50	3.08	0.00	44.9	135	
	1300	18.99	.52	100	24.70	5.49	3.08	0.00	45.5	136	
	1305	19.01	.65	100	24.64	5.48	3.08	0.00	46.1	137	
	1310	19.03	.78	100	24.56	5.48	3.08	0.00	46.7	138	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

Conversions	**Stabilization Criteria**			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)
3	40ml GLASS		HCl	N		VOC
1	60ml PLASTIC		HNO3	N		Arsenic

Sample ID: LHSMW06_070218 Sample Time: 1310

bhate ENVIRONMENT INFRASTRUCTURE

GROUNDWATER SAMPLE COLLECTION FORM

LOCATION	Site: LHAAP - 58	Location ID: LHSmw07	Date: 7/17/18
	Project Name: LHAAP	Project No./Phase: NWO1312.0150	Recorded By: Scott Beesinger
EQUIPMENT	Pump Type/ID#: Bladder Pump / SamplePro	Water Quality Meter/ID#: U-52 Horiba 21101	PID Type/ID#: NA
	Water Level Indicator Type/ID#: Solinist 101	Other Equipment/ID#: NA	Decon Method: Liquinox & DI water
	Tubing Type/Diameter (in): 1/4"	Other Equipment/ID#: NA	PPE: Level D
WELL INFO	Casing Type / ID (in): PVC 4"	Unit Casing Volume (gal/lin ft) (A): 0.652	Initial Depth to Water (ft) (B): 18.75
	Total Well Depth (ft) (C): 30.48	Water Column Thickness (ft) (C-B): 11.73	Well Volume (gal) (A*(C-B)): 7.65
	Ambient PID (ppm): NA	Well Mouth PID (ppm): NA	System Volume (gal): NA
	Weather: CLEAR | Sunny	Well Condition: GOOD	Comments:

CASING INFO											
Casing ID (in)	0.5	0.75	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0
Unit Casing Volume (gal/lin ft)	0.016	0.020	0.043	0.103	0.160	0.378	0.652	1.03	1.48	2.57

DATE	TIME (24 Hr)	Water Level (BTOC)	Volume Removed (Gals)	Pumping Rate (ml/min)	Temp (C)	pH	Cond (mS/cm)	DO (mg/l)	Turb (NTU)	ORP (mV)	Remarks (odor, clarity, etc.)
7/17/18	0740	18.81	.13	100	24.63	6.45	13.6	0.33	20.2	-353	
	0745	18.85	.26	100	23.37	6.33	13.8	0.08	16.3	-390	
	0750	18.89	.39	100	23.03	6.25	14.0	0.00	14.4	-390	
	0755	18.92	.52	100	22.96	6.24	14.1	0.00	14.0	-389	
	0800	18.94	.65	100	22.90	6.24	14.1	0.00	13.7	-388	
	0805	18.95	.78	100	22.86	6.23	14.1	0.00	13.2	-389	

Colorimeter Results

Time	Analyte	Dilution	Result	Units

No. Containers/Volume/Type			Preserv.	Filter (Y/N)	Method	Parameter(s)

Conversions	Stabilization Criteria			
1 L = 0.26 gals	Temp	+/- 10%	DO	+/- 10%
1 gal = 3.79 L	pH	+/- 0.1	Turb	+/- 10%
	Cond	+/- 10%	ORP	+/- 10

Sample ID: LHSmw07_071718 Sample Time: 0805

APPENDIX D
LABORATORY ANALYTICAL RESULTS
(PROVIDED ON CD)

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QUARTERLY CONTROL SUMMARY REPORT
LHAAP-58 NOVEMBER 2017
SEMI-ANNUAL SAMPLING EVENT
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

August 2018

Prepared For:

Longhorn Army Ammunition Plant
Karnack, Texas

Under Contract To:

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Tulsa District
Tulsa, Oklahoma

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Prepared By:

1608 13th Avenue South, Suite 300
Birmingham, Alabama 35205
1-800-806-4001 • www.bhate.com

Table of Contents

1 INTRODUCTION 3
1.1 Intended Use of Data 3
1.2 Preservation and Holding Times 4
1.3 Calibrations 4
1.3.1 Continuing Calibration Verifications 4
1.4 Blanks 4
1.5 Surrogates 4
1.5.1 SW8270D SIM 4
1.6 Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD) 4
1.7 Matrix Spike (MS)/Matrix Spike Duplicate Sample (MSD) 5
1.7.1 SM3500-Fe 5
1.7.2 SW8260 5
1.7.3 SW8270D SIM 5
1.8 Internal Standards 5
1.9 Field Precision 5
1.9.1 SW8270D SIM 5
2 DATA USABILITY SUMMARY 6

Tables

Table 1: Field Sample Identification and Laboratory Packages
Table 2: Qualified Analytical Data
Table 3: Completeness by Method

1 INTRODUCTION

Bhate reviewed seven data packages from ALS Environmental, Houston, Texas with the analyses for ferrous iron and volatile fatty acids subcontracted to ALS Rochester, NY, and the analyses of dissolved gases to ALS Simi Valley, CA. The dechlorinating bacteria analysis was subcontracted to Microbial Insights in Knoxville, TN. Groundwater samples were collected from November 13-17, 2017, from Site LHAAP-58 at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. Data were reviewed for conformance to the requirements of the following guidance documents: *USEPA Contract Laboratory Program* [CLP] *National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA, January 2017); *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA, January 2017); and the *Final Army Basewide Uniform Federal Policy (UFP) – Quality Assurance Project Plan (QAPP) Longhorn Army Ammunition Plant* (Bhate, May 2018) which is an appendix to the Installation-Wide Work Plan.

1.1 Intended Use of Data

The objective of sampling at LHAAP-58 in November 2017 was to complete the semi-annual groundwater sampling event.

Analyses performed include:

- SM2320B – Alkalinity
- E365.3 – Phosphorus
- RSK-175 – Dissolved Gases
- E415.1 – Total Organic Carbon
- SW8260C – Volatile Organic Compounds (VOCs)
- SM3500-Fe - Ferrous Iron
- SW6020A – Total and Dissolved Metals (Iron and Manganese) and Total Arsenic
- SW9056A – Anions (chloride, nitrate, nitrite, and sulfate)
- E376.1 – Sulfide
- High Performance Liquid Chromatography (HPLC)-METACIDS – Volatile Fatty Acids (VFAs)
- CENSUS – Dechlorinating Bacteria (dehalococcoides [DHC]/dehalobacter [DHB])
- SW8270D Selected Ion Monitoring (SIM) – 1,4 Dioxane

Table 1 lists the sample identification (ID) numbers and their associated laboratory package.

Table 2 lists qualified results with the qualification flag and reason code.

The following narrative is a brief synopsis of data that required qualification due to quality control discrepancies.

1.2 Preservation and Holding Times

Sample ID data were evaluated for agreement with the chain-of-custody (COC). All samples were received in appropriate containers, within the proper temperature range, in good condition, and within the required hold time with the following exception.

- The analysis for ferrous iron was outside the requisite 24-hour hold time and all results were qualified as estimated, "J".

1.3 Calibrations

All analytes reported must be present in the initial and continuing calibration. The calibrations must meet the acceptance criteria specified in Worksheet 24 (Analytical Instrument Calibration) of the QAPP. All results reported must be within the calibration range. Samples were diluted, if necessary, to bring analyte responses within the calibration range

1.3.1 Continuing Calibration Verifications

The calibrations must meet the following criteria otherwise the compound is qualified as J or UJ: The continuing calibration verification (CCV) criteria are 20 percent difference (%D) for VOCs and 50% for closing CCVs. Metals and general chemistry are 10%D; VFAs, Dissolved Gases, and TOC are 15%D.

The CCV for all compounds were within control limits.

1.4 Blanks

If the analyte result for an associated sample was less than 5X (10X for common laboratory contaminants) the analyte concentration in the blank, that result was qualified as "UB" and considered an artifact of blank contamination. Where the sample result for the affected analyte was non-detect or greater than 5X (10X) the amount in the blank, no qualifier was applied.

No compounds were reported in the various analytical blanks.

1.5 Surrogates

Surrogates were evaluated using limits defined by each method in the project-specific QAPP Worksheet 15.

1.5.1 SW8270D SIM

The surrogate 2-fluorobiphenyl was reported above control limits in samples 35AWW11-111417 and 35AWW16-111317. The detection of 1,4-dioxane was flagged as estimated, "J".

1.6 Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

LCS/LCSD recoveries were evaluated using limits defined in the project-specific QAPP Worksheet 15.

All sample recoveries were within control limits.

1.7 Matrix Spike (MS)/Matrix Spike Duplicate Sample (MSD)

MS/MSD recoveries were evaluated using limits defined in Worksheet 15 of the project-specific QAPP. When sample results were greater than 4X the spike amount, control limits were not applicable and require no qualification. Furthermore, if a MS/MSD analyses was performed on a batched (unrelated) sample, no qualification was made to the sample data.

1.7.1 SM3500-Fe

The MS and MSD recoveries for ferrous iron were above control limits in the spike sample 35AWW06-111417 (139%/137%). Ferrous iron was qualified as estimated, "J".

1.7.2 SW8260

Due to possible matrix effect, multiple compounds were below control limits in spiked sample 35AWW12-111617. These non-detect compounds were qualified as estimated, "UJ". The MS recovery for 1,1,2,2-tetrachloroethane (70.3%) was below control limits in spike sample 35AWW21-111317. This non-detect compound was considered estimated and flagged, "UJ".

1.7.3 SW8270D SIM

The MS/MSD recoveries for 1,4-dioxane in spike sample 35AWW12_111617 were above control limits and qualified as estimated, "J".

1.8 Internal Standards

If the percent recovery (%R) for an internal standard in a sample is not within the limit, the associated sample is qualified for those analytes associated with the internal standard(s) outside of the limit.

Internal standards were within acceptance criteria for the associated compounds.

1.9 Field Precision

Precision is the measure of variability of individual sample measurements. Evaluation of field duplicates for precision was done using the relative percent difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD limits were set at <30% for groundwater matrices.

1.9.1 SW8270D SIM

The RPD, between 35AWW20-111417 and its duplicate, was exceeded for 1,4-dioxane (118%). This compound was qualified as estimated, "J", in both sample and duplicate.

2 DATA USABILITY SUMMARY

The data are usable for the intended purposes of the project (see Table 3). The data quality objectives have been met for the project.

Table 1: Field Sample Identification and Laboratory Packages

Client Sample ID	Lab Package/ID	SM2320B	E365.3	E415.1	SW6020A	SW8260C	HPLC-METACIDS	SW9056A	RSK-175	SM3500Fe	E376.1	CENSUS	Arsenic	SW8270D SIM
03WW01_111517	HS17110813	X	X	X	X	X	X	X	X	X	X	X	X	X
35AWW01_111617	HS17111049					X							X	X
35AWW05_111317	HS17110800					X								X
35AWW06_111417	HS17110732	X	X	X	X	X		X	X	X	X		X	X
35AWW07_111717	HS17111044												X	
35AWW08-111517	HS17110813	X	X	X	X	X	X	X	X	X	X	X	X	X
35AWW09-111517	HS17110816	X	X	X	X	X	X	X	X	X	X	X	X	X
35AWW10-111517	HS17110816	X	X	X	X	X	X	X	X	X	X	X		X
35AWW11-111417	HS17110731	X	X	X	X	X		X	X	X	X			X
35AWW12_111617	HS17111049					X								X
35AWW13_111617	HS17111049					X								X
35AWW14_111717	HS17111044					X								X
35AWW15_111617	HS17111049					X								X
35AWW16-111317	HS17110800					X								X
35AWW16-111317_a	HS17110800					X								X
35AWW17-111317	HS17110800					X								X
35AWW18-111317	HS17110800					X								X
35AWW19_111717	HS17111044					X								X
35AWW20-111417	HS17110731	X	X	X	X	X		X	X	X	X			X
35AWW20-111417-a	HS17110731	X	X	X	X	X		X	X	X	X			X
35AWW21-111317	HS17110800					X								X
35AWW22_111717	HS17111044					X								X
LHSMW03_111717	HS17111044												X	
LHSMW06_111717	HS17111044					X							X	X
LHSMW07-111417	HS17110732	X	X	X	X	X		X	X	X	X		X	X
1004TW001_111717	HS17111044												X	

Notes:
MW – Monitoring Well
SM – Standard Method
SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
E – U.S. Environmental Protection Agency Method
HS - Houston

Table 2: Qualified Analytical Data

Client Sample ID Laboratory	Laboratory Package	Analyte Name	Data Validation Qualifier	Reason for Qualification
03WW01-111517	HS17110813	Ferrous Iron	18.9 J	HT
35AWW06-111417	HS17110732	Ferrous Iron	0.09 J	HT/MS/MSD >
35AWW08-111517	HS17110813	Ferrous Iron	17.4 J	HT
35AWW09-111517	HS17110816	Ferrous Iron	0.06 J	HT
35AWW10-111517	HS17110816	Ferrous Iron	0.07 J	HT
35AWW11-111417	HS17110731	Ferrous Iron 1,4-Dioxane	0.08 J 1.6 J	HT Surr >
35AWW12_111617	HS17111049	1,4-Dioxane 49 volatiles	0.20 J UJ	MS/MSD > MS/MSD <
35AWW16-111317	HS17110800	1,4-Dioxane	1.2 J	Surr >
35AWW20-111417	HS17110731	Ferrous Iron 1,4-Dioxane	0.45 J 28 J	HT Dup RPD
35AWW20-111417-a	HS17110731	Ferrous Iron 1,4-Dioxane	0.43 J 110 J	HT Dup RPD
35AWW21-111317	HS17110800	1,1,2,2-Tetrachloroethane	< 0.5 UJ	MS <
LHSMW07-111417	HS17110732	Ferrous Iron	0.4 J	HT

Notes:
J – Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
UJ – The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
Surr > - surrogate recovery above control limits
MS/MSD >/<– Matrix spike/duplicate recoveries above/below control limits
HT – exceeded recommended hold time
Dup RPD – duplicate relative percent difference outside control limits

Table 3: Completeness by Method

Method	No. of Rejected Results	% Completeness
SM2320B	0	100
E365.3	0	100
E415.1	0	100
SW6020A	0	100
SW8260C	0	100
HPLC-METACIDS	0	100
SW9056A	0	100
RSK-175	0	100
SM3500-Fe	0	100
E376.1	0	100
CENSUS	0	100
SW8270D SIM	0	100

10515 Research Drive
Knoxville, TN 37932
Phone: (865) 573-8188
Fax: (865) 573-8133

Client: Shannon Tyrell-Swadis
ALS Laboratory Group
10450 Stancliff Rd
Suite 210
Houston, TX 77040

Phone:

Fax:

Identifier: 060OK **Date Rec:** 11/16/2017 **Report Date:** 11/22/2017

Client Project #: NWD1312.0150 **Client Project Name:** LHAAP-58

Purchase Order #:

Analysis Requested: CENSUS

Reviewed By:



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MICROBIAL INSIGHTS, INC.

10515 Research Dr., Knoxville, TN 37932
Tel. (865) 573-8188 Fax. (865) 573-8133

CENSUS

Client: **ALS Laboratory Group**
Project: LHAAP-58

MI Project Number: **060OK**
Date Received: 11/16/2017

Sample Information

Client Sample ID:		**35AWW08_111517**	**03WW01_111517**	**35AWW09_111517**	**35AWW10_111517**
Sample Date:		11/15/2017	11/15/2017	11/15/2017	11/15/2017
Units:		cells/mL	cells/mL	cells/mL	cells/mL
Analyst/Reviewer:		JS	JS	JS	JS
Dechlorinating Bacteria					
Dehalococcoides	*DHC*	**3.06E+06**	**3.53E+04**	**1.50E+00**	<9.00E-01
tceA Reductase	TCE	<3.80E+00	<2.10E+00	<5.00E-01	<9.00E-01
BAV1 Vinyl Chloride Reductase	BVC	<3.80E+00	<2.10E+00	<5.00E-01	<9.00E-01
Vinyl Chloride Reductase	VCR	**4.72E+06**	**5.32E+04**	**2.20E+00**	<9.00E-01
Dehalobacter spp.	*DHBt*	<3.85E+01	<2.08E+01	**1.40E+00 (J)**	<9.10E+00

Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited
< = Result not detected

Quality Assurance/Quality Control Data

Samples Received **11/16/2017**

Component	Date Prepared	Date Analyzed	Arrival Temperature	Positive Control	Extraction Blank	Negative Control
DHC	11/16/2017	11/22/2017	0 °C	103%	non-detect	non-detect
BVC	11/16/2017	11/22/2017	0 °C	106%	non-detect	non-detect
DHBt	11/16/2017	11/22/2017	0 °C	96%	non-detect	non-detect
TCE	11/16/2017	11/22/2017	0 °C	104%	non-detect	non-detect
VCR	11/16/2017	11/22/2017	0 °C	107%	non-detect	non-detect

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

December 04, 2017

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS17110731**

Laboratory Results for: **LHAAP-58**

Dear Marcia,

ALS Environmental received 4 sample(s) on Nov 15, 2017 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Sonia West

Generated By: Dayna.Fisher
Sonia West
Project Manager

ALS Group USA, Corp Date: 04-Dec-17

Client: Bhate Environmental Associates, Inc.
Project: LHAAP-58
Work Order: HS17110731

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS17110731-01	35AWW11-111417	Water		14-Nov-2017 10:30	15-Nov-2017 08:40	☐
HS17110731-02	35AWW20-111417	Water		14-Nov-2017 11:45	15-Nov-2017 08:40	☐
HS17110731-03	35AWW20-111417-a	Water		14-Nov-2017 11:45	15-Nov-2017 08:40	☐
HS17110731-04	Trip Blank	Water	ALS-110717-7	14-Nov-2017 00:01	15-Nov-2017 08:40	☐

ALS Group USA, Corp Date: 04-Dec-17

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LHAAP-58
Work Order: HS17110731

Work Order Comments

- Sample duplicate listed on the chain of custody 35AWW20_111417 is labeled and reported as 35AWW20_111417-a.
- The analyses for RSK-175 Dissolved Gases and CO2 were subcontracted to ALS Environmental in Simi Valley, CA. Final Report attached.
- The analysis for Ferrous Iron was subcontracted to ALS Environmental in Rochester, NY. Final Report attached.

GCMS Semivolatiles by Method SW8270SIM

Batch ID: 122270

Sample ID: 35AWW11-111417 (HS17110731-01)

- One or more of the method 8270 surrogates were recovered outside of the control limits. This was due to a dilution required for sample analysis.
- The GCMS semi-volatile extract of this sample was run at a dilution due to a high level of matrix interference.

Sample ID: 35AWW20-111417-a (HS17110731-03)

- Low area counts for internal standard, but internal standard associated with target compound meets QC limits.
- The GCMS semi-volatile extract of this sample was run at a dilution due to a high level of matrix interference.
- The surrogate recoveries could not be determined due to dilution below the calibration range.

Sample ID: LCSD-122270

- Low area counts for internal standard, but internal standard associated with target compound meets QC limits.
- LCSD RPD was above the control limits for some surrogates

GCMS Volatiles by Method SW8260

Batch ID: R305631

Sample ID: HS17110493-01MS

- MS and MSD are for an unrelated sample

Metals by Method SW6020

Batch ID: 122338,122422

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9056

Batch ID: R305969

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Batch ID: R305878

Sample ID: HS17110722-02MS

- MS and MSD are for an unrelated sample

ALS Group USA, Corp Date: 04-Dec-17

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LHAAP-58
Work Order: HS17110731

WetChemistry by Method SW9056

Batch ID: R305878

Sample ID: HS17110732-01MS

- MS and MSD are for an unrelated sample

WetChemistry by Method E415.1

Batch ID: R306127

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2320B

Batch ID: R306067

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E376.1

Batch ID: R305693

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E365.3

Batch ID: 122373

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Group USA, Corp Date: 04-Dec-17

Client: Bhate Environmental Associates, Inc. **ANALYTICAL REPORT**
Project: LHAAP-58 WorkOrder:HS17110731
Sample ID: 35AWW11-111417 Lab ID:HS17110731-01
Collection Date: 14-Nov-2017 10:30 Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: PC
1,1,1,2-Tetrachloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,1,1-Trichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,1,2,2-Tetrachloroethane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,1,2-Trichloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,1-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,1-Dichloroethene	**12**		**0.20**	**0.50**	**1.0**	**ug/L**	1	16-Nov-2017 21:20
1,1-Dichloropropene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2,3-Trichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2,3-Trichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2,4-Trichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2,4-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2-Dibromo-3-chloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2-Dibromoethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2-Dichlorobenzene	0.50	U	0.50	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2-Dichloroethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,2-Dichloropropane	0.50	U	0.50	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,3,5-Trimethylbenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,3-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,3-Dichloropropane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
1,4-Dichlorobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Nov-2017 21:20
2,2-Dichloropropane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
2-Butanone	1.0	U	0.50	1.0	2.0	ug/L	1	16-Nov-2017 21:20
2-Chlorotoluene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
2-Hexanone	1.0	U	1.0	1.0	2.0	ug/L	1	16-Nov-2017 21:20
4-Chlorotoluene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Nov-2017 21:20
4-Isopropyltoluene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
4-Methyl-2-pentanone	1.0	U	0.70	1.0	2.0	ug/L	1	16-Nov-2017 21:20
Acetone	1.0	U	0.40	1.0	2.0	ug/L	1	16-Nov-2017 21:20
Benzene	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
Bromobenzene	0.50	U	0.40	0.50	1.0	ug/L	1	16-Nov-2017 21:20
Bromochloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
Bromodichloromethane	0.50	U	0.20	0.50	1.0	ug/L	1	16-Nov-2017 21:20
Bromoform	0.50	U	0.40	0.50	1.0	ug/L	1	16-Nov-2017 21:20
Bromomethane	0.50	U	0.40	0.50	1.0	ug/L	1	16-Nov-2017 21:20
Carbon disulfide	1.0	U	0.60	1.0	2.0	ug/L	1	16-Nov-2017 21:20
Carbon tetrachloride	0.50	U	0.50	0.50	1.0	ug/L	1	16-Nov-2017 21:20
Chlorobenzene	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20
Chloroethane	0.50	U	0.30	0.50	1.0	ug/L	1	16-Nov-2017 21:20

Note: See Qualifiers Page for a list of qualifiers and their explanation.