LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

ADMINISTRATIVE RECORD

Volume 17

2019

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Longhorn Army Ammunition Plant

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

VOLUME 17

2019

A. Title: (cont'd) Report – Quarterly Evaluation Report, 1st Quarter (January–March) 2019, Groundwater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, July 2019
Author(s): Bhate Environmental Associates, Inc.
Recipient: U.S. Army Corps of Engineers, Tulsa District
Date: July 19, 2019
Bate Stamp: 00936356 – 00936376

B. Title: Minutes – Final Minutes Quarterly Restoration Advisory Board Meeting, April 25, 2019
Author(s): Bhate Environmental Associates, Inc.
Recipient: All Parties
Date: July 25, 2019
Bate Stamp: 00936377 – 00936418

C. Title: Report – Draft Final Addendum Post-Screening Investigation Report, LHAAP-47
Author(s): Department of the Army
Recipient: Environmental Protection Agency and Texas Commission on Environmental Quality
Date: July 30, 2019
Bate Stamp: 00936419 – 00936902

D. Title: Report – August 2019 Underground Injection Control Substantive Requirements Notification for Remedy at LHAAP-04
Author(s): Department of the Army
Recipient: Texas Commission on Environmental Quality
Date: August 1, 2019
Bate Stamp: 00936903 – 00936995

E. Title: Minutes – Final Minutes, Monthly Managers' Meeting, July 25, 2019
Author(s): Department of the Army
Recipient: All Parties
Date: August 27, 2019
Bate Stamp: 00936996 – 00937022

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

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F. Title: Minutes – Final Minutes, Monthly Manager's Meeting, August 21, 2019
Author(s): Department of the Army
Recipient: All Parties
Date: August 27, 2019
Bate Stamp: 00937023 – 00937047

G. Title: Report – Final Explanation of Significant Differences, Record of Decision for Contingency Remedy at LHAAP-50, Former Sump Water Tank, Longhorn Army Ammunition Plant, July 2019
Author(s): Department of the Army
Recipient: Environmental Protection Agency and Texas Commission on Environmental Quality
Date: September 13, 2019
Bate Stamp: 00937048 – 00937075

H. Title: Report – Final Record of Decision, LHAAP-29, Former TNT Production Area, Group 2
Author(s): Department of the Army
Recipient: Environmental Protection Agency and Texas Commission on Environmental Quality
Date: September 26, 2019
Bate Stamp: 00937076 – 00937224

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.

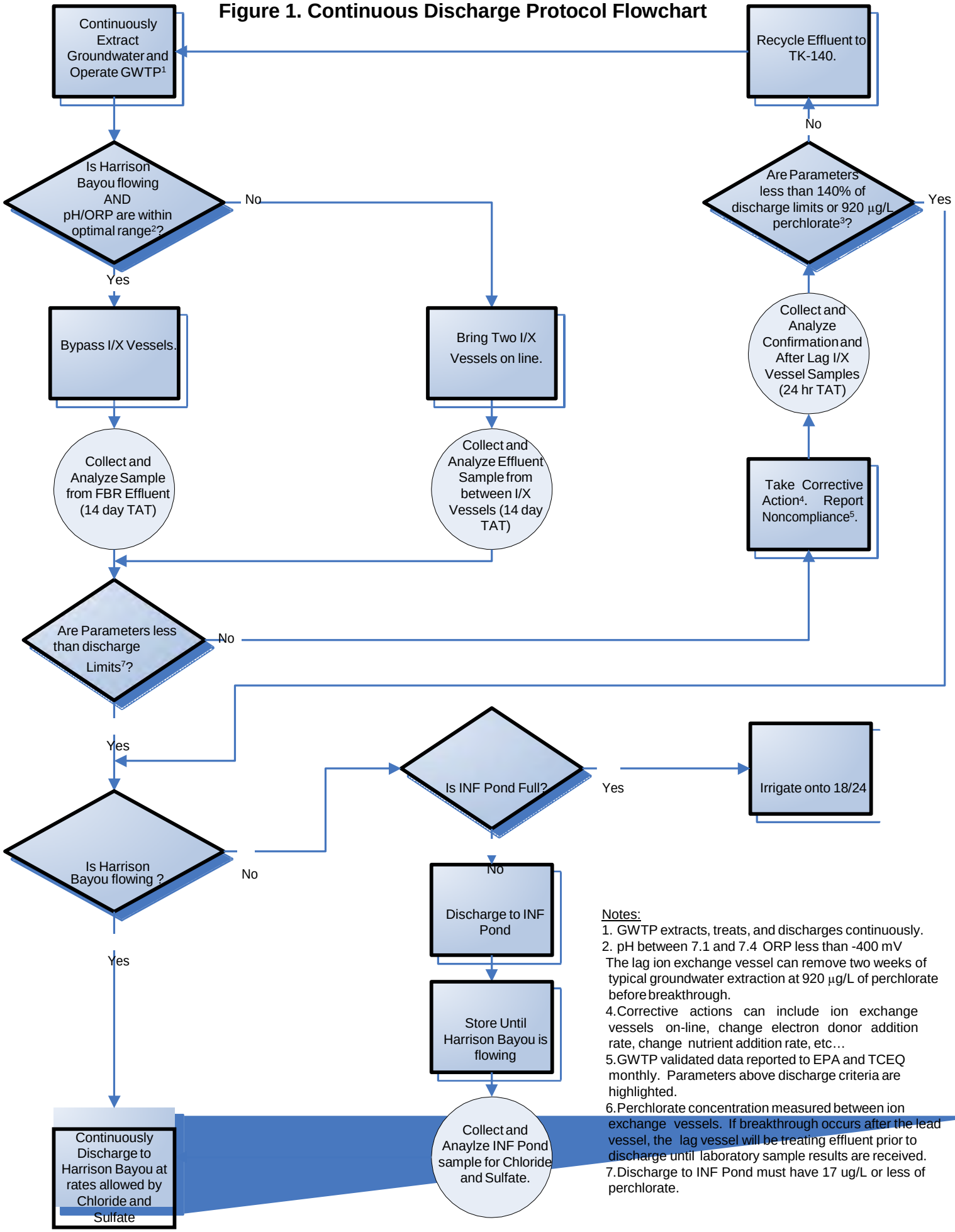
As soon as flow in Harrison Bayou returns, stored GWTP effluent from the INF Pond will be discharged. As with direct discharges from the GWTP to Harrison Bayou, the allowable flowrate of effluent from the INF Pond is calculated based upon the chloride and sulfate concentrations in the pond and the flow 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
AIR DATA TABLES, PID READINGS, AND CALIBRATION LOGS

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Appendix H, Table 1. Ambient Air Data - February 2019
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	0.67	U	PASS	0.60	U	PASS
1,1-Dichloroethene	75-35-4	210	714	0.69	U	PASS	0.63	U	PASS
1,2-Dichloroethane	107-06-2	160	162	0.68	U	PASS	0.61	U	PASS
Acetone	67-64-1	5,900	NA	**9.0**		PASS	6.3	U	PASS
Benzene	71-43-2	170	575	**0.80**		PASS	**0.69**		PASS
Carbon disulfide	75-15-0	30	NA	1.4	U	PASS	1.3	U	PASS
Chloroform	67-66-3	100	98	0.69	U	PASS	0.63	U	PASS
cis-1,2-Dichloroethene	156-59-2	7,900	NA	**12.0**		PASS	**0.64**		PASS
Methylene chloride	75-09-2	3,600	12,158	**2.8**		PASS	**1.4**		PASS
Tetrachloroethene	127-18-4	2,000	6,782	0.68	U	PASS	0.61	U	PASS
trans-1,2-Dichloroethene	156-60-5	7,900	NA	0.68	U	PASS	0.61	U	PASS
Trichloroethene	79-01-6	540	537	**55.0**		PASS	**2.1**		PASS
Vinyl chloride	75-01-4	20,000	66,460	0.68	U	PASS	0.61	U	PASS
n-Hexane	110-54-3	5,300	6,336	**1.00**		PASS	**0.83**		PASS
Styrene	100-42-5	110	21,725	0.68	U	PASS	0.61	U	PASS
Toluene	108-88-3	640	15,074	**1.2**		PASS	**0.76**		PASS
Ethylbenzene	100-41-4	740	86,844	0.67	U	PASS	0.60	U	PASS
m,p-Xylenes	179601-23-1	180	7,382	1.4	U	PASS	1.3	U	PASS
o-Xylene	95-47-6	1,600	7,382	0.68	U	PASS	0.61	U	PASS
1,3-Dichlorobenzene	541-73-1	720	NA	0.69	U	PASS	0.63	U	PASS
Propene (C3 H6)	115-07-1	Asphyxiant	Asphyxiant	0.67	U	NA	0.60	U	NA
Dichlorodifluoromethane (CCl2F2)	75-71-8	50,000	49,452	**2.5**		PASS	**2.6**		PASS
Ethanol	64-17-5	18,800	NA	6.5	U	PASS	5.9	U	PASS
Trichlorofluoromethane (CCl3F)	75-69-4	28,000	56,184	**1.4**		PASS	**1.3**		PASS
Trichlorotrifluoroethane (C2Cl3F3)	76-13-1	38,000	NA	**19**		PASS	**7.0**		PASS
alpha-Pinene	80-56-8	60	3,499	0.67	U	PASS	0.60	U	PASS
d-Limonene	5989-27-5	1,100	NA	0.65	U	PASS	0.59	U	PASS

Notes:

(1) Sample collected over an 8-hour period on February 27, 2019, between 8 AM and 4 PM

(2) Sample collected over a 24-hour period beginning on February 27, 2019, at 6:30 AM and ending on February 28, 2019 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 # = Chemical Abstracts Service Number

GWTP = Groundwater Treatment Plant

NA - Not applicable

U = non-detect

µg/m^3 = micrograms per cubic meter

Appendix H, Table 2. Emission Stack Air Data - February 2019
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	67	U	5.49E-04	U	3.57E-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	69	U	5.66E-04	U	3.68E-04	U	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	**140**		2.30E-03		1.49E-03		5	PASS	40	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	2.9	PASS
Acetone	67-64-1	690	U	5.66E-03	U	3.68E-03	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	67	U	5.49E-04	U	3.57E-04	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	140	U	1.15E-03	U	7.46E-04	U	5	PASS	31	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	2.2	PASS
Chloroform	67-66-3	69	U	5.66E-04	U	3.68E-04	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	**2,800**		4.59E-02		2.98E-02		5	PASS	793	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Methylene chloride	75-09-2	**630**		1.03E-02		6.71E-03		5	PASS	26	106.262 List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.9	PASS
Tetrachloroethene	127-18-4	68	U	5.57E-04	U	3.62E-04	U	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	68	U	5.57E-04	U	3.62E-04	U	5	PASS	793	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	1.0	PASS
Trichloroethene	79-01-6	**12,000**		1.97E-01		1.28E-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	68	U	5.57E-04	U	3.62E-04	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	67	U	5.49E-04	U	3.57E-04	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	68	U	5.57E-04	U	3.62E-04	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	68	U	5.57E-04	U	3.62E-04	U	5	PASS	188	ACGIH List	30 TAC 106.533(f)(1)(A)(ii)	2,000	14	6.0	PASS
Ethylbenzene	100-41-4	67	U	5.49E-04	U	3.57E-04	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	140	U	1.15E-03	U	7.46E-04	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	68	U	5.57E-04	U	3.62E-04	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	69	U	5.66E-04	U	3.68E-04	U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2,000	14	1.0	PASS
Propene (C3 H6)	115-07-1	67	U	5.49E-04	U	3.57E-04	U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2,000	14	6.0	PASS
Dichlorodifluoromethane (CCl2F2)	75-71-8	67	U	5.49E-04	U	3.57E-04	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	650	U	5.33E-03	U	3.46E-03	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	68	U	5.57E-04	U	3.62E-04	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	**1,900**		3.12E-02		2.02E-02		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	67	U	5.49E-04	U	3.57E-04	U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2,000	14	1.0	PASS
d-Limonene	5989-27-5	65	U	5.33E-04	U	3.46E-04	U	5	PASS	(5)	--	30 TAC 106.533(f)(1)(A)(i)	2,000	14	1.0	PASS
		TOTAL		0.310												

Notes:

(1) Sample collected on February 27, 2019. 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

ACGIH = American Conference of Governmental Industrial Hygienists

Appendix H, Table 3: PID Measurements for 1st Quarter 2019
Longhorn Army Ammunition Plant
Groundwater Treatment Plant

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
2/13/2019	8:00	Outside GWTP Office	3980 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 39 degrees
2/13/2019	8:00	Downwind	3980 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 39 degrees
2/13/2019	8:00	Stripper	3980 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.6 ppm Steady State 7.1 ppm	Clear 39 degrees
2/13/2019	14:00	Outside GWTP Office	3750 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 66 degrees
2/13/2019	14:00	Downwind	3750 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 66 degrees
2/13/2019	14:00	Stripper	3750 ACFM	MiniRAE 3000	Kennie Moore	Max. 18.9 ppm Steady State 6.4 ppm	Clear 66 degrees
2/20/2019	8:00	Outside GWTP Office	3875 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 41 degrees
2/20/2019	8:00	Downwind	3875 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 41 degrees
2/20/2019	8:00	Stripper	3875 ACFM	MiniRAE 3000	Kennie Moore	Max. 20.1 ppm Steady State 7.6 ppm	Cloudy 41 degrees
2/20/2019	14:00	Outside GWTP Office	3758 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 59 degrees
2/20/2019	14:00	Downwind	3758 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 59 degrees
2/20/2019	14:00	Stripper	3758 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.0 ppm Steady State 6.1 ppm	Clear 59 degrees
2/27/2019	8:00	Outside GWTP Office	3790 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 58 degrees
2/27/2019	8:00	Downwind	3790 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 58 degrees
2/27/2019	8:00	Stripper	3790 ACFM	MiniRAE 3000	Kennie Moore	Max. 20.1 ppm Steady State 7.6 ppm	Cloudy 58 degrees
2/27/2019	14:00	Outside GWTP Office	3694 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 67 degrees
2/27/2019	14:00	Downwind	3694 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 67 degrees
2/27/2019	14:00	Stripper	3694 ACFM	MiniRAE 3000	Scott Beesinger	Max. 19.0 ppm Steady State 6.1 ppm	Cloudy 67 degrees
3/7/2019	8:00	Outside GWTP Office	3749 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 49 degrees
3/7/2019	8:00	Downwind	3749 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 49 degrees
3/7/2019	8:00	Stripper	3749 ACFM	MiniRAE 3000	Kennie Moore	Max. 22.9 ppm Steady State 8.3 ppm	Cloudy 49 degrees
3/7/2019	14:00	Outside GWTP Office	3771 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 61 degrees
3/7/2019	14:00	Downwind	3771 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Cloudy 61 degrees
3/7/2019	14:00	Stripper	3771 ACFM	MiniRAE 3000	Scott Beesinger	Max. 20.4 ppm Steady State 6.9 ppm	Cloudy 61 degrees
3/13/2019	8:00	Outside GWTP Office	3701 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 67 degrees
3/13/2019	8:00	Downwind	3701 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Cloudy 67 degrees
3/13/2019	8:00	Stripper	3701 ACFM	MiniRAE 3000	Kennie Moore	Max. 23.1 ppm Steady State 7.7 ppm	Cloudy 67 degrees
3/13/2019	14:00	Outside GWTP Office	3740 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Rain 55 degrees
3/13/2019	14:00	Downwind	3740 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Rain 55 degrees
3/13/2019	14:00	Stripper	3740 ACFM	MiniRAE 3000	Scott Beesinger	Max. 21.7 ppm Steady State 5.8 ppm	Rain 55 degrees

Appendix H, Table 3: PID Measurements for 1st Quarter 2019
Longhorn Army Ammunition Plant
Groundwater Treatment Plant

Date	Time	Location	Air Flow Rate at Blower	Instrument ID	Person Collecting	PID Reading	Weather Conditions
3/20/2019	8:00	Outside GWTP Office	3881 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 41 degrees
3/20/2019	8:00	Downwind	3881 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 41 degrees
3/20/2019	8:00	Stripper	3881 ACFM	MiniRAE 3000	Kennie Moore	Max. 21.9 ppm Steady State 5.3 ppm	Clear 41 degrees
3/20/2019	14:00	Outside GWTP Office	3688 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 74 degrees
3/20/2019	14:00	Downwind	3688 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 74 degrees
3/20/2019	14:00	Stripper	3688 ACFM	MiniRAE 3000	Scott Beesinger	Max. 23.2 ppm Steady State 6.8 ppm	Clear 74 degrees
3/28/2019	8:00	Outside GWTP Office	3784 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 44 degrees
3/28/2019	8:00	Downwind	3784 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 44 degrees
3/28/2019	8:00	Stripper	3784 ACFM	MiniRAE 3000	Kennie Moore	Max. 21.1 ppm Steady State 5.0 ppm	Clear 44 degrees
3/28/2019	14:00	Outside GWTP Office	3693 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 76 degrees
3/28/2019	14:00	Downwind	3693 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 76 degrees
3/28/2019	14:00	Stripper	3693 ACFM	MiniRAE 3000	Scott Beesinger	Max. 23.1 ppm Steady State 6.3 ppm	Clear 76 degrees
4/3/2019	8:00	Outside GWTP Office	3802 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 46 degrees
4/3/2019	8:00	Downwind	3802 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 46 degrees
4/3/2019	8:00	Stripper	3802 ACFM	MiniRAE 3000	Kennie Moore	Max. 22.7 ppm Steady State 7.4 ppm	Clear 46 degrees
4/3/2019	14:00	Outside GWTP Office	3705 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 74 degrees
4/3/2019	14:00	Downwind	3705 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 74 degrees
4/3/2019	14:00	Stripper	3705 ACFM	MiniRAE 3000	Scott Beesinger	Max. 24.3 ppm Steady State 8.2 ppm	Clear 74 degrees
4/9/2019	8:00	Outside GWTP Office	3769 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 53 degrees
4/9/2019	8:00	Downwind	3769 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 53 degrees
4/9/2019	8:00	Stripper	3769 ACFM	MiniRAE 3000	Kennie Moore	Max. 20.4 ppm Steady State 4.9 ppm	Clear 53 degrees
4/9/2019	14:00	Outside GWTP Office	3678 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 81 degrees
4/9/2019	14:00	Downwind	3678 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Clear 81 degrees
4/9/2019	14:00	Stripper	3678 ACFM	MiniRAE 3000	Scott Beesinger	Max. 22.9 ppm Steady State 6.1 ppm	Clear 81 degrees
4/15/2019	8:00	Outside GWTP Office	3847 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 49 degrees
4/15/2019	8:00	Downwind	3847 ACFM	MiniRAE 3000	Kennie Moore	0.0 ppm	Clear 49 degrees
4/15/2019	8:00	Stripper	3847 ACFM	MiniRAE 3000	Kennie Moore	Max. 19.7 ppm Steady State 4.5 ppm	Clear 49 degrees
4/15/2019	14:00	Outside GWTP Office	3678 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Rain 77 degrees
4/15/2019	14:00	Downwind	3678 ACFM	MiniRAE 3000	Scott Beesinger	0.0 ppm	Rain 77 degrees
4/15/2019	14:00	Stripper	3678 ACFM	MiniRAE 3000	Scott Beesinger	Max. 22.9 ppm Steady State 6.1 ppm	Rain 77 degrees

00936370

EQUIPMENT CALIBRATION DAILY LOG

Date: 2/13/19	Project Name: LHAAP- GWTP
Project Number: NWD1312.0150	Recorded By: Scott Beasinger

PID	Model: MiniRAE 3000	Bulb: 10.6 ~~10.6~~ 11.7 eV			Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	Equipment ID #: PGM 7320						
	Parameter	Standard	Exp. Date	Lot #	Time: 0630	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)	10/5/21	JBH-248-100-19	Value: SB	Value:	Value:

COMB. GAS/O_2 METER	Model:				Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
	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:

WATER QUALITY METER	Model:				Morning Calibration/Check	Evening Check (one point only)	Additional Calib./Check (if necessary)
	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:

00936371

EQUIPMENT CALIBRATION DAILY LOG

Date: 2/20/19 | Project Name: LHAAP- GWTP

Project Number: NWO 1312.0150 | Recorded By: Scott Beesinger

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model: MiniRAE 3000		Bulb: ~~10.6~~ 11.7 meV				
	Equipment ID #: PGM 7320						
	Parameter	Standard	Exp. Date	Lot #	Time: 0645	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)	10/5/21	JBH-248-100-19	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:

00936372

EQUIPMENT CALIBRATION DAILY LOG

Date: 2/27/19 | Project Name: LHAAP- GWTP

Project Number: NWD1312.0150 | Recorded By: Scott Beasinger

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model: MiniRAE 3000		Bulb: ~~10.6~~ 11.7 meV				
	Equipment ID #: PGM 7320						
	Parameter	Standard	Exp. Date	Lot #	Time: 0700	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)	10/5/21	JBH-248-100-19	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:

00936373

EQUIPMENT CALIBRATION DAILY LOG

Date: 3/7/19

Project Number: NWD1312.0150

Project Name: LHAAP- GWTP

Recorded By: Scott Beesinger

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model: MiniRAE 3000		Bulb: ~~10.6~~ 11.7 eV				
	Equipment ID #: PGM 7320						
	Parameter	Standard	Exp. Date	Lot #	Time: 0640	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)	10/5/21	JBH-248-100-19	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:

00936374

EQUIPMENT CALIBRATION DAILY LOG

Date: 3/13/19 | Project Name: LHAAP- GWTP

Project Number: NW01312.0150 | Recorded By: Scott Beasinger

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model: MiniRAE 3000		Bulb: ~~10.6~~ 11.7 meV				
	Equipment ID #: PGM 7320						
	Parameter	Standard	Exp. Date	Lot #	Time: 0650	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)	10/5/21	JBH-248-100-19	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:

00936375

EQUIPMENT CALIBRATION DAILY LOG

Date: 3/20/19 | Project Name: LHAAP- GWTP

Project Number: NW01312.0150 | Recorded By: Scott Beasinger

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model: MiniRAE 3000		Bulb: ~~10.6~~ 11.7 meV				
	Equipment ID #: PGM 7320						
	Parameter	Standard	Exp. Date	Lot #	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)	10/5/21	JBH-248-100-19	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:

00936376

EQUIPMENT CALIBRATION DAILY LOG

Date: 3/28/19

Project Number: NWD 1312.0150

Project Name: LHAAP- GWTP

Recorded By: Scott Beasinger

					Morning Calibration	Evening Check	Additional Calib./Check (if necessary)
PID	Model: MiniRAE 3000		Bulb: ~~10.6~~ 11.7 meV				
	Equipment ID #: PGM 7320						
	Parameter	Standard	Exp. Date	Lot #	Time: 0645	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)	10/5/21	JBH-248-100-19	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:

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: April 25, 2019, 5:00-5:40 PM Central Daylight Time (CDT)

Meeting Participants:

Army BRAC:	Rose M. Zeiler
USACE:	Aaron Williams and John Doran
USAEC:	Andrew Maly
USGS:	Kent Becher
Bhate:	Kim Nemmers
APTIM:	William (Bill) Foss
USEPA Region 6:	Rich Mayer, Dorelle Harrison, and Janetta Coats
TCEQ:	April Palmie
USFWS:	Eric Duerkop
RAB:	Present: Judy VanDeventer, Paul Fortune, Carol Fortune, Charles Dixon, and Richard LeTourneau Absent: Terry Britt; John Pollard, Jr.; Tom Walker; and Nigel R. Shivers
Public:	Laura-Ashley Overdyke (Executive Director of the Caddo Lake Institute [CLI]), George Rice (CLI), John Fortune (New RAB Member), Sharron McAvoy (New RAB Member), Deon Hall (New RAB Member) Brad Eskue, Robert Speight, and James Saunders

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 Installation Co-Chair, called the RAB meeting to order at 5:05 pm CDT. Mr. Fortune welcomed everyone and asked if there was anyone present that had not attended before. Mr. Aaron Williams stated that Mr. John Doran was new to the RAB Meeting. Mr. Doran stated that he was with the United States Army Corps of Engineers (USACE) and was assisting Mr. Williams on the project and had been with the USACE for about 6 months.

Ms. Rose M. Zeiler welcomed everyone and explained the purpose of the RAB meeting. Ms. Zeiler explained that the meeting is held every 3 months and then presented the mission for the RAB. Ms. Zeiler stated that it is important for everyone to ask questions or provide comments and that you can just raise your hand or speak up when you need to.

Administrative

Ms. Zeiler stated that there are three RAB applicants, who were John Fortune, Sharron McAvoy, and Deon Hall. Ms. Zeiler stated that ballots should have been handed out to RAB members. Ms. Zeiler emphasized how great it was that there were three applicants. Ms. Zeiler then explained that the charter calls for a vote and requires a 2/3 majority for approval. Two of the three

applicants were present and were asked to stand up. Mr. Hall was not present. Mr. John Fortune was one of the interested RAB members and explained that he had grown up in Karnack, worked at the Army Ammunition Plant for Thiokol and had recently moved back and wanted to participate. Ms. Sharron McAvoy stated her interest in environmental protection and that she was a member of the Sierra Club. Ms. Zeiler asked for the votes to be handed to her during the meeting. **Note:** votes were tallied by Mr. Paul Fortune and Ms. Zeiler at the end of the RAB Meeting, when it was announced that each of the three applicants were approved as new RAB members.

Open Items

Ms. Zeiler noted that the RAB Meeting minutes had been sent out in November 2018. Ms. VanDeventer made a motion to accept the October 2018 RAB Meeting minutes. Mr. Fortune seconded the motion. (**Note:** no meeting was held in January 2019 due to the partial Government shutdown).

Ms. Zeiler then reminded everyone of the ongoing outreach with the website address listed in the slide packet. Ms. Zeiler stated that the meeting minutes, ongoing activities, and information by site are on the website as well as the administrative record.

Defense Environmental Restoration

Ms. Kim Nemmers reminded everyone that copies of the slides were available and that Bhate's role was to manage most of the sites as a contractor with the exception of LHAAP-29, LHAAP-18/24, and LHAAP-47. Ms. Nemmers then pointed out the slide with the acronyms and reviewed the agenda for the meeting. Ms. Nemmers then stated that three sites will be discussed by Mr. Bill Foss.

LHAAP-03

Mr. Foss provided an update on LHAAP-03, which was discussed about a year ago. Mr. Foss stated that LHAAP-03 is a very small site that was a former waste collection pad outside of the paint shop building. Site soils are contaminated with lead and arsenic. The Record of Decision (ROD) selected a remedy of excavation. Mr. Foss explained that additional soil samples were collected in November 2018 to both narrow down what area needed to be excavated and to determine if lateral or vertical delineation could be achieved to eliminate some of the confirmation sampling following excavation. Mr. Foss stated that a Remedial Design (RD)/ Remedial Action Work Plan (RAWP) was prepared using the older data and the data collected in November 2018. The RD/RAWP is currently in Army review. Mr. Foss stated that the plan is to excavate in late summer/early fall 2019. Mr. Foss explained that the map shows the area of excavation but noted that the scale makes it look like a large area. Mr. Foss also pointed out that much of the excavation is only down to 2 to 3 feet below ground surface (bgs). Mr. Foss explained that the yellow dots were the November 2018 samples.

LHAAP-04

Mr. Foss stated that LHAAP-04 is the location of a former pilot Wastewater Treatment Plant. In 1997, the structures were demolished. Then soil excavation was completed in 2009 for mercury and perchlorate contamination. The ROD selected a remedy for perchlorate treatment. Mr. Foss

explained that the first thing completed under Bhate's contract was to install monitoring wells and collect samples. The results indicated that the plume appeared to have shifted. So, the Army provided a scope of work to complete additional sampling. Mr. Foss explained that the plume used to be centered around monitoring well 04WW04. However, 04WW05 had perchlorate detections that increased. So, this indicated that the plume may have shifted to the west. The yellow circles are the additional data collected via direct push technology to evaluate the lithology and grab a groundwater sample. Then three new wells were installed based upon the data (04WW09, 04WW10, and 04WW11). The center of the mass of the plume did shift and this information was used to develop the RD. Mr. Foss explained that the RD will use in-situ bioremediation (ISB) which uses bacteria to degrade the contaminants. Mr. Foss explained that 25 direct push points will be advanced to allow for a little over 1,400 gallons of injectate (emulsified vegetable oil [EVO], nutrients, and water) to be added. Monitoring will be completed to evaluate the injections and RD. Land use controls (LUCs) will also be monitored which basically does not allow for groundwater use except for the environmental groundwater sampling. LUCs also restrict land use to prevent residential use. Mr. Foss then showed the location of the injection points and pointed out that the target area is where the contamination is 5 times the cleanup level (hot spot) and then there are a few locations to the south and west based upon the known plume migration. Mr. Foss stated that the RD was approved so the plan is to do the work in June or July 2019. Mr. Richard LeTourneau asked about backfilling. Mr. Foss stated that the site will be backfilled with soil that is either certified clean or sampled for offsite laboratory analysis to verify that the soil does not contain any contaminants above cleanup levels. Ms. Zeiler stated that this site had a substantial excavation previously.

LHAAP-17

Mr. Foss explained that LHAAP-17 was a former burning ground and flashing ground near the groundwater treatment plant (GWTP) and site LHAAP-18/24. The site was used for burning of TNT and flashing of powder. The waste was removed in the 1980s but contamination remains. Mr. Foss explained that the contaminants are mostly explosives, perchlorate, and solvents. The ROD that was signed in 2016 included groundwater extraction for the large perchlorate plume that has concentrations that are restrictive to natural attenuation. Mr. Foss explained that soil excavation of the explosives contaminated area will also be completed. Monitoring will be completed to evaluate the remedy, and LUCs will remain. Ms. Zeiler stated that there is a contingent remedy. Mr. Foss stated that the contingent remedy will apply if the reduction of perchlorate has not occurred in 18 months and includes another active remediation ahead of monitored natural attenuation.

Mr. Foss stated that previously the presentations at the RAB included a briefing on the pre-design investigation that included an aquifer pumping test and soil and groundwater sampling. The pumping test provided the basis for the type of system to install. The soil sampling provided the extent of soil requiring excavation. Based upon that information, the RD includes approximately 5,300 cubic yards of soil that is mostly 2 to 3 feet bgs. The excavation depth will be controlled by groundwater depth because soil excavation will not extend into the groundwater, which is expected to be at 7 feet bgs. Groundwater extraction will include up to three wells and will run for 18 months. The extracted groundwater will be piped to the GWTP. The contingent remedy

will be used if the perchlorate remains above 20,000 parts per million (ppm) following the extraction for 18 months. Mr. Foss explained that monitoring of the remedy will be completed and that LUCs will be in place. Mr. Foss stated that the LUCs prohibit groundwater use and limit site usage due to the perchlorate.

Mr. Foss explained the slide with the soil excavations. Mr. Foss stated that the areas furthest out from the site boundary were being excavated due to ecological concerns. The other deeper areas are due to explosives such as TNT. Mr. Foss then pointed out the deeper areas that were determined based upon the historic data as well as the newer data collected. Mr. Foss then showed the potential wells that will be used for groundwater extraction. Mr. Foss stated that wells 17WW02 and 17WW06 will be used for extraction. Groundwater results from 17WWW01 will determine if that well is brought online for extraction also. Mr. Foss explained the purple line is the current perchlorate plume.

Overview of Sites

Ms. Zeiler explained that several remedies are being implemented this summer. Mr. Foss stated that the areas need to dry-up following all the rain this winter/spring. Ms. Zeiler stated that the website would have a schedule of the work.

Ms. Nemmers explained that field work is completed, and then a report is prepared with that information. Also, remedial action operation (RA-O) sampling is completed semi-annually at a minimum. Ms. Nemmers explained that RA-O sampling is primarily sampling of monitoring wells to evaluate the remedy once it is in place. Ms. Nemmers stated that the ion exchange vessels at the GWTP were replaced and that the ion exchange is used to ensure that there is no perchlorate in the GWTP effluent.

Ms. Nemmers stated that the ongoing documents include the RD/RAWP for LHAAP-03 that Mr. Foss discussed. Ms. Nemmers stated that even though quite a bit of sampling has occurred, the list of documents for the sites are minimal because the reports are not written until additional sampling events are completed.

For the 3 month look ahead, Ms. Nemmers presented the four sites planned for field work (LHAAP-03, LHAAP-04, LHAAP-16, and LHAAP-17) in July or August and explained soil excavation will be conducted at two of the sites (LHAAP-03 and LHAAP-17). Ms. Nemmers explained that the schedule will be dependent upon the weather and that work will be moved up if possible.

Groundwater Treatment Plant

Ms. Nemmers stated that there were handouts with the information on the slides for the GWTP as well as handouts for the RDs of LHAAP-04 and LHAAP-17. Ms. Nemmers stated that the chart had a couple of dips since that last RAB meeting, which is due to power issues to the GWTP. Currently, the GWTP is on a generator. Ms. Judy VanDeventer asked if the site used Southwestern Electric Power Company (SWEPCO) to which Ms. Nemmers stated that the GWTP does use SWEPCO. Ms. VanDeventer pointed out that there has been power loss more frequently as of late from SWEPCO. Ms. Nemmers stated that the site has not been affected recently because it is pulling its power from the generator. Ms. Nemmers then pointed out that you will

see a big jump in water processed the next month following power outage because the GWTP operators are working to fix pumps and motors while the GWTP is not operating.

Surface Water Sampling

Ms. Nemmers presented the five locations sampled for surface water and stated that results are usually non-detect and well below the action level.

LHAAP-18/24, LHAAP-29 and LHAAP-47

Mr. Williams explained that a separate contractor, HDR, is responsible for developing the Proposed Plan (PP) for the preferred remedy followed by the ROD for LHAAP-18/24, LHAAP-29, and LHAAP-47. For LHAAP-18/24, the PP was finalized in February and the public meeting is after the RAB meeting. Mr. Williams encouraged everyone to stay stating that LHAAP-18/24 is considered to be the most contaminated site at Longhorn. Mr. Williams stated that the comment period goes through May 2, 2019. Mr. Williams stated that the expectation is to have the ROD drafted by September 2019. Ms. Zeiler then stated that no comments had been received yet.

Mr. Williams explained that the LHAAP-29 PP was finalized and the public meeting was held in December 2018. The ROD has been submitted to the regulators for review.

Mr. Williams stated that the LHAAP-47 Post-Screening Investigation data had been shared at the last RAB meeting in October 2018. Mr. Williams explained that many of the shallow wells are now dry and thus the plume has shrunk. In the intermediate wells, there are somewhat higher hits but overall the remedy remains the same. Therefore, Mr. Williams stated that the remedy remains the same and so a revision to the Draft Final ROD is being prepared for submittal to the regulators in August 2019.

Mr. Williams stated that in addition to the PP that is online you can also review the Final Revised Feasibility Study (FS) that details all of the remedial alternatives evaluated for LHAAP-18/24. The FS is in the administrative record.

Mr. Williams stated that some surface water sampling needed to be completed for LHAAP-47, which was completed in March 2019. The results are either non-detect or below the cleanup levels.

Next RAB Meeting Schedule and Closing Remarks

Ms. Zeiler then discussed the next meeting with the RAB members. It was decided that the next RAB Meeting will be held on **July 25, 2019,** with the **meeting starting at 6:00 pm CDT** at the Karnack Community Center.

Adjourn

Ms. VanDeventer made the motion to adjourn, and Mr. Paul Fortune seconded the motion. The meeting adjourned at 5:41 pm CDT.

April 2019 Meeting Attachments and Handouts:

- Meeting Agenda
- Color Copy of Bhate Presentation Slides
- Groundwater Treatment Plant (GWTP) – Processed Groundwater Volumes Handout
- Surface Water Sampling Handout
- Remedial Design Handout for LHAAP-17 and LHAAP-04

LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD
Karnack, Texas
(479) 635-0110

AGENDA

DATE:	Thursday, April 25, 2019
TIME:	5:00 – 6:00 PM
PLACE:	Karnack Community Center, Karnack, Texas

05:00 **Welcome and Introduction**

05:05 **Open Items {RMZ}**
- Purpose of the RAB Meeting
- RAB Administrative Issues
  - RAB Applicants
  - Minutes (October 2018 RAB Meeting)
- Ongoing Outreach/Website

05:15 **Defense Environmental Restoration Program (DERP) Update {Bhate}**
- LHAAP-03 Field Work Status Update
- LHAAP-04 Field Work Status Update
- Documents and Field Work Completed since last RAB
- Three Month Lookahead
- Groundwater Treatment Plant (GWTP) Update

05:45 **Other Defense Environmental Restoration Program (DERP) Update {RMZ}**
- LHAAP-18/24 Proposed Plan
- LHAAP-29 Record of Decision and Responsiveness Summary
- LHAAP-47 Pre-Screening Investigation (PSI) Update
- Five Year Review Update

05:55 **Next RAB Meeting Schedule and Closing Remarks {RMZ}**

Longhorn Army Ammunition Plant Quarterly Restoration Advisory Board Meeting

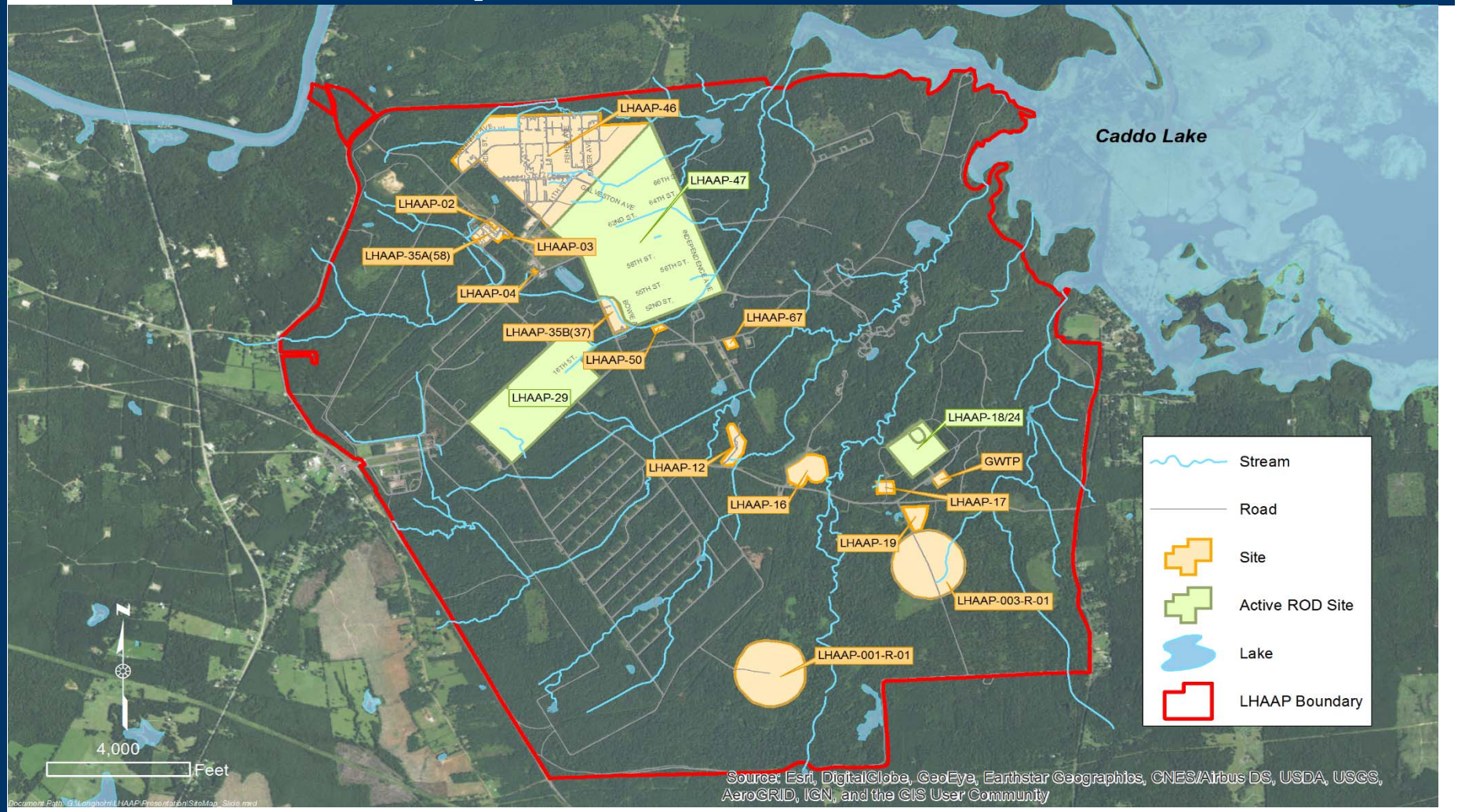
Karnack Community Center
April 25, 2019
5:00 PM CDT

APTIM

bhate

Restoration Advisory Board Meeting

Site Map



Restoration Advisory Board Meeting

Abbreviations and Acronyms

µg/L	Micrograms per liter
DERP	Defense Environmental Restoration Program
ECP	Environmental Condition of Property
EISB	Enhanced In-situ Bioremediation
FBR	Fluidized Bed Reactor
ft bgs	Feet below ground surface
GWTP	Groundwater Treatment Plant
ISB	In-Situ Bioremediation
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MNA	Monitored natural attenuation
PCL	Protective Concentration Level
PDI	Pre-Design Investigation
PSI	Pre-Screening Investigation
RAB	Restoration Advisory Board
RA(O)	Remedial Action Operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
TCEQ	Texas Commission on Environmental Quality
TRRP	Texas Risk Reduction Program
USEPA	U.S. Environmental Protection Agency
VOCs	Volatile organic compounds

Restoration Advisory Board Meeting

Agenda

05:00 Welcome and Introduction

05:05 Open Items {RMZ}

- Purpose of the Restoration Advisory Board (RAB) Meeting
- RAB Administrative Issues
  - RAB Applicants
  - Minutes (October 2018 RAB Meeting)
- Ongoing Outreach/Website

05:15 Defense Environmental Restoration Program (DERP) Update {Bhate}

- LHAAP-03 Field Work Status Update
- LHAAP-04 Field Work Status Update
- LHAAP-17 Remedial Design Update
- Documents and Field Work Completed Since Last RAB
- Three Month Look Ahead
- Groundwater Treatment Plant (GWTP) Update

05:45 Other DERP Update {AW}

- LHAAP-18/24 Proposed Plan
- LHAAP-29 Record of Decision (ROD) and Responsiveness Summary
- LHAAP-47 Pre-Screening Investigation (PSI) Update
- Five Year Review Update

05:55 Next RAB Meeting Schedule and Closing Remarks {RMZ}

Restoration Advisory Board Meeting

Purpose of the RAB Meeting

- Held every 3 months
- The mission of the Longhorn Army Ammunition Plant (LHAAP) RAB is to promote community awareness and obtain constructive community review and comments on environmental restoration activities at the former LHAAP

Restoration Advisory Board Meeting

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

Restoration Advisory Board Meeting

RAB Administrative Issues

- RAB Membership
- Discussion of October 2018 RAB Meeting minutes/motion to accept

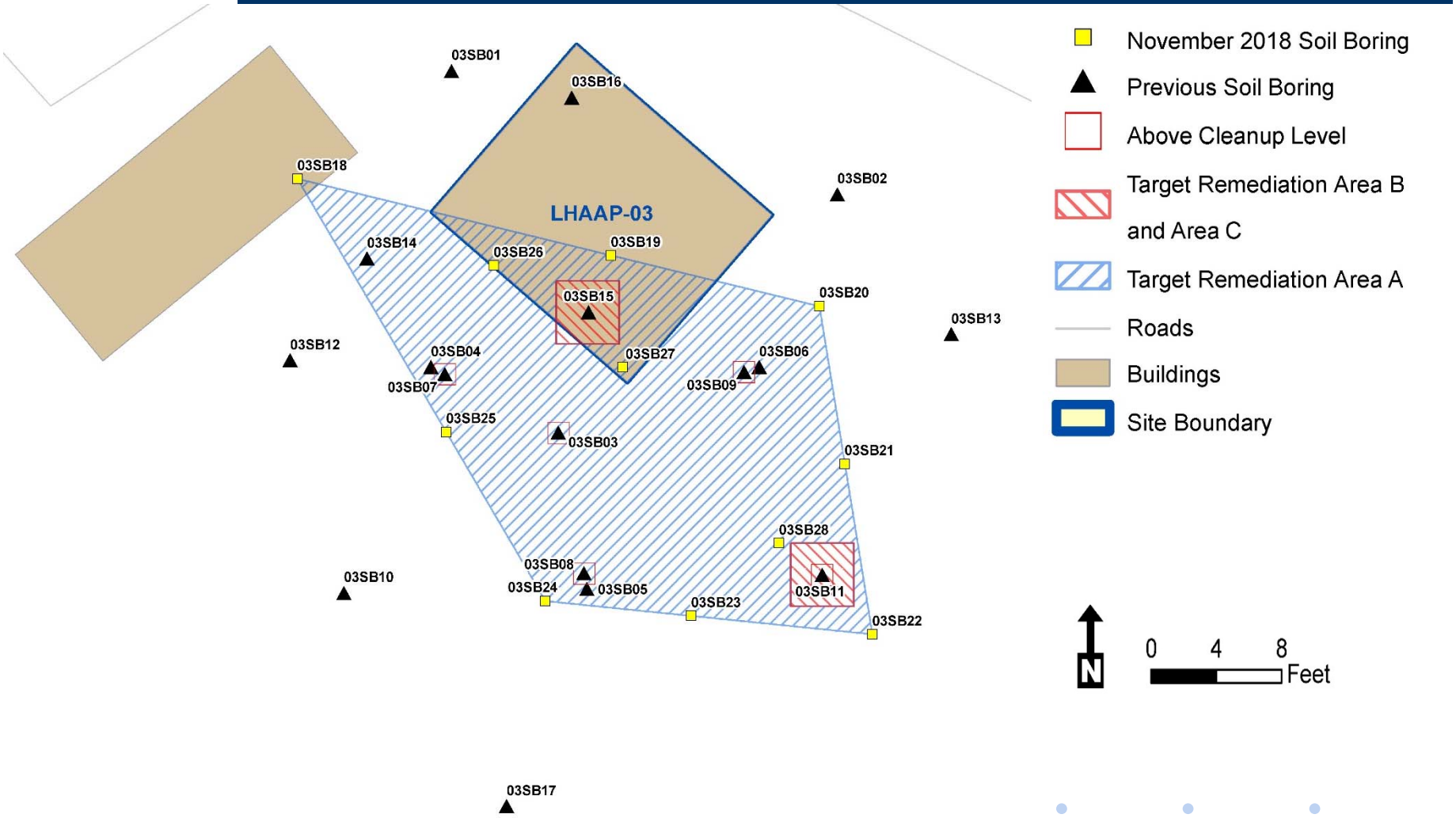
Restoration Advisory Board Meeting

LHAAP-03 Pre-Excavation Soil Sampling

- **Site Background**
  - LHAAP-03 is the site of a former Waste Collection Pad for the Building 722-P Paint Shop
  - Building 722-P and the surrounding structures have been demolished
  - Soil is contaminated with arsenic and lead at concentrations that could be a risk to groundwater and the ROD selected excavation and offsite disposal as the remedy
  - Groundwater is being addressed as part of site LHAAP-35A(58)
- **Recent Activities**
  - Pre-excavation soil samples were collected in late November 2018 from locations surrounding the excavation area defined in the ROD
  - Samples were used to better define the area where excavation is required
  - Soil sample data will be included in the Remedial Design (RD) and Remedial Action Work Plan (RAWP)
  - RD/RAWP is currently in preparation for submittal to the U.S. Environmental Protection Agency (USEPA) and Texas Commission on Environmental Quality (TCEQ)

Restoration Advisory Board Meeting

LHAAP-03 Pre-Excavation Soil Sampling



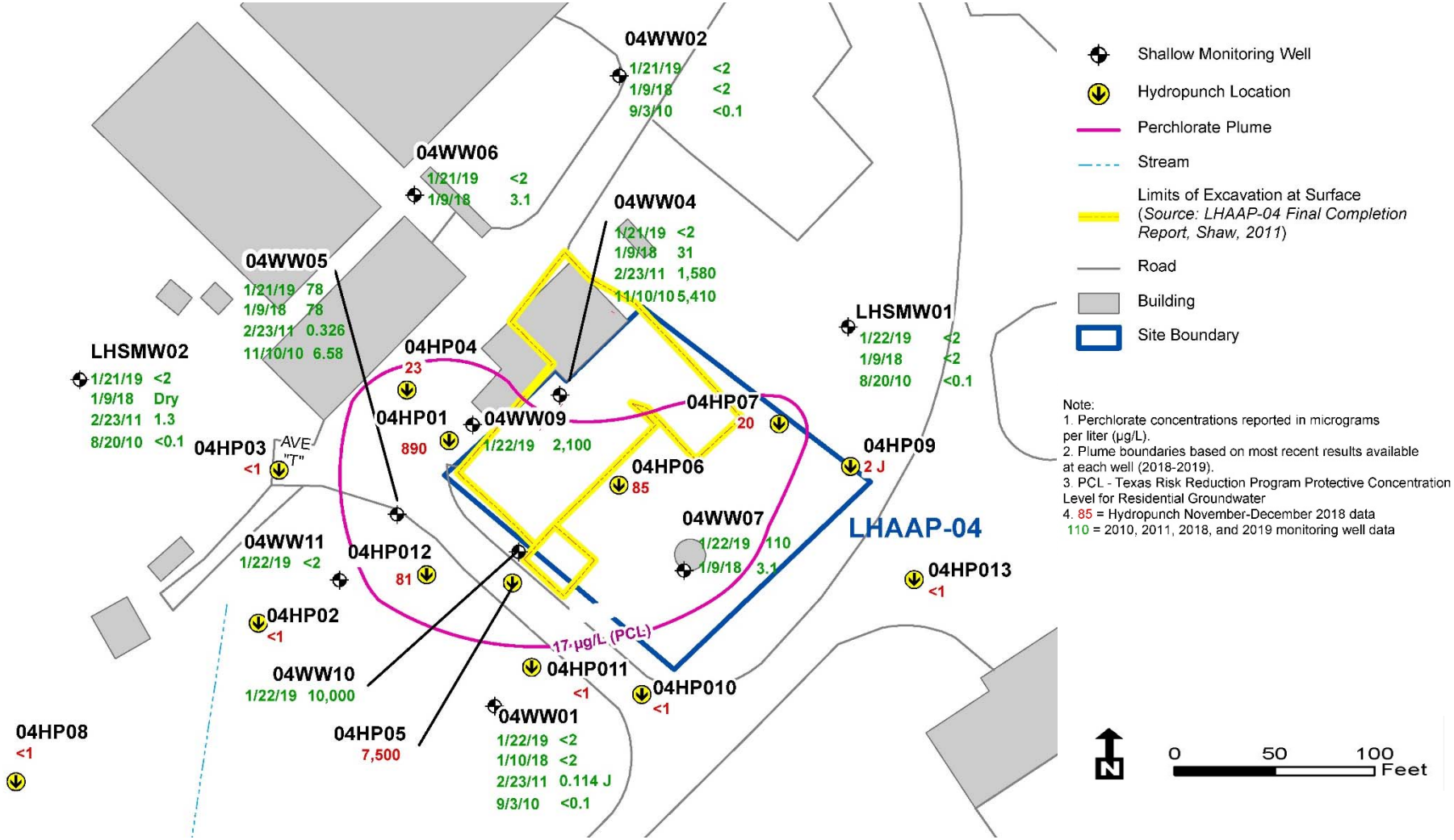
Restoration Advisory Board Meeting

LHAAP-04 Remedial Design

- **Site Background**
  - LHAAP-04 is the site of the former Pilot Wastewater Treatment Plant, located near the former Fire Station
  - Demolition of the structures and disposal of associated wastes was conducted in 1997
  - Soil contaminated with mercury and perchlorate was excavated in 2009
  - The ROD published in October 2016 selected In-Situ Bioremediation (ISB), Long-Term Monitoring, and Land Use Controls (LUCs) as the remedy for groundwater
- **Recent Activities**
  - Groundwater sampling in January 2018 revealed that the groundwater plume may have migrated since the previous sampling in 2010-2011
  - Additional direct-push groundwater sampling was performed in November-December 2019 and additional monitoring wells were installed in January 2019
  - January 2019 sampling of the new and existing wells confirmed that the plume had migrated slightly to the southwest, but is still adequately delineated

Restoration Advisory Board Meeting

LHAAP-04 2010-2019 Perchlorate Data



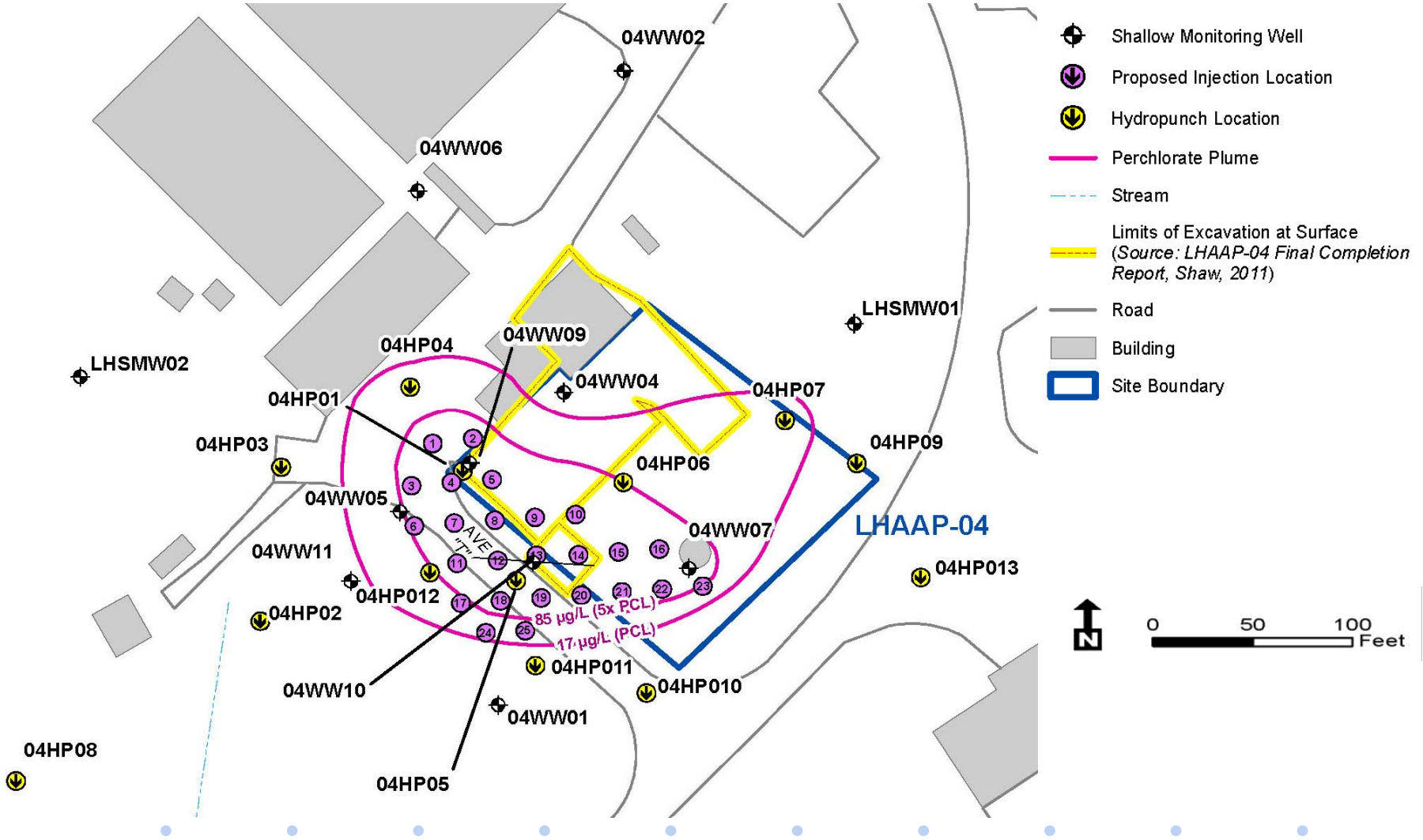
Restoration Advisory Board Meeting

LHAAP-04 Remedial Design

- **Remedial Design**
  - ISB will be implemented for the hot-spot defined as 5 times the Texas Risk Reduction Program (TRRP) Protective Concentration Level (PCL) for Residential Groundwater (17 micrograms per liter [µg/L])
  - 25 direct push injection locations will be used to inject emulsified vegetable oil (EVO)
  - Each location will receive approximately 15 gallons of EVO, 6 gallons of nutrients, and 1,463 gallons of water to treat a radius of approximately 10 feet around the location
  - Injection grid is spaced approximately 20-25 feet apart and shifted slightly to the south and west to account for future migration of the plume
- **Long-Term Monitoring and LUCs**
  - Baseline sampling of all site wells prior to injections, quarterly sampling for the first 2 years, semi-annual sampling for years 3 through 5, and annual sampling thereafter
  - LUCs include prohibition on use of groundwater (except for environmental monitoring), restriction to non-residential land use, and maintenance of remediation and monitoring systems
  - LUCs will remain in place until the concentration of perchlorate allows for unrestricted use and unlimited exposure

Restoration Advisory Board Meeting

LHAAP-04 Injection Plan



Restoration Advisory Board Meeting

LHAAP-17 Remedial Design

- **Site Background**
  - **LHAAP-17 is the site of the former Burning Ground No. 2/Flashing Ground used from 1959 to 1980 for burning of bulk TNT, photo flash powder, and reject material from Universal Match Corporation**
  - **Waste material was reportedly removed from the burning trenches in 1984**
  - **Contaminants include explosives and metals in soil, and perchlorate and chlorinated solvents in groundwater**
  - **The ROD published in August 2016 selected Groundwater Extraction, Monitored Natural Attenuation (MNA), Soil Excavation, Long-Term Monitoring, and LUCs as the remedy**
- **Recent Activities**
  - **Pre-Design Investigation (PDI) (aquifer pumping test and soil and groundwater sampling) conducted in January 2018**
  - **Groundwater sampling to assess current plume conditions**
  - **Soil sampling refined the extent of the soil contamination requiring excavation**
  - **Aquifer pumping test provided design basis for the groundwater extraction system design**

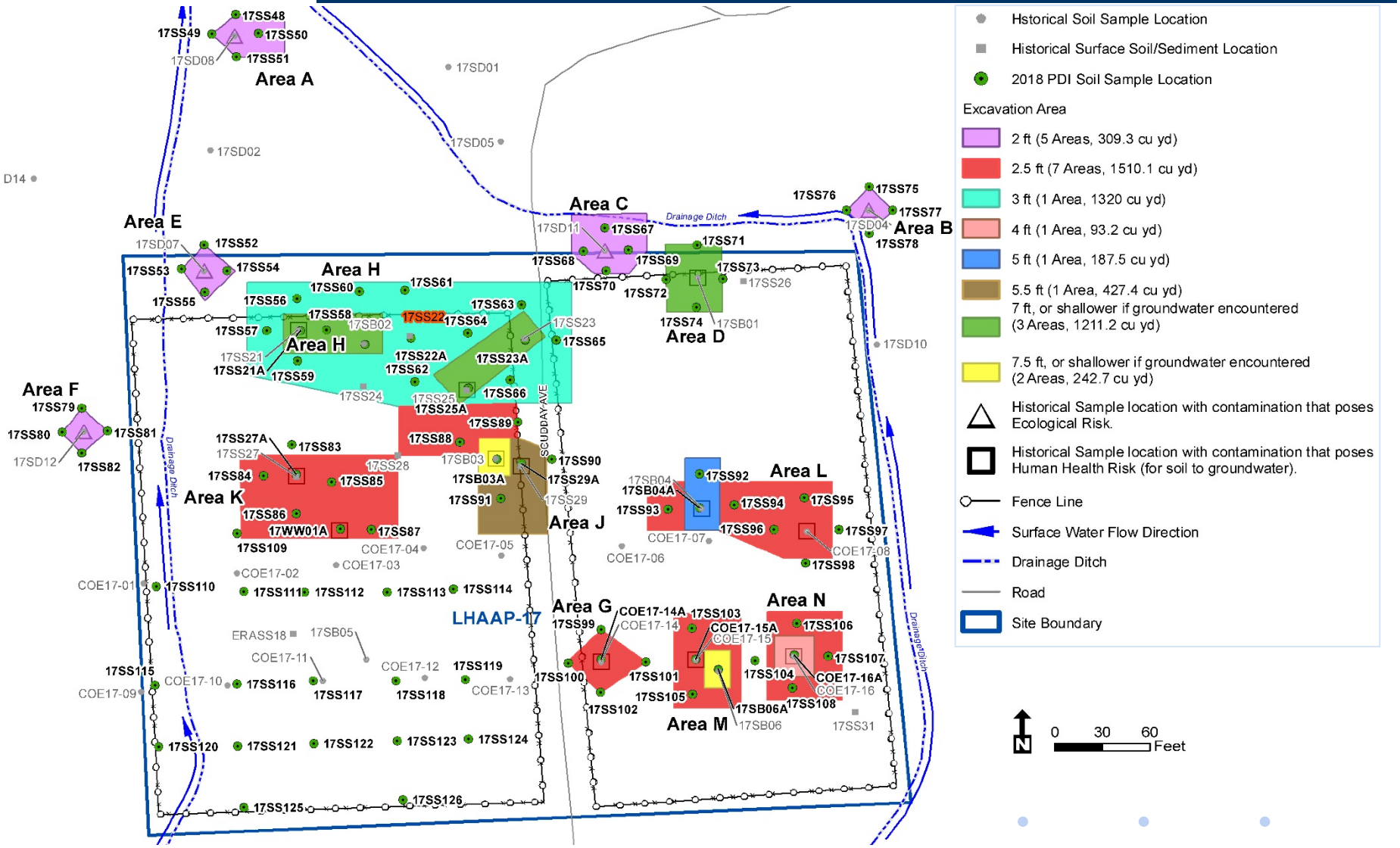
Restoration Advisory Board Meeting

LHAAP-17 Remedial Design

- **Remedial Design**
  - Approximately 5,300 in-place cubic yards of soil will be excavated based on the previous soil sampling data and transported to an offsite licensed disposal facility
  - Excavation will be backfilled with clean soil once sampling confirms contaminated soil has been removed
  - Groundwater extraction will be conducted for 18 months in up to three wells to reduce perchlorate concentrations to less than 20,000 µg/L
  - MNA will be the remedy for chlorinated solvents and perchlorate in groundwater unless perchlorate remains above 20,000 µg/L
- **Long-Term Monitoring and LUCs**
  - Extraction: Baseline sampling prior to extraction, monthly sampling for first 6 months of extraction, quarterly sampling for last 12 months of extraction
  - MNA: quarterly sampling for the first 2 years, semi-annual sampling for years 3 through 5, and annual sampling thereafter
  - LUCs include prohibiting use of groundwater (except for environmental monitoring), restricting land use to non-residential, and maintaining remediation/monitoring systems
  - LUCs will remain in place until the concentration of perchlorate allows for unrestricted use and unlimited exposure

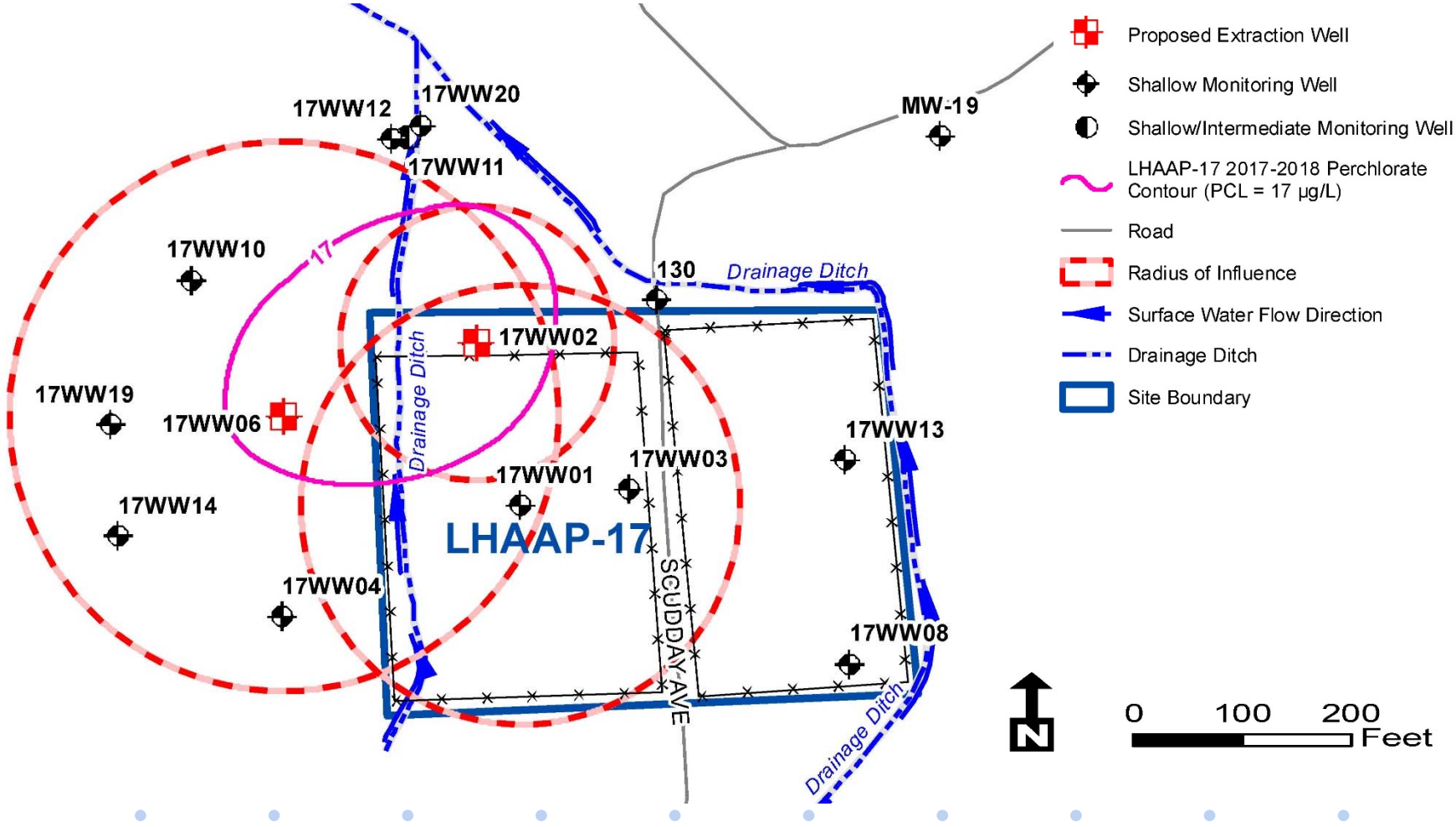
Restoration Advisory Board Meeting

LHAAP-17 Soil Excavation Areas



Restoration Advisory Board Meeting

LHAAP-17 Groundwater Extraction



Restoration Advisory Board Meeting

Completed Field Work Since Last RAB Meeting

Site	Activity
LHAAP-03	Supplemental Soil Sampling – November 2018
LHAAP-04	Supplemental Groundwater Sampling – November 2018 to January 2019
LHAAP-12	Remedial Action Operation (RA(O)) Sampling – December 2018
LHAAP-16	Annual Compliance Sampling – February 2019
LHAAP-37	RA(O) Sampling – November 2018, February 2019
LHAAP-46	RA(O) Sampling – February 2019
LHAAP-50	RA(O) Sampling – November 2018
LHAAP-58	RA(O) Sampling –December 2018, March 2019
LHAAP-67	RA(O) Sampling – October/November 2018
LHAAP-001-R	Groundwater Sampling – November 2018
LHAAP-001-R and LHAAP-003-R	Annual LUC Report-Year 1
GWTP	Replaced and disposed of ion exchange vessels (used to polish groundwater for perchlorate)
LHAAP-18/24	RA(O) Sampling – December 2018

Restoration Advisory Board Meeting

Documents in Process

Site	Document
LHAAP-03	Remedial Design and Remedial Action Work Plan
LHAAP-12	Annual RA(O) Report
GWTP	Quarterly Evaluation 4th Quarter (October - December 2018) Quarterly Evaluation 1st Quarter (January – March 2019)

Restoration Advisory Board Meeting

3 Month Look Ahead - Field Work

Site	Activity
LHAAP-03	Complete soil excavation
LHAAP-04	Complete ISB injections
LHAAP-16	Complete well installations and ISB injections
LHAAP-17	Complete soil excavation and extraction system installation
LHAAP-37	RA(O) Sampling – May 2019
LHAAP-50	RA(O) Sampling – May 2019
LHAAP-58	RA(O) Sampling – June 2019
LHAAP-67	RA(O) Sampling – May 2019
LHAAP-18/24	RA(O) Sampling – June 2019

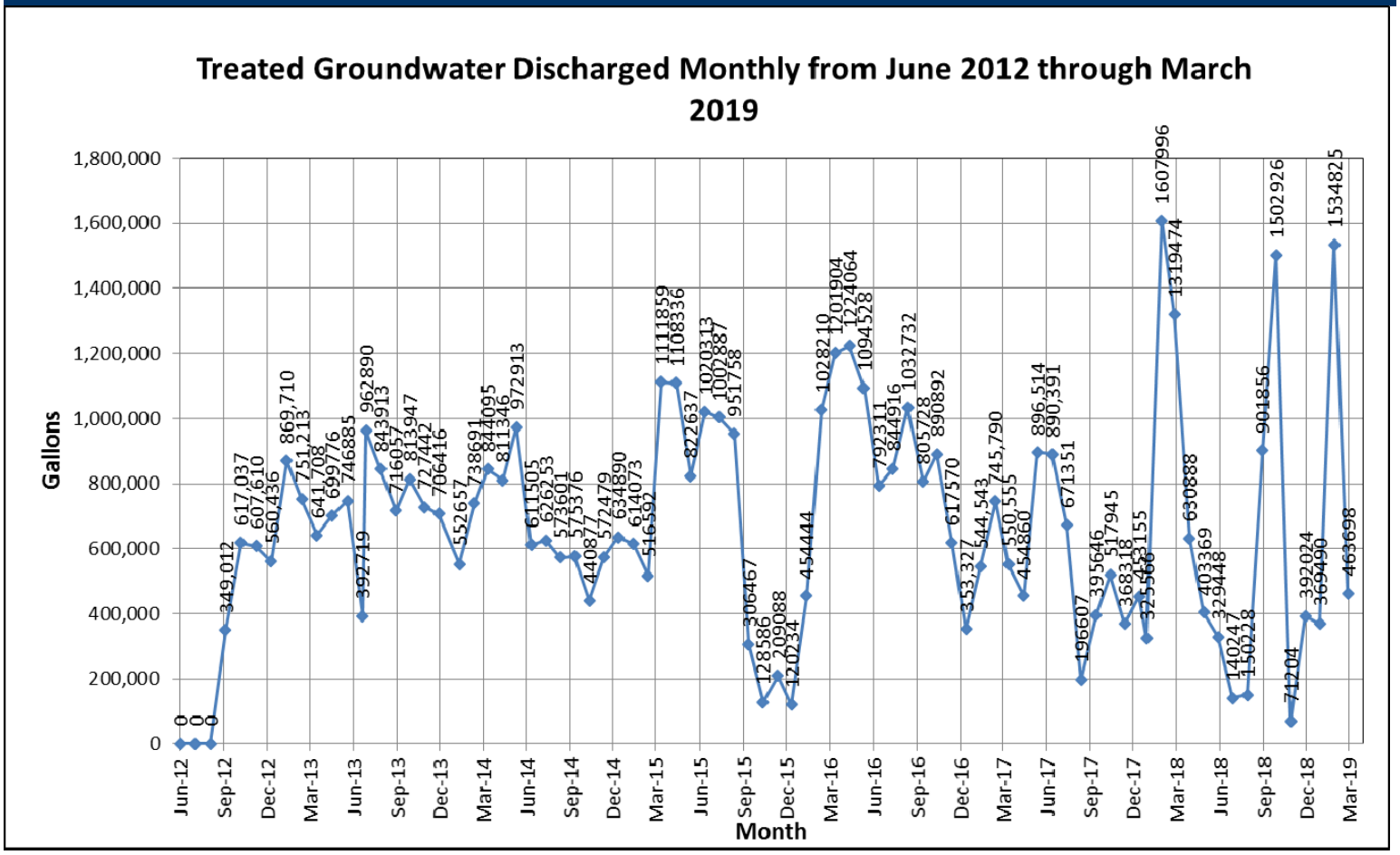
Restoration Advisory Board Meeting

3 Month Look Ahead - Documents

Site	Document
LHAAP-03	Remedial Design and Remedial Action Work Plan
LHAAP-12	2018 RA(O) Report
GWTP, LHAAP-16, and LHAAP-18/24	Quarterly Evaluation Report: Fourth Quarter (October – December) 2018 Quarterly Evaluation Report: First Quarter (January – March 2019)

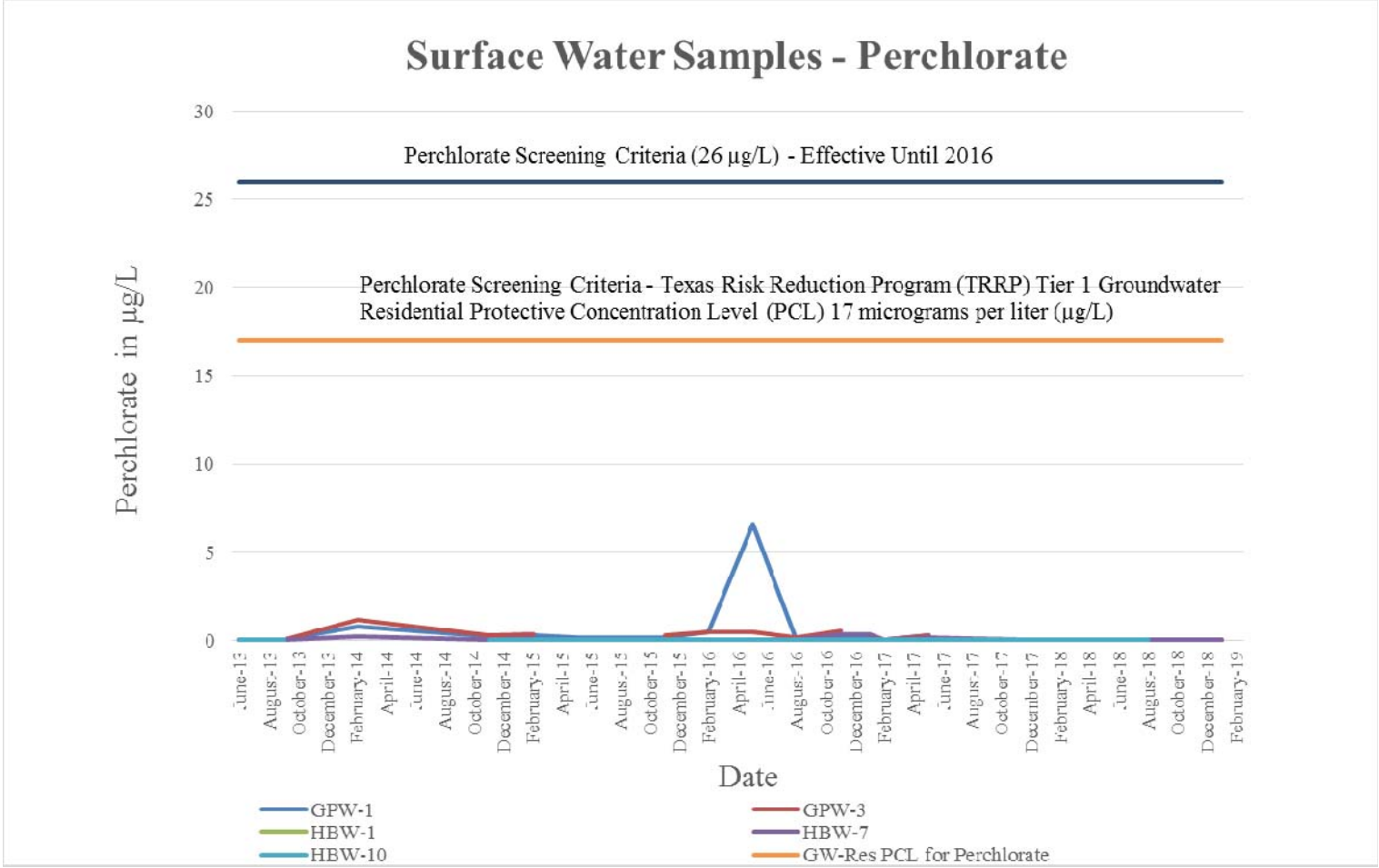
Restoration Advisory Board Meeting

GWTP Update



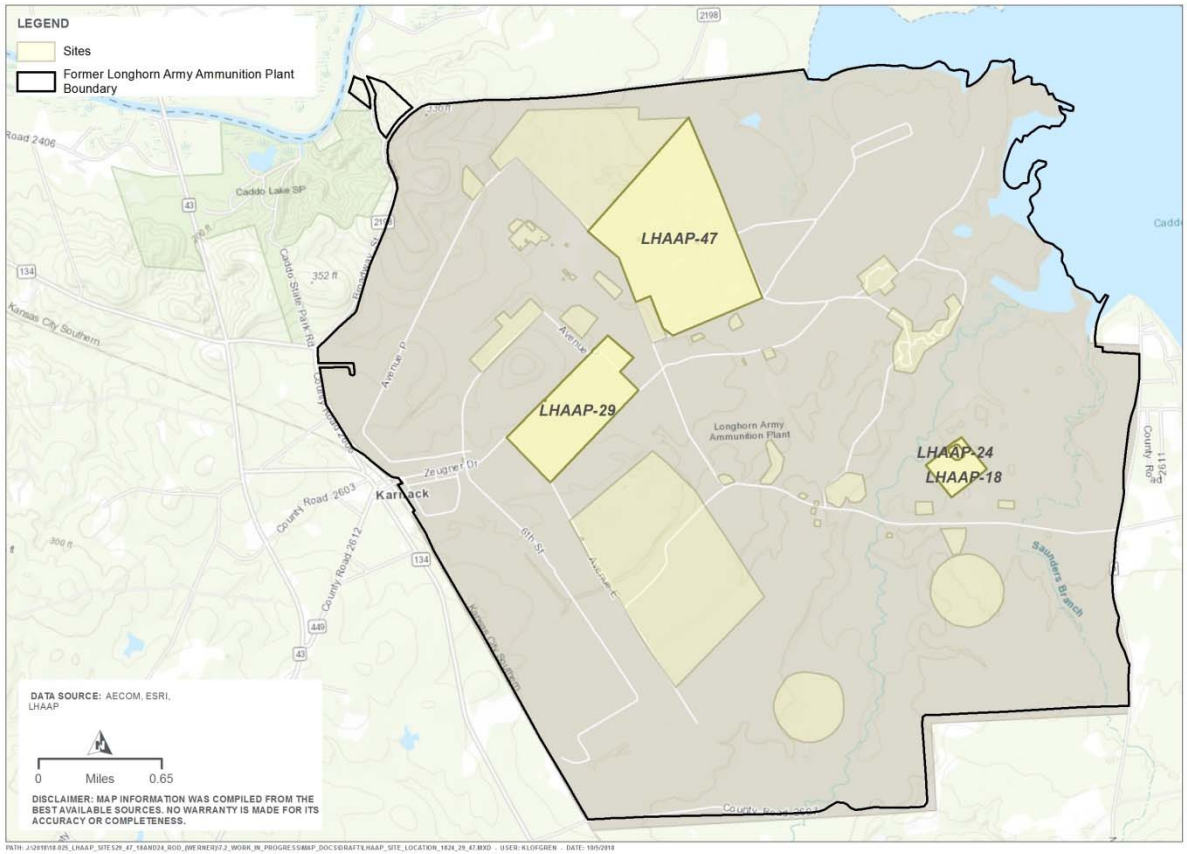
Restoration Advisory Board Meeting

Surface Water Sample Results



Restoration Advisory Board Meeting

LHAAP-18/24, 29, 47 Status Update



Restoration Advisory Board Meeting

LHAAP-18/24, 29 & 47 Document Status

- **LHAAP-18/24**
  - **Proposed Plan finalized February 2019**
  - **Public meeting April 25, 2019, 6:00pm – 7:30pm**
  - **Public comment period April 2 to May 2, 2019**
  - **Draft Record of Decision submittal planned for September 2019**
- **LHAAP-29**
  - **Proposed Plan finalized November 2018 and public meeting was held December 6, 2018.**
  - **Draft Record of Decision submittal planned for May 2019**
- **LHAAP-47**
  - **Post Screening Investigation Report finalized April 2019**
  - **Revised Draft Final Record of Decision submittal planned for August 2019**

Restoration Advisory Board Meeting

Feasibility Study for LHAAP-18/24

- LHAAP-18/24
  - Final Revised Feasibility Study located in the Administrative Record, Volume 1, 2017, Bate Stamp 00692951 - 00731961

Administrative Record located on the Longhorn environmental website at www.longhornaap.com

Restoration Advisory Board Meeting

LHAAP-47 Field Work Update

- **Work Completed**
  - **Collected 4 surface water samples March 2019**



Restoration Advisory Board Meeting

Next RAB Meeting Schedule & Closing Remarks

- Schedule July 2019 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 discharged.

Processed Water Discharged 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

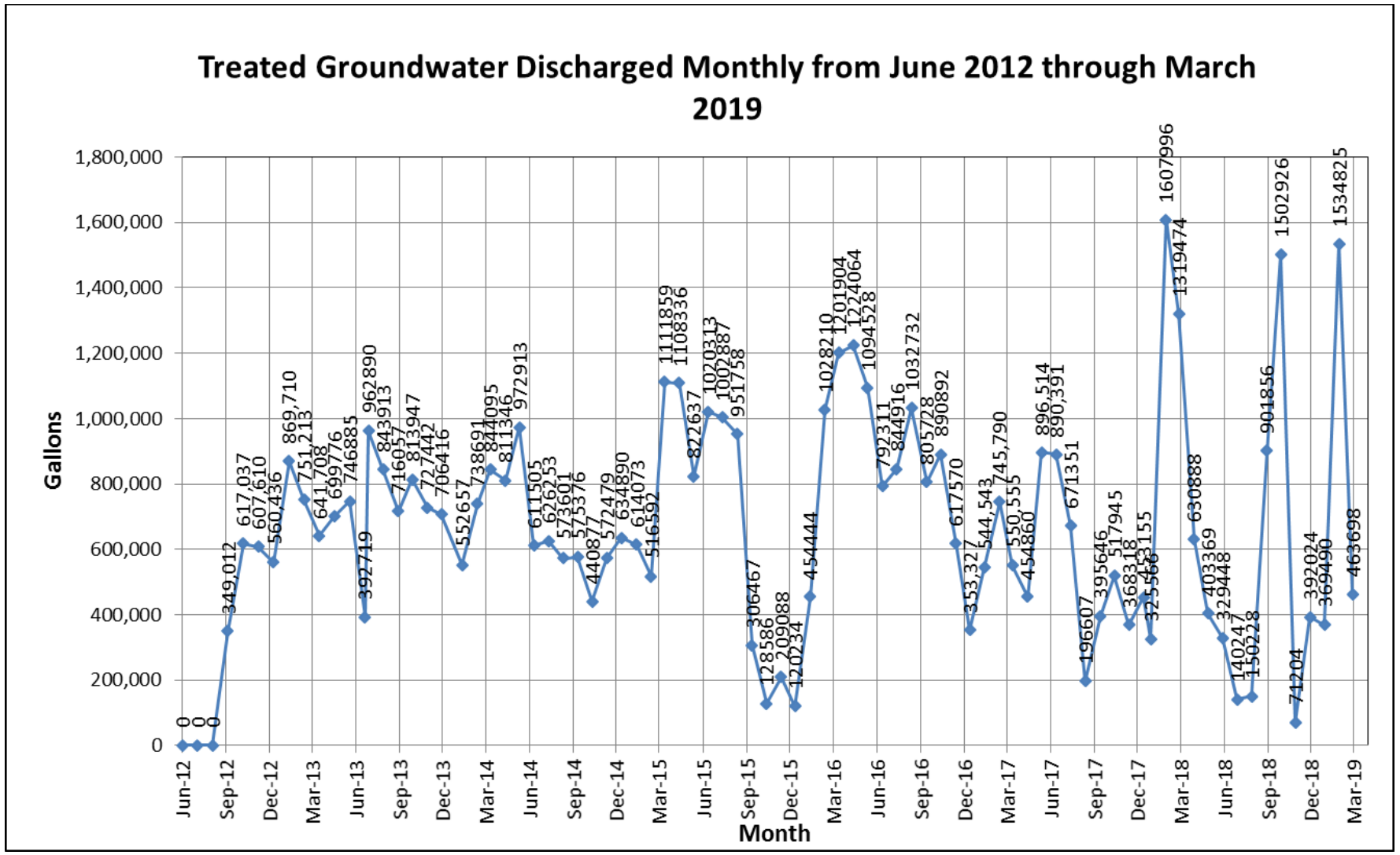
Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728

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	Jul - 18	Aug-18	Sep-18
517,945	368,318	453,155	325,566	1,607,996	1,319,474	630,888	403,369	329,448	140,247	150,228	901,856

Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
1,502,926	71,204	392,024	369,490	1,534,825	463,698

*Indicates Estimate


Treated Groundwater Discharged Monthly from June 2012 through March 2019
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
Sep-12
Dec-12
Mar-13
Jun-13
Sep-13
Dec-13
Mar-14
Jun-14
Sep-14
Dec-14
Mar-15
Jun-15
Sep-15
Dec-15
Mar-16
Jun-16
Sep-16
Dec-16
Mar-17
Jun-17
Sep-17
Dec-17
Mar-18
Jun-18
Sep-18
Dec-18
Mar-19
0
0
0
349,012
617,037
607,610
560,436
869,710
751,213
641,708
699776
746885
392719
962890
843913
716057
813947
72,7442
706416
552657
738691
844095
811346
972913
611505
626253
573601
575376
440877
572479
634890
614073
516592
1111859
1108336
822637
1020313
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
140247
150228
901856
1502926
71204
392024
369490
1534825
463698

Water Discharge Location and Volume (Gallons)

Month	Total Combined to Harrison Bayou	LHAAP-18/24 Sprinklers	GWTP To 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
Jun-18	193,669	0	135,779	0	0
Jul -18	0	0	140,247	0	0
Aug -18	49,409	0	100,819	0	0
Sep-18	585,397	0	316,459	524,484	0
Oct-18	1,409,106	0	93,820	1,016,285	0
Nov-18	71,204	0	0	0	0
Dec-18	392,024	0	0	0	0
Jan-19	369,490	0	0	369,490	0
Feb-19	1,534,825	0	0	1,326,485	0
Mar-19	463,698	0	0	83,250	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

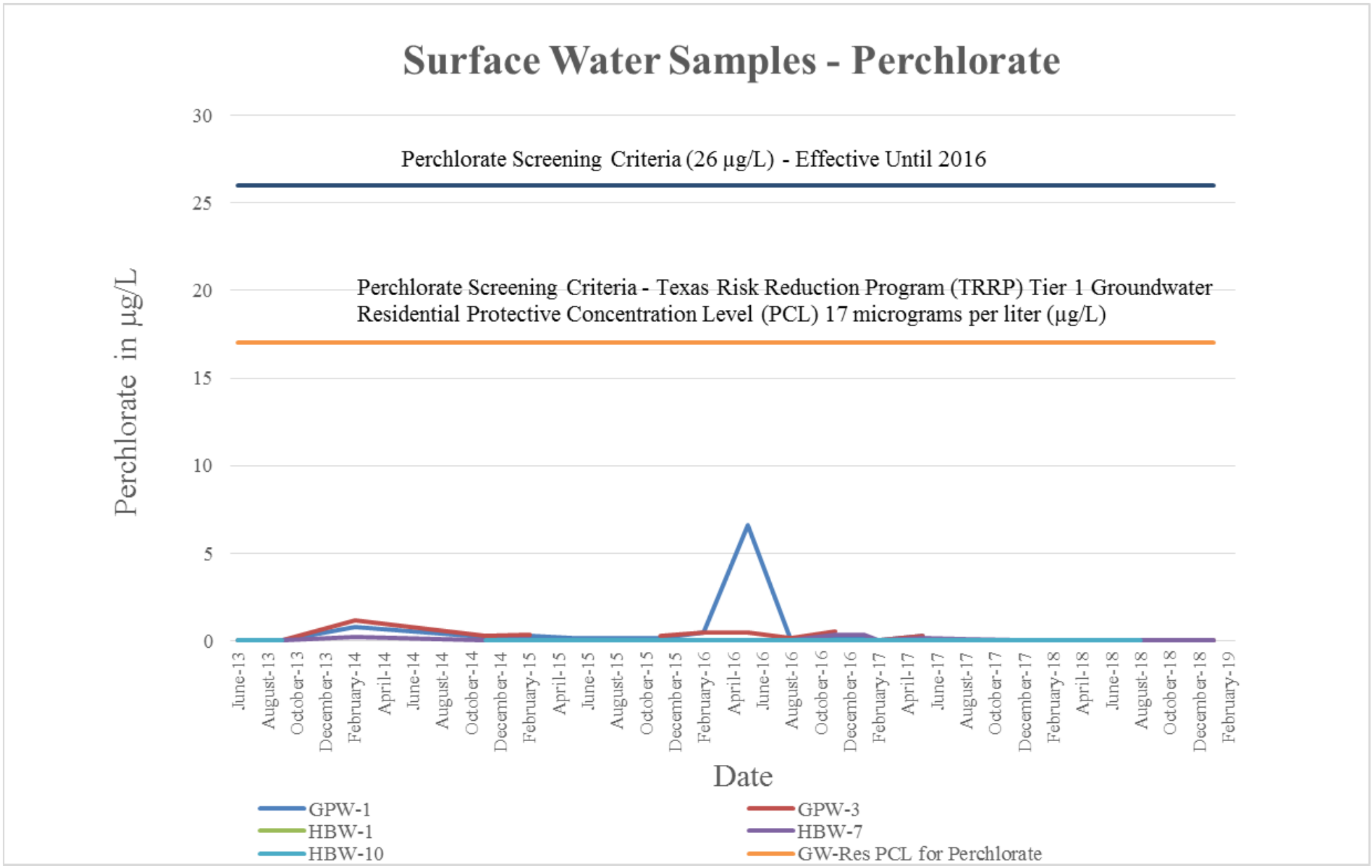
Quarter	2nd	3rd	4th	1st	2nd	3nd	4th	1st	2nd	3rd	4th
Creek Sample ID	**Jun 2013**	**Sept 2013**	**Dec 2013**	**Feb 2014**	**May 2014**	**Aug 2014**	**Nov 2014**	**Feb 2015**	**May 2015**	**Aug 2015**	**Nov 2015**
GPW-1	dry	<0.2 U	dry	0.766	dry	dry	0.244 J	0.311 J	0.156J	dry	0.142 J
GPW-3	dry	<0.2 U	dry	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	3rd
Creek Sample ID	**Feb 2016**	**May 2016**	**Aug 2016**	**Nov 2016**	**Feb 2017**	**May 2017**	**Aug 2017**	**Dec 2017**	**Mar 2018**	**June 2018**	**August 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	<2.0 U
GPW-3	0.474	0.457	0.141	0.563	<1 U	0.274	dry	<4.0 U	<4.0 U	dry	<2.0 U
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	<2.0 U
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	<2.0 U
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	<2.0 U

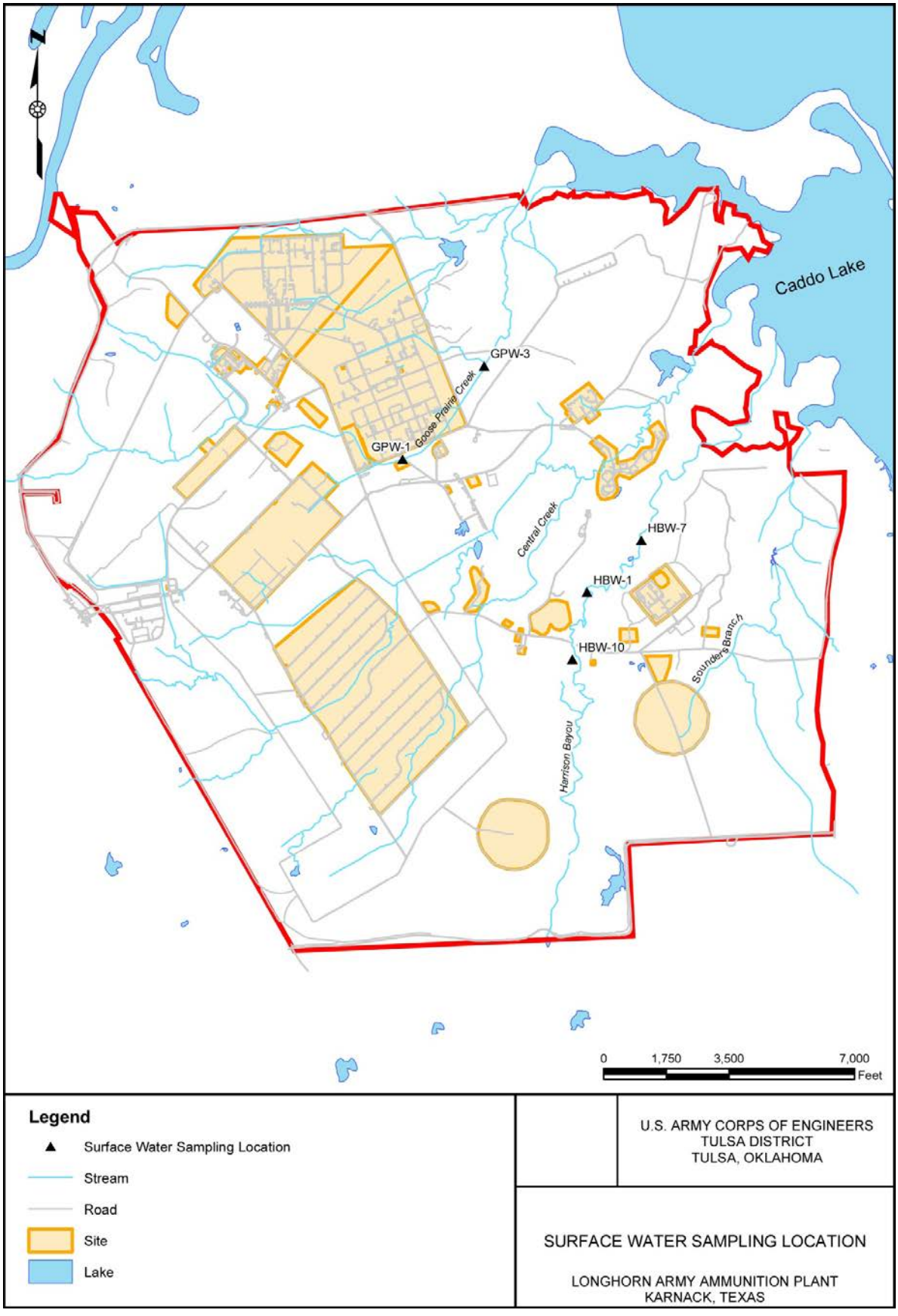
NS – not sampled U – non-detect J – Estimated Dry – no surface water

Quarter	4th	1st
Creek Sample ID	Oct 2018	Jan 2019
GPW-1	<2.0 U	<2.0 U
GPW-3	<2.0 U	<2.0 U
HBW-1	<2.0 U	<2.0 U
HBW-7	<2.0 U	<2.0 U
HBW-10	<2.0 U	<2.0 U

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
June-13
August-13
October-13
December-13
February-14
April-14
June-14
August-14
October-14
December-14
February-15
April-15
June-15
August-15
October-15
December-15
February-16
April-16
June-16
August-16
October-16
December-16
February-17
April-17
June-17
August-17
October-17
December-17
February-18
April-18
June-18
August-18
October-18
December-18
February-19
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

July 30, 2019

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency, Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270-2102

Re: Draft Final Addendum Post Screening Investigation Report, LHAAP-47, Longhorn Army Ammunition Plant, Karnack, Texas, June 2019

Dear Mr. Mayer,

Two hard copies (HC) and two compact discs (CDs) of the above-referenced document are being transmitted to you for your records. The document includes revisions based upon the Environmental Protection Agency's (EPA) comments on the Draft received July 12, 2019. In accordance with the Federal Facility Agreement, this Draft Final will be considered Final after 30 days without further comment. Response to comments on the Draft version of the document are included within this Draft Final.

The document was prepared by HDR Environmental, Operations and Construction, Inc. (HDR) on behalf of the Army as part of HDR's contract for the facility. I ask that Phil Werner, HDR'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 (1 hard copy, 1 CD)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy, 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK
A. Sherman, USAEC, San Antonio, TX (1 CD)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

July 30, 2019

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 Addendum Post Screening Investigation Report, LHAAP-47, Longhorn Army Ammunition Plant, Karnack, Texas, June 2019

Dear Ms. Palmie,

One hard copy (HC) and one compact disc (CD) of the above-referenced document are being transmitted to you for your records. The document includes revisions based upon the Environmental Protection Agency's (EPA) comments on the Draft received July 12, 2019. In accordance with the Federal Facility Agreement, this Draft Final will be considered Final after 30 days without further comment. Response to comments on the Draft version of the document are included within this Draft Final.

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Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
R. Mayer, USEPA Region 6, Dallas, TX (2 hard copies, 2 CDs)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy, 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK
A. Sherman, USAEC, San Antonio, TX (1 CD)

Comments on:

Draft Addendum PSI Report for LHAAP-47, Plant 3 Area, Solid Rocket Motor Fuel Production, Longhorn Army Ammunition Plant, Karnack, Harrison County, Texas Submitted: July 1, 2019

Submitted by: USACE / HDR
Responded by: Mr. Rich Mayer
U.S. Environmental Protection Agency, Region 6
Date Responded: 12 July 2019

1. **Respondent concurs (C) or does not concur (D)**
2. **Commenter agrees (A) or does not agree (D) with response.**

Number	Section/Page	Paragraph/ Line	Comment	C,D	Response	A,D
Reviewer #1:						
1	Figure 2-1		Please provide a larger sized Figure. The current Figure is difficult to see the wells, surface water sampling locations and to read the legend.	C	The paper size was increased to 11 x 17 and the figure inserted and sized accordingly.	
2	Table 2-1		The dissolved oxygen levels presented are not correct. It is impossible for the DO levels to be as high as shown, except possibly for the 14.20 mg/L result for SW4. Please correct or explain (typo errors, bad DO membrane, etc.) these high levels shown. EPA does like the info presented and formats for tables 2-1, 2-2, and 3-1.	C	The values entered into Table 2-1 were decimal point typos and have been corrected. Also, HDR appreciates the compliment.	
3	Table 3-1		The column which indicates the contaminants compliance levels for surface water should not be stated as screening levels. Please correct.	C	Text has been revised in Table 3-1 to state, “Compliance Levels”.	

00936422

Draft Final

Addendum Post-Screening Investigation Report

for LHAAP-47, Plant 3 Area,
Solid Rocket Motor Fuel Production
Longhorn Army Ammunition Plant
Karnack, Texas

July 2019

Prepared For:

U.S. Army Corps of Engineers – Tulsa District

Prepared By:

HDR
2650 Park Tower Drive, Suite 400
Vienna, VA 22180

Contract No. W912BV-15-D-0014
Task Order No. W912BV18F0023

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Draft Final

ADDENDUM

POST-SCREENING INVESTIGATION REPORT

FOR

LHAAP-47, PLANT 3 AREA,

SOLID ROCKET MOTOR FUEL PRODUCTION

LONGHORN ARMY AMMUNITION PLANT

KARNACK, TEXAS

Prepared For:

U.S. Army Corp of Engineers Tulsa District

Prepared By:

HDR, Inc.
2650 Park Tower Drive, Suite 400
Vienna, VA 22180

Contract No. W912BV-15-D-0014
Task Order No. W912BV18F0023

July 2019

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Figures

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Appendices

Appendix A – Surface Water Raw Analytical Data Package
Appendix B – Data Validation Report

Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
btoc	below top of casing
ft	feet
$^{GW}GW_{Ing}$	Tier 1 residential groundwater
GPS	Global Positioning System
IWWP	Installation Wide Work Plan
J	estimated value
LHAAP	Longhorn Army Ammunition Plant
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
MSL	above mean sea level
mV	millivolt
ND	not detected
NTU	nephelometric turbidity units
PCL	Protective Concentration Level
PSI	Post Screening Investigation
ROD	Record of Decision
SDWA	Safe Drinking Water Act
TCEQ	Texas Commission on Environmental Quality
TRRP	Texas Risk Reduction Program
USEPA	U.S. Environmental Protection Agency
ug/L	micrograms per liter
µS/cm	microsiemens per centimeter
VOC	volatile organic compound
VRS	Virtual Reference Station
WP	Work Plan
°C	degrees Celsius

1 Introduction

This addendum to the Post-Screening Investigation (PSI) Report has been prepared for the former Longhorn Army Ammunition Plant (LHAAP) site LHAAP-47 (Plant 3 Area), located in Karnack, Texas. The purpose of this addendum is to summarize the results of the surface water sample collection and analysis performed at LHAAP-47 in March and April 2019. Due to drought conditions and the lack of surface water in Goose Prairie Creek and its tributaries during the summer of 2018 when the PSI field investigation was conducted, surface water sampling could not be performed. The decision was subsequently made to perform this activity when surface water was present and could be attributed to groundwater recharge and not overland flow from precipitation events.

This document describes the PSI activities completed at site LHAAP-47. The PSI effort was performed in accordance with the Installation Wide Work Plan (IWWP) (AECOM, 2014) and PSI Work Plan (WP) (AECOM, 2016). The IWWP and PSI WP were reviewed by and concurrence was obtained from the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency (USEPA).

The objective of the surface water sampling is to re-assess and update the LHAAP-47 groundwater contribution to surface water in Goose Prairie Creek. The addendum PSI data will be used to support revision of the Draft Final Record of Decision (ROD), as necessary.

2 Investigation Activities

This section presents information on the activities completed at LHAAP-47 to re-assess the current surface water conditions. The following provides a description of the activities completed to collect and analyze surface water samples from Goose Prairie Creek.

Surface water samples were collected on 7 March 2019, as part of the PSI surface water re-assessment. Four samples were collected at various locations in Goose Prairie Creek and its tributaries, as shown on **Figure 2-1**. The surface water samples were analyzed for volatile organic compounds (VOCs) and perchlorate to assess whether contaminated groundwater was impacting surface water. Additionally, water quality parameters were collected at each sampling location using an YSI 556 water quality meter and a Hanna Turbidimeter. **Table 2-1** presents the water quality parameters collected at each surface water location.

To evaluate whether groundwater was contributing to surface water, water levels were gauged in nearby wells, while creek bottom elevations were collected at each sample location (as shown in **Table 2-2**). Water level measurements were collected in accordance with the procedures identified in the IWWP and PSI WPs from the up gradient wells.

Creek bottom elevations were collected using a Trimble R2 Global Positioning System (GPS) receiver receiving real-time corrections from a Virtual Reference Station (VRS) subscription. At each sample location, the R2 receiver, which was mounted on a 2-meter survey pole, was placed in the center of the creek. The survey pole was set up using a tripod and leveled properly. The field team then collected several points at each location, those with the highest accuracy metrics were used for the final creek bottom elevations. A second mobilization was conducted 25 April 2019 to revisit creek bottom elevations at sample location SW2 due to abnormal readings collected in March. It was determined that elevation readings were collected while the receiver was in “roving” mode, which did not fix an accurate elevation. The coordinate data collected from the other three surface water sample locations were confirmed they were collected in “fixed” mode and did not need reassessment.

Prior to collecting GPS data, the system was verified to be working properly by collecting a coordinate on an established survey monument (monument C-22) near the sampling areas. The coordinate data comparison for this verification is shown in **Table 2-2**. The location of the C-22 monument is shown on **Figure 2-1**.

Table 2-1. Water Quality Parameters

Sample Location	Turbidity (NTUs)	Temperature (°C)	Conductivity (µS/cm)	pH	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Water Clarity	Estimated Channel Depth (feet)	Estimated Channel Width (feet)	Estimated Water Depth (feet)	Cut Bank
SW1	15.5	7.85	257	7.95	8.340	97.2	cloudy	6	10	1	no
SW2	14.3	8.47	86	7.67	4.532	96.9	cloudy	5	8	3	no
SW3	14.3	9.32	82	6.61	2.230	137.9	clear	8	12	0.3	no
SW4	14.6	8.92	81	7.35	1.420	90.1	cloudy	5	8	2	yes

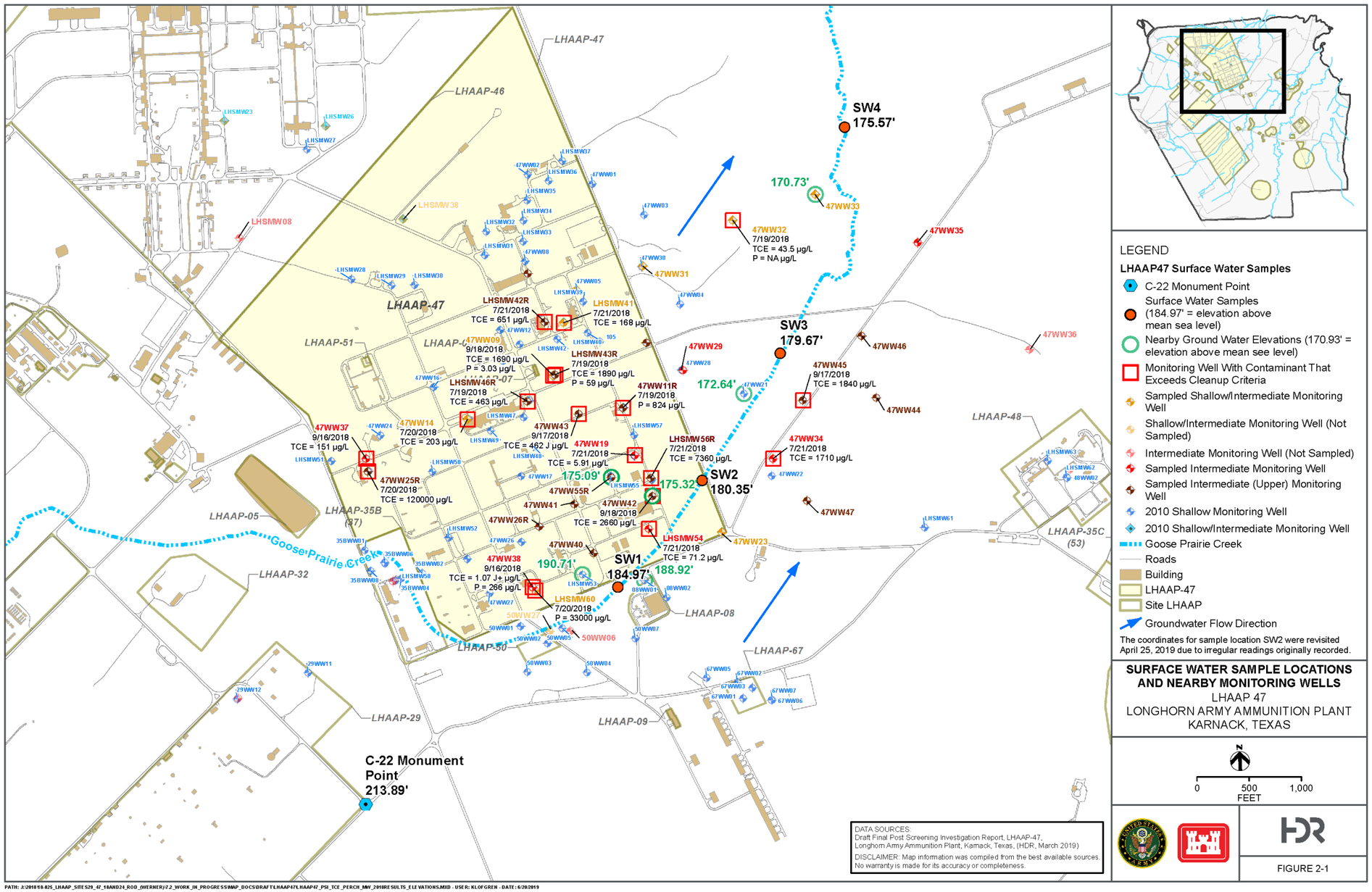
NTUs - nephelometric turbidity units
°C – degrees Celsius
µS/cm - microsiemens per centimeter
mg/L – milligrams per liter
mV – millivolt

Table 2-2. Sample and Well Survey Location Data

Location ID	Associated Sample Area	Creek Bottom Elevation (ft MSL)[2]	Groundwater Elevation (ft MSL)[2]	Groundwater Elevation Minus Creek Bottom Elevation[3]	Easting[1]	Northing[1]	Top of Casing Elevation (ft MSL)[2]	Depth to Groundwater (ft btoc)[2]
Monument Location Data								
C-22[1]	-	213.89	-	-	3307823.95	6955892.44	-	-
Collection Date: 3/07/2019	Surface Water Sample Location Data							
SW1	-	184.97	-	-	3310243.92	6957976.18	-	-
SW2	-	180.35*	-	-	3311050.55	6958996.49	-	-
SW3	-	179.67	-	-	3311800.52	6960219.95	-	-
SW4	-	175.57	-	-	3312417.66	6962387.87	-	-
Collection Date: 3/07/2019	Monitoring Well Location Data							
08WW01	SW1	-	188.92	3.95	3310498.19	6958043.02	199.31	10.39
LHSMW53	SW1	-	190.71	5.74	6958096.73	3309903.12	197.61	6.90
47WW42	SW2	-	175.32	-15.97	6958850.75	3310575.55	195.22	19.90
LHSMW55R	SW2	-	175.09	-16.20	6959029.23	3310180.19	198.76	23.67
47WW21	SW3	-	172.64	-7.03	6959832.47	3311452.33	187.59	14.95
47WW33	SW4	-	170.73	-4.84	6961743.00	3312137.00	181.58	10.85

1 - NAD_1983_StatePlane_Texas_North_Central_FIPS_4202_Feet
2 - North American Vertical Datum of 1988
FIPS: Federal Information Processing Standard
ft - feet
MSL - mean sea level
btoc - below top of casing
* - Elevation height recorded during 25 April 2019

Figure 2-1. Surface Water Sample Locations and Nearby Monitoring Wells



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3 Investigation Findings

This section presents sample results from the PSI surface water field investigation. The surface water results presented in this section have been compared to Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), where they exist. Where an MCL has not been promulgated, the Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Levels (PCL) ($^{GW}GW_{Ing}$) (TRRP Groundwater PCL) comparison levels were used. Surface water results are discussed in relation to these screening levels. The results of the sampling and analyses are discussed below.

General observations of the surface water conditions and creek morphology were recorded during sampling. Field activities were completed under sunny skies; the previous rain event had occurred three days prior to sample collection. In general, surface water was found to be cloudy with low laminar flow at locations with deeper water. In areas with shallow water, the water appeared clear with slightly more turbulent flow. Since sampling was performed post-winter, tree foliage was minimal and all sample locations were surrounded by heavy woods and dense branch cover. Creek bottoms were very sandy at all locations except SW2, which was very rocky. Samples were collected in one day; weather conditions were overcast, damp, and cool with no measurable precipitation.

Four surface water and one duplicate sample were collected and submitted to MicroBac Laboratories for perchlorate and VOC analyses. Perchlorate was detected at each surface water location at low concentrations, well below the TRRP Groundwater PCL value of 17 micrograms per liter (µg/L). Acetone was detected in three of the four samples collected, plus the duplicate sample. These values were qualified as estimated, with possible high bias (J+), due to acetone detections in the associated trip blanks. The detections, however, were well below the TRRP Groundwater PCL value of 22,000 µg/L. Trichloroethene was detected at one surface water sample location at an estimated value of 0.373 µg/L below the MCL. No other VOCs were detected in any of the surface water samples. A summary of the sample results are provided in **Table 3-1** presented below.

A comparison of the creek bottom elevations to the groundwater elevations identified that groundwater near surface water location SW1 was higher than the creek bottom and was likely contributing to surface water flow. Groundwater elevations at all other surface water locations were found to be lower than the creek bottom elevations.

Table 3-1. Surface Water Results

Chemical Abstracts Service Number	Chemical Name	Sample ID	SW1	DUP1	SW2	SW3	SW4
		Collection Date	03/07/2019				
		Compliance Levels (µg/L)					
SW6850-Perchlorate (µg/L)							
14797-73-0	Perchlorate	17(2)	0.542 J-	0.548	0.530	0.486	0.430
SW8260B-VOCs (µg/L)							
67-64-1	Acetone	22,000(2)	3.56 J+	3.76 J+	3.16 J+	3.65 J+	ND
75-35-4	1,1-Dichloroethene	7(1)	ND	ND	ND	ND	ND
107-06-2	1,2-Dichloroethane	5(1)	ND	ND	ND	ND	ND
67-66-3	Chloroform	80(1)	ND	ND	ND	ND	ND
156-59-2	cis-1,2-Dichloroethene	70(1)	ND	ND	ND	ND	ND
127-18-4	Tetrachloroethene	5(1)	ND	ND	ND	ND	ND
156-60-5	trans-1,2-Dichloroethene	100(1)	ND	ND	ND	ND	ND
79-01-6	Trichloroethene	5(1)	ND	ND	ND	0.373 J	ND
75-01-4	Vinyl chloride	2(1)	ND	ND	ND	ND	ND

ND = not detected
(1) = EPA MCL
(2) = TRRP Groundwater PCL
ug/L = micrograms per liter
J = estimated value
J+ = estimated value bias high
J- = estimated value bias low

4 References

AECOM, 2014, Final Installation-Wide Work Plan for Longhorn Army Ammunition Plant, Karnack, Texas, July.

AECOM, 2016, Draft Final Post-Screening Investigation Work Plan, LHAAP-47, Plant Area 3, Longhorn Army Ammunition Plant, Karnack, Texas, December.

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A

Surface Water Raw Analytical Data Package

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Microbac

Laboratory Report Number: L19030638

Lynn Lutz
HDR Environmental
HDR 9781 S. Meridian Blvd
Englweood, CO 80112

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Stephanie Mossburg – Team Chemist/Data Specialist
(740) 373-4071
Stephanie.Mossburg@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on March 25 2019

Leslie Bucina – Laboratory Manager

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 5.0

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00114989	I	3.0		1001915721210004575000785913246353	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	Yes

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Samples Received

Client ID	Laboratory ID	Date Collected	Date Received
SW1	L19030638-01	03/07/2019 11:30	03/09/2019 09:22
SW1 MS	L19030638-02	03/07/2019 11:30	03/09/2019 09:22
SW1 MSD	L19030638-03	03/07/2019 11:30	03/09/2019 09:22
SW2	L19030638-04	03/07/2019 12:30	03/09/2019 09:22
SW3	L19030638-05	03/07/2019 13:00	03/09/2019 09:22
SW4	L19030638-06	03/07/2019 14:45	03/09/2019 09:22
DUP01	L19030638-07	03/07/2019 10:00	03/09/2019 09:22
TB01	L19030638-08	03/07/2019 08:00	03/09/2019 09:22

Microbac REPORT L19030638
PREPARED FOR HDR Environmental
WORK ID:

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1.0 Summary Data

1.1 Narratives

Microbac Laboratories
Case Narrative

Login Number: L19030638
Department: General Chromatography
Analyst: John W. Richards Jr.

METHOD

Analysis SW-846 6850

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial Calibration: For all compounds that yielded a %RSD greater than 15%, linear or higher order equations were applied. All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration and Tune: All acceptance criteria were met.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

Matrix Spikes: Recovery out of range was observed for the following analyte: Perchlorate. Please see the applicable QC report for a detailed presentation of the failures.

Sample #	Analyte	Date	Result	Lower	Upper	Type
L19030638-03	Perchlorate	2019-03-18 20:48:40	80.5	84	119	Recovery

SAMPLES

Samples: All acceptance criteria were met.

Internal Standards: All acceptance criteria were met.

Manual Integration Reason Codes

Reason #1: Data System Fails to Select Correct Peak In some cases the chromatography system selects and integrates the 'wrong peak'. In this case the analyst must correct the selection and force the system to integrate the proper peak. Other times the system may miss the peak completely.

Reason #2: Data System Splits the Peak Incorrectly or Integrates a False Peak as a Rider Peak This phenomena is common at low concentrations where the signal:noise ratio is low. A single compound (peak) is incorrectly split into multiple peaks or integrated as a main peak with one or more rider peaks resulting in low area counts for the target compound.

Reason #3: Improperly Integrated Isomers and/or coeluting compounds. This system often fails to distinguish coeluting compounds and or isomers. The integration areas and concentrations are wrong, and they must be corrected by manual integration. Prime examples are benzo(k)fluoranthene and benzo(b)fluoranthene which are often unresolved and integrated improperly when both are present at low concentrations in standards or samples.

Reason #4: System Establishes Incorrect Baseline There are numerous situations in chromatography where the system establishes the baseline incorrectly. Some baseline errors will be obvious to the analyst and should be corrected via manual procedures.

Reason #5: Miscellaneous Other situations involving integration errors may require in-depth review and technical judgment. These cases should be brought to the attention of the laboratory management. If the form of manual integration is not clearly covered by these four cases, then review and approval by the Laboratory Director or the QA/QC Supervisor will be required.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Microbac Laboratories Inc., both technically and for completeness, except for the conditions noted above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Narrative ID: 147535
Approved By: Eric Lawson



Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	8260
Prep Batch Number(s):		**Reviewer Name:**	Anthony Canter
LRC Date:	2019-03-25 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Anthony Canter		Volatiles Lab Supervisor	2019-03-25 13:47:36

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	8260
Prep Batch Number(s):		**Reviewer Name:**	Anthony Canter
LRC Date:	2019-03-25 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?	X				
Were % moisture (or solids) reported for all soil and sediment samples?	X				
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?	X				
Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	8260
Prep Batch Number(s):		**Reviewer Name:**	Anthony Canter
LRC Date:	2019-03-25 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	8260
Prep Batch Number(s):		**Reviewer Name:**	Anthony Canter
LRC Date:	2019-03-25 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	8260
Prep Batch Number(s):		**Reviewer Name:**	Anthony Canter
LRC Date:	2019-03-25 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	8260
Prep Batch Number(s):		**Reviewer Name:**	Anthony Canter
LRC Date:	2019-03-25 00:00:00		

the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG699914	**Reviewer Name:**	Eric Lawson
LRC Date:	2019-03-20 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson		Chemist III	2019-03-20 20:04:37

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG699914	**Reviewer Name:**	Eric Lawson
LRC Date:	2019-03-20 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG699914	**Reviewer Name:**	Eric Lawson
LRC Date:	2019-03-20 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			1
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG699914	**Reviewer Name:**	Eric Lawson
LRC Date:	2019-03-20 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG699914	**Reviewer Name:**	Eric Lawson
LRC Date:	2019-03-20 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L19030638
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG699914	**Reviewer Name:**	Eric Lawson
LRC Date:	2019-03-20 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] _____ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

1. Sample 03 MSD yielded a recovery for perchlorate that was below the acceptance limit.

1.2 Certificate of Analysis

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L19030638-01	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	SW1	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/05/2019 21:06
Workgroup #:	WG699219	**Analyst:**	KFR	**Run Date:**	03/12/2019 15:30
Collect Date:	03/07/2019 11:30	**Dilution:**	1	**File ID:**	11M29837
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.56	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	96.8	81	118	
4-Bromofluorobenzene	99.7	85	114	
Dibromofluoromethane	96.0	80	119	
Toluene-d8	99.9	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Sample #:	L19030638-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	SW1	**Prep Method:**	6850	**Prep Date:**	03/15/2019 16:30
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/18/2019 18:39
Workgroup #:	WG699914	**Analyst:**	JWR	**Run Date:**	03/18/2019 20:22
Collect Date:	03/07/2019 11:30	**Dilution:**	1	**File ID:**	1LM.LM45229
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.542		0.400	0.200	0.100

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L19030638-02	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	SW1 MS	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/05/2019 21:06
Workgroup #:	WG699219	**Analyst:**	KFR	**Run Date:**	03/12/2019 13:30
Collect Date:	03/07/2019 11:30	**Dilution:**	1	**File ID:**	11M29833
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	18.8		2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	20.0		1.00	0.500	0.250
Acetone	67-64-1	18.1		10.0	5.00	2.50
Chloroform	67-66-3	19.9		0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	20.6		1.00	0.500	0.250
Tetrachloroethene	127-18-4	19.5		1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	20.0		1.00	0.500	0.250
Trichloroethene	79-01-6	19.4		1.00	0.500	0.250
Vinyl chloride	75-01-4	14.4		1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	96.5	81	118	
4-Bromofluorobenzene	101	85	114	
Dibromofluoromethane	101	80	119	
Toluene-d8	100	89	112	

Sample #:	L19030638-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	SW1 MS	**Prep Method:**	6850	**Prep Date:**	03/15/2019 16:30
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/18/2019 18:39
Workgroup #:	WG699914	**Analyst:**	JWR	**Run Date:**	03/18/2019 20:35
Collect Date:	03/07/2019 11:30	**Dilution:**	1	**File ID:**	1LM.LM45230
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.735		0.400	0.200	0.100

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L19030638-03	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	SW1 MSD	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/05/2019 21:06
Workgroup #:	WG699219	**Analyst:**	KFR	**Run Date:**	03/12/2019 14:00
Collect Date:	03/07/2019 11:30	**Dilution:**	1	**File ID:**	11M29834
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	18.2		2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	20.1		1.00	0.500	0.250
Acetone	67-64-1	18.4		10.0	5.00	2.50
Chloroform	67-66-3	19.4		0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	20.5		1.00	0.500	0.250
Tetrachloroethene	127-18-4	19.4		1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	19.7		1.00	0.500	0.250
Trichloroethene	79-01-6	19.4		1.00	0.500	0.250
Vinyl chloride	75-01-4	14.2		1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	99.3	81	118	
4-Bromofluorobenzene	106	85	114	
Dibromofluoromethane	102	80	119	
Toluene-d8	102	89	112	

Sample #:	L19030638-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	SW1 MSD	**Prep Method:**	6850	**Prep Date:**	03/15/2019 16:30
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/18/2019 18:39
Workgroup #:	WG699914	**Analyst:**	JWR	**Run Date:**	03/18/2019 20:48
Collect Date:	03/07/2019 11:30	**Dilution:**	1	**File ID:**	1LM.LM45231
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.703		0.400	0.200	0.100

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L19030638-04	**PrePrep Method:**	N/A	**Instrument:**	HPMS8
Client ID:	SW2	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/04/2019 17:07
Workgroup #:	WG699028	**Analyst:**	EEA	**Run Date:**	03/11/2019 17:01
Collect Date:	03/07/2019 12:30	**Dilution:**	1	**File ID:**	8M429076
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.16	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	108	81	118	
4-Bromofluorobenzene	112	85	114	
Dibromofluoromethane	106	80	119	
Toluene-d8	105	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Sample #:	L19030638-04	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	SW2	**Prep Method:**	6850	**Prep Date:**	03/15/2019 16:30
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/18/2019 18:39
Workgroup #:	WG699914	**Analyst:**	JWR	**Run Date:**	03/18/2019 21:01
Collect Date:	03/07/2019 12:30	**Dilution:**	1	**File ID:**	1LM.LM45232
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.530		0.400	0.200	0.100

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L19030638-05	**PrePrep Method:**	N/A	**Instrument:**	HPMS8
Client ID:	SW3	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/04/2019 17:07
Workgroup #:	WG699028	**Analyst:**	EEA	**Run Date:**	03/11/2019 17:30
Collect Date:	03/07/2019 13:00	**Dilution:**	1	**File ID:**	8M429077
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.65	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.373	J	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	106	81	118	
4-Bromofluorobenzene	106	85	114	
Dibromofluoromethane	104	80	119	
Toluene-d8	103	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Sample #:	L19030638-05	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	SW3	**Prep Method:**	6850	**Prep Date:**	03/15/2019 16:30
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/18/2019 18:39
Workgroup #:	WG699914	**Analyst:**	JWR	**Run Date:**	03/18/2019 21:14
Collect Date:	03/07/2019 13:00	**Dilution:**	1	**File ID:**	1LM.LM45233
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.486		0.400	0.200	0.100

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L19030638-06	**PrePrep Method:**	N/A	**Instrument:**	HPMS8
Client ID:	SW4	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/04/2019 17:07
Workgroup #:	WG699028	**Analyst:**	EEA	**Run Date:**	03/11/2019 17:59
Collect Date:	03/07/2019 14:45	**Dilution:**	1	**File ID:**	8M429078
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	108	81	118	
4-Bromofluorobenzene	111	85	114	
Dibromofluoromethane	104	80	119	
Toluene-d8	103	89	112	

U	Analyte was not detected. The concentration is below the reported LOD.

Sample #:	L19030638-06	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	SW4	**Prep Method:**	6850	**Prep Date:**	03/15/2019 16:30
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/18/2019 18:39
Workgroup #:	WG699914	**Analyst:**	JWR	**Run Date:**	03/18/2019 21:27
Collect Date:	03/07/2019 14:45	**Dilution:**	1	**File ID:**	1LM.LM45234
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.430		0.400	0.200	0.100

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #:	L19030638-07	**PrePrep Method:**	N/A	**Instrument:**	HPMS8
Client ID:	DUP01	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/04/2019 17:07
Workgroup #:	WG699028	**Analyst:**	EEA	**Run Date:**	03/11/2019 18:28
Collect Date:	03/07/2019 10:00	**Dilution:**	1	**File ID:**	8M429079
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.76	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	111	81	118	
4-Bromofluorobenzene	114	85	114	
Dibromofluoromethane	106	80	119	
Toluene-d8	106	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Sample #:	L19030638-07	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	DUP01	**Prep Method:**	6850	**Prep Date:**	03/15/2019 16:30
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	03/18/2019 18:39
Workgroup #:	WG699914	**Analyst:**	JWR	**Run Date:**	03/18/2019 21:40
Collect Date:	03/07/2019 10:00	**Dilution:**	1	**File ID:**	1LM.LM45235
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.548		0.400	0.200	0.100

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Sample #:	L19030638-08	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	TB01	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/05/2019 21:06
Workgroup #:	WG699219	**Analyst:**	KFR	**Run Date:**	03/12/2019 14:59
Collect Date:	03/07/2019 08:00	**Dilution:**	1	**File ID:**	11M29836
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	2.67	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	98.6	81	118	
4-Bromofluorobenzene	98.2	85	114	
Dibromofluoromethane	99.4	80	119	
Toluene-d8	99.6	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

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2.0 Full Sample Data Package

2.1 Volatiles Data

2.1.1 Volatiles GCMS Data (8260)

2.1.1.1 Summary Data

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Sample #:	L19030638-01	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	SW1	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/05/2019 21:06
Workgroup #:	WG699219	**Analyst:**	KFR	**Run Date:**	03/12/2019 15:30
Collect Date:	03/07/2019 11:30	**Dilution:**	1	**File ID:**	11M29837
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.56	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	96.8	81	118	
4-Bromofluorobenzene	99.7	85	114	
Dibromofluoromethane	96.0	80	119	
Toluene-d8	99.9	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Sample #:	L19030638-02	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	SW1 MS	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/05/2019 21:06
Workgroup #:	WG699219	**Analyst:**	KFR	**Run Date:**	03/12/2019 13:30
Collect Date:	03/07/2019 11:30	**Dilution:**	1	**File ID:**	11M29833
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	18.8		2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	20.0		1.00	0.500	0.250
Acetone	67-64-1	18.1		10.0	5.00	2.50
Chloroform	67-66-3	19.9		0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	20.6		1.00	0.500	0.250
Tetrachloroethene	127-18-4	19.5		1.00	0.500	0.250

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Analyte	CAS #	Result	Qual	LOQ	LOD	DL
trans-1,2-Dichloroethene	156-60-5	20.0		1.00	0.500	0.250
Trichloroethene	79-01-6	19.4		1.00	0.500	0.250
Vinyl chloride	75-01-4	14.4		1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	96.5	81	118	
4-Bromofluorobenzene	101	85	114	
Dibromofluoromethane	101	80	119	
Toluene-d8	100	89	112	

Sample #: L19030638-03
Client ID: SW1 MSD
Matrix: Water
Workgroup #: WG699219
Collect Date: 03/07/2019 11:30
Sample Tag: 01

PrePrep Method: N/A
Prep Method: 5030B/5030C/5035A
Analytical Method: 8260B
Analyst: KFR
Dilution: 1
Units: ug/L

Instrument: HPMS11
Prep Date: N/A
Cal Date: 03/05/2019 21:06
Run Date: 03/12/2019 14:00
File ID: 11M29834

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	18.2		2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	20.1		1.00	0.500	0.250
Acetone	67-64-1	18.4		10.0	5.00	2.50
Chloroform	67-66-3	19.4		0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	20.5		1.00	0.500	0.250
Tetrachloroethene	127-18-4	19.4		1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	19.7		1.00	0.500	0.250
Trichloroethene	79-01-6	19.4		1.00	0.500	0.250
Vinyl chloride	75-01-4	14.2		1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	99.3	81	118	
4-Bromofluorobenzene	106	85	114	
Dibromofluoromethane	102	80	119	
Toluene-d8	102	89	112	

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Lab Report #: L19030638
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Lab Contact: Stephanie Mossburg

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Sample #:	L19030638-04	**PrePrep Method:**	N/A	**Instrument:**	HPMS8
Client ID:	SW2	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/04/2019 17:07
Workgroup #:	WG699028	**Analyst:**	EEA	**Run Date:**	03/11/2019 17:01
Collect Date:	03/07/2019 12:30	**Dilution:**	1	**File ID:**	8M429076
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.16	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	108	81	118	
4-Bromofluorobenzene	112	85	114	
Dibromofluoromethane	106	80	119	
Toluene-d8	105	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Sample #:	L19030638-05	**PrePrep Method:**	N/A	**Instrument:**	HPMS8
Client ID:	SW3	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/04/2019 17:07
Workgroup #:	WG699028	**Analyst:**	EEA	**Run Date:**	03/11/2019 17:30
Collect Date:	03/07/2019 13:00	**Dilution:**	1	**File ID:**	8M429077
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.65	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250

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Analyte	CAS #	Result	Qual	LOQ	LOD	DL
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.373	J	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	106	81	118	
4-Bromofluorobenzene	106	85	114	
Dibromofluoromethane	104	80	119	
Toluene-d8	103	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Sample #: L19030638-06
Client ID: SW4
Matrix: Water
Workgroup #: WG699028
Collect Date: 03/07/2019 14:45
Sample Tag: 01

PrePrep Method: N/A
Prep Method: 5030B/5030C/5035A
Analytical Method: 8260B
Analyst: EEA
Dilution: 1
Units: ug/L

Instrument: HPMS8
Prep Date: N/A
Cal Date: 03/04/2019 17:07
Run Date: 03/11/2019 17:59
File ID: 8M429078

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	5.00	U	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	108	81	118	
4-Bromofluorobenzene	111	85	114	
Dibromofluoromethane	104	80	119	
Toluene-d8	103	89	112	

U	Analyte was not detected. The concentration is below the reported LOD.

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Sample #:	L19030638-07	**PrePrep Method:**	N/A	**Instrument:**	HPMS8
Client ID:	DUP01	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/04/2019 17:07
Workgroup #:	WG699028	**Analyst:**	EEA	**Run Date:**	03/11/2019 18:28
Collect Date:	03/07/2019 10:00	**Dilution:**	1	**File ID:**	8M429079
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	3.76	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	111	81	118	
4-Bromofluorobenzene	114	85	114	
Dibromofluoromethane	106	80	119	
Toluene-d8	106	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

Sample #:	L19030638-08	**PrePrep Method:**	N/A	**Instrument:**	HPMS11
Client ID:	TB01	**Prep Method:**	5030B/5030C/5035A	**Prep Date:**	N/A
Matrix:	Water	**Analytical Method:**	8260B	**Cal Date:**	03/05/2019 21:06
Workgroup #:	WG699219	**Analyst:**	KFR	**Run Date:**	03/12/2019 14:59
Collect Date:	03/07/2019 08:00	**Dilution:**	1	**File ID:**	11M29836
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
1,1-Dichloroethene	75-35-4	1.00	U	2.00	1.00	0.500
1,2-Dichloroethane	107-06-2	0.500	U	1.00	0.500	0.250
Acetone	67-64-1	2.67	J	10.0	5.00	2.50
Chloroform	67-66-3	0.250	U	0.500	0.250	0.125
cis-1,2-Dichloroethene	156-59-2	0.500	U	1.00	0.500	0.250
Tetrachloroethene	127-18-4	0.500	U	1.00	0.500	0.250

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Analyte	CAS #	Result	Qual	LOQ	LOD	DL
trans-1,2-Dichloroethene	156-60-5	0.500	U	1.00	0.500	0.250
Trichloroethene	79-01-6	0.500	U	1.00	0.500	0.250
Vinyl chloride	75-01-4	0.500	U	1.00	0.500	0.250

Surrogate	Recovery	Lower Limit	Upper Limit	Q
1,2-Dichloroethane-d4	98.6	81	118	
4-Bromofluorobenzene	98.2	85	114	
Dibromofluoromethane	99.4	80	119	
Toluene-d8	99.6	89	112	

J	Estimated value ; the analyte concentration was less than the LOQ.
U	Analyte was not detected. The concentration is below the reported LOD.

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Lab Contact: Stephanie Mossburg

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2.1.1.2 QC Summary Data

Example 8260 Calculations

1.0 Calculating the Response Factor (RF) from the initial calibration (ICAL) data:

RF = [(Ax) (Cis)] / [(Ais) (Cx)]

where:	Example
Ax = Area of the characteristic ion for the compound being measured:	3399156
Cis = Concentration of the specific internal standard (ug/mL)	25
Ais = Area of the characteristic ion of the specific internal standard	846471
Cx = Concentration of the compound in the standard being measured (ug/mL)	100
RF = Calculated Response Factor	**1.0039**

2.0 Calculating the concentration (C) of a compound in water using the average RF: *

Cx = [(Ax) (Cis) (Vn)(D)] / [(Ais) (RF) (Vs)]

where:	**Example**
Ax = Area of the characteristic ion for the compound being measured	**3122498**
Cis = Concentration of the specific internal standard (ug/L)	**25**
D = Dilution factor for sample as a multiplier (10x = 10)	**1**
Ais = Area of the characteristic ion of the specific internal standard	**611048**
RF = Average RF from the ICAL	**1.004**
Vs = Purge volume of sample (mL)	**10**
Vn = Nominal purge volume of sample (mL) (10.0 mL)	**10**
Cx = Concentration of the compound in the sample being measured (ug/L)	**127.2428**

3.0 Calculating the concentration (C) of a compound in soil using the average RF: *

Cx = [(Ax) (Cis) (Wn)(D)] / [(Ais) (RF) (Ws)]

where:	**Example**
Ax = Area of the characteristic ion for the compound being measured	**3122498**
Cis = Concentration of the specific internal standard (ug/L)	**25**
D = Dilution factor for sample as a multiplier (10x = 10)	**1**
Ais = Area of the characteristic ion of the specific internal standard	**611048**
RF = Average RF from the ICAL	**1.004**
Ws = Weight of sample purged (g)	**5**
Wn = Nominal purge weight (g) (5.0 g)	**5**
Cx = Concentration of the compound in the sample being measured (ug/L)	**127.2428**

Dry weight correction:

Percent solids (PCT_S)	**50**
Cd = (Cx) (100)/PCT_S	**254.4856**

* Concentrations appearing on the instrument quantitation reports are on-column results and do not take into account initial volume, final volume, and the dilution factor.

4.0 Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, y = mx + b

y = response ratio = response of analyte / response of IS = Ax/Ais

x = amount ratio = concentration analyte/concentration internal standard = Cx / Cis

m = slope from curve = 0.213

b = intercept from curve = - 0.00642

Step 2: Calculate y from Quantitation Report

y = 86550/593147 = 0.1459

Step 3: Solve for x

x = (y - b)/m = [(0.1459 -(- 0.00642)]/ 0.213 = 0.7152

Step 4: Solve for analyte concentration Cx

Cx = Cis (x) = (25.0)(0.7152) = 17.88

Example Spreadsheet Calculation:

Slope from curve, m:	**0.213**
Intercept from curve, b:	**-0.00642**
Area of analyte, Ax:	**86550**
Area of Internal Standard , Ais:	**593147**
Concentration of IS, Cis	**25.00**
Response Ratio:	**0.145917**
Amount Ratio:	**0.715195**
Concentration:	**17.87988**
Units of Internal Standard:	**ug/L**

5.0 Concentration from Quadratic Regression

Step 1 - Retrieve Curve Data from Plot, y = Ax^2 + Bx + C
Where:
Ax^2 + Bx + (C - y) = 0
A, B, C = constants from the ICAL quadratic regression
y = Response ratio = Area of analyte/Area of internal standard (IS)
x = Amount ratio = Concentration of analyte/concentration of IS

Step 2: Calculate y from Quantitation Report

y = Ax/Ais

Step 3: Solve for x using the quadratic formula
Ax^2 + Bx + C - y = 0

$$x = \frac{b \pm \sqrt{\left(b^2 - 4a(c - y)\right)}}{2a}$$ (Two possible solutions)

Step 4: Solve for analyte concentration Cx

Cx = (Cis)(Amount ratio)

Example Spreadsheet Calculation:

Value of A from plot:	**-0.00629**	
Value of B from plot:	**0.511**	
Value of C from plot:	**-0.0276**	
Area of unknown from quantitation report:	**293821**	
Area of IS from quantiation report:	**784848**	
Response ratio, y:	**0.374367**	
C - y:	**-0.40197**	
Root 1 - Computed amount ratio , X1:	**80.44567**	
Root 2 - Computed amount ratio , X2:	**0.794396**	use this solution
Concentration of IS, Cis:	**25.00**	
Concentration of analyte, Cx:	**19.86**	ug/L

MICROBAC®

TCLP Volatile

Analyst(s): CPD
Date: 3/7/19
Filter Lot #: 168931111

Agitator Speed 30 ± 2 rpm ☑

Balance ID: BAL020
pH Probe ID: T6
Temp probe ID: ETP 1025

Analyst / Date		Analyst / Date	
CPD	3/7/19	CPD	3/8/19
Time On	Temp On °C	Time Off	Temp Off °C
1451	22.1	0811	22.3

ZHE	Sample #	Pressure √	PSI ON	PSI OFF	Method	Fluid #	Matrix*	%Solid	Size Reduction Yes	Size Reduction No	Int. Wt. (g)	Fluid Vol. (mL)
A												
B												
C												
D												
E												
F												
G												
H												
I												
J												
K	03-0239-01	✓	10	10	1311	F1ZHE-335	S	100		✓	25.00	500
L												
M												
N												
O												
P												
Q												
R												
S												
NA	FBK24E#1	NA	NA	NA	1311	F1ZHE-335	NA	NA	NA	NA	40	40

CPD 3/8/19

*Matrix Code = (S-solid) (SS-sand, soil or sludge) (P-paint) (O-organic) (W-water or waste)

omments: NA

Peer Review By: Robert Cinkus

Microbac Laboratories Inc.

Run Log ID:

Instrument Run Log

Instrument: HPMS8 Dataset: 111218

Analyst1: EEA Analyst2: NA

Method: 8260B SOP: MSV01 Rev: 19

Method: 5030/5035 SOP: PAT01 Rev: 16

Maintenance Log ID:

Internal Standard: STD90422 Surrogate Standard: STD90202

CCV: STD90360 LCS: STD90635 MS/MSD: STD90635

Column 1 ID: RTX502.2 Column 2 ID: NA

Workgroups: WG684281 ICAL A9

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M427929	WG684281-01 50ng/ BFB STD	NA	1	1	STD90475	11/12/18 13:12
8M427930	WG684281-02 5 ug/L ICAL A9 8260	NA	1	1	STD90626	11/12/18 13:37
8M427931	WG684281-03 20 ug/L ICAL A9 8260	NA	1	1	STD90626	11/12/18 14:06
8M427932	WG684281-04 50 ug/L ICAL A9 8260	NA	1	1	STD90626	11/12/18 14:34
8M427933	WG684281-05 100 ug/L ICAL A9 8260	NA	1	1	STD90626	11/12/18 15:03
8M427934	WG684281-06 200 ug/L ICAL A9 8260	NA	1	1	STD90626	11/12/18 15:31
8M427935	WG684281-07 300 ug/L ICAL A9 8260	NA	1	1	STD90626	11/12/18 15:59
8M427936	WG684281-08 400 ug/L ICAL A9 8260	NA	1	1	STD90626	11/12/18 16:28
8M427937	WG684281-09 500 ug/L ICAL A9 8260	NA	1	1	STD90626	11/12/18 16:57
8M427938	RINSE	NA	1	1	STD90626	11/12/18 17:25
8M427939	WG684281-10 100 ug/L ICV/ALT A9 8260	NA	1	1	STD90627	11/12/18 17:54
8M427940	WG684351-01 BLANK 8260	NA	1	1		11/12/18 18:22
8M427941	WG684351-02 P+A 100 ug	NA	1	1		11/12/18 18:52
8M427942	WG684351-03 P+A 100 ug/L 8260	NA	1	1	STD90627	11/12/18 19:21
8M427943	WG684351-04 P+A 100 ug/L 8260	NA	1	1	STD90627	11/12/18 19:49
8M427944	WG684351-05 P+A 100 ug/L 8260	NA	1	1	STD90627	11/12/18 20:17

Approved: November 15, 2018

Microbac Laboratories Inc. Run Log ID:

Instrument Run Log

Instrument: HPMS11 Dataset: 021919
Analyst1: KFR Analyst2: NA
Method: 8260B SOP: MSV01, OVAP MSV01 Rev: 25,0
Method: 5035A/5030B/5030C SOP: PATO1, OVAP PATO1 Rev: 19,1

Maintenance Log ID:

Internal Standard: STD91917 Surrogate Standard: STD91918
CCV: STD92151 LCS: STD92076 MS/MSD: NA

Column 1 ID: RTX502.2 Column 2 ID: NA
Workgroups: WG696624

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
11M29623	WG696624-01 50ng BFB 8260	NA	1	1	STD91899	02/19/19 10:43
11M29624	WG696624-02 CCV 50ug/L 8260	NA	1	1	STD91899	02/19/19 11:12
11M29625	WG696624-02 CCV 50ug/L 8260	NA	1	1	STD91899	02/19/19 11:48
11M29626	WG696507-12 ICV 50ug/L 8260	NA	1	1	STD91879	02/19/19 12:18
11M29628	WG696624-03 5ug/L ICAL A9 8260	NA	1	1	STD92151	02/19/19 13:17
11M29629	WG696624-04 20ug/L ICAL A9 8260	NA	1	1	STD92151	02/19/19 13:47
11M29630	WG696624-05 50ug/L ICAL A9 8260	NA	1	1	STD92151	02/19/19 14:16
11M29631	WG696624-06 100ug/L ICAL A9 8260	NA	1	1	STD92151	02/19/19 14:45
11M29632	WG696624-07 200ug/L ICAL A9 8260	NA	1	1	STD92151	02/19/19 15:15
11M29633	WG696624-08 300ug/L ICAL A9 8260	NA	1	1	STD92151	02/19/19 15:44
11M29634	WG696624-09 400ug/L ICAL A9 8260	NA	1	1	STD92151	02/19/19 16:14
11M29635	WG696624-10 500ug/L ICAL A9 8260	NA	1	1	STD92151	02/19/19 16:44
11M29636	RINSE	NA	1	1		02/19/19 17:13
11M29637	WG696624-11 ICV/ALT 100ug/L ICAL A9 82	NA	1	1	STD92076	02/19/19 17:43

Approved: February 20, 2019

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Microbac Laboratories Inc. Run Log ID:

Instrument Run Log

Instrument: HPMS8 Dataset: 030419
Analyst1: EEA Analyst2: NA
Method: 8260B SOP: MSV01 Rev: 26
Method: 5030/5035 SOP: PAT01 Rev: 18

Maintenance Log ID:

Internal Standard: STD92348 Surrogate Standard: STD92349
CCV: STD92326 LCS: STD92354 MS/MSD: NA

Column 1 ID: RTX502.2 Column 2 ID: NA
Workgroups: WG698192 ICAL

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M428954	WG698192-01 50ng BFB 8260	NA	1	1	STD91948	03/04/19 11:54
8M428956	WG698192-02 0.3 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 12:45
8M428957	WG698192-03 0.4 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 13:15
8M428958	WG698192-04 1 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 13:43
8M428959	WG698192-05 2 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 14:12
8M428960	WG698192-06 5 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 14:42
8M428961	WG698192-07 20 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 15:11
8M428962	WG698192-08 50 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 15:40
8M428963	WG698192-09 100 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 16:09
8M428964	WG698192-10 200 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 16:38
8M428965	WG698192-11 300 ug/L ICAL 8260	NA	1	1	STD92326	03/04/19 17:07
8M428967	WG698192-12 ALT 50 ug/L ICAL 8260	NA	1	1	STD92354	03/04/19 18:06

Approved: March 05, 2019

Page: 1

Microbac Laboratories Inc.

Run Log ID:

Instrument Run Log

Instrument: HPMS11 Dataset: 030519

Analyst1: KFR Analyst2: NA

Method: 8260B SOP: MSV01, OVAP MSV01 Rev: 25,0

Method: 5035A/5030B/5030C SOP: PATO1, OVAP PATO1 Rev: 19,1

Maintenance Log ID:

Internal Standard: STD92347 Surrogate Standard: STD92346

CCV: STD92320 LCS: STD92316 MS/MSD: NA

Column 1 ID: RTX502.2 Column 2 ID: NA

Workgroups: WG698387, WG698731

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
11M29730	WG698387-02 CCV 50ug/kg 8260	NA	1	1	STD92189	03/05/19 12:58
11M29735	WG698387-01 50ng BFB 8260	NA	1	1	STD91899	03/05/19 15:39
11M29736	RINSE	NA	1	1		03/05/19 16:10
11M29737	WG698387-02 STD 0.3ug/L 8260	NA	1	1	STD92320	03/05/19 16:39
11M29738	WG698387-03 STD 0.4ug/L 8260	NA	1	1	STD92320	03/05/19 17:09
11M29739	WG698387-04 STD 1ug/L 8260	NA	1	1	STD92320	03/05/19 17:38
11M29740	WG698387-05 STD 2ug/L 8260	NA	1	1	STD92320	03/05/19 18:08
11M29741	WG698387-06 STD 5ug/L 8260	NA	1	1	STD92320	03/05/19 18:38
11M29742	WG698387-07 STD 20ug/L 8260	NA	1	1	STD92320	03/05/19 19:08
11M29743	WG698387-08 STD 50ug/L 8260	NA	1	1	STD92320	03/05/19 19:38
11M29744	WG698387-09 STD 100ug/L 8260	NA	1	1	STD92320	03/05/19 20:08
11M29745	WG698387-10 STD 200ug/L 8260	NA	1	1	STD92320	03/05/19 20:37
11M29746	WG698387-11 STD 300ug/L 8260	NA	1	1	STD92320	03/05/19 21:06
11M29747	RINSE	NA	1	1		03/05/19 21:35
11M29748	WG698387-12 ICV 50ug/L 8260	NA	1	1	STD92316	03/05/19 22:04
11M29749	RINSE	NA	1	1		03/05/19 22:33
11M29750	WG698731-01 BLANK 8260	NA	1	1		03/05/19 23:02
11M29751	L19010001-01 A LOQ 8260	NA	1	1	STD92184	03/05/19 23:30
11M29752	L19010001-01 B LOQ 8260	NA	1	1	STD92185	03/06/19 00:00
11M29753	RINSE	NA	1	1		03/06/19 00:29
11M29754	RINSE	NA	1	1		03/06/19 00:58

Approved: March 07, 2019

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Microbac Laboratories Inc.

Run Log ID:

Instrument Run Log

Instrument: HPMS8 Dataset: 031119

Analyst1: EEA Analyst2: NA

Method: 8260B SOP: MSV01 Rev: 26

Method: 5030/5035 SOP: PAT01 Rev: 18

Maintenance Log ID:

Internal Standard: STD92348 Surrogate Standard: STD92349

CCV: STD92326 LCS: STD92354 MS/MSD: NA

Column 1 ID: RTX502.2 Column 2 ID: NA

Workgroups: WG699028

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
8M429060	WG699027-01 50ng BFB 8260	NA	1	1	STD92421	03/11/19 08:56
8M429061	WG699027-02 CCV 50 ug/L 8260	NA	1	1	STD92326	03/11/19 09:19
8M429062	WG000000-01 A9 100 ug/L 8260	NA	1	1	STD00000	03/11/19 10:12
8M429063	WG699028-01 BLANK 8260	NA	1	1		03/11/19 10:41
8M429064	WG699028-02 LCS 20 ug/L 8260	NA	1	1	STD92354	03/11/19 11:09
8M429065	WG699028-03 LCS DUP 20 ug/L 8260	NA	1	1	STD92354	03/11/19 11:38
8M429066	L19030582-02 A 826-BETX	<2	1	1		03/11/19 12:07
8M429067	L19030584-02 A 826-BETX	<2	1	1		03/11/19 12:36
8M429068	L19030586-02 A 826-BETX	<2	1	1		03/11/19 13:05
8M429069	L19030582-01 A 826-BETX	<2	1	1		03/11/19 13:35
8M429070	L19030583-01 A 826-BETX	<2	1	1		03/11/19 14:04
8M429071	L19030584-01 A 826-BETX	<2	1	1		03/11/19 14:34
8M429072	L19030585-01 A 826-BETX	<2	1	1		03/11/19 15:03
8M429073	L19030586-01 A 826-BETX	<2	1	1		03/11/19 15:32
8M429074	L19030587-01 A 826-BETX	<2	1	1		03/11/19 16:02
8M429075	L19030239-01 A 10X 826-TC-SPE	NA	17	10		03/11/19 16:31
8M429076	L19030638-04 A 826-SPE	<2	1	1		03/11/19 17:01
8M429077	L19030638-05 A 826-SPE	<2	1	1		03/11/19 17:30
8M429078	L19030638-06 A 826-SPE	<2	1	1		03/11/19 17:59
8M429079	L19030638-07 A 826-SPE	<2	1	1		03/11/19 18:28
8M429080	L19030631-01 B 826-SPE1	NA	12	100		03/11/19 18:57
8M429081	RINSE	NA	1	1		03/11/19 19:26
8M429082	RINSE	NA	1	1		03/11/19 19:54
8M429083	WG699028-04 CCV 50 ug/L 8260	NA	1	1	STD92326	03/11/19 20:23
8M429084	RINSE	NA	1	1		03/11/19 20:51
8M429085	WG698729-01 A 10X 826-TC-SPE	NA	17	10		03/11/19 21:20

Approved: March 12, 2019

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Microbac Laboratories Inc.

Run Log ID:

Instrument Run Log

Instrument: HPMS11 Dataset: 031219

Analyst1: KFR Analyst2: NA

Method: 8260B SOP: MSV01, OVAP MSV01 Rev: 26,0

Method: 5035A/5030B/5030C SOP: PATO1, OVAP PATO1 Rev: 18,1

Maintenance Log ID:

Internal Standard: STD92347 Surrogate Standard: STD92346

CCV: STD92189 STD92320 LCS: STD92316 MS/MSD: NA

Column 1 ID: RTX502.2 Column 2 ID: NA

Workgroups: WG699219

Comments:

File ID	Sample Information	pH	Mat	Dil	Reference	Date/Time
11M29828	WG699218-01 50ng BFB 8260	NA	1	1	STD92290	03/12/19 10:56
11M29829	WG699218-02 CCV 50ug/kg 8260	NA	1	1	STD92189	03/12/19 11:21
11M29830	WG000000-01 A9 50ug/L 8260	NA	1	1	STD92151	03/12/19 12:02
11M29831	WG699219-01 BLANK 8260	NA	1	1		03/12/19 12:31
11M29832	WG699219-02 LCS 20ug/L 8260	NA	1	1	STD92316	03/12/19 13:00
11M29833	L19030638-02 A MS 826-SPE	<2	1	1	STD92316	03/12/19 13:30
11M29834	L19030638-03 A MSD 826-SPE	<2	1	1	STD92316	03/12/19 14:00
11M29835	RINSE	NA	1	1		03/12/19 14:30
11M29836	L19030638-08 A TBLK 826-SPE	<2	1	1		03/12/19 14:59
11M29837	L19030638-01 A REF 826-SPE	<2	1	1		03/12/19 15:30
11M29838	L19030660-01 A 826-SPE	<2	1	1		03/12/19 16:00
11M29839	L19030660-02 A 826-SPE	<2	1	1		03/12/19 16:37
11M29840	L19030660-05 A 826-SPE	<2	1	1		03/12/19 17:06
11M29841	L19030660-06 A 826-SPE	<2	1	1		03/12/19 17:37
11M29842	L19030660-08 A 826-SPE	<2	1	1		03/12/19 18:13
11M29843	L19030660-03 2X A 826-SPE	<2	1	2	SEDIMENT	03/12/19 18:43
11M29844	L19030660-04 2X A 826-SPE	3	1	2	SEDIMENT	03/12/19 19:13
11M29845	L19030660-09 2X A 826-SPE	<2	1	2	SEDIMENT	03/12/19 19:43
11M29846	L19030660-10 2X A 826-SPE	<2	1	2	SEDIMENT	03/12/19 20:13
11M29847	L19030660-07 2X A 826-SPE	4	1	2	SEDIMENT	03/12/19 20:42
11M29848	RINSE	NA	1	1		03/12/19 21:12
11M29849	L19030687-03 A 826-BETX	<2	1	1		03/12/19 21:41
11M29850	L19030687-01 A 826-BETX	<2	1	1		03/12/19 22:10
11M29851	WG699219-03 QCMRL 50ug/L 8260	NA	1	1	STD92320	03/12/19 22:39
11M29852	RINSE	NA	1	1		03/12/19 23:09
11M29853	RINSE	NA	1	1		03/12/19 23:39

Approved: March 18, 2019

Page: 1

Microbac Laboratories Inc. Checklist ID: 147172

Data Checklist

Date: 12-NOV-2018
Analyst: EEA
Analyst: NA
Method: 8260B
Instrument: HPMS8
Curve Workgroup: WG684281
Runlog ID: 93326
Analytical Workgroups:

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	X
TCL Hits	X
Spectra of TCL Hits	EEA
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	EEA
Secondary Reviewer	ADC
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
14-NOV-2018

Secondary Reviewer:
15-NOV-2018

CHECKLIST1 - Modified 03/05/2008
Generated: NOV-15-2018 11:58:30

Microbac Laboratories Inc.

Checklist ID: 150666

Data Checklist

Date: 19-FEB-2019
Analyst: KFR
Analyst: NA
Method: 8260B
Instrument: HPMS11
Curve Workgroup: NA
Runlog ID: 95301
Analytical Workgroups: WG696624

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	NA
TCL Hits	X
Spectra of TCL Hits	KFR
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	X
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	KFR
Secondary Reviewer	ADC
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
20-FEB-2019
Karissa Reynolds

Secondary Reviewer:
20-FEB-2019
Cathy Cater

CHECKLIST1 - Modified 03/05/2008
Generated: FEB-20-2019 14:05:53

Microbac Laboratories Inc.

Checklist ID: 151191

Data Checklist

Date: 04-MAR-2019

Analyst: EEA

Analyst: NA

Method: 8260B

Instrument: HPMS8

Curve Workgroup: WG698192

Runlog ID: 95571

Analytical Workgroups:

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	NA
TCL Hits	X
Spectra of TCL Hits	EEA
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	EEA
Secondary Reviewer	ADC
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
05-MAR-2019

Secondary Reviewer:
05-MAR-2019

CHECKLIST1 - Modified 03/05/2008

Generated: MAR-05-2019 13:16:09

Microbac Laboratories Inc.

Checklist ID: 151265

Data Checklist

Date: 05-MAR-2019

Analyst: KFR

Analyst: NA

Method: 8260B

Instrument: HPMS11

Curve Workgroup: NA

Runlog ID: 95609

Analytical Workgroups: WG698387

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	NA
Samples	X
TCL Hits	X
Spectra of TCL Hits	KFR
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	NA
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	KFR
Secondary Reviewer	ADC
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
07-MAR-2019

Karissa Reynolds

Secondary Reviewer:
07-MAR-2019

Cathy Cater

CHECKLIST1 - Modified 03/05/2008

Generated: MAR-07-2019 12:02:24

Microbac Laboratories Inc. Checklist ID: 151457

Data Checklist

Date: 11-MAR-2019
Analyst: EEA
Analyst: NA
Method: 8260B
Instrument: HPMS8
Curve Workgroup: NA
Runlog ID: 95685
Analytical Workgroups: WG699028

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	EEA
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	X
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	EEA
Secondary Reviewer	ADC
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer:
12-MAR-2019

Secondary Reviewer:
12-MAR-2019

CHECKLIST1 - Modified 03/05/2008
Generated: MAR-12-2019 16:47:37

Microbac Laboratories Inc.

Checklist ID: 151636

Data Checklist

Date: 12-MAR-2019
Analyst: KFR
Analyst: NA
Method: 8260B
Instrument: HPMS11
Curve Workgroup: NA
Runlog ID: 95794
Analytical Workgroups: WG699219

System Performance Check	NA
BFB	X
Initial Calibration	X
Average RF	X
Linear Reg or Higher Order Curve	X
Second Source standard % Difference	X
Continuing Calibration /Check Standards	X
Project/Client Specific Requirements	X
Special Standards	NA
Blanks	X
TCL's	X
Surrogates	X
LCS (Laboratory Control Sample)	X
Recoveries	X
Surrogates	X
MS/MSD/Duplicates	X
Samples	X
TCL Hits	X
Spectra of TCL Hits	KFR
Surrogates	X
Internal Standards Criteria	X
Library Searches	NA
Calculations & Correct Factors	X
Dilutions Run	X
Reruns	NA
Manual Integrations	NA
Case Narrative	X
Results Reporting/Data Qualifiers	X
KOBRA Workgroup Data	X
Check for Completeness	X
Primary Reviewer	KFR
Secondary Reviewer	EEA
Check for compliance with method and project specific requirements	X
Check the completeness of reported information	X
Check the information for the report narrative	X
Check the reasonableness of the results	X

Primary Reviewer: 15-MAR-2019 Karissa Reynolds

Secondary Reviewer: 18-MAR-2019

CHECKLIST1 - Modified 03/05/2008
Generated: MAR-18-2019 16:30:47

Microbac Laboratories Inc.

HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 8260B **AAB#:** WG699028

Login Number: L19030638

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
SW2	04	03/07/19					03/11/2019	4.2	14		03/11/19	4.2	14	
SW3	05	03/07/19					03/11/2019	4.2	14		03/11/19	4.2	14	
SW4	06	03/07/19					03/11/2019	4.1	14		03/11/19	4.1	14	
DUP01	07	03/07/19					03/11/2019	4.4	14		03/11/19	4.4	14	

*** = SEE PROJECT QAPP REQUIREMENTS**

HOLD_TIMES - Modified 03/06/2008
PDF File ID: 6344147
Report generated 03/16/2019 10:31

Microbac Laboratories Inc.

HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 8260B **AAB#:** WG699219

Login Number: L19030638

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
SW1	01	03/07/19					03/12/2019	5.2	14		03/12/19	5.2	14	
SW1 MS	02	03/07/19					03/12/2019	5.1	14		03/12/19	5.1	14	
SW1 MSD	03	03/07/19					03/12/2019	5.1	14		03/12/19	5.1	14	
TB01	08	03/07/19					03/12/2019	5.3	14		03/12/19	5.3	14	

* = SEE PROJECT QAPP REQUIREMENTS

HOLD_TIMES - Modified 03/06/2008
PDF File ID: 6344147
Report generated 03/16/2019 10:31

Microbac Laboratories Inc.
SURROGATE STANDARDS

Login Number: L19030638
Instrument Id: HPMS8
Workgroup (AAB#): WG699028

Method: 8260
CAL ID: HPMS8-04-MAR-19
Matrix: Water

Sample Number	Dilution	Tag	1	2	3	4
L19030638-04	1.00	01	108	106	112	105
L19030638-05	1.00	01	106	104	106	103
L19030638-06	1.00	01	108	104	111	103
L19030638-07	1.00	01	111	106	114	106
WG699028-01	1.00	01	103	103	109	104
WG699028-02	1.00	01	105	104	104	102
WG699028-03	1.00	01	106	106	102	102
WG699028-04	1.00	01	104	103	101	101

Surrogates	Surrogate Limits		
1 - 1,2-Dichloroethane-d4	81	-	118
2 - Dibromofluoromethane	80	-	119
3 - 4-Bromofluorobenzene	85	-	114
4 - Toluene-d8	89	-	112

Underline = Result out of surrogate limits

DL = surrogate diluted out
ND = surrogate not detected

SURROGATES - Modified 03/06/2008
PDF File ID: 6344156
Report generated: 03/16/2019 10:29

Microbac Laboratories Inc.
SURROGATE STANDARDS

Login Number: L19030638
Instrument Id: HPMS11
Workgroup (AAB#): WG699219

Method: 8260
CAL ID: HPMS11-05-MAR-19
Matrix: Water

Sample Number	Dilution	Tag	1	2	3	4
L19030638-01	1.00	01	96.8	96.0	99.7	99.9
L19030638-02	1.00	01	96.5	101	101	100
L19030638-03	1.00	01	99.3	102	106	102
L19030638-08	1.00	01	98.6	99.4	98.2	99.6
WG699219-01	1.00	01	95.7	98.9	106	102
WG699219-02	1.00	01	98.5	101	100	99.8
WG699219-03	1.00	01	100	105	98.7	101

Surrogates	Surrogate Limits		
1 - 1,2-Dichloroethane-d4	81	-	118
2 - Dibromofluoromethane	80	-	119
3 - 4-Bromofluorobenzene	85	-	114
4 - Toluene-d8	89	-	112

Underline = Result out of surrogate limits

DL = surrogate diluted out
ND = surrogate not detected

SURROGATES - Modified 03/06/2008
PDF File ID: 6344156
Report generated: 03/16/2019 10:29

METHOD BLANK SUMMARY

Login Number: L19030638
Blank File ID: 11M29831
Prep Date: 03/12/19 12:31
Analyzed Date: 03/12/19 12:31
Analyst: KFR

Work Group: WG699219
Blank Sample ID: WG699219-01
Instrument ID: HPMS11
Method: 8260B

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG699219-02	11M29832	03/12/19 13:00	01
SW1 MS	L19030638-02	11M29833	03/12/19 13:30	01
SW1 MSD	L19030638-03	11M29834	03/12/19 14:00	01
TB01	L19030638-08	11M29836	03/12/19 14:59	01
SW1	L19030638-01	11M29837	03/12/19 15:30	01
QCMRL	WG699219-03	11M29851	03/12/19 22:39	01

Report Name: BLANK_SUMMARY
PDF File ID: 6344148
Report generated 03/16/2019 10:31

METHOD BLANK SUMMARY

Login Number: L19030638
Work Group: WG699028
Blank File ID: 8M429063
Blank Sample ID: WG699028-01
Prep Date: 03/11/19 10:41
Instrument ID: HPMS8
Analyzed Date: 03/11/19 10:41
Method: 8260B
Analyst: EEA

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
LCS	WG699028-02	8M429064	03/11/19 11:09	01
LCS2	WG699028-03	8M429065	03/11/19 11:38	01
SW2	L19030638-04	8M429076	03/11/19 17:01	01
SW3	L19030638-05	8M429077	03/11/19 17:30	01
SW4	L19030638-06	8M429078	03/11/19 17:59	01
DUP01	L19030638-07	8M429079	03/11/19 18:28	01
QCMRL	WG699028-04	8M429083	03/11/19 20:23	01

Report Name: BLANK_SUMMARY
PDF File ID: 6344148
Report generated 03/16/2019 10:31

Microbac Laboratories Inc.
METHOD BLANK REPORT

Login Number: L19030638 Prep Date: 03/12/19 12:31 Sample ID: WG699219-01
Instrument ID: HPMS11 Run Date: 03/12/19 12:31 Prep Method: 5030B/5030C/503
File ID: 11M29831 Analyst: KFR Method: 8260B
Workgroup (AAB#): WG699219 Matrix: Water Units: ug/L
Contract #: Cal ID: HPMS11-05-MAR-19

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,1-Dichloroethene	0.500	2.00	0.500	1	U
1,2-Dichloroethane	0.250	1.00	0.250	1	U
Acetone	2.50	10.0	2.50	1	U
Chloroform	0.125	0.500	0.125	1	U
cis-1,2-Dichloroethene	0.250	1.00	0.250	1	U
Tetrachloroethene	0.250	1.00	0.250	1	U
trans-1,2-Dichloroethene	0.250	1.00	0.250	1	U
Trichloroethene	0.250	1.00	0.250	1	U
Vinyl chloride	0.250	1.00	0.250	1	U

Surrogates	% Recovery	Surrogate Limits			Qualifier
1,2-Dichloroethane-d4	95.7	81	-	118	PASS
4-Bromofluorobenzene	106	85	-	114	PASS
Dibromofluoromethane	98.9	80	-	119	PASS
Toluene-d8	102	89	-	112	PASS

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name:BLANK
PDF ID: 6344149
16-MAR-2019 10:31

Microbac Laboratories Inc.

METHOD BLANK REPORT

Login Number: L19030638 Prep Date: 03/11/19 10:41 Sample ID: WG699028-01
Instrument ID: HPMS8 Run Date: 03/11/19 10:41 Prep Method: 5030B/5030C/503
File ID: 8M429063 Analyst: EEA Method: 8260B
Workgroup (AAB#): WG699028 Matrix: Water Units: ug/L
Contract #: Cal ID: HPMS8-04-MAR-19

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
1,1-Dichloroethene	0.500	2.00	0.500	1	U
1,2-Dichloroethane	0.250	1.00	0.250	1	U
Acetone	2.50	10.0	2.50	1	U
Chloroform	0.125	0.500	0.125	1	U
cis-1,2-Dichloroethene	0.250	1.00	0.250	1	U
Tetrachloroethene	0.250	1.00	0.250	1	U
trans-1,2-Dichloroethene	0.250	1.00	0.250	1	U
Trichloroethene	0.250	1.00	0.250	1	U
Vinyl chloride	0.250	1.00	0.250	1	U

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	103	81 - 118	PASS
4-Bromofluorobenzene	109	85 - 114	PASS
Dibromofluoromethane	103	80 - 119	PASS
Toluene-d8	104	89 - 112	PASS

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name:BLANK
PDF ID: 6344149
16-MAR-2019 10:31

Login Number: L19030638 Run Date: 03/12/2019 Sample ID: WG699219-02
Instrument ID: HPMS11 Run Time: 13:00 Prep Method: 5030B/5030C/503
File ID: 11M29832 Analyst: KFR Method: 8260B
Workgroup (AAB#): WG699219 Matrix: Water Units: ug/L
QC Key: DOD5 Lot#: STD92316 Cal ID: HPMS11-05-MAR-19

Analytes	Expected	Found	% Rec	LCS Limits	Q
1,1-Dichloroethene	20.0	19.3	96.3	71 - 131	
1,2-Dichloroethane	20.0	20.2	101	73 - 128	
Acetone	20.0	14.7	73.7	39 - 160	
Chloroform	20.0	20.0	99.9	79 - 124	
cis-1,2-Dichloroethene	20.0	21.2	106	78 - 123	
Tetrachloroethene	20.0	20.0	99.9	74 - 129	
trans-1,2-Dichloroethene	20.0	20.9	105	75 - 124	
Trichloroethene	20.0	20.1	100	79 - 123	
Vinyl chloride	20.0	15.3	76.3	58 - 137	

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	98.5	81 - 118	PASS
4-Bromofluorobenzene	100	85 - 114	PASS
Dibromofluoromethane	101	80 - 119	PASS
Toluene-d8	99.8	89 - 112	PASS

* EXCEEDS %REC LIMIT

LCS - Modified 03/06/2008
PDF File ID: 6351178
Report generated: 03/25/2019 09:45

Microbac Laboratories Inc.
LABORATORY CONTROL SAMPLE (LCS)

Login Number: L19030638 Analyst: EEA Prep Method: 5030B/5030C/503
Instrument ID: HPMS8 Matrix: Water Method: 8260B
Workgroup (AAB#): WG699028 Units: ug/L
QC Key: DOD5 Lot #: STD92354

Sample ID: WG699028-02 LCS File ID: 8M429064 Run Date: 03/11/2019 11:09
Sample ID: WG699028-03 LCS2 File ID: 8M429065 Run Date: 03/11/2019 11:38

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
1,1-Dichloroethene	20.0	20.1	100	20.0	19.1	95.5	4.97	71 - 131	20	
1,2-Dichloroethane	20.0	20.8	104	20.0	20.3	102	2.16	73 - 128	20	
Acetone	20.0	14.7	73.3	20.0	14.9	74.4	1.53	39 - 160	20	
Chloroform	20.0	20.0	100	20.0	19.5	97.4	2.79	79 - 124	20	
cis-1,2-Dichloroethene	20.0	20.7	104	20.0	20.2	101	2.51	78 - 123	20	
Tetrachloroethene	20.0	20.7	103	20.0	19.6	97.8	5.60	74 - 129	20	
trans-1,2-Dichloroethene	20.0	20.5	102	20.0	19.9	99.4	3.01	75 - 124	20	
Trichloroethene	20.0	20.9	105	20.0	20.5	102	2.23	79 - 123	20	
Vinyl chloride	20.0	18.7	93.3	20.0	17.9	89.6	4.11	58 - 137	20	

Surogates	LCS	LCS2	Surrogate Limits	Qualifier
	% Recovery	% Recovery		
1,2-Dichloroethane-d4	105	106	81 - 118	PASS
Dibromofluoromethane	104	106	80 - 119	PASS
4-Bromofluorobenzene	104	102	85 - 114	PASS
Toluene-d8	102	102	89 - 112	PASS

* EXCEEDS %REC LIMIT

\# EXCEEDS RPD LIMIT

LCS_LCS2 - Modified 03/06/2008
PDF File ID: 6344150
Report generated: 03/25/2019 09:45

Microbac Laboratories Inc.

MS/MSD REPORT

Loginnum: L19030638 Cal ID: HPMS11- 05-MAR-19 Worknum: WG699219

Instrument ID: HPMS11 Contract #: Prep Method: 5030B/5030C/

Parent ID: L19030638-01 File ID: 11M29837 Dil: 1 Method: 5035A

Sample ID: L19030638-02 MS File ID: 11M29833 Dil: 1 Matrix: 8260B

Sample ID: L19030638-03 MSD File ID: 11M29834 Dil: 1 Units: Water

ug/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
1,1-Dichloroethene	U	20.0	18.8	93.8	20.0	18.2	91.2	2.76	71 - 131	20	
1,2-Dichloroethane	U	20.0	20.0	100	20.0	20.1	100	0.224	73 - 128	20	
Acetone	3.56	20.0	18.1	72.6	20.0	18.4	74	1.47	39 - 160	20	
Chloroform	U	20.0	19.9	99.3	20.0	19.4	97	2.42	79 - 124	20	
cis-1,2-Dichloroethene	U	20.0	20.6	103	20.0	20.5	102	0.391	78 - 123	20	
Tetrachloroethene	U	20.0	19.5	97.5	20.0	19.4	97	0.543	74 - 129	20	
trans-1,2-Dichloroethene	U	20.0	20.0	99.9	20.0	19.7	98.5	1.42	75 - 124	20	
Trichloroethene	U	20.0	19.4	96.9	20.0	19.4	96.9	0.0217	79 - 123	20	
Vinyl chloride	U	20.0	14.4	72.2	20.0	14.2	70.9	1.78	58 - 137	20	

* FAILS %REC LIMIT

\# FAILS RPD LIMIT

MS_MSD - Modified 03/06/2008

PDF File ID: 6353090

Report generated 03/18/2019 16:24

Microbac Laboratories Inc.
ORGANIC INSTRUMENT CHECK

BFB

Login Number: L19030638
Instrument: HPMS11
Analyst: KFR
Workgroup: WG698264

Tune ID: WG698264-01
Run Date: 02/19/2019
Run Time: 10:43
File ID: 11M29623
Cal ID: HPMS11-18-FEB-19

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	24.8	6454	PASS
75.0	95.0	30.0	60.0	51.0	13278	PASS
95.0	95.0	100	100	100	26034	PASS
96.0	95.0	5.00	9.00	7.76	2021	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	83.6	21765	PASS
175	174	5.00	9.00	7.68	1671	PASS
176	174	95.0	101	99.3	21610	PASS
177	176	5.00	9.00	6.27	1355	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG696624-03	STD	01	02/19/2019 13:17	
WG696624-04	STD	01	02/19/2019 13:47	
WG696624-05	STD	01	02/19/2019 14:16	
WG696624-06	STD-CCV	01	02/19/2019 14:45	
WG696624-07	STD	01	02/19/2019 15:15	
WG696624-08	STD	01	02/19/2019 15:44	
WG696624-09	STD	01	02/19/2019 16:14	
WG696624-10	STD	01	02/19/2019 16:44	
WG696624-11	SSCV	01	02/19/2019 17:43	

* Sample past 12 hour tune limit

TUNE - Modified 03/06/2008
PDF File ID: 6344153
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
ORGANIC INSTRUMENT CHECK

BFB

Login Number: L19030638
Instrument: HPMS11
Analyst: KFR
Workgroup: WG698387

Tune ID: WG698387-01
Run Date: 03/05/2019
Run Time: 15:39
File ID: 11M29735
Cal ID: HPMS11-05-MAR-19

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	28.5	5208	PASS
75.0	95.0	30.0	60.0	55.0	10035	PASS
95.0	95.0	100	100	100	18251	PASS
96.0	95.0	5.00	9.00	5.67	1034	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	74.8	13653	PASS
175	174	5.00	9.00	8.31	1135	PASS
176	174	95.0	101	98.9	13499	PASS
177	176	5.00	9.00	6.20	837	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG698387-02	STD	01	03/05/2019 16:39	
WG698387-03	STD	01	03/05/2019 17:09	
WG698387-04	STD	01	03/05/2019 17:38	
WG698387-05	STD	01	03/05/2019 18:08	
WG698387-06	STD	01	03/05/2019 18:38	
WG698387-07	STD	01	03/05/2019 19:08	
WG698387-08	STD-CCV	01	03/05/2019 19:38	
WG698387-09	STD	01	03/05/2019 20:08	
WG698387-10	STD	01	03/05/2019 20:37	
WG698387-11	STD	01	03/05/2019 21:06	
WG698387-12	SSCV	01	03/05/2019 22:04	

* Sample past 12 hour tune limit

TUNE - Modified 03/06/2008
PDF File ID: 6344153
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
ORGANIC INSTRUMENT CHECK

BFB

Login Number: L19030638
Instrument: HPMS11
Analyst: KFR
Workgroup: WG699218

Tune ID: WG699218-01
Run Date: 03/12/2019
Run Time: 10:56
File ID: 11M29828
Cal ID: HPMS11-05-MAR-19

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	23.7	7906	PASS
75.0	95.0	30.0	60.0	52.2	17441	PASS
95.0	95.0	100	100	100	33392	PASS
96.0	95.0	5.00	9.00	6.51	2173	PASS
173	174	0	2.00	0	0	PASS
174	95.0	50.0	100	83.3	27800	PASS
175	174	5.00	9.00	7.67	2131	PASS
176	174	95.0	101	96.6	26850	PASS
177	176	5.00	9.00	6.71	1801	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG699218-02	CCV	01	03/12/2019 11:21	
WG699219-01	BLANK	01	03/12/2019 12:31	
WG699219-02	LCS	01	03/12/2019 13:00	
L19030638-02	SW1 MS	01	03/12/2019 13:30	
L19030638-03	SW1 MSD	01	03/12/2019 14:00	
L19030638-08	TB01	01	03/12/2019 14:59	
L19030638-01	SW1	01	03/12/2019 15:30	
WG699219-03	QCMRL	01	03/12/2019 22:39	

* Sample past 12 hour tune limit

TUNE - Modified 03/06/2008
PDF File ID: 6344153
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
ORGANIC INSTRUMENT CHECK

BFB

Login Number: L19030638
Instrument: HPMS8
Analyst: EEA
Workgroup: WG684281

Tune ID: WG684281-01
Run Date: 11/12/2018
Run Time: 13:12
File ID: 8M427929
Cal ID: HPMS8-12-NOV-18

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	22.0	18596	PASS
75.0	95.0	30.0	60.0	48.9	41416	PASS
95.0	95.0	100	100	100	84642	PASS
96.0	95.0	5.00	9.00	6.98	5906	PASS
173	174	0	2.00	0.256	193	PASS
174	95.0	50.0	100	89.2	75469	PASS
175	174	5.00	9.00	7.05	5319	PASS
176	174	95.0	101	99.7	75216	PASS
177	176	5.00	9.00	6.87	5164	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG684281-02	STD	01	11/12/2018 13:37	
WG684281-03	STD	01	11/12/2018 14:06	
WG684281-04	STD	01	11/12/2018 14:34	
WG684281-05	STD-CCV	01	11/12/2018 15:03	
WG684281-06	STD	01	11/12/2018 15:31	
WG684281-07	STD	01	11/12/2018 15:59	
WG684281-08	STD	01	11/12/2018 16:28	
WG684281-09	STD	01	11/12/2018 16:57	
WG684281-10	SSCV	01	11/12/2018 17:54	

* Sample past 12 hour tune limit

TUNE - Modified 03/06/2008
PDF File ID: 6344153
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
ORGANIC INSTRUMENT CHECK

BFB

Login Number: L19030638
Instrument: HPMS8
Analyst: EEA
Workgroup: WG698192

Tune ID: WG698192-01
Run Date: 03/04/2019
Run Time: 11:54
File ID: 8M428954
Cal ID: HPMS8 -

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	20.6	13778	PASS
75.0	95.0	30.0	60.0	45.4	30314	PASS
95.0	95.0	100	100	100	66746	PASS
96.0	95.0	5.00	9.00	6.45	4307	PASS
173	174	0	2.00	0.231	137	PASS
174	95.0	50.0	100	88.7	59210	PASS
175	174	5.00	9.00	7.60	4497	PASS
176	174	95.0	101	98.1	58093	PASS
177	176	5.00	9.00	6.48	3763	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG698192-02	STD	01	03/04/2019 12:45	
WG698192-03	STD	01	03/04/2019 13:15	
WG698192-04	STD	01	03/04/2019 13:43	
WG698192-05	STD	01	03/04/2019 14:12	
WG698192-06	STD	01	03/04/2019 14:42	
WG698192-07	STD	01	03/04/2019 15:11	
WG698192-08	STD-CCV	01	03/04/2019 15:40	
WG698192-09	STD	01	03/04/2019 16:09	
WG698192-10	STD	01	03/04/2019 16:38	
WG698192-11	STD	01	03/04/2019 17:07	
WG698192-12	SSCV	01	03/04/2019 18:06	

* Sample past 12 hour tune limit

TUNE - Modified 03/06/2008
PDF File ID: 6344153
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
ORGANIC INSTRUMENT CHECK

BFB

Login Number: L19030638
Instrument: HPMS8
Analyst: EEA
Workgroup: WG699027

Tune ID: WG699027-01
Run Date: 03/11/2019
Run Time: 08:56
File ID: 8M429060
Cal ID: HPMS8-04-MAR-19

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50.0	95.0	15.0	40.0	21.3	11408	PASS
75.0	95.0	30.0	60.0	45.9	24533	PASS
95.0	95.0	100	100	100	53437	PASS
96.0	95.0	5.00	9.00	7.71	4118	PASS
173	174	0	2.00	0.392	184	PASS
174	95.0	50.0	100	87.8	46904	PASS
175	174	5.00	9.00	7.10	3330	PASS
176	174	95.0	101	95.1	44586	PASS
177	176	5.00	9.00	7.15	3188	PASS

This check relates to the following samples:

Lab ID	Client ID	Tag	Date Analyzed	Q
WG699027-02	CCV	01	03/11/2019 09:19	
WG699028-01	BLANK	01	03/11/2019 10:41	
WG699028-02	LCS	01	03/11/2019 11:09	
WG699028-03	LCS2	01	03/11/2019 11:38	
L19030638-04	SW2	01	03/11/2019 17:01	
L19030638-05	SW3	01	03/11/2019 17:30	
L19030638-06	SW4	01	03/11/2019 17:59	
L19030638-07	DUP01	01	03/11/2019 18:28	
WG699028-04	QCMRL	01	03/11/2019 20:23	
WG698729-01	FBLK1	DL01	03/11/2019 21:20	*

* Sample past 12 hour tune limit

TUNE - Modified 03/06/2008
PDF File ID: 6344153
Report generated 03/16/2019 10:29

Calibration Table Report
Method: A9FOOWT.M
Title: Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Calibration: Wed Feb 20 09:41:04 2019
Curve: WG696624
Calibration Files

Compound	5 11M29628.D	20 11M29629.D	50 11M29630.D	100 11M29631.D	200 11M29632.D	300 11M29633.D	400 11M29634.D	500 11M29635.D	Avg	%RSD	R^2 Linear	R^2 Quadratic
Fluorobenzene	ISTD											
Acetonitrile	0.037	0.043	0.039	0.036	0.034	0.036	0.035	0.036	0.037	8.060		
3-Chloro-1-propene	0.526	0.498	0.507	0.514	0.466	0.445	0.414	0.391	0.470	10.567		
2-Chloro-1,3-butadiene	0.594	0.553	0.561	0.595	0.533	0.508	0.469	0.439	0.531	10.635		
Methacrylonitrile	0.245	0.218	0.221	0.216	0.198	0.216	0.204	0.202	0.215	6.918		
Isobutyl Alcohol			0.015	0.014	0.014	0.016	0.015		0.015	6.329		
1-Butanol	0.006	0.008	0.008	0.009	0.008	0.009	0.009	0.009	0.008	11.670		
Cyclohexanone		0.023	0.021	0.021	0.020	0.021	0.020	0.021	0.021	5.842		
2-Nitropropane	0.100	0.090	0.095	0.096	0.093	0.104	0.104	0.103	0.098	5.484		
Ethyl Acetate	0.302	0.301	0.304	0.298	0.272	0.290	0.272	0.261	0.288	5.855		
Methyl methacrylate	0.307	0.285	0.293	0.287	0.262	0.273	0.256	0.245	0.276	7.559		
Chlorobenzene-d5	ISTD											
1,4-Dichlorobenzene-d4	ISTD											

Wed Feb 20 09:42:09 2019

Calibration Table Report
Method: 8260WT.M
Title: 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Calibration: Wed Mar 06 14:13:24 2019
Curve: WG698387
Calibration Files

Compound	0.3 11M29737.D	0.4 11M29738.D	1 11M29739.D	2 11M29740.D	5 11M29741.D	20 11M29742.D	50 11M29743.D	100 11M29744.D	200 11M29745.D	300 11M29746.D	Avg	%RSD	Linear R^2	Quadratic R^2
Fluorobenzene	ISTD													
Dichlorodifluoromethane			0.348	0.350	0.330	0.401	0.404	0.381	0.371		0.369	7.615		
Chloromethane		0.901	0.771	0.748	0.686	0.718	0.679	0.620	0.550		0.709	14.773		
Vinyl Chloride		0.596	0.529	0.558	0.526	0.565	0.543	0.490	0.430		0.530	9.622		
1,3-Butadiene			0.545	0.497	0.305	0.255	0.202	0.182	0.174	0.163	0.290	51.794	0.992	
Bromomethane			0.230	0.218	0.197	0.197	0.186	0.189	0.202		0.203	7.837		
Chloroethane			0.205	0.193	0.190	0.213	0.213	0.207	0.212		0.205	4.665		
Trichlorofluoromethane		0.464	0.480	0.513	0.488	0.516	0.527	0.512	0.509		0.501	4.218		
Diethyl ether			0.265	0.269	0.266	0.247	0.240	0.269		0.279	0.262	5.252		
Isoprene			0.365	0.366	0.363	0.403	0.410	0.416	0.412	0.423	0.395	6.470		
Acrolein				0.045	0.046	0.044	0.045	0.046		0.047	0.045	2.821		
1,1,2-Trichloro-1,2,2-Trifluoroet			0.224	0.236	0.229	0.256	0.263	0.254	0.260		0.246	6.393		
Acetone					0.100	0.099	0.093	0.085	0.088	0.083	0.091	7.863		
1,1-Dichloroethene		0.417	0.497	0.453	0.474	0.503	0.503	0.495	0.485		0.478	6.261		
Tert-Butyl Alcohol				0.023	0.024	0.026	0.025	0.027		0.029	0.025	8.004		
Dimethyl Sulfide			0.298	0.285	0.306	0.328	0.329	0.326	0.330	0.328	0.316	5.493		
Iodomethane				0.168	0.184	0.283	0.335	0.325	0.344		0.273	28.636	0.998	
Methyl acetate				0.162	0.189	0.200	0.204	0.203	0.209	0.213	0.197	8.753		
Methylene Chloride			0.254	0.255	0.260	0.274	0.274	0.272	0.277		0.267	3.702		
Carbon Disulfide			0.710	0.723	0.725	0.800	0.794	0.776	0.719	0.632	0.735	7.476		
Acrylonitrile			0.083	0.100	0.101	0.102	0.110	0.110		0.099	0.101	8.767		
Methyl Tert Butyl Ether		0.766	0.740	0.738	0.731	0.779	0.784	0.766	0.743		0.756	2.681		
trans-1,2-Dichloroethene		0.217	0.239	0.253	0.252	0.274	0.279	0.277	0.283		0.259	8.917		
n-Hexane				0.378	0.369	0.400	0.413	0.414	0.420	0.400	0.399	4.760		
Diisopropyl ether			1.021	1.041	1.034	0.961	0.910	0.974		0.878	0.974	6.485		
Vinyl Acetate					0.219	0.326	0.348	0.339	0.394	0.343	0.328	17.719	0.995	
1,1-Dichloroethane		0.562	0.557	0.540	0.542	0.588	0.589	0.583	0.564		0.566	3.441		
Ethyl-Tert-Butyl ether			1.021	1.051	1.034	0.978	0.938	0.984		0.887	0.985	5.842		
2-Butanone				0.106	0.108	0.125	0.122	0.117	0.117	0.120	0.116	5.983		
Propionitrile			0.029	0.036	0.035	0.037	0.037	0.035		0.028	0.034	11.563		
2,2-Dichloropropane			0.342	0.389	0.358	0.407	0.412	0.418	0.412		0.391	7.647		
cis-1,2-Dichloroethene		0.234	0.284	0.288	0.284	0.316	0.315	0.316	0.317		0.294	9.793		
Chloroform		0.581	0.482	0.492	0.494	0.523	0.521	0.515	0.498		0.513	6.027		
1-Bromopropane					0.055	0.065	0.065	0.064	0.066	0.067	0.064	6.952		
Bromochloromethane			0.123	0.161	0.172	0.185	0.189	0.185	0.191		0.173	14.001		
Tetrahydrofuran			0.092	0.074	0.072	0.072	0.073	0.073		0.073	0.075	9.560		
Dibromofluoromethane					0.289	0.269	0.301	0.298	0.286		0.289	4.386		
1,1,1-Trichloroethane		0.425	0.412	0.444	0.439	0.482	0.498	0.509	0.510		0.465	8.485		
Cyclohexane			0.541	0.537	0.515	0.557	0.575	0.572	0.571	0.533	0.550	3.968		
1,1-Dichloropropene			0.307	0.346	0.330	0.356	0.370	0.370	0.367		0.349	6.762		
Carbon Tetrachloride			0.304	0.355	0.355	0.404	0.439	0.460	0.449		0.395	14.848		
Tert-Amyl-Methyl ether			0.73	0.776	0.761	0.725	0.708	0.751		0.69	0.7344	4.1499		
1,2-Dichloroethane-d4					0.363	0.323	0.36	0.351	0.335		0.3463	4.8933		
1,2-Dichloroethane	0.406	0.433	0.427	0.451	0.454	0.466	0.471	0.461	0.445		0.4461	4.6706		
Benzene		1.09	1.001	1.093	1.015	1.085	1.088	1.04	0.899		1.0386	6.4759		
Trichloroethene	0.287	0.258	0.279	0.302	0.284	0.304	0.312	0.314	0.311		0.2946	6.4663		
Methylcyclohexane			0.385	0.389	0.388	0.426	0.433	0.435	0.437	0.427	0.415	5.6404		
1,2-Dichloropropane		0.27	0.297	0.32	0.291	0.323	0.321	0.322	0.324		0.3085	6.541		
1,4-Dioxane					0.002	0.002	0.002	0.002		0.002	0.0021	5.7317		
Bromodichloromethane		0.319	0.315	0.323	0.349	0.392	0.408	0.407	0.404		0.3646	11.576		
Dibromomethane			0.15	0.165	0.177	0.183	0.188	0.184	0.187		0.1762	7.9773		
2-Chloroethyl Vinyl Ether					0.114	0.142	0.153	0.154	0.163	0.169	0.1493	13.144		
4-Methyl-2-Pentanone					0.095	0.11	0.111	0.104	0.106	0.111	0.1064	5.7105		
cis-1,3-Dichloropropene		0.394	0.355	0.372	0.39	0.437	0.451	0.448	0.44		0.4109	9.1114		
Dimethyl Disulfide					0.17	0.244	0.267	0.28	0.292		0.2509	19.253	0.999	
Chlorobenzene-d5	ISTD													
Toluene-d8					1.314	1.167	1.296	1.268	1.176		1.2442	5.4772		
Toluene		1.556	1.487	1.45	1.547	1.589	1.573	1.474	1.172		1.481	9.0786		
Ethyl Methacrylate			0.335	0.364	0.389	0.451	0.456	0.451	0.444	0.456	0.4183	11.541		
trans-1,3-Dichloropropene			0.409	0.432	0.451	0.507	0.536	0.538	0.522		0.4849	10.97		
1,1,2-Trichloroethane		0.364	0.291	0.293	0.299	0.324	0.325	0.314	0.313		0.3153	7.472		
2-Hexanone				0.189	0.23	0.251	0.252	0.238	0.237	0.243	0.2343	9.1319		
1,3-Dichloropropane	0.447	0.504	0.535	0.505	0.501	0.536	0.534	0.519	0.497		0.5087	5.4558		
Tetrachloroethene			0.304	0.287	0.295	0.321	0.327	0.328	0.337		0.3141	6.0162		
Dibromochloromethane				0.299	0.304	0.365	0.395	0.393	0.397		0.3589	12.849		
1,2-Dibromoethane			0.287	0.281	0.286	0.312	0.323	0.314	0.312		0.3022	5.638		
1-Chlorohexane			0.442	0.445	0.455	0.502	0.52	0.518	0.52	0.51	0.4889	7.1805		
Chlorobenzene	1.088	1.097	0.984	0.957	0.986	1.061	1.092	1.065	0.95		1.0311	5.8969		
1,1,1,2-Tetrachloroethane				0.319	0.333	0.398	0.439	0.459	0.484		0.4053	16.74	0.992	
Ethylbenzene	0.456	0.461	0.497	0.484	0.507	0.54	0.576	0.592	0.607		0.5245	10.808		
m-,p-Xylene	0.581	0.584	0.607	0.601	0.601	0.661	0.685	0.652	0.727		0.6332	7.9869		
o-Xylene	0.524	0.6	0.565	0.617	0.595	0.649	0.673	0.659	0.648		0.6144	7.9247		
Styrene		0.947	0.918	0.982	1.001	1.096	1.144	1.088	0.954		1.0163	8.0974		
Bromoform			0.148	0.172	0.166	0.225	0.26	0.257	0.267		0.2137	23.656	0.998	
Isopropylbenzene	1.521	1.621	1.535	1.52	1.56	1.676	1.696	1.514	1.2		1.5381	9.3868		
1,4-Dichlorobenzene-d4	ISTD													
1,1,2,2-Tetrachloroethane		0.479	0.626	0.633	0.665	0.713	0.756	0.667	0.679		0.6522	12.485		
p-Bromofluorobenzene					0.987	0.875	1.037	0.965	0.919		0.9567	6.5367		
1,2,3-Trichloropropane			0.17	0.227	0.215	0.233	0.241	0.221	0.217		0.2178	10.565		
trans-1,4-Dichloro-2-Butene			0.232	0.208	0.264	0.286	0.306	0.296	0.307	0.298	0.2746	13.421		

n-Propylbenzene		3.825	3.77	3.713	3.979	4.105	4.125	3.44	2.537		3.6868	13.987
Bromobenzene		0.869	0.845	0.84	0.914	0.917	0.985	0.926	0.907		0.9004	5.3071
1,3,5-Trimethylbenzene	2.444	2.76	2.567	2.602	2.729	2.816	2.939	2.595	2.102		2.6173	9.3004
2-Chlorotoluene		2.791	2.593	2.652	2.771	2.747	2.852	2.531	2.051		2.6234	9.7295
4-Chlorotoluene		2.209	2.257	2.181	2.217	2.259	2.376	2.079	1.671		2.1561	9.8709
a-Methylstyrene			1.286	1.405	1.435	1.633	1.665	1.606	1.48	1.412	1.4903	8.8698
tert-Butylbenzene			0.621	0.602	0.64	0.651	0.678	0.649	0.671		0.6446	4.1475
1,2,4-Trimethylbenzene	2.622	2.831	2.707	2.685	2.733	2.931	3.026	2.648	2.129		2.7013	9.3786
sec-Butylbenzene		3.222	3.208	3.421	3.342	3.58	3.665	3.13	2.427		3.2493	11.711
p-Isopropyltoluene	2.717	2.754	2.893	2.8	2.944	3.105	3.213	2.78	2.222		2.8254	9.9368
1,3-Dichlorobenzene	1.652	1.678	1.536	1.654	1.654	1.715	1.834	1.687	1.538		1.6609	5.4265
1,4-Dichlorobenzene	1.616	1.673	1.609	1.601	1.643	1.724	1.845	1.687	1.529		1.6586	5.4208
n-Butylbenzene		2.507	2.421	2.436	2.552	2.777	2.967	2.604	2.106		2.5463	10.032
1,2-Dichlorobenzene	1.577	1.517	1.558	1.554	1.603	1.656	1.769	1.608	1.485		1.5919	5.2505
1,2-Dibromo-3-Chloropropane					0.11	0.128	0.151	0.138	0.146		0.1347	11.997
1,2,4-Trichlorobenzene			0.87	0.93	0.954	1.053	1.153	1.113	1.136		1.0298	10.885
Hexachlorobutadiene			0.39	0.472	0.512	0.533	0.57	0.554	0.601		0.519	13.554
Naphthalene		2.268	2.064	2.103	2.131	2.326	2.549	2.282	1.916		2.205	8.7724
1,2,3-Trichlorobenzene		0.882	0.914	0.878	0.875	0.969	1.089	1.055	1.078		0.9675	9.6848

Wed Mar 06 14:13:53 2019

Calibration Table Report
Method: A9FOOWT.M
Title: A9-FOO Water SOP:MSV01 111218 HPMS8
Last Calibration: Tue Nov 13 11:28:33 2018
Curve: WG684281
Calibration Files

Compound	5 8M427930.D	20 8M427931.D	50 8M427932.D	100 8M427933.D	200 8M427934.D	300 8M427935.D	400 8M427936.D	500 8M427937.D	Avg	%RSD
Fluorobenzene	ISTD									
Acetonitrile		0.021	0.023	0.021	0.025	0.025	0.023	0.025	0.023	7.012
3-Chloro-1-propene	0.440	0.458	0.460	0.474	0.478	0.476	0.447	0.426	0.457	4.070
2-Chloro-1,3-butadiene	0.415	0.459	0.466	0.479	0.489	0.487	0.460	0.438	0.462	5.466
Ethyl Acetate		0.183	0.202	0.208	0.222	0.227	0.212	0.216	0.210	6.943
Methacrylonitrile	0.076	0.086	0.094	0.097	0.102	0.105	0.100	0.103	0.095	10.375
Isobutyl Alcohol			0.007	0.006	0.007	0.007	0.007	0.008	0.007	10.078
1-Butanol									0.000	0.000
Methyl methacrylate	0.150	0.178	0.196	0.209	0.225	0.232	0.219	0.222	0.204	13.626
2-Nitropropane		0.052	0.062	0.067	0.076	0.079	0.076	0.079	0.070	14.773
Chlorobenzene-d5	ISTD									
1,4-Dichlorobenzene-d4	ISTD									
Cyclohexanone			0.023	0.022	0.027	0.028	0.025	0.028	0.026	9.715

Tue Nov 13 12:22:27 2018

Calibration Table Report
Method: 8260WTR.M
Title: Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Calibration: Mon Mar 04 17:44:12 2019
Curve: WG698192
Calibration Files

Compound	0.3 8M428956.D	0.4 8M428957.D	1 8M428958.D	2 8M428959.D	5 8M428960.D	20 8M428961.D	50 8M428962.D	100 8M428963.D	200 8M428964.D	300 8M428965.D	Avg	%RSD	r^2 Linear	 Quadratic
Fluorobenzene	ISTD													
Dichlorodifluoromethane			0.379	0.399	0.396	0.501	0.488	0.438	0.443		0.435	10.795		
Chloromethane			0.693	0.702	0.643	0.663	0.611	0.535	0.531		0.625	11.194		
Vinyl Chloride		0.464	0.482	0.521	0.507	0.559	0.543	0.492			0.510	6.668		
1,3-Butadiene					0.442	0.400	0.325	0.272	0.273	0.263	0.329	22.926	0.995	
Bromomethane			0.311	0.357	0.342	0.324	0.282	0.259	0.272		0.307	12.069		
Chloroethane			0.235	0.269	0.275	0.292	0.290	0.270	0.277		0.273	7.015		
Trichlorofluoromethane		0.471	0.479	0.520	0.518	0.571	0.559	0.507	0.514		0.517	6.710		
Diethyl ether			0.241	0.288	0.281	0.293	0.283	0.267		0.279	0.276	6.331		
Isoprene				0.499	0.508	0.535	0.544	0.502	0.514	0.519	0.517	3.251		
Acrolein				0.030	0.029	0.032	0.033	0.032		0.034	0.032	5.791		
1,1,2-Trichloro-1,2,2-Trifluoroet			0.264	0.288	0.300	0.324	0.319	0.291	0.300		0.298	6.728		
Acetone					0.069	0.083	0.082	0.076	0.077	0.074	0.077	6.846		
1,1-Dichloroethene		0.511	0.504	0.542	0.545	0.571	0.559	0.512	0.521		0.533	4.600		
Tert-Butyl Alcohol				0.027	0.024	0.026	0.023	0.024		0.025	0.025	6.414		
Dimethyl Sulfide				0.371	0.366	0.400	0.404	0.375	0.384	0.388	0.384	3.701		
Iodomethane			0.054	0.067	0.110	0.284	0.414	0.403	0.404		0.248	67.275	0.993	
Methyl acetate					0.171	0.201	0.205	0.198	0.211	0.211	0.199	7.458		
Methylene Chloride			0.299	0.345	0.344	0.355	0.345	0.318	0.326		0.333	5.907		
Carbon Disulfide			0.973	1.026	1.011	1.069	1.064	0.970	0.954	0.909	0.997	5.575		
Acrylonitrile				0.087	0.089	0.103	0.102	0.101		0.099	0.097	7.358		
Methyl Tert Butyl Ether			0.725	0.817	0.793	0.858	0.819	0.763	0.777		0.793	5.465		
trans-1,2-Dichloroethene		0.479	0.481	0.515	0.518	0.546	0.538	0.496	0.503		0.509	4.824		
n-Hexane			0.475	0.500	0.495	0.526	0.525	0.482	0.506	0.490	0.500	3.736		
Diisopropyl ether			1.159	1.346	1.305	1.351	1.311	1.185		1.172	1.261	6.787		
Vinyl Acetate					0.436	0.496	0.480	0.470	0.439	0.487	0.468	5.352		
1,1-Dichloroethane		0.624	0.624	0.681	0.667	0.708	0.691	0.637	0.637		0.659	4.919		
Ethyl-Tert-Butyl ether			0.997	1.151	1.116	1.156	1.118	1.020			1.093	6.231		
2-Butanone					0.096	0.118	0.119	0.111	0.119	0.117	0.113	7.905		
Propionitrile			0.006	0.027	0.031	0.036	0.035	0.034		0.037	0.029	37.074	0.999	
2,2-Dichloropropane			0.456	0.498	0.490	0.511	0.496	0.446	0.448		0.478	5.593		
cis-1,2-Dichloroethene		0.314	0.340	0.369	0.375	0.399	0.388	0.359	0.365		0.364	7.419		
Chloroform	0.654	0.582	0.564	0.585	0.577	0.616	0.592	0.545	0.546		0.585	5.881		
1-Bromopropane				0.069	0.075	0.082	0.083	0.077	0.080	0.080	0.078	6.256		
Bromochloromethane			0.172	0.204	0.210	0.227	0.221	0.206	0.212		0.207	8.443		
Tetrahydrofuran			0.073	0.081	0.074	0.082	0.077	0.073		0.075	0.076	5.141		
Dibromofluoromethane					0.244	0.240	0.261	0.259	0.242		0.249	4.013		
1,1,1-Trichloroethane			0.452	0.510	0.522	0.546	0.539	0.490	0.495		0.508	6.302		
Cyclohexane			0.627	0.674	0.691	0.710	0.717	0.654	0.673	0.664	0.676	4.374		
1,1-Dichloropropene		0.354	0.404	0.440	0.446	0.465	0.456	0.421	0.425		0.426	8.233		
Tert-Amyl-Methyl ether			0.745	0.878	0.853	0.885	0.853	0.783			0.833	6.736		
Carbon Tetrachloride			0.42	0.455	0.464	0.497	0.49	0.45	0.453		0.46134	5.67645		
1,2-Dichloroethane-d4					0.237	0.243	0.258	0.253	0.239		0.24601	3.71655		
Heptane											0	0		
1,2-Dichloroethane		0.339	0.385	0.409	0.409	0.442	0.426	0.393	0.395		0.3998	7.73245		
Benzene		1.295	1.259	1.398	1.393	1.462	1.406	1.268	1.202		1.33547	6.82851		
Trichloroethene	0.375	0.316	0.34	0.361	0.377	0.392	0.388	0.357	0.368		0.36384	6.57282		
Methylcyclohexane			0.525	0.567	0.587	0.598	0.591	0.536	0.558	0.546	0.56348	4.76329		
1,2-Dichloropropane		0.318	0.325	0.381	0.367	0.393	0.391	0.358	0.367		0.36249	7.75569		
Bromodichloromethane		0.377	0.364	0.43	0.428	0.462	0.452	0.418	0.425		0.41972	8.03818		
1,4-Dioxane				0.002	0.002	0.002	0.002	0.002		0.002	0.00204	13.6522		
Dibromomethane			0.142	0.165	0.169	0.183	0.174	0.164	0.17		0.16685	7.43399		
2-Chloroethyl Vinyl Ether					0.128	0.154	0.164	0.159	0.173	0.173	0.15839	10.5996		
4-Methyl-2-Pentanone					0.079	0.1	0.103	0.101	0.109	0.106	0.09965	10.9254		
cis-1,3-Dichloropropene		0.432	0.454	0.485	0.498	0.557	0.547	0.507	0.514		0.49934	8.55427		
Dimethyl Disulfide					0.272	0.313	0.324	0.303	0.315	0.312	0.30664	5.9179		
Chlorobenzene-d5	ISTD													
Toluene-d8					1.352	1.252	1.319	1.282	1.162		1.27345	5.72054		
Toluene		1.823	1.799	1.984	2.022	2.058	1.94	1.733	1.575		1.8666	8.80527		
Ethyl Methacrylate			0.264	0.384	0.413	0.492	0.493	0.468	0.489	0.492	0.43707	18.547	1.000	
Paraldehyde											0	0		
trans-1,3-Dichloropropene			0.458	0.536	0.577	0.626	0.603	0.563	0.564		0.56117	9.63234		
1,1,2-Trichloroethane		0.276	0.299	0.339	0.343	0.363	0.346	0.319	0.325		0.32628	8.57325		
2-Hexanone					0.072	0.122	0.129	0.128	0.142	0.141	0.12236	20.9232	0.999	
1,3-Dichloropropane		0.475	0.517	0.587	0.591	0.64	0.588	0.549	0.55		0.56193	9.06418		
Tetrachloroethene		0.364	0.371	0.408	0.418	0.419	0.408	0.377	0.382		0.39336	5.65135		
Dibromochloromethane			0.35	0.403	0.415	0.45	0.442	0.416	0.423		0.4141	7.87795		
1,2-Dibromoethane		0.249	0.28	0.321	0.336	0.358	0.341	0.321	0.329		0.31683	11.1504		
1-Chlorohexane			0.609	0.625	0.676	0.68	0.679	0.625	0.638	0.642	0.64683	4.313		
Chlorobenzene	1.418	1.188	1.208	1.309	1.322	1.352	1.287	1.176	1.128		1.26541	7.53272		
1,1,1,2-Tetrachloroethane			0.399	0.48	0.464	0.502	0.489	0.461	0.461		0.46523	7.07824		
Ethylbenzene	0.627	0.643	0.639	0.718	0.715	0.744	0.728	0.677	0.67		0.68465	6.31414		
m-,p-Xylene	0.862	0.806	0.799	0.857	0.886	0.91	0.872	0.792	0.725		0.83421	6.93508		
o-Xylene	0.773	0.727	0.726	0.835	0.842	0.894	0.868	0.815	0.806		0.80945	7.25366		
Styrene			1.161	1.309	1.361	1.481	1.443	1.34	1.286		1.34009	7.85616		
Bromoform			0.202	0.227	0.244	0.283	0.281	0.271	0.29		0.25676	12.9003		
Isopropylbenzene		1.89	1.969	2.151	2.205	2.264	2.176	1.945	1.756		2.04451	8.7673		
1,4-Dichlorobenzene-d4	ISTD													
1,1,2,2-Tetrachloroethane		0.641	0.626	0.772	0.74	0.784	0.719	0.684	0.677		0.7053	8.24185		
p-Bromofluorobenzene					0.924	0.875	0.939	0.932	0.841		0.90228	4.71386		

1,2,3-Trichloropropane			0.168	0.221	0.221	0.233	0.221	0.205	0.208		0.21099	10.1005
trans-1,4-Dichloro-2-Butene				0.205	0.233	0.249	0.249	0.239	0.247	0.246	0.23843	6.59335
n-Propylbenzene		4.572	4.432	4.971	4.973	5.031	4.724	4.094	3.397		4.5243	12.2898
Bromobenzene		0.878	0.953	1.126	1.128	1.128	1.079	1.005	0.984		1.03519	9.11264
1,3,5-Trimethylbenzene		2.984	3.19	3.573	3.577	3.552	3.435	3.067	2.714		3.26143	9.90939
2-Chlorotoluene		2.658	3.069	2.941	3.458	3.365	3.144	2.784	2.513		2.99144	11.102
4-Chlorotoluene		2.485	2.528	3.162	2.759	2.813	2.651	2.397	2.116		2.61382	11.9401
a-Methylstyrene				1.804	1.927	1.941	2.011	1.872	1.782	1.763	1.87148	4.95057
tert-Butylbenzene			0.679	0.778	0.809	0.802	0.77	0.72	0.71		0.75242	6.61504
1,2,4-Trimethylbenzene		3.122	3.099	3.555	3.641	3.648	3.501	3.118	2.732		3.30188	10.0521
sec-Butylbenzene		4.009	4.079	4.513	4.615	4.629	4.39	3.879	3.277		4.17398	11.0555
p-Isopropyltoluene		3.396	3.4	3.854	3.91	3.981	3.804	3.373	2.906		3.57808	10.338
1,3-Dichlorobenzene		1.944	1.916	2.132	2.189	2.161	2.075	1.924	1.803		2.01804	6.93274
1,4-Dichlorobenzene		2.16	1.959	2.124	2.155	2.173	2.08	1.908	1.791		2.04364	6.91852
n-Butylbenzene		3.285	3.043	3.372	3.518	3.601	3.472	3.098	2.693		3.26014	9.23843
1,2-Dichlorobenzene	1.863	1.846	1.826	1.938	1.986	2.008	1.926	1.784	1.677		1.87269	5.58313
1,2-Dibromo-3-Chloropropane				0.114	0.122	0.14	0.132	0.126	0.129		0.12712	6.88681
1,2,4-Trichlorobenzene		1.35	1.238	1.374	1.374	1.466	1.427	1.334	1.306		1.35883	5.18072
Hexachlorobutadiene		0.601	0.569	0.667	0.662	0.687	0.677	0.634	0.624		0.64028	6.38782
Naphthalene		2.132	2.329	2.596	2.61	2.803	2.656	2.439	2.253		2.47706	9.19022
1,2,3-Trichlorobenzene		1.176	1.168	1.314	1.276	1.347	1.302	1.208	1.195		1.24827	5.5729

Tue Mar 05 10:59:07 2019

Microbac Laboratories Inc.
ALTERNATE SOURCE CALIBRATION REPORT

Login Number: L19030638 Run Date: 03/05/2019 Sample ID: WG698387-12
Instrument ID: HPMS11 Run Time: 22:04 Method: 8260B
File ID: 11M29748 Analyst: KFR QC Key: DOD5
ICal Workgroup: WG698387 Cal ID: HPMS11 - 05-MAR-19

Analyte		Expected	Found	Units	RF	%D	UCL	Q
1,1-Dichloroethene	CCC	50.0	51.2	ug/L	0.490	2.40	20	
Chloroform	CCC	50.0	51.1	ug/L	0.524	2.10	20	
Vinyl Chloride	CCC	50.0	45.2	ug/L	0.478	9.70	20	
Bromoform	SPCC	50.0	46.7	ug/L	0.241	6.70	20	
Chloromethane	SPCC	50.0	43.4	ug/L	0.615	13.3	20	
1,1-Dichloroethane	SPCC	50.0	51.4	ug/L	0.581	2.80	20	
Chlorobenzene	SPCC	50.0	52.6	ug/L	1.08	5.20	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	49.9	ug/L	0.651	0.200	20	
1,2-Dichloroethane		50.0	52.1	ug/L	0.465	4.10	20	
Acetone		50.0	44.2	ug/L	0.0808	11.6	20	
cis-1,2-Dichloroethene		50.0	53.2	ug/L	0.313	6.30	20	
Tetrachloroethene		50.0	51.7	ug/L	0.325	3.40	20	
trans-1,2-Dichloroethene		50.0	52.6	ug/L	0.273	5.30	20	
Trichloroethene		50.0	54.3	ug/L	0.320	8.60	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

ALT - Modified 09/06/2007
Version 1.5 PDF File ID: 6344152
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
ALTERNATE SOURCE CALIBRATION REPORT

Login Number: L19030638 Run Date: 03/04/2019 Sample ID: WG698192-12
Instrument ID: HPMS8 Run Time: 18:06 Method: 8260B
File ID: 8M428967 Analyst: EEA QC Key: DOD5
ICal Workgroup: WG698192 Cal ID: HPMS8 - 04-MAR-19

Analyte		Expected	Found	Units	RF	%D	UCL	Q
1,1-Dichloroethene	CCC	50.0	51.6	ug/L	0.550	3.10	20	
Chloroform	CCC	50.0	51.7	ug/L	0.604	3.40	20	
Vinyl Chloride	CCC	50.0	44.8	ug/L	0.457	10.4	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	47.6	ug/L	0.671	4.80	20	
Bromoform	SPCC	50.0	55.7	ug/L	0.286	11.4	20	
Chloromethane	SPCC	50.0	49.0	ug/L	0.613	2.00	20	
1,1-Dichloroethane	SPCC	50.0	53.0	ug/L	0.698	5.90	20	
Chlorobenzene	SPCC	50.0	53.8	ug/L	1.36	7.50	20	
1,2-Dichloroethane		50.0	53.5	ug/L	0.428	7.00	20	
Acetone		50.0	46.4	ug/L	0.0714	7.30	20	
cis-1,2-Dichloroethene		50.0	54.6	ug/L	0.397	9.20	20	
Tetrachloroethene		50.0	53.7	ug/L	0.423	7.40	20	
trans-1,2-Dichloroethene		50.0	53.3	ug/L	0.543	6.60	20	
Trichloroethene		50.0	57.0	ug/L	0.415	13.9	20	

* Exceeds %D Limit

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

ALT - Modified 09/06/2007
Version 1.5 PDF File ID: 6344152
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L19030638 Run Date: 03/11/2019 Sample ID: WG699027-02
Instrument ID: HPMS8 Run Time: 09:19 Method: 8260B
File ID: 8M429061 Analyst: EEA QC Key: DOD5
Workgroup (AAB#): WG699028 Cal ID: HPMS8 - 04-MAR-19
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
1,2-Dichloropropane	CCC	50.0	48.0	ug/L	0.348	4.04	20	
Ethylbenzene	CCC	50.0	47.7	ug/L	0.653	4.58	20	
Toluene	CCC	50.0	46.1	ug/L	1.72	7.73	20	
1,1-Dichloroethene	CCC	50.0	46.6	ug/L	0.497	6.82	20	
Chloroform	CCC	50.0	45.3	ug/L	0.530	9.31	20	
Vinyl Chloride	CCC	50.0	46.6	ug/L	0.475	6.85	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	44.7	ug/L	0.630	10.6	20	
1,1-Dichloroethane	SPCC	50.0	46.6	ug/L	0.613	6.88	20	
Bromoform	SPCC	50.0	47.3	ug/L	0.243	5.34	20	
Chlorobenzene	SPCC	50.0	45.1	ug/L	1.14	9.71	20	
Chloromethane	SPCC	50.0	42.1	ug/L	0.526	15.8	20	
1,2-Dichloroethane		50.0	46.8	ug/L	0.374	6.44	20	
Acetone		50.0	40.0	ug/L	0.0616	20.0	20	
cis-1,2-Dichloroethene		50.0	47.6	ug/L	0.346	4.90	20	
Tetrachloroethene		50.0	46.3	ug/L	0.364	7.36	20	
trans-1,2-Dichloroethene		50.0	47.2	ug/L	0.481	5.64	20	
Trichloroethene		50.0	45.7	ug/L	0.333	8.55	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

CCV - Modified 03/05/2008
PDF File ID: 6344154
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L19030638 Run Date: 03/12/2019 Sample ID: WG699218-02
Instrument ID: HPMS11 Run Time: 11:21 Method: 8260B
File ID: 11M29829 Analyst: KFR QC Key: DOD5
Workgroup (AAB#): WG699219 Cal ID: HPMS11 - 05-MAR-19
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
1,2-Dichloropropane	CCC	50.0	48.0	ug/L	0.296	4.09	20	
Ethylbenzene	CCC	50.0	52.0	ug/L	0.546	4.01	20	
Toluene	CCC	50.0	50.0	ug/L	1.48	0.00600	20	
1,1-Dichloroethene	CCC	50.0	49.9	ug/L	0.477	0.225	20	
Chloroform	CCC	50.0	47.9	ug/L	0.492	4.18	20	
Vinyl Chloride	CCC	50.0	41.3	ug/L	0.437	17.5	20	
1,1,2,2-Tetrachloroethane	SPCC	50.0	46.9	ug/L	0.612	6.19	20	
1,1-Dichloroethane	SPCC	50.0	48.1	ug/L	0.545	3.72	20	
Bromoform	SPCC	50.0	46.5	ug/L	0.240	6.98	20	
Chlorobenzene	SPCC	50.0	49.6	ug/L	1.02	0.842	20	
Chloromethane	SPCC	50.0	34.5	ug/L	0.490	30.9	20	*
1,2-Dichloroethane		50.0	46.4	ug/L	0.414	7.30	20	
Acetone		50.0	40.6	ug/L	0.0743	18.7	20	
cis-1,2-Dichloroethene		50.0	50.7	ug/L	0.298	1.40	20	
Tetrachloroethene		50.0	52.1	ug/L	0.327	4.20	20	
trans-1,2-Dichloroethene		50.0	51.8	ug/L	0.269	3.65	20	
Trichloroethene		50.0	49.5	ug/L	0.291	1.08	20	

* Exceeds %D Criteria

CCC Calibration Check Compounds
SPCC System Performance Check Compounds

CCV - Modified 03/05/2008
PDF File ID: 6344154
Report generated 03/16/2019 10:29

Login Number: L19030638 Run Date: 03/12/2019 Sample ID: WG699219-03
Instrument ID: HPMS11 Run Time: 22:39 Prep Method: 5030B/5030C/503
File ID: 11M29851 Analyst: KFR Method: 8260B
Workgroup (AAB#): WG699219 Matrix: Water Units: ug/L
Contract #: Cal ID: HPMS11-05-MAR-19

Analytes	Expected	Found	% Rec	Limits	Q
1,1-Dichloroethene	50.0	47.2	94.5	50 - 150	
1,2-Dichloroethane	50.0	49.5	99.0	50 - 150	
Acetone	50.0	44.5	89.0	50 - 150	
Chloroform	50.0	47.7	95.4	50 - 150	
cis-1,2-Dichloroethene	50.0	50.9	102	50 - 150	
Tetrachloroethene	50.0	48.5	96.9	50 - 150	
trans-1,2-Dichloroethene	50.0	49.7	99.5	50 - 150	
Trichloroethene	50.0	57.2	114	50 - 150	
Vinyl chloride	50.0	43.4	86.8	50 - 150	

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	100	81 - 118	PASS
4-Bromofluorobenzene	98.7	85 - 114	PASS
Dibromofluoromethane	105	80 - 119	PASS
Toluene-d8	101	89 - 112	PASS

* FAILS %REC LIMIT

QCMRL - Modified 03/06/2007
PDF File ID: 6344151
Report generated 03/25/2019 09:45

Login Number: L19030638 Run Date: 03/11/2019 Sample ID: WG699028-04
Instrument ID: HPMS8 Run Time: 20:23 Prep Method: 5030B/5030C/503
File ID: 8M429083 Analyst: EEA Method: 8260B
Workgroup (AAB#): WG699028 Matrix: Water Units: ug/L
Contract #: Cal ID: HPMS8-04-MAR-19

Analytes	Expected	Found	% Rec	Limits	Q
1,1-Dichloroethene	50.0	50.7	101	50 - 150	
1,2-Dichloroethane	50.0	52.0	104	50 - 150	
Acetone	50.0	45.3	90.5	50 - 150	
Chloroform	50.0	49.7	99.5	50 - 150	
cis-1,2-Dichloroethene	50.0	51.6	103	50 - 150	
Tetrachloroethene	50.0	48.0	96.0	50 - 150	
trans-1,2-Dichloroethene	50.0	51.5	103	50 - 150	
Trichloroethene	50.0	54.1	108	50 - 150	
Vinyl chloride	50.0	50.7	101	50 - 150	

Surrogates	% Recovery	Surrogate Limits	Qualifier
1,2-Dichloroethane-d4	104	81 - 118	PASS
4-Bromofluorobenzene	101	85 - 114	PASS
Dibromofluoromethane	103	80 - 119	PASS
Toluene-d8	101	89 - 112	PASS

* FAILS %REC LIMIT

QCMRL - Modified 03/06/2007
PDF File ID: 6344151
Report generated 03/25/2019 09:45

Microbac Laboratories Inc.
INTERNAL STANDARD AREA SUMMARY
(COMPARED TO MIDPOINT OF ICAL)

Login Number: L19030638
Instrument ID: HPMS8
Workgroup (AAB#): WG699028

ICAL CCV Number: WG698192-08
CAL ID: HPMS8-04-MAR-19
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG698192-08	NA	NA	217564	400675	533134
Upper Limit	NA	NA	435128	801350	1066268
Lower Limit	NA	NA	108782	200338	266567
L19030638-04	1.00	01	173005	343409	454746
L19030638-05	1.00	01	182078	350977	465976
L19030638-06	1.00	01	174153	341702	457216
L19030638-07	1.00	01	165281	327300	434603
WG699028-01	1.00	01	196164	381131	508811
WG699028-02	1.00	01	215609	399992	523789
WG699028-03	1.00	01	217474	402726	524940

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits

INTERNAL_STD_ICAL - Modified 03/06/2008
PDF File ID: 6344155
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.
INTERNAL STANDARD AREA SUMMARY
(COMPARED TO MIDPOINT OF ICAL)

Login Number: L19030638
Instrument ID: HPMS11
Workgroup (AAB#): WG699219

ICAL CCV Number: WG698387-08
CAL ID: HPMS11-05-MAR-19
Matrix: WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG698387-08	NA	NA	148978	299517	395124
Upper Limit	NA	NA	297956	599034	790248
Lower Limit	NA	NA	74489	149759	197562
L19030638-01	1.00	01	140428	281096	379422
L19030638-02	1.00	01	148384	291460	384567
L19030638-03	1.00	01	153036	305010	401795
L19030638-08	1.00	01	140720	282943	375235
WG699219-01	1.00	01	149164	314358	428800
WG699219-02	1.00	01	156356	309185	402710

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits

INTERNAL_STD_ICAL - Modified 03/06/2008
PDF File ID: 6344155
Report generated 03/16/2019 10:29

Microbac Laboratories Inc.

INTERNAL STANDARD RETENTION TIME SUMMARY
(COMPARED TO MIDPOINT OF ICAL)

Login Number:L19030638
Instrument ID:HPMS8
Workgroup (AAB#):WG699028

ICAL CCV Number:WG698192-08
CAL ID: HPMS8-04-MAR-19
Matrix:WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG698192-08	NA	NA	17.62	14.6	10.74
Upper Limit	NA	NA	18.12	15.1	11.24
Lower Limit	NA	NA	17.12	14.1	10.24
L19030638-04	1.00	01	17.62	14.6	10.74
L19030638-05	1.00	01	17.61	14.59	10.74
L19030638-06	1.00	01	17.62	14.6	10.73
L19030638-07	1.00	01	17.61	14.59	10.74
WG699028-01	1.00	01	17.61	14.59	10.74
WG699028-02	1.00	01	17.61	14.6	10.73
WG699028-03	1.00	01	17.62	14.6	10.73

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits

INTERNAL_STD_RT_ICAL - Modified 03/06/2008
PDF File ID: 6344157
Report generated: 03/16/2019 10:29

Microbac Laboratories Inc.

INTERNAL STANDARD RETENTION TIME SUMMARY
(COMPARED TO MIDPOINT OF ICAL)

Login Number:L19030638
Instrument ID:HPMS11
Workgroup (AAB#):WG699219

ICAL CCV Number:WG698387-08
CAL ID: HPMS11-05-MAR-19
Matrix:WATER

Sample Number	Dilution	Tag	IS-1	IS-2	IS-3
WG698387-08	NA	NA	16.83	14.02	10.39
Upper Limit	NA	NA	17.33	14.52	10.89
Lower Limit	NA	NA	16.33	13.52	9.89
L19030638-01	1.00	01	16.833	14.0206	10.3914
L19030638-02	1.00	01	16.8329	14.0205	10.3913
L19030638-03	1.00	01	16.8329	14.0205	10.381
L19030638-08	1.00	01	16.833	14.0207	10.3915
WG699219-01	1.00	01	16.8223	14.0203	10.3911
WG699219-02	1.00	01	16.8227	14.0207	10.3812

IS-1 - 1,4-Dichlorobenzene-d4
IS-2 - Chlorobenzene-d5
IS-3 - Fluorobenzene

Underline = Response outside limits

INTERNAL_STD_RT_ICAL - Modified 03/06/2008
PDF File ID: 6344157
Report generated: 03/16/2019 10:29

2.1.1.3 Sample Data

Data File : C:\MSDCHEM\1\DATA\031219\11M29837.D Vial: 9
Acq On : 12 Mar 2019 15:30 Operator: KFR
Sample : L19030638-01 A REF 826-SPE Inst : hpms11
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 16 10:12:53 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

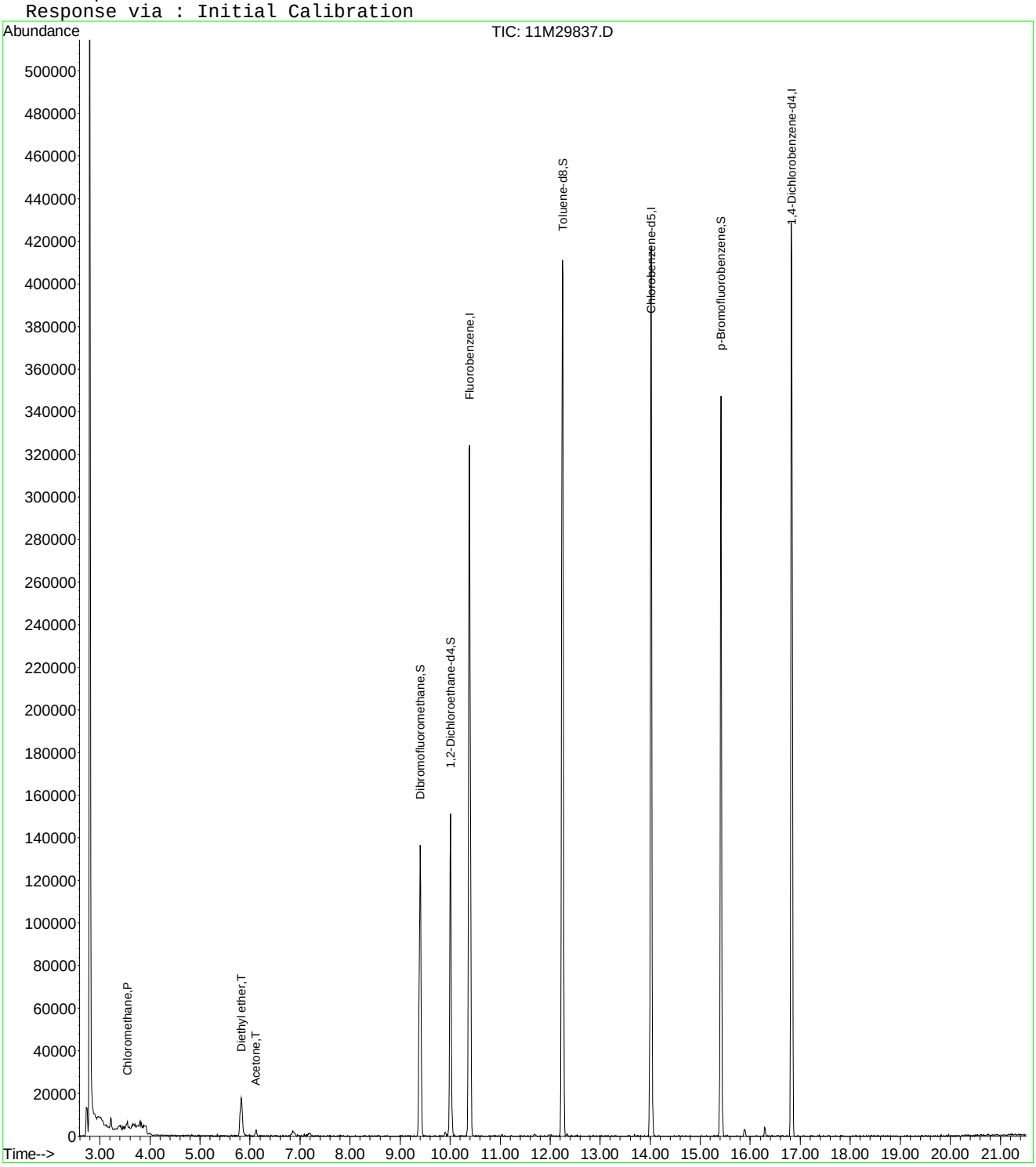
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3914	96	379422	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0206	117	281096	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	140428	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3988	111	105079	23.9918	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 95.9672%			
43) 1,2-Dichloroethane-d4	10.0088	65	127216	24.2084	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 96.8336%			
57) Toluene-d8	12.2525	98	349412	24.9775	ug/L	0.0000
Spiked Amount 25.0000	Range 88 - 110		Recovery = 99.9100%			
78) p-Bromofluorobenzene	15.4164	95	133942	24.9245	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 99.6980%			
Target Compounds						Qvalue
3) Chloromethane	3.5466	50	1702	0.1581	ug/L #	75
9) Diethyl ether	5.8213	59	1149	0.2890	ug/L #	1
13) Acetone	6.1108	43	4940	3.5613	ug/L	96

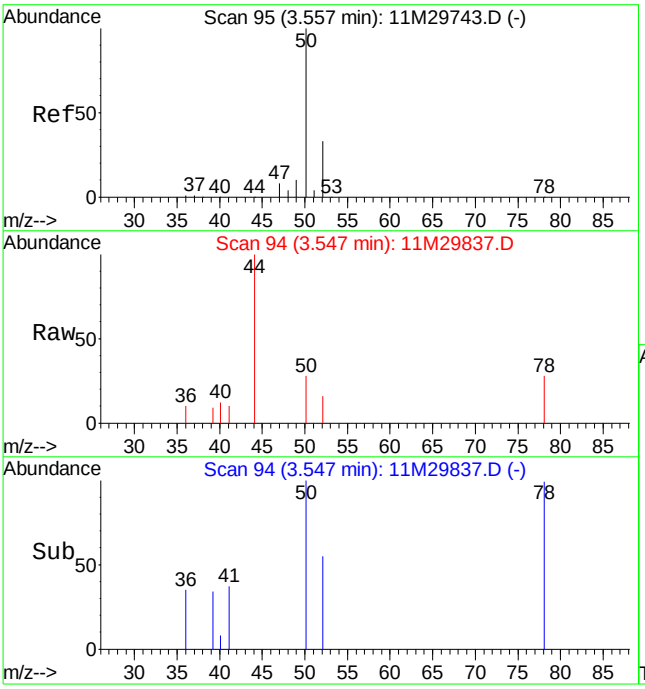
(#) = qualifier out of range (m) = manual integration
11M29837.D 8260WT.M Sat Mar 16 10:12:53 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29837.D Vial: 9
Acq On : 12 Mar 2019 15:30 Operator: KFR
Sample : L19030638-01 A REF 826-SPE Inst : hpms11
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 16 10:12 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration

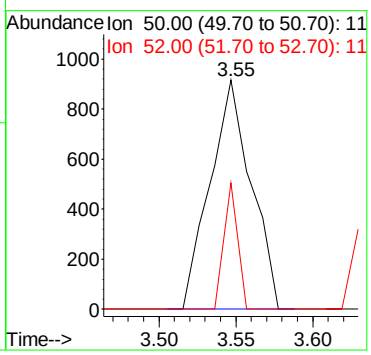


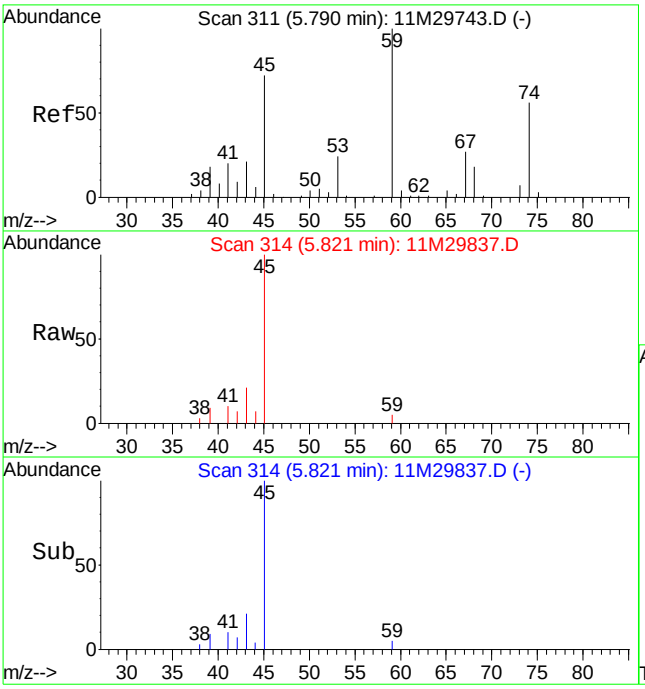


#3
Chloromethane
Concen: 0.1581 ug/L
RT: 3.55 min Scan# 94
Delta R.T. -0.01 min
Lab File: 11M29837.D
Acq: 12 Mar 2019 15:30

Tgt Ion: 50 Resp: 1702

Ion	Ratio	Lower	Upper
50	100		
52	18.4	19.6	45.6#

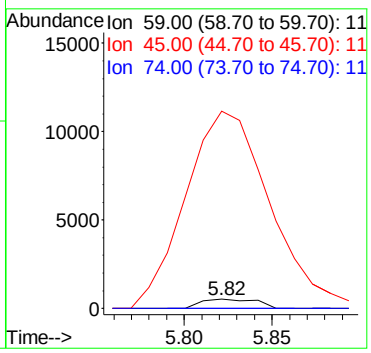


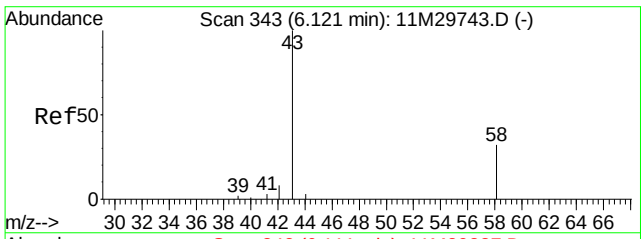


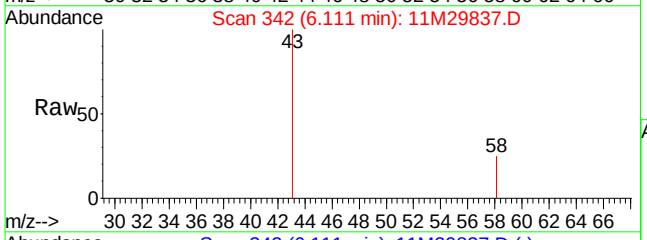
#9
Diethyl ether
Concen: 0.2890 ug/L
RT: 5.82 min Scan# 314
Delta R.T. 0.03 min
Lab File: 11M29837.D
Acq: 12 Mar 2019 15:30

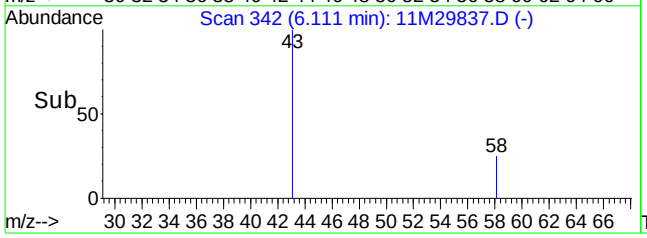
Tgt Ion: 59 Resp: 1149

Ion	Ratio	Lower	Upper
59	100		
45	3269.5	43.1	100.5#
74	0.0	34.4	80.2#





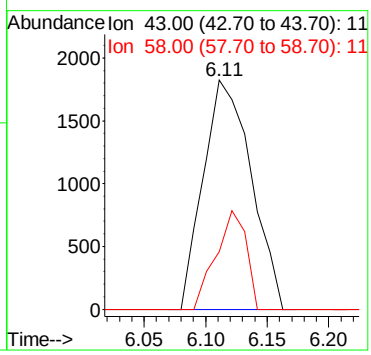




#13
Acetone
Concen: 3.5613 ug/L
RT: 6.11 min Scan# 342
Delta R.T. -0.01 min
Lab File: 11M29837.D
Acq: 12 Mar 2019 15:30

Tgt Ion: 43 Resp: 4940

Ion	Ratio	Lower	Upper
43	100		
58	27.2	17.8	41.4



Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29833.D Vial: 5
Acq On : 12 Mar 2019 13:30 Operator: KFR
Sample : L19030638-02 A MS 826-SPE Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 15:48:15 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3913	96	384567	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0205	117	291460	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8329	152	148384	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3987	111	112107	25.2540	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 101.0160%			
43) 1,2-Dichloroethane-d4	10.0088	65	128552	24.1354	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 96.5416%			
57) Toluene-d8	12.2421	98	363045	25.0292	ug/L	-0.0105
Spiked Amount 25.0000	Range 88 - 110		Recovery = 100.1168%			
78) p-Bromofluorobenzene	15.4164	95	143624	25.2932	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 101.1728%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1226	85	80317	14.1375	ug/L	98
3) Chloromethane	3.5569	50	129369	11.8562	ug/L	99
4) Vinyl Chloride	3.7740	62	117559	14.4322	ug/L	99
5) 1,3-Butadiene	3.8154	54	43352	13.3665	ug/L	98
6) Bromomethane	4.6528	94	66389	21.2731	ug/L	97
7) Chloroethane	4.7976	64	57741	18.3359	ug/L	99
8) Trichlorofluoromethane	5.2732	101	129392	16.7861	ug/L	99
9) Diethyl ether	5.7902	59	386259	95.8462	ug/L	96
10) Isoprene	5.8212	67	106672	17.5698	ug/L	99
11) Acrolein	6.0177	56	63038	90.0764	ug/L	97
12) 1,1,2-Trichloro-1,2,2-Trif	6.0384	101	72940	19.2900	ug/L	100
13) Acetone	6.1314	43	25433	18.0896	ug/L	99
14) 1,1-Dichloroethene	6.3382	61	138053	18.7592	ug/L	100
15) Tert-Butyl Alcohol	6.4416	59	69257	176.6046	ug/L	99
16) Dimethyl Sulfide	6.5864	62	100022	20.5596	ug/L	98
17) Iodomethane	6.8345	142	91374	18.9965	ug/L	100
18) Methyl acetate	6.8552	43	53504	17.6427	ug/L #	88
19) Methylene Chloride	7.0930	84	84413	20.5833	ug/L	91
20) Carbon Disulfide	7.1344	76	188811	16.7042	ug/L	99
21) Acrylonitrile	7.2688	53	29793	19.2224	ug/L	95
22) Methyl Tert Butyl Ether	7.2998	73	219636	18.8868	ug/L	100
23) trans-1,2-Dichloroethene	7.5273	96	79628	19.9746	ug/L	99
24) n-Hexane	7.5996	57	99128	16.1442	ug/L	97
25) Diisopropyl ether	7.9305	45	1483348	98.9823	ug/L	99
26) Vinyl Acetate	8.0959	43	147917	28.4864	ug/L	99
27) 1,1-Dichloroethane	8.1270	63	170585	19.6099	ug/L	100
28) Ethyl-Tert-Butyl ether	8.4785	59	1548861	102.2538	ug/L	99
29) 2-Butanone	8.6543	43	30958	17.2866	ug/L	98
30) Propionitrile	8.7577	54	51668	98.7468	ug/L	98
31) 2,2-Dichloropropane	8.8611	77	133409	22.1807	ug/L	99
32) cis-1,2-Dichloroethene	8.9335	96	93129	20.5775	ug/L	99
33) Chloroform	9.1299	83	156881	19.8695	ug/L	98
34) 1-Bromopropane	9.2540	122	19355	19.7444	ug/L	95
35) Bromochloromethane	9.3470	130	55718	20.9965	ug/L	96
36) Tetrahydrofuran	9.3677	42	105670	91.0754	ug/L	97
38) 1,1,1-Trichloroethane	9.6365	97	150906	21.1081	ug/L	97
39) Cyclohexane	9.6572	56	125463	14.8228	ug/L	98
40) 1,1-Dichloropropene	9.8123	75	109170	20.3096	ug/L	99
41) Carbon Tetrachloride	9.9571	117	133653	21.9845	ug/L	99
42) Tert-Amyl-Methyl ether	9.9157	73	1179267	104.3820	ug/L	98

(#) = qualifier out of range (m) = manual integration
11M29833.D 8260WT.M Tue Mar 12 15:48:16 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\031219\11M29833.D Vial: 5
Acq On : 12 Mar 2019 13:30 Operator: KFR
Sample : L19030638-02 A MS 826-SPE Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 15:48:15 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

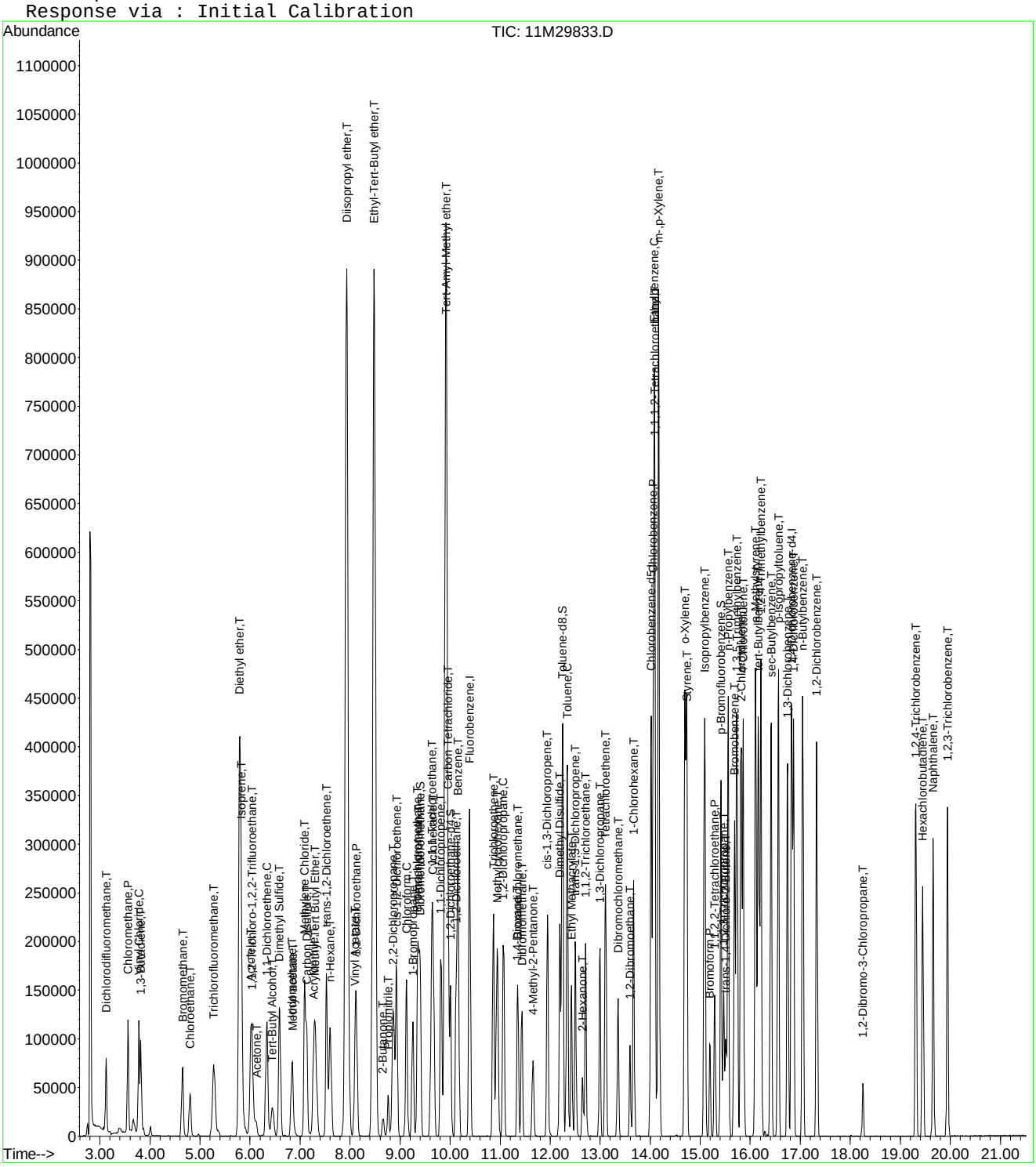
	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
44)	1,2-Dichloroethane	10.1225	62	137489	20.0351	ug/L		98
45)	Benzene	10.1535	78	323838	20.2690	ug/L		99
46)	Trichloroethene	10.8669	130	87832	19.3832	ug/L		99
47)	Methylcyclohexane	10.9393	83	109903	17.2166	ug/L		98
48)	1,2-Dichloropropane	11.0634	63	91785	19.3395	ug/L		98
49)	1,4-Dioxane	11.3426	88	4204	129.0965	ug/L		95
50)	Bromodichloromethane	11.3529	83	114675	20.4454	ug/L		99
51)	Dibromomethane	11.4356	93	55041	20.3028	ug/L		97
53)	4-Methyl-2-Pentanone	11.6527	58	30325	18.5331	ug/L		97
54)	cis-1,3-Dichloropropene	11.9423	75	137501	21.7519	ug/L		99
55)	Dimethyl Disulfide	12.1904	79	75627	19.3160	ug/L		95
58)	Toluene	12.3455	91	356314	20.6372	ug/L		99
59)	Ethyl Methacrylate	12.4282	69	100139	20.5345	ug/L		95
60)	trans-1,3-Dichloropropene	12.5006	75	117448	20.7762	ug/L		100
61)	1,1,2-Trichloroethane	12.7074	97	73443	19.9814	ug/L		100
62)	2-Hexanone	12.6454	43	49499	18.1183	ug/L	#	72
63)	1,3-Dichloropropane	12.9969	76	123021	20.7445	ug/L		96
64)	Tetrachloroethene	13.1106	164	71408	19.4983	ug/L		98
65)	Dibromochloromethane	13.3588	129	89145	21.3055	ug/L		99
66)	1,2-Dibromoethane	13.5966	107	71097	20.1830	ug/L		99
67)	1-Chlorohexane	13.6690	91	106626	18.7056	ug/L		96
68)	Chlorobenzene	14.0619	112	242793	20.1983	ug/L		99
69)	1,1,1,2-Tetrachloroethane	14.0929	131	96570	19.3196	ug/L		99
70)	Ethylbenzene	14.0825	106	121025	19.7914	ug/L		94
71)	m-,p-Xylene	14.1653	106	307571	41.6625	ug/L		95
72)	o-Xylene	14.6926	106	148617	20.7483	ug/L		97
73)	Styrene	14.7340	104	254520	21.4821	ug/L		99
74)	Bromoform	15.1889	173	57475	19.5067	ug/L		98
75)	Isopropylbenzene	15.0855	105	367862	20.5151	ug/L		99
77)	1,1,2,2-Tetrachloroethane	15.2923	83	85758	22.1546	ug/L		98
79)	1,2,3-Trichloropropane	15.4681	110	26632	20.6052	ug/L		77
80)	trans-1,4-Dichloro-2-Buten	15.5094	53	30635	18.7987	ug/L		88
81)	n-Propylbenzene	15.5611	91	472472	21.5916	ug/L		99
82)	Bromobenzene	15.6852	156	109154	20.4255	ug/L		95
83)	1,3,5-Trimethylbenzene	15.7369	105	326778	21.0358	ug/L		99
84)	2-Chlorotoluene	15.8196	91	318728	20.4696	ug/L		100
85)	4-Chlorotoluene	15.8610	91	255627	19.9748	ug/L		99
86)	a-Methylstyrene	16.1091	118	185178	20.9348	ug/L		97
87)	tert-Butylbenzene	16.1608	134	75502	19.7334	ug/L		98
88)	1,2,4-Trimethylbenzene	16.2125	105	334743	20.8785	ug/L		100
89)	sec-Butylbenzene	16.4193	105	406703	21.0883	ug/L		98
90)	p-Isopropyltoluene	16.5641	119	356283	21.2457	ug/L		98
91)	1,3-Dichlorobenzene	16.7502	146	203188	20.6109	ug/L		98
92)	1,4-Dichlorobenzene	16.8639	146	205943	20.9199	ug/L		99
93)	n-Butylbenzene	17.0500	91	318673	21.0859	ug/L		99
94)	1,2-Dichlorobenzene	17.3292	146	199286	21.0924	ug/L		97
95)	1,2-Dibromo-3-Chloropropan	18.2494	75	16540	20.6838	ug/L		97
96)	1,2,4-Trichlorobenzene	19.3144	180	131500	21.5152	ug/L		99
97)	Hexachlorobutadiene	19.4488	225	64656	20.9885	ug/L		98
98)	Naphthalene	19.6556	128	292138	22.3216	ug/L		99
99)	1,2,3-Trichlorobenzene	19.9451	180	124914	21.7534	ug/L		100

(#) = qualifier out of range (m) = manual integration
11M29833.D 8260WT.M Tue Mar 12 15:48:16 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29833.D Vial: 5
Acq On : 12 Mar 2019 13:30 Operator: KFR
Sample : L19030638-02 A MS 826-SPE Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 15:48 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration



11M29833.D 8260WT.M Tue Mar 12 15:48:17 2019 Page 3

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29834.D Vial: 6
Acq On : 12 Mar 2019 14:00 Operator: KFR
Sample : L19030638-03 A MSD 826-SPE Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 15:48:17 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3810	96	401795	25.0000	ug/L	-0.0105
56) Chlorobenzene-d5	14.0205	117	305010	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8329	152	153036	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3987	111	118196	25.4840	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 101.9360%			
43) 1,2-Dichloroethane-d4	10.0088	65	138169	24.8287	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 99.3148%			
57) Toluene-d8	12.2421	98	385857	25.4201	ug/L	-0.0105
Spiked Amount 25.0000	Range 88 - 110		Recovery = 101.6804%			
78) p-Bromofluorobenzene	15.4164	95	155418	26.5382	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 106.1528%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1020	85	80150	13.5032	ug/L	97
3) Chloromethane	3.5465	50	137095	12.0255	ug/L	99
4) Vinyl Chloride	3.7637	62	120653	14.1769	ug/L	99
5) 1,3-Butadiene	3.8050	54	46237	13.7099	ug/L	97
6) Bromomethane	4.6322	94	66753	20.4726	ug/L	100
7) Chloroethane	4.7873	64	57755	17.5540	ug/L	99
8) Trichlorofluoromethane	5.2629	101	132120	16.4050	ug/L	99
9) Diethyl ether	5.7799	59	400099	95.0235	ug/L	95
10) Isoprene	5.8109	67	107918	17.0129	ug/L	98
11) Acrolein	6.0074	56	64880	88.7334	ug/L	98
12) 1,1,2-Trichloro-1,2,2-Trif	6.0281	101	75497	19.1101	ug/L	99
13) Acetone	6.1108	43	26966	18.3575	ug/L	97
14) 1,1-Dichloroethene	6.3279	61	140305	18.2477	ug/L	98
15) Tert-Butyl Alcohol	6.4416	59	73072	178.3434	ug/L	98
16) Dimethyl Sulfide	6.5761	62	101894	20.0464	ug/L	99
17) Iodomethane	6.8242	142	97304	19.3332	ug/L	98
18) Methyl acetate	6.8449	43	53606	16.9184	ug/L #	82
19) Methylene Chloride	7.0827	84	84341	19.6839	ug/L	94
20) Carbon Disulfide	7.1240	76	194241	16.4478	ug/L	98
21) Acrylonitrile	7.2688	53	30283	18.7008	ug/L	99
22) Methyl Tert Butyl Ether	7.2895	73	225429	18.5538	ug/L	100
23) trans-1,2-Dichloroethene	7.5273	96	82023	19.6932	ug/L	97
24) n-Hexane	7.5893	57	100831	15.7174	ug/L	99
25) Diisopropyl ether	7.9305	45	1538618	98.2681	ug/L	99
26) Vinyl Acetate	8.0960	43	151765	28.0099	ug/L	98
27) 1,1-Dichloroethane	8.1166	63	172792	19.0119	ug/L	100
28) Ethyl-Tert-Butyl ether	8.4785	59	1598878	101.0299	ug/L	98
29) 2-Butanone	8.6543	43	32953	17.6116	ug/L	99
30) Propionitrile	8.7577	54	54194	99.1334	ug/L	100
31) 2,2-Dichloropropane	8.8611	77	132488	21.0831	ug/L	99
32) cis-1,2-Dichloroethene	8.9231	96	96922	20.4973	ug/L	96
33) Chloroform	9.1196	83	159988	19.3942	ug/L	99
34) 1-Bromopropane	9.2540	122	19435	18.9759	ug/L	95
35) Bromochloromethane	9.3470	130	57636	20.7880	ug/L	95
36) Tetrahydrofuran	9.3677	42	110026	90.7637	ug/L	96
38) 1,1,1-Trichloroethane	9.6262	97	153558	20.5581	ug/L	98
39) Cyclohexane	9.6572	56	125596	14.2023	ug/L	96
40) 1,1-Dichloropropene	9.8123	75	110716	19.7141	ug/L	98
41) Carbon Tetrachloride	9.9467	117	136517	21.4927	ug/L	98
42) Tert-Amyl-Methyl ether	9.9157	73	1222188	103.5426	ug/L	98

(#) = qualifier out of range (m) = manual integration
11M29834.D 8260WT.M Tue Mar 12 15:48:18 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\031219\11M29834.D Vial: 6
Acq On : 12 Mar 2019 14:00 Operator: KFR
Sample : L19030638-03 A MSD 826-SPE Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 15:48:17 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

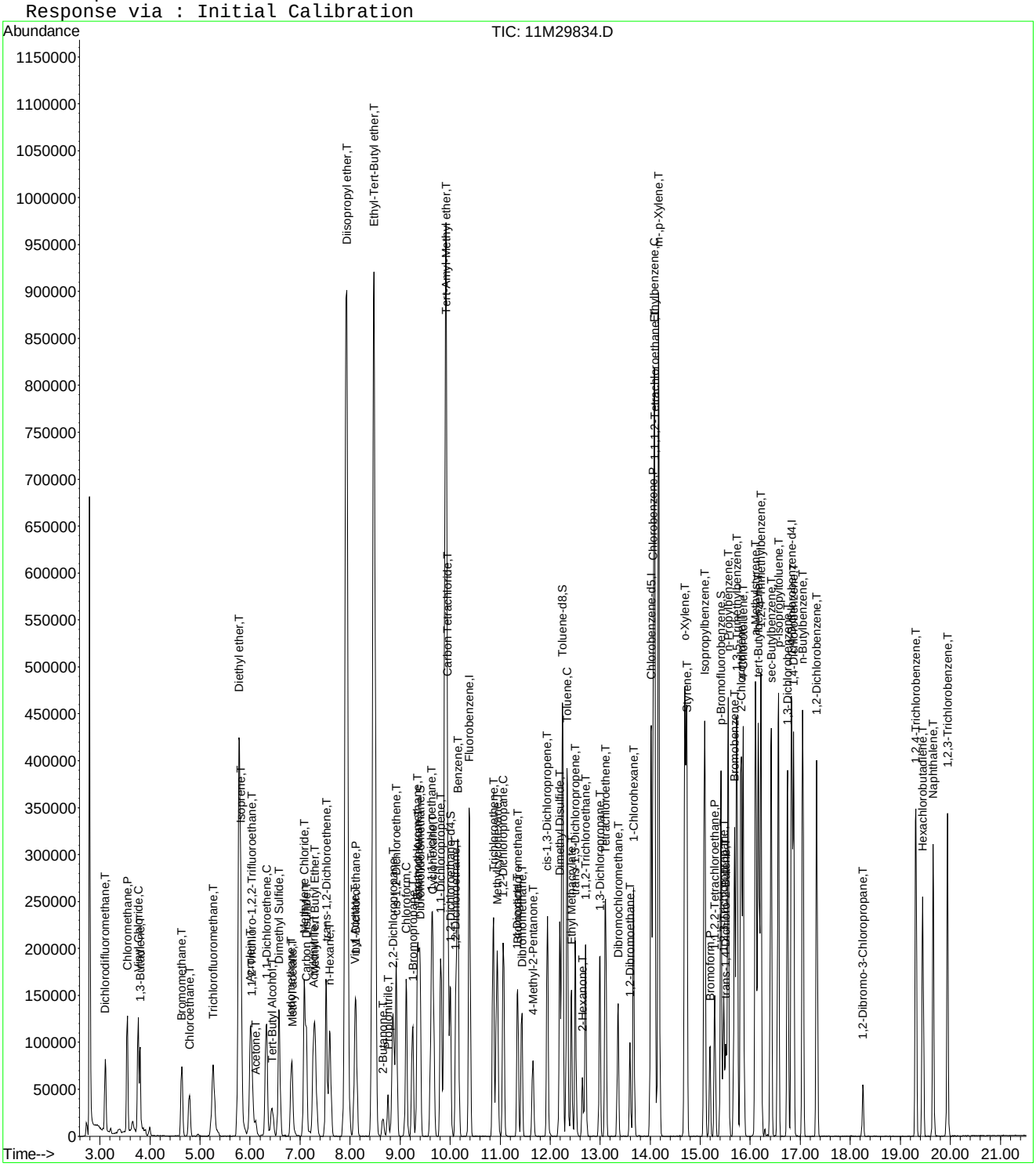
	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
44)	1,2-Dichloroethane	10.1122	62	143971	20.0801	ug/L		98
45)	Benzene	10.1535	78	331414	19.8538	ug/L		99
46)	Trichloroethene	10.8670	130	91787	19.3874	ug/L		98
47)	Methylcyclohexane	10.9393	83	111003	16.6433	ug/L		97
48)	1,2-Dichloropropane	11.0634	63	94993	19.1572	ug/L		100
49)	1,4-Dioxane	11.3426	88	4376	128.6164	ug/L		96
50)	Bromodichloromethane	11.3529	83	118778	20.2689	ug/L		100
51)	Dibromomethane	11.4357	93	55827	19.7098	ug/L		96
53)	4-Methyl-2-Pentanone	11.6528	58	31090	18.1859	ug/L		97
54)	cis-1,3-Dichloropropene	11.9423	75	138778	21.0126	ug/L		100
55)	Dimethyl Disulfide	12.1904	79	75810	18.6301	ug/L		89
58)	Toluene	12.3352	91	363444	20.1150	ug/L		98
59)	Ethyl Methacrylate	12.4283	69	101283	19.8464	ug/L		96
60)	trans-1,3-Dichloropropene	12.5006	75	119544	20.2076	ug/L		100
61)	1,1,2-Trichloroethane	12.7074	97	74073	19.2575	ug/L		98
62)	2-Hexanone	12.6454	43	52725	18.4417	ug/L	#	75
63)	1,3-Dichloropropane	12.9969	76	124959	20.1352	ug/L		98
64)	Tetrachloroethene	13.1107	164	74323	19.3927	ug/L		98
65)	Dibromochloromethane	13.3588	129	90562	20.6827	ug/L		100
66)	1,2-Dibromoethane	13.5966	107	73699	19.9922	ug/L		98
67)	1-Chlorohexane	13.6690	91	107453	18.0133	ug/L		96
68)	Chlorobenzene	14.0619	112	249114	19.8035	ug/L		99
69)	1,1,1,2-Tetrachloroethane	14.0929	131	99276	18.9904	ug/L		100
70)	Ethylbenzene	14.0826	106	126550	19.7755	ug/L		96
71)	m-,p-Xylene	14.1653	106	309475	40.0581	ug/L		93
72)	o-Xylene	14.6926	106	156195	20.8375	ug/L		99
73)	Styrene	14.7340	104	258441	20.8440	ug/L		99
74)	Bromoform	15.1992	173	57703	18.7437	ug/L		99
75)	Isopropylbenzene	15.0855	105	377185	20.1005	ug/L		99
77)	1,1,2,2-Tetrachloroethane	15.2923	83	87397	21.8917	ug/L		98
79)	1,2,3-Trichloropropane	15.4681	110	28306	21.2346	ug/L		95
80)	trans-1,4-Dichloro-2-Buten	15.5094	53	31342	18.6479	ug/L		89
81)	n-Propylbenzene	15.5611	91	479217	21.2341	ug/L		100
82)	Bromobenzene	15.6852	156	112466	20.4056	ug/L		94
83)	1,3,5-Trimethylbenzene	15.7369	105	335778	20.9581	ug/L		99
84)	2-Chlorotoluene	15.8196	91	325026	20.2396	ug/L		100
85)	4-Chlorotoluene	15.8610	91	260729	19.7542	ug/L		99
86)	a-Methylstyrene	16.1091	118	187499	20.5528	ug/L		98
87)	tert-Butylbenzene	16.1608	134	75262	19.0727	ug/L		96
88)	1,2,4-Trimethylbenzene	16.2125	105	340472	20.5903	ug/L		99
89)	sec-Butylbenzene	16.4193	105	412349	20.7311	ug/L		99
90)	p-Isopropyltoluene	16.5641	119	362103	20.9364	ug/L		98
91)	1,3-Dichlorobenzene	16.7502	146	206075	20.2683	ug/L		99
92)	1,4-Dichlorobenzene	16.8639	146	208212	20.5074	ug/L		99
93)	n-Butylbenzene	17.0500	91	322284	20.6766	ug/L		99
94)	1,2-Dichlorobenzene	17.3292	146	200079	20.5326	ug/L		99
95)	1,2-Dibromo-3-Chloropropan	18.2494	75	17130	20.7704	ug/L		98
96)	1,2,4-Trichlorobenzene	19.3144	180	133856	21.2349	ug/L		98
97)	Hexachlorobutadiene	19.4488	225	66894	21.0549	ug/L		98
98)	Naphthalene	19.6556	128	293786	21.7652	ug/L		99
99)	1,2,3-Trichlorobenzene	19.9451	180	126194	21.3082	ug/L		99

(#) = qualifier out of range (m) = manual integration
11M29834.D 8260WT.M Tue Mar 12 15:48:18 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29834.D Vial: 6
Acq On : 12 Mar 2019 14:00 Operator: KFR
Sample : L19030638-03 A MSD 826-SPE Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 15:48 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration



11M29834.D 8260WT.M Tue Mar 12 15:48:18 2019 Page 3

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429076.D Vial: 16
Acq On : 11 Mar 2019 17:01 Operator: EEA
Sample : L19030638-04 A 826-SPE Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 09:00:34 2019 Quant Results File: 8260WTR.RES

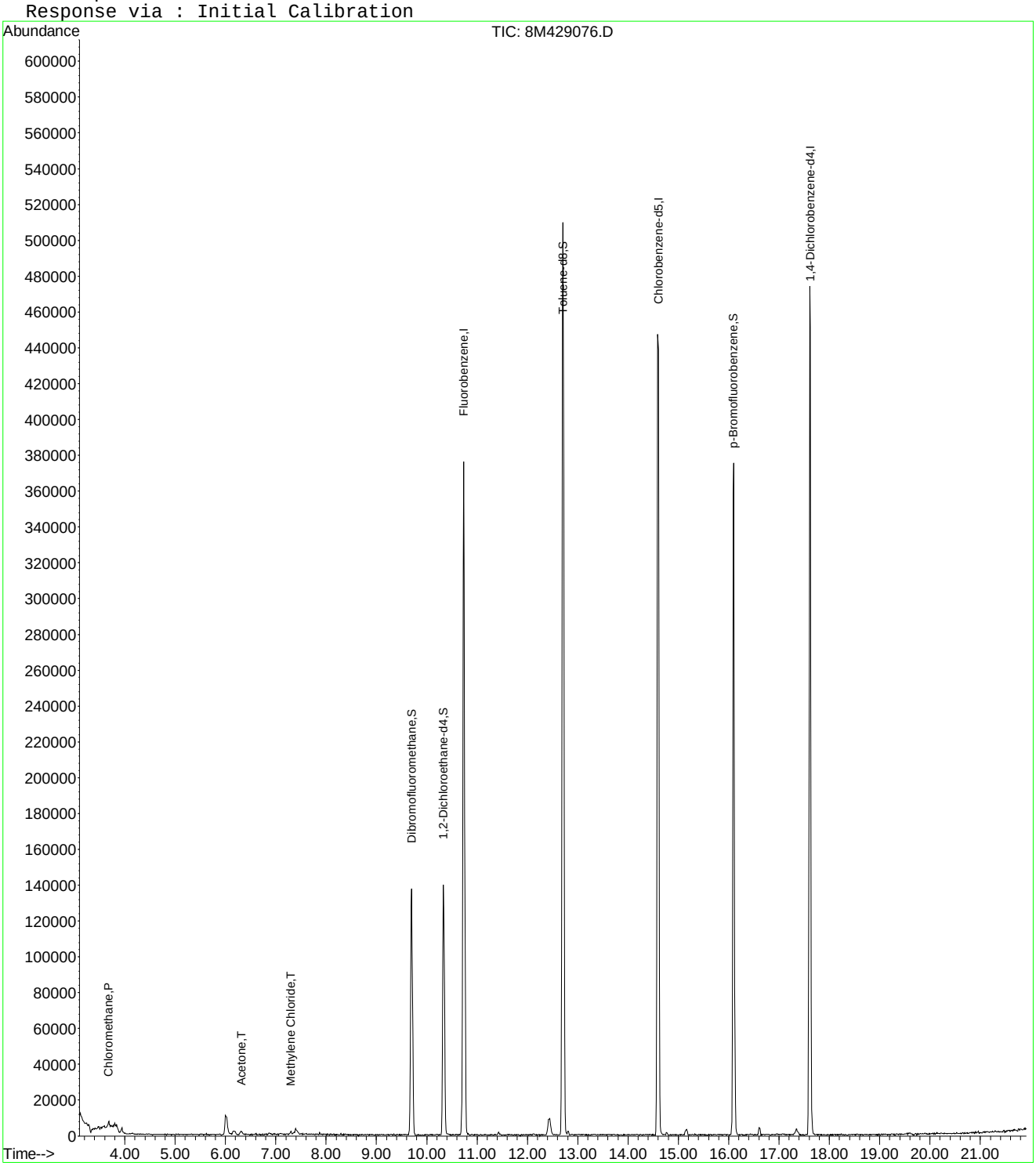
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

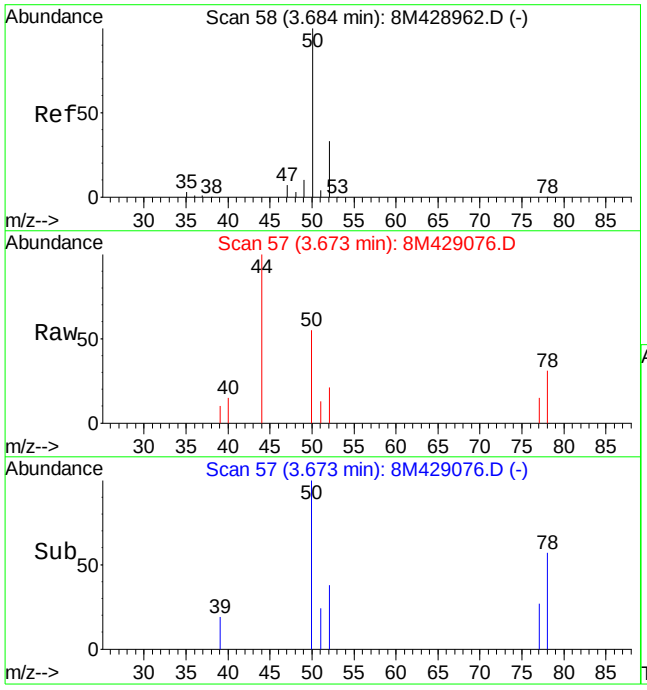
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	454746	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.60	117	343409	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	173005	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	9.70	111	120294	26.5379	ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 106.16%			
43) 1,2-Dichloroethane-d4	10.33	65	121109	27.0638	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 108.24%			
58) Toluene-d8	12.71	98	459517	26.2692	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 105.08%			
80) p-Bromofluorobenzene	16.09	95	174326	27.9193	ug/L	-0.01
Spiked Amount 25.000	Range 86 - 115		Recovery = 111.68%			
Target Compounds						Qvalue
3) Chloromethane	3.67	50	4517	0.3971	ug/L	94
13) Acetone	6.31	43	4429	3.1617	ug/L	83
19) Methylene Chloride	7.29	84	1034	0.1706	ug/L	73

(#) = qualifier out of range (m) = manual integration
8M429076.D 8260WTR.M Tue Mar 12 09:00:35 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429076.D Vial: 16
Acq On : 11 Mar 2019 17:01 Operator: EEA
Sample : L19030638-04 A 826-SPE Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 9:00 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration

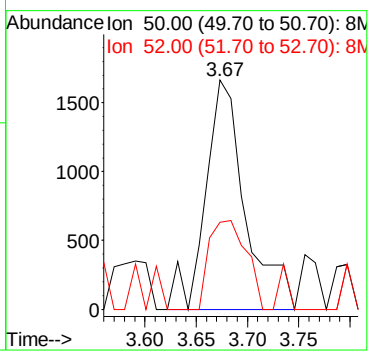


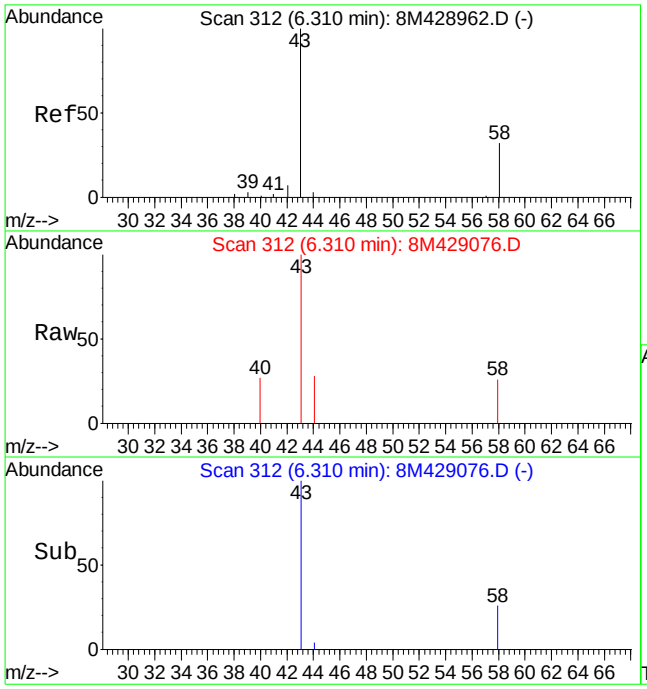


#3
Chloromethane
Concen: 0.40 ug/L
RT: 3.67 min Scan# 57
Delta R.T. -0.01 min
Lab File: 8M429076.D
Acq: 11 Mar 2019 17:01

Tgt Ion: 50 Resp: 4517

Ion	Ratio	Lower	Upper
50	100		
52	36.3	19.7	46.1

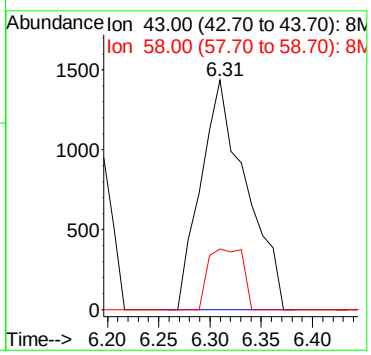


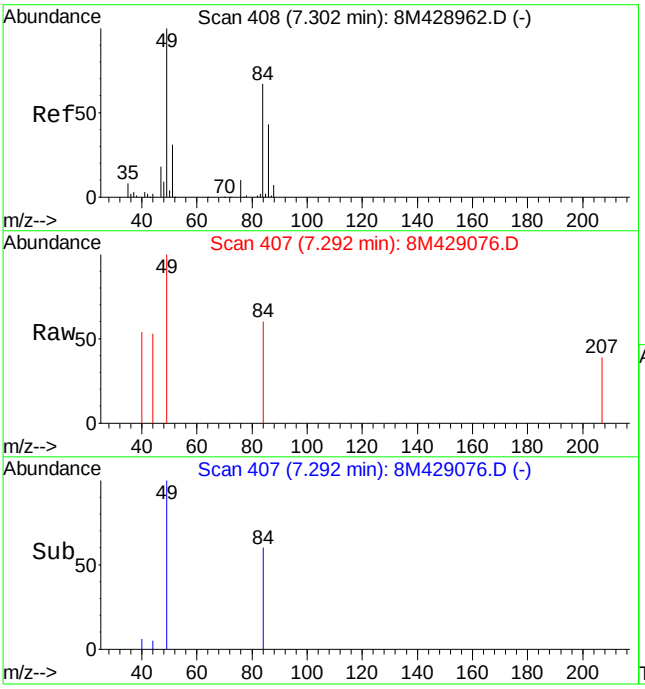


#13
Acetone
Concen: 3.16 ug/L
RT: 6.31 min Scan# 312
Delta R.T. 0.00 min
Lab File: 8M429076.D
Acq: 11 Mar 2019 17:01

Tgt Ion: 43 Resp: 4429

Ion	Ratio	Lower	Upper
43	100		
58	20.3	17.6	41.2

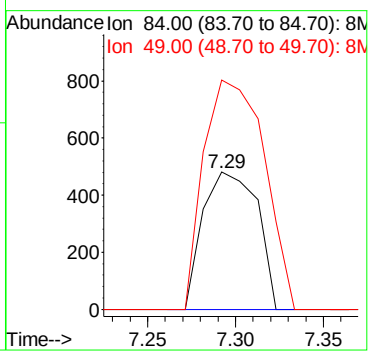




#19
Methylene Chloride
Concen: 0.17 ug/L
RT: 7.29 min Scan# 407
Delta R.T. -0.01 min
Lab File: 8M429076.D
Acq: 11 Mar 2019 17:01

Tgt Ion: 84 Resp: 1034

Ion	Ratio	Lower	Upper
84	100		
49	186.0	90.7	211.7



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429077.D Vial: 17
Acq On : 11 Mar 2019 17:30 Operator: EEA
Sample : L19030638-05 A 826-SPE Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 09:00:37 2019 Quant Results File: 8260WTR.RES

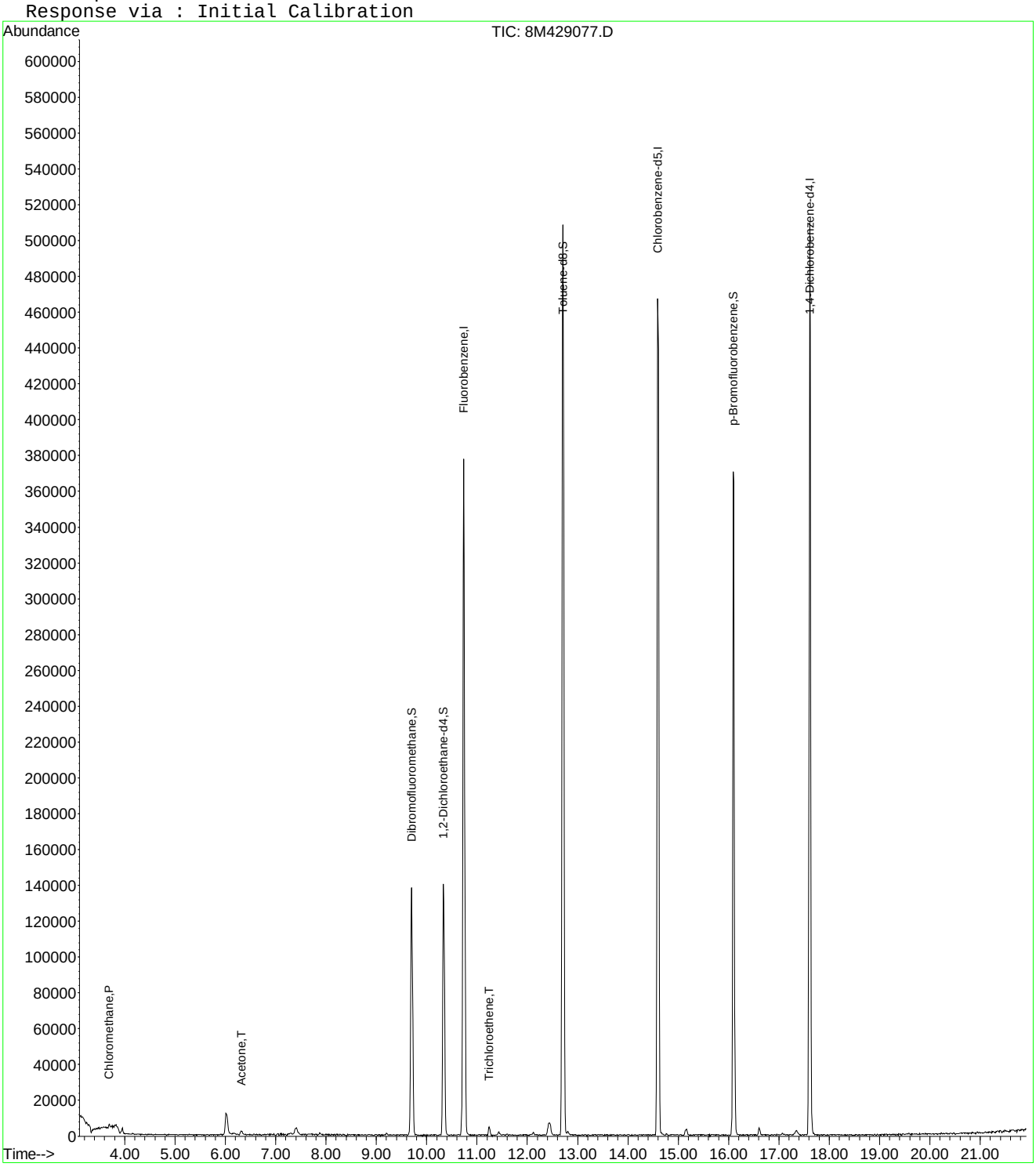
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

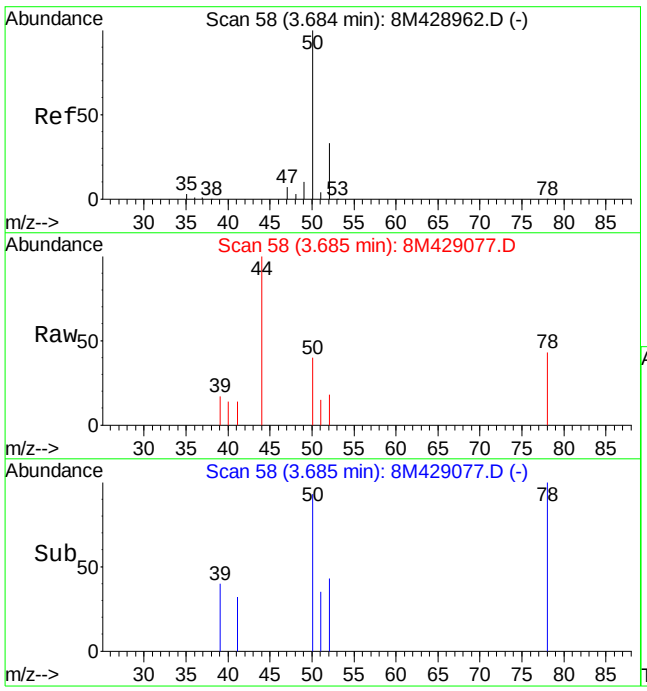
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	465976	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.59	117	350977	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.61	152	182078	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	9.70	111	120553	25.9541	ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 103.80%			
43) 1,2-Dichloroethane-d4	10.33	65	121077	26.4045	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 105.60%			
58) Toluene-d8	12.71	98	460535	25.7597	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 103.04%			
80) p-Bromofluorobenzene	16.09	95	174740	26.5910	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 106.36%			
Target Compounds						Qvalue
3) Chloromethane	3.69	50	2748	0.2358	ug/L #	64
13) Acetone	6.31	43	5246	3.6547	ug/L	83
47) Trichloroethene	11.24	130	2529	0.3729	ug/L	92

(#) = qualifier out of range (m) = manual integration
8M429077.D 8260WTR.M Tue Mar 12 09:00:37 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429077.D Vial: 17
Acq On : 11 Mar 2019 17:30 Operator: EEA
Sample : L19030638-05 A 826-SPE Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 9:00 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration

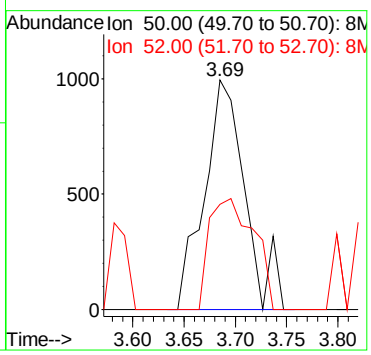


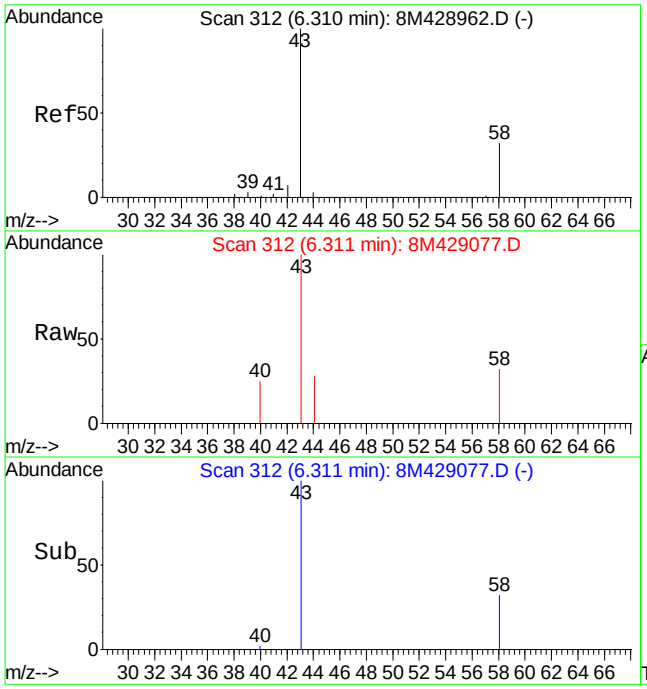


#3
Chloromethane
Concen: 0.24 ug/L
RT: 3.69 min Scan# 58
Delta R.T. 0.00 min
Lab File: 8M429077.D
Acq: 11 Mar 2019 17:30

Tgt Ion: 50 Resp: 2748

Ion	Ratio	Lower	Upper
50	100		
52	53.1	19.7	46.1#

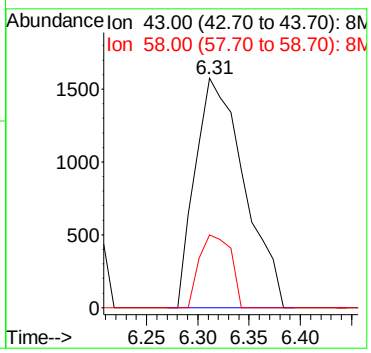


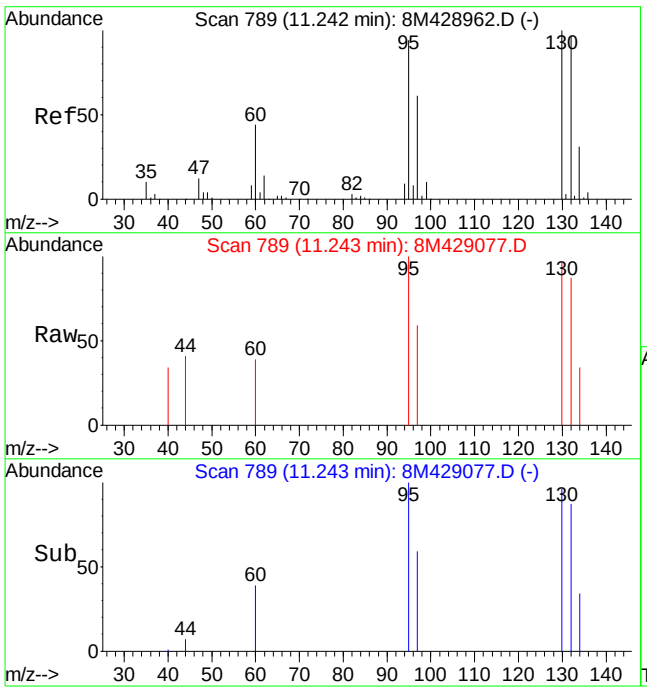


#13
Acetone
Concen: 3.65 ug/L
RT: 6.31 min Scan# 312
Delta R.T. 0.00 min
Lab File: 8M429077.D
Acq: 11 Mar 2019 17:30

Tgt Ion: 43 Resp: 5246

Ion	Ratio	Lower	Upper
43	100		
58	20.2	17.6	41.2

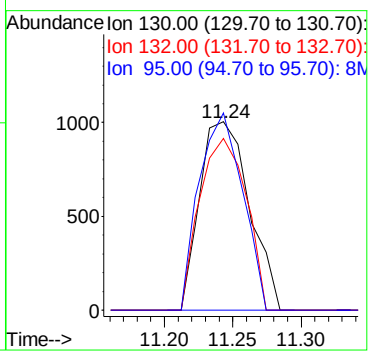




#47
Trichloroethene
Concen: 0.37 ug/L
RT: 11.24 min Scan# 789
Delta R.T. 0.00 min
Lab File: 8M429077.D
Acq: 11 Mar 2019 17:30

Tgt Ion:130 Resp: 2529

Ion	Ratio	Lower	Upper
130	100		
132	85.6	58.0	135.2
95	91.5	57.4	133.8



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429078.D Vial: 18
Acq On : 11 Mar 2019 17:59 Operator: EEA
Sample : L19030638-06 A 826-SPE Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 09:00:39 2019 Quant Results File: 8260WTR.RES

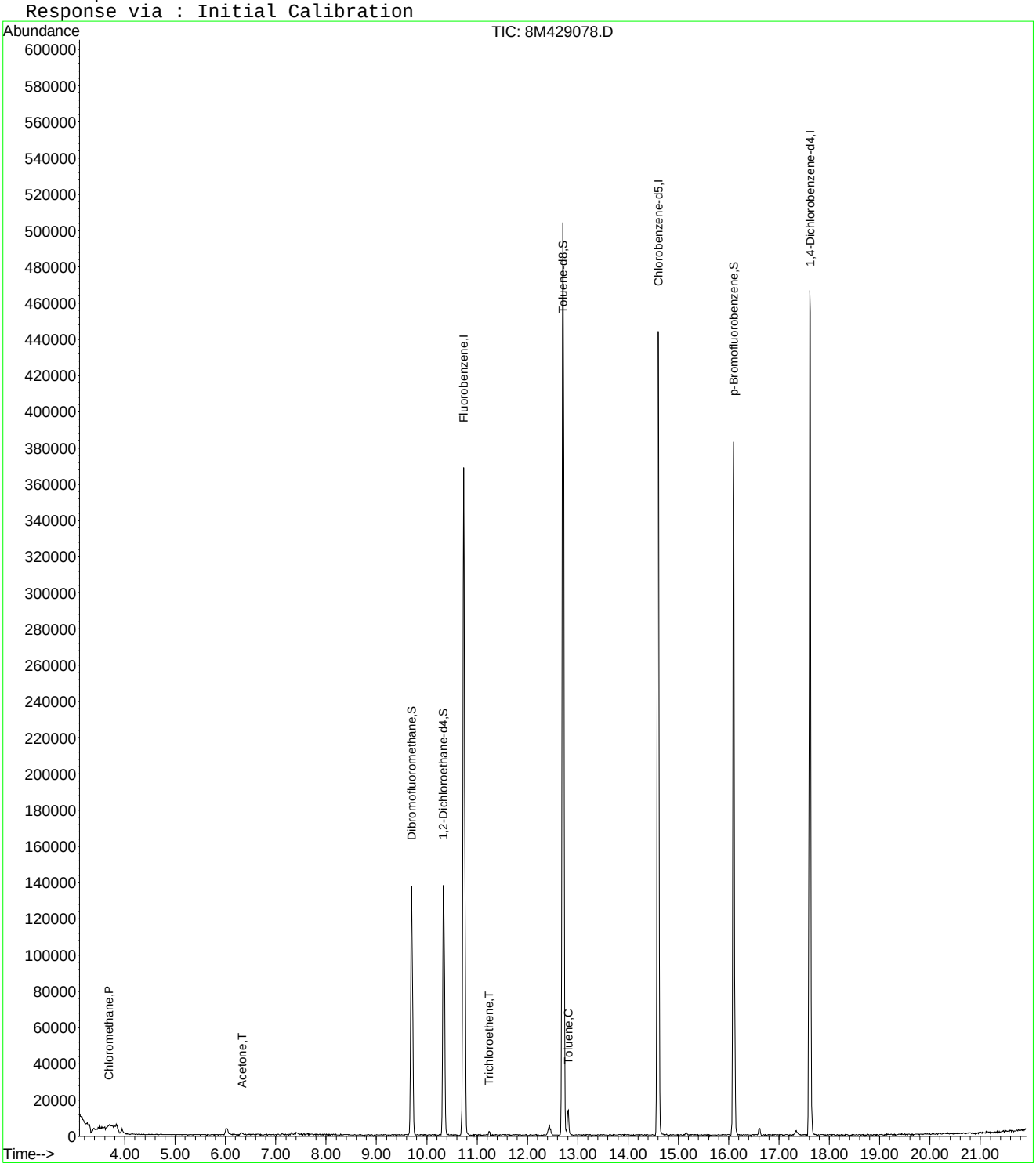
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

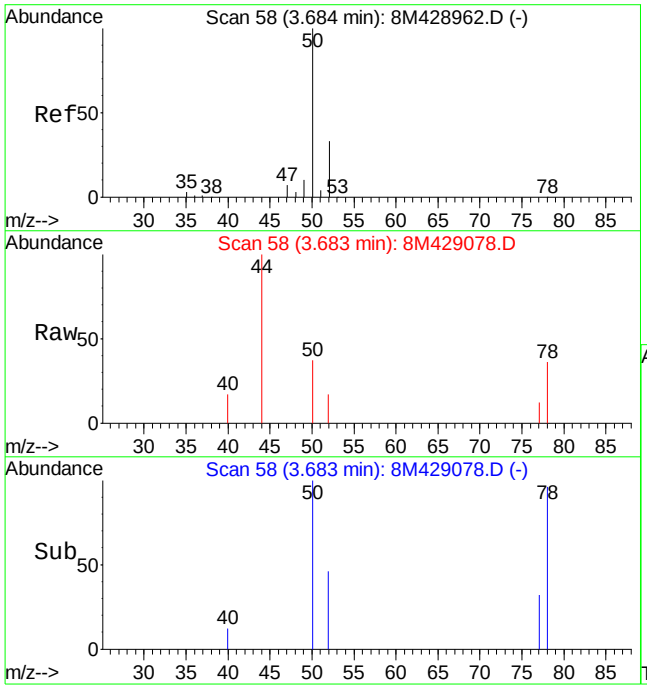
Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Fluorobenzene	10.73	96	457216	25.00 ug/L	0.00
57) Chlorobenzene-d5	14.60	117	341702	25.00 ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	174153	25.00 ug/L	0.00
System Monitoring Compounds					
37) Dibromofluoromethane	9.70	111	118738	26.0532 ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 104.20%		
43) 1,2-Dichloroethane-d4	10.33	65	122035	27.1234 ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 108.48%		
58) Toluene-d8	12.71	98	450320	25.8720 ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 103.48%		
80) p-Bromofluorobenzene	16.10	95	175118	27.8612 ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 111.44%		
Target Compounds					Qvalue
3) Chloromethane	3.68	50	3338	0.2919 ug/L	87
13) Acetone	6.33	43	3143	2.2316 ug/L #	45
47) Trichloroethene	11.24	130	1116	0.1677 ug/L	79
59) Toluene	12.81	91	15796	0.6191 ug/L	98

(#) = qualifier out of range (m) = manual integration
8M429078.D 8260WTR.M Tue Mar 12 09:00:40 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429078.D Vial: 18
Acq On : 11 Mar 2019 17:59 Operator: EEA
Sample : L19030638-06 A 826-SPE Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 9:00 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration

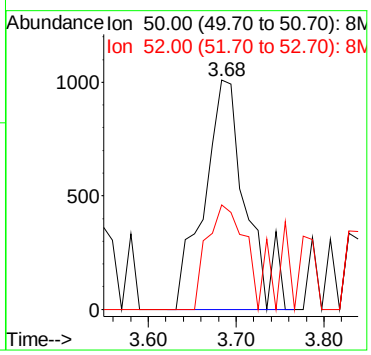


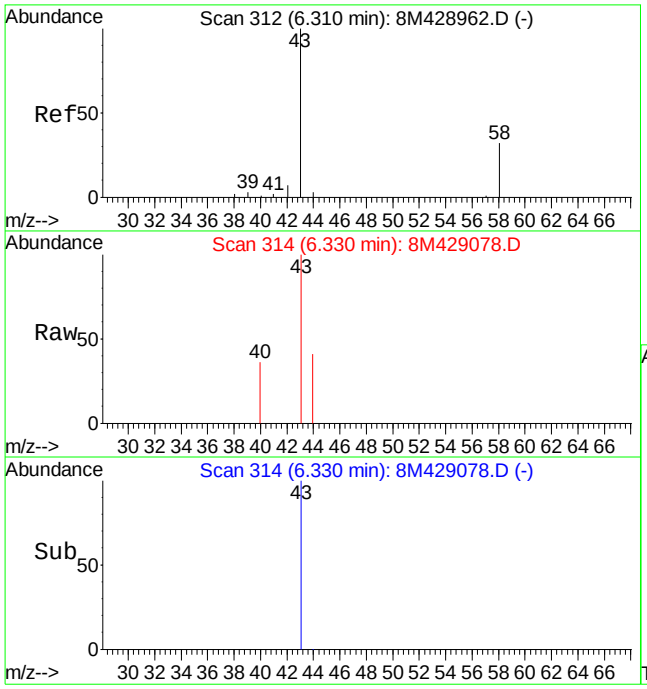


#3
Chloromethane
Concen: 0.29 ug/L
RT: 3.68 min Scan# 58
Delta R.T. -0.00 min
Lab File: 8M429078.D
Acq: 11 Mar 2019 17:59

Tgt Ion: 50 Resp: 3338

Ion	Ratio	Lower	Upper
50	100		
52	40.4	19.7	46.1

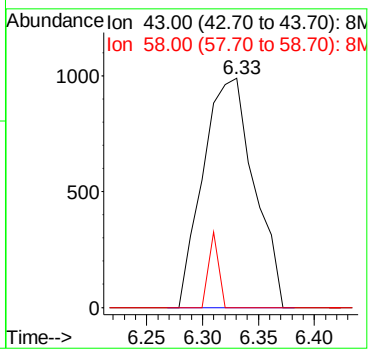


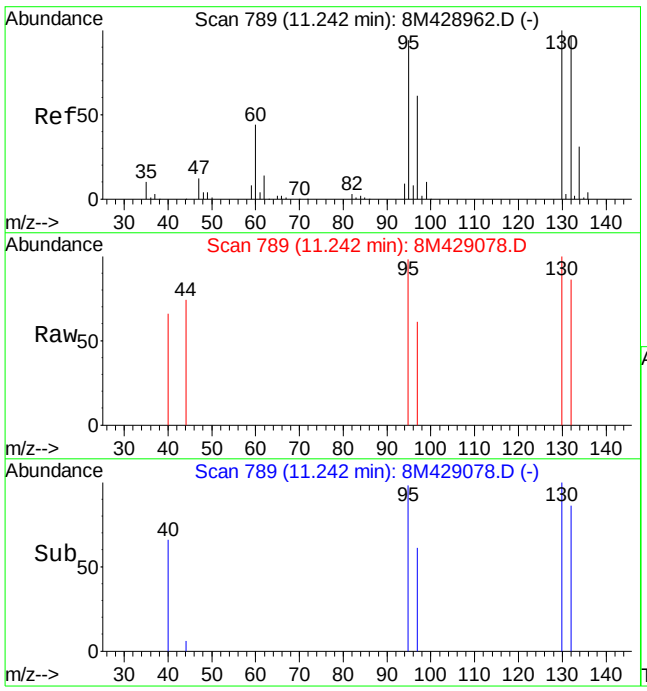


#13
Acetone
Concen: 2.23 ug/L
RT: 6.33 min Scan# 314
Delta R.T. 0.02 min
Lab File: 8M429078.D
Acq: 11 Mar 2019 17:59

Tgt Ion: 43 Resp: 3143

Ion	Ratio	Lower	Upper
43	100		
58	0.0	17.6	41.2#

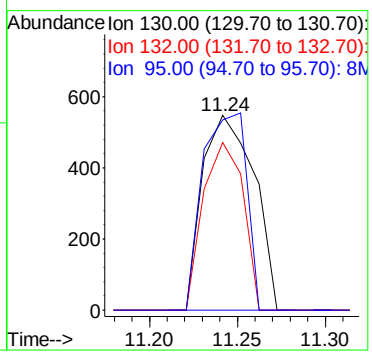


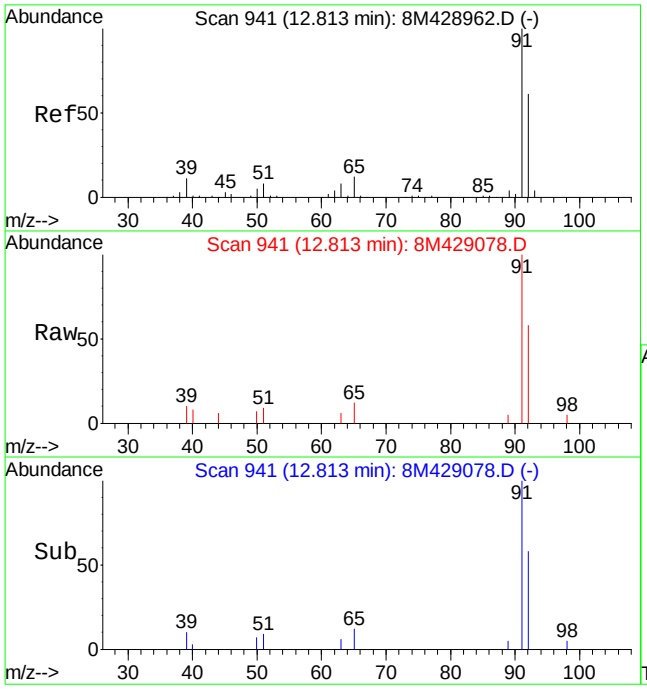


#47
Trichloroethene
Concen: 0.17 ug/L
RT: 11.24 min Scan# 789
Delta R.T. -0.00 min
Lab File: 8M429078.D
Acq: 11 Mar 2019 17:59

Tgt Ion:130 Resp: 1116

Ion	Ratio	Lower	Upper
130	100		
132	66.5	58.0	135.2
95	85.7	57.4	133.8

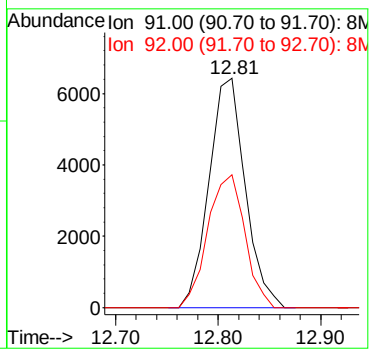




#59
Toluene
Concen: 0.62 ug/L
RT: 12.81 min Scan# 941
Delta R.T. -0.00 min
Lab File: 8M429078.D
Acq: 11 Mar 2019 17:59

Tgt Ion: 91 Resp: 15796

Ion	Ratio	Lower	Upper
91	100		
92	59.1	36.6	85.4



Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429079.D Vial: 19
Acq On : 11 Mar 2019 18:28 Operator: EEA
Sample : L19030638-07 A 826-SPE Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 09:00:41 2019 Quant Results File: 8260WTR.RES

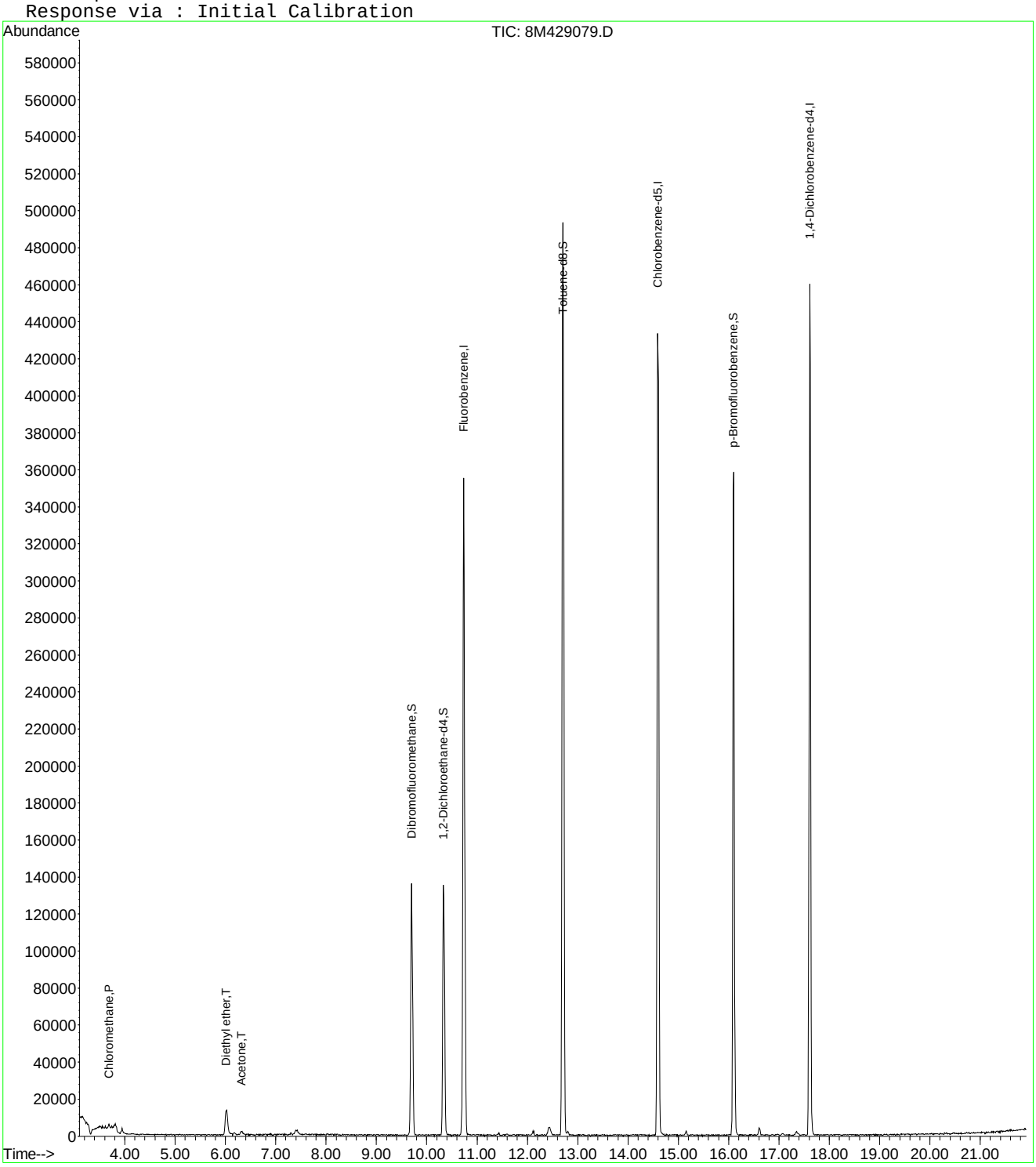
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

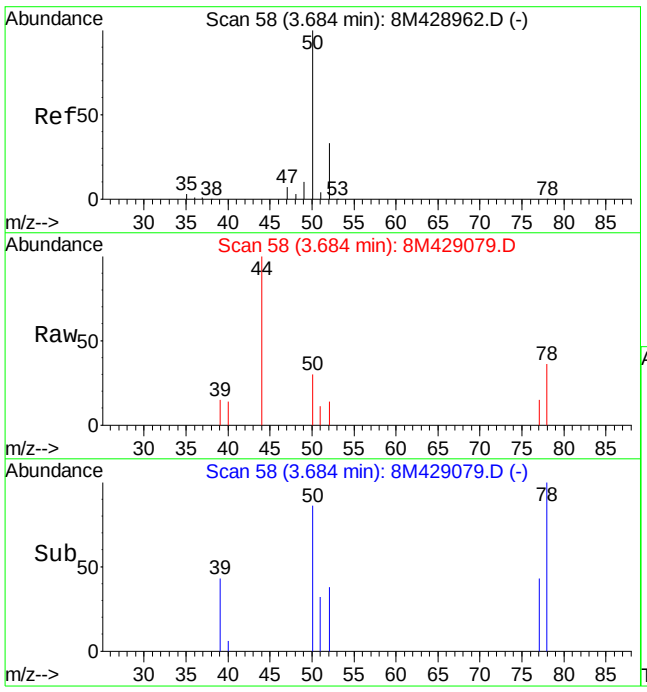
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	434603	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.59	117	327300	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.61	152	165281	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	9.70	111	114717	26.4806	ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 105.92%			
43) 1,2-Dichloroethane-d4	10.33	65	118733	27.7625	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 111.04%			
58) Toluene-d8	12.71	98	442309	26.5300	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 106.12%			
80) p-Bromofluorobenzene	16.09	95	169582	28.4287	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 113.72%			
Target Compounds						Qvalue
3) Chloromethane	3.68	50	2094	0.1926	ug/L	99
9) Diethyl ether	6.01	59	757	0.1578	ug/L #	1
13) Acetone	6.31	43	5028	3.7557	ug/L	78

(#) = qualifier out of range (m) = manual integration
8M429079.D 8260WTR.M Tue Mar 12 09:00:42 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429079.D Vial: 19
Acq On : 11 Mar 2019 18:28 Operator: EEA
Sample : L19030638-07 A 826-SPE Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 9:00 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration

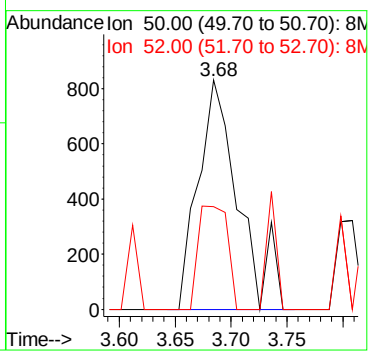


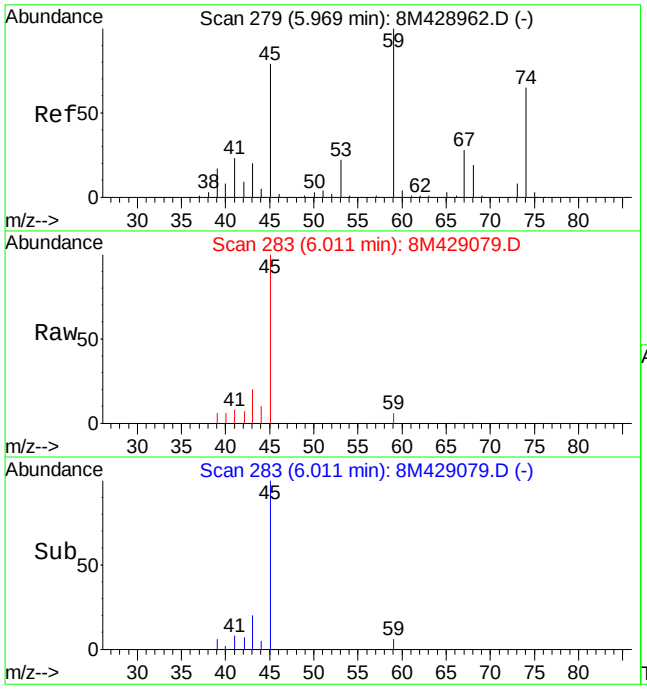


#3
Chloromethane
Concen: 0.19 ug/L
RT: 3.68 min Scan# 58
Delta R.T. 0.00 min
Lab File: 8M429079.D
Acq: 11 Mar 2019 18:28

Tgt Ion: 50 Resp: 2094

Ion	Ratio	Lower	Upper
50	100		
52	32.6	19.7	46.1

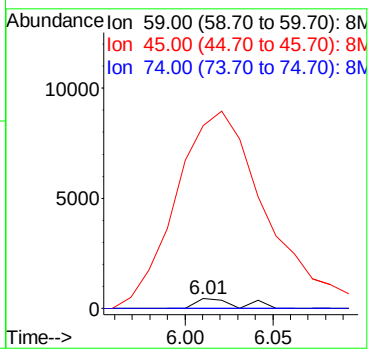


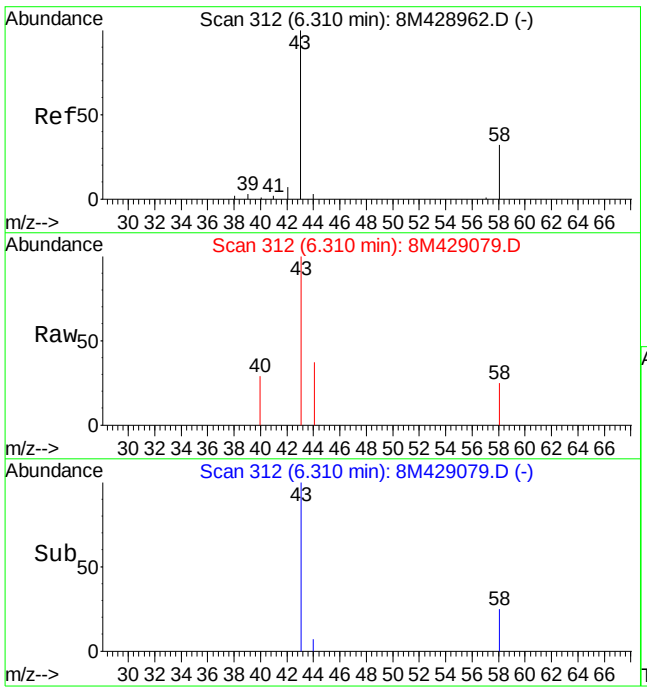


#9
Diethyl ether
Concen: 0.16 ug/L
RT: 6.01 min Scan# 283
Delta R.T. 0.04 min
Lab File: 8M429079.D
Acq: 11 Mar 2019 18:28

Tgt Ion: 59 Resp: 757

Ion	Ratio	Lower	Upper
59	100		
45	4317.3	47.6	111.2#
74	0.0	38.6	90.2#

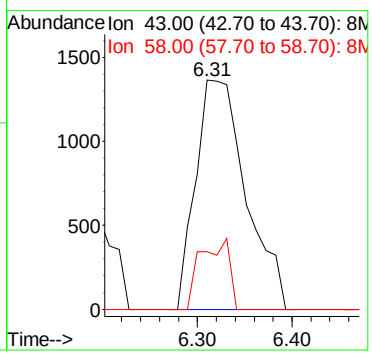




#13
Acetone
Concen: 3.76 ug/L
RT: 6.31 min Scan# 312
Delta R.T. 0.00 min
Lab File: 8M429079.D
Acq: 11 Mar 2019 18:28

Tgt Ion: 43 Resp: 5028

Ion	Ratio	Lower	Upper
43	100		
58	17.6	17.6	41.2



Data File : C:\MSDCHEM\1\DATA\031219\11M29836.D Vial: 8
Acq On : 12 Mar 2019 14:59 Operator: KFR
Sample : L19030638-08 A TBLK 826-SPE Inst : hpms11
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 16 10:12:51 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

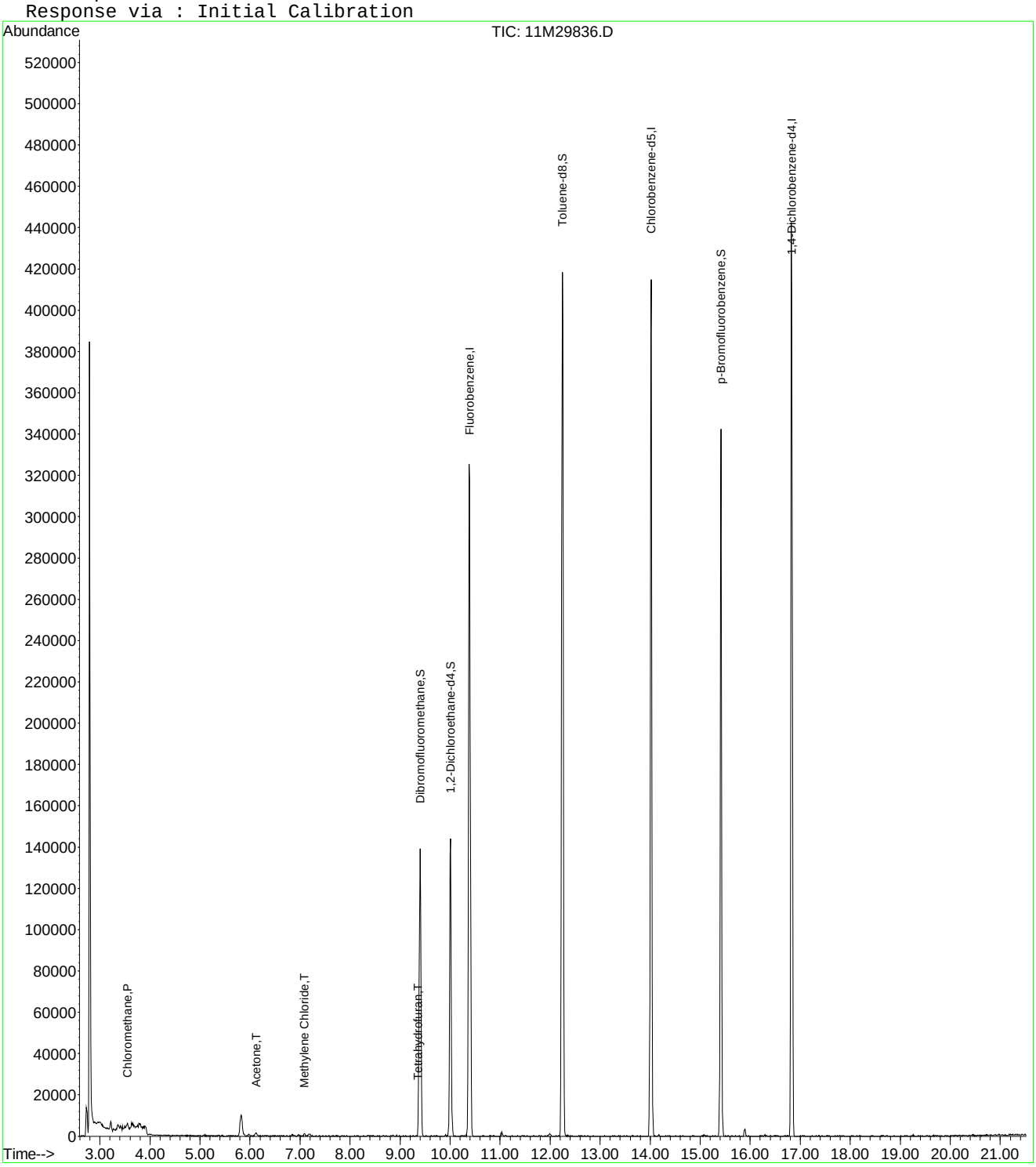
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3915	96	375235	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0207	117	282943	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	140720	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3989	111	107668	24.8572	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 99.4288%			
43) 1,2-Dichloroethane-d4	10.0089	65	128137	24.6558	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 98.6232%			
57) Toluene-d8	12.2423	98	350595	24.8984	ug/L	-0.0103
Spiked Amount 25.0000	Range 88 - 110		Recovery = 99.5936%			
78) p-Bromofluorobenzene	15.4165	95	132232	24.5552	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 98.2208%			
Target Compounds						Qvalue
3) Chloromethane	3.5467	50	2094	0.1967	ug/L #	56
13) Acetone	6.1212	43	3660	2.6680	ug/L #	69
19) Methylene Chloride	7.0828	84	977	0.2442	ug/L	92
36) Tetrahydrofuran	9.3575	42	892	0.7879	ug/L #	37

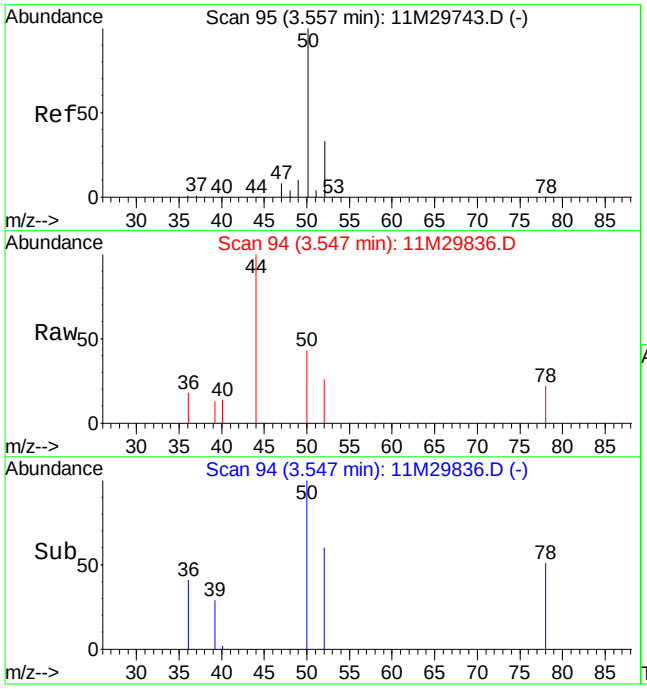
(#) = qualifier out of range (m) = manual integration
11M29836.D 8260WT.M Sat Mar 16 10:12:52 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29836.D Vial: 8
Acq On : 12 Mar 2019 14:59 Operator: KFR
Sample : L19030638-08 A TBLK 826-SPE Inst : hpms11
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 16 10:12 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration

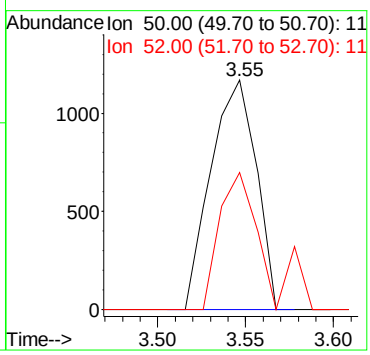


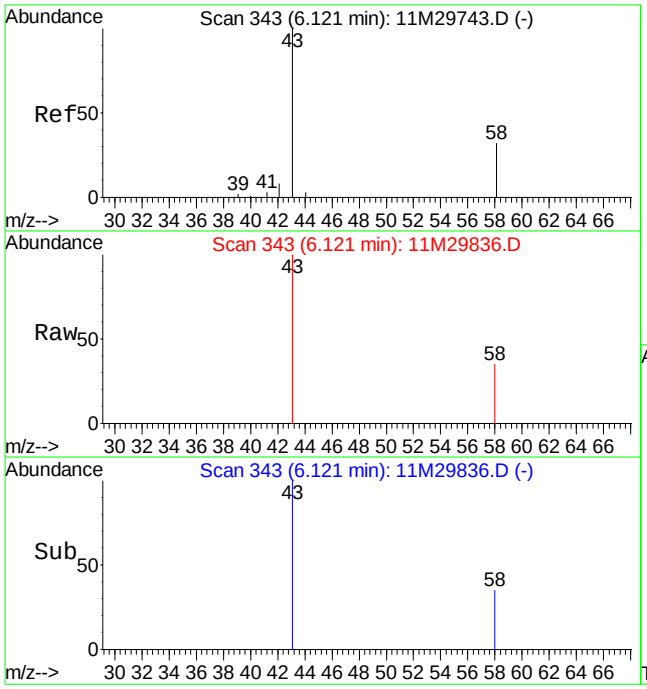


#3
Chloromethane
Concen: 0.1967 ug/L
RT: 3.55 min Scan# 94
Delta R.T. -0.01 min
Lab File: 11M29836.D
Acq: 12 Mar 2019 14:59

Tgt Ion: 50 Resp: 2094

Ion	Ratio	Lower	Upper
50	100		
52	57.4	19.6	45.6#

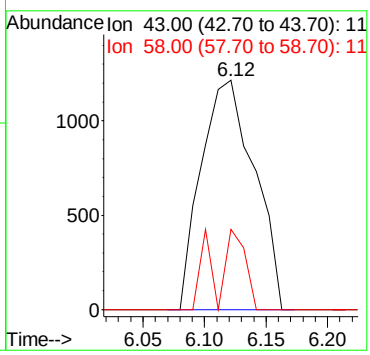


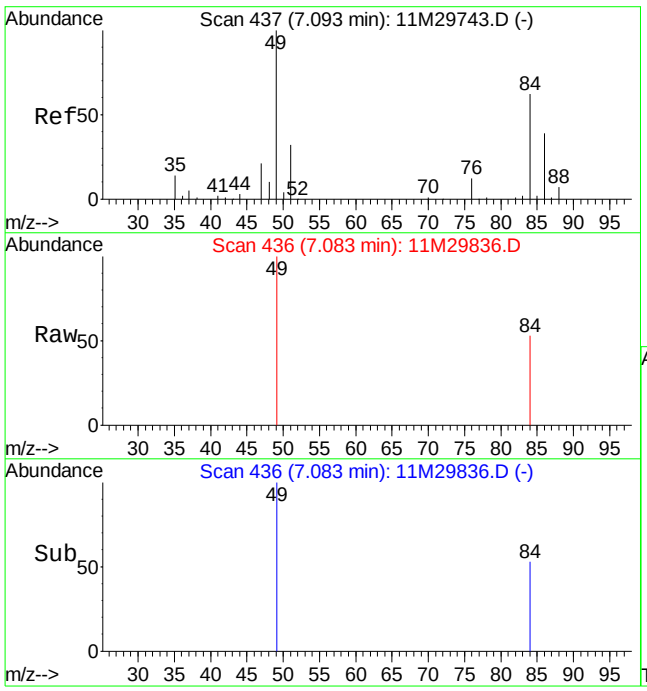


#13
Acetone
Concen: 2.6680 ug/L
RT: 6.12 min Scan# 343
Delta R.T. 0.00 min
Lab File: 11M29836.D
Acq: 12 Mar 2019 14:59

Tgt Ion: 43 Resp: 3660

Ion	Ratio	Lower	Upper
43	100		
58	12.7	17.8	41.4#

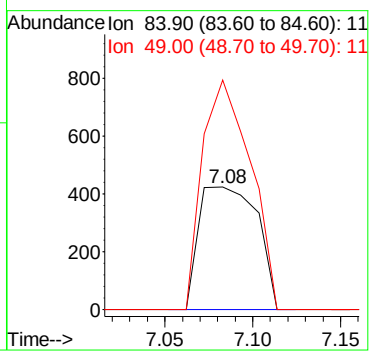


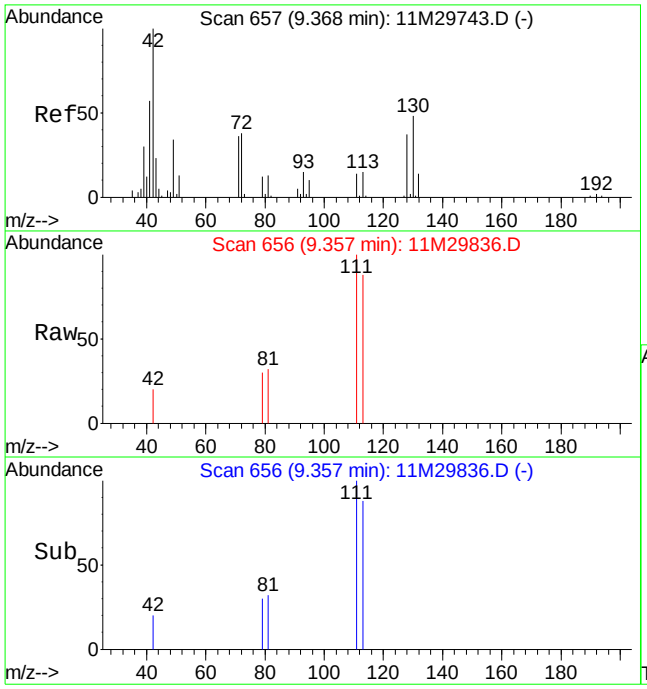


#19
Methylene Chloride
Concen: 0.2442 ug/L
RT: 7.08 min Scan# 436
Delta R.T. -0.01 min
Lab File: 11M29836.D
Acq: 12 Mar 2019 14:59

Tgt Ion: 84 Resp: 977

Ion	Ratio	Lower	Upper
84	100		
49	154.5	99.4	231.8

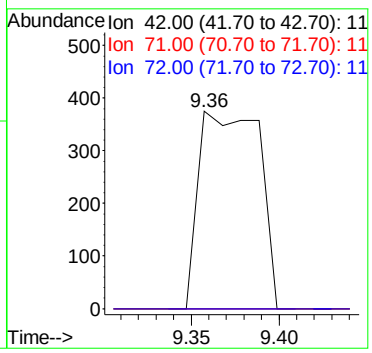




#36
Tetrahydrofuran
Concen: 0.7879 ug/L
RT: 9.36 min Scan# 656
Delta R.T. -0.01 min
Lab File: 11M29836.D
Acq: 12 Mar 2019 14:59

Tgt Ion: 42 Resp: 892

Ion	Ratio	Lower	Upper
42	100		
71	0.0	22.1	51.7#
72	0.0	22.9	53.3#



2.1.1.4 Standards Data

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29628.D Vial: 4
Acq On : 19 Feb 2019 13:17 Operator: KFR
Sample : WG696624-03 5ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:20 2019 Quant Results File: A9FOOWT.RES

Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

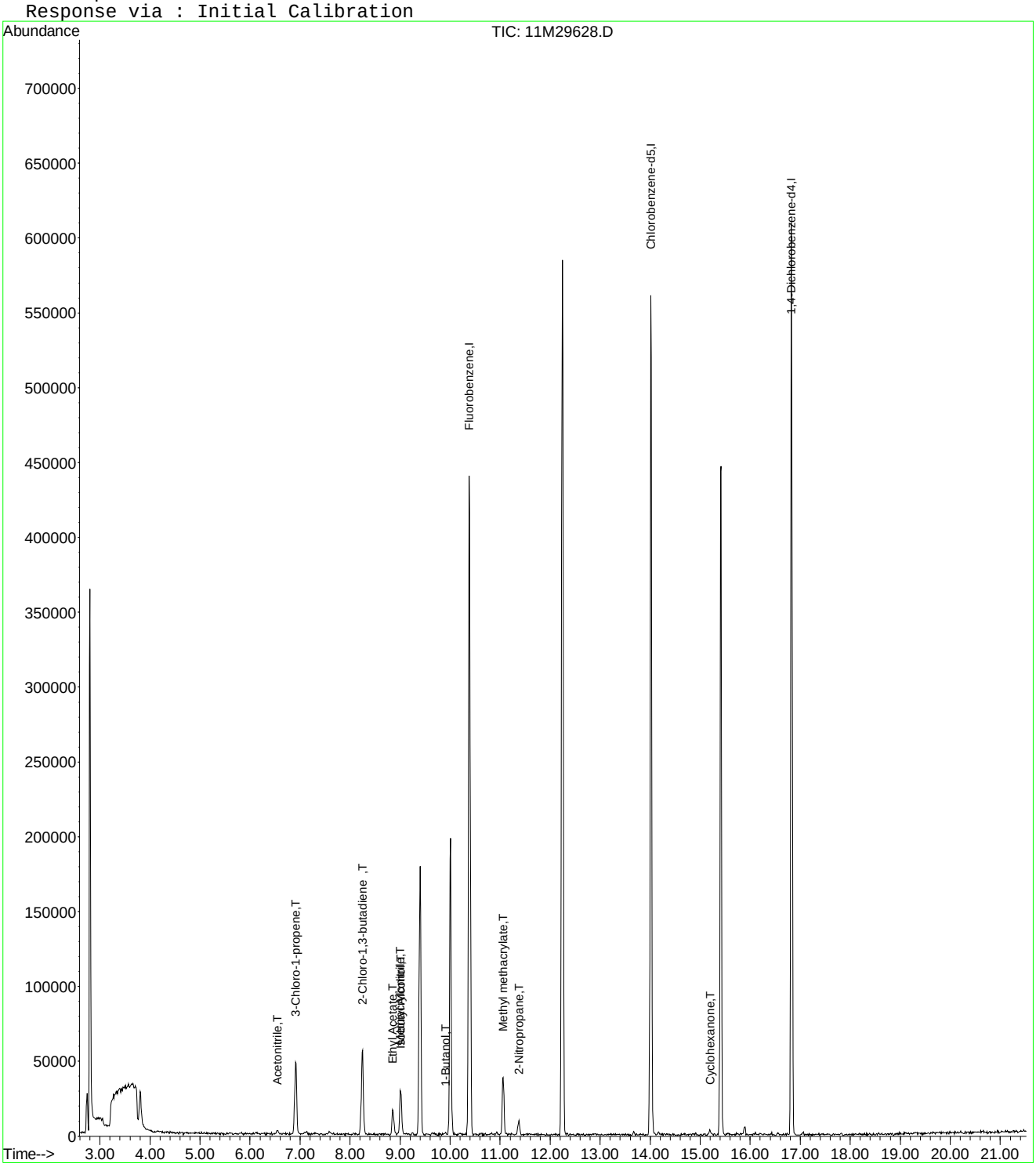
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Fluorobenzene	10.3812	96	493305	25.0000	ug/L		0.0000
12) Chlorobenzene-d5	14.0104	117	374544	25.0000	ug/L		0.0000
13) 1,4-Dichlorobenzene-d4	16.8227	152	189147	25.0000	ug/L		0.0000
Target Compounds							Qvalue
2) Acetonitrile	6.5452	41	3643	4.9714	ug/L		74
3) 3-Chloro-1-propene	6.9071	41	51893	5.3368	ug/L		99
4) 2-Chloro-1,3-butadiene	8.2513	53	58581	5.4502	ug/L		97
5) Methacrylonitrile	9.0060	41	24202	5.7049	ug/L		89
6) Isobutyl Alcohol	9.0164	43	4052	14.1171	ug/L		71
7) 1-Butanol	9.9056	56	628	3.7711	ug/L	#	14
8) Cyclohexanone	15.1995	55	3200	7.7190	ug/L	#	67
9) 2-Nitropropane	11.3738	43	9863	5.0857	ug/L		94
10) Ethyl Acetate	8.8509	43	29837	5.2588	ug/L		97
11) Methyl methacrylate	11.0636	41	30286	5.5638	ug/L		91

(#) = qualifier out of range (m) = manual integration
11M29628.D A9FOOWT.M Wed Feb 20 09:25:20 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29628.D Vial: 4
Acq On : 19 Feb 2019 13:17 Operator: KFR
Sample : WG696624-03 5ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29628.D Vial: 4
Acq On : 19 Feb 2019 13:17 Operator: KFR
Sample : WG696624-03 5ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	5.000	4.971	0.6	100	0.00
3	T	3-Chloro-1-propene	5.000	5.337	-6.7	100	-0.01
4	T	2-Chloro-1,3-butadiene	5.000	5.450	-9.0	100	0.01
5	T	Methacrylonitrile	5.000	5.705	-14.1	100	0.00
6	T	Isobutyl Alcohol	-1.000	14.117	0.0	100	0.00
7	T	1-Butanol	5.000	3.771	24.6	100	0.01
8	T	Cyclohexanone	-1.000	7.719	0.0	0	0.01
9	T	2-Nitropropane	5.000	5.086	-1.7	100	0.00
10	T	Ethyl Acetate	5.000	5.259	-5.2	100	0.00
11	T	Methyl methacrylate	5.000	5.564	-11.3	100	0.01
12	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29628.D A9FOOWT.M Wed Feb 20 09:21:53 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29629.D Vial: 5
Acq On : 19 Feb 2019 13:47 Operator: KFR
Sample : WG696624-04 20ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:21 2019 Quant Results File: A9FOOWT.RES

Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3811	96	480707	25.0000	ug/L	0.0000
12) Chlorobenzene-d5	14.0206	117	363206	25.0000	ug/L	0.0102
13) 1,4-Dichlorobenzene-d4	16.8226	152	186142	25.0000	ug/L	0.0000

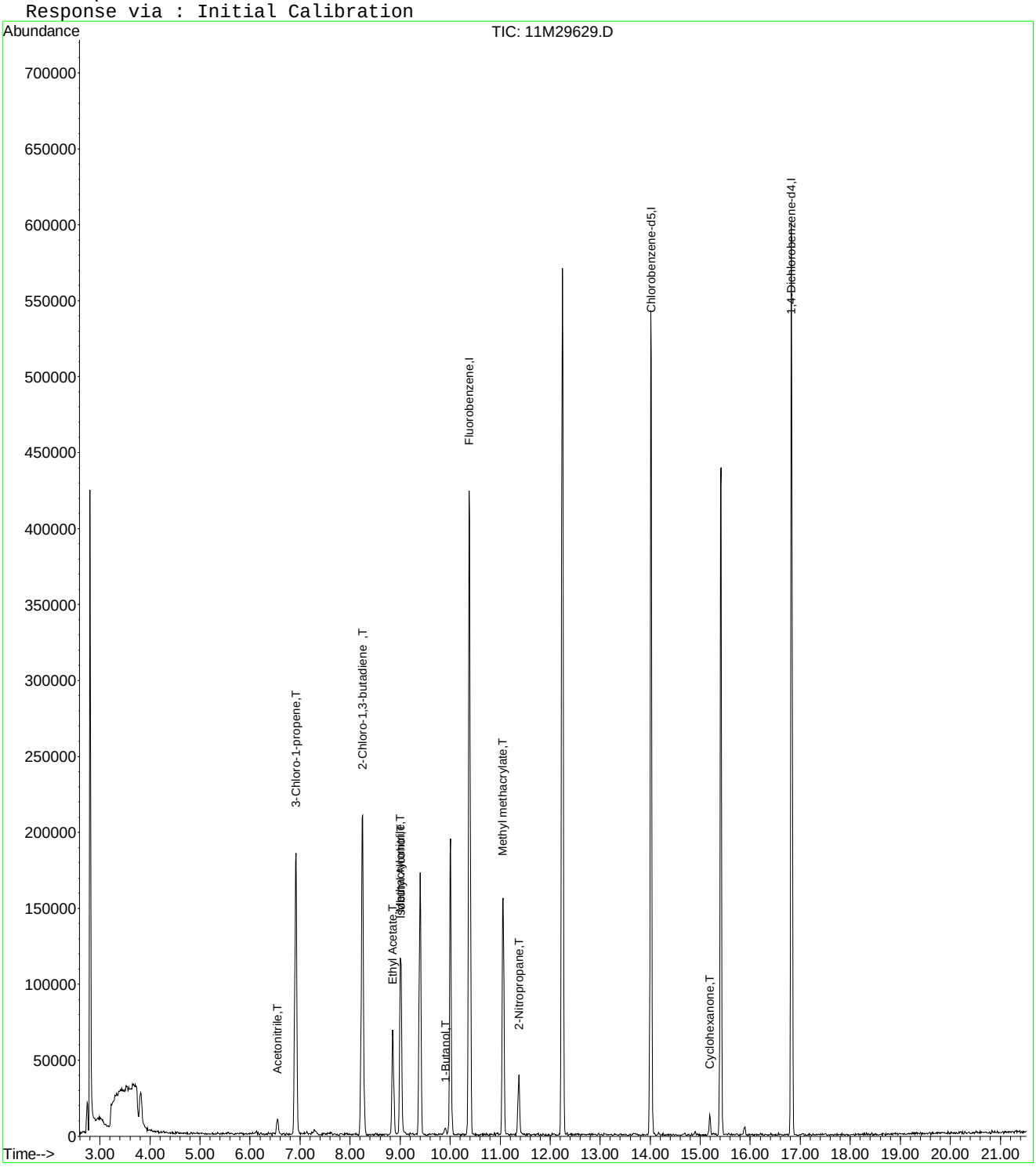
Target Compounds						Qvalue
2) Acetonitrile	6.5451	41	16699	23.3856	ug/L	99
3) 3-Chloro-1-propene	6.9173	41	191643	20.2255	ug/L	96
4) 2-Chloro-1,3-butadiene	8.2511	53	212583	20.2965	ug/L	99
5) Methacrylonitrile	9.0059	41	83846	20.2822	ug/L	96
6) Isobutyl Alcohol	9.0162	43	9203	32.9033	ug/L	85
7) 1-Butanol	9.9054	56	3151	19.4173	ug/L #	34
8) Cyclohexanone	15.1890	55	8986	22.2440	ug/L	96
9) 2-Nitropropane	11.3737	43	34565	18.2899	ug/L	97
10) Ethyl Acetate	8.8508	43	115887	20.9604	ug/L	97
11) Methyl methacrylate	11.0531	41	109713	20.6836	ug/L	98

(#) = qualifier out of range (m) = manual integration
11M29629.D A9FOOWT.M Wed Feb 20 09:25:21 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29629.D Vial: 5
Acq On : 19 Feb 2019 13:47 Operator: KFR
Sample : WG696624-04 20ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29629.D Vial: 5
Acq On : 19 Feb 2019 13:47 Operator: KFR
Sample : WG696624-04 20ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	20.000	23.386	-16.9	100	0.00
3	T	3-Chloro-1-propene	20.000	20.226	-1.1	100	0.00
4	T	2-Chloro-1,3-butadiene	20.000	20.297	-1.5	100	0.01
5	T	Methacrylonitrile	20.000	20.282	-1.4	100	0.00
6	T	Isobutyl Alcohol	-1.000	32.903	0.0	100	0.00
7	T	1-Butanol	20.000	19.417	2.9	100	0.01
8	T	Cyclohexanone	20.000	22.244	-11.2	100	0.00
9	T	2-Nitropropane	20.000	18.290	8.6	100	0.00
10	T	Ethyl Acetate	20.000	20.960	-4.8	100	0.00
11	T	Methyl methacrylate	20.000	20.684	-3.4	100	0.00
12	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.01
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29629.D A9FOOWT.M Wed Feb 20 09:22:14 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29630.D Vial: 6
Acq On : 19 Feb 2019 14:16 Operator: KFR
Sample : WG696624-05 50ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:22 2019 Quant Results File: A9FOOWT.RES

Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

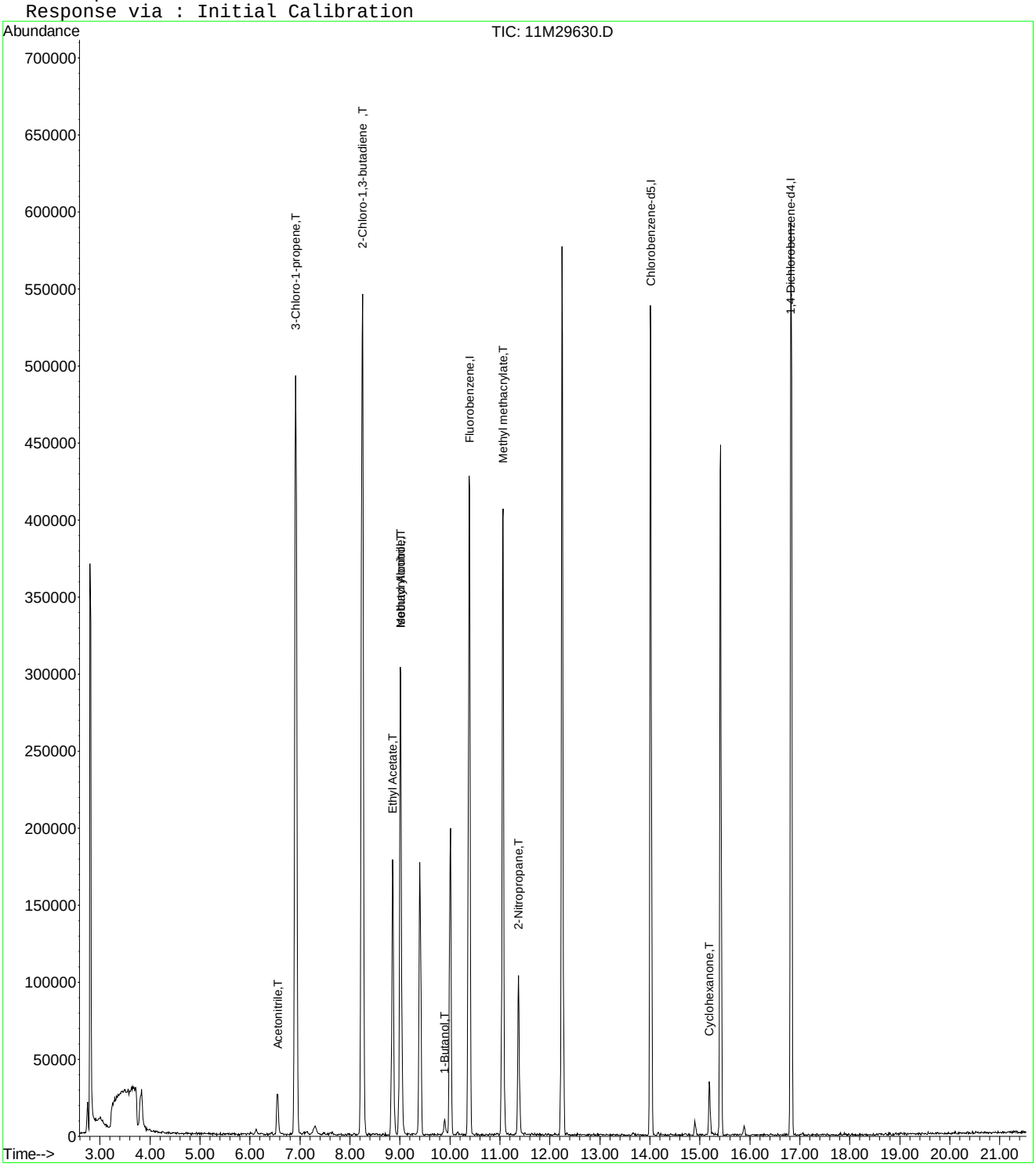
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Fluorobenzene	10.3915	96	485902	25.0000	ug/L		0.0103
12) Chlorobenzene-d5	14.0207	117	364295	25.0000	ug/L		0.0103
13) 1,4-Dichlorobenzene-d4	16.8227	152	182799	25.0000	ug/L		0.0000
Target Compounds							Qvalue
2) Acetonitrile	6.5555	41	38349	53.1305	ug/L		98
3) 3-Chloro-1-propene	6.9174	41	493137	51.4880	ug/L		98
4) 2-Chloro-1,3-butadiene	8.2512	53	544956	51.4739	ug/L		98
5) Methacrylonitrile	9.0163	41	214843	51.4146	ug/L		100
6) Isobutyl Alcohol	9.0163	43	28972	102.4756	ug/L		91
7) 1-Butanol	9.8952	56	7907	48.2041	ug/L	#	87
8) Cyclohexanone	15.1890	55	20882	51.1387	ug/L		95
9) 2-Nitropropane	11.3737	43	92750	48.5534	ug/L		99
10) Ethyl Acetate	8.8509	43	295121	52.8077	ug/L		99
11) Methyl methacrylate	11.0635	41	284315	53.0272	ug/L		98

(#) = qualifier out of range (m) = manual integration
11M29630.D A9FOOWT.M Wed Feb 20 09:25:22 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29630.D Vial: 6
Acq On : 19 Feb 2019 14:16 Operator: KFR
Sample : WG696624-05 50ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29630.D Vial: 6
Acq On : 19 Feb 2019 14:16 Operator: KFR
Sample : WG696624-05 50ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.01
2	T	Acetonitrile	50.000	53.130	-6.3	100	0.01
3	T	3-Chloro-1-propene	50.000	51.488	-3.0	100	0.00
4	T	2-Chloro-1,3-butadiene	50.000	51.474	-2.9	100	0.01
5	T	Methacrylonitrile	50.000	51.415	-2.8	100	0.01
6	T	Isobutyl Alcohol	100.000	102.476	-2.5	100	0.00
7	T	1-Butanol	50.000	48.204	3.6	100	0.00
8	T	Cyclohexanone	50.000	51.139	-2.3	100	0.00
9	T	2-Nitropropane	50.000	48.553	2.9	100	0.00
10	T	Ethyl Acetate	50.000	52.808	-5.6	100	0.00
11	T	Methyl methacrylate	50.000	53.027	-6.1	100	0.01
12	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.01
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29630.D A9FOOWT.M Wed Feb 20 09:22:23 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29631.D Vial: 7
Acq On : 19 Feb 2019 14:45 Operator: KFR
Sample : WG696624-06 100ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:23 2019 Quant Results File: A9FOOWT.RES

Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

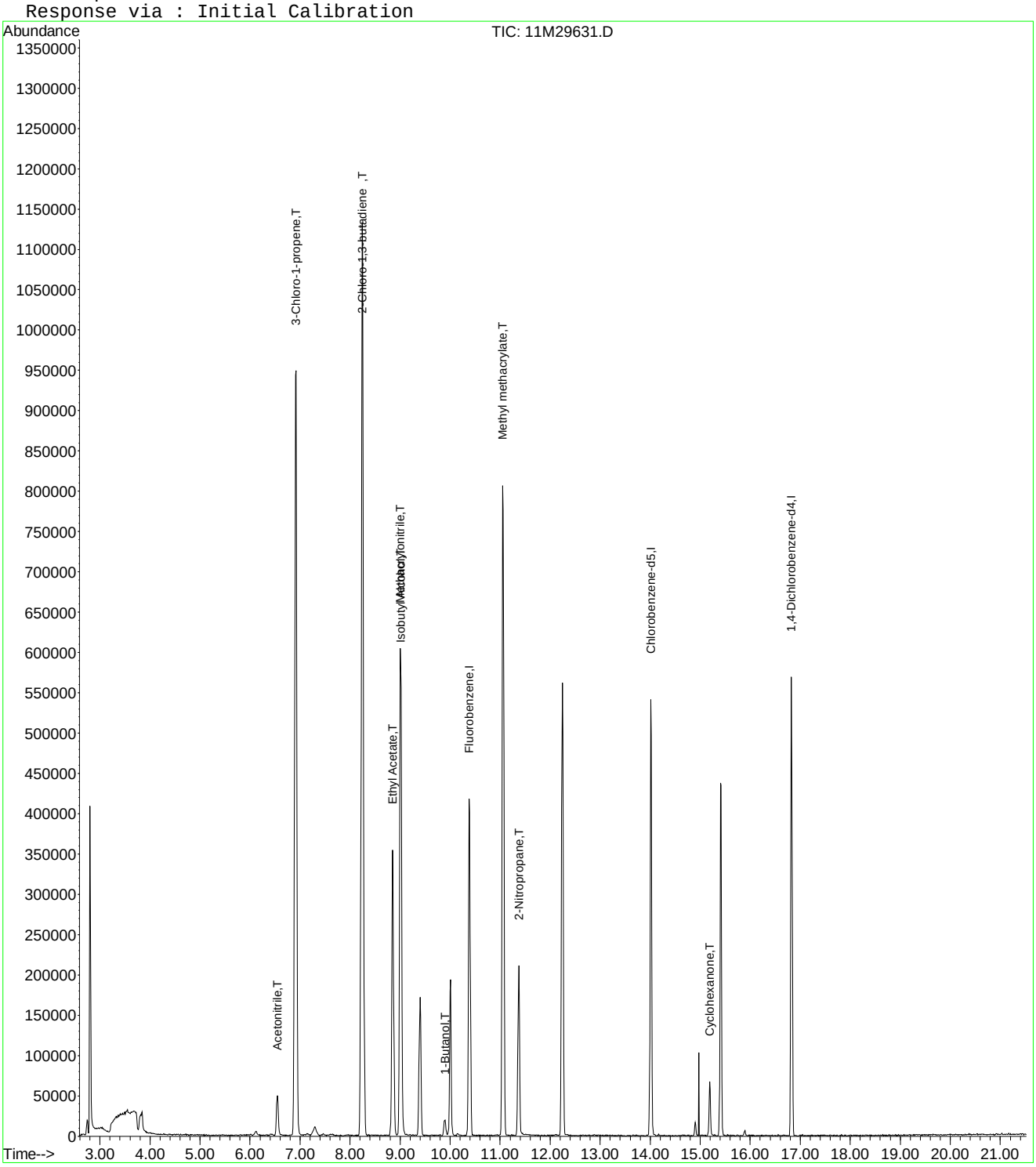
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3812	96	474275	25.0000	ug/L	0.0000
12) Chlorobenzene-d5	14.0104	117	359140	25.0000	ug/L	0.0000
13) 1,4-Dichlorobenzene-d4	16.8227	152	178860	25.0000	ug/L	0.0000

Target Compounds						Qvalue
2) Acetonitrile	6.5452	41	68209	96.8166	ug/L	100
3) 3-Chloro-1-propene	6.9174	41	974729	104.2656	ug/L	100
4) 2-Chloro-1,3-butadiene	8.2409	53	1129368	109.2897	ug/L	100
5) Methacrylonitrile	9.0060	41	410236	100.5813	ug/L	100
6) Isobutyl Alcohol	9.0163	43	52091	188.7657	ug/L	100
7) 1-Butanol	9.8952	56	16192	101.1326	ug/L	100
8) Cyclohexanone	15.1891	55	39101	98.1034	ug/L	100
9) 2-Nitropropane	11.3738	43	182796	98.0372	ug/L	100
10) Ethyl Acetate	8.8509	43	565874	103.7374	ug/L	100
11) Methyl methacrylate	11.0532	41	544148	103.9763	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29631.D A9FOOWT.M Wed Feb 20 09:25:23 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\021919\11M29631.D Vial: 7
Acq On : 19 Feb 2019 14:45 Operator: KFR
Sample : WG696624-06 100ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29631.D Vial: 7
Acq On : 19 Feb 2019 14:45 Operator: KFR
Sample : WG696624-06 100ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	100.000	96.817	3.2	100	0.00
3	T	3-Chloro-1-propene	100.000	104.266	-4.3	100	0.00
4	T	2-Chloro-1,3-butadiene	100.000	109.290	-9.3	100	0.00
5	T	Methacrylonitrile	100.000	100.581	-0.6	100	0.00
6	T	Isobutyl Alcohol	200.000	188.766	5.6	100	0.00
7	T	1-Butanol	100.000	101.133	-1.1	100	0.00
8	T	Cyclohexanone	100.000	98.103	1.9	100	0.00
9	T	2-Nitropropane	100.000	98.037	2.0	100	0.00
10	T	Ethyl Acetate	100.000	103.737	-3.7	100	0.00
11	T	Methyl methacrylate	100.000	103.976	-4.0	100	0.00
12	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29631.D A9FOOWT.M Wed Feb 20 09:22:34 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29632.D Vial: 8
Acq On : 19 Feb 2019 15:15 Operator: KFR
Sample : WG696624-07 200ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:23 2019 Quant Results File: A9FOOWT.RES

Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

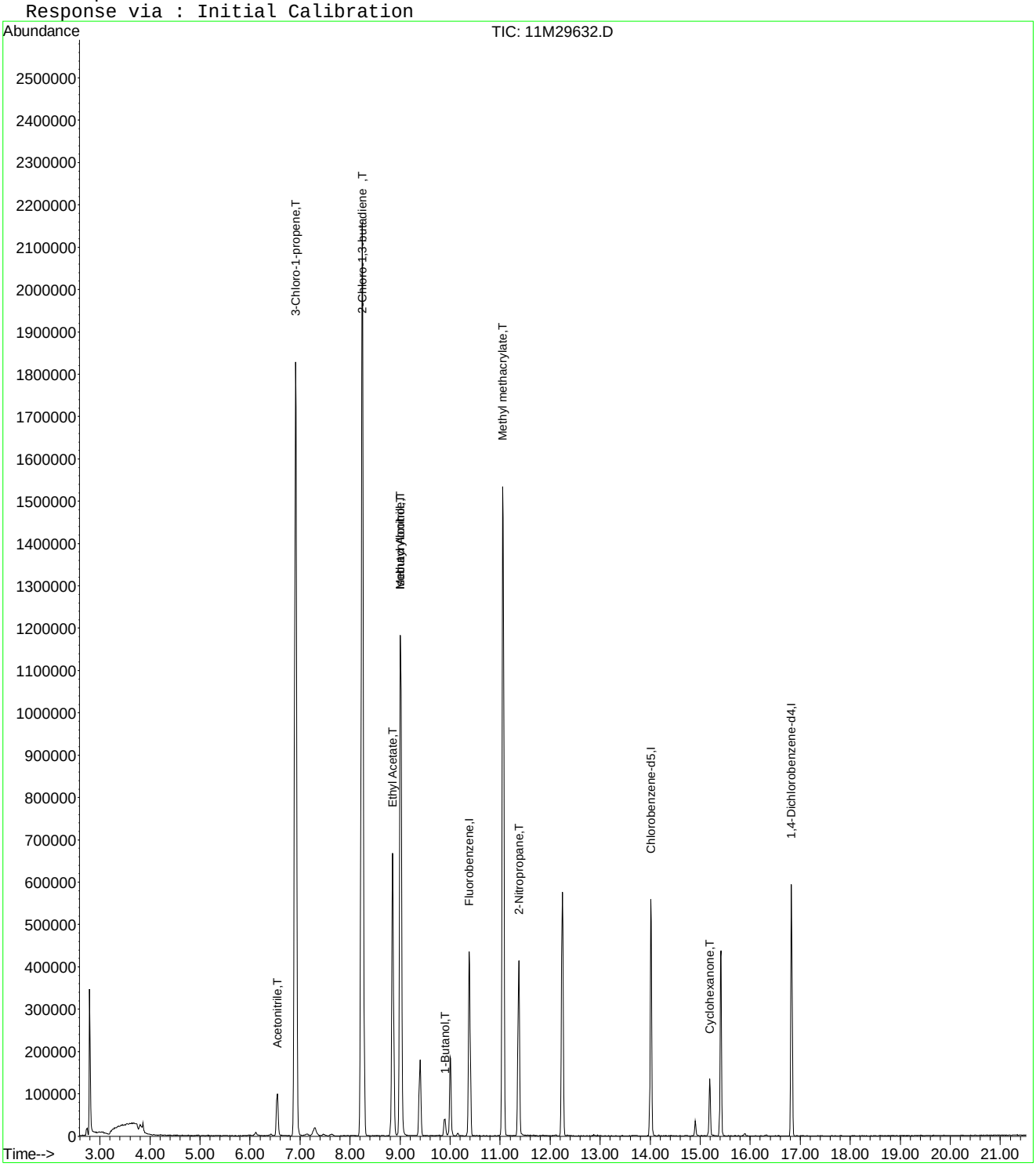
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3812	96	492245	25.0000	ug/L	0.0000
12) Chlorobenzene-d5	14.0104	117	371771	25.0000	ug/L	0.0000
13) 1,4-Dichlorobenzene-d4	16.8227	152	181875	25.0000	ug/L	0.0000
Target Compounds						Qvalue
2) Acetonitrile	6.5452	41	133510	182.5875	ug/L	97
3) 3-Chloro-1-propene	6.9071	41	1836470	189.2735	ug/L	98
4) 2-Chloro-1,3-butadiene	8.2409	53	2100037	195.8032	ug/L	97
5) Methacrylonitrile	9.0060	41	781256	184.5549	ug/L	98
6) Isobutyl Alcohol	9.0060	43	106345	371.3012	ug/L	98
7) 1-Butanol	9.8952	56	32962	198.3596	ug/L	92
8) Cyclohexanone	15.1891	55	77205	186.6340	ug/L	98
9) 2-Nitropropane	11.3738	43	366954	189.6203	ug/L	98
10) Ethyl Acetate	8.8509	43	1072599	189.4531	ug/L	100
11) Methyl methacrylate	11.0533	41	1030275	189.6791	ug/L	99

(#) = qualifier out of range (m) = manual integration
11M29632.D A9FOOWT.M Wed Feb 20 09:25:24 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29632.D Vial: 8
Acq On : 19 Feb 2019 15:15 Operator: KFR
Sample : WG696624-07 200ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29632.D Vial: 8
Acq On : 19 Feb 2019 15:15 Operator: KFR
Sample : WG696624-07 200ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	200.000	182.587	8.7	100	0.00
3	T	3-Chloro-1-propene	200.000	189.274	5.4	100	-0.01
4	T	2-Chloro-1,3-butadiene	200.000	195.803	2.1	100	0.00
5	T	Methacrylonitrile	200.000	184.555	7.7	100	0.00
6	T	Isobutyl Alcohol	400.000	371.301	7.2	100	-0.01
7	T	1-Butanol	200.000	198.360	0.8	100	0.00
8	T	Cyclohexanone	200.000	186.634	6.7	100	0.00
9	T	2-Nitropropane	200.000	189.620	5.2	100	0.00
10	T	Ethyl Acetate	200.000	189.453	5.3	100	0.00
11	T	Methyl methacrylate	200.000	189.679	5.2	100	0.00
12	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29633.D Vial: 9
Acq On : 19 Feb 2019 15:44 Operator: KFR
Sample : WG696624-08 300ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:24 2019 Quant Results File: A9FOOWT.RES

Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

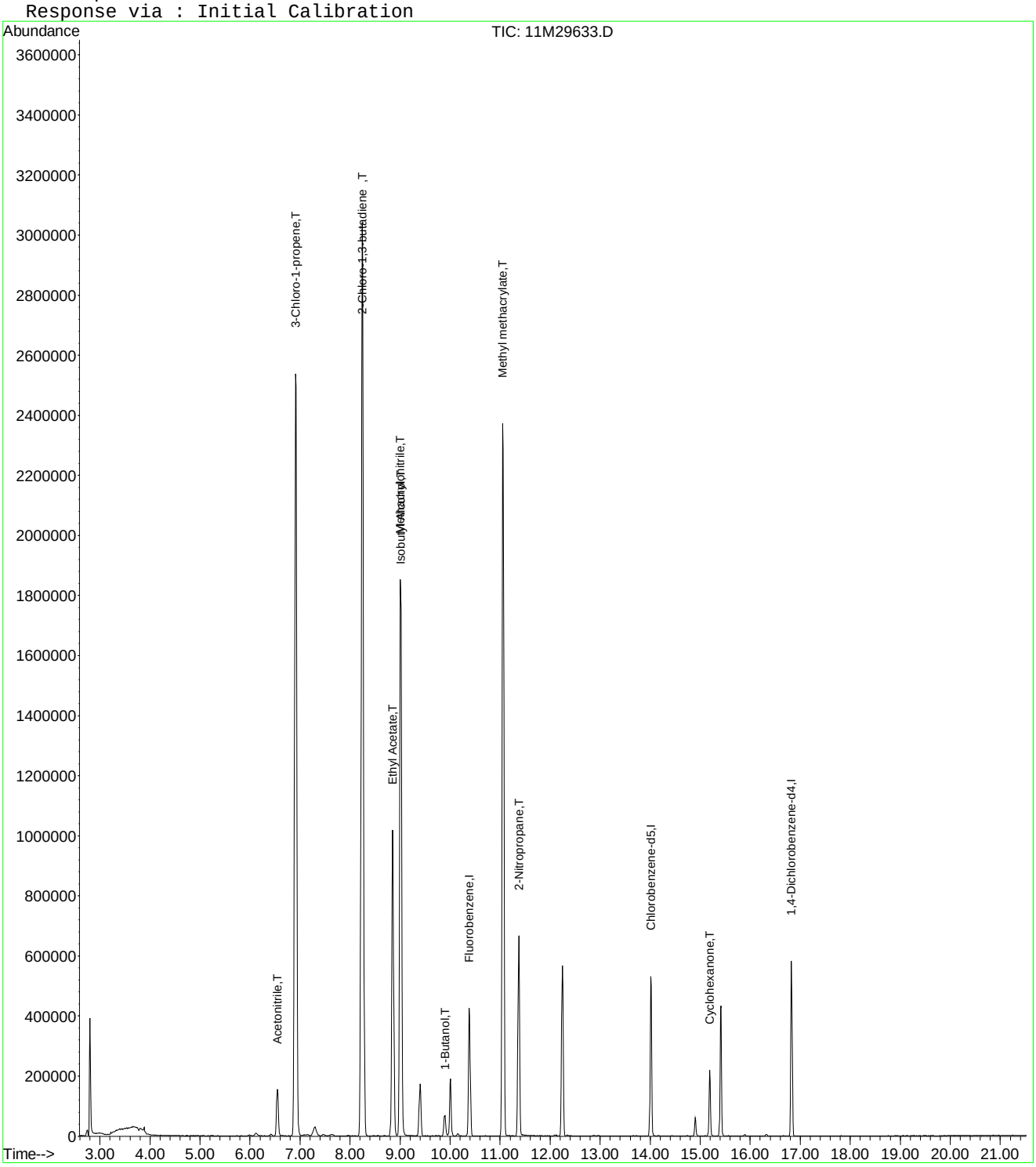
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3812	96	474847	25.0000	ug/L	0.0000
12) Chlorobenzene-d5	14.0104	117	358911	25.0000	ug/L	0.0000
13) 1,4-Dichlorobenzene-d4	16.8228	152	182980	25.0000	ug/L	0.0000

Target Compounds						Qvalue
2) Acetonitrile	6.5452	41	207084	293.5833	ug/L	99
3) 3-Chloro-1-propene	6.9071	41	2534392	270.7743	ug/L	93
4) 2-Chloro-1,3-butadiene	8.2409	53	2894878	279.8019	ug/L	91
5) Methacrylonitrile	9.0061	41	1228345	300.8017	ug/L	97
6) Isobutyl Alcohol	9.0164	43	179274	648.8648	ug/L	96
7) 1-Butanol	9.8953	56	53953	336.5759	ug/L #	90
8) Cyclohexanone	15.1891	55	120994	303.2053	ug/L	94
9) 2-Nitropropane	11.3738	43	592773	317.5332	ug/L	97
10) Ethyl Acetate	8.8510	43	1650539	302.2162	ug/L	98
11) Methyl methacrylate	11.0533	41	1556331	297.0270	ug/L	96

(#) = qualifier out of range (m) = manual integration
11M29633.D A9FOOWT.M Wed Feb 20 09:25:24 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\021919\11M29633.D Vial: 9
Acq On : 19 Feb 2019 15:44 Operator: KFR
Sample : WG696624-08 300ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29633.D Vial: 9
Acq On : 19 Feb 2019 15:44 Operator: KFR
Sample : WG696624-08 300ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	300.000	293.583	2.1	100	0.00
3	T	3-Chloro-1-propene	300.000	270.774	9.7	100	-0.01
4	T	2-Chloro-1,3-butadiene	300.000	279.802	6.7	100	0.00
5	T	Methacrylonitrile	300.000	300.802	-0.3	100	0.00
6	T	Isobutyl Alcohol	600.000	648.865	-8.1	100	0.00
7	T	1-Butanol	300.000	336.576	-12.2	100	0.00
8	T	Cyclohexanone	300.000	303.205	-1.1	100	0.00
9	T	2-Nitropropane	300.000	317.533	-5.8	100	0.00
10	T	Ethyl Acetate	300.000	302.216	-0.7	100	0.00
11	T	Methyl methacrylate	300.000	297.027	1.0	100	0.00
12	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29633.D A9FOOWT.M Wed Feb 20 09:22:54 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29634.D Vial: 10
Acq On : 19 Feb 2019 16:14 Operator: KFR
Sample : WG696624-09 400ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:25 2019 Quant Results File: A9FOOWT.RES

Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3812	96	468154	25.0000	ug/L	0.0000
12) Chlorobenzene-d5	14.0104	117	356242	25.0000	ug/L	0.0000
13) 1,4-Dichlorobenzene-d4	16.8227	152	182659	25.0000	ug/L	0.0000

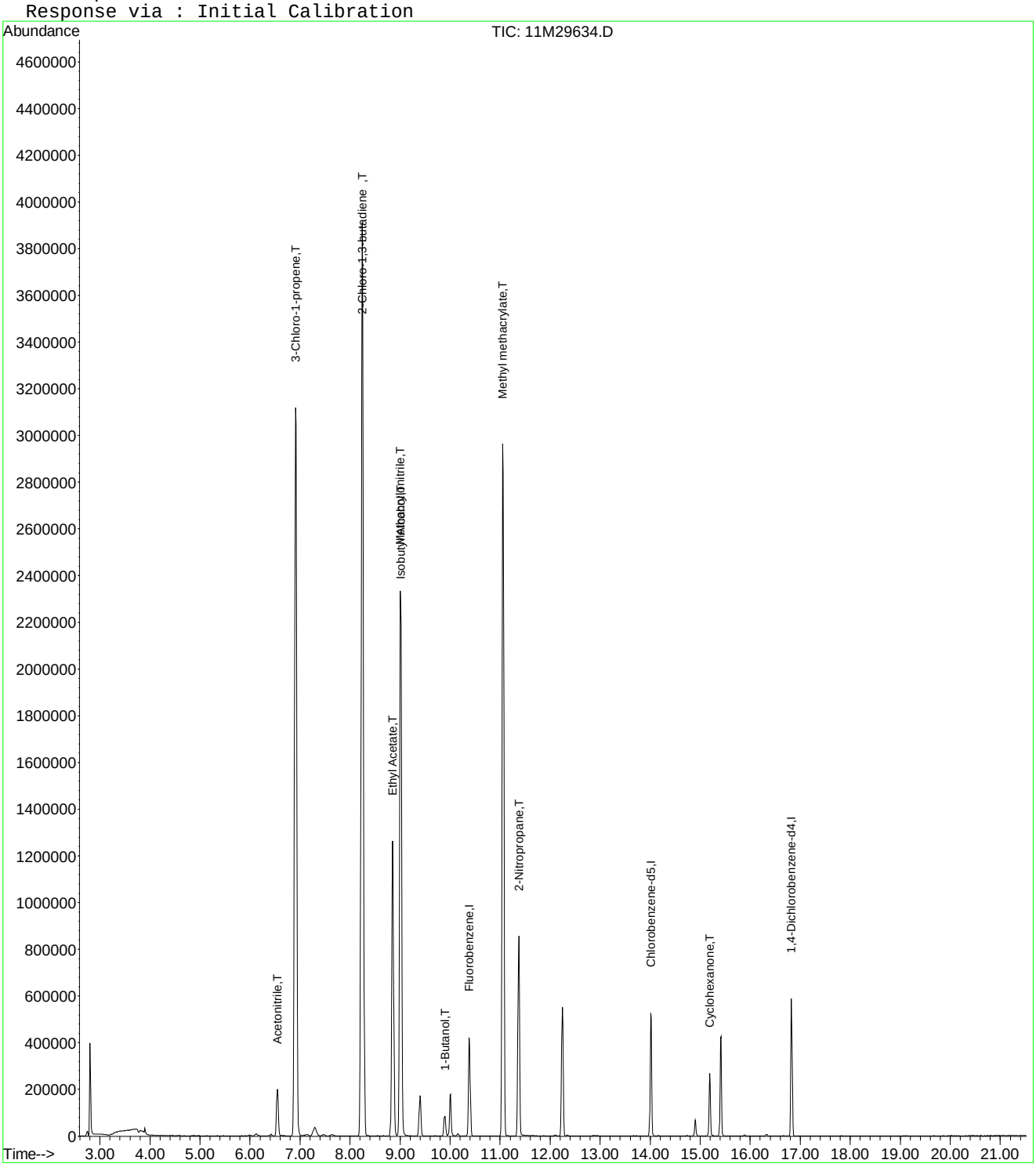
Target Compounds						Qvalue
2) Acetonitrile	6.5452	41	264059	379.7089	ug/L	100
3) 3-Chloro-1-propene	6.9071	41	3101308	336.0806	ug/L	88
4) 2-Chloro-1,3-butadiene	8.2409	53	3513249	344.4247	ug/L	85
5) Methacrylonitrile	9.0060	41	1525655	378.9494	ug/L	95
6) Isobutyl Alcohol	9.0164	43	222649	817.3773	ug/L	97
7) 1-Butanol	9.8952	56	68125	431.0611	ug/L #	88
8) Cyclohexanone	15.1891	55	149846	380.8755	ug/L	96
9) 2-Nitropropane	11.3738	43	779327	423.4338	ug/L	96
10) Ethyl Acetate	8.8509	43	2034170	377.7845	ug/L	97
11) Methyl methacrylate	11.0533	41	1917267	371.1432	ug/L	93

(#) = qualifier out of range (m) = manual integration
11M29634.D A9FOOWT.M Wed Feb 20 09:25:25 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29634.D Vial: 10
Acq On : 19 Feb 2019 16:14 Operator: KFR
Sample : WG696624-09 400ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29634.D Vial: 10
Acq On : 19 Feb 2019 16:14 Operator: KFR
Sample : WG696624-09 400ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	400.000	379.709	5.1	100	0.00
3	T	3-Chloro-1-propene	-1.000	336.081	0.0	100	-0.01
4	T	2-Chloro-1,3-butadiene	400.000	344.425	13.9	100	0.00
5	T	Methacrylonitrile	400.000	378.949	5.3	100	0.00
6	T	Isobutyl Alcohol	800.000	817.377	-2.2	100	0.00
7	T	1-Butanol	400.000	431.061	-7.8	100	0.00
8	T	Cyclohexanone	400.000	380.876	4.8	100	0.00
9	T	2-Nitropropane	400.000	423.434	-5.9	100	0.00
10	T	Ethyl Acetate	400.000	377.785	5.6	100	0.00
11	T	Methyl methacrylate	400.000	371.143	7.2	100	0.00
12	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29634.D A9FOOWT.M Wed Feb 20 09:23:01 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\021919\11M29635.D Vial: 11
Acq On : 19 Feb 2019 16:44 Operator: KFR
Sample : WG696624-10 500ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:26 2019 Quant Results File: A9FOOWT.RES

Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

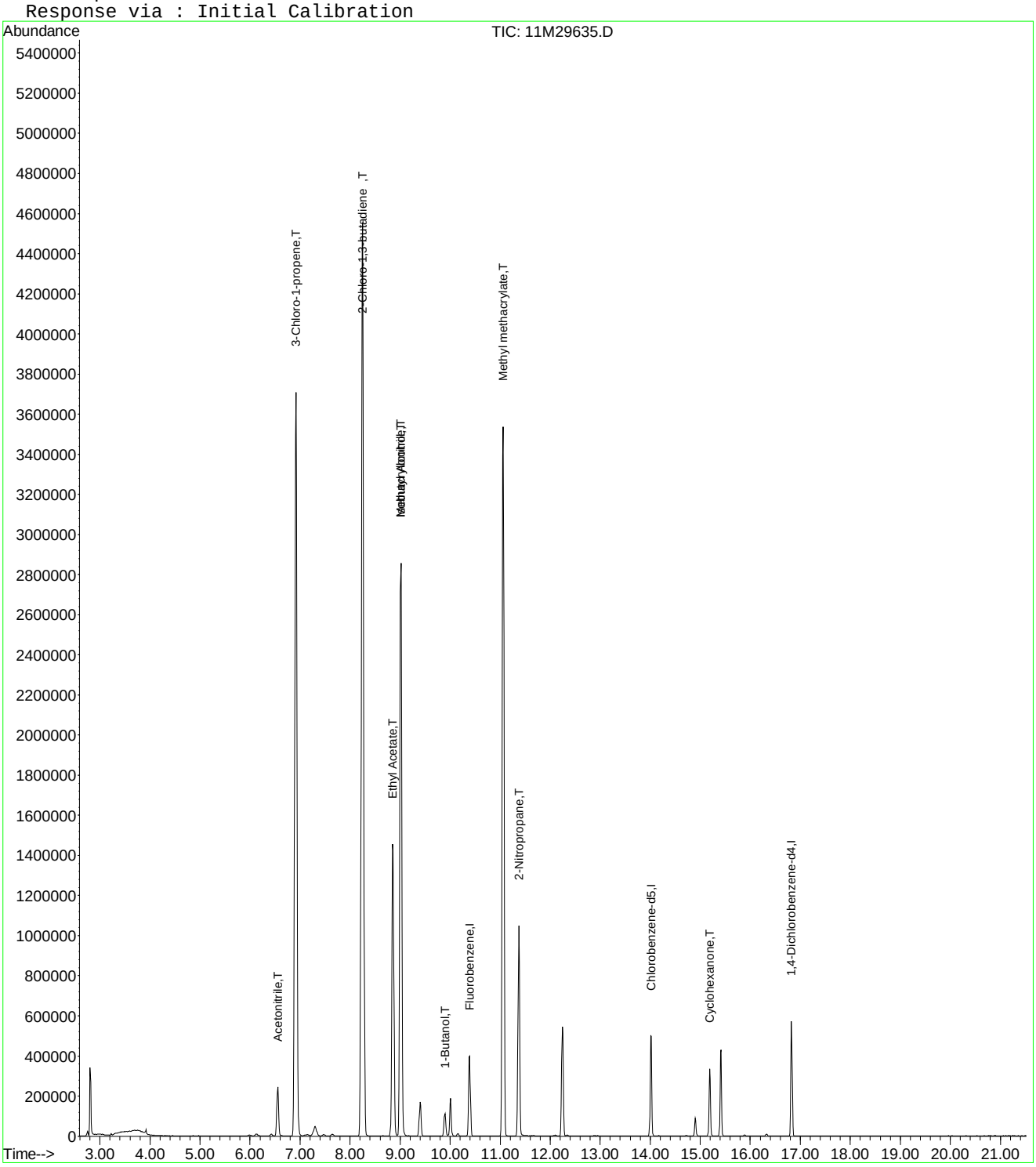
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3915	96	457625	25.0000	ug/L	0.0103
12) Chlorobenzene-d5	14.0206	117	342580	25.0000	ug/L	0.0103
13) 1,4-Dichlorobenzene-d4	16.8227	152	178100	25.0000	ug/L	0.0000
Target Compounds						Qvalue
2) Acetonitrile	6.5555	41	327940	482.4176	ug/L	100
3) 3-Chloro-1-propene	6.9173	41	3578473	396.7120	ug/L	83
4) 2-Chloro-1,3-butadiene	8.2512	53	4013475	402.5176	ug/L	79
5) Methacrylonitrile	9.0163	41	1845697	468.9907	ug/L	94
6) Isobutyl Alcohol	9.0163	43	278050	1044.2482	ug/L	98
7) 1-Butanol	9.8951	56	85596	554.0702	ug/L	91
8) Cyclohexanone	15.1890	55	189971	493.9741	ug/L	97
9) 2-Nitropropane	11.3737	43	946149	525.9013	ug/L	97
10) Ethyl Acetate	8.8508	43	2388468	453.7905	ug/L	95
11) Methyl methacrylate	11.0635	41	2238019	443.2020	ug/L	90

(#) = qualifier out of range (m) = manual integration
11M29635.D A9FOOWT.M Wed Feb 20 09:25:26 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29635.D Vial: 11
Acq On : 19 Feb 2019 16:44 Operator: KFR
Sample : WG696624-10 500ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29635.D Vial: 11
Acq On : 19 Feb 2019 16:44 Operator: KFR
Sample : WG696624-10 500ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92151 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.01
2	T	Acetonitrile	500.000	482.418	3.5	100	0.01
3	T	3-Chloro-1-propene	-1.000	396.712	0.0	100	0.00
4	T	2-Chloro-1,3-butadiene	-1.000	402.518	0.0	100	0.01
5	T	Methacrylonitrile	500.000	468.991	6.2	100	0.01
6	T	Isobutyl Alcohol	-1.000	1044.248	0.0	100	0.00
7	T	1-Butanol	500.000	554.070	-10.8	100	0.00
8	T	Cyclohexanone	500.000	493.974	1.2	100	0.00
9	T	2-Nitropropane	500.000	525.901	-5.2	100	0.00
10	T	Ethyl Acetate	500.000	453.790	9.2	100	0.00
11	T	Methyl methacrylate	500.000	443.202	11.4	100	0.01
12	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.01
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29635.D A9FOOWT.M Wed Feb 20 09:23:09 2019 Page 1

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\021919\11M29637.D Vial: 13
Acq On : 19 Feb 2019 17:43 Operator: KFR
Sample : WG696624-11 ICV/ALT 100ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92076 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 09:25:28 2019 Quant Results File: A9FOOWT.RES

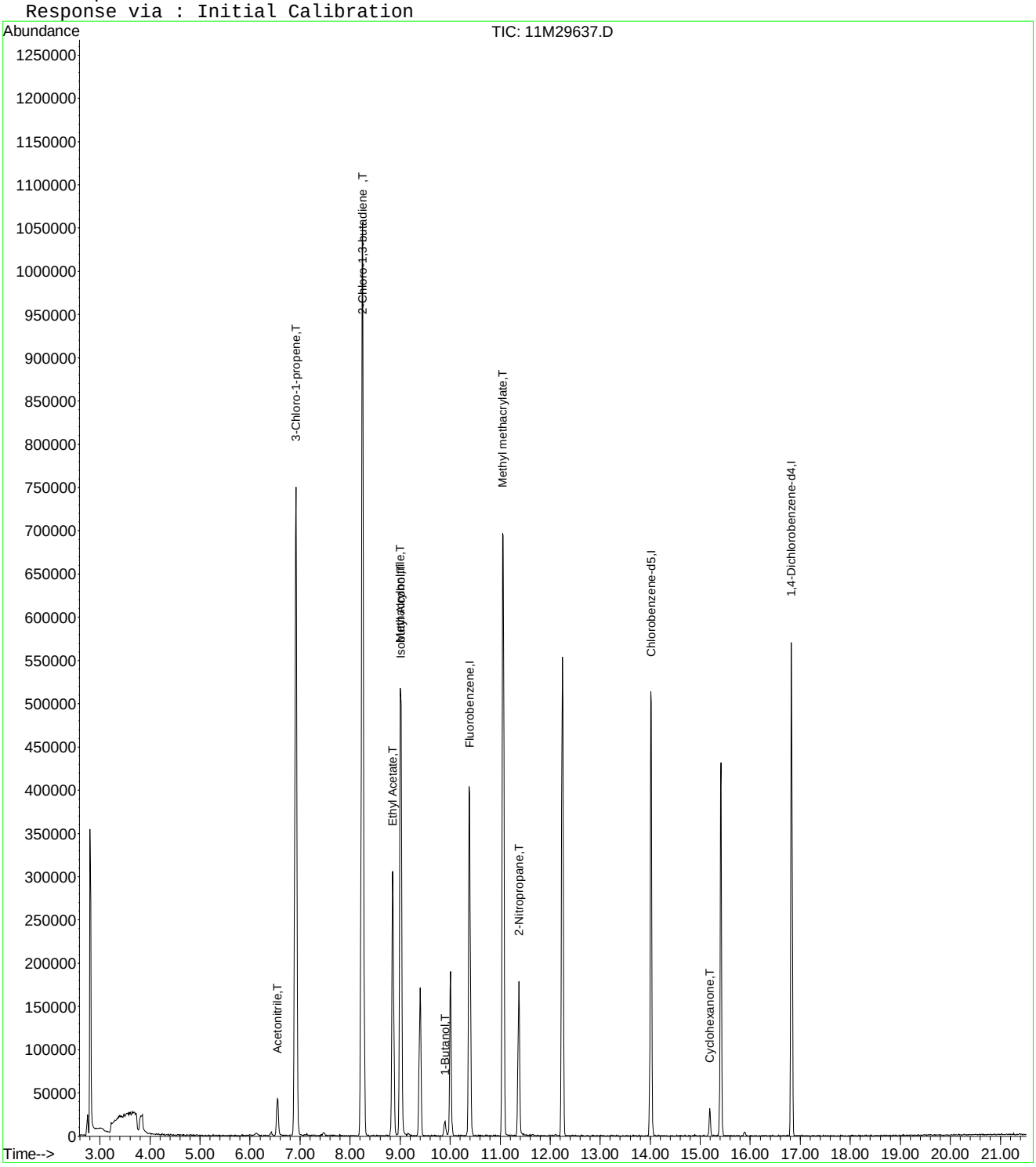
Quant Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3914	96	459316	25.0000	ug/L	0.0102
12) Chlorobenzene-d5	14.0206	117	349389	25.0000	ug/L	0.0102
13) 1,4-Dichlorobenzene-d4	16.8226	152	174186	25.0000	ug/L	0.0000
Target Compounds						Qvalue
2) Acetonitrile	6.5451	41	58636	85.9392	ug/L	98
3) 3-Chloro-1-propene	6.9173	41	745583	82.3515	ug/L	100
4) 2-Chloro-1,3-butadiene	8.2511	53	1057575	105.6753	ug/L	100
5) Methacrylonitrile	9.0059	41	356343	90.2132	ug/L	100
6) Isobutyl Alcohol	9.0162	43	46312	173.2896	ug/L	94
7) 1-Butanol	9.8951	56	12029	77.5781	ug/L	93
8) Cyclohexanone	15.1890	55	18983	49.1790	ug/L	98
9) 2-Nitropropane	11.3737	43	151551	83.9270	ug/L	100
10) Ethyl Acetate	8.8508	43	496274	93.9411	ug/L	100
11) Methyl methacrylate	11.0531	41	475432	93.8047	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29637.D A9FOOWT.M Wed Feb 20 09:25:28 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\021919\11M29637.D Vial: 13
Acq On : 19 Feb 2019 17:43 Operator: KFR
Sample : WG696624-11 ICV/ALT 100ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92076 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Feb 20 9:25 2019 Quant Results File: A9FOOWT.RES

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\021919\11M29637.D Vial: 13
Acq On : 19 Feb 2019 17:43 Operator: KFR
Sample : WG696624-11 ICV/ALT 100ug/L ICAL A9 8260 Inst : hpms11
Misc : 1,1 STD92076 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\A9FOOWT.M (RTE Integrator)
Title : Appendix IX (SOP:OVL MSV01) Water 021919 HPMS11
Last Update : Wed Feb 20 09:20:16 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	97	0.01
2	T	Acetonitrile	100.000	85.939	14.1	86	0.00
3	T	3-Chloro-1-propene	100.000	82.352	17.6	76	0.00
4	T	2-Chloro-1,3-butadiene	100.000	105.675	-5.7	94	0.01
5	T	Methacrylonitrile	100.000	90.213	9.8	87	0.00
6	T	Isobutyl Alcohol	200.000	173.290	13.4	89	0.00
7	T	1-Butanol	100.000	77.578	22.4	74	0.00
8	T	Cyclohexanone	100.000	49.179	50.8	49	0.00
9	T	2-Nitropropane	100.000	83.927	16.1	83	0.00
10	T	Ethyl Acetate	100.000	93.941	6.1	88	0.00
11	T	Methyl methacrylate	100.000	93.805	6.2	87	0.00
12	I	Chlorobenzene-d5	25.000	25.000	0.0	97	0.01
13	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	97	0.00

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29737.D Vial: 2
Acq On : 5 Mar 2019 16:39 Operator: KFR
Sample : WG698387-02 STD 0.3ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:19 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3915	96	386161	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0206	117	286256	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	138590	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	0.0000	111	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 118		Recovery =	0.0000%	#	
43) 1,2-Dichloroethane-d4	0.0000	65	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 80 - 120		Recovery =	0.0000%	#	
57) Toluene-d8	0.0000	98	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 88 - 110		Recovery =	0.0000%	#	
78) p-Bromofluorobenzene	0.0000	95	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 115		Recovery =	0.0000%	#	
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1227	85	1412	0.2475	ug/L #	62
3) Chloromethane	3.5570	50	4628	0.4224	ug/L	94
4) Vinyl Chloride	3.7845	62	2722	0.3328	ug/L #	1
5) 1,3-Butadiene	3.8258	54	2961	Below Cal		83
6) Bromomethane	4.6633	94	749	0.2390	ug/L	93
8) Trichlorofluoromethane	5.2733	101	2030	0.2623	ug/L #	67
10) Isoprene	5.8213	67	1068	0.1752	ug/L	74
13) Acetone	6.1315	43	452	0.3202	ug/L #	45
14) 1,1-Dichloroethene	6.3487	61	1896	0.2566	ug/L	74
16) Dimethyl Sulfide	6.5968	62	1144	0.2342	ug/L	98
17) Iodomethane	6.8450	142	202	1.5324	ug/L #	29
19) Methylene Chloride	7.0931	84	1255	0.3048	ug/L	96
20) Carbon Disulfide	7.1345	76	4500	0.3965	ug/L #	74
22) Methyl Tert Butyl Ether	7.2999	73	3610	0.3091	ug/L #	48
23) trans-1,2-Dichloroethene	7.5377	96	1045	0.2611	ug/L	69
24) n-Hexane	7.6101	57	1883	0.3054	ug/L #	72
26) Vinyl Acetate	8.0961	43	1638	2.2761	ug/L #	75
27) 1,1-Dichloroethane	8.1374	63	2672	0.3059	ug/L #	52
31) 2,2-Dichloropropane	8.8612	77	1293	0.2141	ug/L #	43
32) cis-1,2-Dichloroethene	8.9336	96	1200	0.2641	ug/L	88
33) Chloroform	9.1300	83	2562	0.3231	ug/L	94
35) Bromochloromethane	9.3575	130	481	0.1805	ug/L #	21
36) Tetrahydrofuran	9.3782	42	1373	1.1785	ug/L #	37
38) 1,1,1-Trichloroethane	9.6160	97	2230	0.3106	ug/L #	35
39) Cyclohexane	9.6573	56	2370	0.2788	ug/L #	91
40) 1,1-Dichloropropene	9.8124	75	1521	0.2818	ug/L #	39
41) Carbon Tetrachloride	9.9572	117	1207	0.1977	ug/L #	77
44) 1,2-Dichloroethane	10.1226	62	1882	0.2731	ug/L #	53
45) Benzene	10.1536	78	5004	0.3119	ug/L	94
46) Trichloroethene	10.8567	130	1328	0.2919	ug/L	92
47) Methylcyclohexane	10.9498	83	1957	0.3053	ug/L #	77
48) 1,2-Dichloropropane	11.0739	63	1291	0.2709	ug/L #	64
50) Bromodichloromethane	11.3530	83	1329	0.2360	ug/L #	89
51) Dibromomethane	11.4358	93	463	0.1701	ug/L #	53
54) cis-1,3-Dichloropropene	11.9527	75	1834	0.2889	ug/L #	65
55) Dimethyl Disulfide	12.1905	79	220	2.4564	ug/L #	1
58) Toluene	12.3456	91	5233	0.3086	ug/L	94
59) Ethyl Methacrylate	12.4283	69	742	0.1549	ug/L	77
60) trans-1,3-Dichloropropene	12.5110	75	1066	0.1920	ug/L #	51
61) 1,1,2-Trichloroethane	12.7179	97	844	0.2338	ug/L	67

(#) = qualifier out of range (m) = manual integration
11M29737.D 8260WT.M Wed Mar 06 14:03:22 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29737.D Vial: 2
Acq On : 5 Mar 2019 16:39 Operator: KFR
Sample : WG698387-02 STD 0.3ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:19 2019 Quant Results File: 8260WT.RES

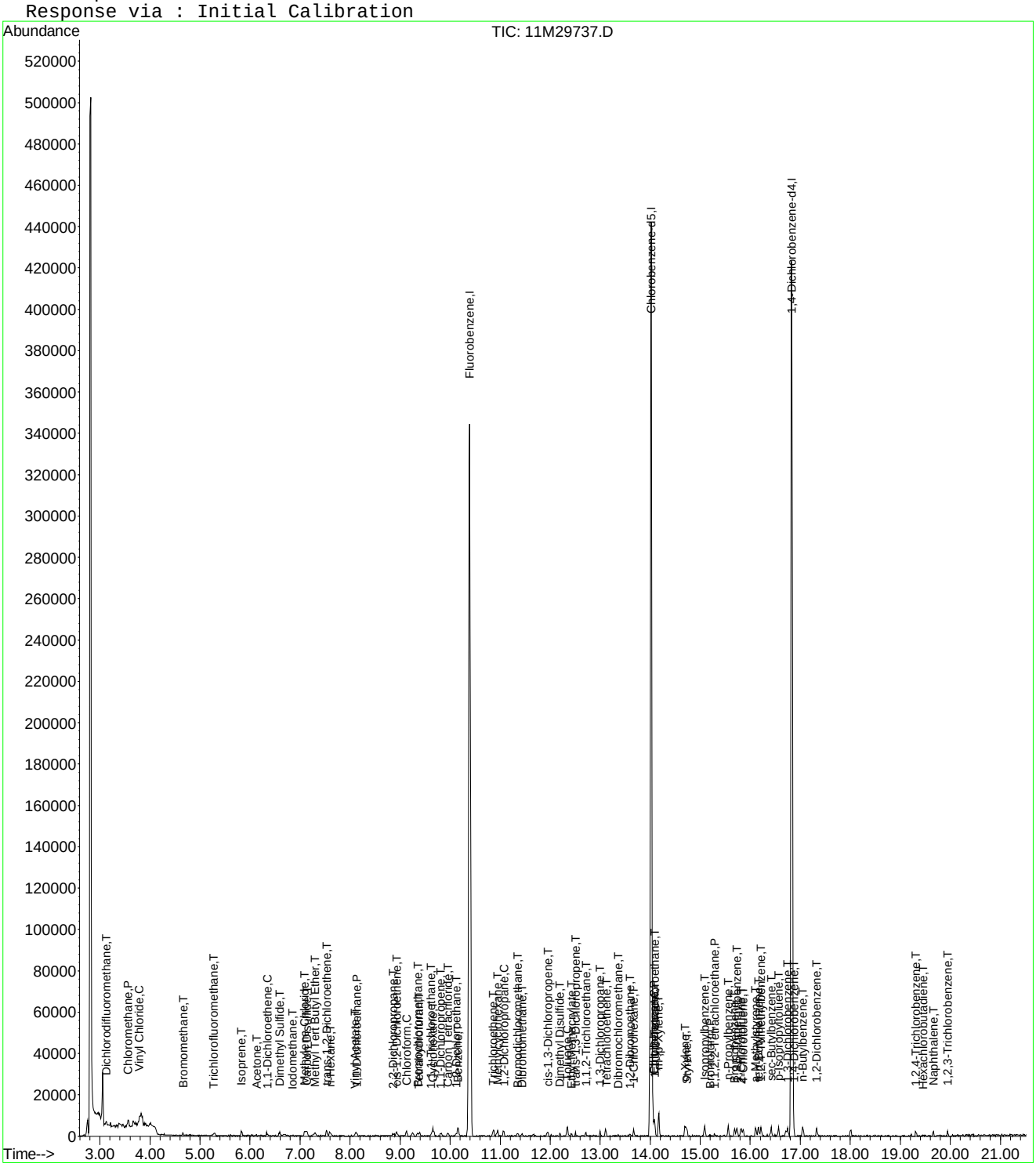
Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
63)	1,3-Dichloropropane	12.9970	76	1537	0.2639	ug/L		99
64)	Tetrachloroethene	13.1211	164	934	0.2597	ug/L		87
65)	Dibromochloromethane	13.3589	129	832	0.2025	ug/L	#	38
66)	1,2-Dibromoethane	13.5967	107	883	0.2552	ug/L		94
67)	1-Chlorohexane	13.6691	91	1266	0.2261	ug/L		92
68)	Chlorobenzene	14.0723	112	3738	0.3166	ug/L		98
69)	1,1,1,2-Tetrachloroethane	14.0930	131	806	0.8276	ug/L		97
70)	Ethylbenzene	14.0827	106	1567	0.2609	ug/L		61
71)	m-,p-Xylene	14.1654	106	3991	0.5504	ug/L		83
72)	o-Xylene	14.7030	106	1800	0.2559	ug/L		72
73)	Styrene	14.7341	104	3323	0.2856	ug/L		77
74)	Bromoform	15.1994	173	446	0.8783	ug/L	#	29
75)	Isopropylbenzene	15.0856	105	5224	0.2966	ug/L		89
77)	1,1,2,2-Tetrachloroethane	15.2924	83	903	0.2498	ug/L		87
81)	n-Propylbenzene	15.5612	91	6486	0.3174	ug/L		91
82)	Bromobenzene	15.6853	156	1377	0.2759	ug/L		87
83)	1,3,5-Trimethylbenzene	15.7370	105	4065	0.2802	ug/L		100
84)	2-Chlorotoluene	15.8197	91	4532	0.3116	ug/L		95
85)	4-Chlorotoluene	15.8611	91	3558	0.2977	ug/L		94
86)	a-Methylstyrene	16.1092	118	2026	0.2452	ug/L		93
87)	tert-Butylbenzene	16.1713	134	701	0.1962	ug/L	#	17
88)	1,2,4-Trimethylbenzene	16.2126	105	4360	0.2912	ug/L		82
89)	sec-Butylbenzene	16.4194	105	5766	0.3201	ug/L	#	78
90)	p-Isopropyltoluene	16.5642	119	4518	0.2885	ug/L		90
91)	1,3-Dichlorobenzene	16.7503	146	2748	0.2984	ug/L		90
92)	1,4-Dichlorobenzene	16.8744	146	2688	0.2923	ug/L	#	34
93)	n-Butylbenzene	17.0501	91	4116	0.2916	ug/L	#	85
94)	1,2-Dichlorobenzene	17.3293	146	2622	0.2971	ug/L		95
96)	1,2,4-Trichlorobenzene	19.3145	180	1324	0.2319	ug/L	#	69
97)	Hexachlorobutadiene	19.4593	225	462	0.1606	ug/L	#	23
98)	Naphthalene	19.6660	128	2997	0.2452	ug/L	#	86
99)	1,2,3-Trichlorobenzene	19.9452	180	1235	0.2303	ug/L	#	68

(#) = qualifier out of range (m) = manual integration
11M29737.D 8260WT.M Wed Mar 06 14:03:22 2019 Page 2

Data File : C:\MSDCHEM\1\DATA\030519\11M29737.D Vial: 2
Acq On : 5 Mar 2019 16:39 Operator: KFR
Sample : WG698387-02 STD 0.3ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\030519\11M29737.D Vial: 2
Acq On : 5 Mar 2019 16:39 Operator: KFR
Sample : WG698387-02 STD 0.3ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 13:50:26 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	-1.000	0.248	0.0	100	0.00
3	P	Chloromethane	-1.000	0.422	0.0	0	0.00
4	C	Vinyl Chloride	-1.000	0.333	0.0	100	0.01
5	T	1,3-Butadiene	-1.000	-4.635	0.0	100	0.01
6	T	Bromomethane	-1.000	0.239	0.0	100	0.02
7	T	Chloroethane	-1.000	0.067	0.0	100	-0.01
8	T	Trichlorofluoromethane	-1.000	0.262	0.0	100	0.00
9	T	Diethyl ether	-1.000	0.000	0.0	0	-5.79#
10	T	Isoprene	-1.000	0.175	0.0	100	0.00
11	T	Acrolein	-1.000	0.000	0.0	0	-6.02#
12	T	1,1,2-Trichloro-1,2,2-Trifl	-1.000	0.061	0.0	100	-0.01
13	T	Acetone	-1.000	0.320	0.0	100	0.01
14	C	1,1-Dichloroethene	-1.000	0.257	0.0	100	0.02
15	T	Tert-Butyl Alcohol	-1.000	0.000	0.0	0	-6.44#
16	T	Dimethyl Sulfide	-1.000	0.234	0.0	100	0.01
17	T	Iodomethane	-1.000	1.532	0.0	0	0.01
18	T	Methyl acetate	-1.000	0.062	0.0	100	0.01
19	T	Methylene Chloride	-1.000	0.305	0.0	100	0.00
20	T	Carbon Disulfide	-1.000	0.396	0.0	100	0.00
21	T	Acrylonitrile	-1.000	0.000	0.0	0	-7.27#
22	T	Methyl Tert Butyl Ether	-1.000	0.309	0.0	100	0.00
23	T	trans-1,2-Dichloroethene	-1.000	0.261	0.0	100	0.01
24	T	n-Hexane	-1.000	0.305	0.0	100	0.01
25	T	Diisopropyl ether	-1.000	0.000	0.0	0	-7.93#
26	T	Vinyl Acetate	-1.000	2.276	0.0	0	0.00
27	P	1,1-Dichloroethane	-1.000	0.306	0.0	100	0.01
28	T	Ethyl-Tert-Butyl ether	-1.000	0.000	0.0	0	-8.48#
29	T	2-Butanone	-1.000	0.000	0.0	0	-8.65#
30	T	Propionitrile	-1.000	0.000	0.0	0	-8.76#
31	T	2,2-Dichloropropane	-1.000	0.214	0.0	100	0.00
32	T	cis-1,2-Dichloroethene	-1.000	0.264	0.0	100	0.00
33	C	Chloroform	-1.000	0.323	0.0	100	0.00
34	T	1-Bromopropane	-1.000	0.000	0.0	0	-9.25#
35	T	Bromochloromethane	-1.000	0.181	0.0	100	0.01
36	T	Tetrahydrofuran	-1.000	1.178	0.0	100	0.01
37	S	Dibromofluoromethane	-1.000	0.000	0.0	0	-9.40#
38	T	1,1,1-Trichloroethane	-1.000	0.311	0.0	100	-0.01
39	T	Cyclohexane	-1.000	0.279	0.0	100	0.00
40	T	1,1-Dichloropropene	-1.000	0.282	0.0	100	0.00
41	T	Carbon Tetrachloride	-1.000	0.198	0.0	0	0.00
42	T	Tert-Amyl-Methyl ether	-1.000	0.000	0.0	0	-9.92#
43	S	1,2-Dichloroethane-d4	-1.000	0.000	0.0	0	-10.01#
44	T	1,2-Dichloroethane	0.300	0.273	9.0	100	0.00
45	T	Benzene	-1.000	0.312	0.0	100	0.00
46	T	Trichloroethene	0.300	0.292	2.7	100	-0.01
47	T	Methylcyclohexane	-1.000	0.305	0.0	100	0.01
48	C	1,2-Dichloropropane	-1.000	0.271	0.0	100	0.01
49	T	1,4-Dioxane	-1.000	0.000	0.0	0	-11.34#
50	T	Bromodichloromethane	-1.000	0.236	0.0	100	0.00
51	T	Dibromomethane	-1.000	0.170	0.0	100	0.00
52	T	2-Chloroethyl Vinyl Ether	-1.000	0.000	0.0	0	-11.62#
53	T	4-Methyl-2-Pentanone	-1.000	0.000	0.0	0	-11.65#
54	T	cis-1,3-Dichloropropene	-1.000	0.289	0.0	100	0.01

(#) = Out of Range
11M29737.D 8260WT.M Wed Mar 06 13:56:07 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29737.D Vial: 2
Acq On : 5 Mar 2019 16:39 Operator: KFR
Sample : WG698387-02 STD 0.3ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 13:50:26 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	-1.000	2.456	0.0	0	0.00
56	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
57	S	Toluene-d8	-1.000	0.000	0.0	0	-12.25#
58	C	Toluene	-1.000	0.309	0.0	0	0.00
59	T	Ethyl Methacrylate	-1.000	0.155	0.0	100	0.00
60	T	trans-1,3-Dichloropropene	-1.000	0.192	0.0	100	0.01
61	T	1,1,2-Trichloroethane	-1.000	0.234	0.0	100	0.01
62	T	2-Hexanone	-1.000	0.000	0.0	0	-12.65#
63	T	1,3-Dichloropropane	0.300	0.264	12.0	100	0.00
64	T	Tetrachloroethene	-1.000	0.272	0.0	100	0.01
65	T	Dibromochloromethane	-1.000	0.202	0.0	0	0.00
66	T	1,2-Dibromoethane	-1.000	0.255	0.0	100	0.00
67	T	1-Chlorohexane	-1.000	0.226	0.0	100	0.00
68	P	Chlorobenzene	0.300	0.317	-5.7	100	0.01
69	T	1,1,1,2-Tetrachloroethane	-1.000	0.828	0.0	0	0.00
70	C	Ethylbenzene	0.300	0.261	13.0	100	0.00
71	T	m-,p-Xylene	0.600	0.550	8.3	100	0.00
72	T	o-Xylene	0.300	0.256	14.7	100	0.01
73	T	Styrene	-1.000	0.286	0.0	100	0.00
74	P	Bromoform	-1.000	0.878	0.0	100	0.00
75	T	Isopropylbenzene	0.300	0.297	1.0	100	0.00
76	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
77	P	1,1,2,2-Tetrachloroethane	-1.000	0.250	0.0	100	0.00
78	S	p-Bromofluorobenzene	-1.000	0.000	0.0	0	-15.42#
79	T	1,2,3-Trichloropropane	-1.000	0.000	0.0	0	-15.47#
80	T	trans-1,4-Dichloro-2-Butene	-1.000	0.000	0.0	0	-15.51#
81	T	n-Propylbenzene	-1.000	0.317	0.0	0	0.00
82	T	Bromobenzene	-1.000	0.276	0.0	100	0.00
83	T	1,3,5-Trimethylbenzene	0.300	0.280	6.7	100	0.00
84	T	2-Chlorotoluene	-1.000	0.312	0.0	100	0.00
85	T	4-Chlorotoluene	-1.000	0.298	0.0	100	0.00
86	T	a-Methylstyrene	-1.000	0.245	0.0	100	0.00
87	T	tert-Butylbenzene	-1.000	0.196	0.0	100	0.00
88	T	1,2,4-Trimethylbenzene	0.300	0.291	3.0	100	0.00
89	T	sec-Butylbenzene	-1.000	0.320	0.0	0	0.00
90	T	p-Isopropyltoluene	0.300	0.288	4.0	100	0.00
91	T	1,3-Dichlorobenzene	0.300	0.298	0.7	100	0.00
92	T	1,4-Dichlorobenzene	0.300	0.292	2.7	100	0.01
93	T	n-Butylbenzene	-1.000	0.292	0.0	0	0.00
94	T	1,2-Dichlorobenzene	0.300	0.297	1.0	100	0.00
95	T	1,2-Dibromo-3-Chloropropane	-1.000	0.000	0.0	0	-18.25#
96	T	1,2,4-Trichlorobenzene	-1.000	0.232	0.0	100	0.00
97	T	Hexachlorobutadiene	-1.000	0.161	0.0	100	0.01
98	T	Naphthalene	-1.000	0.245	0.0	0	0.01
99	T	1,2,3-Trichlorobenzene	-1.000	0.230	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29737.D 8260WT.M Wed Mar 06 13:56:07 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29738.D Vial: 3
Acq On : 5 Mar 2019 17:09 Operator: KFR
Sample : WG698387-03 STD 0.4ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:22 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3915	96	377565	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0207	117	278973	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	132375	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	0.0000	111	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 118		Recovery =	0.0000%	#	
43) 1,2-Dichloroethane-d4	0.0000	65	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 80 - 120		Recovery =	0.0000%	#	
57) Toluene-d8	0.0000	98	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 88 - 110		Recovery =	0.0000%	#	
78) p-Bromofluorobenzene	0.0000	95	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 115		Recovery =	0.0000%	#	
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1124	85	2037	0.3652	ug/L #	62
3) Chloromethane	3.5570	50	5445	0.5083	ug/L	86
4) Vinyl Chloride	3.7741	62	3600	0.4502	ug/L #	1
5) 1,3-Butadiene	3.8362	54	3453	Below Cal	#	73
6) Bromomethane	4.6426	94	1237	0.4037	ug/L	87
7) Chloroethane	4.7977	64	1149	0.3716	ug/L #	45
8) Trichlorofluoromethane	5.2734	101	2805	0.3706	ug/L	91
10) Isoprene	5.8110	67	1801	0.3021	ug/L	82
13) Acetone	6.1212	43	615	0.4455	ug/L #	45
14) 1,1-Dichloroethene	6.3280	61	2520	0.3488	ug/L	77
16) Dimethyl Sulfide	6.5762	62	1596	0.3341	ug/L	87
17) Iodomethane	6.8346	142	413	1.5744	ug/L #	29
18) Methyl acetate	6.8450	43	691	0.2321	ug/L #	64
19) Methylene Chloride	7.0931	84	1475	0.3663	ug/L	81
20) Carbon Disulfide	7.1242	76	5151	0.4642	ug/L #	74
22) Methyl Tert Butyl Ether	7.2896	73	4630	0.4055	ug/L #	64
23) trans-1,2-Dichloroethene	7.5274	96	1309	0.3345	ug/L	81
24) n-Hexane	7.5998	57	2206	0.3659	ug/L #	72
26) Vinyl Acetate	8.0857	43	388	2.0546	ug/L #	75
27) 1,1-Dichloroethane	8.1167	63	3396	0.3976	ug/L #	88
29) 2-Butanone	8.6751	43	221	0.1257	ug/L #	54
31) 2,2-Dichloropropane	8.8612	77	2020	0.3421	ug/L #	62
32) cis-1,2-Dichloroethene	8.9232	96	1411	0.3176	ug/L	85
33) Chloroform	9.1197	83	3509	0.4527	ug/L	87
35) Bromochloromethane	9.3471	130	684	0.2625	ug/L #	46
36) Tetrahydrofuran	9.3782	42	1575	1.3826	ug/L #	37
38) 1,1,1-Trichloroethane	9.6263	97	2565	0.3654	ug/L #	82
39) Cyclohexane	9.6677	56	2783	0.3349	ug/L #	84
40) 1,1-Dichloropropene	9.8124	75	1675	0.3174	ug/L #	39
41) Carbon Tetrachloride	9.9572	117	1830	0.3066	ug/L #	84
44) 1,2-Dichloroethane	10.1226	62	2617	0.3884	ug/L #	60
45) Benzene	10.1537	78	6582	0.4196	ug/L	93
46) Trichloroethene	10.8671	130	1557	0.3500	ug/L	91
47) Methylcyclohexane	10.9395	83	2570	0.4101	ug/L #	84
48) 1,2-Dichloropropane	11.0739	63	1631	0.3500	ug/L #	60
50) Bromodichloromethane	11.3530	83	1927	0.3499	ug/L #	64
51) Dibromomethane	11.4254	93	730	0.2743	ug/L #	70
54) cis-1,3-Dichloropropene	11.9527	75	2382	0.3838	ug/L #	58
55) Dimethyl Disulfide	12.2009	79	547	2.5320	ug/L #	32
58) Toluene	12.3353	91	6944	0.4202	ug/L	92

(#) = qualifier out of range (m) = manual integration
11M29738.D 8260WT.M Wed Mar 06 14:03:24 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29738.D Vial: 3
Acq On : 5 Mar 2019 17:09 Operator: KFR
Sample : WG698387-03 STD 0.4ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:22 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

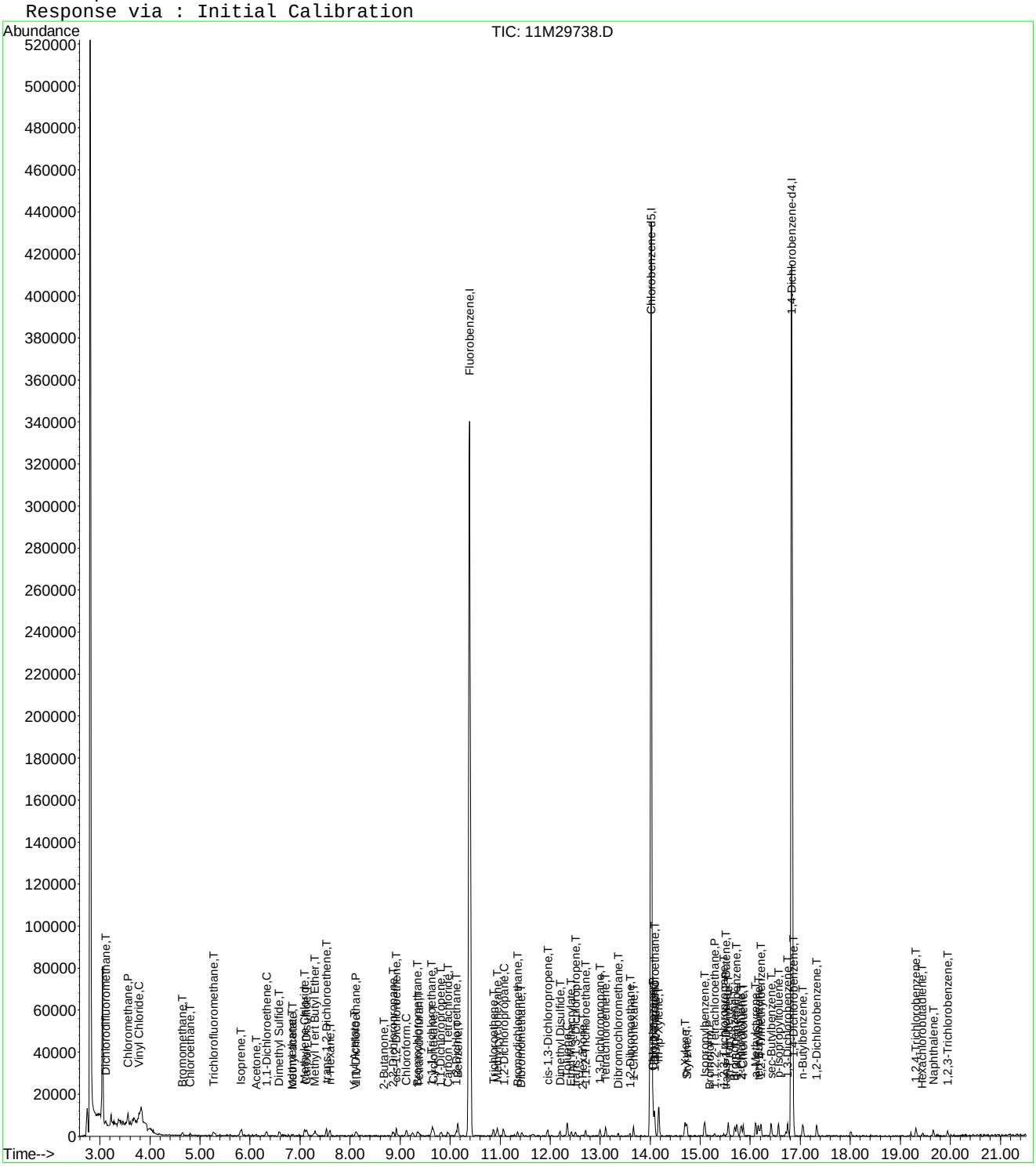
	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
59)	Ethyl Methacrylate	12.4180	69	1232	0.2639	ug/L		90
60)	trans-1,3-Dichloropropene	12.5111	75	1692	0.3127	ug/L	#	51
61)	1,1,2-Trichloroethane	12.7075	97	1624	0.4616	ug/L		75
62)	2-Hexanone	12.6558	43	645	0.2467	ug/L	#	13
63)	1,3-Dichloropropane	12.9970	76	2249	0.3962	ug/L		93
64)	Tetrachloroethene	13.1108	164	895	0.2553	ug/L		91
65)	Dibromochloromethane	13.3589	129	939	0.2345	ug/L		95
66)	1,2-Dibromoethane	13.6071	107	1006	0.2984	ug/L		93
67)	1-Chlorohexane	13.6691	91	1871	0.3429	ug/L		89
68)	Chlorobenzene	14.0620	112	4896	0.4255	ug/L		89
69)	1,1,1,2-Tetrachloroethane	14.0930	131	1296	0.9306	ug/L		92
70)	Ethylbenzene	14.0827	106	2058	0.3516	ug/L		66
71)	m-,p-Xylene	14.1654	106	5214	0.7379	ug/L		80
72)	o-Xylene	14.7031	106	2678	0.3906	ug/L		95
73)	Styrene	14.7341	104	4225	0.3726	ug/L		95
74)	Bromoform	15.1890	173	399	0.8661	ug/L	#	29
75)	Isopropylbenzene	15.0856	105	7237	0.4217	ug/L		87
77)	1,1,2,2-Tetrachloroethane	15.2924	83	1015	0.2939	ug/L		80
79)	1,2,3-Trichloropropane	15.4682	110	203	0.1761	ug/L	#	1
80)	trans-1,4-Dichloro-2-Buten	15.5199	53	212	0.1458	ug/L	#	1
81)	n-Propylbenzene	15.5612	91	8102	0.4150	ug/L		92
82)	Bromobenzene	15.6853	156	1841	0.3862	ug/L		84
83)	1,3,5-Trimethylbenzene	15.7267	105	5846	0.4218	ug/L		98
84)	2-Chlorotoluene	15.8197	91	5911	0.4255	ug/L		95
85)	4-Chlorotoluene	15.8611	91	4679	0.4098	ug/L		89
86)	a-Methylstyrene	16.1092	118	2822	0.3576	ug/L		77
87)	tert-Butylbenzene	16.1713	134	1433	0.4198	ug/L		86
88)	1,2,4-Trimethylbenzene	16.2126	105	5997	0.4193	ug/L		78
89)	sec-Butylbenzene	16.4194	105	6824	0.3966	ug/L		98
90)	p-Isopropyltoluene	16.5642	119	5834	0.3900	ug/L		85
91)	1,3-Dichlorobenzene	16.7503	146	3553	0.4040	ug/L		100
92)	1,4-Dichlorobenzene	16.8640	146	3543	0.4034	ug/L	#	6
93)	n-Butylbenzene	17.0501	91	5310	0.3938	ug/L	#	85
94)	1,2-Dichlorobenzene	17.3293	146	3212	0.3811	ug/L		97
96)	1,2,4-Trichlorobenzene	19.3145	180	1993	0.3655	ug/L		98
97)	Hexachlorobutadiene	19.4386	225	775	0.2820	ug/L	#	57
98)	Naphthalene	19.6660	128	4804	0.4115	ug/L	#	87
99)	1,2,3-Trichlorobenzene	19.9452	180	1868	0.3646	ug/L	#	40

(#) = qualifier out of range (m) = manual integration
11M29738.D 8260WT.M Wed Mar 06 14:03:24 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29738.D Vial: 3
Acq On : 5 Mar 2019 17:09 Operator: KFR
Sample : WG698387-03 STD 0.4ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\030519\11M29738.D Vial: 3
Acq On : 5 Mar 2019 17:09 Operator: KFR
Sample : WG698387-03 STD 0.4ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	-1.000	0.365	0.0	100	-0.01
3	P	Chloromethane	0.400	0.508	-27.0#	100	0.00
4	C	Vinyl Chloride	0.400	0.450	-12.5	100	0.00
5	T	1,3-Butadiene	-1.000	-4.414	0.0	100	0.02
6	T	Bromomethane	-1.000	0.404	0.0	100	0.00
7	T	Chloroethane	-1.000	0.372	0.0	100	0.00
8	T	Trichlorofluoromethane	0.400	0.371	7.3	100	0.00
9	T	Diethyl ether	-1.000	0.000	0.0	0	-5.79#
10	T	Isoprene	-1.000	0.302	0.0	100	-0.01
11	T	Acrolein	-1.000	0.000	0.0	0	-6.02#
12	T	1,1,2-Trichloro-1,2,2-Trifl	-1.000	0.060	0.0	100	0.01
13	T	Acetone	-1.000	0.446	0.0	100	0.00
14	C	1,1-Dichloroethene	0.400	0.349	12.8	100	0.00
15	T	Tert-Butyl Alcohol	-1.000	0.000	0.0	0	-6.44#
16	T	Dimethyl Sulfide	-1.000	0.334	0.0	100	-0.01
17	T	Iodomethane	-1.000	1.574	0.0	0	0.00
18	T	Methyl acetate	-1.000	0.232	0.0	100	0.00
19	T	Methylene Chloride	-1.000	0.366	0.0	100	0.00
20	T	Carbon Disulfide	-1.000	0.464	0.0	100	-0.01
21	T	Acrylonitrile	-1.000	0.000	0.0	0	-7.27#
22	T	Methyl Tert Butyl Ether	0.400	0.406	-1.5	100	-0.01
23	T	trans-1,2-Dichloroethene	0.400	0.334	16.5	100	0.00
24	T	n-Hexane	-1.000	0.366	0.0	100	0.00
25	T	Diisopropyl ether	-1.000	0.000	0.0	0	-7.93#
26	T	Vinyl Acetate	-1.000	2.055	0.0	0	-0.01
27	P	1,1-Dichloroethane	0.400	0.398	0.5	100	-0.01
28	T	Ethyl-Tert-Butyl ether	-1.000	0.000	0.0	0	-8.48#
29	T	2-Butanone	-1.000	0.126	0.0	100	0.02
30	T	Propionitrile	-1.000	0.000	0.0	0	-8.76#
31	T	2,2-Dichloropropane	-1.000	0.342	0.0	100	0.00
32	T	cis-1,2-Dichloroethene	0.400	0.318	20.5	100	-0.01
33	C	Chloroform	0.400	0.453	-13.2	100	-0.01
34	T	1-Bromopropane	-1.000	0.000	0.0	0	-9.25#
35	T	Bromochloromethane	-1.000	0.263	0.0	100	0.00
36	T	Tetrahydrofuran	-1.000	1.383	0.0	100	0.01
37	S	Dibromofluoromethane	-1.000	0.000	0.0	0	-9.40#
38	T	1,1,1-Trichloroethane	0.400	0.365	8.8	100	0.00
39	T	Cyclohexane	-1.000	0.335	0.0	100	0.01
40	T	1,1-Dichloropropene	-1.000	0.317	0.0	100	0.00
41	T	Carbon Tetrachloride	-1.000	0.307	0.0	0	0.00
42	T	Tert-Amyl-Methyl ether	-1.000	0.000	0.0	0	-9.92#
43	S	1,2-Dichloroethane-d4	-1.000	0.000	0.0	0	-10.01#
44	T	1,2-Dichloroethane	0.400	0.388	3.0	100	0.00
45	T	Benzene	0.400	0.420	-5.0	100	0.00
46	T	Trichloroethene	0.400	0.350	12.5	100	0.00
47	T	Methylcyclohexane	-1.000	0.410	0.0	100	0.00
48	C	1,2-Dichloropropane	0.400	0.350	12.5	100	0.01
49	T	1,4-Dioxane	-1.000	0.000	0.0	0	-11.34#
50	T	Bromodichloromethane	0.400	0.350	12.5	100	0.00
51	T	Dibromomethane	-1.000	0.274	0.0	100	-0.01
52	T	2-Chloroethyl Vinyl Ether	-1.000	0.000	0.0	0	-11.62#
53	T	4-Methyl-2-Pentanone	-1.000	0.118	0.0	100	0.01
54	T	cis-1,3-Dichloropropene	0.400	0.384	4.0	100	0.01

(#) = Out of Range
11M29738.D 8260WT.M Wed Mar 06 14:02:13 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29738.D Vial: 3
Acq On : 5 Mar 2019 17:09 Operator: KFR
Sample : WG698387-03 STD 0.4ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	-1.000	2.532	0.0	0	0.01
56	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
57	S	Toluene-d8	-1.000	0.000	0.0	0	-12.25#
58	C	Toluene	0.400	0.420	-5.0	100	0.00
59	T	Ethyl Methacrylate	-1.000	0.264	0.0	100	-0.01
60	T	trans-1,3-Dichloropropene	-1.000	0.313	0.0	100	0.01
61	T	1,1,2-Trichloroethane	0.400	0.462	-15.5	100	0.00
62	T	2-Hexanone	-1.000	0.247	0.0	100	0.01
63	T	1,3-Dichloropropane	0.400	0.396	1.0	100	0.00
64	T	Tetrachloroethene	-1.000	0.267	0.0	0	0.00
65	T	Dibromochloromethane	-1.000	0.234	0.0	0	0.00
66	T	1,2-Dibromoethane	-1.000	0.298	0.0	100	0.01
67	T	1-Chlorohexane	-1.000	0.343	0.0	100	0.00
68	P	Chlorobenzene	0.400	0.426	-6.5	100	0.00
69	T	1,1,1,2-Tetrachloroethane	-1.000	0.931	0.0	0	0.00
70	C	Ethylbenzene	0.400	0.352	12.0	100	0.00
71	T	m-,p-Xylene	0.800	0.738	7.8	100	0.00
72	T	o-Xylene	0.400	0.391	2.3	100	0.01
73	T	Styrene	0.400	0.373	6.8	100	0.00
74	P	Bromoform	-1.000	0.866	0.0	100	0.00
75	T	Isopropylbenzene	0.400	0.422	-5.5	100	0.00
76	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
77	P	1,1,2,2-Tetrachloroethane	0.400	0.294	26.5#	100	0.00
78	S	p-Bromofluorobenzene	-1.000	0.000	0.0	0	-15.42#
79	T	1,2,3-Trichloropropane	-1.000	0.176	0.0	100	0.00
80	T	trans-1,4-Dichloro-2-Butene	-1.000	0.146	0.0	100	0.01
81	T	n-Propylbenzene	0.400	0.415	-3.7	100	0.00
82	T	Bromobenzene	0.400	0.386	3.5	100	0.00
83	T	1,3,5-Trimethylbenzene	0.400	0.422	-5.5	100	-0.01
84	T	2-Chlorotoluene	0.400	0.426	-6.5	100	0.00
85	T	4-Chlorotoluene	0.400	0.410	-2.5	100	0.00
86	T	a-Methylstyrene	-1.000	0.358	0.0	100	0.00
87	T	tert-Butylbenzene	-1.000	0.420	0.0	100	0.00
88	T	1,2,4-Trimethylbenzene	0.400	0.419	-4.7	100	0.00
89	T	sec-Butylbenzene	0.400	0.397	0.8	100	0.00
90	T	p-Isopropyltoluene	0.400	0.390	2.5	100	0.00
91	T	1,3-Dichlorobenzene	0.400	0.404	-1.0	100	0.00
92	T	1,4-Dichlorobenzene	0.400	0.403	-0.8	100	0.00
93	T	n-Butylbenzene	0.400	0.394	1.5	100	0.00
94	T	1,2-Dichlorobenzene	0.400	0.381	4.8	100	0.00
95	T	1,2-Dibromo-3-Chloropropane	-1.000	0.000	0.0	0	-18.25#
96	T	1,2,4-Trichlorobenzene	-1.000	0.366	0.0	100	0.00
97	T	Hexachlorobutadiene	-1.000	0.282	0.0	100	-0.01
98	T	Naphthalene	0.400	0.411	-2.7	100	0.01
99	T	1,2,3-Trichlorobenzene	0.400	0.365	8.8	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29738.D 8260WT.M Wed Mar 06 14:02:13 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29739.D Vial: 4
Acq On : 5 Mar 2019 17:38 Operator: KFR
Sample : WG698387-04 STD 1ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:24 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3914	96	384700	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0206	117	284086	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	139198	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	0.0000	111	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 118		Recovery =	0.0000%	#	
43) 1,2-Dichloroethane-d4	0.0000	65	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 80 - 120		Recovery =	0.0000%	#	
57) Toluene-d8	0.0000	98	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 88 - 110		Recovery =	0.0000%	#	
78) p-Bromofluorobenzene	0.0000	95	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 115		Recovery =	0.0000%	#	
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1123	85	5353	0.9419	ug/L	98
3) Chloromethane	3.5569	50	11863	1.0868	ug/L	99
4) Vinyl Chloride	3.7741	62	8135	0.9983	ug/L #	37
5) 1,3-Butadiene	3.8258	54	8383	Below Cal		88
6) Bromomethane	4.6426	94	3541	1.1343	ug/L	94
7) Chloroethane	4.7874	64	3156	1.0019	ug/L #	68
8) Trichlorofluoromethane	5.2836	101	7392	0.9586	ug/L	98
9) Diethyl ether	5.7800	59	20415	5.0640	ug/L	99
10) Isoprene	5.8213	67	5610	0.9237	ug/L	87
11) Acrolein	6.0178	56	1845	2.6355	ug/L	83
12) 1,1,2-Trichloro-1,2,2-Trif	6.0281	101	3450	0.9121	ug/L	100
13) Acetone	6.1108	43	1412	1.0040	ug/L #	45
14) 1,1-Dichloroethene	6.3280	61	7652	1.0394	ug/L	90
15) Tert-Butyl Alcohol	6.4314	59	2669	6.8036	ug/L #	72
16) Dimethyl Sulfide	6.5864	62	4585	0.9421	ug/L	96
17) Iodomethane	6.8346	142	1869	1.8517	ug/L	96
18) Methyl acetate	6.8553	43	2719	0.8963	ug/L #	64
19) Methylene Chloride	7.0931	84	3907	0.9524	ug/L	82
20) Carbon Disulfide	7.1344	76	10930	0.9666	ug/L	96
21) Acrylonitrile	7.2688	53	3210	2.0704	ug/L	78
22) Methyl Tert Butyl Ether	7.3102	73	11394	0.9794	ug/L	89
23) trans-1,2-Dichloroethene	7.5273	96	3681	0.9231	ug/L	96
24) n-Hexane	7.5997	57	5259	0.8562	ug/L #	72
25) Diisopropyl ether	7.9306	45	78591	5.2425	ug/L	98
26) Vinyl Acetate	8.1064	43	1790	2.3044	ug/L #	75
27) 1,1-Dichloroethane	8.1270	63	8573	0.9852	ug/L	96
28) Ethyl-Tert-Butyl ether	8.4786	59	78527	5.1825	ug/L	99
29) 2-Butanone	8.6647	43	1260	0.7033	ug/L #	54
30) Propionitrile	8.7577	54	2233	4.2662	ug/L #	61
31) 2,2-Dichloropropane	8.8612	77	5262	0.8746	ug/L	95
32) cis-1,2-Dichloroethene	8.9335	96	4374	0.9661	ug/L	89
33) Chloroform	9.1300	83	7424	0.9399	ug/L	97
34) 1-Bromopropane	9.2644	122	437	0.4456	ug/L	45
35) Bromochloromethane	9.3471	130	1899	0.7154	ug/L	68
36) Tetrahydrofuran	9.3781	42	7056	6.0794	ug/L	98
38) 1,1,1-Trichloroethane	9.6263	97	6335	0.8858	ug/L #	93
39) Cyclohexane	9.6573	56	8321	0.9827	ug/L	98
40) 1,1-Dichloropropene	9.8124	75	4731	0.8798	ug/L	95
41) Carbon Tetrachloride	9.9571	117	4680	0.7695	ug/L	89
42) Tert-Amyl-Methyl ether	9.9158	73	56129	4.9665	ug/L	99

(#) = qualifier out of range (m) = manual integration
11M29739.D 8260WT.M Wed Mar 06 14:03:25 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29739.D Vial: 4
Acq On : 5 Mar 2019 17:38 Operator: KFR
Sample : WG698387-04 STD 1ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:24 2019 Quant Results File: 8260WT.RES

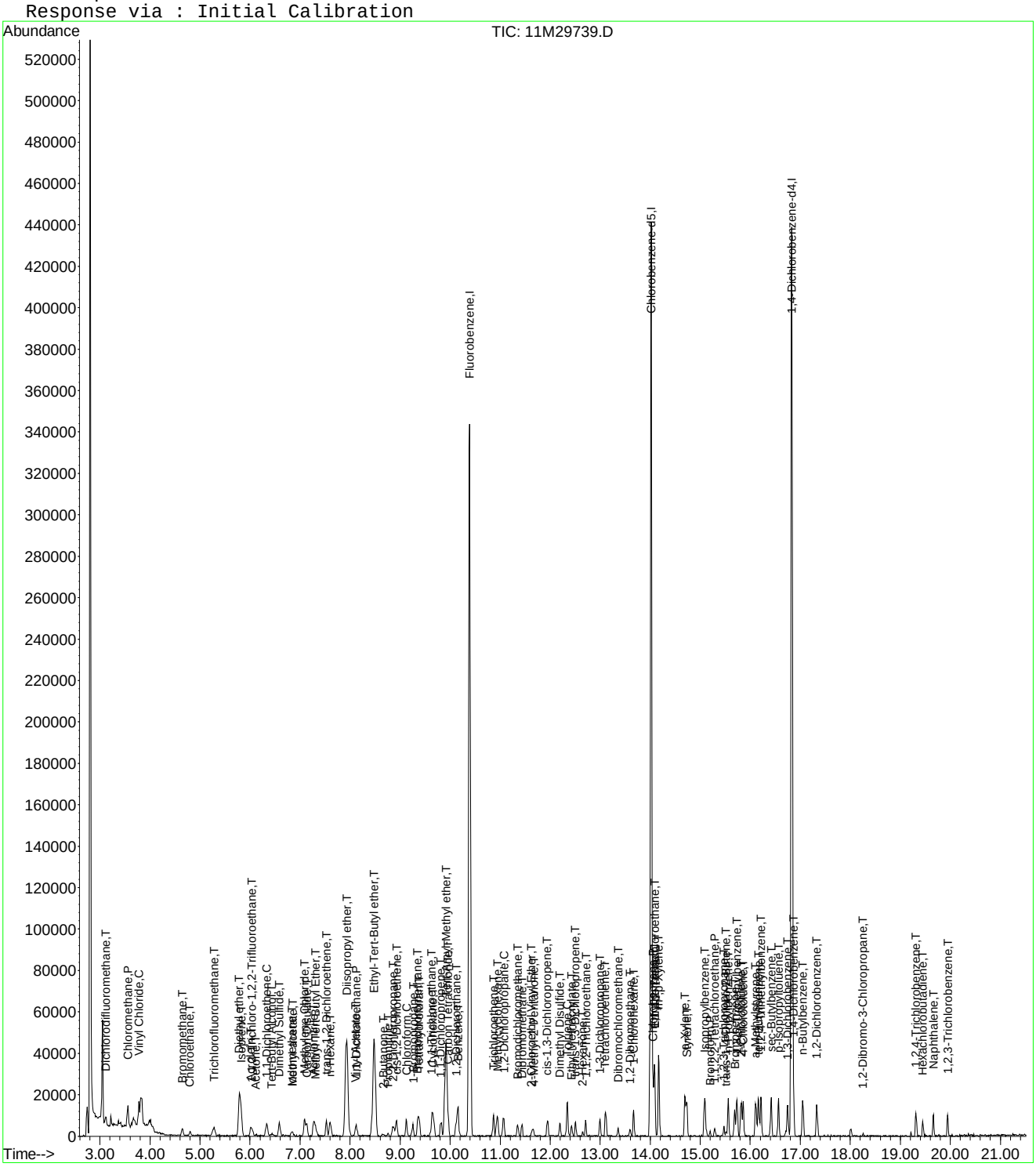
Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
44)	1,2-Dichloroethane	10.1226	62	6571	0.9572	ug/L		94
45)	Benzene	10.1639	78	15399	0.9635	ug/L		94
46)	Trichloroethene	10.8670	130	4299	0.9484	ug/L		95
47)	Methylcyclohexane	10.9497	83	5922	0.9274	ug/L		96
48)	1,2-Dichloropropane	11.0738	63	4564	0.9613	ug/L		96
50)	Bromodichloromethane	11.3530	83	4854	0.8651	ug/L	#	96
51)	Dibromomethane	11.4357	93	2301	0.8485	ug/L		92
52)	2-Chloroethyl Vinyl Ether	11.6218	63	1169	0.5088	ug/L	#	52
53)	4-Methyl-2-Pentanone	11.6735	58	1053	0.6433	ug/L	#	60
54)	cis-1,3-Dichloropropene	11.9423	75	5466	0.8644	ug/L		99
55)	Dimethyl Disulfide	12.1905	79	1853	2.8216	ug/L		82
58)	Toluene	12.3456	91	16901	1.0043	ug/L		91
59)	Ethyl Methacrylate	12.4283	69	3811	0.8018	ug/L		96
60)	trans-1,3-Dichloropropene	12.5007	75	4648	0.8436	ug/L		100
61)	1,1,2-Trichloroethane	12.7178	97	3306	0.9228	ug/L		90
62)	2-Hexanone	12.6454	43	2125	0.7980	ug/L	#	62
63)	1,3-Dichloropropane	12.9970	76	6082	1.0522	ug/L		96
64)	Tetrachloroethene	13.1004	164	3452	0.9671	ug/L		99
65)	Dibromochloromethane	13.3589	129	2960	0.7258	ug/L		96
66)	1,2-Dibromoethane	13.5967	107	3256	0.9483	ug/L		90
67)	1-Chlorohexane	13.6691	91	5020	0.9035	ug/L		95
68)	Chlorobenzene	14.0620	112	11177	0.9540	ug/L		96
69)	1,1,1,2-Tetrachloroethane	14.0930	131	3601	1.3826	ug/L		99
70)	Ethylbenzene	14.0930	106	5651	0.9481	ug/L		85
71)	m-,p-Xylene	14.1654	106	13797	1.9174	ug/L		91
72)	o-Xylene	14.6927	106	6415	0.9188	ug/L		80
73)	Styrene	14.7340	104	10433	0.9034	ug/L		99
74)	Bromoform	15.1993	173	1683	1.2940	ug/L		87
75)	Isopropylbenzene	15.0856	105	17441	0.9979	ug/L		94
77)	1,1,2,2-Tetrachloroethane	15.2924	83	3484	0.9594	ug/L		100
79)	1,2,3-Trichloropropane	15.4681	110	947	0.7810	ug/L		58
80)	trans-1,4-Dichloro-2-Buten	15.5198	53	1289	0.8432	ug/L	#	91
81)	n-Propylbenzene	15.5612	91	20991	1.0226	ug/L		94
82)	Bromobenzene	15.6956	156	4704	0.9383	ug/L		97
83)	1,3,5-Trimethylbenzene	15.7370	105	14295	0.9809	ug/L		100
84)	2-Chlorotoluene	15.8197	91	14437	0.9884	ug/L		95
85)	4-Chlorotoluene	15.8610	91	12567	1.0468	ug/L		91
86)	a-Methylstyrene	16.1092	118	7163	0.8632	ug/L		85
87)	tert-Butylbenzene	16.1712	134	3458	0.9634	ug/L		89
88)	1,2,4-Trimethylbenzene	16.2126	105	15075	1.0023	ug/L		98
89)	sec-Butylbenzene	16.4194	105	17862	0.9873	ug/L		99
90)	p-Isopropyltoluene	16.5641	119	16110	1.0241	ug/L		93
91)	1,3-Dichlorobenzene	16.7502	146	8551	0.9246	ug/L		99
92)	1,4-Dichlorobenzene	16.8640	146	8959	0.9701	ug/L	#	66
93)	n-Butylbenzene	17.0501	91	13479	0.9507	ug/L		97
94)	1,2-Dichlorobenzene	17.3292	146	8675	0.9788	ug/L		97
95)	1,2-Dibromo-3-Chloropropan	18.2495	75	206	0.2746	ug/L		92
96)	1,2,4-Trichlorobenzene	19.3145	180	4843	0.8447	ug/L		94
97)	Hexachlorobutadiene	19.4489	225	2172	0.7516	ug/L		94
98)	Naphthalene	19.6660	128	11494	0.9362	ug/L	#	93
99)	1,2,3-Trichlorobenzene	19.9555	180	5087	0.9443	ug/L		90

(#) = qualifier out of range (m) = manual integration
11M29739.D 8260WT.M Wed Mar 06 14:03:26 2019 Page 2

Data File : C:\MSDCHEM\1\DATA\030519\11M29739.D Vial: 4
Acq On : 5 Mar 2019 17:38 Operator: KFR
Sample : WG698387-04 STD 1ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\030519\11M29739.D Vial: 4
Acq On : 5 Mar 2019 17:38 Operator: KFR
Sample : WG698387-04 STD 1ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 13:50:26 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	1.000	0.942	5.8	100	-0.01
3	P	Chloromethane	1.000	1.087	-8.7	100	0.00
4	C	Vinyl Chloride	1.000	0.998	0.2	100	0.00
5	T	1,3-Butadiene	-1.000	-2.522	0.0	100	0.01
6	T	Bromomethane	1.000	1.134	-13.4	100	0.00
7	T	Chloroethane	1.000	1.002	-0.2	100	-0.01
8	T	Trichlorofluoromethane	1.000	0.959	4.1	100	0.01
9	T	Diethyl ether	5.000	5.064	-1.3	100	-0.01
10	T	Isoprene	1.000	0.924	7.6	100	0.00
11	T	Acrolein	-1.000	2.635	0.0	100	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	1.000	0.912	8.8	100	-0.01
13	T	Acetone	-1.000	1.004	0.0	100	-0.01
14	C	1,1-Dichloroethene	1.000	1.039	-3.9	100	0.00
15	T	Tert-Butyl Alcohol	-1.000	6.804	0.0	100	-0.01
16	T	Dimethyl Sulfide	1.000	0.942	5.8	100	0.00
17	T	Iodomethane	-1.000	1.852	0.0	0	0.00
18	T	Methyl acetate	-1.000	0.896	0.0	100	0.01
19	T	Methylene Chloride	1.000	0.952	4.8	100	0.00
20	T	Carbon Disulfide	1.000	0.967	3.3	100	0.00
21	T	Acrylonitrile	2.500	2.070	17.2	100	0.00
22	T	Methyl Tert Butyl Ether	1.000	0.979	2.1	100	0.01
23	T	trans-1,2-Dichloroethene	1.000	0.923	7.7	100	0.00
24	T	n-Hexane	-1.000	0.856	0.0	100	0.00
25	T	Diisopropyl ether	5.000	5.242	-4.8	100	0.00
26	T	Vinyl Acetate	-1.000	2.304	0.0	0	0.01
27	P	1,1-Dichloroethane	1.000	0.985	1.5	100	0.00
28	T	Ethyl-Tert-Butyl ether	5.000	5.182	-3.6	100	0.00
29	T	2-Butanone	-1.000	0.703	0.0	100	0.01
30	T	Propionitrile	5.000	4.266	14.7	100	0.00
31	T	2,2-Dichloropropane	1.000	0.875	12.5	100	0.00
32	T	cis-1,2-Dichloroethene	1.000	0.966	3.4	100	0.00
33	C	Chloroform	1.000	0.940	6.0	100	0.00
34	T	1-Bromopropane	-1.000	0.446	0.0	100	0.01
35	T	Bromochloromethane	1.000	0.715	28.5#	100	0.00
36	T	Tetrahydrofuran	5.000	6.079	-21.6	100	0.01
37	S	Dibromofluoromethane	-1.000	0.000	0.0	0	-9.40#
38	T	1,1,1-Trichloroethane	1.000	0.886	11.4	100	0.00
39	T	Cyclohexane	1.000	0.983	1.7	100	0.00
40	T	1,1-Dichloropropene	1.000	0.880	12.0	100	0.00
41	T	Carbon Tetrachloride	1.000	0.770	23.0	100	0.00
42	T	Tert-Amyl-Methyl ether	5.000	4.967	0.7	100	0.00
43	S	1,2-Dichloroethane-d4	-1.000	0.000	0.0	0	-10.01#
44	T	1,2-Dichloroethane	1.000	0.957	4.3	100	0.00
45	T	Benzene	1.000	0.963	3.7	100	0.01
46	T	Trichloroethene	1.000	0.948	5.2	100	0.00
47	T	Methylcyclohexane	1.000	0.927	7.3	100	0.01
48	C	1,2-Dichloropropane	1.000	0.961	3.9	100	0.01
49	T	1,4-Dioxane	-1.000	0.000	0.0	0	-11.34#
50	T	Bromodichloromethane	1.000	0.865	13.5	100	0.00
51	T	Dibromomethane	1.000	0.848	15.2	100	0.00
52	T	2-Chloroethyl Vinyl Ether	-1.000	0.509	0.0	0	0.00
53	T	4-Methyl-2-Pentanone	-1.000	0.643	0.0	100	0.02
54	T	cis-1,3-Dichloropropene	1.000	0.864	13.6	100	0.00

(#) = Out of Range
11M29739.D 8260WT.M Wed Mar 06 13:57:31 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29739.D Vial: 4
Acq On : 5 Mar 2019 17:38 Operator: KFR
Sample : WG698387-04 STD 1ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 13:50:26 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	-1.000	2.822	0.0	0	0.00
56	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
57	S	Toluene-d8	-1.000	0.000	0.0	0	-12.25#
58	C	Toluene	1.000	1.004	-0.4	100	0.00
59	T	Ethyl Methacrylate	1.000	0.802	19.8	100	0.00
60	T	trans-1,3-Dichloropropene	1.000	0.844	15.6	100	0.00
61	T	1,1,2-Trichloroethane	1.000	0.923	7.7	100	0.01
62	T	2-Hexanone	-1.000	0.798	0.0	100	0.00
63	T	1,3-Dichloropropane	1.000	1.052	-5.2	100	0.00
64	T	Tetrachloroethene	1.000	1.013	-1.3	100	-0.01
65	T	Dibromochloromethane	-1.000	0.726	0.0	0	0.00
66	T	1,2-Dibromoethane	1.000	0.948	5.2	100	0.00
67	T	1-Chlorohexane	1.000	0.904	9.6	100	0.00
68	P	Chlorobenzene	1.000	0.954	4.6	100	0.00
69	T	1,1,1,2-Tetrachloroethane	-1.000	1.383	0.0	0	0.00
70	C	Ethylbenzene	1.000	0.948	5.2	100	0.01
71	T	m-,p-Xylene	2.000	1.917	4.1	100	0.00
72	T	o-Xylene	1.000	0.919	8.1	100	0.00
73	T	Styrene	1.000	0.903	9.7	100	0.00
74	P	Bromoform	1.000	1.294	-29.4#	100	0.00
75	T	Isopropylbenzene	1.000	0.998	0.2	100	0.00
76	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
77	P	1,1,2,2-Tetrachloroethane	1.000	0.959	4.1	100	0.00
78	S	p-Bromofluorobenzene	-1.000	0.000	0.0	0	-15.42#
79	T	1,2,3-Trichloropropane	1.000	0.781	21.9	100	0.00
80	T	trans-1,4-Dichloro-2-Butene	1.000	0.843	15.7	100	0.01
81	T	n-Propylbenzene	1.000	1.023	-2.3	100	0.00
82	T	Bromobenzene	1.000	0.938	6.2	100	0.01
83	T	1,3,5-Trimethylbenzene	1.000	0.981	1.9	100	0.00
84	T	2-Chlorotoluene	1.000	0.988	1.2	100	0.00
85	T	4-Chlorotoluene	1.000	1.047	-4.7	100	0.00
86	T	a-Methylstyrene	1.000	0.863	13.7	100	0.00
87	T	tert-Butylbenzene	1.000	0.963	3.7	100	0.00
88	T	1,2,4-Trimethylbenzene	1.000	1.002	-0.2	100	0.00
89	T	sec-Butylbenzene	1.000	0.987	1.3	100	0.00
90	T	p-Isopropyltoluene	1.000	1.024	-2.4	100	0.00
91	T	1,3-Dichlorobenzene	1.000	0.925	7.5	100	0.00
92	T	1,4-Dichlorobenzene	1.000	0.970	3.0	100	0.00
93	T	n-Butylbenzene	1.000	0.951	4.9	100	0.00
94	T	1,2-Dichlorobenzene	1.000	0.979	2.1	100	0.00
95	T	1,2-Dibromo-3-Chloropropane	-1.000	0.275	0.0	0	0.00
96	T	1,2,4-Trichlorobenzene	1.000	0.845	15.5	100	0.00
97	T	Hexachlorobutadiene	1.000	0.752	24.8	100	0.00
98	T	Naphthalene	1.000	0.936	6.4	100	0.01
99	T	1,2,3-Trichlorobenzene	1.000	0.944	5.6	100	0.01

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29739.D 8260WT.M Wed Mar 06 13:57:32 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29740.D Vial: 5
Acq On : 5 Mar 2019 18:08 Operator: KFR
Sample : WG698387-05 STD 2ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:28 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3811	96	378991	25.0000	ug/L	-0.0104
56) Chlorobenzene-d5	14.0206	117	282579	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	138944	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	0.0000	111	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 118		Recovery =	0.0000%	#	
43) 1,2-Dichloroethane-d4	0.0000	65	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 80 - 120		Recovery =	0.0000%	#	
57) Toluene-d8	0.0000	98	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 88 - 110		Recovery =	0.0000%	#	
78) p-Bromofluorobenzene	0.0000	95	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 115		Recovery =	0.0000%	#	
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1124	85	10625	1.8977	ug/L	97
3) Chloromethane	3.5466	50	22686	2.1097	ug/L	100
4) Vinyl Chloride	3.7741	62	16908	2.1063	ug/L #	66
5) 1,3-Butadiene	3.8258	54	15068	0.1664	ug/L	93
6) Bromomethane	4.6426	94	6619	2.1521	ug/L	96
7) Chloroethane	4.7977	64	5844	1.8831	ug/L	87
8) Trichlorofluoromethane	5.2733	101	15552	2.0472	ug/L	97
9) Diethyl ether	5.7800	59	81473	20.5141	ug/L	99
10) Isoprene	5.8213	67	11094	1.8542	ug/L	99
11) Acrolein	6.0074	56	6790	9.8451	ug/L	99
12) 1,1,2-Trichloro-1,2,2-Trif	6.0281	101	7157	1.9206	ug/L	93
13) Acetone	6.1212	43	3297	2.3795	ug/L #	67
14) 1,1-Dichloroethene	6.3383	61	13742	1.8948	ug/L	99
15) Tert-Butyl Alcohol	6.4314	59	13890	35.9405	ug/L #	95
16) Dimethyl Sulfide	6.5864	62	8647	1.8036	ug/L	99
17) Iodomethane	6.8346	142	5095	2.4842	ug/L	87
18) Methyl acetate	6.8449	43	4915	1.6445	ug/L #	70
19) Methylene Chloride	7.0827	84	7726	1.9116	ug/L	89
20) Carbon Disulfide	7.1241	76	21916	1.9674	ug/L	94
21) Acrylonitrile	7.2585	53	15196	9.9487	ug/L	92
22) Methyl Tert Butyl Ether	7.2999	73	22380	1.9528	ug/L	98
23) trans-1,2-Dichloroethene	7.5273	96	7684	1.9559	ug/L	92
24) n-Hexane	7.5997	57	11469	1.8953	ug/L #	85
25) Diisopropyl ether	7.9306	45	315707	21.3768	ug/L	99
26) Vinyl Acetate	8.0960	43	5449	2.9745	ug/L #	81
27) 1,1-Dichloroethane	8.1270	63	16376	1.9102	ug/L	97
28) Ethyl-Tert-Butyl ether	8.4786	59	318557	21.3401	ug/L	98
29) 2-Butanone	8.6647	43	3219	1.8239	ug/L #	80
30) Propionitrile	8.7577	54	11015	21.3614	ug/L	96
31) 2,2-Dichloropropane	8.8612	77	11781	1.9875	ug/L	99
32) cis-1,2-Dichloroethene	8.9232	96	8733	1.9580	ug/L	99
33) Chloroform	9.1196	83	14912	1.9164	ug/L	98
34) 1-Bromopropane	9.2540	122	1286	1.3312	ug/L	82
35) Bromochloromethane	9.3471	130	4887	1.8687	ug/L	95
36) Tetrahydrofuran	9.3678	42	22315	19.5159	ug/L	98
38) 1,1,1-Trichloroethane	9.6263	97	13456	1.9099	ug/L #	94
39) Cyclohexane	9.6470	56	16282	1.9519	ug/L	97
40) 1,1-Dichloropropene	9.8124	75	10481	1.9785	ug/L	97
41) Carbon Tetrachloride	9.9572	117	10773	1.7981	ug/L	97
42) Tert-Amyl-Methyl ether	9.9158	73	235381	21.1411	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29740.D 8260WT.M Wed Mar 06 14:03:30 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29740.D Vial: 5
Acq On : 5 Mar 2019 18:08 Operator: KFR
Sample : WG698387-05 STD 2ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:28 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

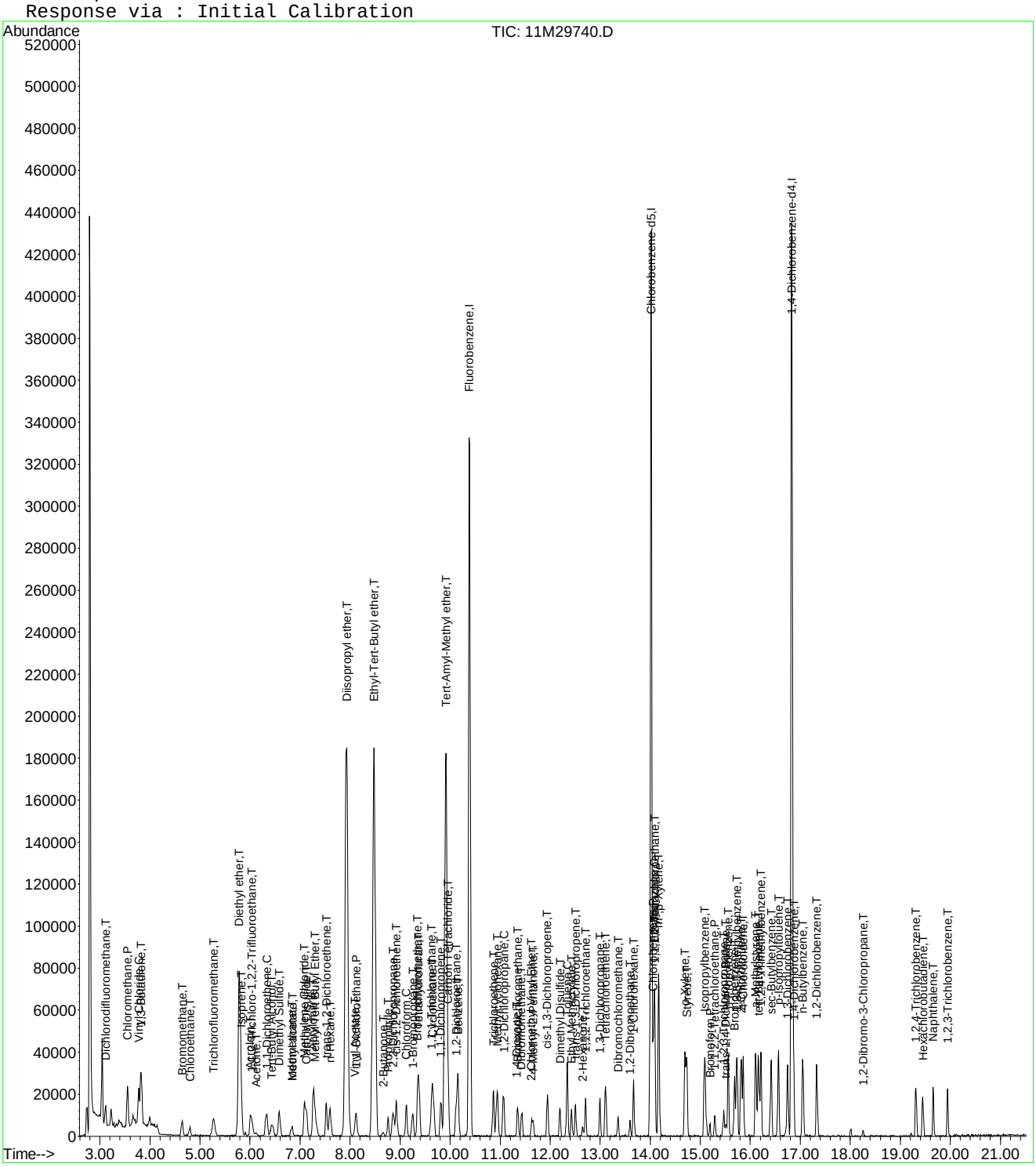
	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
44)	1,2-Dichloroethane	10.1226	62	13667	2.0209	ug/L		97
45)	Benzene	10.1639	78	33141	2.1048	ug/L		93
46)	Trichloroethene	10.8670	130	9146	2.0481	ug/L		93
47)	Methylcyclohexane	10.9394	83	11788	1.8738	ug/L		96
48)	1,2-Dichloropropane	11.0738	63	9712	2.0765	ug/L		94
49)	1,4-Dioxane	11.3323	88	735	22.9025	ug/L		74
50)	Bromodichloromethane	11.3530	83	9790	1.7711	ug/L		97
51)	Dibromomethane	11.4254	93	5012	1.8760	ug/L		93
52)	2-Chloroethyl Vinyl Ether	11.6218	63	2669	1.1792	ug/L	#	74
53)	4-Methyl-2-Pentanone	11.6528	58	2783	1.7258	ug/L	#	64
54)	cis-1,3-Dichloropropene	11.9423	75	11273	1.8096	ug/L		94
55)	Dimethyl Disulfide	12.2008	79	4445	3.4159	ug/L		94
58)	Toluene	12.3456	91	32770	1.9576	ug/L		96
59)	Ethyl Methacrylate	12.4283	69	8224	1.7394	ug/L		100
60)	trans-1,3-Dichloropropene	12.5110	75	9761	1.7810	ug/L		93
61)	1,1,2-Trichloroethane	12.7075	97	6630	1.8605	ug/L		93
62)	2-Hexanone	12.6558	43	4277	1.6147	ug/L	#	77
63)	1,3-Dichloropropane	12.9970	76	11407	1.9840	ug/L		100
64)	Tetrachloroethene	13.1107	164	6478	1.8244	ug/L		100
65)	Dibromochloromethane	13.3589	129	6749	1.6637	ug/L		93
66)	1,2-Dibromoethane	13.5967	107	6352	1.8599	ug/L		100
67)	1-Chlorohexane	13.6691	91	10068	1.8218	ug/L		99
68)	Chlorobenzene	14.0620	112	21643	1.8571	ug/L		98
69)	1,1,1,2-Tetrachloroethane	14.0930	131	7202	2.1037	ug/L		99
70)	Ethylbenzene	14.0826	106	10939	1.8451	ug/L		82
71)	m-,p-Xylene	14.1654	106	27179	3.7973	ug/L		85
72)	o-Xylene	14.6927	106	13955	2.0095	ug/L		99
73)	Styrene	14.7340	104	22207	1.9332	ug/L		99
74)	Bromoform	15.1993	173	3881	2.0377	ug/L		93
75)	Isopropylbenzene	15.0856	105	34361	1.9765	ug/L		97
77)	1,1,2,2-Tetrachloroethane	15.2924	83	7039	1.9420	ug/L		98
79)	1,2,3-Trichloropropane	15.4681	110	2527	2.0880	ug/L		78
80)	trans-1,4-Dichloro-2-Buten	15.5095	53	2315	1.5171	ug/L		66
81)	n-Propylbenzene	15.5612	91	41272	2.0142	ug/L		98
82)	Bromobenzene	15.6853	156	9342	1.8669	ug/L		89
83)	1,3,5-Trimethylbenzene	15.7370	105	28921	1.9882	ug/L		99
84)	2-Chlorotoluene	15.8197	91	29474	2.0215	ug/L		99
85)	4-Chlorotoluene	15.8610	91	24240	2.0228	ug/L		97
86)	a-Methylstyrene	16.1092	118	15618	1.8856	ug/L		94
87)	tert-Butylbenzene	16.1712	134	6692	1.8679	ug/L		85
88)	1,2,4-Trimethylbenzene	16.2126	105	29847	1.9881	ug/L		98
89)	sec-Butylbenzene	16.4194	105	38024	2.1056	ug/L		96
90)	p-Isopropyltoluene	16.5641	119	31128	1.9823	ug/L		100
91)	1,3-Dichlorobenzene	16.7503	146	18388	1.9920	ug/L		97
92)	1,4-Dichlorobenzene	16.8743	146	17794	1.9303	ug/L		81
93)	n-Butylbenzene	17.0501	91	27074	1.9131	ug/L		99
94)	1,2-Dichlorobenzene	17.3293	146	17273	1.9524	ug/L		99
95)	1,2-Dibromo-3-Chloropropan	18.2598	75	1087	1.4517	ug/L		79
96)	1,2,4-Trichlorobenzene	19.3145	180	10335	1.8058	ug/L		99
97)	Hexachlorobutadiene	19.4592	225	5249	1.8197	ug/L		98
98)	Naphthalene	19.6557	128	23379	1.9077	ug/L	#	95
99)	1,2,3-Trichlorobenzene	19.9452	180	9758	1.8148	ug/L		95

(#) = qualifier out of range (m) = manual integration
11M29740.D 8260WT.M Wed Mar 06 14:03:31 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29740.D Vial: 5
Acq On : 5 Mar 2019 18:08 Operator: KFR
Sample : WG698387-05 STD 2ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\030519\11M29740.D Vial: 5
Acq On : 5 Mar 2019 18:08 Operator: KFR
Sample : WG698387-05 STD 2ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 13:50:26 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	-0.01
2	T	Dichlorodifluoromethane	2.000	1.898	5.1	100	-0.01
3	P	Chloromethane	2.000	2.110	-5.5	100	-0.01
4	C	Vinyl Chloride	2.000	2.106	-5.3	100	0.00
5	T	1,3-Butadiene	-1.000	0.166	0.0	100	0.01
6	T	Bromomethane	2.000	2.152	-7.6	100	0.00
7	T	Chloroethane	2.000	1.883	5.8	100	0.00
8	T	Trichlorofluoromethane	2.000	2.047	-2.4	100	0.00
9	T	Diethyl ether	20.000	20.514	-2.6	100	-0.01
10	T	Isoprene	2.000	1.854	7.3	100	0.00
11	T	Acrolein	10.000	9.845	1.5	100	-0.01
12	T	1,1,2-Trichloro-1,2,2-Trifl	2.000	1.921	3.9	100	-0.01
13	T	Acetone	-1.000	2.380	0.0	100	0.00
14	C	1,1-Dichloroethene	2.000	1.895	5.2	100	0.01
15	T	Tert-Butyl Alcohol	40.000	35.940	10.2	100	-0.01
16	T	Dimethyl Sulfide	2.000	1.804	9.8	100	0.00
17	T	Iodomethane	2.000	2.484	-24.2	100	0.00
18	T	Methyl acetate	2.000	1.645	17.8	100	0.00
19	T	Methylene Chloride	2.000	1.912	4.4	100	-0.01
20	T	Carbon Disulfide	2.000	1.967	1.6	100	-0.01
21	T	Acrylonitrile	10.000	9.949	0.5	100	-0.01
22	T	Methyl Tert Butyl Ether	2.000	1.953	2.3	100	0.00
23	T	trans-1,2-Dichloroethene	2.000	1.956	2.2	100	0.00
24	T	n-Hexane	2.000	1.895	5.2	100	0.00
25	T	Diisopropyl ether	20.000	21.377	-6.9	100	0.00
26	T	Vinyl Acetate	-1.000	2.974	0.0	0	0.00
27	P	1,1-Dichloroethane	2.000	1.910	4.5	100	0.00
28	T	Ethyl-Tert-Butyl ether	20.000	21.340	-6.7	100	0.00
29	T	2-Butanone	2.000	1.824	8.8	100	0.01
30	T	Propionitrile	20.000	21.361	-6.8	100	0.00
31	T	2,2-Dichloropropane	2.000	1.988	0.6	100	0.00
32	T	cis-1,2-Dichloroethene	2.000	1.958	2.1	100	-0.01
33	C	Chloroform	2.000	1.916	4.2	100	-0.01
34	T	1-Bromopropane	-1.000	1.331	0.0	100	0.00
35	T	Bromochloromethane	2.000	1.869	6.6	100	0.00
36	T	Tetrahydrofuran	20.000	19.516	2.4	100	0.00
37	S	Dibromofluoromethane	-1.000	0.000	0.0	0	-9.40#
38	T	1,1,1-Trichloroethane	2.000	1.910	4.5	100	0.00
39	T	Cyclohexane	2.000	1.952	2.4	100	-0.01
40	T	1,1-Dichloropropene	2.000	1.979	1.0	100	0.00
41	T	Carbon Tetrachloride	2.000	1.798	10.1	100	0.00
42	T	Tert-Amyl-Methyl ether	20.000	21.141	-5.7	100	0.00
43	S	1,2-Dichloroethane-d4	-1.000	0.000	0.0	0	-10.01#
44	T	1,2-Dichloroethane	2.000	2.021	-1.0	100	0.00
45	T	Benzene	2.000	2.105	-5.2	100	0.01
46	T	Trichloroethene	2.000	2.048	-2.4	100	0.00
47	T	Methylcyclohexane	2.000	1.874	6.3	100	0.00
48	C	1,2-Dichloropropane	2.000	2.076	-3.8	100	0.01
49	T	1,4-Dioxane	-1.000	22.902	0.0	100	-0.01
50	T	Bromodichloromethane	2.000	1.771	11.5	100	0.00
51	T	Dibromomethane	2.000	1.876	6.2	100	-0.01
52	T	2-Chloroethyl Vinyl Ether	-1.000	1.179	0.0	0	0.00
53	T	4-Methyl-2-Pentanone	-1.000	1.726	0.0	100	0.00
54	T	cis-1,3-Dichloropropene	2.000	1.810	9.5	100	0.00

(#) = Out of Range
11M29740.D 8260WT.M Wed Mar 06 13:57:55 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29740.D Vial: 5
Acq On : 5 Mar 2019 18:08 Operator: KFR
Sample : WG698387-05 STD 2ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 13:50:26 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	-1.000	3.416	0.0	0	0.01
56	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
57	S	Toluene-d8	-1.000	0.000	0.0	0	-12.25#
58	C	Toluene	2.000	1.958	2.1	100	0.00
59	T	Ethyl Methacrylate	2.000	1.739	13.0	100	0.00
60	T	trans-1,3-Dichloropropene	2.000	1.781	11.0	100	0.01
61	T	1,1,2-Trichloroethane	2.000	1.860	7.0	100	0.00
62	T	2-Hexanone	2.000	1.615	19.3	100	0.01
63	T	1,3-Dichloropropane	2.000	1.984	0.8	100	0.00
64	T	Tetrachloroethene	2.000	1.911	4.4	100	0.00
65	T	Dibromochloromethane	2.000	1.664	16.8	100	0.00
66	T	1,2-Dibromoethane	2.000	1.860	7.0	100	0.00
67	T	1-Chlorohexane	2.000	1.822	8.9	100	0.00
68	P	Chlorobenzene	2.000	1.857	7.2	100	0.00
69	T	1,1,1,2-Tetrachloroethane	2.000	2.104	-5.2	100	0.00
70	C	Ethylbenzene	2.000	1.845	7.8	100	0.00
71	T	m-,p-Xylene	4.000	3.797	5.1	100	0.00
72	T	o-Xylene	2.000	2.009	-0.4	100	0.00
73	T	Styrene	2.000	1.933	3.3	100	0.00
74	P	Bromoform	2.000	2.038	-1.9	100	0.00
75	T	Isopropylbenzene	2.000	1.976	1.2	100	0.00
76	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
77	P	1,1,2,2-Tetrachloroethane	2.000	1.942	2.9	100	0.00
78	S	p-Bromofluorobenzene	1.000	0.000	100.0#	0	-15.42#
79	T	1,2,3-Trichloropropane	2.000	2.088	-4.4	100	0.00
80	T	trans-1,4-Dichloro-2-Butene	2.000	1.517	24.2	100	0.00
81	T	n-Propylbenzene	2.000	2.014	-0.7	100	0.00
82	T	Bromobenzene	2.000	1.867	6.7	100	0.00
83	T	1,3,5-Trimethylbenzene	2.000	1.988	0.6	100	0.00
84	T	2-Chlorotoluene	2.000	2.022	-1.1	100	0.00
85	T	4-Chlorotoluene	2.000	2.023	-1.2	100	0.00
86	T	a-Methylstyrene	2.000	1.886	5.7	100	0.00
87	T	tert-Butylbenzene	2.000	1.868	6.6	100	0.00
88	T	1,2,4-Trimethylbenzene	2.000	1.988	0.6	100	0.00
89	T	sec-Butylbenzene	2.000	2.106	-5.3	100	0.00
90	T	p-Isopropyltoluene	2.000	1.982	0.9	100	0.00
91	T	1,3-Dichlorobenzene	2.000	1.992	0.4	100	0.00
92	T	1,4-Dichlorobenzene	2.000	1.930	3.5	100	0.01
93	T	n-Butylbenzene	2.000	1.913	4.3	100	0.00
94	T	1,2-Dichlorobenzene	2.000	1.952	2.4	100	0.00
95	T	1,2-Dibromo-3-Chloropropane	-1.000	1.452	0.0	0	0.01
96	T	1,2,4-Trichlorobenzene	2.000	1.806	9.7	100	0.00
97	T	Hexachlorobutadiene	2.000	1.820	9.0	100	0.01
98	T	Naphthalene	2.000	1.908	4.6	100	0.00
99	T	1,2,3-Trichlorobenzene	2.000	1.815	9.3	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29740.D 8260WT.M Wed Mar 06 13:57:55 2019 Page 2

Data File : C:\MSDCHEM\1\DATA\030519\11M29741.D Vial: 6
Acq On : 5 Mar 2019 18:38 Operator: KFR
Sample : WG698387-06 STD 5ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:34 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3914	96	392987	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0206	117	289755	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	139899	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3988	111	22696	5.0031	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 20.0124%#			
43) 1,2-Dichloroethane-d4	10.0089	65	28500	5.2362	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 20.9448%#			
57) Toluene-d8	12.2525	98	76134	5.2797	ug/L	0.0000
Spiked Amount 25.0000	Range 88 - 110		Recovery = 21.1188%#			
78) p-Bromofluorobenzene	15.4164	95	27613	5.1578	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 20.6312%#			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1124	85	25923	4.4652	ug/L	98
3) Chloromethane	3.5466	50	53957	4.8390	ug/L	100
4) Vinyl Chloride	3.7741	62	41361	4.9689	ug/L	88
5) 1,3-Butadiene	3.8258	54	24006	3.3577	ug/L	92
6) Bromomethane	4.6426	94	15504	4.8615	ug/L	100
7) Chloroethane	4.7977	64	14961	4.6491	ug/L	95
8) Trichlorofluoromethane	5.2733	101	38366	4.8706	ug/L	99
9) Diethyl ether	5.7800	59	209116	50.7782	ug/L	99
10) Isoprene	5.8213	67	28561	4.6034	ug/L	98
11) Acrolein	6.0074	56	17920	25.0577	ug/L	100
12) 1,1,2-Trichloro-1,2,2-Trif	6.0281	101	17984	4.6542	ug/L	98
13) Acetone	6.1212	43	7821	5.4436	ug/L	97
14) 1,1-Dichloroethene	6.3280	61	37262	4.9548	ug/L	97
15) Tert-Butyl Alcohol	6.4314	59	37162	92.7324	ug/L	98
16) Dimethyl Sulfide	6.5865	62	24073	4.8422	ug/L	98
17) Iodomethane	6.8346	142	14449	4.2023	ug/L	98
18) Methyl acetate	6.8346	43	14821	4.7825	ug/L	98
19) Methylene Chloride	7.0931	84	20465	4.8833	ug/L	99
20) Carbon Disulfide	7.1241	76	56967	4.9319	ug/L	98
21) Acrylonitrile	7.2689	53	39559	24.9766	ug/L	94
22) Methyl Tert Butyl Ether	7.2999	73	57453	4.8346	ug/L	99
23) trans-1,2-Dichloroethene	7.5274	96	19820	4.8653	ug/L	100
24) n-Hexane	7.5997	57	29004	4.6224	ug/L #	96
25) Diisopropyl ether	7.9306	45	812924	53.0833	ug/L	100
26) Vinyl Acetate	8.0960	43	17244	5.0073	ug/L	98
27) 1,1-Dichloroethane	8.1167	63	42561	4.7879	ug/L	98
28) Ethyl-Tert-Butyl ether	8.4786	59	812824	52.5119	ug/L	99
29) 2-Butanone	8.6544	43	8490	4.6391	ug/L	92
30) Propionitrile	8.7578	54	27847	52.0803	ug/L	99
31) 2,2-Dichloropropane	8.8612	77	28125	4.5759	ug/L	100
32) cis-1,2-Dichloroethene	8.9232	96	22324	4.8269	ug/L	96
33) Chloroform	9.1197	83	38862	4.8165	ug/L	96
34) 1-Bromopropane	9.2541	122	4320	4.3125	ug/L	93
35) Bromochloromethane	9.3471	130	13508	4.9812	ug/L	99
36) Tetrahydrofuran	9.3678	42	56348	47.5249	ug/L	98
38) 1,1,1-Trichloroethane	9.6263	97	34541	4.7279	ug/L	99
39) Cyclohexane	9.6573	56	40501	4.6825	ug/L	99
40) 1,1-Dichloropropene	9.8124	75	25937	4.7218	ug/L	97
41) Carbon Tetrachloride	9.9572	117	27882	4.4880	ug/L	99
42) Tert-Amyl-Methyl ether	9.9158	73	598486	51.8396	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29741.D 8260WT.M Wed Mar 06 14:03:35 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29741.D Vial: 6
Acq On : 5 Mar 2019 18:38 Operator: KFR
Sample : WG698387-06 STD 5ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:34 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

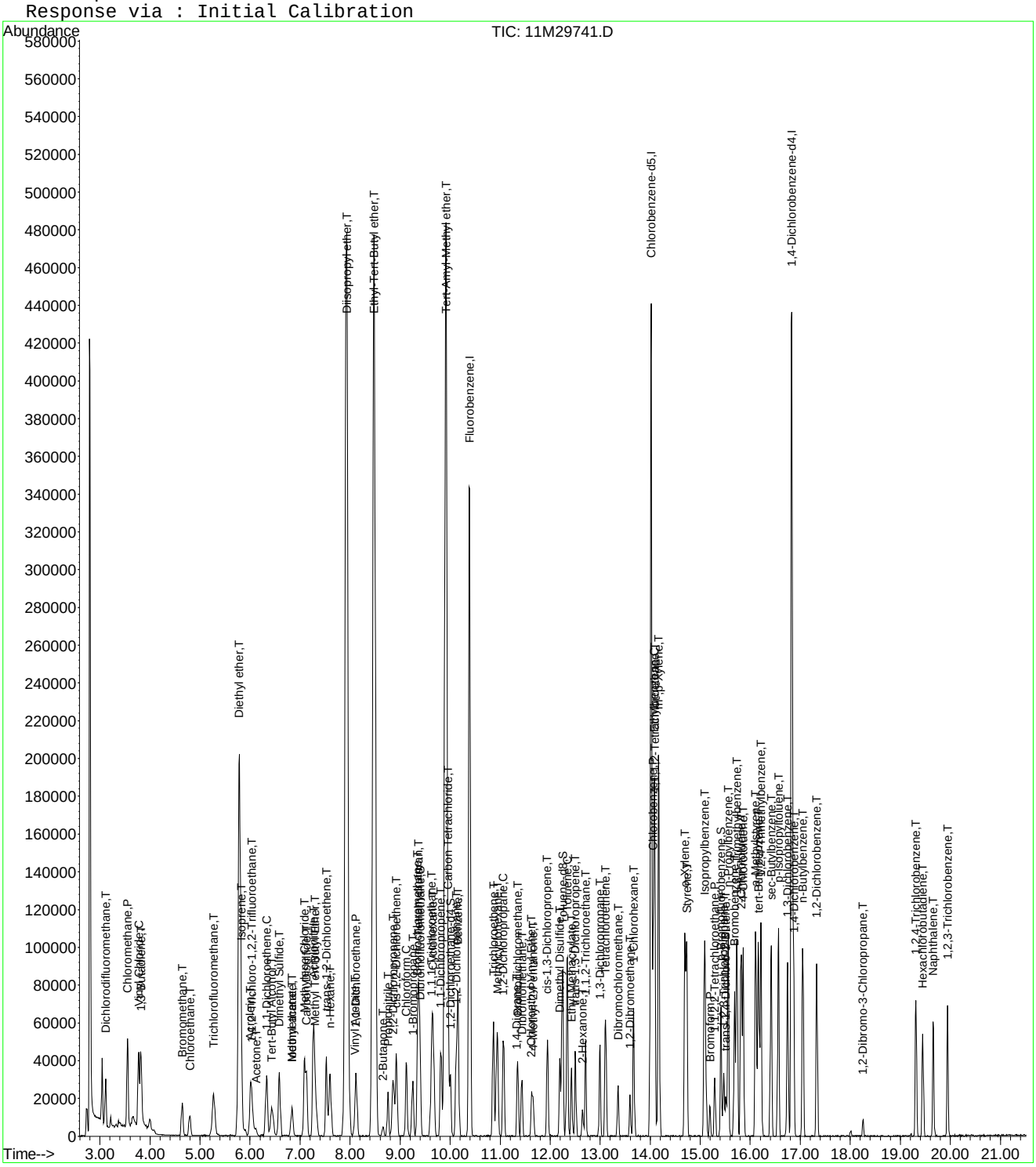
	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
44)	1,2-Dichloroethane	10.1226	62	35675	5.0872	ug/L	98
45)	Benzene	10.1536	78	79739	4.8839	ug/L	100
46)	Trichloroethene	10.8670	130	22287	4.8130	ug/L	100
47)	Methylcyclohexane	10.9498	83	30480	4.6725	ug/L	98
48)	1,2-Dichloropropane	11.0635	63	22894	4.7205	ug/L	97
49)	1,4-Dioxane	11.3323	88	2997	90.0601	ug/L	90
50)	Bromodichloromethane	11.3530	83	27396	4.7798	ug/L	99
51)	Dibromomethane	11.4357	93	13935	5.0300	ug/L	95
52)	2-Chloroethyl Vinyl Ether	11.6218	63	8940	3.8091	ug/L	97
53)	4-Methyl-2-Pentanone	11.6529	58	7495	4.4824	ug/L	99
54)	cis-1,3-Dichloropropene	11.9423	75	30690	4.7510	ug/L	99
55)	Dimethyl Disulfide	12.1905	79	13399	5.3390	ug/L	86
58)	Toluene	12.3456	91	89627	5.2216	ug/L	95
59)	Ethyl Methacrylate	12.4283	69	22563	4.6540	ug/L	98
60)	trans-1,3-Dichloropropene	12.5007	75	26133	4.6501	ug/L	97
61)	1,1,2-Trichloroethane	12.7075	97	17300	4.7344	ug/L	96
62)	2-Hexanone	12.6455	43	13329	4.9076	ug/L	92
63)	1,3-Dichloropropane	12.9970	76	29055	4.9282	ug/L	97
64)	Tetrachloroethene	13.1107	164	17118	4.7017	ug/L	99
65)	Dibromochloromethane	13.3589	129	17620	4.2359	ug/L	99
66)	1,2-Dibromoethane	13.5967	107	16570	4.7316	ug/L	96
67)	1-Chlorohexane	13.6691	91	26371	4.6535	ug/L	99
68)	Chlorobenzene	14.0620	112	57129	4.7806	ug/L	100
69)	1,1,1,2-Tetrachloroethane	14.0930	131	19294	4.4172	ug/L	99
70)	Ethylbenzene	14.0826	106	29387	4.8340	ug/L	94
71)	m-,p-Xylene	14.1654	106	69659	9.4913	ug/L	86
72)	o-Xylene	14.6927	106	34481	4.8422	ug/L	97
73)	Styrene	14.7340	104	58036	4.9272	ug/L	100
74)	Bromoform	15.1993	173	9642	3.8985	ug/L	93
75)	Isopropylbenzene	15.0856	105	90391	5.0706	ug/L	97
77)	1,1,2,2-Tetrachloroethane	15.2924	83	18603	5.0974	ug/L	100
79)	1,2,3-Trichloropropane	15.4682	110	6006	4.9287	ug/L	74
80)	trans-1,4-Dichloro-2-Buten	15.5095	53	7392	4.8111	ug/L	96
81)	n-Propylbenzene	15.5612	91	111335	5.3965	ug/L	97
82)	Bromobenzene	15.6853	156	25563	5.0736	ug/L	98
83)	1,3,5-Trimethylbenzene	15.7370	105	76366	5.2141	ug/L	98
84)	2-Chlorotoluene	15.8197	91	77542	5.2820	ug/L	94
85)	4-Chlorotoluene	15.8611	91	62041	5.1419	ug/L	99
86)	a-Methylstyrene	16.1092	118	40145	4.8137	ug/L	97
87)	tert-Butylbenzene	16.1712	134	17911	4.9652	ug/L	97
88)	1,2,4-Trimethylbenzene	16.2126	105	76458	5.0581	ug/L	100
89)	sec-Butylbenzene	16.4194	105	93501	5.1423	ug/L	97
90)	p-Isopropyltoluene	16.5642	119	82364	5.2094	ug/L	97
91)	1,3-Dichlorobenzene	16.7503	146	46292	4.9805	ug/L	97
92)	1,4-Dichlorobenzene	16.8743	146	45984	4.9544	ug/L	94
93)	n-Butylbenzene	17.0501	91	71407	5.0114	ug/L	97
94)	1,2-Dichlorobenzene	17.3293	146	44856	5.0355	ug/L	100
95)	1,2-Dibromo-3-Chloropropan	18.2495	75	3084	4.0905	ug/L	97
96)	1,2,4-Trichlorobenzene	19.3145	180	26680	4.6300	ug/L	99
97)	Hexachlorobutadiene	19.4489	225	14319	4.9301	ug/L	97
98)	Naphthalene	19.6557	128	59627	4.8323	ug/L	99
99)	1,2,3-Trichlorobenzene	19.9452	180	24480	4.5217	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29741.D 8260WT.M Wed Mar 06 14:03:35 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29741.D Vial: 6
Acq On : 5 Mar 2019 18:38 Operator: KFR
Sample : WG698387-06 STD 5ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\030519\11M29741.D Vial: 6
Acq On : 5 Mar 2019 18:38 Operator: KFR
Sample : WG698387-06 STD 5ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 13:50:26 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	5.000	4.465	10.7	100	-0.01
3	P	Chloromethane	5.000	4.839	3.2	100	-0.01
4	C	Vinyl Chloride	5.000	4.969	0.6	100	0.00
5	T	1,3-Butadiene	5.000	3.358	32.8#	100	0.01
6	T	Bromomethane	5.000	4.862	2.8	100	0.00
7	T	Chloroethane	5.000	4.649	7.0	100	0.00
8	T	Trichlorofluoromethane	5.000	4.871	2.6	100	0.00
9	T	Diethyl ether	50.000	50.778	-1.6	100	-0.01
10	T	Isoprene	5.000	4.603	7.9	100	0.00
11	T	Acrolein	25.000	25.058	-0.2	100	-0.01
12	T	1,1,2-Trichloro-1,2,2-Trifl	5.000	4.654	6.9	100	-0.01
13	T	Acetone	5.000	5.444	-8.9	100	0.00
14	C	1,1-Dichloroethene	5.000	4.955	0.9	100	0.00
15	T	Tert-Butyl Alcohol	100.000	92.732	7.3	100	-0.01
16	T	Dimethyl Sulfide	5.000	4.842	3.2	100	0.00
17	T	Iodomethane	5.000	4.202	16.0	100	0.00
18	T	Methyl acetate	5.000	4.782	4.4	100	-0.01
19	T	Methylene Chloride	5.000	4.883	2.3	100	0.00
20	T	Carbon Disulfide	5.000	4.932	1.4	100	-0.01
21	T	Acrylonitrile	25.000	24.977	0.1	100	0.00
22	T	Methyl Tert Butyl Ether	5.000	4.835	3.3	100	0.00
23	T	trans-1,2-Dichloroethene	5.000	4.865	2.7	100	0.00
24	T	n-Hexane	5.000	4.622	7.6	100	0.00
25	T	Diisopropyl ether	50.000	53.083	-6.2	100	0.00
26	T	Vinyl Acetate	5.000	5.007	-0.1	100	0.00
27	P	1,1-Dichloroethane	5.000	4.788	4.2	100	-0.01
28	T	Ethyl-Tert-Butyl ether	50.000	52.512	-5.0	100	0.00
29	T	2-Butanone	5.000	4.639	7.2	100	0.00
30	T	Propionitrile	50.000	52.080	-4.2	100	0.00
31	T	2,2-Dichloropropane	5.000	4.576	8.5	100	0.00
32	T	cis-1,2-Dichloroethene	5.000	4.827	3.5	100	-0.01
33	C	Chloroform	5.000	4.817	3.7	100	-0.01
34	T	1-Bromopropane	5.000	4.312	13.8	100	0.00
35	T	Bromochloromethane	5.000	4.981	0.4	100	0.00
36	T	Tetrahydrofuran	50.000	47.525	5.0	100	0.00
37	S	Dibromofluoromethane	5.000	5.003	-0.1	100	0.00
38	T	1,1,1-Trichloroethane	5.000	4.728	5.4	100	0.00
39	T	Cyclohexane	5.000	4.682	6.4	100	0.00
40	T	1,1-Dichloropropene	5.000	4.722	5.6	100	0.00
41	T	Carbon Tetrachloride	5.000	4.488	10.2	100	0.00
42	T	Tert-Amyl-Methyl ether	50.000	51.840	-3.7	100	0.00
43	S	1,2-Dichloroethane-d4	5.000	5.236	-4.7	100	0.00
44	T	1,2-Dichloroethane	5.000	5.087	-1.7	100	0.00
45	T	Benzene	5.000	4.884	2.3	100	0.00
46	T	Trichloroethene	5.000	4.813	3.7	100	0.00
47	T	Methylcyclohexane	5.000	4.672	6.6	100	0.01
48	C	1,2-Dichloropropane	5.000	4.721	5.6	100	0.00
49	T	1,4-Dioxane	100.000	90.060	9.9	100	-0.01
50	T	Bromodichloromethane	5.000	4.780	4.4	100	0.00
51	T	Dibromomethane	5.000	5.030	-0.6	100	0.00
52	T	2-Chloroethyl Vinyl Ether	5.000	3.809	23.8	100	0.00
53	T	4-Methyl-2-Pentanone	5.000	4.482	10.4	100	0.00
54	T	cis-1,3-Dichloropropene	5.000	4.751	5.0	100	0.00

(#) = Out of Range
11M29741.D 8260WT.M Wed Mar 06 13:58:12 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29741.D Vial: 6
Acq On : 5 Mar 2019 18:38 Operator: KFR
Sample : WG698387-06 STD 5ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 13:50:26 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	5.000	5.339	-6.8	100	0.00
56	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
57	S	Toluene-d8	5.000	5.280	-5.6	100	0.00
58	C	Toluene	5.000	5.222	-4.4	100	0.00
59	T	Ethyl Methacrylate	5.000	4.654	6.9	100	0.00
60	T	trans-1,3-Dichloropropene	5.000	4.650	7.0	100	0.00
61	T	1,1,2-Trichloroethane	5.000	4.734	5.3	100	0.00
62	T	2-Hexanone	5.000	4.908	1.8	100	0.00
63	T	1,3-Dichloropropane	5.000	4.928	1.4	100	0.00
64	T	Tetrachloroethene	5.000	4.924	1.5	100	0.00
65	T	Dibromochloromethane	5.000	4.236	15.3	100	0.00
66	T	1,2-Dibromoethane	5.000	4.732	5.4	100	0.00
67	T	1-Chlorohexane	5.000	4.654	6.9	100	0.00
68	P	Chlorobenzene	5.000	4.781	4.4	100	0.00
69	T	1,1,1,2-Tetrachloroethane	5.000	4.417	11.7	100	0.00
70	C	Ethylbenzene	5.000	4.834	3.3	100	0.00
71	T	m-,p-Xylene	10.000	9.491	5.1	100	0.00
72	T	o-Xylene	5.000	4.842	3.2	100	0.00
73	T	Styrene	5.000	4.927	1.5	100	0.00
74	P	Bromoform	5.000	3.898	22.0	100	0.00
75	T	Isopropylbenzene	5.000	5.071	-1.4	100	0.00
76	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
77	P	1,1,2,2-Tetrachloroethane	5.000	5.097	-1.9	100	0.00
78	S	p-Bromofluorobenzene	5.000	5.158	-3.2	100	0.00
79	T	1,2,3-Trichloropropane	5.000	4.929	1.4	100	0.00
80	T	trans-1,4-Dichloro-2-Butene	5.000	4.811	3.8	100	0.00
81	T	n-Propylbenzene	5.000	5.397	-7.9	100	0.00
82	T	Bromobenzene	5.000	5.074	-1.5	100	0.00
83	T	1,3,5-Trimethylbenzene	5.000	5.214	-4.3	100	0.00
84	T	2-Chlorotoluene	5.000	5.282	-5.6	100	0.00
85	T	4-Chlorotoluene	5.000	5.142	-2.8	100	0.00
86	T	a-Methylstyrene	5.000	4.814	3.7	100	0.00
87	T	tert-Butylbenzene	5.000	4.965	0.7	100	0.00
88	T	1,2,4-Trimethylbenzene	5.000	5.058	-1.2	100	0.00
89	T	sec-Butylbenzene	5.000	5.142	-2.8	100	0.00
90	T	p-Isopropyltoluene	5.000	5.209	-4.2	100	0.00
91	T	1,3-Dichlorobenzene	5.000	4.981	0.4	100	0.00
92	T	1,4-Dichlorobenzene	5.000	4.954	0.9	100	0.01
93	T	n-Butylbenzene	5.000	5.011	-0.2	100	0.00
94	T	1,2-Dichlorobenzene	5.000	5.036	-0.7	100	0.00
95	T	1,2-Dibromo-3-Chloropropane	5.000	4.091	18.2	100	0.00
96	T	1,2,4-Trichlorobenzene	5.000	4.630	7.4	100	0.00
97	T	Hexachlorobutadiene	5.000	4.930	1.4	100	0.00
98	T	Naphthalene	5.000	4.832	3.4	100	0.00
99	T	1,2,3-Trichlorobenzene	5.000	4.522	9.6	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29741.D 8260WT.M Wed Mar 06 13:58:12 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29742.D Vial: 7
Acq On : 5 Mar 2019 19:08 Operator: KFR
Sample : WG698387-07 STD 20ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:36 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3915	96	390701	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0207	117	294074	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	148164	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3989	111	42025	9.3182	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 37.2728%#			
43) 1,2-Dichloroethane-d4	10.0089	65	50464	9.3258	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 37.3032%#			
57) Toluene-d8	12.2526	98	137326	9.3834	ug/L	0.0000
Spiked Amount 25.0000	Range 88 - 110		Recovery = 37.5336%#			
78) p-Bromofluorobenzene	15.4165	95	51838	9.1426	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 36.5704%#			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1124	85	125308	21.7106	ug/L	99
3) Chloromethane	3.5467	50	224404	20.2429	ug/L	100
4) Vinyl Chloride	3.7638	62	176474	21.3247	ug/L	99
5) 1,3-Butadiene	3.8051	54	79748	24.7594	ug/L	96
6) Bromomethane	4.6427	94	61649	19.4441	ug/L	98
7) Chloroethane	4.7874	64	66614	20.8215	ug/L	99
8) Trichlorofluoromethane	5.2630	101	161131	20.5754	ug/L	100
9) Diethyl ether	5.7800	59	308356	75.3141	ug/L	99
10) Isoprene	5.8214	67	125862	20.4051	ug/L	99
11) Acrolein	6.0075	56	27463	38.6264	ug/L	98
12) 1,1,2-Trichloro-1,2,2-Trif	6.0282	101	79889	20.7960	ug/L	99
13) Acetone	6.1109	43	31044	21.7338	ug/L	96
14) 1,1-Dichloroethene	6.3280	61	157212	21.0272	ug/L	98
15) Tert-Butyl Alcohol	6.4314	59	64696	162.3841	ug/L	99
16) Dimethyl Sulfide	6.5865	62	102463	20.7307	ug/L	98
17) Iodomethane	6.8243	142	88521	18.1838	ug/L	100
18) Methyl acetate	6.8450	43	62615	20.3229	ug/L	99
19) Methylene Chloride	7.0828	84	85684	20.5652	ug/L	99
20) Carbon Disulfide	7.1242	76	250026	21.7726	ug/L	99
21) Acrylonitrile	7.2586	53	63669	40.4343	ug/L	93
22) Methyl Tert Butyl Ether	7.2896	73	243518	20.6117	ug/L	100
23) trans-1,2-Dichloroethene	7.5274	96	85524	21.1168	ug/L	99
24) n-Hexane	7.5894	57	125092	20.0529	ug/L	99
25) Diisopropyl ether	7.9307	45	1201067	78.8877	ug/L	100
26) Vinyl Acetate	8.0961	43	101860	19.9478	ug/L	99
27) 1,1-Dichloroethane	8.1167	63	183782	20.7953	ug/L	99
28) Ethyl-Tert-Butyl ether	8.4787	59	1222739	79.4563	ug/L	100
29) 2-Butanone	8.6544	43	39021	21.4468	ug/L	96
30) Propionitrile	8.7578	54	46276	87.0532	ug/L	98
31) 2,2-Dichloropropane	8.8612	77	127123	20.8037	ug/L	99
32) cis-1,2-Dichloroethene	8.9232	96	98859	21.5006	ug/L	99
33) Chloroform	9.1197	83	163362	20.3655	ug/L	99
34) 1-Bromopropane	9.2541	122	20388	20.4717	ug/L	92
35) Bromochloromethane	9.3472	130	57852	21.4584	ug/L	98
36) Tetrahydrofuran	9.3679	42	90012	76.3620	ug/L	99
38) 1,1,1-Trichloroethane	9.6263	97	150552	20.7280	ug/L	99
39) Cyclohexane	9.6573	56	174247	20.2632	ug/L	98
40) 1,1-Dichloropropene	9.8125	75	111283	20.3777	ug/L	99
41) Carbon Tetrachloride	9.9572	117	126215	20.4351	ug/L	99
42) Tert-Amyl-Methyl ether	9.9159	73	906856	79.0095	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29742.D 8260WT.M Wed Mar 06 14:03:37 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29742.D Vial: 7
Acq On : 5 Mar 2019 19:08 Operator: KFR
Sample : WG698387-07 STD 20ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:36 2019 Quant Results File: 8260WT.RES

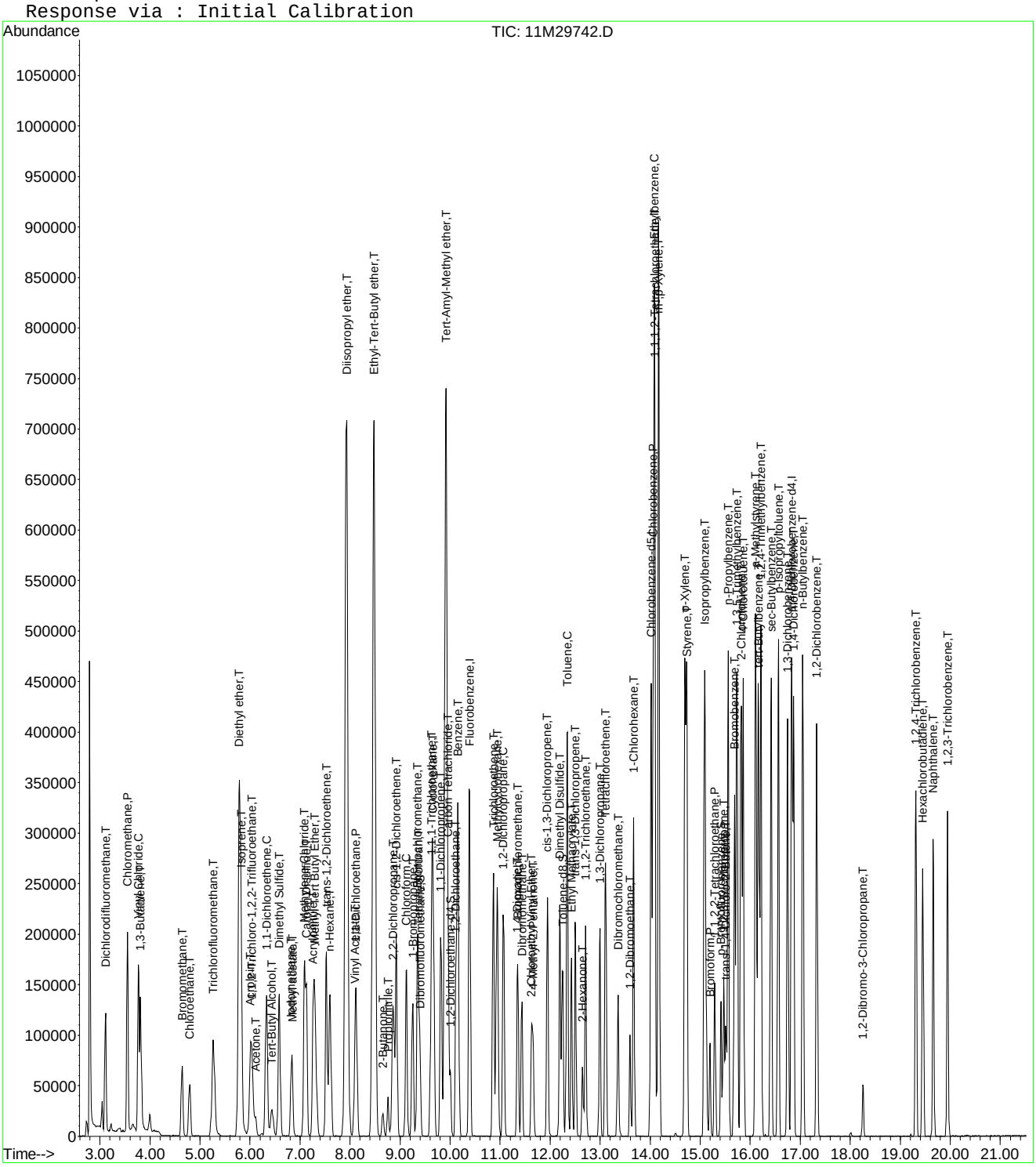
Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
44)	1,2-Dichloroethane	10.1123	62	145731	20.9027	ug/L	98
45)	Benzene	10.1537	78	339062	20.8887	ug/L	99
46)	Trichloroethene	10.8671	130	95118	20.6615	ug/L	98
47)	Methylcyclohexane	10.9395	83	133133	20.5282	ug/L	99
48)	1,2-Dichloropropane	11.0635	63	100929	20.9323	ug/L	99
49)	1,4-Dioxane	11.3427	88	5301	160.2274	ug/L	99
50)	Bromodichloromethane	11.3531	83	122680	21.5292	ug/L	100
51)	Dibromomethane	11.4358	93	57070	20.7207	ug/L	99
52)	2-Chloroethyl Vinyl Ether	11.6219	63	44520	19.0800	ug/L	100
53)	4-Methyl-2-Pentanone	11.6529	58	34506	20.7572	ug/L	98
54)	cis-1,3-Dichloropropene	11.9424	75	136570	21.2655	ug/L	99
55)	Dimethyl Disulfide	12.1906	79	76353	19.2103	ug/L	96
58)	Toluene	12.3456	91	373915	21.4641	ug/L	97
59)	Ethyl Methacrylate	12.4284	69	106101	21.5636	ug/L	97
60)	trans-1,3-Dichloropropene	12.5007	75	119252	20.9079	ug/L	100
61)	1,1,2-Trichloroethane	12.7075	97	76173	20.5399	ug/L	98
62)	2-Hexanone	12.6455	43	59069	21.4290	ug/L	99
63)	1,3-Dichloropropane	12.9970	76	126137	21.0809	ug/L	98
64)	Tetrachloroethene	13.1108	164	75608	20.4616	ug/L	99
65)	Dibromochloromethane	13.3589	129	85987	20.3681	ug/L	98
66)	1,2-Dibromoethane	13.5967	107	73437	20.6619	ug/L	99
67)	1-Chlorohexane	13.6691	91	118090	20.5326	ug/L	97
68)	Chlorobenzene	14.0620	112	249566	20.5772	ug/L	99
69)	1,1,1,2-Tetrachloroethane	14.0930	131	93650	18.5949	ug/L	98
70)	Ethylbenzene	14.0827	106	126947	20.5753	ug/L	92
71)	m-,p-Xylene	14.1654	106	311240	41.7848	ug/L	91
72)	o-Xylene	14.6927	106	152623	21.1181	ug/L	96
73)	Styrene	14.7341	104	257910	21.5748	ug/L	99
74)	Bromoform	15.1994	173	52978	17.8837	ug/L	98
75)	Isopropylbenzene	15.0856	105	394369	21.7978	ug/L	98
77)	1,1,2,2-Tetrachloroethane	15.2924	83	84470	21.8543	ug/L	100
79)	1,2,3-Trichloropropane	15.4682	110	27663	21.4346	ug/L	94
80)	trans-1,4-Dichloro-2-Buten	15.5096	53	33901	20.8338	ug/L	98
81)	n-Propylbenzene	15.5612	91	486553	22.2681	ug/L	98
82)	Bromobenzene	15.6853	156	108647	20.3609	ug/L	99
83)	1,3,5-Trimethylbenzene	15.7370	105	333787	21.5189	ug/L	99
84)	2-Chlorotoluene	15.8198	91	325566	20.9398	ug/L	99
85)	4-Chlorotoluene	15.8611	91	267721	20.9509	ug/L	98
86)	a-Methylstyrene	16.1092	118	193534	21.9120	ug/L	98
87)	tert-Butylbenzene	16.1713	134	77137	20.1906	ug/L	98
88)	1,2,4-Trimethylbenzene	16.2127	105	347387	21.6993	ug/L	97
89)	sec-Butylbenzene	16.4194	105	424363	22.0367	ug/L	98
90)	p-Isopropyltoluene	16.5642	119	368039	21.9793	ug/L	98
91)	1,3-Dichlorobenzene	16.7503	146	203238	20.6466	ug/L	99
92)	1,4-Dichlorobenzene	16.8640	146	204384	20.7923	ug/L	100
93)	n-Butylbenzene	17.0501	91	329180	21.8134	ug/L	99
94)	1,2-Dichlorobenzene	17.3293	146	196258	20.8028	ug/L	99
95)	1,2-Dibromo-3-Chloropropan	18.2495	75	15193	19.0275	ug/L	95
96)	1,2,4-Trichlorobenzene	19.3145	180	124786	20.4470	ug/L	100
97)	Hexachlorobutadiene	19.4489	225	63234	20.5573	ug/L	99
98)	Naphthalene	19.6557	128	275722	21.0986	ug/L	99
99)	1,2,3-Trichlorobenzene	19.9452	180	114903	20.0397	ug/L	99

(#) = qualifier out of range (m) = manual integration
11M29742.D 8260WT.M Wed Mar 06 14:03:37 2019 Page 2

Data File : C:\MSDCHEM\1\DATA\030519\11M29742.D Vial: 7
Acq On : 5 Mar 2019 19:08 Operator: KFR
Sample : WG698387-07 STD 20ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29743.D Vial: 8
Acq On : 5 Mar 2019 19:38 Operator: KFR
Sample : WG698387-08 STD 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:37 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3915	96	395124	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0207	117	299517	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	148978	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3989	111	119072	26.1063	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 104.4252%			
43) 1,2-Dichloroethane-d4	10.0089	65	142217	25.9876	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 103.9504%			
57) Toluene-d8	12.2526	98	388036	26.0325	ug/L	0.0000
Spiked Amount 25.0000	Range 88 - 110		Recovery = 104.1300%			
78) p-Bromofluorobenzene	15.4165	95	154561	27.1107	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 108.4428%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1227	85	319634	54.7593	ug/L	100
3) Chloromethane	3.5570	50	536525	47.8568	ug/L	100
4) Vinyl Chloride	3.7741	62	429474	51.3158	ug/L	100
5) 1,3-Butadiene	3.8155	54	159508	54.6222	ug/L	100
6) Bromomethane	4.6426	94	146832	45.7924	ug/L	100
7) Chloroethane	4.7977	64	168484	52.0735	ug/L	100
8) Trichlorofluoromethane	5.2734	101	416066	52.5342	ug/L	100
9) Diethyl ether	5.7904	59	378702	91.4602	ug/L	100
10) Isoprene	5.8214	67	323736	51.8974	ug/L	100
11) Acrolein	6.0178	56	35356	49.1712	ug/L	100
12) 1,1,2-Trichloro-1,2,2-Trif	6.0385	101	207472	53.4028	ug/L	100
13) Acetone	6.1212	43	73792	51.0832	ug/L	100
14) 1,1-Dichloroethene	6.3280	61	397617	52.5861	ug/L	100
15) Tert-Butyl Alcohol	6.4417	59	80396	199.5315	ug/L	100
16) Dimethyl Sulfide	6.5865	62	259928	52.0010	ug/L	100
17) Iodomethane	6.8346	142	264453	50.7961	ug/L	100
18) Methyl acetate	6.8450	43	161156	51.7207	ug/L	100
19) Methylene Chloride	7.0931	84	216377	51.3517	ug/L	100
20) Carbon Disulfide	7.1345	76	627208	54.0068	ug/L	100
21) Acrylonitrile	7.2689	53	86947	54.5993	ug/L	100
22) Methyl Tert Butyl Ether	7.2999	73	619562	51.8536	ug/L	100
23) trans-1,2-Dichloroethene	7.5274	96	220129	53.7438	ug/L	100
24) n-Hexane	7.5998	57	326174	51.7020	ug/L	100
25) Diisopropyl ether	7.9306	45	1437902	93.3861	ug/L	100
26) Vinyl Acetate	8.0961	43	275033	49.9454	ug/L	100
27) 1,1-Dichloroethane	8.1271	63	465254	52.0552	ug/L	100
28) Ethyl-Tert-Butyl ether	8.4786	59	1483214	95.3037	ug/L	100
29) 2-Butanone	8.6544	43	96483	52.4356	ug/L	100
30) Propionitrile	8.7578	54	58685	109.1609	ug/L	100
31) 2,2-Dichloropropane	8.8612	77	325588	52.6862	ug/L	100
32) cis-1,2-Dichloroethene	8.9336	96	249007	53.5497	ug/L	100
33) Chloroform	9.1300	83	411337	50.7052	ug/L	100
34) 1-Bromopropane	9.2541	122	51248	50.8823	ug/L	100
35) Bromochloromethane	9.3472	130	149707	54.9074	ug/L	100
36) Tetrahydrofuran	9.3678	42	115030	96.4937	ug/L	100
38) 1,1,1-Trichloroethane	9.6263	97	393600	53.5842	ug/L	100
39) Cyclohexane	9.6573	56	454208	52.2286	ug/L	100
40) 1,1-Dichloropropene	9.8125	75	292591	52.9783	ug/L	100
41) Carbon Tetrachloride	9.9572	117	347273	55.5964	ug/L	100
42) Tert-Amyl-Methyl ether	9.9158	73	1118994	96.4006	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29743.D 8260WT.M Wed Mar 06 14:03:38 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29743.D Vial: 8
Acq On : 5 Mar 2019 19:38 Operator: KFR
Sample : WG698387-08 STD 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:37 2019 Quant Results File: 8260WT.RES

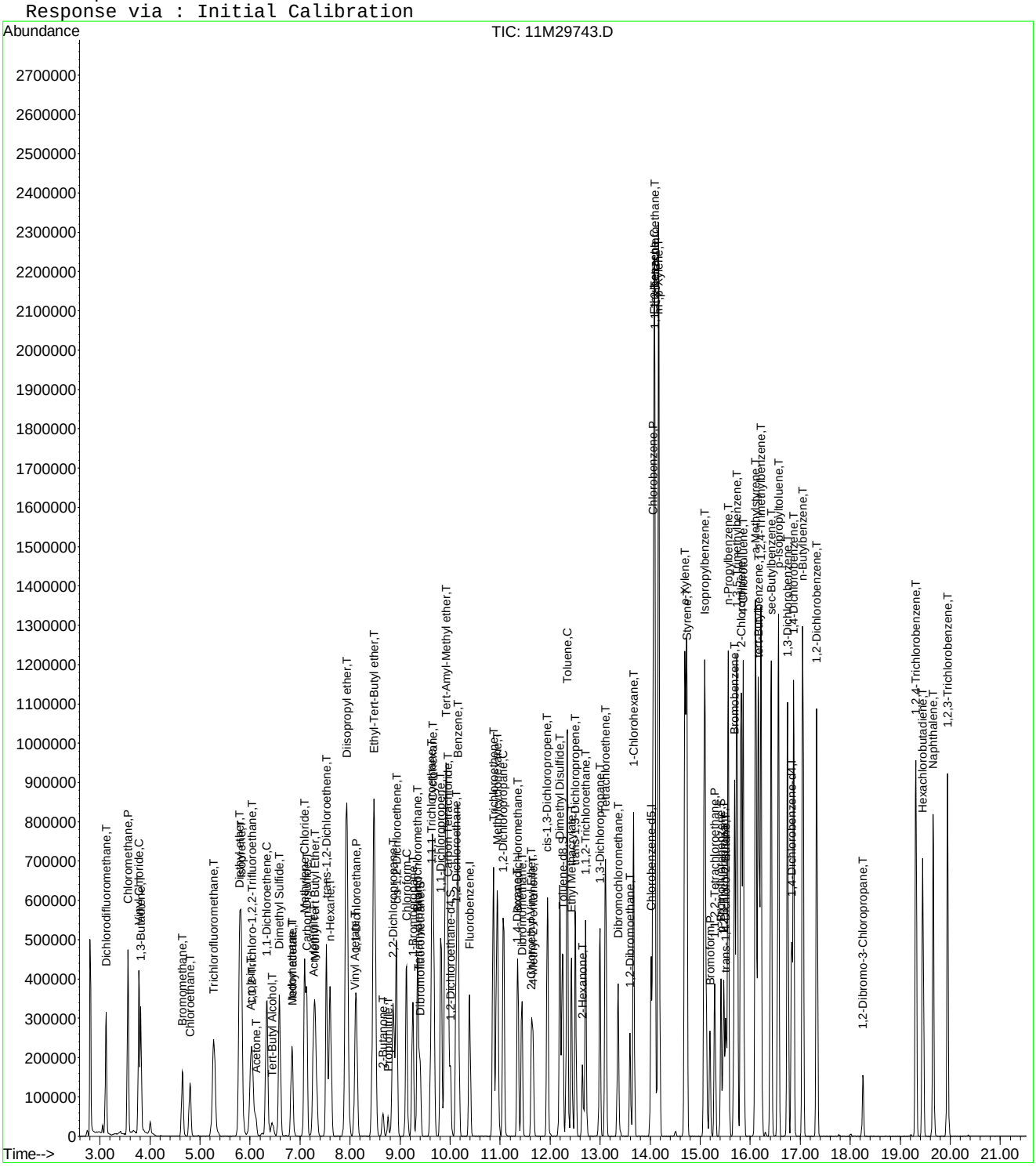
Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
44)	1,2-Dichloroethane	10.1226	62	372401	52.8169	ug/L	100
45)	Benzene	10.1537	78	859665	52.3689	ug/L	100
46)	Trichloroethene	10.8671	130	246923	53.0361	ug/L	100
47)	Methylcyclohexane	10.9395	83	342261	52.1834	ug/L	100
48)	1,2-Dichloropropane	11.0635	63	253911	52.0708	ug/L	100
49)	1,4-Dioxane	11.3427	88	6871	205.3573	ug/L	100
50)	Bromodichloromethane	11.3530	83	322541	55.9694	ug/L	100
51)	Dibromomethane	11.4358	93	148264	53.2284	ug/L	100
52)	2-Chloroethyl Vinyl Ether	11.6219	63	121055	51.2999	ug/L	100
53)	4-Methyl-2-Pentanone	11.6529	58	87502	52.0479	ug/L	100
54)	cis-1,3-Dichloropropene	11.9424	75	356078	54.8246	ug/L	100
55)	Dimethyl Disulfide	12.1906	79	211371	48.4027	ug/L	100
58)	Toluene	12.3456	91	942130	53.0989	ug/L	100
59)	Ethyl Methacrylate	12.4284	69	273140	54.5033	ug/L	100
60)	trans-1,3-Dichloropropene	12.5007	75	321046	55.2645	ug/L	100
61)	1,1,2-Trichloroethane	12.7075	97	194552	51.5072	ug/L	100
62)	2-Hexanone	12.6455	43	151006	53.7863	ug/L	100
63)	1,3-Dichloropropane	12.9970	76	319726	52.4637	ug/L	100
64)	Tetrachloroethene	13.1108	164	196155	52.1203	ug/L	100
65)	Dibromochloromethane	13.3589	129	236412	54.9823	ug/L	100
66)	1,2-Dibromoethane	13.5967	107	193590	53.4779	ug/L	100
67)	1-Chlorohexane	13.6691	91	311199	53.1257	ug/L	100
68)	Chlorobenzene	14.0620	112	654155	52.9562	ug/L	100
69)	1,1,1,2-Tetrachloroethane	14.0930	131	262859	50.0692	ug/L	100
70)	Ethylbenzene	14.0827	106	345055	54.9095	ug/L	100
71)	m-,p-Xylene	14.1654	106	820245	108.1189	ug/L	100
72)	o-Xylene	14.6927	106	402899	54.7353	ug/L	100
73)	Styrene	14.7341	104	685057	56.2652	ug/L	100
74)	Bromoform	15.1994	173	156045	50.3375	ug/L	100
75)	Isopropylbenzene	15.0856	105	1015763	55.1237	ug/L	100
77)	1,1,2,2-Tetrachloroethane	15.2924	83	225117	57.9246	ug/L	100
79)	1,2,3-Trichloropropane	15.4682	110	71864	55.3794	ug/L	100
80)	trans-1,4-Dichloro-2-Buten	15.5096	53	91132	55.6989	ug/L	100
81)	n-Propylbenzene	15.5612	91	1229035	55.9420	ug/L	100
82)	Bromobenzene	15.6853	156	293574	54.7163	ug/L	100
83)	1,3,5-Trimethylbenzene	15.7370	105	875594	56.1401	ug/L	100
84)	2-Chlorotoluene	15.8197	91	849903	54.3656	ug/L	100
85)	4-Chlorotoluene	15.8611	91	707826	55.0893	ug/L	100
86)	a-Methylstyrene	16.1092	118	496169	55.8694	ug/L	100
87)	tert-Butylbenzene	16.1713	134	202064	52.6013	ug/L	100
88)	1,2,4-Trimethylbenzene	16.2126	105	901561	56.0078	ug/L	100
89)	sec-Butylbenzene	16.4194	105	1092033	56.3983	ug/L	100
90)	p-Isopropyltoluene	16.5642	119	957350	56.8606	ug/L	100
91)	1,3-Dichlorobenzene	16.7503	146	546574	55.2220	ug/L	100
92)	1,4-Dichlorobenzene	16.8640	146	549748	55.6213	ug/L	100
93)	n-Butylbenzene	17.0501	91	884045	58.2620	ug/L	100
94)	1,2-Dichlorobenzene	17.3293	146	527196	55.5760	ug/L	100
95)	1,2-Dibromo-3-Chloropropan	18.2495	75	44949	55.9860	ug/L	100
96)	1,2,4-Trichlorobenzene	19.3145	180	343464	55.9713	ug/L	100
97)	Hexachlorobutadiene	19.4489	225	169902	54.9333	ug/L	100
98)	Naphthalene	19.6557	128	759495	57.7999	ug/L	100
99)	1,2,3-Trichlorobenzene	19.9452	180	324460	56.2784	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29743.D 8260WT.M Wed Mar 06 14:03:40 2019 Page 2

Data File : C:\MSDCHEM\1\DATA\030519\11M29743.D Vial: 8
Acq On : 5 Mar 2019 19:38 Operator: KFR
Sample : WG698387-08 STD 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29744.D Vial: 9
Acq On : 5 Mar 2019 20:08 Operator: KFR
Sample : WG698387-09 STD 100ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:41 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3914	96	415385	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0206	117	311453	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	157604	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3988	111	247388	51.5937	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 206.3748%#			
43) 1,2-Dichloroethane-d4	10.0089	65	291480	50.6647	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 202.6588%#			
57) Toluene-d8	12.2422	98	789829	50.9572	ug/L	-0.0104
Spiked Amount 25.0000	Range 88 - 110		Recovery = 203.8288%#			
78) p-Bromofluorobenzene	15.4165	95	304258	50.4473	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 201.7892%#			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1124	85	632796	103.1219	ug/L	100
3) Chloromethane	3.5570	50	1030983	87.4757	ug/L	97
4) Vinyl Chloride	3.7741	62	814275	92.5481	ug/L	99
5) 1,3-Butadiene	3.8051	54	301777	102.9245	ug/L	98
6) Bromomethane	4.6426	94	314715	93.3626	ug/L	99
7) Chloroethane	4.7977	64	343303	100.9294	ug/L	100
8) Trichlorofluoromethane	5.2630	101	851180	102.2313	ug/L	100
9) Diethyl ether	5.7800	59	893245	205.2050	ug/L	99
10) Isoprene	5.8213	67	691488	105.4440	ug/L	99
11) Acrolein	6.0178	56	77209	102.1405	ug/L	99
12) 1,1,2-Trichloro-1,2,2-Trif	6.0281	101	421860	103.2893	ug/L	99
13) Acetone	6.1108	43	141631	93.2631	ug/L	99
14) 1,1-Dichloroethene	6.3280	61	821836	103.3889	ug/L	99
15) Tert-Butyl Alcohol	6.4417	59	176386	416.4125	ug/L	100
16) Dimethyl Sulfide	6.5865	62	541839	103.1125	ug/L	100
17) Iodomethane	6.8243	142	539332	97.1378	ug/L	100
18) Methyl acetate	6.8449	43	337408	103.0045	ug/L	99
19) Methylene Chloride	7.0828	84	452640	102.1832	ug/L	96
20) Carbon Disulfide	7.1241	76	1289051	105.5820	ug/L	100
21) Acrylonitrile	7.2689	53	182195	108.8308	ug/L	97
22) Methyl Tert Butyl Ether	7.2896	73	1272204	101.2824	ug/L	100
23) trans-1,2-Dichloroethene	7.5274	96	459624	106.7422	ug/L	100
24) n-Hexane	7.5997	57	687134	103.6054	ug/L	100
25) Diisopropyl ether	7.9306	45	3237070	199.9805	ug/L	96
26) Vinyl Acetate	8.0960	43	563662	95.4835	ug/L	99
27) 1,1-Dichloroethane	8.1167	63	968353	103.0600	ug/L	99
28) Ethyl-Tert-Butyl ether	8.4786	59	3270320	199.8843	ug/L	95
29) 2-Butanone	8.6544	43	194976	100.7950	ug/L	99
30) Propionitrile	8.7578	54	117851	208.5238	ug/L	97
31) 2,2-Dichloropropane	8.8612	77	694068	106.8349	ug/L	99
32) cis-1,2-Dichloroethene	8.9232	96	524813	107.3575	ug/L	98
33) Chloroform	9.1197	83	855826	100.3513	ug/L	100
34) 1-Bromopropane	9.2541	122	106621	100.6966	ug/L	98
35) Bromochloromethane	9.3471	130	308016	107.4596	ug/L	99
36) Tetrahydrofuran	9.3678	42	243433	194.2451	ug/L	99
38) 1,1,1-Trichloroethane	9.6263	97	845315	109.4669	ug/L	99
39) Cyclohexane	9.6573	56	950015	103.9122	ug/L	99
40) 1,1-Dichloropropene	9.8124	75	614532	105.8434	ug/L	100
41) Carbon Tetrachloride	9.9572	117	765034	116.5036	ug/L	100
42) Tert-Amyl-Methyl ether	9.9158	73	2495067	204.4640	ug/L	98

(#) = qualifier out of range (m) = manual integration
11M29744.D 8260WT.M Wed Mar 06 14:03:42 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29744.D Vial: 9
Acq On : 5 Mar 2019 20:08 Operator: KFR
Sample : WG698387-09 STD 100ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:41 2019 Quant Results File: 8260WT.RES

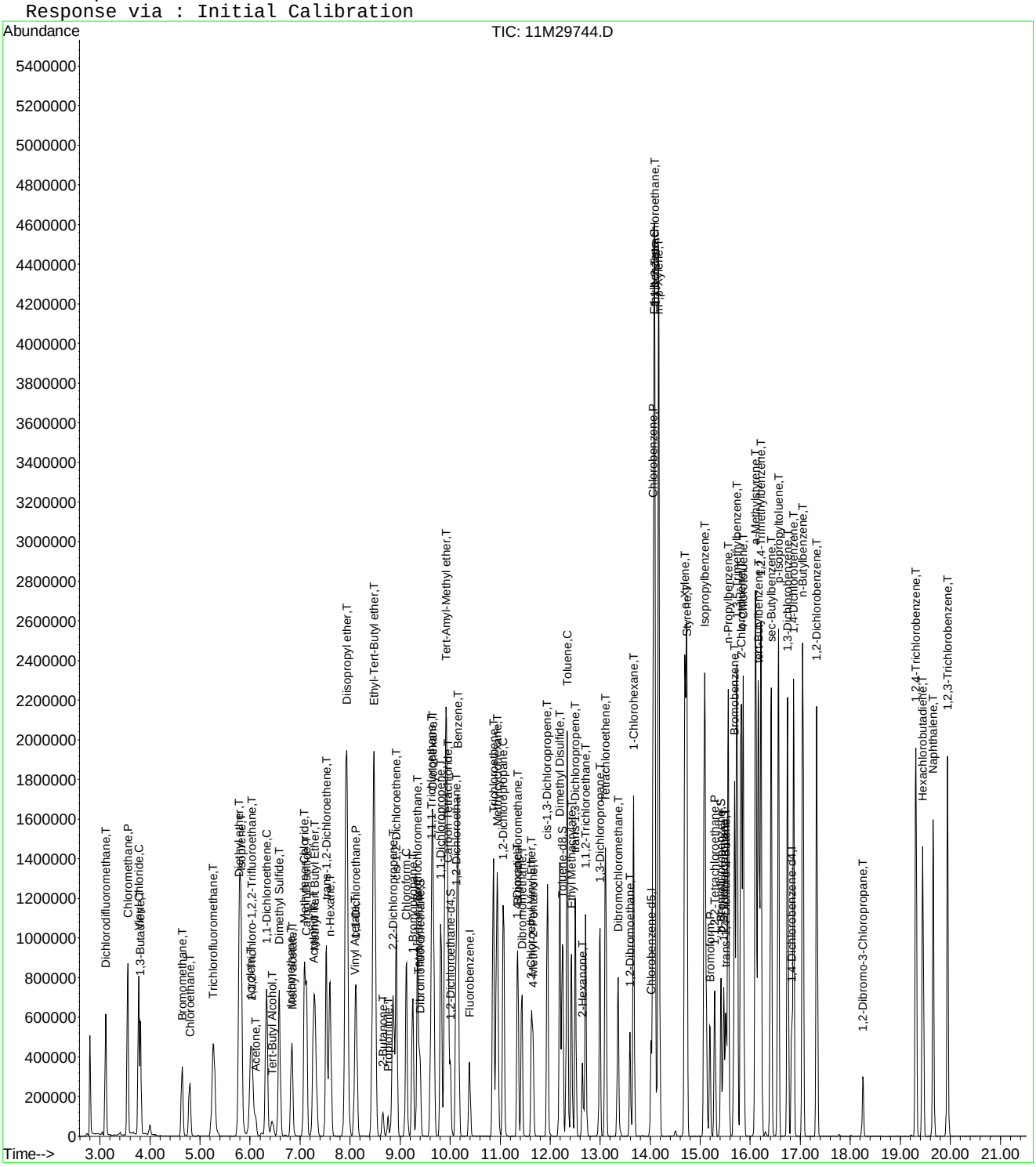
Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
44)	1,2-Dichloroethane	10.1226	62	766097	103.3544	ug/L	99
45)	Benzene	10.1536	78	1727579	100.1070	ug/L	98
46)	Trichloroethene	10.8671	130	521978	106.6462	ug/L	99
47)	Methylcyclohexane	10.9394	83	723217	104.8882	ug/L	99
48)	1,2-Dichloropropane	11.0635	63	534603	104.2861	ug/L	100
49)	1,4-Dioxane	11.3427	88	14544	413.4821	ug/L	92
50)	Bromodichloromethane	11.3530	83	675450	111.4914	ug/L	99
51)	Dibromomethane	11.4357	93	305931	104.4754	ug/L	99
52)	2-Chloroethyl Vinyl Ether	11.6218	63	256622	103.4451	ug/L	99
53)	4-Methyl-2-Pentanone	11.6529	58	173401	98.1114	ug/L	98
54)	cis-1,3-Dichloropropene	11.9424	75	744841	109.0880	ug/L	99
55)	Dimethyl Disulfide	12.1905	79	465102	98.6792	ug/L	96
58)	Toluene	12.3456	91	1836635	99.5467	ug/L	96
59)	Ethyl Methacrylate	12.4283	69	561442	107.7387	ug/L	100
60)	trans-1,3-Dichloropropene	12.5007	75	669902	110.8968	ug/L	100
61)	1,1,2-Trichloroethane	12.7075	97	391481	99.6716	ug/L	99
62)	2-Hexanone	12.6455	43	296376	101.5195	ug/L	99
63)	1,3-Dichloropropane	12.9970	76	645987	101.9374	ug/L	100
64)	Tetrachloroethene	13.1107	164	408078	104.2748	ug/L	99
65)	Dibromochloromethane	13.3589	129	489986	109.5887	ug/L	100
66)	1,2-Dibromoethane	13.5967	107	391461	103.9941	ug/L	100
67)	1-Chlorohexane	13.6691	91	645592	105.9872	ug/L	100
68)	Chlorobenzene	14.0620	112	1326225	103.2482	ug/L	97
69)	1,1,1,2-Tetrachloroethane	14.0930	131	572327	104.1068	ug/L	100
70)	Ethylbenzene	14.0826	106	737666	112.8879	ug/L	82
71)	m-,p-Xylene	14.1654	106	1624155	205.8801	ug/L	80
72)	o-Xylene	14.6927	106	821160	107.2822	ug/L	91
73)	Styrene	14.7341	104	1354826	107.0102	ug/L	97
74)	Bromoform	15.1993	173	320623	98.7515	ug/L	99
75)	Isopropylbenzene	15.0856	105	1885676	98.4106	ug/L	96
77)	1,1,2,2-Tetrachloroethane	15.2924	83	420749	102.3370	ug/L	100
79)	1,2,3-Trichloropropane	15.4682	110	139039	101.2812	ug/L	75
80)	trans-1,4-Dichloro-2-Buten	15.5095	53	186906	107.9826	ug/L	93
81)	n-Propylbenzene	15.5612	91	2168390	93.2966	ug/L	94
82)	Bromobenzene	15.6853	156	583544	102.8081	ug/L	99
83)	1,3,5-Trimethylbenzene	15.7370	105	1636117	99.1607	ug/L	96
84)	2-Chlorotoluene	15.8197	91	1595448	96.4699	ug/L	97
85)	4-Chlorotoluene	15.8611	91	1310872	96.4398	ug/L	96
86)	a-Methylstyrene	16.1092	118	1012308	107.7487	ug/L	100
87)	tert-Butylbenzene	16.1713	134	408998	100.6430	ug/L	93
88)	1,2,4-Trimethylbenzene	16.2126	105	1669192	98.0200	ug/L	94
89)	sec-Butylbenzene	16.4194	105	1973074	96.3226	ug/L	95
90)	p-Isopropyltoluene	16.5642	119	1752347	98.3820	ug/L	94
91)	1,3-Dichlorobenzene	16.7503	146	1063781	101.5945	ug/L	98
92)	1,4-Dichlorobenzene	16.8640	146	1063224	101.6850	ug/L	98
93)	n-Butylbenzene	17.0501	91	1641647	102.2695	ug/L	96
94)	1,2-Dichlorobenzene	17.3293	146	1013857	101.0291	ug/L	98
95)	1,2-Dibromo-3-Chloropropan	18.2495	75	87196	102.6623	ug/L	98
96)	1,2,4-Trichlorobenzene	19.3145	180	701877	108.1184	ug/L	98
97)	Hexachlorobutadiene	19.4489	225	349257	106.7424	ug/L	100
98)	Naphthalene	19.6557	128	1438608	103.4903	ug/L	98
99)	1,2,3-Trichlorobenzene	19.9452	180	665078	109.0455	ug/L	98

(#) = qualifier out of range (m) = manual integration
11M29744.D 8260WT.M Wed Mar 06 14:03:42 2019 Page 2

Data File : C:\MSDCHEM\1\DATA\030519\11M29744.D Vial: 9
Acq On : 5 Mar 2019 20:08 Operator: KFR
Sample : WG698387-09 STD 100ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29745.D Vial: 10
Acq On : 5 Mar 2019 20:37 Operator: KFR
Sample : WG698387-10 STD 200ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:42 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3913	96	428361	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0205	117	327954	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8329	152	168167	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3987	111	490236	99.1434	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 396.5736%#			
43) 1,2-Dichloroethane-d4	10.0087	65	573937	96.7391	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 386.9564%#			
57) Toluene-d8	12.2421	98	1542774	94.5267	ug/L	-0.0105
Spiked Amount 25.0000	Range 88 - 110		Recovery = 378.1068%#			
78) p-Bromofluorobenzene	15.4164	95	618324	96.0812	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 384.3248%#			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1019	85	1270961	200.8447	ug/L	99
3) Chloromethane	3.5465	50	1885900	155.1656	ug/L	90
4) Vinyl Chloride	3.7637	62	1472282	162.2664	ug/L	95
5) 1,3-Butadiene	3.8050	54	596563	202.6036	ug/L	98
6) Bromomethane	4.6322	94	692246	199.1392	ug/L	99
7) Chloroethane	4.7873	64	726036	206.9852	ug/L	99
8) Trichlorofluoromethane	5.2629	101	1743409	203.0499	ug/L	98
10) Isoprene	5.8109	67	1413331	208.9882	ug/L	100
11) Acrolein	6.0177	56	485	0.6222	ug/L	85
12) 1,1,2-Trichloro-1,2,2-Trif	6.0280	101	889556	211.2035	ug/L	99
13) Acetone	6.1107	43	303071	193.5249	ug/L	99
14) 1,1-Dichloroethene	6.3279	61	1661278	202.6618	ug/L	97
16) Dimethyl Sulfide	6.5864	62	1131090	208.7272	ug/L	99
17) Iodomethane	6.8242	142	1178735	204.1959	ug/L	99
18) Methyl acetate	6.8449	43	715518	211.8177	ug/L	98
19) Methylene Chloride	7.0827	84	948379	207.6105	ug/L	93
20) Carbon Disulfide	7.1240	76	2465515	195.8251	ug/L	96
21) Acrylonitrile	7.2895	53	33298	19.2874	ug/L #	34
22) Methyl Tert Butyl Ether	7.2895	73	2546443	196.5857	ug/L	97
23) trans-1,2-Dichloroethene	7.5169	96	969505	218.3356	ug/L	95
24) n-Hexane	7.5893	57	1438700	210.3545	ug/L	99
26) Vinyl Acetate	8.0959	43	1350499	219.2172	ug/L	99
27) 1,1-Dichloroethane	8.1166	63	1931262	199.3144	ug/L	96
29) 2-Butanone	8.6543	43	399832	200.4363	ug/L	99
31) 2,2-Dichloropropane	8.8611	77	1412579	210.8457	ug/L	98
32) cis-1,2-Dichloroethene	8.9231	96	1084862	215.2005	ug/L	95
33) Chloroform	9.1196	83	1707865	194.1923	ug/L	98
34) 1-Bromopropane	9.2540	122	225233	206.2743	ug/L	98
35) Bromochloromethane	9.3470	130	655255	221.6782	ug/L	96
36) Tetrahydrofuran	9.3677	42	1370	1.0601	ug/L #	37
38) 1,1,1-Trichloroethane	9.6262	97	1747688	219.4668	ug/L	100
39) Cyclohexane	9.6572	56	1958321	207.7117	ug/L	97
40) 1,1-Dichloropropene	9.8123	75	1256934	209.9291	ug/L	97
41) Carbon Tetrachloride	9.9571	117	1537293	227.0158	ug/L	99
44) 1,2-Dichloroethane	10.1225	62	1526389	199.6876	ug/L	96
45) Benzene	10.1535	78	3080240	173.0820	ug/L	89
46) Trichloroethene	10.8669	130	1066911	211.3791	ug/L	99
47) Methylcyclohexane	10.9393	83	1499216	210.8449	ug/L	99
48) 1,2-Dichloropropane	11.0634	63	1110542	210.0733	ug/L	100
49) 1,4-Dioxane	11.3529	88	1143	31.5108	ug/L #	11

(#) = qualifier out of range (m) = manual integration
11M29745.D 8260WT.M Wed Mar 06 14:03:43 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29745.D Vial: 10
Acq On : 5 Mar 2019 20:37 Operator: KFR
Sample : WG698387-10 STD 200ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:42 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

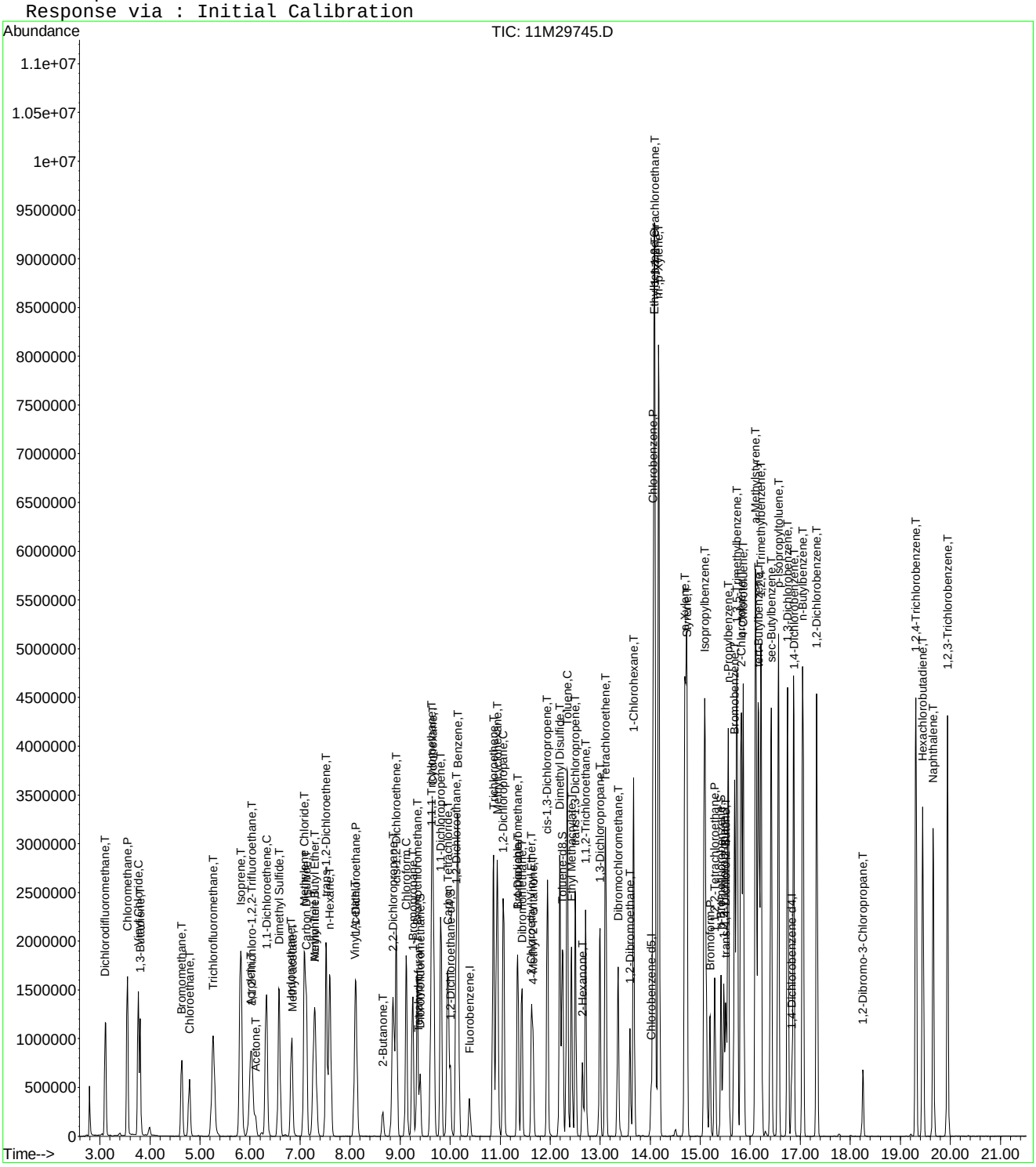
	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
50)	Bromodichloromethane	11.3529	83	1384146	221.5497	ug/L		98
51)	Dibromomethane	11.4356	93	641505	212.4376	ug/L		98
52)	2-Chloroethyl Vinyl Ether	11.6217	63	559641	218.7593	ug/L		99
53)	4-Methyl-2-Pentanone	11.6527	58	363640	199.5172	ug/L		99
54)	cis-1,3-Dichloropropene	11.9423	75	1507465	214.0925	ug/L		96
55)	Dimethyl Disulfide	12.1904	79	1001200	203.3688	ug/L		90
58)	Toluene	12.3455	91	3075154	158.2889	ug/L		84
59)	Ethyl Methacrylate	12.4282	69	1165365	212.3774	ug/L		99
60)	trans-1,3-Dichloropropene	12.5006	75	1369222	215.2590	ug/L		97
61)	1,1,2-Trichloroethane	12.7074	97	820697	198.4373	ug/L		99
62)	2-Hexanone	12.6454	43	621972	202.3284	ug/L		100
63)	1,3-Dichloropropane	12.9969	76	1304284	195.4617	ug/L		99
64)	Tetrachloroethene	13.1106	164	883638	214.4323	ug/L		99
65)	Dibromochloromethane	13.3588	129	1042382	221.4055	ug/L		99
66)	1,2-Dibromoethane	13.5966	107	818783	206.5706	ug/L		99
67)	1-Chlorohexane	13.6690	91	1364610	212.7569	ug/L		99
68)	Chlorobenzene	14.0619	112	2493144	184.3284	ug/L		86
69)	1,1,1,2-Tetrachloroethane	14.0929	131	1269144	218.5028	ug/L		99
70)	Ethylbenzene	14.0825	106	1593549	231.5969	ug/L		48
71)	m-,p-Xylene	14.1653	106	2860586	344.3669	ug/L		61
72)	o-Xylene	14.6926	106	1700846	211.0302	ug/L		71
73)	Styrene	14.7340	104	2503558	187.7929	ug/L		86
74)	Bromoform	15.1992	173	699412	203.7971	ug/L		98
75)	Isopropylbenzene	15.0855	105	3148871	156.0664	ug/L		79
77)	1,1,2,2-Tetrachloroethane	15.2923	83	913096	208.1385	ug/L		99
79)	1,2,3-Trichloropropane	15.4681	110	292113	199.4203	ug/L		76
80)	trans-1,4-Dichloro-2-Buten	15.5094	53	412571	223.3859	ug/L		89
81)	n-Propylbenzene	15.5611	91	3413475	137.6422	ug/L	#	75
82)	Bromobenzene	15.6852	156	1220551	201.5284	ug/L		70
83)	1,3,5-Trimethylbenzene	15.7369	105	2828431	160.6562	ug/L		81
84)	2-Chlorotoluene	15.8196	91	2758682	156.3283	ug/L		83
85)	4-Chlorotoluene	15.8610	91	2248327	155.0179	ug/L		78
86)	a-Methylstyrene	16.1091	118	1990995	198.6077	ug/L		92
87)	tert-Butylbenzene	16.1712	134	903332	208.3225	ug/L		73
88)	1,2,4-Trimethylbenzene	16.2125	105	2863604	157.5970	ug/L		76
89)	sec-Butylbenzene	16.4193	105	3264819	149.3724	ug/L	#	78
90)	p-Isopropyltoluene	16.5641	119	2989514	157.2977	ug/L	#	77
91)	1,3-Dichlorobenzene	16.7502	146	2068616	185.1503	ug/L		90
92)	1,4-Dichlorobenzene	16.8742	146	2057069	184.3773	ug/L		89
93)	n-Butylbenzene	17.0500	91	2833678	165.4410	ug/L	#	82
94)	1,2-Dichlorobenzene	17.3292	146	1997899	186.5820	ug/L		90
95)	1,2-Dibromo-3-Chloropropan	18.2494	75	196511	216.8342	ug/L		99
96)	1,2,4-Trichlorobenzene	19.3144	180	1528702	220.6928	ug/L		93
97)	Hexachlorobutadiene	19.4488	225	808980	231.7160	ug/L		99
98)	Naphthalene	19.6556	128	2578020	173.8080	ug/L	#	89
99)	1,2,3-Trichlorobenzene	19.9451	180	1450350	222.8612	ug/L		94

(#) = qualifier out of range (m) = manual integration
11M29745.D 8260WT.M Wed Mar 06 14:03:43 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29745.D Vial: 10
Acq On : 5 Mar 2019 20:37 Operator: KFR
Sample : WG698387-10 STD 200ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\030519\11M29746.D Vial: 11
Acq On : 5 Mar 2019 21:06 Operator: KFR
Sample : WG698387-11 STD 300ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:44 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3813	96	427056	25.0000	ug/L	-0.0102
56) Chlorobenzene-d5	14.0208	117	316685	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8332	152	153710	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	0.0000	111	0	0.0000	ug/L	
Spiked Amount 25.0000	Range 86 - 118		Recovery =	0.0000%#		
43) 1,2-Dichloroethane-d4	9.9987	65	490	0.0828	ug/L	-0.0102
Spiked Amount 25.0000	Range 80 - 120		Recovery =	0.3312%#		
57) Toluene-d8	12.1907	98	8364	0.5307	ug/L	-0.0619
Spiked Amount 25.0000	Range 88 - 110		Recovery =	2.1228%#		
78) p-Bromofluorobenzene	15.4166	95	2545	0.4327	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery =	1.7308%#		
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1125	85	5406	0.8569	ug/L	96
3) Chloromethane	3.5468	50	58494	4.8274	ug/L	98
4) Vinyl Chloride	3.7639	62	2436	0.2693	ug/L #	16
5) 1,3-Butadiene	3.8053	54	834854	286.7325	ug/L	98
6) Bromomethane	4.6325	94	106548	30.7445	ug/L	100
8) Trichlorofluoromethane	5.2632	101	2791	0.3261	ug/L	85
9) Diethyl ether	5.7801	59	1428327	319.1619	ug/L	98
10) Isoprene	5.8112	67	2166154	321.2864	ug/L	99
11) Acrolein	6.0076	56	121549	156.4038	ug/L	95
12) 1,1,2-Trichloro-1,2,2-Trif	6.0490	101	1522	0.3625	ug/L	77
13) Acetone	6.1110	43	422798	270.8011	ug/L	98
14) 1,1-Dichloroethene	6.3178	61	1985	0.2429	ug/L #	27
15) Tert-Butyl Alcohol	6.4419	59	292797	672.3451	ug/L	99
16) Dimethyl Sulfide	6.5763	62	1679640	310.9018	ug/L	99
17) Iodomethane	6.8244	142	1404276	243.7192	ug/L	99
18) Methyl acetate	6.8451	43	1092692	324.4626	ug/L	98
19) Methylene Chloride	7.0829	84	1415	0.3107	ug/L	92
20) Carbon Disulfide	7.1243	76	3236660	257.8593	ug/L	91
21) Acrylonitrile	7.2587	53	254755	148.0145	ug/L	90
22) Methyl Tert Butyl Ether	7.2897	73	2841	0.2200	ug/L #	1
23) trans-1,2-Dichloroethene	7.5275	96	2279	0.5148	ug/L	84
24) n-Hexane	7.5896	57	2052381	300.9988	ug/L	97
25) Diisopropyl ether	7.9308	45	4498959	270.3420	ug/L	90
26) Vinyl Acetate	8.0859	43	1756570	285.3988	ug/L	99
28) Ethyl-Tert-Butyl ether	8.4788	59	4544638	270.1803	ug/L	88
29) 2-Butanone	8.6546	43	613943	308.7109	ug/L	99
30) Propionitrile	8.7579	54	189351	325.8787	ug/L	99
32) cis-1,2-Dichloroethene	8.9234	96	1148	0.2284	ug/L	93
34) 1-Bromopropane	9.2542	122	345495	317.3803	ug/L	97
36) Tetrahydrofuran	9.3680	42	373832	290.1436	ug/L	99
39) Cyclohexane	9.6575	56	2733471	290.8149	ug/L	95
40) 1,1-Dichloropropene	9.8126	75	2367	0.3965	ug/L #	53
41) Carbon Tetrachloride	9.9470	117	960	0.1422	ug/L #	69
42) Tert-Amyl-Methyl ether	9.9160	73	3533814	281.6724	ug/L	93
44) 1,2-Dichloroethane	10.1124	62	1085	0.1424	ug/L #	40
45) Benzene	10.1538	78	3944	0.2223	ug/L	88
46) Trichloroethene	10.8672	130	1750	0.3478	ug/L	91
47) Methylcyclohexane	10.9396	83	2186326	308.4174	ug/L	97
49) 1,4-Dioxane	11.3428	88	22511	622.4917	ug/L	93
51) Dibromomethane	11.4255	93	486	0.1614	ug/L #	57

(#) = qualifier out of range (m) = manual integration
11M29746.D 8260WT.M Wed Mar 06 14:03:45 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29746.D Vial: 11
Acq On : 5 Mar 2019 21:06 Operator: KFR
Sample : WG698387-11 STD 300ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:03:44 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

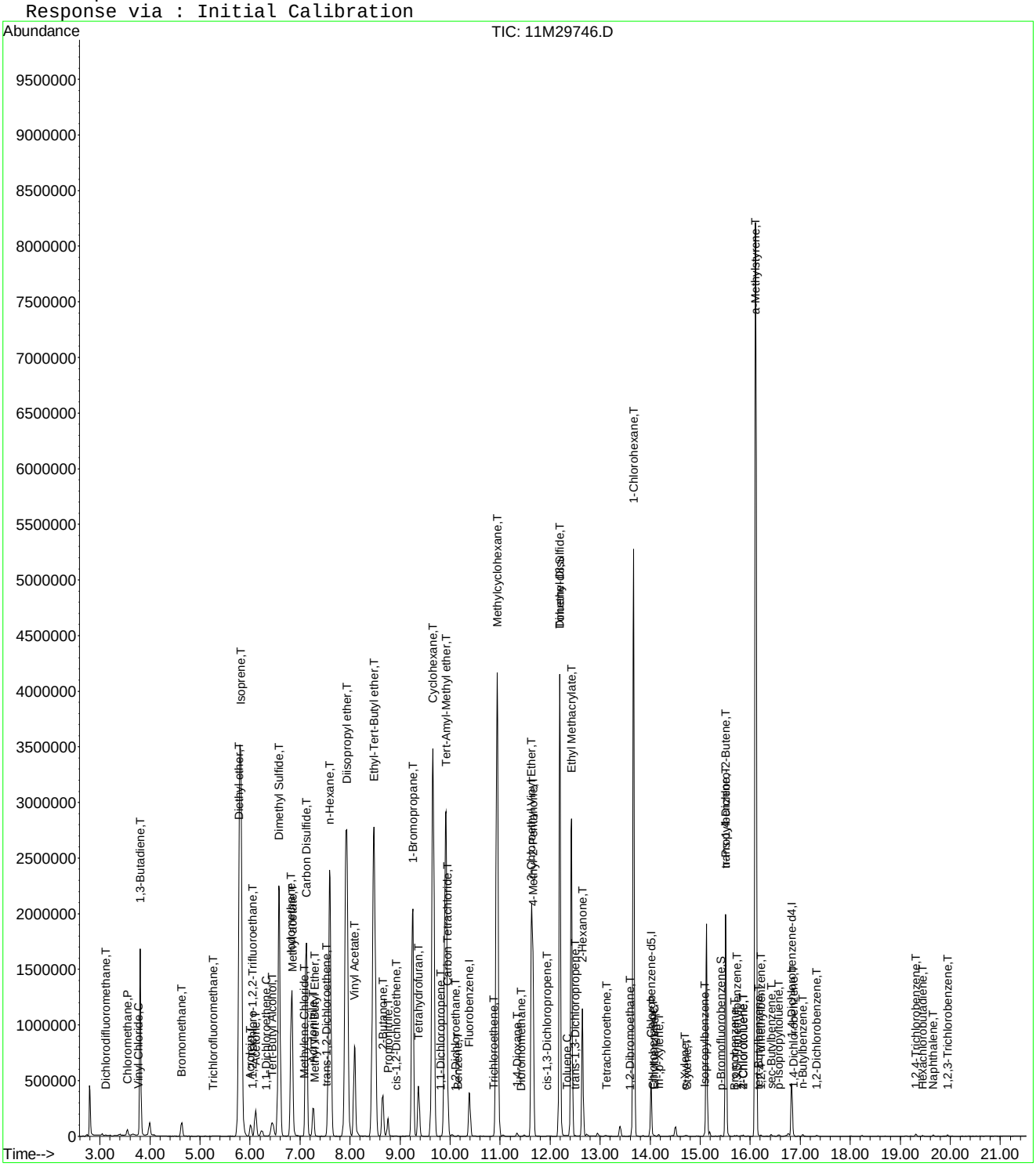
	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
52)	2-Chloroethyl Vinyl Ether	11.6220	63	864552	338.9793	ug/L		98
53)	4-Methyl-2-Pentanone	11.6530	58	570189	313.7998	ug/L		99
54)	cis-1,3-Dichloropropene	11.9425	75	1075	0.1531	ug/L	#	43
55)	Dimethyl Disulfide	12.1907	79	1475968	299.5697	ug/L		79
58)	Toluene	12.3354	91	4554	0.2428	ug/L		97
59)	Ethyl Methacrylate	12.4285	69	1732998	327.0618	ug/L		99
60)	trans-1,3-Dichloropropene	12.5009	75	2259	0.3678	ug/L	#	51
62)	2-Hexanone	12.6456	43	923582	311.1336	ug/L		97
64)	Tetrachloroethene	13.1212	164	2035	0.5114	ug/L		95
66)	1,2-Dibromoethane	13.5969	107	566	0.1479	ug/L	#	41
67)	1-Chlorohexane	13.6692	91	1936253	312.6242	ug/L		99
68)	Chlorobenzene	14.0622	112	4481	0.3431	ug/L		86
70)	Ethylbenzene	14.0828	106	2492	0.3751	ug/L		95
71)	m-,p-Xylene	14.1759	106	5977	0.7451	ug/L		90
72)	o-Xylene	14.6929	106	2419	0.3108	ug/L		99
73)	Styrene	14.7342	104	4055	0.3150	ug/L		80
75)	Isopropylbenzene	15.0858	105	14600	0.7494	ug/L		97
80)	trans-1,4-Dichloro-2-Buten	15.5097	53	548795	325.0918	ug/L	#	12
81)	n-Propylbenzene	15.5097	91	118053	5.2080	ug/L	#	59
82)	Bromobenzene	15.6854	156	1717	0.3102	ug/L		80
83)	1,3,5-Trimethylbenzene	15.7372	105	6615	0.4111	ug/L		95
84)	2-Chlorotoluene	15.8612	91	13520	0.8382	ug/L		98
85)	4-Chlorotoluene	15.8612	91	13517	1.0196	ug/L		96
86)	a-Methylstyrene	16.1094	118	2605115	284.3095	ug/L		88
87)	tert-Butylbenzene	16.1714	134	1554	0.3921	ug/L	#	1
88)	1,2,4-Trimethylbenzene	16.2128	105	7192	0.4330	ug/L		97
89)	sec-Butylbenzene	16.4196	105	16306	0.8162	ug/L		95
90)	p-Isopropyltoluene	16.5643	119	9508	0.5473	ug/L		95
92)	1,4-Dichlorobenzene	16.8642	146	7658	0.7510	ug/L	#	47
93)	n-Butylbenzene	17.0503	91	12522	0.7998	ug/L		94
94)	1,2-Dichlorobenzene	17.3295	146	4341	0.4435	ug/L		91
96)	1,2,4-Trichlorobenzene	19.3147	180	8523	1.3462	ug/L		94
97)	Hexachlorobutadiene	19.4491	225	2841	0.8903	ug/L		84
98)	Naphthalene	19.6559	128	12052	0.8890	ug/L	#	94
99)	1,2,3-Trichlorobenzene	19.9454	180	6215	1.0448	ug/L		94

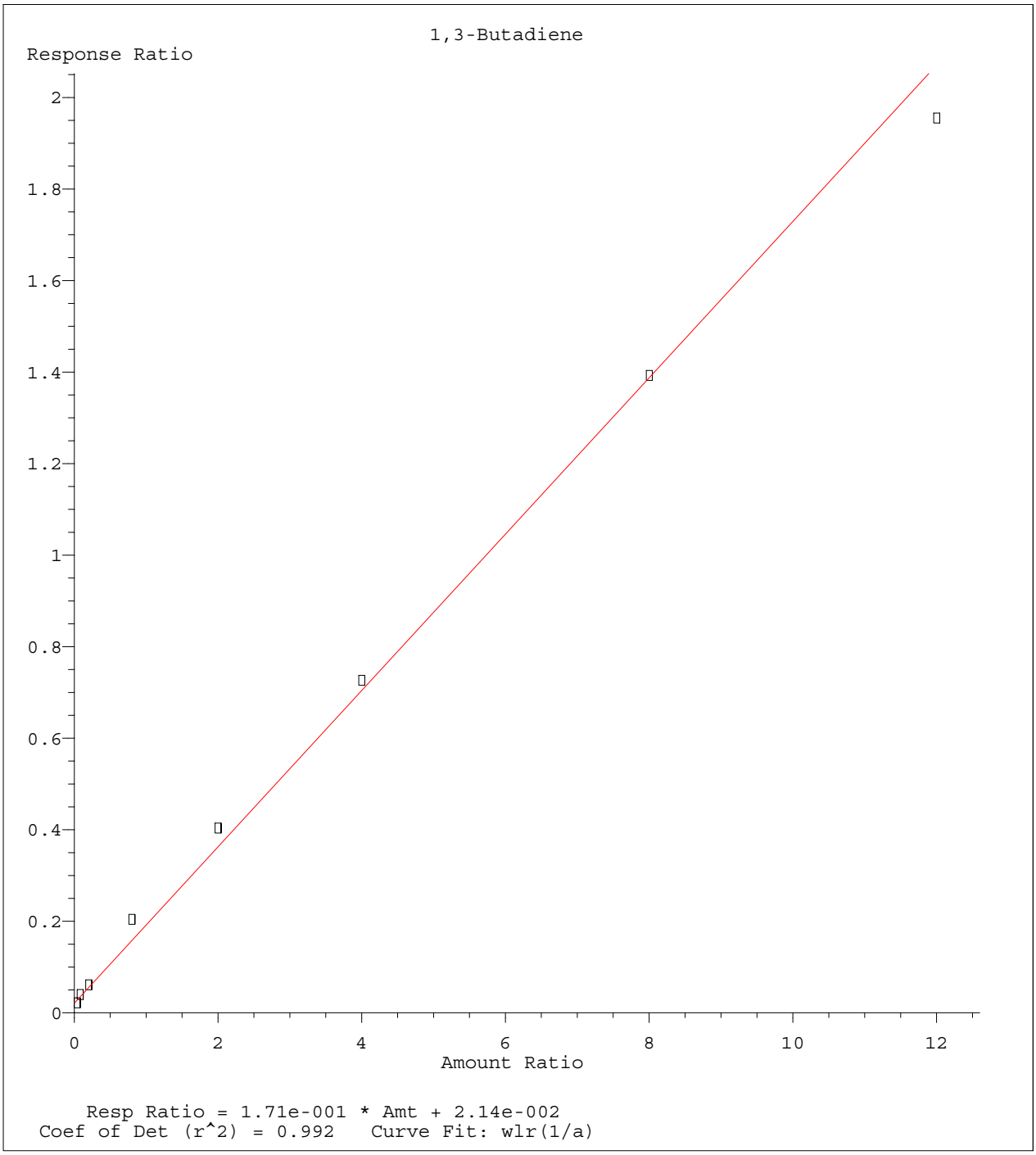
(#) = qualifier out of range (m) = manual integration
11M29746.D 8260WT.M Wed Mar 06 14:03:45 2019 Page 2

Quantitation Report (Not Reviewed)

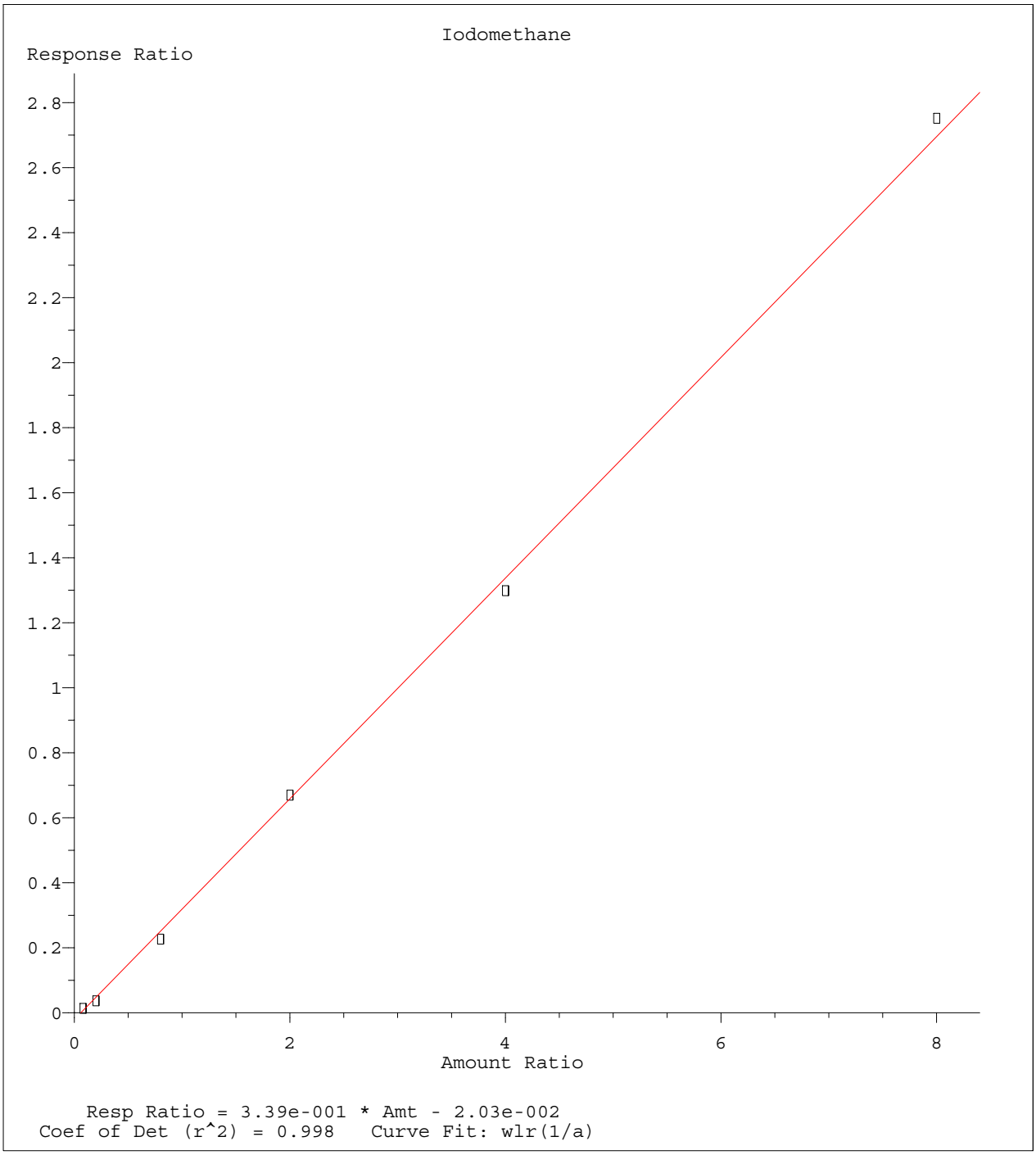
Data File : C:\MSDCHEM\1\DATA\030519\11M29746.D Vial: 11
Acq On : 5 Mar 2019 21:06 Operator: KFR
Sample : WG698387-11 STD 300ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:03 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration

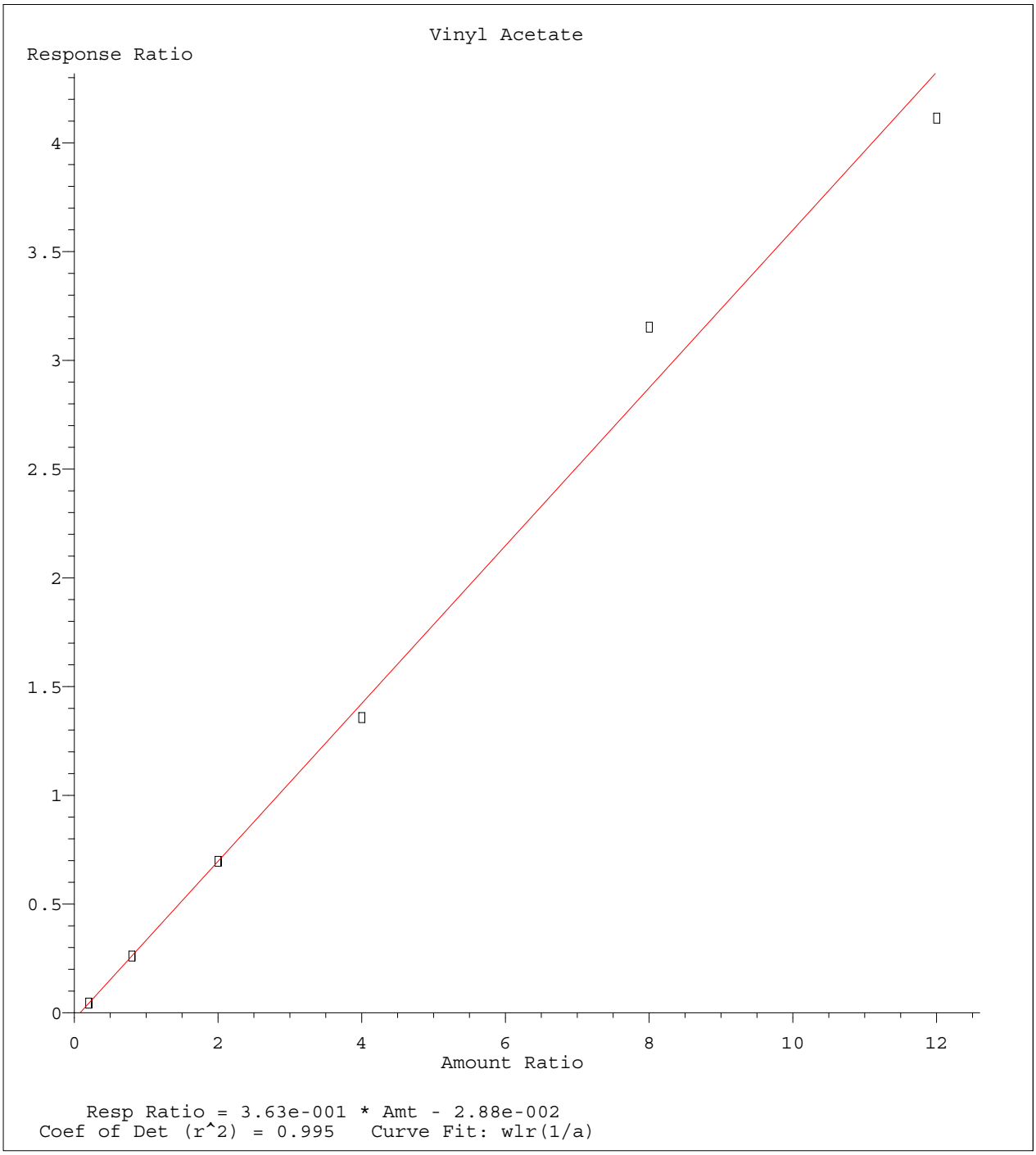




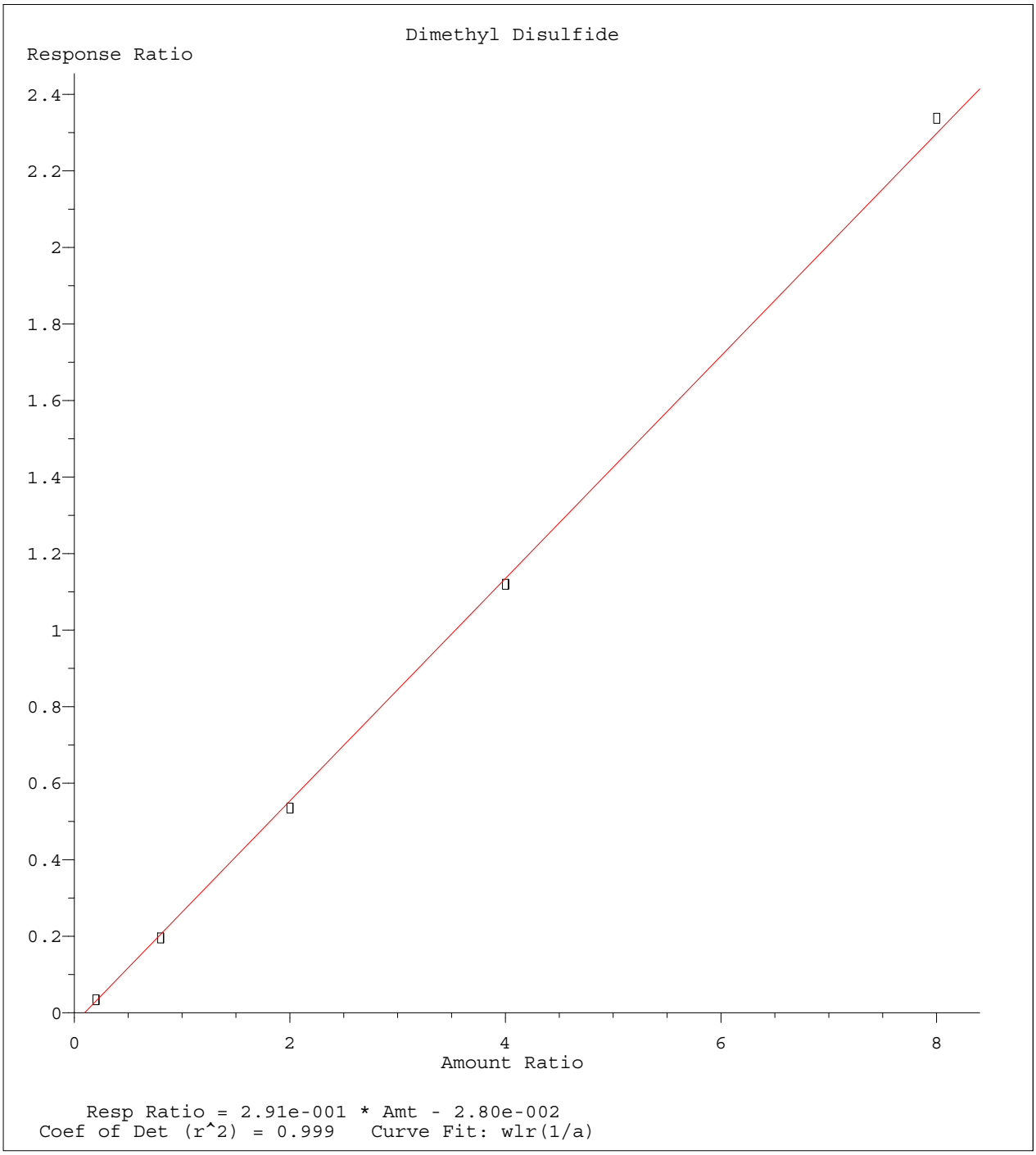
Method Name: C:\MSDCHEM\1\METHODS\8260WT.M
Calibration Table Last Updated: Wed Mar 06 14:13:24 2019



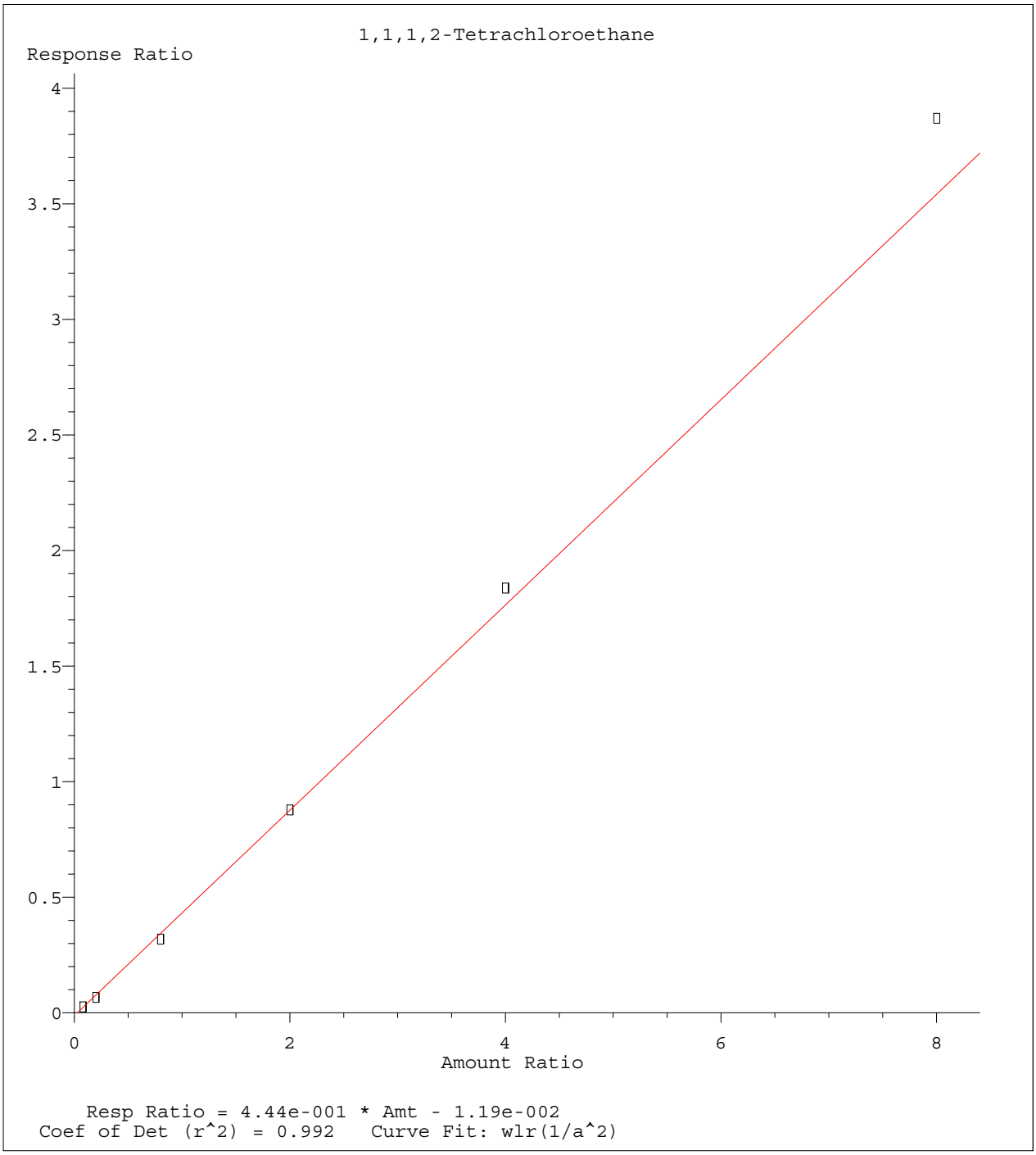
Method Name: C:\MSDCHEM\1\METHODS\8260WT.M
Calibration Table Last Updated: Wed Mar 06 14:13:24 2019



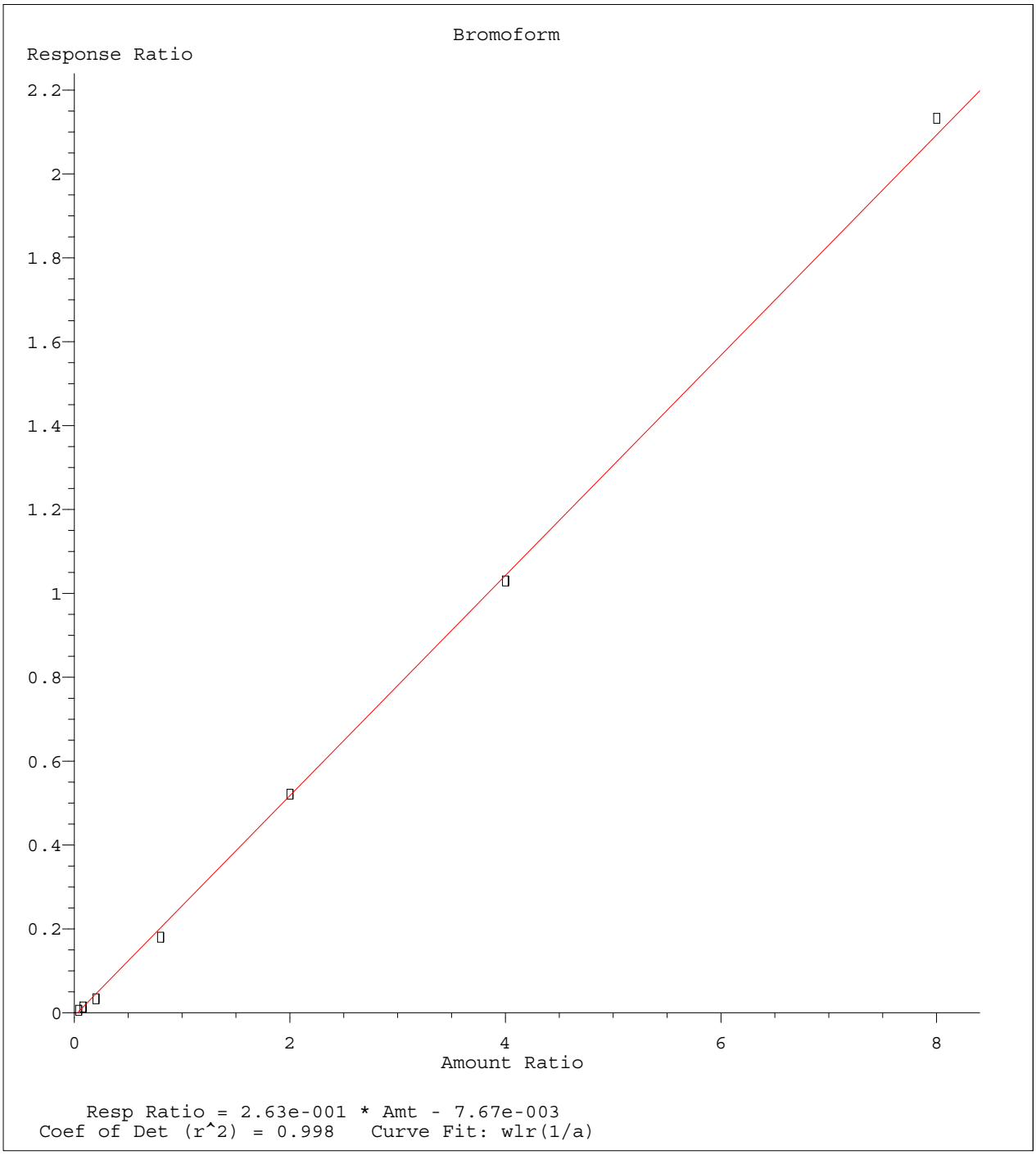
Method Name: C:\MSDCHEM\1\METHODS\8260WT.M
Calibration Table Last Updated: Wed Mar 06 14:13:24 2019



Method Name: C:\MSDCHEM\1\METHODS\8260WT.M
Calibration Table Last Updated: Wed Mar 06 14:13:24 2019



Method Name: C:\MSDCHEM\1\METHODS\8260WT.M
Calibration Table Last Updated: Wed Mar 06 14:13:24 2019



Method Name: C:\MSDCHEM\1\METHODS\8260WT.M
Calibration Table Last Updated: Wed Mar 06 14:13:24 2019

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\030519\11M29748.D Vial: 13
Acq On : 5 Mar 2019 22:04 Operator: KFR
Sample : WG698387-12 ICV 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:04:07 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3811	96	386715	25.0000	ug/L	-0.0104
56) Chlorobenzene-d5	14.0206	117	292297	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	155467	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3988	111	111894	25.0660	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 100.2640%			
43) 1,2-Dichloroethane-d4	10.0089	65	135183	25.2394	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 100.9576%			
57) Toluene-d8	12.2422	98	362421	24.9146	ug/L	-0.0104
Spiked Amount 25.0000	Range 88 - 110		Recovery = 99.6584%			
78) p-Bromofluorobenzene	15.4165	95	145455	24.4486	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 97.7944%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1227	85	289735	50.7164	ug/L	100
3) Chloromethane	3.5570	50	475907	43.3728	ug/L	100
4) Vinyl Chloride	3.7741	62	369939	45.1634	ug/L	99
5) 1,3-Butadiene	3.8154	54	138904	47.9634	ug/L	99
6) Bromomethane	4.6323	94	132979	42.3739	ug/L	99
7) Chloroethane	4.7874	64	150096	47.3990	ug/L	98
8) Trichlorofluoromethane	5.2630	101	362897	46.8172	ug/L	100
9) Diethyl ether	5.7903	59	403945	99.6780	ug/L	99
10) Isoprene	5.8213	67	305673	50.0673	ug/L	99
11) Acrolein	6.0178	56	62254	88.4621	ug/L	98
12) 1,1,2-Trichloro-1,2,2-Trif	6.0281	101	193938	51.0046	ug/L	100
13) Acetone	6.1212	43	62519	44.2205	ug/L	98
14) 1,1-Dichloroethene	6.3280	61	378767	51.1824	ug/L	100
15) Tert-Butyl Alcohol	6.4624	59	93422	236.9019	ug/L	98
16) Dimethyl Sulfide	6.5865	62	271232	55.4424	ug/L	100
17) Iodomethane	6.8346	142	337280	65.7407	ug/L	97
18) Methyl acetate	6.8449	43	163842	53.7262	ug/L	98
19) Methylene Chloride	7.0931	84	209684	50.8454	ug/L	98
20) Carbon Disulfide	7.1241	76	536742	47.2221	ug/L	100
21) Acrylonitrile	7.2689	53	81286	52.1544	ug/L	96
22) Methyl Tert Butyl Ether	7.2999	73	565588	48.3657	ug/L	98
23) trans-1,2-Dichloroethene	7.5274	96	210986	52.6317	ug/L	99
24) n-Hexane	7.5997	57	271496	43.9708	ug/L	99
25) Diisopropyl ether	7.9306	45	1580423	104.8742	ug/L	100
26) Vinyl Acetate	8.0960	43	171935	32.6187	ug/L	99
27) 1,1-Dichloroethane	8.1167	63	449642	51.4024	ug/L	99
28) Ethyl-Tert-Butyl ether	8.4786	59	1625562	106.7214	ug/L	99
29) 2-Butanone	8.6544	43	87976	48.8520	ug/L	97
30) Propionitrile	8.7578	54	59303	112.7091	ug/L	100
31) 2,2-Dichloropropane	8.8612	77	301940	49.9220	ug/L	98
32) cis-1,2-Dichloroethene	8.9232	96	241911	53.1549	ug/L	99
33) Chloroform	9.1300	83	405475	51.0695	ug/L	99
34) 1-Bromopropane	9.2541	122	49023	49.7315	ug/L	95
35) Bromochloromethane	9.3471	130	143553	53.7952	ug/L	99
36) Tetrahydrofuran	9.3678	42	116935	100.2247	ug/L	98
38) 1,1,1-Trichloroethane	9.6263	97	396924	55.2117	ug/L	98
39) Cyclohexane	9.6573	56	352416	41.4049	ug/L	98
40) 1,1-Dichloropropene	9.8124	75	293301	54.2616	ug/L	99
41) Carbon Tetrachloride	9.9572	117	336039	54.9678	ug/L	99
42) Tert-Amyl-Methyl ether	9.9158	73	1230422	108.3050	ug/L	98

(#) = qualifier out of range (m) = manual integration
11M29748.D 8260WT.M Wed Mar 06 14:04:08 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29748.D Vial: 13
Acq On : 5 Mar 2019 22:04 Operator: KFR
Sample : WG698387-12 ICV 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 06 14:04:07 2019 Quant Results File: 8260WT.RES

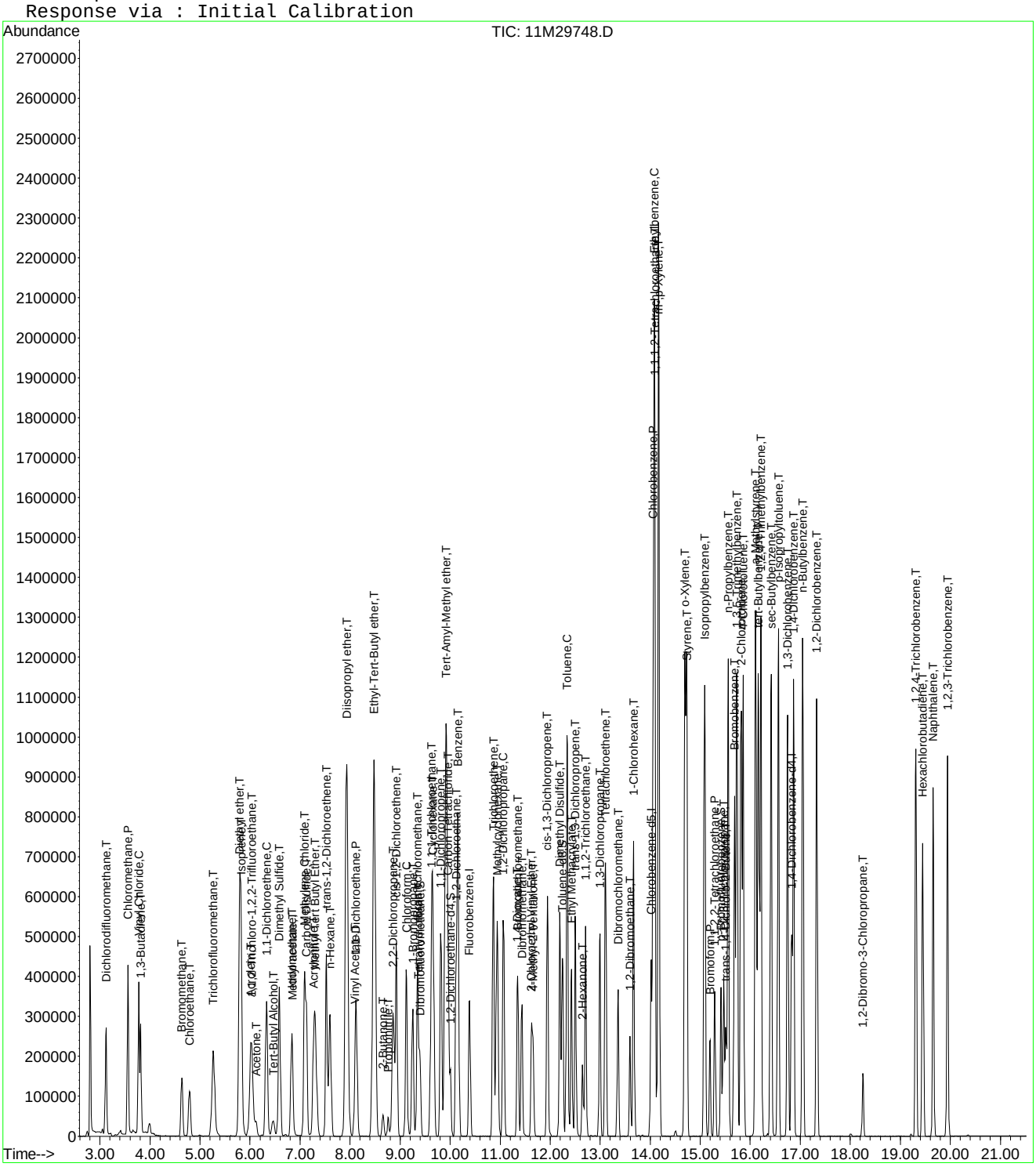
Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
44)	1,2-Dichloroethane	10.1226	62	359321	52.0700	ug/L	99
45)	Benzene	10.1536	78	837480	52.1268	ug/L	100
46)	Trichloroethene	10.8671	130	247418	54.2980	ug/L	100
47)	Methylcyclohexane	10.9394	83	297902	46.4078	ug/L	98
48)	1,2-Dichloropropane	11.0635	63	247364	51.8312	ug/L	99
49)	1,4-Dioxane	11.3427	88	8323	254.1631	ug/L	98
50)	Bromodichloromethane	11.3530	83	301185	53.4000	ug/L	99
51)	Dibromomethane	11.4357	93	140548	51.5555	ug/L	98
52)	2-Chloroethyl Vinyl Ether	11.6218	63	117689	50.9579	ug/L	99
53)	4-Methyl-2-Pentanone	11.6529	58	82421	50.0917	ug/L	98
54)	cis-1,3-Dichloropropene	11.9424	75	351329	55.2697	ug/L	99
55)	Dimethyl Disulfide	12.1905	79	183574	43.2226	ug/L	99
58)	Toluene	12.3353	91	918334	53.0363	ug/L	99
59)	Ethyl Methacrylate	12.4283	69	261494	53.4683	ug/L	99
60)	trans-1,3-Dichloropropene	12.5007	75	304243	53.6657	ug/L	100
61)	1,1,2-Trichloroethane	12.7075	97	186431	50.5763	ug/L	100
62)	2-Hexanone	12.6455	43	141874	51.7818	ug/L	99
63)	1,3-Dichloropropane	12.9970	76	319634	53.7441	ug/L	100
64)	Tetrachloroethene	13.1107	164	189951	51.7185	ug/L	98
65)	Dibromochloromethane	13.3589	129	224538	53.5106	ug/L	99
66)	1,2-Dibromoethane	13.5967	107	186111	52.6818	ug/L	99
67)	1-Chlorohexane	13.6691	91	284180	49.7115	ug/L	99
68)	Chlorobenzene	14.0620	112	633960	52.5890	ug/L	100
69)	1,1,1,2-Tetrachloroethane	14.0930	131	249378	48.6934	ug/L	99
70)	Ethylbenzene	14.0826	106	330037	53.8169	ug/L	100
71)	m-,p-Xylene	14.1654	106	794611	107.3271	ug/L	100
72)	o-Xylene	14.6927	106	393911	54.8361	ug/L	99
73)	Styrene	14.7341	104	667526	56.1795	ug/L	100
74)	Bromoform	15.1993	173	141028	46.6710	ug/L	99
75)	Isopropylbenzene	15.0856	105	953203	53.0064	ug/L	99
77)	1,1,2,2-Tetrachloroethane	15.2924	83	202309	49.8831	ug/L	100
79)	1,2,3-Trichloropropane	15.4682	110	72854	53.7990	ug/L	98
80)	trans-1,4-Dichloro-2-Buten	15.5095	53	82302	48.2026	ug/L	92
81)	n-Propylbenzene	15.5612	91	1203296	52.4844	ug/L	100
82)	Bromobenzene	15.6853	156	278745	49.7840	ug/L	100
83)	1,3,5-Trimethylbenzene	15.7370	105	842593	51.7693	ug/L	100
84)	2-Chlorotoluene	15.8197	91	825177	50.5808	ug/L	100
85)	4-Chlorotoluene	15.8611	91	675304	50.3645	ug/L	99
86)	a-Methylstyrene	16.1092	118	489194	52.7849	ug/L	100
87)	tert-Butylbenzene	16.1609	134	200021	49.8961	ug/L	98
88)	1,2,4-Trimethylbenzene	16.2126	105	870375	51.8136	ug/L	100
89)	sec-Butylbenzene	16.4194	105	1060708	52.4940	ug/L	100
90)	p-Isopropyltoluene	16.5642	119	930561	52.9626	ug/L	100
91)	1,3-Dichlorobenzene	16.7503	146	528121	51.1306	ug/L	99
92)	1,4-Dichlorobenzene	16.8640	146	541106	52.4618	ug/L	99
93)	n-Butylbenzene	17.0501	91	853955	53.9300	ug/L	99
94)	1,2-Dichlorobenzene	17.3293	146	531745	53.7158	ug/L	100
95)	1,2-Dibromo-3-Chloropropan	18.2495	75	45751	54.6065	ug/L	99
96)	1,2,4-Trichlorobenzene	19.3145	180	352342	55.0215	ug/L	99
97)	Hexachlorobutadiene	19.4489	225	179393	55.5810	ug/L	99
98)	Naphthalene	19.6557	128	796590	58.0926	ug/L	100
99)	1,2,3-Trichlorobenzene	19.9452	180	338519	56.2661	ug/L	100

(#) = qualifier out of range (m) = manual integration
11M29748.D 8260WT.M Wed Mar 06 14:04:08 2019 Page 2

Data File : C:\MSDCHEM\1\DATA\030519\11M29748.D Vial: 13
Acq On : 5 Mar 2019 22:04 Operator: KFR
Sample : WG698387-12 ICV 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 6 14:04 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\030519\11M29748.D Vial: 13
Acq On : 5 Mar 2019 22:04 Operator: KFR
Sample : WG698387-12 ICV 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	98	-0.01
2	T	Dichlorodifluoromethane	50.000	50.716	-1.4	91	0.00
3	P	Chloromethane	50.000	43.373	13.3	89	0.00
4	C	Vinyl Chloride	50.000	45.163	9.7	86	0.00
5	T	1,3-Butadiene	50.000	47.963	4.1	87	0.00
6	T	Bromomethane	50.000	42.374	15.3	91	-0.01
7	T	Chloroethane	50.000	47.399	5.2	89	-0.01
8	T	Trichlorofluoromethane	50.000	46.817	6.4	87	-0.01
9	T	Diethyl ether	100.000	99.678	0.3	107	0.00
10	T	Isoprene	50.000	50.067	-0.1	94	0.00
11	T	Acrolein	50.000	88.462	-76.9#	176	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	50.000	51.005	-2.0	93	-0.01
13	T	Acetone	50.000	44.220	11.6	85	0.00
14	C	1,1-Dichloroethene	50.000	51.182	-2.4	95	0.00
15	T	Tert-Butyl Alcohol	200.000	236.902	-18.5	116	0.02
16	T	Dimethyl Sulfide	50.000	55.442	-10.9	104	0.00
17	T	Iodomethane	50.000	65.741	-31.5#	128	0.00
18	T	Methyl acetate	50.000	53.726	-7.5	102	0.00
19	T	Methylene Chloride	50.000	50.845	-1.7	97	0.00
20	T	Carbon Disulfide	50.000	47.222	5.6	86	-0.01
21	T	Acrylonitrile	50.000	52.154	-4.3	93	0.00
22	T	Methyl Tert Butyl Ether	50.000	48.366	3.3	91	0.00
23	T	trans-1,2-Dichloroethene	50.000	52.632	-5.3	96	0.00
24	T	n-Hexane	50.000	43.971	12.1	83	0.00
25	T	Diisopropyl ether	100.000	104.874	-4.9	110	0.00
26	T	Vinyl Acetate	50.000	32.619	34.8#	63	0.00
27	P	1,1-Dichloroethane	50.000	51.402	-2.8	97	-0.01
28	T	Ethyl-Tert-Butyl ether	100.000	106.721	-6.7	110	0.00
29	T	2-Butanone	50.000	48.852	2.3	91	0.00
30	T	Propionitrile	100.000	112.709	-12.7	101	0.00
31	T	2,2-Dichloropropane	50.000	49.922	0.2	93	0.00
32	T	cis-1,2-Dichloroethene	50.000	53.155	-6.3	97	-0.01
33	C	Chloroform	50.000	51.069	-2.1	99	0.00
34	T	1-Bromopropane	50.000	49.732	0.5	96	0.00
35	T	Bromochloromethane	50.000	53.795	-7.6	96	0.00
36	T	Tetrahydrofuran	100.000	100.225	-0.2	102	0.00
37	S	Dibromofluoromethane	25.000	25.066	-0.3	94	0.00
38	T	1,1,1-Trichloroethane	50.000	55.212	-10.4	101	0.00
39	T	Cyclohexane	50.000	41.405	17.2	78	0.00
40	T	1,1-Dichloropropene	50.000	54.262	-8.5	100	0.00
41	T	Carbon Tetrachloride	50.000	54.968	-9.9	97	0.00
42	T	Tert-Amyl-Methyl ether	100.000	108.305	-8.3	110	0.00
43	S	1,2-Dichloroethane-d4	25.000	25.239	-1.0	95	0.00
44	T	1,2-Dichloroethane	50.000	52.070	-4.1	96	0.00
45	T	Benzene	50.000	52.127	-4.3	97	0.00
46	T	Trichloroethene	50.000	54.298	-8.6	100	0.00
47	T	Methylcyclohexane	50.000	46.408	7.2	87	0.00
48	C	1,2-Dichloropropane	50.000	51.831	-3.7	97	0.00
49	T	1,4-Dioxane	200.000	254.163	-27.1#	121	0.00
50	T	Bromodichloromethane	50.000	53.400	-6.8	93	0.00
51	T	Dibromomethane	50.000	51.556	-3.1	95	0.00
52	T	2-Chloroethyl Vinyl Ether	50.000	50.958	-1.9	97	0.00
53	T	4-Methyl-2-Pentanone	50.000	50.092	-0.2	94	0.00
54	T	cis-1,3-Dichloropropene	50.000	55.270	-10.5	99	0.00

(#) = Out of Range
11M29748.D 8260WT.M Wed Mar 06 14:04:11 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\030519\11M29748.D Vial: 13
Acq On : 5 Mar 2019 22:04 Operator: KFR
Sample : WG698387-12 ICV 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:00:17 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	50.000	43.223	13.6	87	0.00
56	I	Chlorobenzene-d5	25.000	25.000	0.0	98	0.00
57	S	Toluene-d8	25.000	24.915	0.3	93	-0.01
58	C	Toluene	50.000	53.036	-6.1	97	0.00
59	T	Ethyl Methacrylate	50.000	53.468	-6.9	96	0.00
60	T	trans-1,3-Dichloropropene	50.000	53.666	-7.3	95	0.00
61	T	1,1,2-Trichloroethane	50.000	50.576	-1.2	96	0.00
62	T	2-Hexanone	50.000	51.782	-3.6	94	0.00
63	T	1,3-Dichloropropane	50.000	53.744	-7.5	100	0.00
64	T	Tetrachloroethene	50.000	51.719	-3.4	97	0.00
65	T	Dibromochloromethane	50.000	53.511	-7.0	95	0.00
66	T	1,2-Dibromoethane	50.000	52.682	-5.4	96	0.00
67	T	1-Chlorohexane	50.000	49.712	0.6	91	0.00
68	P	Chlorobenzene	50.000	52.589	-5.2	97	0.00
69	T	1,1,1,2-Tetrachloroethane	50.000	48.693	2.6	95	0.00
70	C	Ethylbenzene	50.000	53.817	-7.6	96	0.00
71	T	m-,p-Xylene	100.000	107.327	-7.3	97	0.00
72	T	o-Xylene	50.000	54.836	-9.7	98	0.00
73	T	Styrene	50.000	56.180	-12.4	97	0.00
74	P	Bromoform	50.000	46.671	6.7	90	0.00
75	T	Isopropylbenzene	50.000	53.006	-6.0	94	0.00
76	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	104	0.00
77	P	1,1,2,2-Tetrachloroethane	50.000	49.883	0.2	90	0.00
78	S	p-Bromofluorobenzene	25.000	24.449	2.2	94	0.00
79	T	1,2,3-Trichloropropane	50.000	53.799	-7.6	101	0.00
80	T	trans-1,4-Dichloro-2-Butene	50.000	48.203	3.6	90	0.00
81	T	n-Propylbenzene	50.000	52.484	-5.0	98	0.00
82	T	Bromobenzene	50.000	49.784	0.4	95	0.00
83	T	1,3,5-Trimethylbenzene	50.000	51.769	-3.5	96	0.00
84	T	2-Chlorotoluene	50.000	50.581	-1.2	97	0.00
85	T	4-Chlorotoluene	50.000	50.364	-0.7	95	0.00
86	T	a-Methylstyrene	50.000	52.785	-5.6	99	0.00
87	T	tert-Butylbenzene	50.000	49.896	0.2	99	-0.01
88	T	1,2,4-Trimethylbenzene	50.000	51.814	-3.6	97	0.00
89	T	sec-Butylbenzene	50.000	52.494	-5.0	97	0.00
90	T	p-Isopropyltoluene	50.000	52.963	-5.9	97	0.00
91	T	1,3-Dichlorobenzene	50.000	51.131	-2.3	97	0.00
92	T	1,4-Dichlorobenzene	50.000	52.462	-4.9	98	0.00
93	T	n-Butylbenzene	50.000	53.930	-7.9	97	0.00
94	T	1,2-Dichlorobenzene	50.000	53.716	-7.4	101	0.00
95	T	1,2-Dibromo-3-Chloropropane	50.000	54.606	-9.2	102	0.00
96	T	1,2,4-Trichlorobenzene	50.000	55.021	-10.0	103	0.00
97	T	Hexachlorobutadiene	50.000	55.581	-11.2	106	0.00
98	T	Naphthalene	50.000	58.093	-16.2	105	0.00
99	T	1,2,3-Trichlorobenzene	50.000	56.266	-12.5	104	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0

Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427930.D Vial: 5
Acq On : 12 Nov 2018 13:37 Operator: EEA
Sample : WG684281-02 5 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19:37 2018 Quant Results File: A9FOOWT.RES

Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

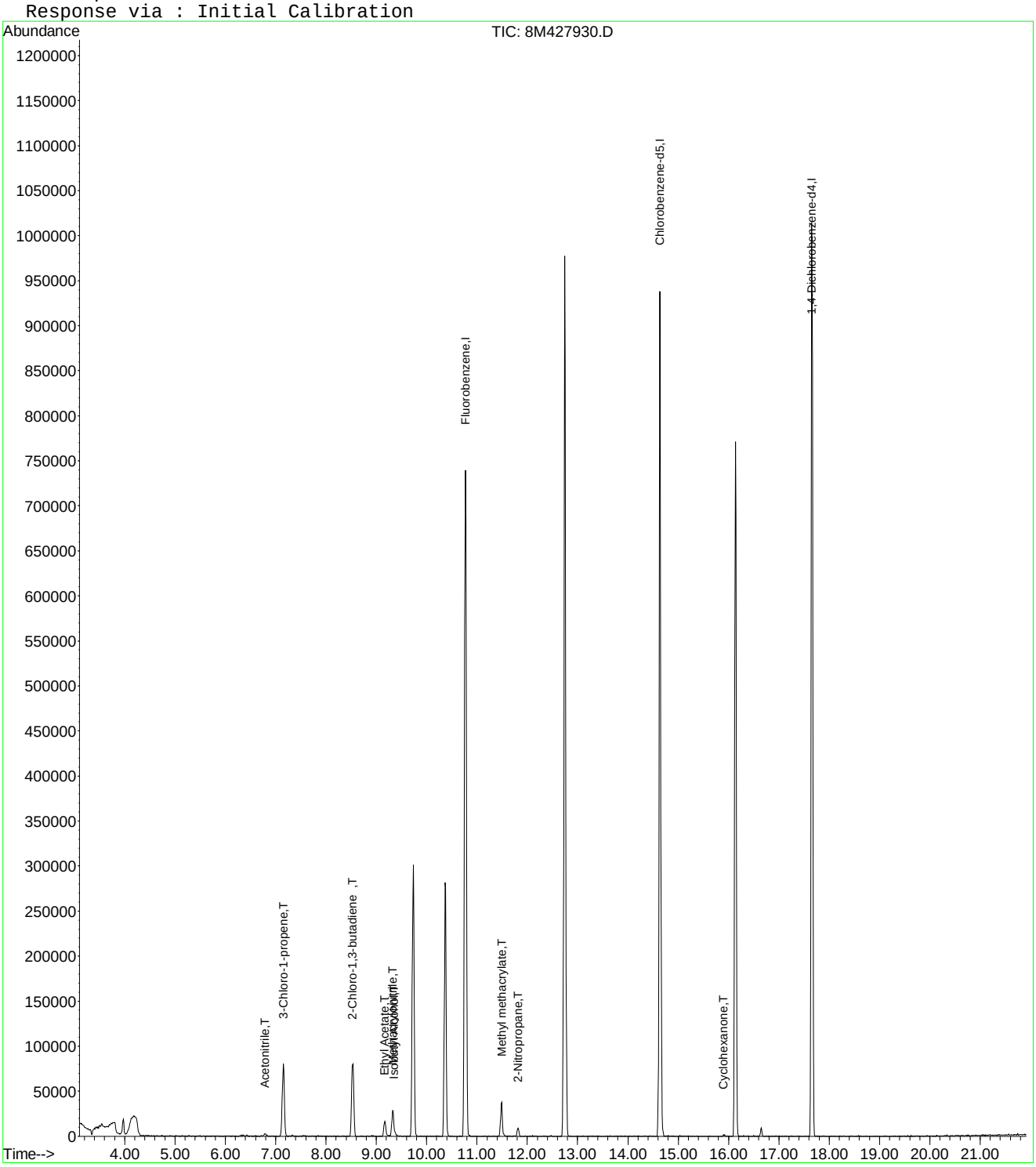
Internal Standards	R.T.	QIon	Response	Conc	Units		Dev(Min)
1) Fluorobenzene	10.77	96	905676	25.00	ug/L		0.00
11) Chlorobenzene-d5	14.64	117	676804	25.00	ug/L		0.00
12) 1,4-Dichlorobenzene-d4	17.65	152	343581	25.00	ug/L		0.00
Target Compounds							Qvalue
2) Acetonitrile	6.79	41	3867	4.5939	ug/L		65
3) 3-Chloro-1-propene	7.15	41	79744	4.8119	ug/L		96
4) 2-Chloro-1,3-butadiene	8.52	53	75225	4.4974	ug/L		99
5) Ethyl Acetate	9.17	43	29157	3.8316	ug/L		97
6) Methacrylonitrile	9.32	67	13803	3.9932	ug/L		95
7) Isobutyl Alcohol	9.35	43	1018	3.9730	ug/L	#	41
9) Methyl methacrylate	11.49	41	27219	3.6869	ug/L		98
10) 2-Nitropropane	11.81	43	7409	2.9142	ug/L		96
13) Cyclohexanone	15.90	55	1169	3.2976	ug/L		94

(#) = qualifier out of range (m) = manual integration
8M427930.D A9FOOWT.M Tue Nov 13 12:19:38 2018 Page 1

Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427930.D Vial: 5
Acq On : 12 Nov 2018 13:37 Operator: EEA
Sample : WG684281-02 5 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427930.D Vial: 5
Acq On : 12 Nov 2018 13:37 Operator: EEA
Sample : WG684281-02 5 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	-1.000	4.594	0.0	100	0.00
3	T	3-Chloro-1-propene	5.000	4.812	3.8	100	0.00
4	T	2-Chloro-1,3-butadiene	5.000	4.497	10.1	100	0.00
5	T	Ethyl Acetate	-1.000	3.832	0.0	100	0.00
6	T	Methacrylonitrile	5.000	3.993	20.1	100	0.00
7	T	Isobutyl Alcohol	-1.000	3.973	0.0	100	0.01
8	T	1-Butanol	-1.000	0.000	0.0	0	-10.29#
9	T	Methyl methacrylate	5.000	3.687	26.3	100	0.00
10	T	2-Nitropropane	-1.000	2.914	0.0	100	0.00
11	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
12	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
13	T	Cyclohexanone	-1.000	3.298	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M427930.D A9FOOWT.M Tue Nov 13 12:17:03 2018

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427931.D Vial: 3
Acq On : 12 Nov 2018 14:06 Operator: EEA
Sample : WG684281-03 20 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19:39 2018 Quant Results File: A9FOOWT.RES

Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

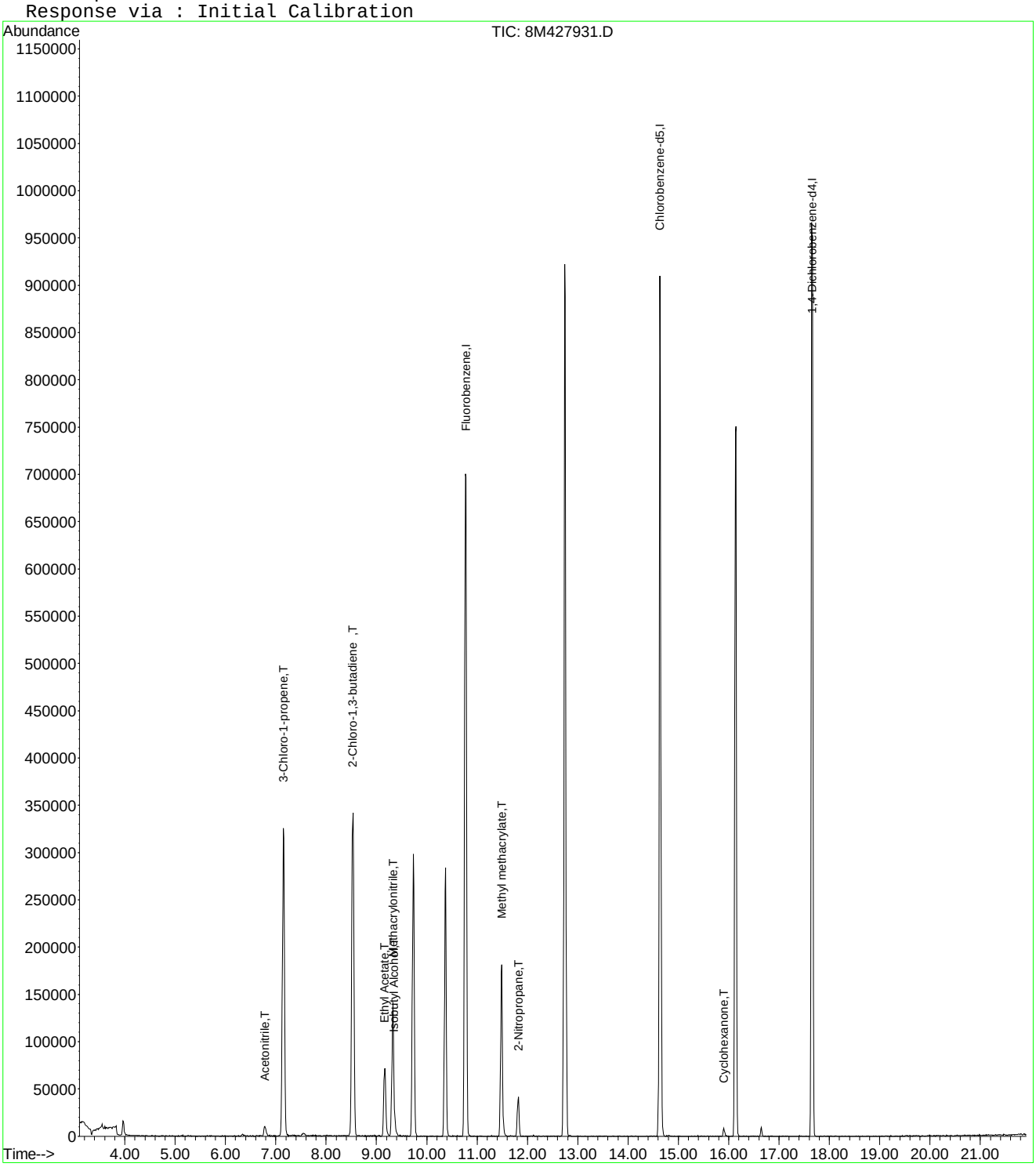
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.78	96	874045	25.00	ug/L	0.00
11) Chlorobenzene-d5	14.63	117	672711	25.00	ug/L	0.00
12) 1,4-Dichlorobenzene-d4	17.66	152	343559	25.00	ug/L	0.00
Target Compounds						Qvalue
2) Acetonitrile	6.79	41	14838	18.2650	ug/L	94
3) 3-Chloro-1-propene	7.15	41	320423	20.0345	ug/L	100
4) 2-Chloro-1,3-butadiene	8.53	53	321084	19.8908	ug/L	99
5) Ethyl Acetate	9.16	43	127962	17.4245	ug/L	98
6) Methacrylonitrile	9.33	67	59985	17.9816	ug/L	96
7) Isobutyl Alcohol	9.35	43	9196	37.1883	ug/L #	79
9) Methyl methacrylate	11.49	41	124457	17.4683	ug/L	100
10) 2-Nitropropane	11.82	43	36091	14.7094	ug/L	94
13) Cyclohexanone	15.90	55	5307	14.9715	ug/L	96

(#) = qualifier out of range (m) = manual integration
8M427931.D A9FOOWT.M Tue Nov 13 12:19:39 2018 Page 1

Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427931.D Vial: 3
Acq On : 12 Nov 2018 14:06 Operator: EEA
Sample : WG684281-03 20 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427931.D Vial: 3
Acq On : 12 Nov 2018 14:06 Operator: EEA
Sample : WG684281-03 20 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	20.000	18.265	8.7	100	0.00
3	T	3-Chloro-1-propene	20.000	20.034	-0.2	100	0.00
4	T	2-Chloro-1,3-butadiene	20.000	19.891	0.5	100	0.00
5	T	Ethyl Acetate	20.000	17.424	12.9	100	0.00
6	T	Methacrylonitrile	20.000	17.982	10.1	100	0.00
7	T	Isobutyl Alcohol	-1.000	37.188	0.0	100	0.01
8	T	1-Butanol	-1.000	0.000	0.0	0	-10.29#
9	T	Methyl methacrylate	20.000	17.468	12.7	100	0.00
10	T	2-Nitropropane	20.000	14.709	26.5	100	0.00
11	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
12	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
13	T	Cyclohexanone	-1.000	14.971	0.0	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M427931.D A9FOOWT.M Tue Nov 13 12:17:43 2018

Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427932.D Vial: 4
Acq On : 12 Nov 2018 14:34 Operator: EEA
Sample : WG684281-04 50 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19:40 2018 Quant Results File: A9FOOWT.RES

Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

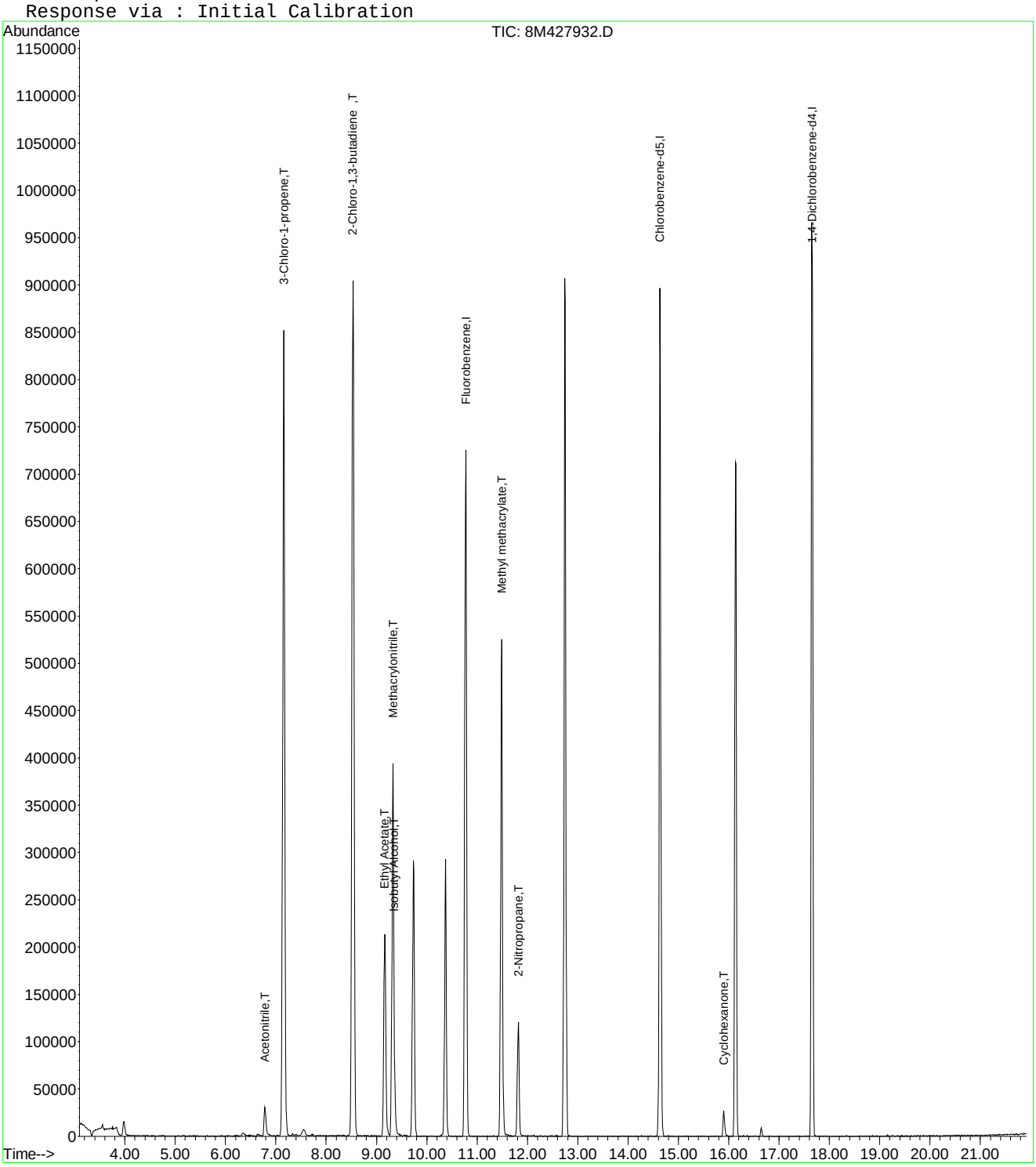
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.78	96	885100	25.00	ug/L	0.00
11) Chlorobenzene-d5	14.63	117	662296	25.00	ug/L	0.00
12) 1,4-Dichlorobenzene-d4	17.66	152	334189	25.00	ug/L	0.00
Target Compounds						Qvalue
2) Acetonitrile	6.78	41	41148	50.0190	ug/L	96
3) 3-Chloro-1-propene	7.16	41	814844	50.3118	ug/L	99
4) 2-Chloro-1,3-butadiene	8.53	53	824807	50.4577	ug/L	100
5) Ethyl Acetate	9.16	43	357052	48.0122	ug/L	99
6) Methacrylonitrile	9.33	67	165999	49.1397	ug/L	97
7) Isobutyl Alcohol	9.35	43	25778	102.9433	ug/L	88
9) Methyl methacrylate	11.49	41	346219	47.9870	ug/L	100
10) 2-Nitropropane	11.82	43	109997	44.2709	ug/L	99
13) Cyclohexanone	15.90	55	15640	45.3588	ug/L	99

(#) = qualifier out of range (m) = manual integration
8M427932.D A9FOOWT.M Tue Nov 13 12:19:41 2018 Page 1

Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427932.D Vial: 4
Acq On : 12 Nov 2018 14:34 Operator: EEA
Sample : WG684281-04 50 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427932.D Vial: 4
Acq On : 12 Nov 2018 14:34 Operator: EEA
Sample : WG684281-04 50 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	50.000	50.019	-0.0	100	0.00
3	T	3-Chloro-1-propene	50.000	50.312	-0.6	100	0.00
4	T	2-Chloro-1,3-butadiene	50.000	50.458	-0.9	100	0.00
5	T	Ethyl Acetate	50.000	48.012	4.0	100	0.00
6	T	Methacrylonitrile	50.000	49.140	1.7	100	0.00
7	T	Isobutyl Alcohol	100.000	102.943	-2.9	100	0.01
8	T	1-Butanol	-1.000	0.000	0.0	100	0.02
9	T	Methyl methacrylate	50.000	47.987	4.0	100	0.00
10	T	2-Nitropropane	50.000	44.271	11.5	100	0.00
11	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
12	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
13	T	Cyclohexanone	50.000	45.359	9.3	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M427932.D A9FOOWT.M Tue Nov 13 12:18:19 2018

Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427933.D Vial: 5
Acq On : 12 Nov 2018 15:03 Operator: EEA
Sample : WG684281-05 100 ug/L ICAL A9 826 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19:41 2018 Quant Results File: A9FOOWT.RES

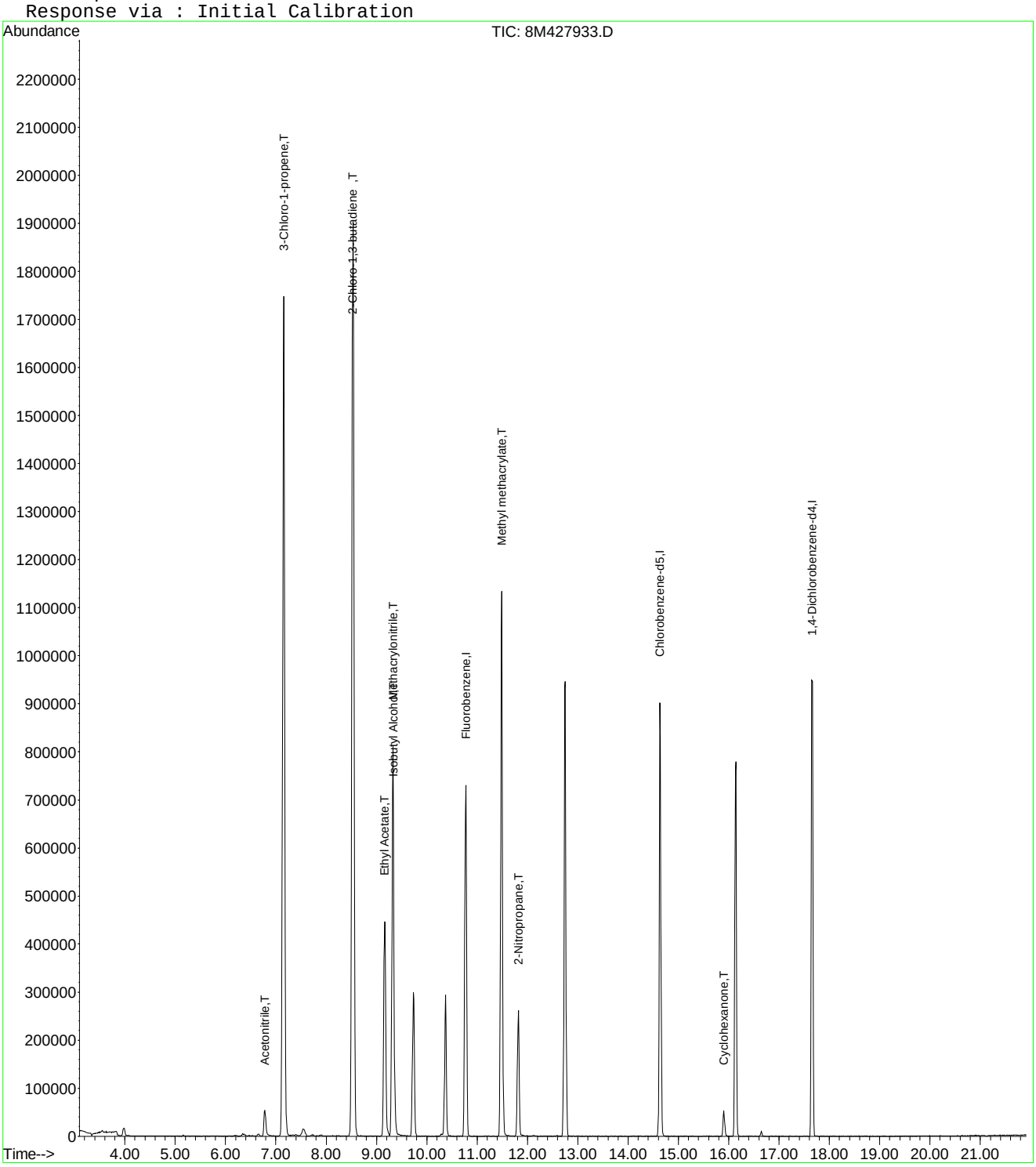
Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.78	96	893935	25.00	ug/L	0.00
11) Chlorobenzene-d5	14.63	117	667066	25.00	ug/L	0.00
12) 1,4-Dichlorobenzene-d4	17.66	152	341780	25.00	ug/L	0.00
Target Compounds						Qvalue
2) Acetonitrile	6.78	41	75612	91.0045	ug/L	100
3) 3-Chloro-1-propene	7.16	41	1695520	103.6537	ug/L	100
4) 2-Chloro-1,3-butadiene	8.53	53	1714203	103.8302	ug/L	100
5) Ethyl Acetate	9.16	43	745480	99.2528	ug/L	100
6) Methacrylonitrile	9.33	67	347443	101.8351	ug/L	100
7) Isobutyl Alcohol	9.34	43	41468	163.9639	ug/L	100
9) Methyl methacrylate	11.49	41	748715	102.7486	ug/L	100
10) 2-Nitropropane	11.82	43	241099	96.0769	ug/L	100
13) Cyclohexanone	15.90	55	30575	86.7036	ug/L	100

(#) = qualifier out of range (m) = manual integration
8M427933.D A9FOOWT.M Tue Nov 13 12:19:42 2018 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427933.D Vial: 5
Acq On : 12 Nov 2018 15:03 Operator: EEA
Sample : WG684281-05 100 ug/L ICAL A9 826 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427933.D Vial: 5
Acq On : 12 Nov 2018 15:03 Operator: EEA
Sample : WG684281-05 100 ug/L ICAL A9 826 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Acetonitrile	100.000	91.005	9.0	100	0.00
3	T	3-Chloro-1-propene	100.000	103.654	-3.7	100	0.00
4	T	2-Chloro-1,3-butadiene	100.000	103.830	-3.8	100	0.00
5	T	Ethyl Acetate	100.000	99.253	0.7	100	0.00
6	T	Methacrylonitrile	100.000	101.835	-1.8	100	0.00
7	T	Isobutyl Alcohol	200.000	163.964	18.0	100	0.00
8	T	1-Butanol	-1.000	0.000	0.0	100	0.00
9	T	Methyl methacrylate	100.000	102.749	-2.7	100	0.00
10	T	2-Nitropropane	100.000	96.077	3.9	100	0.00
11	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00
12	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00
13	T	Cyclohexanone	100.000	86.704	13.3	100	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M427933.D A9FOOWT.M Tue Nov 13 12:18:56 2018

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427934.D Vial: 6
Acq On : 12 Nov 2018 15:31 Operator: EEA
Sample : WG684281-06 200 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19:43 2018 Quant Results File: A9FOOWT.RES

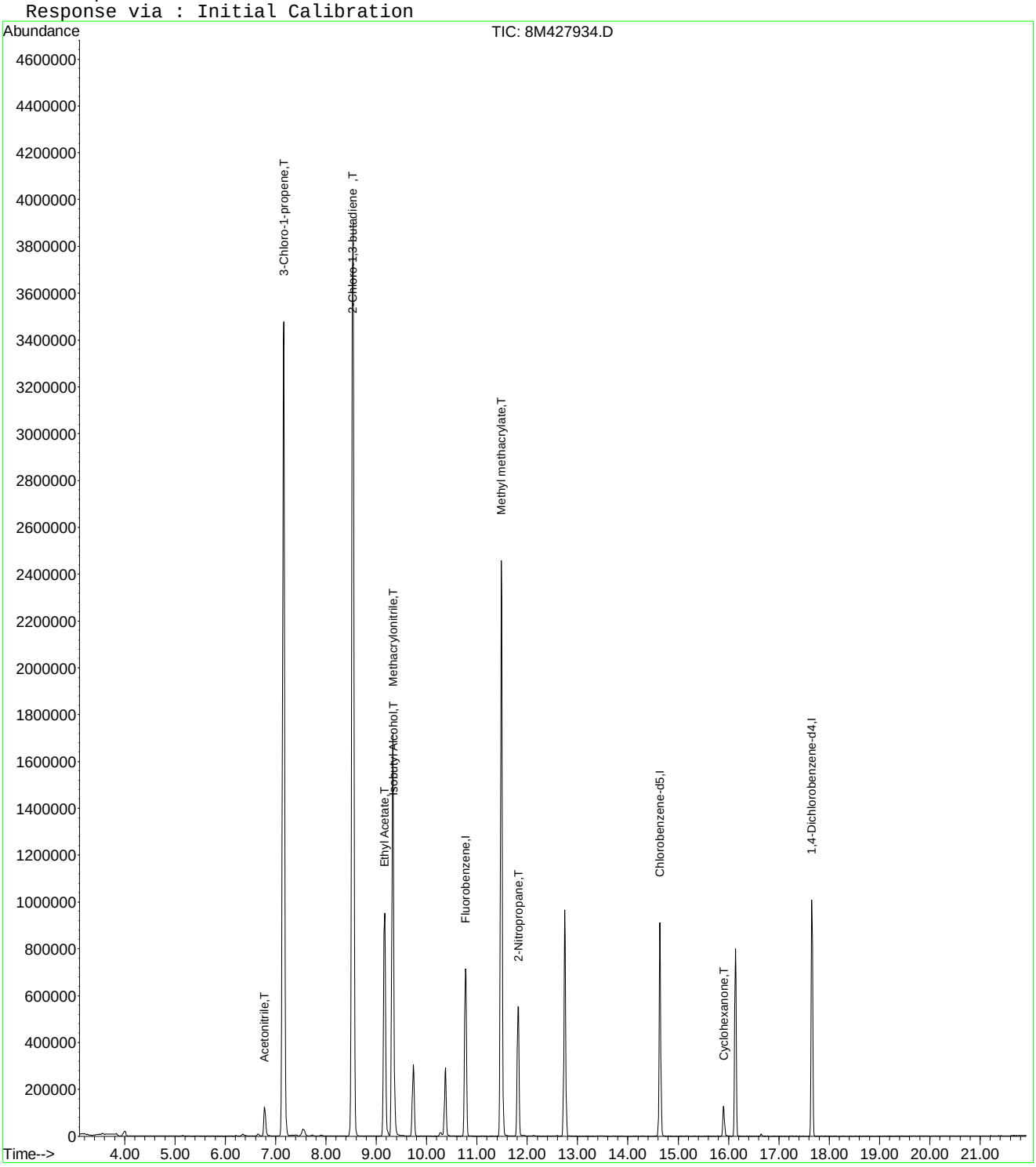
Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.77	96	888856	25.00	ug/L	0.00
11) Chlorobenzene-d5	14.64	117	662279	25.00	ug/L	0.00
12) 1,4-Dichlorobenzene-d4	17.65	152	337695	25.00	ug/L	0.00
Target Compounds						Qvalue
2) Acetonitrile	6.78	41	176351	213.4640	ug/L	95
3) 3-Chloro-1-propene	7.16	41	3397396	208.8827	ug/L	98
4) 2-Chloro-1,3-butadiene	8.54	53	3479174	211.9397	ug/L	99
5) Ethyl Acetate	9.17	43	1581923	211.8198	ug/L	100
6) Methacrylonitrile	9.33	67	728151	214.6396	ug/L	99
7) Isobutyl Alcohol	9.34	43	104801	416.7495	ug/L	98
9) Methyl methacrylate	11.48	41	1598234	220.5841	ug/L	99
10) 2-Nitropropane	11.82	43	539348	216.1560	ug/L	97
13) Cyclohexanone	15.91	55	73604	211.2488	ug/L	93

(#) = qualifier out of range (m) = manual integration
8M427934.D A9FOOWT.M Tue Nov 13 12:19:43 2018 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427934.D Vial: 6
Acq On : 12 Nov 2018 15:31 Operator: EEA
Sample : WG684281-06 200 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427935.D Vial: 7
Acq On : 12 Nov 2018 15:59 Operator: EEA
Sample : WG684281-07 300 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19:44 2018 Quant Results File: A9FOOWT.RES

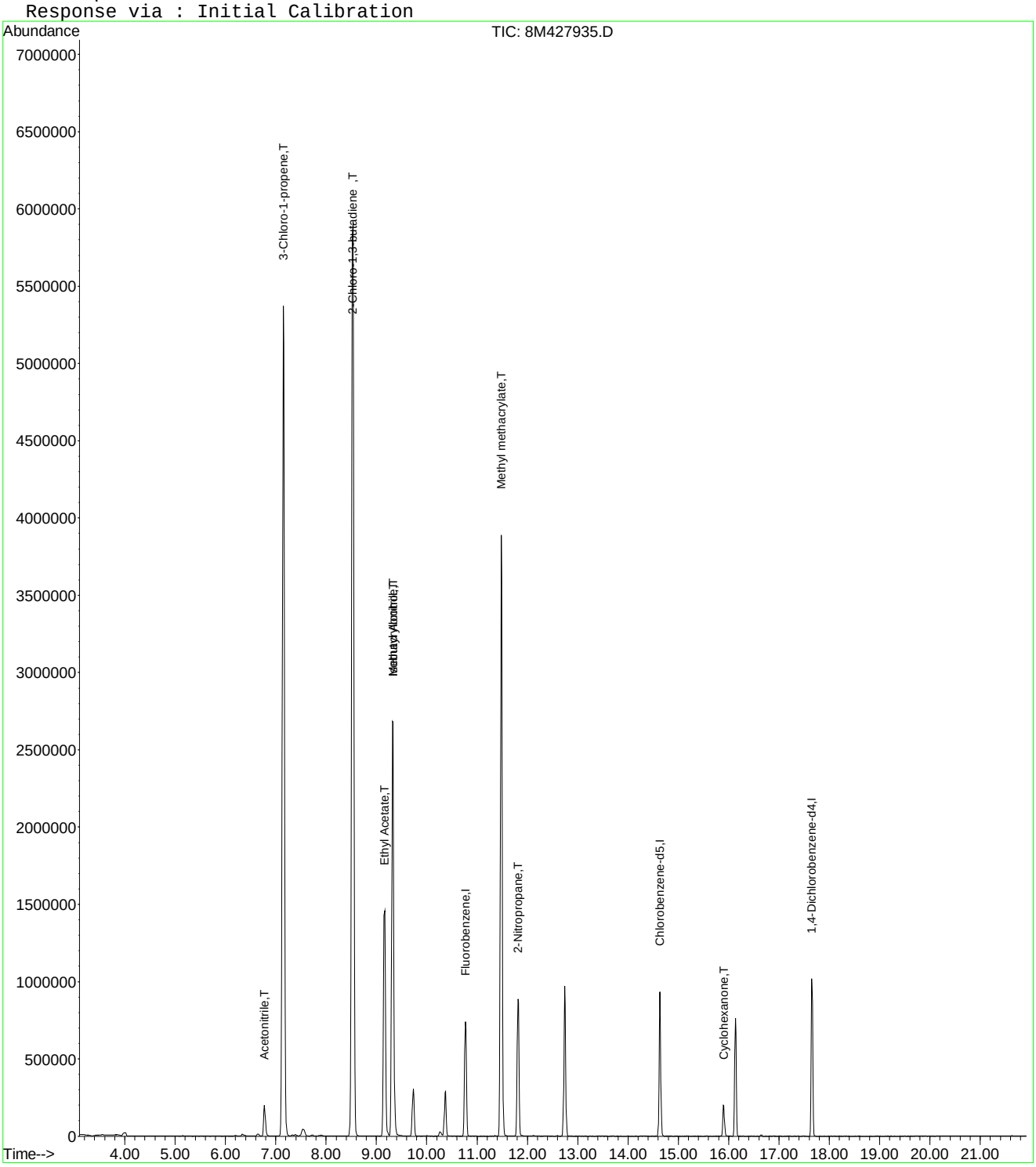
Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.77	96	906816	25.00	ug/L	0.00
11) Chlorobenzene-d5	14.63	117	674675	25.00	ug/L	0.00
12) 1,4-Dichlorobenzene-d4	17.65	152	342902	25.00	ug/L	0.00
Target Compounds						Qvalue
2) Acetonitrile	6.78	41	270445	320.8766	ug/L	95
3) 3-Chloro-1-propene	7.15	41	5177043	311.9970	ug/L	97
4) 2-Chloro-1,3-butadiene	8.53	53	5299143	316.4128	ug/L	97
5) Ethyl Acetate	9.16	43	2468218	323.9492	ug/L	99
6) Methacrylonitrile	9.33	67	1142367	330.0701	ug/L	99
7) Isobutyl Alcohol	9.33	43	162083	631.7706	ug/L	100
9) Methyl methacrylate	11.48	41	2521386	341.1028	ug/L	99
10) 2-Nitropropane	11.81	43	861383	338.3815	ug/L	97
13) Cyclohexanone	15.91	55	116314	328.7603	ug/L	96

(#) = qualifier out of range (m) = manual integration
8M427935.D A9FOOWT.M Tue Nov 13 12:19:45 2018 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427935.D Vial: 7
Acq On : 12 Nov 2018 15:59 Operator: EEA
Sample : WG684281-07 300 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427936.D Vial: 8
Acq On : 12 Nov 2018 16:28 Operator: EEA
Sample : WG684281-08 400 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19:45 2018 Quant Results File: A9FOOWT.RES

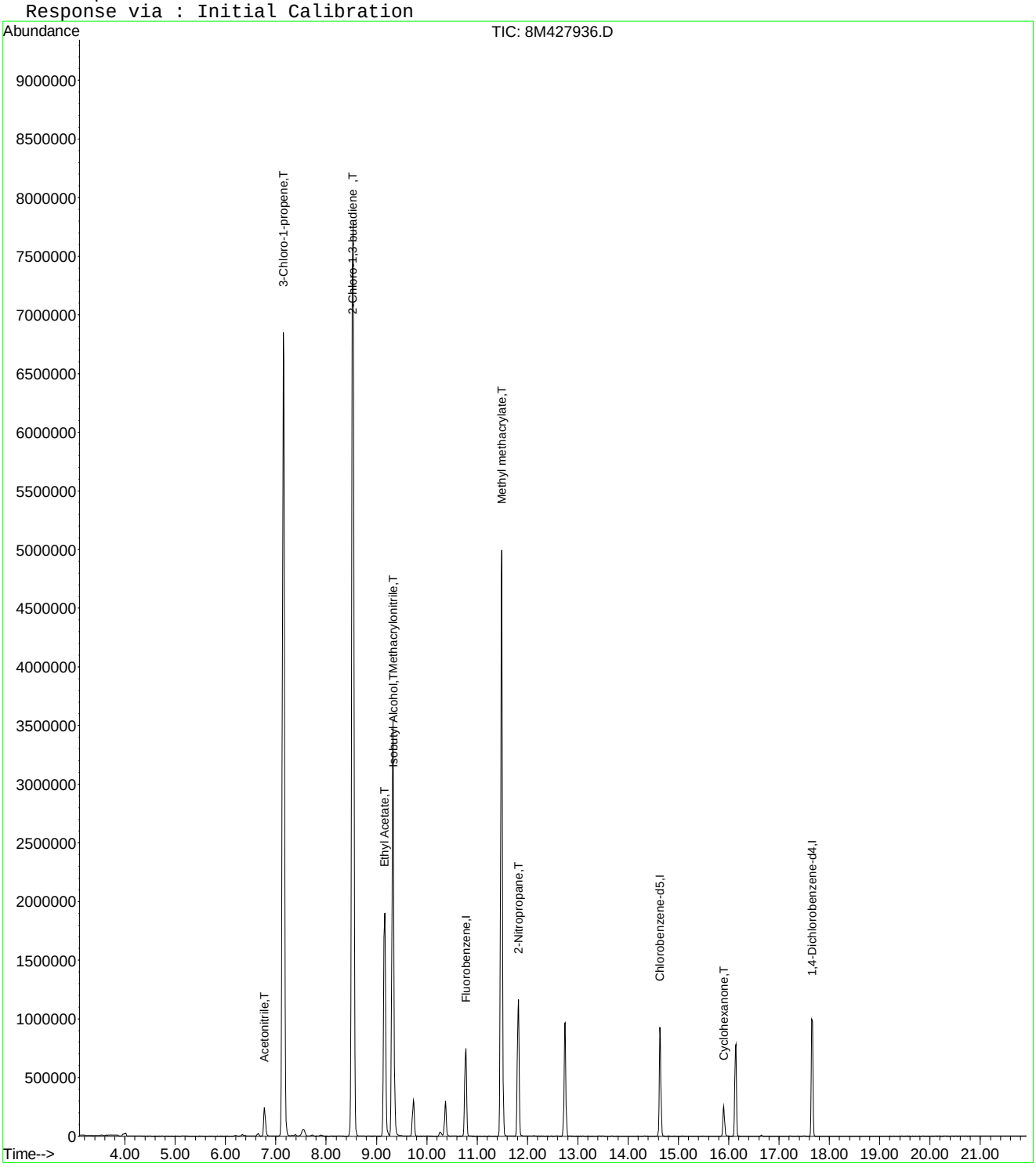
Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.78	96	920293	25.00	ug/L	0.00
11) Chlorobenzene-d5	14.63	117	690560	25.00	ug/L	0.00
12) 1,4-Dichlorobenzene-d4	17.66	152	356915	25.00	ug/L	0.00
Target Compounds						Qvalue
2) Acetonitrile	6.77	41	334101	390.5979	ug/L	94
3) 3-Chloro-1-propene	7.15	41	6583975	390.9758	ug/L	96
4) 2-Chloro-1,3-butadiene	8.53	53	6768931	398.2552	ug/L	94
5) Ethyl Acetate	9.16	43	3123513	403.9521	ug/L	99
6) Methacrylonitrile	9.33	67	1474353	419.7542	ug/L	99
7) Isobutyl Alcohol	9.34	43	198441	762.1604	ug/L	97
9) Methyl methacrylate	11.49	41	3222257	429.5357	ug/L	98
10) 2-Nitropropane	11.82	43	1113942	431.1873	ug/L	98
13) Cyclohexanone	15.90	55	144776	393.1417	ug/L	95

(#) = qualifier out of range (m) = manual integration
8M427936.D A9FOOWT.M Tue Nov 13 12:19:46 2018 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427936.D Vial: 8
Acq On : 12 Nov 2018 16:28 Operator: EEA
Sample : WG684281-08 400 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427937.D Vial: 9
Acq On : 12 Nov 2018 16:57 Operator: EEA
Sample : WG684281-09 500 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19:47 2018 Quant Results File: A9FOOWT.RES

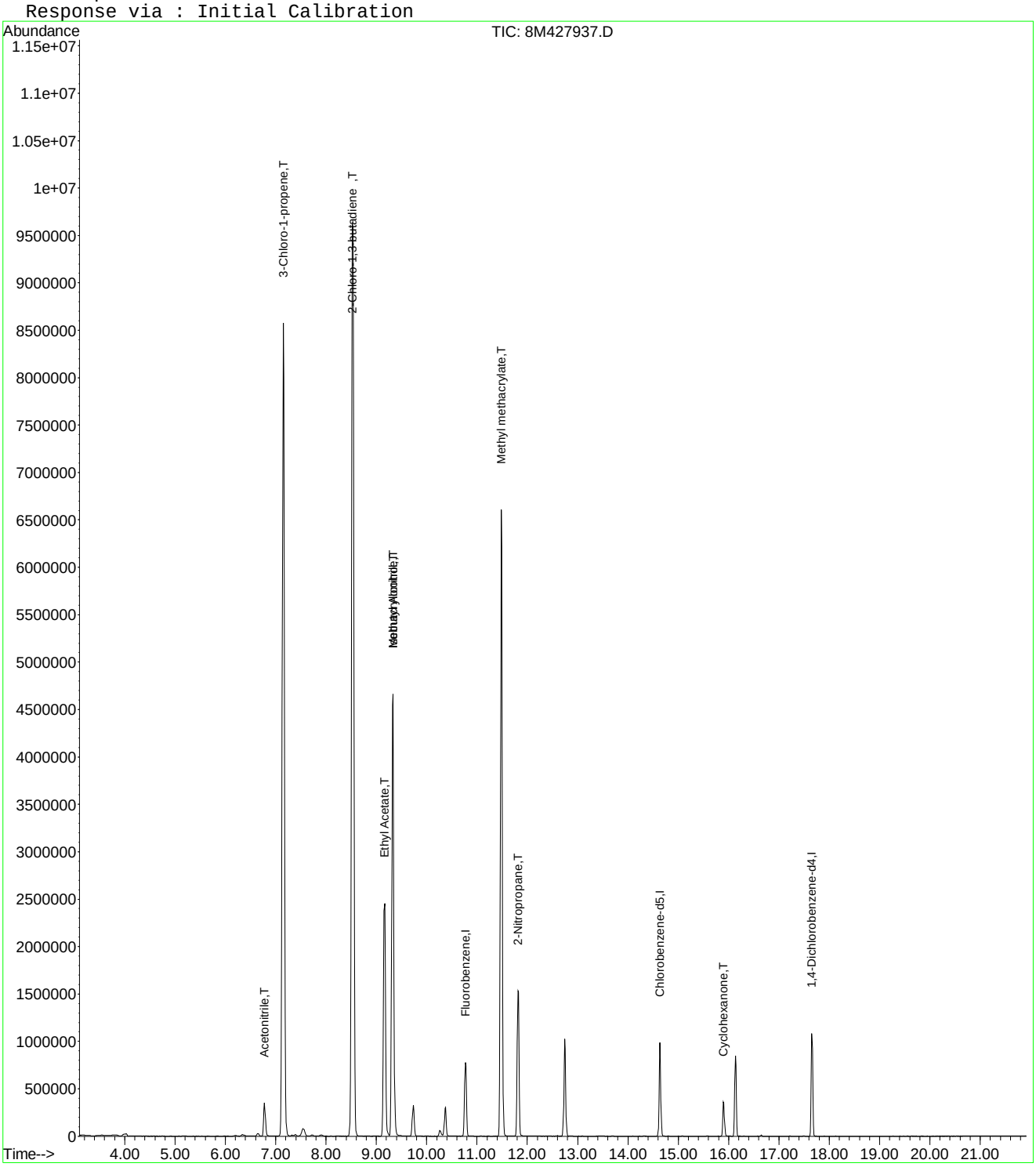
Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.77	96	947276	25.00	ug/L	0.00
11) Chlorobenzene-d5	14.63	117	711576	25.00	ug/L	0.00
12) 1,4-Dichlorobenzene-d4	17.65	152	362181	25.00	ug/L	0.00
Target Compounds						Qvalue
2) Acetonitrile	6.78	41	467918	531.4610	ug/L	96
3) 3-Chloro-1-propene	7.15	41	8071291	465.6443	ug/L	93
4) 2-Chloro-1,3-butadiene	8.52	53	8296799	474.2437	ug/L	90
5) Ethyl Acetate	9.17	43	4087769	513.5969	ug/L	98
6) Methacrylonitrile	9.33	67	1949278	539.1591	ug/L	100
7) Isobutyl Alcohol	9.33	43	295664	1103.2223	ug/L	97
9) Methyl methacrylate	11.48	41	4201381	544.1025	ug/L	96
10) 2-Nitropropane	11.81	43	1504638	565.8288	ug/L	96
13) Cyclohexanone	15.90	55	203813	545.4106	ug/L	94

(#) = qualifier out of range (m) = manual integration
8M427937.D A9FOOWT.M Tue Nov 13 12:19:47 2018 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427937.D Vial: 9
Acq On : 12 Nov 2018 16:57 Operator: EEA
Sample : WG684281-09 500 ug/L ICAL A9 8260 Inst : HPMS8
Misc : 1,1 STD90626 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:19 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427939.D Vial: 11
Acq On : 12 Nov 2018 17:54 Operator: EEA
Sample : WG684 Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:21:16 2018 Quant Results File: A9FOOWT.RES

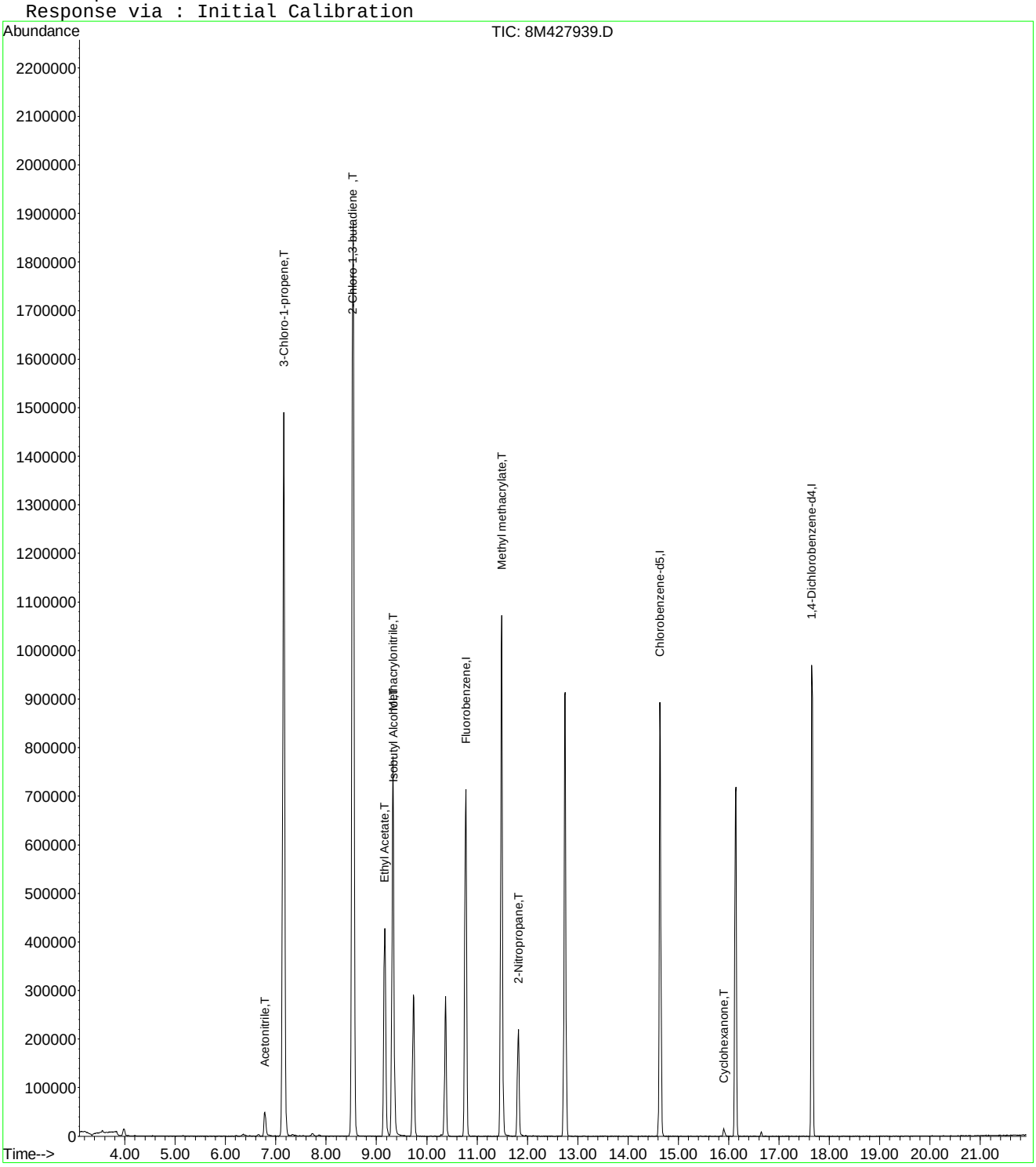
Quant Method : K:\ORGANICS\V...\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.78	96	867230	25.00	ug/L	0.00
11) Chlorobenzene-d5	14.63	117	659296	25.00	ug/L	0.00
12) 1,4-Dichlorobenzene-d4	17.65	152	337570	25.00	ug/L	0.00
Target Compounds						Qvalue
2) Acetonitrile	6.79	41	69875	86.6893	ug/L	96
3) 3-Chloro-1-propene	7.16	41	1445633	91.0986	ug/L	100
4) 2-Chloro-1,3-butadiene	8.53	53	1706775	106.5637	ug/L	99
5) Ethyl Acetate	9.16	43	722113	99.1022	ug/L	99
6) Methacrylonitrile	9.33	67	329117	99.4342	ug/L	98
7) Isobutyl Alcohol	9.34	43	40832	166.4207	ug/L #	8
9) Methyl methacrylate	11.49	41	709327	100.3408	ug/L	100
10) 2-Nitropropane	11.82	43	204866	84.1521	ug/L	100
13) Cyclohexanone	15.90	55	9261	26.5896	ug/L	99

(#) = qualifier out of range (m) = manual integration
8M427939.D A9FOOWT.M Tue Nov 13 12:21:17 2018 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427939.D Vial: 11
Acq On : 12 Nov 2018 17:54 Operator: EEA
Sample : WG684 Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Nov 13 12:20 2018 Quant Results File: A9FOOWT.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427939.D Vial: 11
Acq On : 12 Nov 2018 17:54 Operator: EEA
Sample : WG684 Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8
Last Update : Tue Nov 13 11:28:33 2018
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 1% Max. R.T. Dev 0.50min
Max. RRF Dev : 75% Max. Rel. Area : 200%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	97	0.00
2	T	Acetonitrile	100.000	86.689	13.3	92	0.00
3	T	3-Chloro-1-propene	100.000	91.099	8.9	85	0.00
4	T	2-Chloro-1,3-butadiene	100.000	106.564	-6.6	100	0.00
5	T	Ethyl Acetate	100.000	99.102	0.9	97	0.00
6	T	Methacrylonitrile	100.000	99.434	0.6	95	0.00
7	T	Isobutyl Alcohol	200.000	166.421	16.8	98	0.00
8	T	1-Butanol	-1.000	0.000	0.0	64	0.00
9	T	Methyl methacrylate	100.000	100.341	-0.3	95	0.00
10	T	2-Nitropropane	100.000	84.152	15.8	85	0.00
11	I	Chlorobenzene-d5	25.000	25.000	0.0	99	0.00
12	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	99	0.00
13	T	Cyclohexanone	100.000	26.590	73.4	30	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M427939.D A9FOOWT.M Tue Nov 13 12:22:00 2018 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428956.D Vial: 2
Acq On : 4 Mar 2019 12:45 Operator: EEA
Sample : WG698192-02 0.3 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:33 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	556454	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.59	117	412849	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.61	152	214737	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	0.00	111	0	0.0000	ug/L	
Spiked Amount 25.000	Range 86 - 118		Recovery =	0.00%#		
43) 1,2-Dichloroethane-d4	0.00	65	0	0.0000	ug/L	
Spiked Amount 25.000	Range 80 - 120		Recovery =	0.00%#		
58) Toluene-d8	12.71	98	5830	0.2772	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery =	1.12%#		
80) p-Bromofluorobenzene	16.09	95	3136	0.4046	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery =	1.60%#		
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.23	85	2603	0.2689	ug/L	94
3) Chloromethane	3.69	50	6260	0.4497	ug/L #	59
4) Vinyl Chloride	3.91	62	3220	0.2839	ug/L	95
5) 1,3-Butadiene	3.97	54	3386	Below Cal	#	72
6) Bromomethane	4.80	94	2456	0.3600	ug/L	87
7) Chloroethane	4.97	64	1400	0.2306	ug/L #	45
8) Trichlorofluoromethane	5.45	101	3061	0.2658	ug/L #	81
10) Isoprene	6.00	67	2845	0.2472	ug/L	99
12) 1,1,2-Trichloro-1,2,2-Trif	6.22	101	1756	0.2647	ug/L	79
14) 1,1-Dichloroethene	6.52	61	3658	0.3082	ug/L	91
16) Dimethyl Sulfide	6.79	62	2020	0.2363	ug/L	84
19) Methylene Chloride	7.31	84	2445	0.3297	ug/L	94
20) Carbon Disulfide	7.34	76	7502	0.3381	ug/L	97
22) Methyl Tert Butyl Ether	7.51	73	4997	0.2831	ug/L	82
23) trans-1,2-Dichloroethene	7.75	61	3661	0.3229	ug/L	85
24) n-Hexane	7.82	57	3338	0.3000	ug/L	94
27) 1,1-Dichloroethane	8.37	63	4361	0.2975	ug/L #	73
31) 2,2-Dichloropropane	9.14	77	2983	0.2805	ug/L	82
32) cis-1,2-Dichloroethene	9.20	96	1953	0.2413	ug/L	79
33) Chloroform	9.40	83	4369	0.3358	ug/L	96
35) Bromochloromethane	9.64	130	932	0.2019	ug/L	70
36) Tetrahydrofuran	9.69	42	1559	0.9176	ug/L #	40
38) 1,1,1-Trichloroethane	9.94	97	3064	0.2711	ug/L	95
39) Cyclohexane	9.96	56	4646	0.3087	ug/L #	74
40) 1,1-Dichloropropene	10.13	75	2837	0.2990	ug/L #	37
42) Carbon Tetrachloride	10.27	117	2488	0.2423	ug/L #	86
45) 1,2-Dichloroethane	10.46	62	2598	0.2920	ug/L #	75
46) Benzene	10.49	78	9038	0.3041	ug/L	93
47) Trichloroethene	11.24	130	2501	0.3088	ug/L	92
48) Methylcyclohexane	11.33	83	3683	0.2937	ug/L	93
49) 1,2-Dichloropropane	11.45	63	2210	0.2739	ug/L	88
50) Bromodichloromethane	11.75	83	2302	0.2464	ug/L #	90
55) cis-1,3-Dichloropropene	12.39	75	3125	0.2812	ug/L	85
56) Dimethyl Disulfide	12.64	79	1319	0.1933	ug/L	88
59) Toluene	12.81	91	9322	0.3024	ug/L	95
60) Ethyl Methacrylate	12.92	69	704	0.5646	ug/L #	9
62) trans-1,3-Dichloropropene	12.99	75	2419	0.2610	ug/L #	43
63) 1,1,2-Trichloroethane	13.21	97	1108	0.2056	ug/L	90
65) 1,3-Dichloropropane	13.50	76	2630	0.2834	ug/L	98
66) Tetrachloroethene	13.63	164	1640	0.2525	ug/L	98

(#) = qualifier out of range (m) = manual integration
8M428956.D 8260WTR.M Tue Mar 05 10:54:36 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428956.D Vial: 2
Acq On : 4 Mar 2019 12:45 Operator: EEA
Sample : WG698192-02 0.3 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:33 2019 Quant Results File: 8260WTR.RES

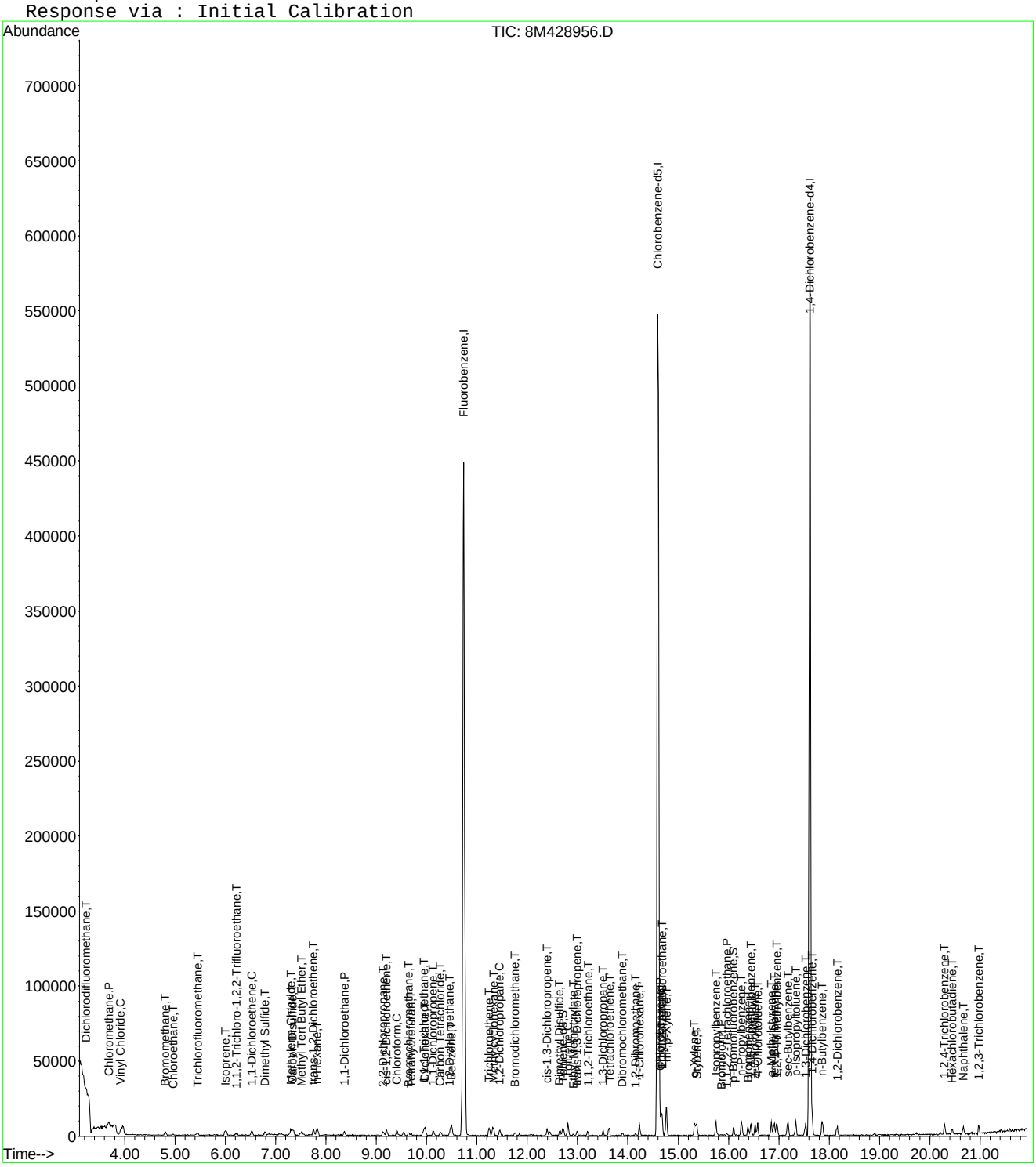
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc Unit		Qvalue
67)	Dibromochloromethane	13.89	129	1608	0.2351 ug/L		75
68)	1,2-Dibromoethane	14.15	107	1081	0.2066 ug/L		94
69)	1-Chlorohexane	14.23	91	3109	0.2911 ug/L		97
70)	Chlorobenzene	14.65	112	7026	0.3362 ug/L		84
71)	1,1,1,2-Tetrachloroethane	14.68	131	2050	0.2668 ug/L		83
72)	Ethylbenzene	14.68	106	3105	0.2746 ug/L		91
73)	m-,p-Xylene	14.77	106	8538	0.6198 ug/L		99
74)	o-Xylene	15.32	106	3828	0.2864 ug/L		88
75)	Styrene	15.37	104	5590	0.2526 ug/L		87
76)	Bromoform	15.86	173	774	0.1825 ug/L	#	27
77)	Isopropylbenzene	15.75	105	10184	0.3016 ug/L		97
79)	1,1,2,2-Tetrachloroethane	15.97	83	1768	0.2918 ug/L	#	77
83)	n-Propylbenzene	16.26	91	12434	0.3200 ug/L		93
84)	Bromobenzene	16.39	156	2466	0.2773 ug/L	#	67
85)	1,3,5-Trimethylbenzene	16.45	105	8697	0.3105 ug/L		91
86)	2-Chlorotoluene	16.53	91	7138	0.2778 ug/L		95
87)	4-Chlorotoluene	16.58	91	8090	0.3603 ug/L		95
88)	a-Methylstyrene	16.85	118	4037	0.2511 ug/L		98
89)	tert-Butylbenzene	16.91	134	1609	0.2490 ug/L		60
90)	1,2,4-Trimethylbenzene	16.96	105	8318	0.2933 ug/L		84
91)	sec-Butylbenzene	17.18	105	11206	0.3126 ug/L		92
92)	p-Isopropyltoluene	17.33	119	9472	0.3082 ug/L		94
93)	1,3-Dichlorobenzene	17.53	146	5075	0.2928 ug/L		98
94)	1,4-Dichlorobenzene	17.67	146	5788	0.3297 ug/L	#	26
95)	n-Butylbenzene	17.86	91	9088	0.3245 ug/L	#	88
96)	1,2-Dichlorobenzene	18.16	146	4801	0.2985 ug/L		89
98)	1,2,4-Trichlorobenzene	20.29	180	3746	0.3209 ug/L		96
99)	Hexachlorobutadiene	20.45	225	1598	0.2906 ug/L	#	67
100)	Naphthalene	20.66	128	6216	0.2922 ug/L	#	68
101)	1,2,3-Trichlorobenzene	20.97	180	3248	0.3029 ug/L	#	90

(#) = qualifier out of range (m) = manual integration
8M428956.D 8260WTR.M Tue Mar 05 10:54:36 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428956.D Vial: 2
Acq On : 4 Mar 2019 12:45 Operator: EEA
Sample : WG698192-02 0.3 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428956.D Vial: 2
Acq On : 4 Mar 2019 12:45 Operator: EEA
Sample : WG698192-02 0.3 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	-1.000	0.269	0.0	100	0.00
3	P	Chloromethane	-1.000	0.450	0.0	100	0.00
4	C	Vinyl Chloride	-1.000	0.284	0.0	100	0.00
5	T	1,3-Butadiene	-1.000	-4.402	0.0	0	0.01
6	T	Bromomethane	-1.000	0.360	0.0	100	0.00
7	T	Chloroethane	-1.000	0.231	0.0	100	0.00
8	T	Trichlorofluoromethane	-1.000	0.266	0.0	100	0.01
9	T	Diethyl ether	-1.000	0.000	0.0	0	-5.97#
10	T	Isoprene	-1.000	0.247	0.0	100	0.00
11	T	Acrolein	-1.000	0.000	0.0	0	-6.21#
12	T	1,1,2-Trichloro-1,2,2-Trifl	-1.000	0.265	0.0	100	0.00
13	T	Acetone	-1.000	0.000	0.0	0	-6.31#
14	C	1,1-Dichloroethene	-1.000	0.308	0.0	100	0.00
15	T	Tert-Butyl Alcohol	-1.000	0.000	0.0	0	-6.63#
16	T	Dimethyl Sulfide	-1.000	0.236	0.0	100	0.00
17	T	Iodomethane	-1.000	0.000	0.0	0	-7.03#
18	T	Methyl acetate	-1.000	0.000	0.0	0	-7.05#
19	T	Methylene Chloride	-1.000	0.330	0.0	100	0.00
20	T	Carbon Disulfide	-1.000	0.338	0.0	100	0.00
21	T	Acrylonitrile	-1.000	0.000	0.0	0	-7.49#
22	T	Methyl Tert Butyl Ether	-1.000	0.283	0.0	100	0.00
23	T	trans-1,2-Dichloroethene	-1.000	0.323	0.0	100	0.00
24	T	n-Hexane	-1.000	0.300	0.0	100	0.00
25	T	Diisopropyl ether	-1.000	0.000	0.0	0	-8.17#
26	T	Vinyl Acetate	-1.000	0.081	0.0	100	0.02
27	P	1,1-Dichloroethane	-1.000	0.298	0.0	100	0.00
28	T	Ethyl-Tert-Butyl ether	-1.000	0.000	0.0	0	-8.74#
29	T	2-Butanone	-1.000	0.000	0.0	0	-8.93#
30	T	Propionitrile	-1.000	0.000	0.0	0	-9.03#
31	T	2,2-Dichloropropane	-1.000	0.280	0.0	100	0.00
32	T	cis-1,2-Dichloroethene	-1.000	0.241	0.0	100	0.00
33	C	Chloroform	0.300	0.336	-12.0	100	0.00
34		1-Bromopropane	-1.000	0.000	0.0	0	-9.55#
35	T	Bromochloromethane	-1.000	0.202	0.0	100	0.00
36	T	Tetrahydrofuran	-1.000	0.918	0.0	100	0.02
37	S	Dibromofluoromethane	-1.000	0.000	0.0	0	-9.70#
38	T	1,1,1-Trichloroethane	-1.000	0.271	0.0	100	0.00
39	T	Cyclohexane	-1.000	0.309	0.0	100	0.00
40	T	1,1-Dichloropropene	-1.000	0.299	0.0	100	0.00
41	T	Tert-Amyl-Methyl ether	-1.000	0.000	0.0	0	-10.24#
42	T	Carbon Tetrachloride	-1.000	0.242	0.0	100	0.00
43	S	1,2-Dichloroethane-d4	-1.000	0.000	0.0	0	-10.33#
44		Heptane	-1.000	0.000	0.0	0	-2.63#
45	T	1,2-Dichloroethane	-1.000	0.292	0.0	100	0.00
46	T	Benzene	-1.000	0.304	0.0	100	0.00
47	T	Trichloroethene	0.300	0.309	-3.0	100	0.00
48	T	Methylcyclohexane	-1.000	0.294	0.0	100	0.00
49	C	1,2-Dichloropropane	-1.000	0.274	0.0	100	0.00
50	T	Bromodichloromethane	-1.000	0.246	0.0	100	0.00
51	T	1,4-Dioxane	-1.000	0.000	0.0	0	-11.75#
52	T	Dibromomethane	-1.000	0.000	0.0	0	-11.84#
53	T	2-Chloroethyl Vinyl Ether	-1.000	0.000	0.0	0	-12.05#
54	T	4-Methyl-2-Pentanone	-1.000	0.000	0.0	0	-12.08#
55	T	cis-1,3-Dichloropropene	-1.000	0.281	0.0	100	0.00
56	T	Dimethyl Disulfide	-1.000	0.193	0.0	100	0.00
57	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00

58	S	Toluene-d8	-1.000	0.277	0.0	100	0.00	
59	C	Toluene	-1.000	0.302	0.0	100	0.00	
60	T	Ethyl Methacrylate	-1.000	0.565	0.0	100	0.01	
61		Paraldehyde	-1.000	0.000	0.0	0	-13.45#	
62	T	trans-1,3-Dichloropropene	-1.000	0.261	0.0	100	0.00	
63	T	1,1,2-Trichloroethane	-1.000	0.206	0.0	100	0.00	
64	T	2-Hexanone	-1.000	0.000	0.0	0	-13.14#	
65	T	1,3-Dichloropropane	-1.000	0.283	0.0	100	0.00	
66	T	Tetrachloroethene	-1.000	0.252	0.0	100	0.00	
67	T	Dibromochloromethane	-1.000	0.235	0.0	100	0.00	
68	T	1,2-Dibromoethane	-1.000	0.207	0.0	100	0.00	
69	T	1-Chlorohexane	-1.000	0.291	0.0	100	0.00	
70	P	Chlorobenzene	0.300	0.336	-12.0	100	0.00	
71	T	1,1,1,2-Tetrachloroethane	-1.000	0.267	0.0	100	0.00	
72	C	Ethylbenzene	0.300	0.275	8.3	100	0.00	
73	T	m-,p-Xylene	0.600	0.620	-3.3	100	0.00	
74	T	o-Xylene	0.300	0.286	4.7	100	0.00	
75	T	Styrene	-1.000	0.253	0.0	100	0.00	
76	P	Bromoform	-1.000	0.183	0.0	100	0.00	
77	T	Isopropylbenzene	-1.000	0.302	0.0	100	0.00	
78	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00	
79	P	1,1,2,2-Tetrachloroethane	-1.000	0.292	0.0	100	0.00	
80	S	p-Bromofluorobenzene	-1.000	0.405	0.0	100	0.00	
81	T	1,2,3-Trichloropropane	-1.000	0.000	0.0	0	-16.16#	
82	T	trans-1,4-Dichloro-2-Butene	-1.000	0.000	0.0	0	-16.20#	
83	T	n-Propylbenzene	-1.000	0.320	0.0	100	0.00	
84	T	Bromobenzene	-1.000	0.277	0.0	100	0.00	
85	T	1,3,5-Trimethylbenzene	-1.000	0.310	0.0	100	0.00	
86	T	2-Chlorotoluene	-1.000	0.278	0.0	100	0.00	
87	T	4-Chlorotoluene	-1.000	0.360	0.0	100	0.00	
88	T	a-Methylstyrene	-1.000	0.251	0.0	100	0.00	
89	T	tert-Butylbenzene	-1.000	0.249	0.0	100	0.00	
90	T	1,2,4-Trimethylbenzene	-1.000	0.293	0.0	100	0.00	
91	T	sec-Butylbenzene	-1.000	0.313	0.0	100	0.00	
92	T	p-Isopropyltoluene	-1.000	0.308	0.0	100	0.00	
93	T	1,3-Dichlorobenzene	-1.000	0.293	0.0	100	0.00	
94	T	1,4-Dichlorobenzene	-1.000	0.330	0.0	100	0.00	
95	T	n-Butylbenzene	-1.000	0.325	0.0	100	0.00	
96	T	1,2-Dichlorobenzene	0.300	0.298	0.7	100	0.00	
97	T	1,2-Dibromo-3-Chloropropane	-1.000	0.000	0.0	0	-19.15#	
98	T	1,2,4-Trichlorobenzene	-1.000	0.321	0.0	100	0.00	
99	T	Hexachlorobutadiene	-1.000	0.291	0.0	100	0.00	
100	T	Naphthalene	-1.000	0.292	0.0	100	0.00	
101	T	1,2,3-Trichlorobenzene	-1.000	0.303	0.0	100	0.00	

(#) = Out of Range SPCC's out = 0 CCC's out = 0

8M428956.D 8260WTR.M Tue Mar 05 10:50:08 2019

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428957.D Vial: 3
Acq On : 4 Mar 2019 13:15 Operator: EEA
Sample : WG698192-03 0.4 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:37 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	562289	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.60	117	415167	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	213977	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	0.00	111	0	0.0000	ug/L	
Spiked Amount 25.000	Range 86 - 118		Recovery =	0.00%#		
43) 1,2-Dichloroethane-d4	0.00	65	0	0.0000	ug/L	
Spiked Amount 25.000	Range 80 - 120		Recovery =	0.00%#		
58) Toluene-d8	12.71	98	3766	0.1781	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery =	0.72%#		
80) p-Bromofluorobenzene	16.10	95	2055	0.2661	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery =	1.08%#		
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.24	85	2978	0.3045	ug/L	96
3) Chloromethane	3.69	50	7913	0.5626	ug/L #	60
4) Vinyl Chloride	3.92	62	4171	0.3639	ug/L	94
5) 1,3-Butadiene	3.98	54	3680	Below Cal	#	63
6) Bromomethane	4.81	94	2607	0.3781	ug/L	90
7) Chloroethane	4.97	64	1991	0.3246	ug/L #	45
8) Trichlorofluoromethane	5.44	101	4235	0.3639	ug/L #	89
10) Isoprene	6.01	67	3944	0.3391	ug/L	90
12) 1,1,2-Trichloro-1,2,2-Trif	6.21	101	1876	0.2798	ug/L	82
14) 1,1-Dichloroethene	6.54	61	4599	0.3835	ug/L	100
16) Dimethyl Sulfide	6.79	62	2470	0.2859	ug/L	95
19) Methylene Chloride	7.31	84	2981	0.3978	ug/L	90
20) Carbon Disulfide	7.35	76	9485	0.4230	ug/L #	74
22) Methyl Tert Butyl Ether	7.51	73	6596	0.3698	ug/L #	76
23) trans-1,2-Dichloroethene	7.75	61	4305	0.3757	ug/L	97
24) n-Hexane	7.83	57	4217	0.3750	ug/L	88
27) 1,1-Dichloroethane	8.37	63	5617	0.3792	ug/L #	84
31) 2,2-Dichloropropane	9.13	77	4556	0.4239	ug/L #	69
32) cis-1,2-Dichloroethene	9.21	96	2824	0.3453	ug/L	93
33) Chloroform	9.41	83	5232	0.3980	ug/L	96
35) Bromochloromethane	9.65	130	1640	0.3516	ug/L	87
36) Tetrahydrofuran	9.69	42	1180	0.6874	ug/L #	40
38) 1,1,1-Trichloroethane	9.94	97	4196	0.3675	ug/L	99
39) Cyclohexane	9.97	56	5825	0.3830	ug/L #	86
40) 1,1-Dichloropropene	10.14	75	3187	0.3324	ug/L	84
42) Carbon Tetrachloride	10.28	117	3577	0.3447	ug/L #	85
45) 1,2-Dichloroethane	10.46	62	3047	0.3389	ug/L #	81
46) Benzene	10.50	78	11649	0.3878	ug/L	92
47) Trichloroethene	11.23	130	2846	0.3478	ug/L	99
48) Methylcyclohexane	11.33	83	4638	0.3660	ug/L	98
49) 1,2-Dichloropropane	11.46	63	2858	0.3505	ug/L	85
50) Bromodichloromethane	11.76	83	3394	0.3595	ug/L #	80
52) Dibromomethane	11.84	93	846	0.2254	ug/L	73
55) cis-1,3-Dichloropropene	12.39	75	3885	0.3459	ug/L	94
56) Dimethyl Disulfide	12.66	79	1797	0.2606	ug/L	92
59) Toluene	12.82	91	12108	0.3906	ug/L	97
60) Ethyl Methacrylate	12.91	69	1310	0.6387	ug/L	95
62) trans-1,3-Dichloropropene	12.99	75	2606	0.2796	ug/L	94
63) 1,1,2-Trichloroethane	13.20	97	1836	0.3388	ug/L	91
65) 1,3-Dichloropropane	13.51	76	3153	0.3379	ug/L	99

(#) = qualifier out of range (m) = manual integration
8M428957.D 8260WTR.M Tue Mar 05 10:54:40 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428957.D Vial: 3
Acq On : 4 Mar 2019 13:15 Operator: EEA
Sample : WG698192-03 0.4 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:37 2019 Quant Results File: 8260WTR.RES

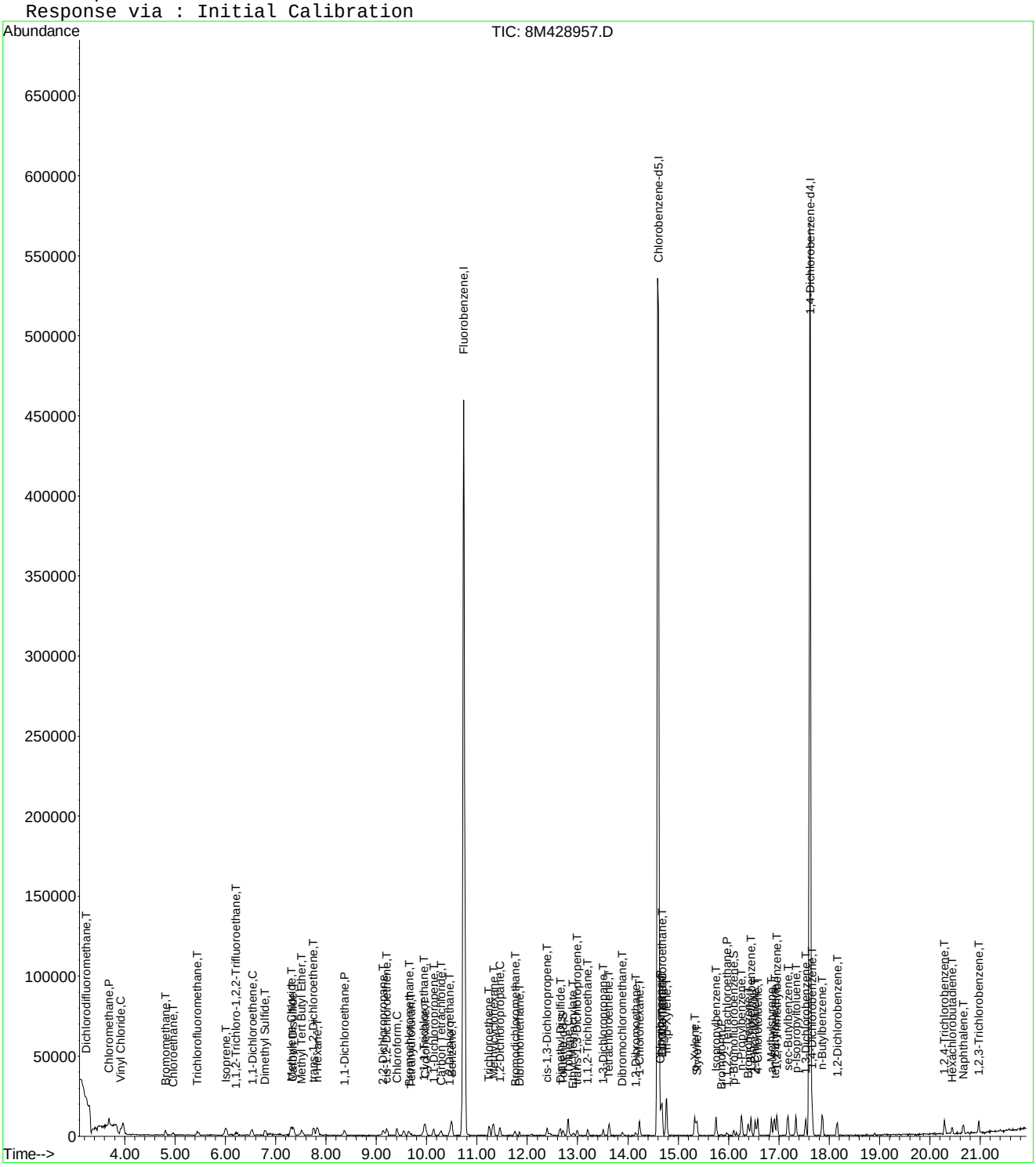
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc Unit		Qvalue
66)	Tetrachloroethene	13.62	164	2418	0.3702 ug/L		92
67)	Dibromochloromethane	13.89	129	1979	0.2878 ug/L		97
68)	1,2-Dibromoethane	14.16	107	1657	0.3149 ug/L		93
69)	1-Chlorohexane	14.23	91	3513	0.3270 ug/L		94
70)	Chlorobenzene	14.65	112	7890	0.3755 ug/L		95
71)	1,1,1,2-Tetrachloroethane	14.68	131	2648	0.3427 ug/L		91
72)	Ethylbenzene	14.68	106	4269	0.3755 ug/L		92
73)	m-,p-Xylene	14.77	106	10707	0.7729 ug/L		97
74)	o-Xylene	15.33	106	4827	0.3591 ug/L		94
75)	Styrene	15.37	104	7151	0.3213 ug/L		89
76)	Bromoform	15.86	173	1112	0.2608 ug/L	#	27
77)	Isopropylbenzene	15.75	105	12556	0.3698 ug/L		95
79)	1,1,2,2-Tetrachloroethane	15.97	83	2195	0.3636 ug/L	#	80
83)	n-Propylbenzene	16.26	91	15652	0.4042 ug/L		92
84)	Bromobenzene	16.39	156	3007	0.3394 ug/L	#	62
85)	1,3,5-Trimethylbenzene	16.44	105	10215	0.3659 ug/L		100
86)	2-Chlorotoluene	16.53	91	9099	0.3554 ug/L		95
87)	4-Chlorotoluene	16.58	91	8507	0.3803 ug/L		99
88)	a-Methylstyrene	16.85	118	4857	0.3032 ug/L		98
89)	tert-Butylbenzene	16.92	134	2096	0.3255 ug/L		73
90)	1,2,4-Trimethylbenzene	16.96	105	10687	0.3782 ug/L		94
91)	sec-Butylbenzene	17.18	105	13726	0.3842 ug/L		97
92)	p-Isopropyltoluene	17.34	119	11628	0.3797 ug/L		100
93)	1,3-Dichlorobenzene	17.53	146	6657	0.3854 ug/L		97
94)	1,4-Dichlorobenzene	17.66	146	7394	0.4227 ug/L		94
95)	n-Butylbenzene	17.86	91	11247	0.4031 ug/L		92
96)	1,2-Dichlorobenzene	18.16	146	6321	0.3944 ug/L		85
98)	1,2,4-Trichlorobenzene	20.29	180	4623	0.3975 ug/L		99
99)	Hexachlorobutadiene	20.45	225	2057	0.3753 ug/L	#	82
100)	Naphthalene	20.66	128	7298	0.3442 ug/L		95
101)	1,2,3-Trichlorobenzene	20.97	180	4025	0.3767 ug/L		93

(#) = qualifier out of range (m) = manual integration
8M428957.D 8260WTR.M Tue Mar 05 10:54:40 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428957.D Vial: 3
Acq On : 4 Mar 2019 13:15 Operator: EEA
Sample : WG698192-03 0.4 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428957.D Vial: 3
Acq On : 4 Mar 2019 13:15 Operator: EEA
Sample : WG698192-03 0.4 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	-1.000	0.304	0.0	100	0.01
3	P	Chloromethane	-1.000	0.563	0.0	100	0.00
4	C	Vinyl Chloride	0.400	0.364	9.0	100	0.01
5	T	1,3-Butadiene	-1.000	-4.359	0.0	0	0.02
6	T	Bromomethane	-1.000	0.378	0.0	100	0.00
7	T	Chloroethane	-1.000	0.325	0.0	100	0.00
8	T	Trichlorofluoromethane	0.400	0.364	9.0	100	0.00
9	T	Diethyl ether	-1.000	0.000	0.0	0	-5.97#
10	T	Isoprene	-1.000	0.339	0.0	100	0.01
11	T	Acrolein	-1.000	0.000	0.0	0	-6.21#
12	T	1,1,2-Trichloro-1,2,2-Trifl	-1.000	0.280	0.0	100	0.00
13	T	Acetone	-1.000	0.000	0.0	0	-6.31#
14	C	1,1-Dichloroethene	0.400	0.384	4.0	100	0.01
15	T	Tert-Butyl Alcohol	-1.000	0.000	0.0	0	-6.63#
16	T	Dimethyl Sulfide	-1.000	0.286	0.0	100	0.00
17	T	Iodomethane	-1.000	0.000	0.0	0	-7.03#
18	T	Methyl acetate	-1.000	0.000	0.0	0	-7.05#
19	T	Methylene Chloride	-1.000	0.398	0.0	100	0.01
20	T	Carbon Disulfide	-1.000	0.423	0.0	100	0.00
21	T	Acrylonitrile	-1.000	0.000	0.0	0	-7.49#
22	T	Methyl Tert Butyl Ether	-1.000	0.370	0.0	100	0.00
23	T	trans-1,2-Dichloroethene	0.400	0.376	6.0	100	0.00
24	T	n-Hexane	-1.000	0.375	0.0	100	0.00
25	T	Diisopropyl ether	-1.000	0.000	0.0	0	-8.17#
26	T	Vinyl Acetate	-1.000	0.108	0.0	100	0.02
27	P	1,1-Dichloroethane	0.400	0.379	5.3	100	0.00
28	T	Ethyl-Tert-Butyl ether	-1.000	0.000	0.0	0	-8.74#
29	T	2-Butanone	-1.000	0.000	0.0	0	-8.93#
30	T	Propionitrile	-1.000	0.000	0.0	0	-9.03#
31	T	2,2-Dichloropropane	-1.000	0.424	0.0	100	0.00
32	T	cis-1,2-Dichloroethene	0.400	0.345	13.8	100	0.00
33	C	Chloroform	0.400	0.398	0.5	100	0.00
34		1-Bromopropane	-1.000	0.000	0.0	0	-9.55#
35	T	Bromochloromethane	-1.000	0.352	0.0	100	0.01
36	T	Tetrahydrofuran	-1.000	0.687	0.0	100	0.02
37	S	Dibromofluoromethane	-1.000	0.000	0.0	0	-9.70#
38	T	1,1,1-Trichloroethane	-1.000	0.367	0.0	100	0.00
39	T	Cyclohexane	-1.000	0.383	0.0	100	0.00
40	T	1,1-Dichloropropene	0.400	0.332	17.0	100	0.00
41	T	Tert-Amyl-Methyl ether	-1.000	0.000	0.0	0	-10.24#
42	T	Carbon Tetrachloride	-1.000	0.345	0.0	100	0.00
43	S	1,2-Dichloroethane-d4	-1.000	0.000	0.0	0	-10.33#
44		Heptane	-1.000	0.000	0.0	0	-2.63#
45	T	1,2-Dichloroethane	0.400	0.339	15.3	100	0.00
46	T	Benzene	0.400	0.388	3.0	100	0.00
47	T	Trichloroethene	0.400	0.348	13.0	100	0.00
48	T	Methylcyclohexane	-1.000	0.366	0.0	100	0.00
49	C	1,2-Dichloropropane	0.400	0.351	12.3	100	0.00
50	T	Bromodichloromethane	0.400	0.360	10.0	100	0.00
51	T	1,4-Dioxane	-1.000	0.000	0.0	0	-11.75#
52	T	Dibromomethane	-1.000	0.225	0.0	100	0.00
53	T	2-Chloroethyl Vinyl Ether	-1.000	0.000	0.0	0	-12.05#
54	T	4-Methyl-2-Pentanone	-1.000	0.000	0.0	0	-12.08#
55	T	cis-1,3-Dichloropropene	0.400	0.346	13.5	100	0.00
56	T	Dimethyl Disulfide	-1.000	0.261	0.0	100	0.01
57	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00

58	S	Toluene-d8	-1.000	0.178	0.0	100	0.00	
59	C	Toluene	0.400	0.391	2.3	100	0.00	
60	T	Ethyl Methacrylate	-1.000	0.639	0.0	100	0.00	
61		Paraldehyde	-1.000	0.000	0.0	0	-13.45#	
62	T	trans-1,3-Dichloropropene	-1.000	0.280	0.0	100	0.00	
63	T	1,1,2-Trichloroethane	0.400	0.339	15.3	100	0.00	
64	T	2-Hexanone	-1.000	0.000	0.0	0	-13.14#	
65	T	1,3-Dichloropropane	0.400	0.338	15.5	100	0.00	
66	T	Tetrachloroethene	0.400	0.370	7.5	100	0.00	
67	T	Dibromochloromethane	-1.000	0.288	0.0	100	0.00	
68	T	1,2-Dibromoethane	0.400	0.315	21.3	100	0.01	
69	T	1-Chlorohexane	-1.000	0.327	0.0	100	0.00	
70	P	Chlorobenzene	0.400	0.375	6.3	100	0.00	
71	T	1,1,1,2-Tetrachloroethane	-1.000	0.343	0.0	100	0.00	
72	C	Ethylbenzene	0.400	0.375	6.3	100	0.00	
73	T	m-,p-Xylene	0.800	0.773	3.4	100	0.00	
74	T	o-Xylene	0.400	0.359	10.3	100	0.00	
75	T	Styrene	-1.000	0.321	0.0	100	0.00	
76	P	Bromoform	-1.000	0.261	0.0	100	0.00	
77	T	Isopropylbenzene	0.400	0.370	7.5	100	0.00	
78	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00	
79	P	1,1,2,2-Tetrachloroethane	0.400	0.364	9.0	100	0.00	
80	S	p-Bromofluorobenzene	-1.000	0.266	0.0	100	0.00	
81	T	1,2,3-Trichloropropane	-1.000	0.000	0.0	0	-16.16#	
82	T	trans-1,4-Dichloro-2-Butene	-1.000	0.000	0.0	0	-16.20#	
83	T	n-Propylbenzene	0.400	0.404	-1.0	100	0.00	
84	T	Bromobenzene	0.400	0.339	15.3	100	0.00	
85	T	1,3,5-Trimethylbenzene	0.400	0.366	8.5	100	0.00	
86	T	2-Chlorotoluene	0.400	0.355	11.3	100	0.00	
87	T	4-Chlorotoluene	0.400	0.380	5.0	100	0.00	
88	T	a-Methylstyrene	-1.000	0.303	0.0	100	0.00	
89	T	tert-Butylbenzene	-1.000	0.325	0.0	100	0.01	
90	T	1,2,4-Trimethylbenzene	0.400	0.378	5.5	100	0.00	
91	T	sec-Butylbenzene	0.400	0.384	4.0	100	0.00	
92	T	p-Isopropyltoluene	0.400	0.380	5.0	100	0.01	
93	T	1,3-Dichlorobenzene	0.400	0.385	3.8	100	0.00	
94	T	1,4-Dichlorobenzene	0.400	0.423	-5.7	100	0.00	
95	T	n-Butylbenzene	0.400	0.403	-0.8	100	0.00	
96	T	1,2-Dichlorobenzene	0.400	0.394	1.5	100	0.00	
97	T	1,2-Dibromo-3-Chloropropane	-1.000	0.000	0.0	0	-19.15#	
98	T	1,2,4-Trichlorobenzene	0.400	0.397	0.8	100	0.00	
99	T	Hexachlorobutadiene	0.400	0.375	6.3	100	0.00	
100	T	Naphthalene	0.400	0.344	14.0	100	0.00	
101	T	1,2,3-Trichlorobenzene	0.400	0.377	5.8	100	0.00	

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M428957.D 8260WTR.M Tue Mar 05 10:50:33 2019

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428958.D Vial: 4
Acq On : 4 Mar 2019 13:43 Operator: EEA
Sample : WG698192-04 1 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:41 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	567997	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.60	117	414878	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	217135	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	0.00	111	0	0.0000	ug/L	
Spiked Amount 25.000	Range 86 - 118		Recovery =	0.00%#		
43) 1,2-Dichloroethane-d4	0.00	65	0	0.0000	ug/L	
Spiked Amount 25.000	Range 80 - 120		Recovery =	0.00%#		
58) Toluene-d8	12.71	98	3302	0.1562	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery =	0.64%#		
80) p-Bromofluorobenzene	16.10	95	2268	0.2894	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery =	1.16%#		
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.23	85	8615	0.8720	ug/L	98
3) Chloromethane	3.69	50	15740	1.1078	ug/L	81
4) Vinyl Chloride	3.92	62	10943	0.9451	ug/L	97
5) 1,3-Butadiene	3.96	54	10326	Below Cal		91
6) Bromomethane	4.81	94	7076	1.0160	ug/L	96
7) Chloroethane	4.97	64	5329	0.8600	ug/L	84
8) Trichlorofluoromethane	5.44	101	10885	0.9259	ug/L #	96
9) Diethyl ether	5.97	59	27357	4.3632	ug/L	100
10) Isoprene	6.01	67	10172	0.8657	ug/L	95
11) Acrolein	6.22	56	691	0.9611	ug/L #	15
12) 1,1,2-Trichloro-1,2,2-Trif	6.21	101	6004	0.8865	ug/L	99
13) Acetone	6.32	43	1013	0.5790	ug/L #	45
14) 1,1-Dichloroethene	6.53	61	11458	0.9459	ug/L	96
15) Tert-Butyl Alcohol	6.65	59	4346	7.7165	ug/L #	87
16) Dimethyl Sulfide	6.79	62	7128	0.8169	ug/L	98
17) Iodomethane	7.06	142	1223	1.6453	ug/L #	36
18) Methyl acetate	7.08	43	2460	0.5430	ug/L #	65
19) Methylene Chloride	7.30	84	6798	0.8981	ug/L	95
20) Carbon Disulfide	7.35	76	22105	0.9759	ug/L	99
21) Acrylonitrile	7.51	53	2590	1.1799	ug/L	100
22) Methyl Tert Butyl Ether	7.52	73	16464	0.9138	ug/L	93
23) trans-1,2-Dichloroethene	7.75	61	10924	0.9438	ug/L	97
24) n-Hexane	7.82	57	10796	0.9504	ug/L	98
25) Diisopropyl ether	8.17	45	131662	4.5950	ug/L	99
26) Vinyl Acetate	8.36	43	6278	0.5906	ug/L #	77
27) 1,1-Dichloroethane	8.37	63	14180	0.9477	ug/L	96
28) Ethyl-Tert-Butyl ether	8.74	59	113232	4.5595	ug/L	98
30) Propionitrile	9.04	54	664	5.3104	ug/L #	58
31) 2,2-Dichloropropane	9.14	77	10364	0.9546	ug/L	99
32) cis-1,2-Dichloroethene	9.21	96	7715	0.9339	ug/L	90
33) Chloroform	9.41	83	12814	0.9649	ug/L	96
34) 1-Bromopropane	9.55	122	1292	0.7276	ug/L	83
35) Bromochloromethane	9.64	130	3907	0.8293	ug/L	89
36) Tetrahydrofuran	9.68	42	8257	4.7614	ug/L	89
38) 1,1,1-Trichloroethane	9.95	97	10277	0.8910	ug/L	99
39) Cyclohexane	9.98	56	14240	0.9269	ug/L	99
40) 1,1-Dichloropropene	10.14	75	9179	0.9477	ug/L	96
41) Tert-Amyl-Methyl ether	10.24	73	84665	4.4737	ug/L	98
42) Carbon Tetrachloride	10.28	117	9534	0.9096	ug/L	98
45) 1,2-Dichloroethane	10.46	62	8742	0.9624	ug/L	93

(#) = qualifier out of range (m) = manual integration
8M428958.D 8260WTR.M Tue Mar 05 10:54:44 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428958.D Vial: 4
Acq On : 4 Mar 2019 13:43 Operator: EEA
Sample : WG698192-04 1 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:41 2019 Quant Results File: 8260WTR.RES

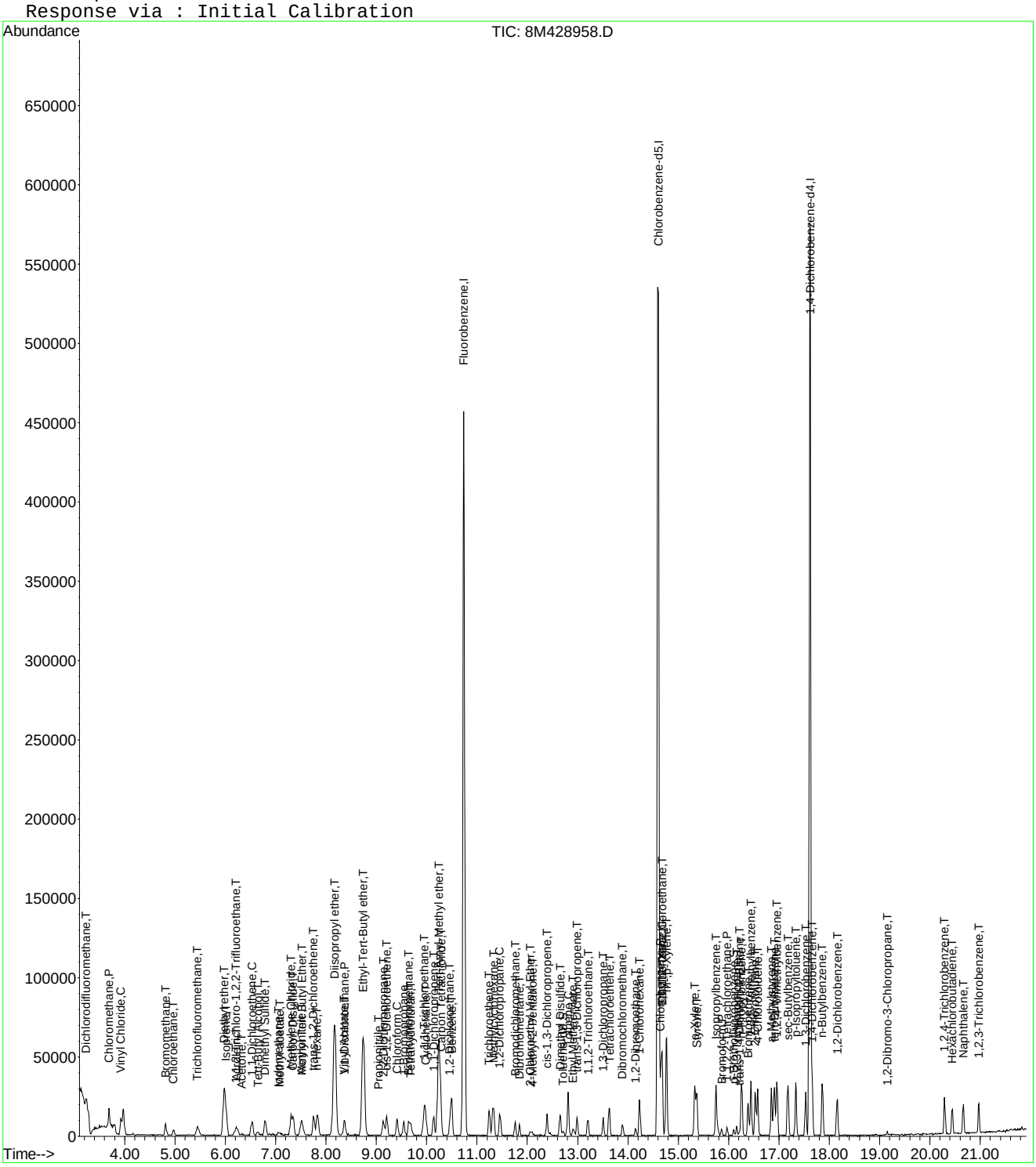
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
46)	Benzene	10.50	78	28601	0.9426	ug/L		99
47)	Trichloroethene	11.24	130	7731	0.9352	ug/L		97
48)	Methylcyclohexane	11.33	83	11923	0.9313	ug/L		99
49)	1,2-Dichloropropane	11.45	63	7389	0.8972	ug/L		98
50)	Bromodichloromethane	11.76	83	8277	0.8680	ug/L	#	92
52)	Dibromomethane	11.84	93	3237	0.8539	ug/L		95
53)	2-Chloroethyl Vinyl Ether	12.06	63	1864	0.5180	ug/L	#	49
54)	4-Methyl-2-Pentanone	12.10	58	674	0.2977	ug/L	#	41
55)	cis-1,3-Dichloropropene	12.39	75	10306	0.9084	ug/L		99
56)	Dimethyl Disulfide	12.65	79	4981	0.7150	ug/L		100
59)	Toluene	12.82	91	29850	0.9636	ug/L		97
60)	Ethyl Methacrylate	12.91	69	4388	1.0179	ug/L		85
62)	trans-1,3-Dichloropropene	12.99	75	7608	0.8170	ug/L		99
63)	1,1,2-Trichloroethane	13.21	97	4956	0.9153	ug/L		99
65)	1,3-Dichloropropane	13.51	76	8573	0.9193	ug/L		94
66)	Tetrachloroethene	13.63	164	6159	0.9435	ug/L		97
67)	Dibromochloromethane	13.89	129	5806	0.8449	ug/L		100
68)	1,2-Dibromoethane	14.15	107	4641	0.8827	ug/L		97
69)	1-Chlorohexane	14.23	91	10107	0.9416	ug/L		97
70)	Chlorobenzene	14.65	112	20039	0.9543	ug/L		82
71)	1,1,1,2-Tetrachloroethane	14.68	131	6625	0.8581	ug/L		100
72)	Ethylbenzene	14.68	106	10609	0.9337	ug/L		95
73)	m-,p-Xylene	14.77	106	26529	1.9163	ug/L		91
74)	o-Xylene	15.33	106	12046	0.8968	ug/L		87
75)	Styrene	15.37	104	19275	0.8667	ug/L		96
76)	Bromoform	15.87	173	3355	0.7874	ug/L		93
77)	Isopropylbenzene	15.75	105	32684	0.9633	ug/L		97
79)	1,1,2,2-Tetrachloroethane	15.97	83	5438	0.8877	ug/L	#	91
81)	1,2,3-Trichloropropane	16.16	110	1456	0.7945	ug/L	#	56
82)	trans-1,4-Dichloro-2-Buten	16.22	53	1255	0.6060	ug/L	#	49
83)	n-Propylbenzene	16.26	91	38492	0.9796	ug/L		98
84)	Bromobenzene	16.39	156	8281	0.9210	ug/L		95
85)	1,3,5-Trimethylbenzene	16.44	105	27707	0.9781	ug/L		96
86)	2-Chlorotoluene	16.53	91	26656	1.0259	ug/L		98
87)	4-Chlorotoluene	16.58	91	21953	0.9670	ug/L		97
88)	a-Methylstyrene	16.85	118	13813	0.8498	ug/L		97
89)	tert-Butylbenzene	16.91	134	5896	0.9022	ug/L		95
90)	1,2,4-Trimethylbenzene	16.96	105	26912	0.9384	ug/L		99
91)	sec-Butylbenzene	17.18	105	35426	0.9772	ug/L		97
92)	p-Isopropyltoluene	17.33	119	29532	0.9503	ug/L		98
93)	1,3-Dichlorobenzene	17.53	146	16643	0.9495	ug/L		97
94)	1,4-Dichlorobenzene	17.66	146	17019	0.9588	ug/L		79
95)	n-Butylbenzene	17.86	91	26429	0.9334	ug/L		98
96)	1,2-Dichlorobenzene	18.16	146	15857	0.9749	ug/L		93
97)	1,2-Dibromo-3-Chloropropan	19.15	75	742	0.6720	ug/L		97
98)	1,2,4-Trichlorobenzene	20.29	180	10753	0.9111	ug/L		99
99)	Hexachlorobutadiene	20.45	225	4942	0.8887	ug/L		93
100)	Naphthalene	20.66	128	20225	0.9401	ug/L		98
101)	1,2,3-Trichlorobenzene	20.97	180	10148	0.9360	ug/L		96

(#) = qualifier out of range (m) = manual integration
8M428958.D 8260WTR.M Tue Mar 05 10:54:44 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428958.D Vial: 4
Acq On : 4 Mar 2019 13:43 Operator: EEA
Sample : WG698192-04 1 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428958.D Vial: 4
Acq On : 4 Mar 2019 13:43 Operator: EEA
Sample : WG698192-04 1 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	1.000	0.872	12.8	100	0.00
3	P	Chloromethane	1.000	1.108	-10.8	100	0.00
4	C	Vinyl Chloride	1.000	0.945	5.5	100	0.01
5	T	1,3-Butadiene	-1.000	-3.263	0.0	0	0.01
6	T	Bromomethane	1.000	1.016	-1.6	100	0.00
7	T	Chloroethane	1.000	0.860	14.0	100	0.00
8	T	Trichlorofluoromethane	1.000	0.926	7.4	100	0.00
9	T	Diethyl ether	5.000	4.363	12.7	100	0.00
10	T	Isoprene	-1.000	0.866	0.0	100	0.01
11	T	Acrolein	-1.000	0.961	0.0	100	0.01
12	T	1,1,2-Trichloro-1,2,2-Trifl	1.000	0.886	11.4	100	0.00
13	T	Acetone	-1.000	0.579	0.0	100	0.01
14	C	1,1-Dichloroethene	1.000	0.946	5.4	100	0.00
15	T	Tert-Butyl Alcohol	-1.000	7.716	0.0	100	0.02
16	T	Dimethyl Sulfide	-1.000	0.817	0.0	100	0.00
17	T	Iodomethane	1.000	1.645	-64.5#	100	0.02
18	T	Methyl acetate	-1.000	0.543	0.0	100	0.02
19	T	Methylene Chloride	1.000	0.898	10.2	100	0.00
20	T	Carbon Disulfide	1.000	0.976	2.4	100	0.00
21	T	Acrylonitrile	-1.000	1.180	0.0	100	0.02
22	T	Methyl Tert Butyl Ether	1.000	0.914	8.6	100	0.01
23	T	trans-1,2-Dichloroethene	1.000	0.944	5.6	100	0.00
24	T	n-Hexane	1.000	0.950	5.0	100	0.00
25	T	Diisopropyl ether	5.000	4.595	8.1	100	0.00
26	T	Vinyl Acetate	-1.000	0.591	0.0	100	0.02
27	P	1,1-Dichloroethane	1.000	0.948	5.2	100	0.00
28	T	Ethyl-Tert-Butyl ether	5.000	4.560	8.8	100	0.00
29	T	2-Butanone	-1.000	0.000	0.0	0	-8.93#
30	T	Propionitrile	5.000	5.310	-6.2	100	0.01
31	T	2,2-Dichloropropane	1.000	0.955	4.5	100	0.00
32	T	cis-1,2-Dichloroethene	1.000	0.934	6.6	100	0.00
33	C	Chloroform	1.000	0.965	3.5	100	0.00
34		1-Bromopropane	-1.000	0.728	0.0	100	0.00
35	T	Bromochloromethane	1.000	0.829	17.1	100	0.00
36	T	Tetrahydrofuran	5.000	4.761	4.8	100	0.01
37	S	Dibromofluoromethane	-1.000	0.000	0.0	0	-9.70#
38	T	1,1,1-Trichloroethane	1.000	0.891	10.9	100	0.01
39	T	Cyclohexane	1.000	0.927	7.3	100	0.01
40	T	1,1-Dichloropropene	1.000	0.948	5.2	100	0.00
41	T	Tert-Amyl-Methyl ether	5.000	4.474	10.5	100	0.00
42	T	Carbon Tetrachloride	1.000	0.910	9.0	100	0.00
43	S	1,2-Dichloroethane-d4	-1.000	0.000	0.0	0	-10.33#
44		Heptane	-1.000	0.000	0.0	0	-2.63#
45	T	1,2-Dichloroethane	1.000	0.962	3.8	100	0.00
46	T	Benzene	1.000	0.943	5.7	100	0.00
47	T	Trichloroethene	1.000	0.935	6.5	100	0.00
48	T	Methylcyclohexane	1.000	0.931	6.9	100	0.00
49	C	1,2-Dichloropropane	1.000	0.897	10.3	100	0.00
50	T	Bromodichloromethane	1.000	0.868	13.2	100	0.00
51	T	1,4-Dioxane	-1.000	0.000	0.0	0	-11.75#
52	T	Dibromomethane	1.000	0.854	14.6	100	0.00
53	T	2-Chloroethyl Vinyl Ether	-1.000	0.518	0.0	100	0.01
54	T	4-Methyl-2-Pentanone	-1.000	0.298	0.0	100	0.02
55	T	cis-1,3-Dichloropropene	1.000	0.908	9.2	100	0.00
56	T	Dimethyl Disulfide	-1.000	0.715	0.0	100	0.00
57	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00

58	S	Toluene-d8	-1.000	0.156	0.0	100	0.00	
59	C	Toluene	1.000	0.964	3.6	100	0.00	
60	T	Ethyl Methacrylate	1.000	1.018	-1.8	100	0.00	
61		Paraldehyde	-1.000	0.000	0.0	0	-13.45#	
62	T	trans-1,3-Dichloropropene	1.000	0.817	18.3	100	0.00	
63	T	1,1,2-Trichloroethane	1.000	0.915	8.5	100	0.00	
64	T	2-Hexanone	-1.000	0.000	0.0	0	-13.14#	
65	T	1,3-Dichloropropane	1.000	0.919	8.1	100	0.00	
66	T	Tetrachloroethene	1.000	0.943	5.7	100	0.00	
67	T	Dibromochloromethane	1.000	0.845	15.5	100	0.00	
68	T	1,2-Dibromoethane	1.000	0.883	11.7	100	0.00	
69	T	1-Chlorohexane	1.000	0.942	5.8	100	0.00	
70	P	Chlorobenzene	1.000	0.954	4.6	100	0.00	
71	T	1,1,1,2-Tetrachloroethane	1.000	0.858	14.2	100	0.00	
72	C	Ethylbenzene	1.000	0.934	6.6	100	0.00	
73	T	m-,p-Xylene	2.000	1.916	4.2	100	0.00	
74	T	o-Xylene	1.000	0.897	10.3	100	0.00	
75	T	Styrene	1.000	0.867	13.3	100	0.00	
76	P	Bromoform	1.000	0.787	21.3	100	0.00	
77	T	Isopropylbenzene	1.000	0.963	3.7	100	0.00	
78	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00	
79	P	1,1,2,2-Tetrachloroethane	1.000	0.888	11.2	100	0.00	
80	S	p-Bromofluorobenzene	-1.000	0.289	0.0	100	0.00	
81	T	1,2,3-Trichloropropane	1.000	0.795	20.5	100	0.00	
82	T	trans-1,4-Dichloro-2-Butene	-1.000	0.606	0.0	100	0.01	
83	T	n-Propylbenzene	1.000	0.980	2.0	100	0.00	
84	T	Bromobenzene	1.000	0.921	7.9	100	0.00	
85	T	1,3,5-Trimethylbenzene	1.000	0.978	2.2	100	0.00	
86	T	2-Chlorotoluene	1.000	1.026	-2.6	100	0.00	
87	T	4-Chlorotoluene	1.000	0.967	3.3	100	0.00	
88	T	a-Methylstyrene	-1.000	0.850	0.0	100	0.00	
89	T	tert-Butylbenzene	1.000	0.902	9.8	100	0.00	
90	T	1,2,4-Trimethylbenzene	1.000	0.938	6.2	100	0.00	
91	T	sec-Butylbenzene	1.000	0.977	2.3	100	0.00	
92	T	p-Isopropyltoluene	1.000	0.950	5.0	100	0.00	
93	T	1,3-Dichlorobenzene	1.000	0.950	5.0	100	0.00	
94	T	1,4-Dichlorobenzene	1.000	0.959	4.1	100	0.00	
95	T	n-Butylbenzene	1.000	0.933	6.7	100	0.00	
96	T	1,2-Dichlorobenzene	1.000	0.975	2.5	100	0.00	
97	T	1,2-Dibromo-3-Chloropropane	-1.000	0.672	0.0	100	0.00	
98	T	1,2,4-Trichlorobenzene	1.000	0.911	8.9	100	0.00	
99	T	Hexachlorobutadiene	1.000	0.889	11.1	100	0.00	
100	T	Naphthalene	1.000	0.940	6.0	100	0.00	
101	T	1,2,3-Trichlorobenzene	1.000	0.936	6.4	100	0.00	

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M428958.D 8260WTR.M Tue Mar 05 10:51:04 2019

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428959.D Vial: 5
Acq On : 4 Mar 2019 14:12 Operator: EEA
Sample : WG698192-05 2 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:45 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	517395	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.59	117	373582	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.61	152	191630	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	0.00	111	0	0.0000	ug/L	
Spiked Amount 25.000	Range 86 - 118		Recovery =	0.00%#		
43) 1,2-Dichloroethane-d4	0.00	65	0	0.0000	ug/L	
Spiked Amount 25.000	Range 80 - 120		Recovery =	0.00%#		
58) Toluene-d8	12.71	98	2209	0.1161	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery =	0.48%#		
80) p-Bromofluorobenzene	16.10	95	1027	0.1485	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery =	0.60%#		
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.23	85	16516	1.8352	ug/L	96
3) Chloromethane	3.69	50	29070	2.2461	ug/L	91
4) Vinyl Chloride	3.91	62	21552	2.0433	ug/L	98
5) 1,3-Butadiene	3.96	54	19915	Below Cal		93
6) Bromomethane	4.80	94	14780	2.3297	ug/L	100
7) Chloroethane	4.97	64	11143	1.9742	ug/L	97
8) Trichlorofluoromethane	5.44	101	21539	2.0113	ug/L	99
9) Diethyl ether	5.97	59	119157	20.8630	ug/L	100
10) Isoprene	6.00	67	20637	1.9282	ug/L	96
11) Acrolein	6.21	56	6115	9.3371	ug/L	91
12) 1,1,2-Trichloro-1,2,2-Trif	6.22	101	11936	1.9347	ug/L	98
13) Acetone	6.32	43	2402	1.5071	ug/L #	45
14) 1,1-Dichloroethene	6.53	61	22437	2.0334	ug/L	98
15) Tert-Butyl Alcohol	6.64	59	22670	44.1879	ug/L	93
16) Dimethyl Sulfide	6.79	62	15368	1.9335	ug/L	100
17) Iodomethane	7.04	142	2763	1.8427	ug/L	89
18) Methyl acetate	7.07	43	5803	1.4061	ug/L #	82
19) Methylene Chloride	7.29	84	14273	2.0701	ug/L	97
20) Carbon Disulfide	7.35	76	42463	2.0580	ug/L	96
21) Acrylonitrile	7.49	53	17921	8.9624	ug/L	100
22) Methyl Tert Butyl Ether	7.51	73	33798	2.0594	ug/L	96
23) trans-1,2-Dichloroethene	7.75	61	21304	2.0206	ug/L	100
24) n-Hexane	7.82	57	20686	1.9992	ug/L	98
25) Diisopropyl ether	8.16	45	557127	21.3454	ug/L	99
26) Vinyl Acetate	8.35	43	16460	1.7000	ug/L #	89
27) 1,1-Dichloroethane	8.37	63	28174	2.0671	ug/L	98
28) Ethyl-Tert-Butyl ether	8.74	59	476596	21.0680	ug/L	99
29) 2-Butanone	8.94	43	3302	1.4064	ug/L #	56
30) Propionitrile	9.04	54	11163	19.3270	ug/L	94
31) 2,2-Dichloropropane	9.13	77	20615	2.0845	ug/L	98
32) cis-1,2-Dichloroethene	9.21	96	15272	2.0295	ug/L	98
33) Chloroform	9.41	83	24223	2.0024	ug/L	99
34) 1-Bromopropane	9.54	122	2860	1.7681	ug/L	88
35) Bromochloromethane	9.64	130	8463	1.9720	ug/L	97
36) Tetrahydrofuran	9.67	42	33536	21.2299	ug/L	99
38) 1,1,1-Trichloroethane	9.94	97	21108	2.0089	ug/L	99
39) Cyclohexane	9.97	56	27878	1.9921	ug/L	99
40) 1,1-Dichloropropene	10.14	75	18198	2.0626	ug/L	94
41) Tert-Amyl-Methyl ether	10.24	73	363559	21.0894	ug/L	99
42) Carbon Tetrachloride	10.28	117	18818	1.9709	ug/L	98

(#) = qualifier out of range (m) = manual integration
8M428959.D 8260WTR.M Tue Mar 05 10:54:47 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428959.D Vial: 5
Acq On : 4 Mar 2019 14:12 Operator: EEA
Sample : WG698192-05 2 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:45 2019 Quant Results File: 8260WTR.RES

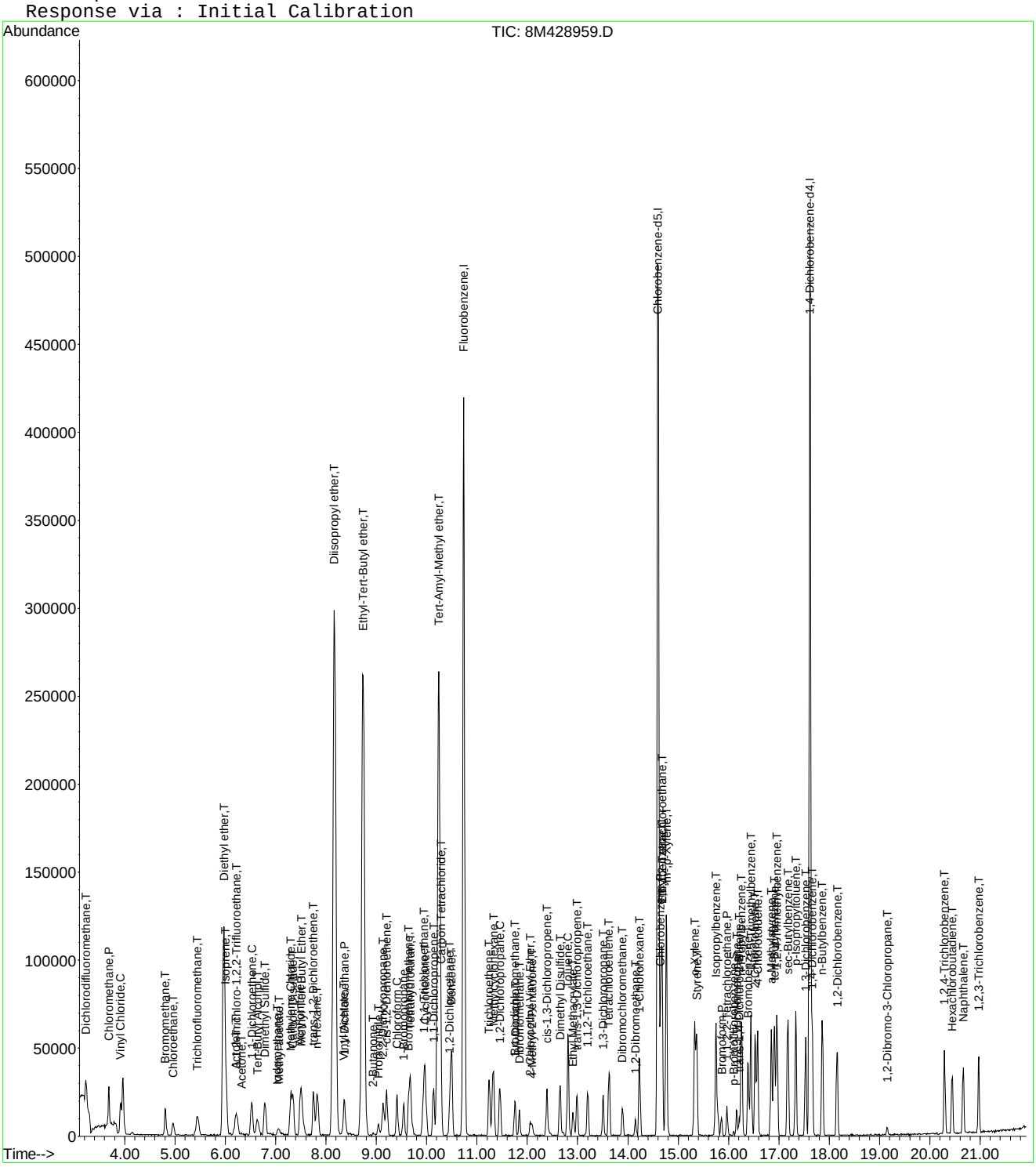
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
45)	1,2-Dichloroethane	10.46	62	16949	2.0484	ug/L		96
46)	Benzene	10.49	78	57876	2.0940	ug/L		98
47)	Trichloroethene	11.24	130	14945	1.9847	ug/L		99
48)	Methylcyclohexane	11.33	83	23479	2.0134	ug/L		99
49)	1,2-Dichloropropane	11.46	63	15773	2.1025	ug/L		95
50)	Bromodichloromethane	11.75	83	17781	2.0470	ug/L		96
51)	1,4-Dioxane	11.76	88	1353	32.0520	ug/L		86
52)	Dibromomethane	11.84	93	6841	1.9811	ug/L		97
53)	2-Chloroethyl Vinyl Ether	12.06	63	4465	1.3621	ug/L		85
54)	4-Methyl-2-Pentanone	12.09	58	2561	1.2417	ug/L	#	64
55)	cis-1,3-Dichloropropene	12.39	75	20089	1.9439	ug/L		100
56)	Dimethyl Disulfide	12.65	79	10683	1.6834	ug/L		96
59)	Toluene	12.80	91	59284	2.1254	ug/L		98
60)	Ethyl Methacrylate	12.91	69	11491	2.0491	ug/L		99
62)	trans-1,3-Dichloropropene	12.99	75	16007	1.9089	ug/L		96
63)	1,1,2-Trichloroethane	13.20	97	10122	2.0760	ug/L		98
65)	1,3-Dichloropropane	13.51	76	17551	2.0901	ug/L		100
66)	Tetrachloroethene	13.62	164	12184	2.0728	ug/L		100
67)	Dibromochloromethane	13.89	129	12041	1.9459	ug/L		100
68)	1,2-Dibromoethane	14.15	107	9579	2.0233	ug/L		99
69)	1-Chlorohexane	14.23	91	18690	1.9336	ug/L		96
70)	Chlorobenzene	14.65	112	39126	2.0691	ug/L		91
71)	1,1,1,2-Tetrachloroethane	14.68	131	14350	2.0641	ug/L		98
72)	Ethylbenzene	14.68	106	21470	2.0985	ug/L		97
73)	m-,p-Xylene	14.77	106	51212	4.1082	ug/L		93
74)	o-Xylene	15.33	106	24948	2.0625	ug/L		95
75)	Styrene	15.37	104	39113	1.9532	ug/L		99
76)	Bromoform	15.87	173	6783	1.7679	ug/L		92
77)	Isopropylbenzene	15.75	105	64286	2.1042	ug/L		99
79)	1,1,2,2-Tetrachloroethane	15.97	83	11829	2.1880	ug/L		97
81)	1,2,3-Trichloropropane	16.17	110	3388	2.0949	ug/L		76
82)	trans-1,4-Dichloro-2-Buten	16.21	53	3150	1.7236	ug/L	#	1
83)	n-Propylbenzene	16.26	91	76210	2.1975	ug/L		97
84)	Bromobenzene	16.39	156	17267	2.1761	ug/L		99
85)	1,3,5-Trimethylbenzene	16.44	105	54779	2.1912	ug/L		95
86)	2-Chlorotoluene	16.53	91	45081	1.9660	ug/L		99
87)	4-Chlorotoluene	16.58	91	48478	2.4196	ug/L		89
88)	a-Methylstyrene	16.85	118	27662	1.9283	ug/L		99
89)	tert-Butylbenzene	16.91	134	11927	2.0680	ug/L		95
90)	1,2,4-Trimethylbenzene	16.96	105	54506	2.1536	ug/L		97
91)	sec-Butylbenzene	17.18	105	69186	2.1624	ug/L		98
92)	p-Isopropyltoluene	17.33	119	59081	2.1541	ug/L		99
93)	1,3-Dichlorobenzene	17.53	146	32687	2.1131	ug/L		100
94)	1,4-Dichlorobenzene	17.66	146	32560	2.0785	ug/L		89
95)	n-Butylbenzene	17.86	91	51689	2.0684	ug/L		97
96)	1,2-Dichlorobenzene	18.16	146	29713	2.0699	ug/L		98
97)	1,2-Dibromo-3-Chloropropan	19.15	75	1749	1.7949	ug/L		85
98)	1,2,4-Trichlorobenzene	20.29	180	21069	2.0228	ug/L		97
99)	Hexachlorobutadiene	20.45	225	10232	2.0848	ug/L		98
100)	Naphthalene	20.66	128	39794	2.0958	ug/L		96
101)	1,2,3-Trichlorobenzene	20.97	180	20147	2.1056	ug/L		95

(#) = qualifier out of range (m) = manual integration
8M428959.D 8260WTR.M Tue Mar 05 10:54:48 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428959.D Vial: 5
Acq On : 4 Mar 2019 14:12 Operator: EEA
Sample : WG698192-05 2 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428959.D Vial: 5
Acq On : 4 Mar 2019 14:12 Operator: EEA
Sample : WG698192-05 2 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	2.000	1.835	8.3	100	0.00
3	P	Chloromethane	2.000	2.246	-12.3	100	0.00
4	C	Vinyl Chloride	2.000	2.043	-2.2	100	0.00
5	T	1,3-Butadiene	-1.000	-1.351	0.0	0	0.01
6	T	Bromomethane	2.000	2.330	-16.5	100	0.00
7	T	Chloroethane	2.000	1.974	1.3	100	0.00
8	T	Trichlorofluoromethane	2.000	2.011	-0.6	100	0.00
9	T	Diethyl ether	20.000	20.863	-4.3	100	0.00
10	T	Isoprene	2.000	1.928	3.6	100	0.00
11	T	Acrolein	10.000	9.337	6.6	100	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	2.000	1.935	3.2	100	0.00
13	T	Acetone	-1.000	1.507	0.0	100	0.01
14	C	1,1-Dichloroethene	2.000	2.033	-1.6	100	0.00
15	T	Tert-Butyl Alcohol	40.000	44.188	-10.5	100	0.01
16	T	Dimethyl Sulfide	2.000	1.933	3.3	100	0.00
17	T	Iodomethane	2.000	1.843	7.9	100	0.00
18	T	Methyl acetate	-1.000	1.406	0.0	100	0.01
19	T	Methylene Chloride	2.000	2.070	-3.5	100	0.00
20	T	Carbon Disulfide	2.000	2.058	-2.9	100	0.00
21	T	Acrylonitrile	10.000	8.962	10.4	100	0.00
22	T	Methyl Tert Butyl Ether	2.000	2.059	-3.0	100	0.00
23	T	trans-1,2-Dichloroethene	2.000	2.021	-1.0	100	0.00
24	T	n-Hexane	2.000	1.999	0.0	100	0.00
25	T	Diisopropyl ether	20.000	21.345	-6.7	100	0.00
26	T	Vinyl Acetate	-1.000	1.700	0.0	100	0.01
27	P	1,1-Dichloroethane	2.000	2.067	-3.4	100	0.00
28	T	Ethyl-Tert-Butyl ether	20.000	21.068	-5.3	100	0.00
29	T	2-Butanone	-1.000	1.406	0.0	100	0.01
30	T	Propionitrile	20.000	19.327	3.4	100	0.01
31	T	2,2-Dichloropropane	2.000	2.084	-4.2	100	0.00
32	T	cis-1,2-Dichloroethene	2.000	2.029	-1.4	100	0.00
33	C	Chloroform	2.000	2.002	-0.1	100	0.00
34		1-Bromopropane	2.000	1.768	11.6	100	0.00
35	T	Bromochloromethane	2.000	1.972	1.4	100	0.00
36	T	Tetrahydrofuran	20.000	21.230	-6.2	100	0.00
37	S	Dibromofluoromethane	-1.000	0.000	0.0	0	-9.70#
38	T	1,1,1-Trichloroethane	2.000	2.009	-0.4	100	0.00
39	T	Cyclohexane	2.000	1.992	0.4	100	0.00
40	T	1,1-Dichloropropene	2.000	2.063	-3.2	100	0.00
41	T	Tert-Amyl-Methyl ether	20.000	21.089	-5.4	100	0.00
42	T	Carbon Tetrachloride	2.000	1.971	1.4	100	0.00
43	S	1,2-Dichloroethane-d4	-1.000	0.000	0.0	0	-10.33#
44		Heptane	-1.000	0.000	0.0	0	-2.63#
45	T	1,2-Dichloroethane	2.000	2.048	-2.4	100	0.00
46	T	Benzene	2.000	2.094	-4.7	100	0.00
47	T	Trichloroethene	2.000	1.985	0.7	100	0.00
48	T	Methylcyclohexane	2.000	2.013	-0.6	100	0.00
49	C	1,2-Dichloropropane	2.000	2.102	-5.1	100	0.00
50	T	Bromodichloromethane	2.000	2.047	-2.4	100	0.00
51	T	1,4-Dioxane	40.000	32.052	19.9	100	0.01
52	T	Dibromomethane	2.000	1.981	0.9	100	0.00
53	T	2-Chloroethyl Vinyl Ether	-1.000	1.362	0.0	100	0.01
54	T	4-Methyl-2-Pentanone	-1.000	1.242	0.0	100	0.01
55	T	cis-1,3-Dichloropropene	2.000	1.944	2.8	100	0.00
56	T	Dimethyl Disulfide	-1.000	1.683	0.0	100	0.00
57	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00

58	S	Toluene-d8	-1.000	0.116	0.0	100	0.00	
59	C	Toluene	2.000	2.125	-6.3	100	0.00	
60	T	Ethyl Methacrylate	2.000	2.049	-2.4	100	0.00	
61		Paraldehyde	-1.000	0.000	0.0	0	-13.45	#
62	T	trans-1,3-Dichloropropene	2.000	1.909	4.5	100	0.00	
63	T	1,1,2-Trichloroethane	2.000	2.076	-3.8	100	0.00	
64	T	2-Hexanone	-1.000	0.000	0.0	0	-13.14	#
65	T	1,3-Dichloropropane	2.000	2.090	-4.5	100	0.00	
66	T	Tetrachloroethene	2.000	2.073	-3.6	100	0.00	
67	T	Dibromochloromethane	2.000	1.946	2.7	100	0.00	
68	T	1,2-Dibromoethane	2.000	2.023	-1.2	100	0.00	
69	T	1-Chlorohexane	2.000	1.934	3.3	100	0.00	
70	P	Chlorobenzene	2.000	2.069	-3.4	100	0.00	
71	T	1,1,1,2-Tetrachloroethane	2.000	2.064	-3.2	100	0.00	
72	C	Ethylbenzene	2.000	2.099	-5.0	100	0.00	
73	T	m-,p-Xylene	4.000	4.108	-2.7	100	0.00	
74	T	o-Xylene	2.000	2.063	-3.2	100	0.00	
75	T	Styrene	2.000	1.953	2.3	100	0.00	
76	P	Bromoform	2.000	1.768	11.6	100	0.00	
77	T	Isopropylbenzene	2.000	2.104	-5.2	100	0.00	
78	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00	
79	P	1,1,2,2-Tetrachloroethane	2.000	2.188	-9.4	100	0.00	
80	S	p-Bromofluorobenzene	-1.000	0.148	0.0	100	0.00	
81	T	1,2,3-Trichloropropane	2.000	2.095	-4.8	100	0.00	
82	T	trans-1,4-Dichloro-2-Butene	2.000	1.724	13.8	100	0.00	
83	T	n-Propylbenzene	2.000	2.198	-9.9	100	0.00	
84	T	Bromobenzene	2.000	2.176	-8.8	100	0.00	
85	T	1,3,5-Trimethylbenzene	2.000	2.191	-9.5	100	0.00	
86	T	2-Chlorotoluene	2.000	1.966	1.7	100	0.00	
87	T	4-Chlorotoluene	2.000	2.420	-21.0	100	0.00	
88	T	a-Methylstyrene	2.000	1.928	3.6	100	0.00	
89	T	tert-Butylbenzene	2.000	2.068	-3.4	100	0.00	
90	T	1,2,4-Trimethylbenzene	2.000	2.154	-7.7	100	0.00	
91	T	sec-Butylbenzene	2.000	2.162	-8.1	100	0.00	
92	T	p-Isopropyltoluene	2.000	2.154	-7.7	100	0.00	
93	T	1,3-Dichlorobenzene	2.000	2.113	-5.6	100	0.00	
94	T	1,4-Dichlorobenzene	2.000	2.079	-4.0	100	0.00	
95	T	n-Butylbenzene	2.000	2.068	-3.4	100	0.00	
96	T	1,2-Dichlorobenzene	2.000	2.070	-3.5	100	0.00	
97	T	1,2-Dibromo-3-Chloropropane	2.000	1.795	10.3	100	0.00	
98	T	1,2,4-Trichlorobenzene	2.000	2.023	-1.2	100	0.00	
99	T	Hexachlorobutadiene	2.000	2.085	-4.2	100	0.00	
100	T	Naphthalene	2.000	2.096	-4.8	100	0.00	
101	T	1,2,3-Trichlorobenzene	2.000	2.106	-5.3	100	0.00	

(#) = Out of Range SPCC's out = 0 CCC's out = 0

8M428959.D 8260WTR.M Tue Mar 05 10:51:36 2019

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428960.D Vial: 6
Acq On : 4 Mar 2019 14:42 Operator: EEA
Sample : WG698192-06 5 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:49 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Fluorobenzene	10.74	96	527749	25.00 ug/L	0.00
57) Chlorobenzene-d5	14.60	117	378036	25.00 ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	196112	25.00 ug/L	0.00
System Monitoring Compounds					
37) Dibromofluoromethane	9.70	111	25738	4.8926 ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 19.56%#		
43) 1,2-Dichloroethane-d4	10.33	65	25061	4.8256 ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 19.32%#		
58) Toluene-d8	12.71	98	102229	5.3088 ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 21.24%#		
80) p-Bromofluorobenzene	16.10	95	36245	5.1209 ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 20.48%#		
Target Compounds					Qvalue
2) Dichlorodifluoromethane	3.23	85	41765	4.5498 ug/L	99
3) Chloromethane	3.69	50	67822	5.1375 ug/L	95
4) Vinyl Chloride	3.92	62	53473	4.9703 ug/L	98
5) 1,3-Butadiene	3.97	54	46618	3.3417 ug/L	95
6) Bromomethane	4.81	94	36051	5.5712 ug/L	99
7) Chloroethane	4.97	64	29010	5.0389 ug/L	98
8) Trichlorofluoromethane	5.44	101	54659	5.0039 ug/L	98
9) Diethyl ether	5.97	59	296644	50.9200 ug/L	99
10) Isoprene	6.00	67	53597	4.9095 ug/L	100
11) Acrolein	6.22	56	15443	23.1177 ug/L	100
12) 1,1,2-Trichloro-1,2,2-Trif	6.23	101	31666	5.0320 ug/L	99
13) Acetone	6.31	43	7326	4.5063 ug/L	90
14) 1,1-Dichloroethene	6.53	61	57536	5.1121 ug/L	98
15) Tert-Butyl Alcohol	6.63	59	49707	94.9870 ug/L	99
16) Dimethyl Sulfide	6.79	62	38663	4.7689 ug/L	99
17) Iodomethane	7.04	142	11611	2.8749 ug/L	95
18) Methyl acetate	7.06	43	18048	4.2873 ug/L	91
19) Methylene Chloride	7.30	84	36357	5.1696 ug/L	96
20) Carbon Disulfide	7.35	76	106758	5.0726 ug/L	99
21) Acrylonitrile	7.49	53	46771	22.9315 ug/L	100
22) Methyl Tert Butyl Ether	7.52	73	83730	5.0018 ug/L	99
23) trans-1,2-Dichloroethene	7.75	61	54727	5.0888 ug/L	100
24) n-Hexane	7.83	57	52293	4.9547 ug/L	98
25) Diisopropyl ether	8.16	45	1377409	51.7377 ug/L	100
26) Vinyl Acetate	8.35	43	45990	4.6567 ug/L	94
27) 1,1-Dichloroethane	8.37	63	70391	5.0632 ug/L	99
28) Ethyl-Tert-Butyl ether	8.74	59	1177833	51.0449 ug/L	99
29) 2-Butanone	8.94	43	10157	4.2412 ug/L #	81
30) Propionitrile	9.03	54	32733	47.1098 ug/L	97
31) 2,2-Dichloropropane	9.13	77	51691	5.1242 ug/L	99
32) cis-1,2-Dichloroethene	9.21	96	39588	5.1576 ug/L	99
33) Chloroform	9.41	83	60893	4.9351 ug/L	98
34) 1-Bromopropane	9.55	122	7921	4.8008 ug/L	96
35) Bromochloromethane	9.64	130	22117	5.0523 ug/L	99
36) Tetrahydrofuran	9.67	42	77687	48.2147 ug/L	99
38) 1,1,1-Trichloroethane	9.94	97	55149	5.1458 ug/L	99
39) Cyclohexane	9.97	56	72976	5.1123 ug/L	97
40) 1,1-Dichloropropene	10.14	75	47040	5.2270 ug/L	97
41) Tert-Amyl-Methyl ether	10.24	73	900192	51.1939 ug/L	100
42) Carbon Tetrachloride	10.28	117	49006	5.0321 ug/L	99

(#) = qualifier out of range (m) = manual integration
8M428960.D 8260WTR.M Tue Mar 05 10:54:51 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428960.D Vial: 6
Acq On : 4 Mar 2019 14:42 Operator: EEA
Sample : WG698192-06 5 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:49 2019 Quant Results File: 8260WTR.RES

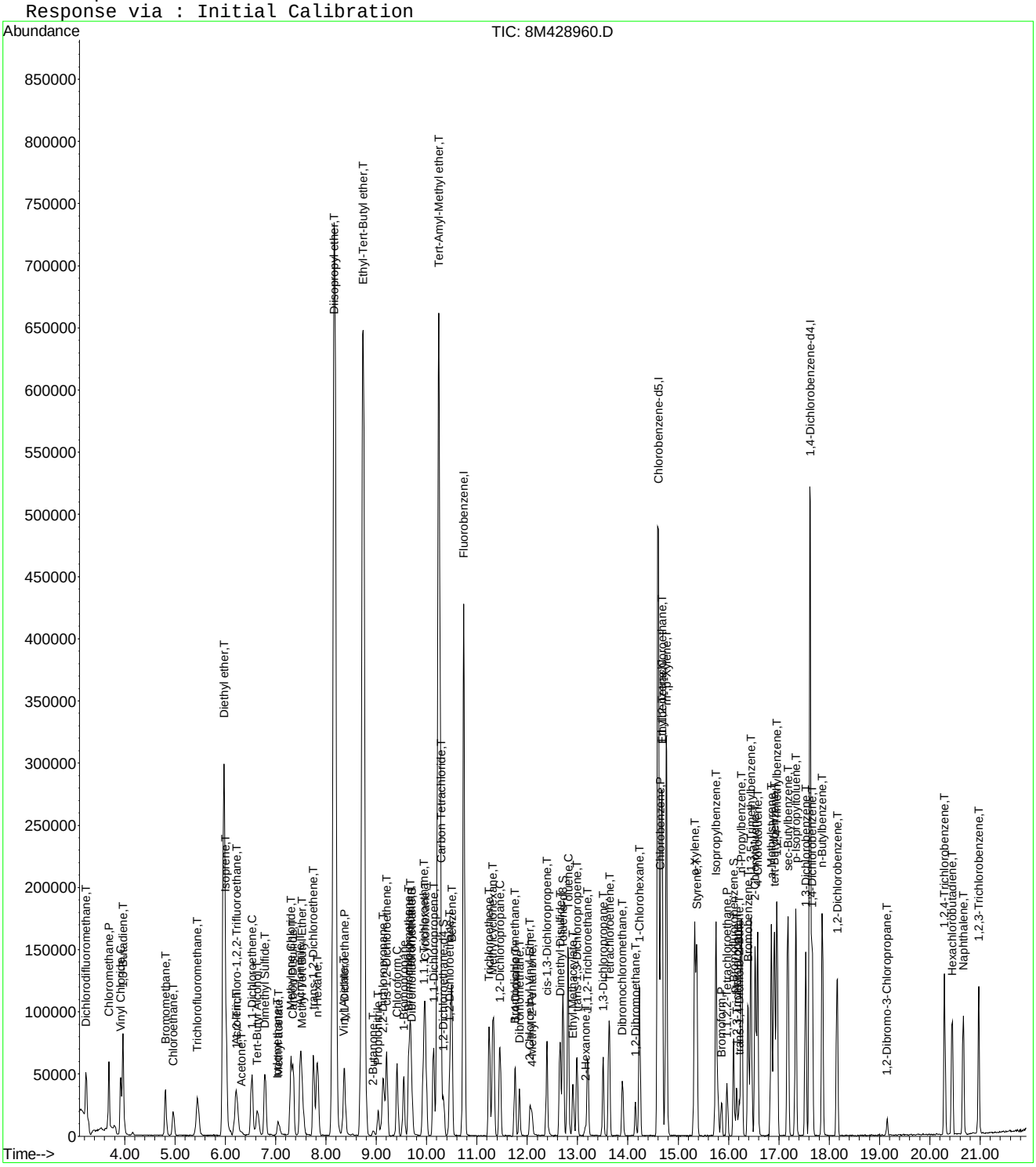
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
45)	1,2-Dichloroethane	10.46	62	43201	5.1188	ug/L		99
46)	Benzene	10.50	78	147053	5.2162	ug/L		99
47)	Trichloroethene	11.24	130	39812	5.1834	ug/L		98
48)	Methylcyclohexane	11.32	83	61933	5.2067	ug/L		98
49)	1,2-Dichloropropane	11.46	63	38788	5.0688	ug/L		98
50)	Bromodichloromethane	11.75	83	45224	5.1041	ug/L		98
51)	1,4-Dioxane	11.76	88	3685	85.5833	ug/L		98
52)	Dibromomethane	11.84	93	17845	5.0664	ug/L		98
53)	2-Chloroethyl Vinyl Ether	12.05	63	13492	4.0351	ug/L		94
54)	4-Methyl-2-Pentanone	12.09	58	8289	3.9402	ug/L		95
55)	cis-1,3-Dichloropropene	12.39	75	52578	4.9879	ug/L		99
56)	Dimethyl Disulfide	12.65	79	28739	4.4397	ug/L		94
59)	Toluene	12.82	91	152840	5.4149	ug/L		98
60)	Ethyl Methacrylate	12.91	69	31243	4.7002	ug/L		96
62)	trans-1,3-Dichloropropene	12.99	75	43645	5.1434	ug/L		99
63)	1,1,2-Trichloroethane	13.20	97	25913	5.2522	ug/L		99
64)	2-Hexanone	13.16	58	5479	5.2779	ug/L	#	58
65)	1,3-Dichloropropane	13.51	76	44680	5.2582	ug/L		97
66)	Tetrachloroethene	13.63	164	31614	5.3149	ug/L		96
67)	Dibromochloromethane	13.89	129	31368	5.0095	ug/L		100
68)	1,2-Dibromoethane	14.15	107	25390	5.2996	ug/L		99
69)	1-Chlorohexane	14.23	91	51086	5.2230	ug/L		100
70)	Chlorobenzene	14.65	112	99963	5.2242	ug/L		98
71)	1,1,1,2-Tetrachloroethane	14.68	131	35067	4.9847	ug/L		96
72)	Ethylbenzene	14.68	106	54042	5.2200	ug/L		95
73)	m-,p-Xylene	14.77	106	133939	10.6179	ug/L		96
74)	o-Xylene	15.33	106	63662	5.2011	ug/L		92
75)	Styrene	15.37	104	102902	5.0780	ug/L		99
76)	Bromoform	15.86	173	18437	4.7486	ug/L		97
77)	Isopropylbenzene	15.75	105	166743	5.3934	ug/L		99
79)	1,1,2,2-Tetrachloroethane	15.97	83	29022	5.2456	ug/L		100
81)	1,2,3-Trichloropropane	16.17	110	8683	5.2462	ug/L		70
82)	trans-1,4-Dichloro-2-Buten	16.21	53	9147	4.8906	ug/L	#	32
83)	n-Propylbenzene	16.26	91	195070	5.4964	ug/L		98
84)	Bromobenzene	16.39	156	44242	5.4482	ug/L		99
85)	1,3,5-Trimethylbenzene	16.44	105	140302	5.4839	ug/L		98
86)	2-Chlorotoluene	16.53	91	135637	5.7801	ug/L		97
87)	4-Chlorotoluene	16.58	91	108219	5.2779	ug/L		98
88)	a-Methylstyrene	16.85	118	75564	5.1471	ug/L		98
89)	tert-Butylbenzene	16.91	134	31731	5.3760	ug/L		98
90)	1,2,4-Trimethylbenzene	16.96	105	142816	5.5138	ug/L		99
91)	sec-Butylbenzene	17.18	105	181023	5.5287	ug/L		99
92)	p-Isopropyltoluene	17.33	119	153347	5.4634	ug/L		99
93)	1,3-Dichlorobenzene	17.53	146	85853	5.4233	ug/L		96
94)	1,4-Dichlorobenzene	17.66	146	84516	5.2719	ug/L		97
95)	n-Butylbenzene	17.86	91	137967	5.3948	ug/L		98
96)	1,2-Dichlorobenzene	18.16	146	77887	5.3019	ug/L		99
97)	1,2-Dibromo-3-Chloropropan	19.14	75	4777	4.7904	ug/L		99
98)	1,2,4-Trichlorobenzene	20.29	180	53900	5.0566	ug/L		100
99)	Hexachlorobutadiene	20.45	225	25972	5.1709	ug/L		98
100)	Naphthalene	20.66	128	102362	5.2679	ug/L		100
101)	1,2,3-Trichlorobenzene	20.97	180	50029	5.1092	ug/L		98

(#) = qualifier out of range (m) = manual integration
8M428960.D 8260WTR.M Tue Mar 05 10:54:52 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428960.D Vial: 6
Acq On : 4 Mar 2019 14:42 Operator: EEA
Sample : WG698192-06 5 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Evaluate Continuing Calibration Report

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428960.D Vial: 6
Acq On : 4 Mar 2019 14:42 Operator: EEA
Sample : WG698192-06 5 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	100	0.00
2	T	Dichlorodifluoromethane	5.000	4.550	9.0	100	0.00
3	P	Chloromethane	5.000	5.137	-2.7	100	0.00
4	C	Vinyl Chloride	5.000	4.970	0.6	100	0.01
5	T	1,3-Butadiene	5.000	3.342	33.2#	100	0.01
6	T	Bromomethane	5.000	5.571	-11.4	100	0.00
7	T	Chloroethane	5.000	5.039	-0.8	100	0.00
8	T	Trichlorofluoromethane	5.000	5.004	-0.1	100	0.00
9	T	Diethyl ether	50.000	50.920	-1.8	100	0.00
10	T	Isoprene	5.000	4.910	1.8	100	0.00
11	T	Acrolein	25.000	23.118	7.5	100	0.01
12	T	1,1,2-Trichloro-1,2,2-Trifl	5.000	5.032	-0.6	100	0.01
13	T	Acetone	5.000	4.506	9.9	100	0.00
14	C	1,1-Dichloroethene	5.000	5.112	-2.2	100	0.00
15	T	Tert-Butyl Alcohol	100.000	94.987	5.0	100	0.00
16	T	Dimethyl Sulfide	5.000	4.769	4.6	100	0.00
17	T	Iodomethane	5.000	2.875	42.5#	100	0.00
18	T	Methyl acetate	5.000	4.287	14.3	100	0.00
19	T	Methylene Chloride	5.000	5.170	-3.4	100	0.00
20	T	Carbon Disulfide	5.000	5.073	-1.5	100	0.00
21	T	Acrylonitrile	25.000	22.931	8.3	100	0.00
22	T	Methyl Tert Butyl Ether	5.000	5.002	-0.0	100	0.01
23	T	trans-1,2-Dichloroethene	5.000	5.089	-1.8	100	0.00
24	T	n-Hexane	5.000	4.955	0.9	100	0.00
25	T	Diisopropyl ether	50.000	51.738	-3.5	100	0.00
26	T	Vinyl Acetate	5.000	4.657	6.9	100	0.01
27	P	1,1-Dichloroethane	5.000	5.063	-1.3	100	0.00
28	T	Ethyl-Tert-Butyl ether	50.000	51.045	-2.1	100	0.00
29	T	2-Butanone	5.000	4.241	15.2	100	0.01
30	T	Propionitrile	50.000	47.110	5.8	100	0.00
31	T	2,2-Dichloropropane	5.000	5.124	-2.5	100	0.00
32	T	cis-1,2-Dichloroethene	5.000	5.158	-3.2	100	0.00
33	C	Chloroform	5.000	4.935	1.3	100	0.00
34		1-Bromopropane	5.000	4.801	4.0	100	0.00
35	T	Bromochloromethane	5.000	5.052	-1.0	100	0.00
36	T	Tetrahydrofuran	50.000	48.215	3.6	100	0.00
37	S	Dibromofluoromethane	5.000	4.893	2.1	100	0.00
38	T	1,1,1-Trichloroethane	5.000	5.146	-2.9	100	0.00
39	T	Cyclohexane	5.000	5.112	-2.2	100	0.00
40	T	1,1-Dichloropropene	5.000	5.227	-4.5	100	0.00
41	T	Tert-Amyl-Methyl ether	50.000	51.194	-2.4	100	0.00
42	T	Carbon Tetrachloride	5.000	5.032	-0.6	100	0.00
43	S	1,2-Dichloroethane-d4	5.000	4.826	3.5	100	0.00
44		Heptane	-1.000	0.000	0.0	0	-2.63#
45	T	1,2-Dichloroethane	5.000	5.119	-2.4	100	0.00
46	T	Benzene	5.000	5.216	-4.3	100	0.00
47	T	Trichloroethene	5.000	5.183	-3.7	100	0.00
48	T	Methylcyclohexane	5.000	5.207	-4.1	100	0.00
49	C	1,2-Dichloropropane	5.000	5.069	-1.4	100	0.00
50	T	Bromodichloromethane	5.000	5.104	-2.1	100	0.00
51	T	1,4-Dioxane	100.000	85.583	14.4	100	0.01
52	T	Dibromomethane	5.000	5.066	-1.3	100	0.00
53	T	2-Chloroethyl Vinyl Ether	5.000	4.035	19.3	100	0.00
54	T	4-Methyl-2-Pentanone	5.000	3.940	21.2	100	0.01
55	T	cis-1,3-Dichloropropene	5.000	4.988	0.2	100	0.00
56	T	Dimethyl Disulfide	5.000	4.440	11.2	100	0.00
57	I	Chlorobenzene-d5	25.000	25.000	0.0	100	0.00

58	S	Toluene-d8	5.000	5.309	-6.2	100	0.00	
59	C	Toluene	5.000	5.415	-8.3	100	0.00	
60	T	Ethyl Methacrylate	5.000	4.700	6.0	100	0.00	
61		Paraldehyde	-1.000	0.000	0.0	0	-13.45#	
62	T	trans-1,3-Dichloropropene	5.000	5.143	-2.9	100	0.00	
63	T	1,1,2-Trichloroethane	5.000	5.252	-5.0	100	0.00	
64	T	2-Hexanone	5.000	5.278	-5.6	100	0.01	
65	T	1,3-Dichloropropane	5.000	5.258	-5.2	100	0.00	
66	T	Tetrachloroethene	5.000	5.315	-6.3	100	0.00	
67	T	Dibromochloromethane	5.000	5.009	-0.2	100	0.00	
68	T	1,2-Dibromoethane	5.000	5.300	-6.0	100	0.00	
69	T	1-Chlorohexane	5.000	5.223	-4.5	100	0.00	
70	P	Chlorobenzene	5.000	5.224	-4.5	100	0.00	
71	T	1,1,1,2-Tetrachloroethane	5.000	4.985	0.3	100	0.00	
72	C	Ethylbenzene	5.000	5.220	-4.4	100	0.00	
73	T	m-,p-Xylene	10.000	10.618	-6.2	100	0.00	
74	T	o-Xylene	5.000	5.201	-4.0	100	0.00	
75	T	Styrene	5.000	5.078	-1.6	100	0.00	
76	P	Bromoform	5.000	4.749	5.0	100	0.00	
77	T	Isopropylbenzene	5.000	5.393	-7.9	100	0.00	
78	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	100	0.00	
79	P	1,1,2,2-Tetrachloroethane	5.000	5.246	-4.9	100	0.00	
80	S	p-Bromofluorobenzene	5.000	5.121	-2.4	100	0.00	
81	T	1,2,3-Trichloropropane	5.000	5.246	-4.9	100	0.00	
82	T	trans-1,4-Dichloro-2-Butene	5.000	4.891	2.2	100	0.00	
83	T	n-Propylbenzene	5.000	5.496	-9.9	100	0.00	
84	T	Bromobenzene	5.000	5.448	-9.0	100	0.00	
85	T	1,3,5-Trimethylbenzene	5.000	5.484	-9.7	100	0.00	
86	T	2-Chlorotoluene	5.000	5.780	-15.6	100	0.00	
87	T	4-Chlorotoluene	5.000	5.278	-5.6	100	0.00	
88	T	a-Methylstyrene	5.000	5.147	-2.9	100	0.00	
89	T	tert-Butylbenzene	5.000	5.376	-7.5	100	0.00	
90	T	1,2,4-Trimethylbenzene	5.000	5.514	-10.3	100	0.00	
91	T	sec-Butylbenzene	5.000	5.529	-10.6	100	0.00	
92	T	p-Isopropyltoluene	5.000	5.463	-9.3	100	0.00	
93	T	1,3-Dichlorobenzene	5.000	5.423	-8.5	100	0.00	
94	T	1,4-Dichlorobenzene	5.000	5.272	-5.4	100	0.00	
95	T	n-Butylbenzene	5.000	5.395	-7.9	100	0.00	
96	T	1,2-Dichlorobenzene	5.000	5.302	-6.0	100	0.00	
97	T	1,2-Dibromo-3-Chloropropane	5.000	4.790	4.2	100	0.00	
98	T	1,2,4-Trichlorobenzene	5.000	5.057	-1.1	100	0.00	
99	T	Hexachlorobutadiene	5.000	5.171	-3.4	100	0.00	
100	T	Naphthalene	5.000	5.268	-5.4	100	0.00	
101	T	1,2,3-Trichlorobenzene	5.000	5.109	-2.2	100	0.00	

(#) = Out of Range SPCC's out = 0 CCC's out = 0

8M428960.D 8260WTR.M Tue Mar 05 10:52:10 2019

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428961.D Vial: 7
Acq On : 4 Mar 2019 15:11 Operator: EEA
Sample : WG698192-07 20 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:53 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.73	96	519761	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.60	117	383859	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	205732	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	9.70	111	49997	9.6501	ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 38.60%#			
43) 1,2-Dichloroethane-d4	10.34	65	50552	9.8836	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 39.52%#			
58) Toluene-d8	12.71	98	192225	9.8309	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 39.32%#			
80) p-Bromofluorobenzene	16.10	95	72023	9.7000	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 38.80%#			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.24	85	208518	23.0646	ug/L	99
3) Chloromethane	3.69	50	275650	21.2012	ug/L	100
4) Vinyl Chloride	3.92	62	232573	21.9498	ug/L	98
5) 1,3-Butadiene	3.96	54	166183	25.1280	ug/L	99
6) Bromomethane	4.81	94	134575	21.1162	ug/L	100
7) Chloroethane	4.97	64	121613	21.4484	ug/L	99
8) Trichlorofluoromethane	5.45	101	237529	22.0793	ug/L	100
9) Diethyl ether	5.97	59	487157	84.9074	ug/L	99
10) Isoprene	6.01	67	222399	20.6850	ug/L	100
11) Acrolein	6.21	56	26862	40.8295	ug/L	94
12) 1,1,2-Trichloro-1,2,2-Trif	6.22	101	134732	21.7392	ug/L	99
13) Acetone	6.32	43	34640	21.6351	ug/L	97
14) 1,1-Dichloroethene	6.53	61	237296	21.4077	ug/L	99
15) Tert-Butyl Alcohol	6.64	59	85003	164.9318	ug/L	99
16) Dimethyl Sulfide	6.78	62	166163	20.8103	ug/L	99
17) Iodomethane	7.04	142	117887	15.5640	ug/L	99
18) Methyl acetate	7.06	43	83477	20.1347	ug/L	99
19) Methylene Chloride	7.30	84	147627	21.3136	ug/L	100
20) Carbon Disulfide	7.34	76	444390	21.4396	ug/L	100
21) Acrylonitrile	7.49	53	85385	42.5070	ug/L	99
22) Methyl Tert Butyl Ether	7.52	73	356631	21.6317	ug/L	99
23) trans-1,2-Dichloroethene	7.75	61	227043	21.4363	ug/L	100
24) n-Hexane	7.83	57	218781	21.0477	ug/L	100
25) Diisopropyl ether	8.17	45	2247355	85.7116	ug/L	100
26) Vinyl Acetate	8.35	43	206107	21.1902	ug/L	100
27) 1,1-Dichloroethane	8.37	63	294302	21.4944	ug/L	99
28) Ethyl-Tert-Butyl ether	8.74	59	1923161	84.6268	ug/L	100
29) 2-Butanone	8.93	43	48902	20.7337	ug/L	97
30) Propionitrile	9.03	54	59321	82.9010	ug/L	99
31) 2,2-Dichloropropane	9.14	77	212343	21.3733	ug/L	99
32) cis-1,2-Dichloroethene	9.20	96	165898	21.9457	ug/L	100
33) Chloroform	9.41	83	256169	21.0803	ug/L	100
34) 1-Bromopropane	9.55	122	34230	21.0652	ug/L	100
35) Bromochloromethane	9.65	130	94314	21.8759	ug/L	99
36) Tetrahydrofuran	9.67	42	136457	85.9906	ug/L	99
38) 1,1,1-Trichloroethane	9.94	97	226839	21.4911	ug/L	99
39) Cyclohexane	9.97	56	295270	21.0029	ug/L	99
40) 1,1-Dichloropropene	10.13	75	193184	21.7961	ug/L	99
41) Tert-Amyl-Methyl ether	10.24	73	1472088	85.0043	ug/L	100
42) Carbon Tetrachloride	10.28	117	206808	21.5619	ug/L	100

(#) = qualifier out of range (m) = manual integration
8M428961.D 8260WTR.M Tue Mar 05 10:54:55 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428961.D Vial: 7
Acq On : 4 Mar 2019 15:11 Operator: EEA
Sample : WG698192-07 20 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:53 2019 Quant Results File: 8260WTR.RES

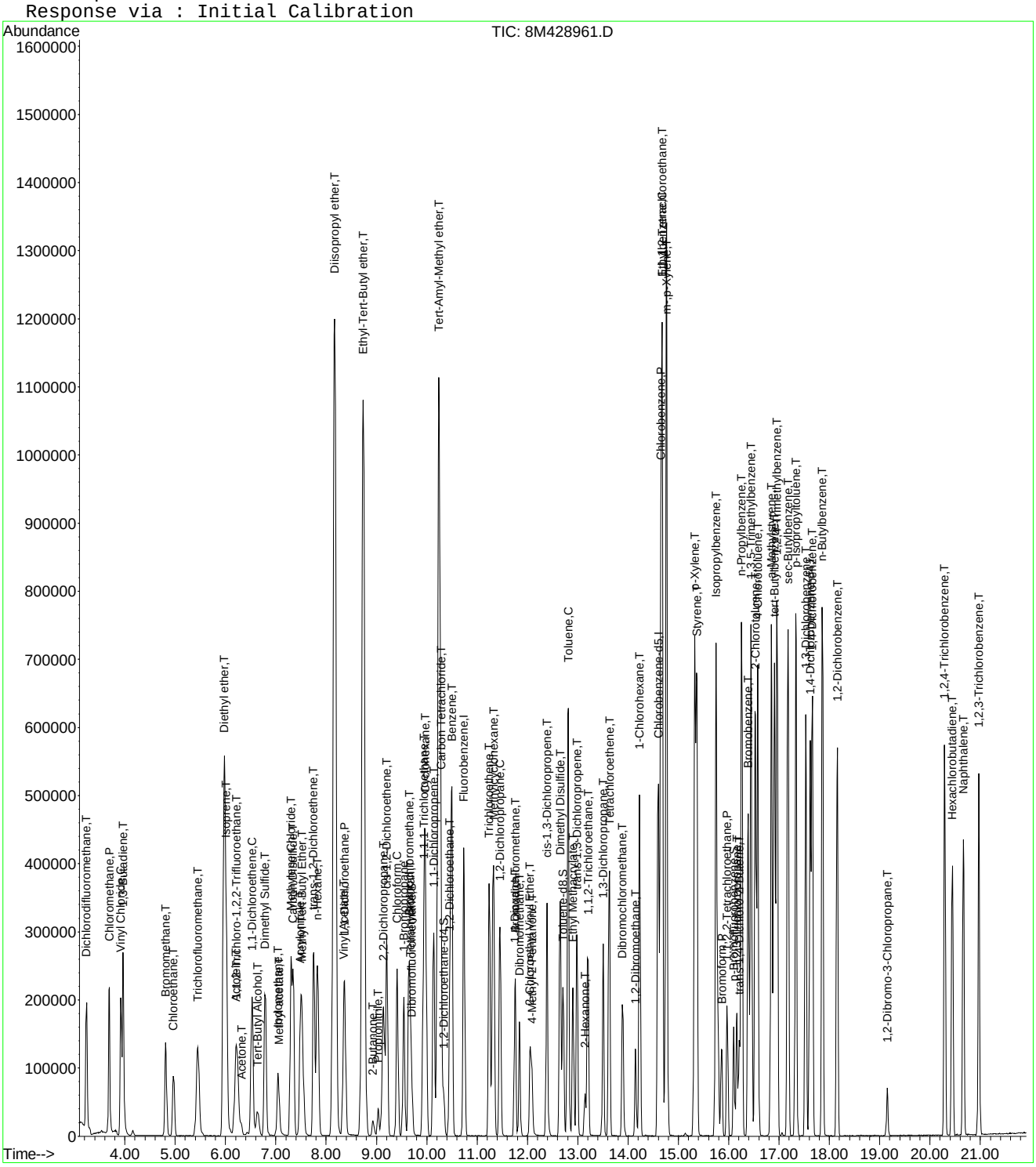
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc Unit		Qvalue
45)	1,2-Dichloroethane	10.46	62	183714	22.1023 ug/L		100
46)	Benzene	10.50	78	607917	21.8951 ug/L		99
47)	Trichloroethene	11.24	130	163168	21.5703 ug/L		100
48)	Methylcyclohexane	11.32	83	248513	21.2134 ug/L		100
49)	1,2-Dichloropropane	11.46	63	163424	21.6846 ug/L		100
50)	Bromodichloromethane	11.76	83	192265	22.0330 ug/L		99
51)	1,4-Dioxane	11.75	88	7695	181.4613 ug/L		100
52)	Dibromomethane	11.84	93	75950	21.8943 ug/L		99
53)	2-Chloroethyl Vinyl Ether	12.05	63	63845	19.3876 ug/L		99
54)	4-Methyl-2-Pentanone	12.09	58	41512	20.0362 ug/L		99
55)	cis-1,3-Dichloropropene	12.39	75	231786	22.3267 ug/L		100
56)	Dimethyl Disulfide	12.65	79	130210	20.4245 ug/L		99
59)	Toluene	12.81	91	632121	22.0555 ug/L		99
60)	Ethyl Methacrylate	12.91	69	151066	20.5854 ug/L		99
62)	trans-1,3-Dichloropropene	12.99	75	192384	22.3278 ug/L		100
63)	1,1,2-Trichloroethane	13.21	97	111470	22.2505 ug/L		98
64)	2-Hexanone	13.14	58	37536	20.0876 ug/L		94
65)	1,3-Dichloropropane	13.51	76	196408	22.7638 ug/L		99
66)	Tetrachloroethene	13.63	164	128648	21.3000 ug/L		99
67)	Dibromochloromethane	13.89	129	138089	21.7184 ug/L		99
68)	1,2-Dibromoethane	14.15	107	109891	22.5896 ug/L		100
69)	1-Chlorohexane	14.23	91	208827	21.0265 ug/L		99
70)	Chlorobenzene	14.65	112	415327	21.3761 ug/L		100
71)	1,1,1,2-Tetrachloroethane	14.67	131	154027	21.5625 ug/L		99
72)	Ethylbenzene	14.67	106	228610	21.7469 ug/L		96
73)	m-,p-Xylene	14.77	106	558736	43.6213 ug/L		97
74)	o-Xylene	15.33	106	274667	22.0997 ug/L		97
75)	Styrene	15.37	104	454662	22.0964 ug/L		100
76)	Bromoform	15.86	173	86855	22.0311 ug/L		99
77)	Isopropylbenzene	15.75	105	695094	22.1422 ug/L		99
79)	1,1,2,2-Tetrachloroethane	15.97	83	129068	22.2374 ug/L		99
81)	1,2,3-Trichloropropane	16.16	110	38369	22.0982 ug/L		88
82)	trans-1,4-Dichloro-2-Buten	16.20	53	41016	20.9044 ug/L	#	16
83)	n-Propylbenzene	16.26	91	827992	22.2389 ug/L		99
84)	Bromobenzene	16.39	156	185655	21.7935 ug/L		99
85)	1,3,5-Trimethylbenzene	16.44	105	584546	21.7795 ug/L		100
86)	2-Chlorotoluene	16.54	91	553801	22.4963 ug/L		98
87)	4-Chlorotoluene	16.58	91	462934	21.5220 ug/L		99
88)	a-Methylstyrene	16.85	118	319438	20.7415 ug/L		98
89)	tert-Butylbenzene	16.91	134	131955	21.3110 ug/L		100
90)	1,2,4-Trimethylbenzene	16.96	105	600342	22.0941 ug/L		98
91)	sec-Butylbenzene	17.18	105	761899	22.1812 ug/L		99
92)	p-Isopropyltoluene	17.33	119	655213	22.2521 ug/L		99
93)	1,3-Dichlorobenzene	17.53	146	355729	21.4204 ug/L		99
94)	1,4-Dichlorobenzene	17.66	146	357635	21.2654 ug/L		99
95)	n-Butylbenzene	17.86	91	592667	22.0909 ug/L		99
96)	1,2-Dichlorobenzene	18.16	146	330508	21.4463 ug/L		99
97)	1,2-Dibromo-3-Chloropropan	19.15	75	22970	21.9575 ug/L		97
98)	1,2,4-Trichlorobenzene	20.29	180	241342	21.5827 ug/L		99
99)	Hexachlorobutadiene	20.44	225	113124	21.4695 ug/L		99
100)	Naphthalene	20.66	128	461267	22.6284 ug/L		100
101)	1,2,3-Trichlorobenzene	20.97	180	221691	21.5813 ug/L		99

(#) = qualifier out of range (m) = manual integration
8M428961.D 8260WTR.M Tue Mar 05 10:54:56 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428961.D Vial: 7
Acq On : 4 Mar 2019 15:11 Operator: EEA
Sample : WG698192-07 20 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428962.D Vial: 8
Acq On : 4 Mar 2019 15:40 Operator: EEA
Sample : WG698192-08 50 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:57 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Fluorobenzene	10.74	96	533134	25.00 ug/L	0.00
57) Chlorobenzene-d5	14.60	117	400675	25.00 ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	217564	25.00 ug/L	0.00
System Monitoring Compounds					
37) Dibromofluoromethane	9.70	111	139380	26.2275 ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 104.92%		
43) 1,2-Dichloroethane-d4	10.33	65	137787	26.2635 ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 105.04%		
58) Toluene-d8	12.71	98	528437	25.8916 ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 103.56%		
80) p-Bromofluorobenzene	16.10	95	204314	26.0202 ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 104.08%		
Target Compounds					Qvalue
2) Dichlorodifluoromethane	3.23	85	519958	56.0710 ug/L	100
3) Chloromethane	3.68	50	651136	48.8249 ug/L	100
4) Vinyl Chloride	3.91	62	579242	53.2965 ug/L	100
5) 1,3-Butadiene	3.95	54	346328	56.1865 ug/L	100
6) Bromomethane	4.81	94	300176	45.9193 ug/L	100
7) Chloroethane	4.97	64	309416	53.2015 ug/L	100
8) Trichlorofluoromethane	5.44	101	596452	54.0520 ug/L	100
9) Diethyl ether	5.97	59	603609	102.5651 ug/L	100
10) Isoprene	6.00	67	579917	52.5843 ug/L	100
11) Acrolein	6.21	56	34765	51.5164 ug/L	100
12) 1,1,2-Trichloro-1,2,2-Trif	6.22	101	340157	53.5082 ug/L	100
13) Acetone	6.31	43	87864	53.5007 ug/L	100
14) 1,1-Dichloroethene	6.53	61	596109	52.4292 ug/L	100
15) Tert-Butyl Alcohol	6.63	59	99887	188.9498 ug/L	100
16) Dimethyl Sulfide	6.79	62	430595	52.5752 ug/L	100
17) Iodomethane	7.03	142	441742	52.8466 ug/L	100
18) Methyl acetate	7.05	43	218390	51.3546 ug/L	100
19) Methylene Chloride	7.30	84	367767	51.7644 ug/L	100
20) Carbon Disulfide	7.34	76	1134616	53.3665 ug/L	100
21) Acrylonitrile	7.49	53	108702	52.7575 ug/L	100
22) Methyl Tert Butyl Ether	7.51	73	873403	51.6479 ug/L	100
23) trans-1,2-Dichloroethene	7.75	61	573205	52.7617 ug/L	100
24) n-Hexane	7.83	57	560051	52.5278 ug/L	100
25) Diisopropyl ether	8.17	45	2794825	103.9178 ug/L	100
26) Vinyl Acetate	8.34	43	511316	51.2506 ug/L	100
27) 1,1-Dichloroethane	8.37	63	736955	52.4736 ug/L	100
28) Ethyl-Tert-Butyl ether	8.74	59	2384559	102.2981 ug/L	100
29) 2-Butanone	8.93	43	127185	52.5718 ug/L	100
30) Propionitrile	9.03	54	74479	100.4636 ug/L	100
31) 2,2-Dichloropropane	9.14	77	528648	51.8762 ug/L	100
32) cis-1,2-Dichloroethene	9.20	96	414079	53.4021 ug/L	100
33) Chloroform	9.41	83	630762	50.6038 ug/L	100
34) 1-Bromopropane	9.55	122	88643	53.1827 ug/L	100
35) Bromochloromethane	9.64	130	235134	53.1708 ug/L	100
36) Tetrahydrofuran	9.67	42	165023	101.3834 ug/L	100
38) 1,1,1-Trichloroethane	9.94	97	574212	53.0371 ug/L	100
39) Cyclohexane	9.97	56	764351	53.0053 ug/L	100
40) 1,1-Dichloropropene	10.14	75	486257	53.4861 ug/L	100
41) Tert-Amyl-Methyl ether	10.24	73	1819195	102.4127 ug/L	100
42) Carbon Tetrachloride	10.28	117	522667	53.1266 ug/L	100

(#) = qualifier out of range (m) = manual integration
8M428962.D 8260WTR.M Tue Mar 05 10:54:59 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428962.D Vial: 8
Acq On : 4 Mar 2019 15:40 Operator: EEA
Sample : WG698192-08 50 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:54:57 2019 Quant Results File: 8260WTR.RES

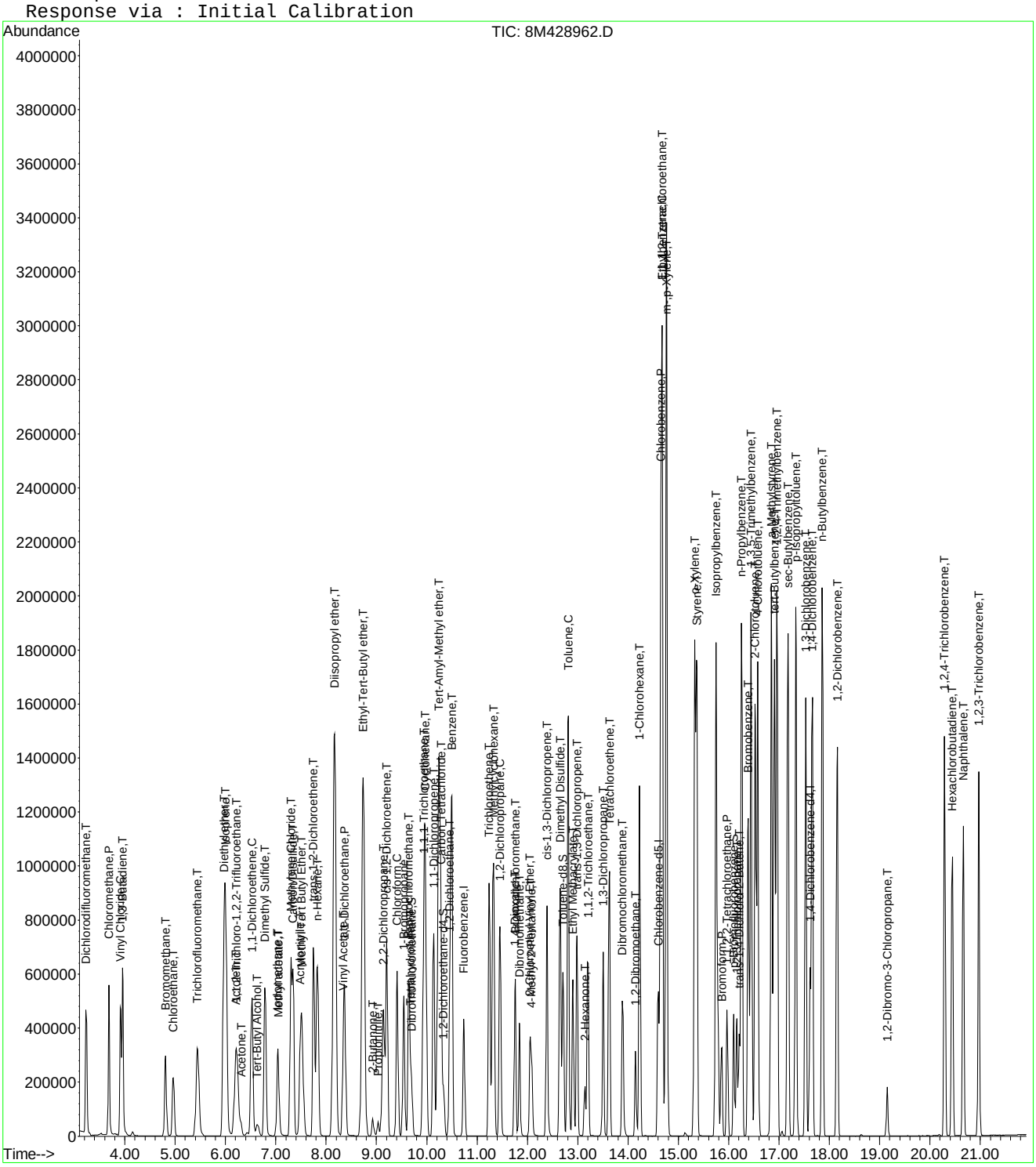
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
45)	1,2-Dichloroethane	10.46	62	454650	53.3261	ug/L	100
46)	Benzene	10.50	78	1499682	52.6586	ug/L	100
47)	Trichloroethene	11.24	130	413618	53.3075	ug/L	100
48)	Methylcyclohexane	11.32	83	630056	52.4333	ug/L	100
49)	1,2-Dichloropropane	11.46	63	416442	53.8713	ug/L	100
50)	Bromodichloromethane	11.76	83	482368	53.8914	ug/L	100
51)	1,4-Dioxane	11.75	88	9416	216.4757	ug/L	100
52)	Dibromomethane	11.84	93	185991	52.2711	ug/L	100
53)	2-Chloroethyl Vinyl Ether	12.05	63	174497	51.6598	ug/L	100
54)	4-Methyl-2-Pentanone	12.08	58	109795	51.6645	ug/L	100
55)	cis-1,3-Dichloropropene	12.39	75	583167	54.7643	ug/L	100
56)	Dimethyl Disulfide	12.65	79	345713	52.8677	ug/L	100
59)	Toluene	12.81	91	1554401	51.9588	ug/L	100
60)	Ethyl Methacrylate	12.91	69	395254	50.8804	ug/L	100
62)	trans-1,3-Dichloropropene	12.99	75	483580	53.7681	ug/L	100
63)	1,1,2-Trichloroethane	13.21	97	277584	53.0830	ug/L	100
64)	2-Hexanone	13.14	58	103399	48.5852	ug/L	100
65)	1,3-Dichloropropane	13.51	76	470894	52.2865	ug/L	100
66)	Tetrachloroethene	13.63	164	327264	51.9103	ug/L	100
67)	Dibromochloromethane	13.89	129	354221	53.3730	ug/L	100
68)	1,2-Dibromoethane	14.15	107	273327	53.8280	ug/L	100
69)	1-Chlorohexane	14.23	91	544258	52.5006	ug/L	100
70)	Chlorobenzene	14.65	112	1031350	50.8539	ug/L	100
71)	1,1,1,2-Tetrachloroethane	14.67	131	391985	52.5717	ug/L	100
72)	Ethylbenzene	14.67	106	583481	53.1750	ug/L	100
73)	m-,p-Xylene	14.77	106	1397295	104.5103	ug/L	100
74)	o-Xylene	15.33	106	695543	53.6147	ug/L	100
75)	Styrene	15.37	104	1156210	53.8331	ug/L	100
76)	Bromoform	15.86	173	224940	54.6622	ug/L	100
77)	Isopropylbenzene	15.75	105	1743408	53.2055	ug/L	100
79)	1,1,2,2-Tetrachloroethane	15.97	83	312670	50.9410	ug/L	100
81)	1,2,3-Trichloropropane	16.16	110	96184	52.3835	ug/L	100
82)	trans-1,4-Dichloro-2-Buten	16.20	53	108529	52.3052	ug/L	100
83)	n-Propylbenzene	16.26	91	2055567	52.2075	ug/L	100
84)	Bromobenzene	16.39	156	469393	52.1041	ug/L	100
85)	1,3,5-Trimethylbenzene	16.44	105	1494686	52.6616	ug/L	100
86)	2-Chlorotoluene	16.53	91	1367937	52.5459	ug/L	100
87)	4-Chlorotoluene	16.58	91	1153673	50.7178	ug/L	100
88)	a-Methylstyrene	16.85	118	875115	53.7320	ug/L	100
89)	tert-Butylbenzene	16.91	134	334890	51.1440	ug/L	100
90)	1,2,4-Trimethylbenzene	16.96	105	1523293	53.0121	ug/L	100
91)	sec-Butylbenzene	17.18	105	1910066	52.5837	ug/L	100
92)	p-Isopropyltoluene	17.33	119	1655407	53.1628	ug/L	100
93)	1,3-Dichlorobenzene	17.53	146	902835	51.4080	ug/L	100
94)	1,4-Dichlorobenzene	17.66	146	905126	50.8929	ug/L	100
95)	n-Butylbenzene	17.86	91	1510654	53.2454	ug/L	100
96)	1,2-Dichlorobenzene	18.16	146	838191	51.4315	ug/L	100
97)	1,2-Dibromo-3-Chloropropan	19.15	75	57558	52.0287	ug/L	100
98)	1,2,4-Trichlorobenzene	20.29	180	620877	52.5041	ug/L	100
99)	Hexachlorobutadiene	20.44	225	294584	52.8677	ug/L	100
100)	Naphthalene	20.66	128	1155751	53.6143	ug/L	100
101)	1,2,3-Trichlorobenzene	20.97	180	566747	52.1715	ug/L	100

(#) = qualifier out of range (m) = manual integration
8M428962.D 8260WTR.M Tue Mar 05 10:55:00 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428962.D Vial: 8
Acq On : 4 Mar 2019 15:40 Operator: EEA
Sample : WG698192-08 50 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428963.D Vial: 9
Acq On : 4 Mar 2019 16:09 Operator: EEA
Sample : WG698192-09 100 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:55:01 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	578503	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.60	117	434394	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	240678	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	9.70	111	299207	51.8870	ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 207.56%#			
43) 1,2-Dichloroethane-d4	10.33	65	292145	51.3184	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 205.28%#			
58) Toluene-d8	12.71	98	1114155	50.3523	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 201.40%#			
80) p-Bromofluorobenzene	16.10	95	448708	51.6568	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 206.64%#			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.23	85	1012567	100.6293	ug/L	99
3) Chloromethane	3.68	50	1237917	85.5444	ug/L	99
4) Vinyl Chloride	3.92	62	1139316	96.6082	ug/L	100
5) 1,3-Butadiene	3.95	54	629287	97.4416	ug/L	99
6) Bromomethane	4.80	94	599065	84.4547	ug/L	98
7) Chloroethane	4.97	64	625726	99.1508	ug/L	99
8) Trichlorofluoromethane	5.44	101	1172724	97.9406	ug/L	100
9) Diethyl ether	5.97	59	1235386	193.4538	ug/L	100
10) Isoprene	6.00	67	1161960	97.0984	ug/L	100
11) Acrolein	6.21	56	74704	102.0183	ug/L	100
12) 1,1,2-Trichloro-1,2,2-Trif	6.22	101	672607	97.5063	ug/L	99
13) Acetone	6.31	43	175252	98.3428	ug/L	95
14) 1,1-Dichloroethene	6.53	61	1185524	96.0923	ug/L	100
15) Tert-Butyl Alcohol	6.64	59	217661	379.4451	ug/L	98
16) Dimethyl Sulfide	6.79	62	867504	97.6144	ug/L	99
17) Iodomethane	7.03	142	932933	101.4253	ug/L	100
18) Methyl acetate	7.06	43	458352	99.3291	ug/L	99
19) Methylene Chloride	7.30	84	735238	95.3712	ug/L	100
20) Carbon Disulfide	7.34	76	2243994	97.2684	ug/L	99
21) Acrylonitrile	7.49	53	233053	104.2394	ug/L	97
22) Methyl Tert Butyl Ether	7.51	73	1764776	96.1742	ug/L	99
23) trans-1,2-Dichloroethene	7.75	61	1148539	97.4283	ug/L	100
24) n-Hexane	7.83	57	1114202	96.3067	ug/L	100
25) Diisopropyl ether	8.16	45	5483147	187.8866	ug/L	98
26) Vinyl Acetate	8.34	43	1086706	100.3813	ug/L	100
27) 1,1-Dichloroethane	8.37	63	1473636	96.6987	ug/L	100
28) Ethyl-Tert-Butyl ether	8.74	59	4719674	186.5960	ug/L	98
29) 2-Butanone	8.93	43	256859	97.8459	ug/L	98
30) Propionitrile	9.03	54	159010	193.3041	ug/L	98
31) 2,2-Dichloropropane	9.13	77	1032620	93.3841	ug/L	100
32) cis-1,2-Dichloroethene	9.21	96	831013	98.7674	ug/L	100
33) Chloroform	9.41	83	1261043	93.2349	ug/L	100
34) 1-Bromopropane	9.55	122	178392	98.6352	ug/L	100
35) Bromochloromethane	9.64	130	477677	99.5458	ug/L	99
36) Tetrahydrofuran	9.67	42	335892	190.1747	ug/L	98
38) 1,1,1-Trichloroethane	9.94	97	1134879	96.6024	ug/L	99
39) Cyclohexane	9.97	56	1513886	96.7499	ug/L	99
40) 1,1-Dichloropropene	10.14	75	974256	98.7595	ug/L	100
41) Tert-Amyl-Methyl ether	10.24	73	3624583	188.0457	ug/L	99
42) Carbon Tetrachloride	10.28	117	1042270	97.6334	ug/L	100

(#) = qualifier out of range (m) = manual integration
8M428963.D 8260WTR.M Tue Mar 05 10:55:03 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428963.D Vial: 9
Acq On : 4 Mar 2019 16:09 Operator: EEA
Sample : WG698192-09 100 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:55:01 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

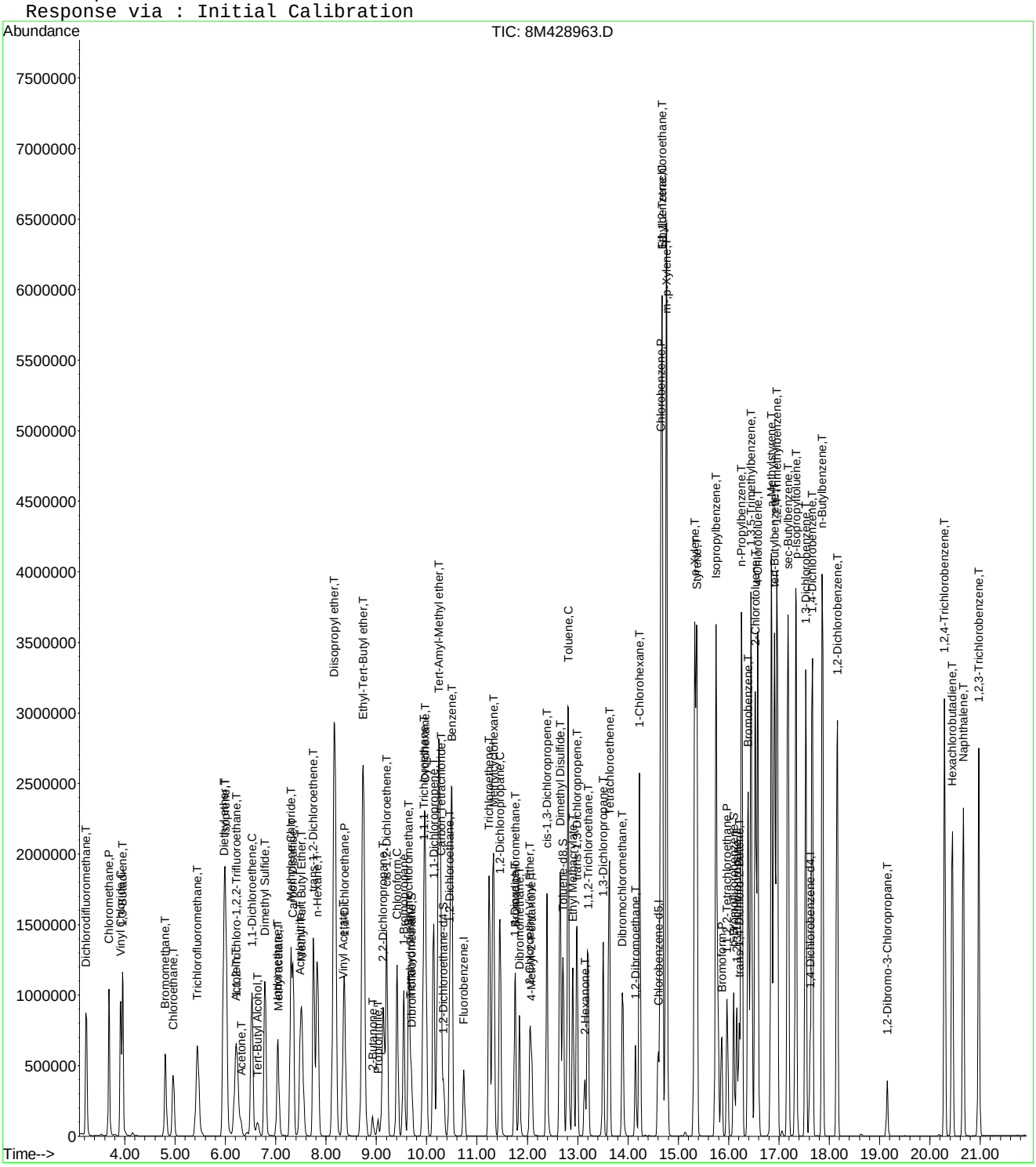
	Compound	R.T.	QIon	Response	Conc Unit	Qvalue
45)	1,2-Dichloroethane	10.46	62	908506	98.2021 ug/L	100
46)	Benzene	10.50	78	2934603	94.9621 ug/L	99
47)	Trichloroethene	11.24	130	825611	98.0606 ug/L	99
48)	Methylcyclohexane	11.33	83	1240651	95.1499 ug/L	99
49)	1,2-Dichloropropane	11.46	63	827768	98.6830 ug/L	100
50)	Bromodichloromethane	11.76	83	967751	99.6404 ug/L	100
51)	1,4-Dioxane	11.75	88	20243	428.8924 ug/L	99
52)	Dibromomethane	11.84	93	380355	98.5121 ug/L	100
53)	2-Chloroethyl Vinyl Ether	12.05	63	369044	100.6870 ug/L	100
54)	4-Methyl-2-Pentanone	12.08	58	234067	101.5033 ug/L	99
55)	cis-1,3-Dichloropropene	12.39	75	1173352	101.5463 ug/L	100
56)	Dimethyl Disulfide	12.65	79	701550	98.8700 ug/L	99
59)	Toluene	12.81	91	3010430	92.8182 ug/L	98
60)	Ethyl Methacrylate	12.91	69	813537	96.1671 ug/L	100
62)	trans-1,3-Dichloropropene	12.99	75	977484	100.2477 ug/L	99
63)	1,1,2-Trichloroethane	13.21	97	555137	97.9197 ug/L	99
64)	2-Hexanone	13.15	58	222332	93.7044 ug/L	96
65)	1,3-Dichloropropane	13.51	76	954169	97.7237 ug/L	99
66)	Tetrachloroethene	13.63	164	655070	95.8410 ug/L	99
67)	Dibromochloromethane	13.89	129	723064	100.4923 ug/L	100
68)	1,2-Dibromoethane	14.15	107	557984	101.3574 ug/L	99
69)	1-Chlorohexane	14.23	91	1085750	96.6046 ug/L	100
70)	Chlorobenzene	14.65	112	2043702	92.9488 ug/L	99
71)	1,1,1,2-Tetrachloroethane	14.68	131	801855	99.1943 ug/L	99
72)	Ethylbenzene	14.68	106	1176858	98.9266 ug/L	94
73)	m-,p-Xylene	14.77	106	2751893	189.8501 ug/L	92
74)	o-Xylene	15.33	106	1415977	100.6756 ug/L	95
75)	Styrene	15.37	104	2327941	99.9753 ug/L	98
76)	Bromoform	15.86	173	470887	105.5470 ug/L	99
77)	Isopropylbenzene	15.75	105	3379273	95.1238 ug/L	97
79)	1,1,2,2-Tetrachloroethane	15.97	83	658687	97.0087 ug/L	99
81)	1,2,3-Trichloropropane	16.16	110	197378	97.1721 ug/L	99
82)	trans-1,4-Dichloro-2-Buten	16.21	53	229702	100.0724 ug/L	99
83)	n-Propylbenzene	16.26	91	3941692	90.4972 ug/L	96
84)	Bromobenzene	16.39	156	967544	97.0859 ug/L	99
85)	1,3,5-Trimethylbenzene	16.44	105	2952548	94.0355 ug/L	98
86)	2-Chlorotoluene	16.54	91	2680366	93.0717 ug/L	98
87)	4-Chlorotoluene	16.58	91	2307353	91.6944 ug/L	98
88)	a-Methylstyrene	16.85	118	1801911	100.0119 ug/L	99
89)	tert-Butylbenzene	16.91	134	692727	95.6325 ug/L	96
90)	1,2,4-Trimethylbenzene	16.96	105	3001972	94.4384 ug/L	97
91)	sec-Butylbenzene	17.18	105	3734793	92.9438 ug/L	98
92)	p-Isopropyltoluene	17.34	119	3247181	94.2672 ug/L	97
93)	1,3-Dichlorobenzene	17.53	146	1851935	95.3232 ug/L	100
94)	1,4-Dichlorobenzene	17.66	146	1836509	93.3451 ug/L	98
95)	n-Butylbenzene	17.86	91	2982166	95.0167 ug/L	98
96)	1,2-Dichlorobenzene	18.16	146	1717023	95.2386 ug/L	99
97)	1,2-Dibromo-3-Chloropropan	19.15	75	121519	99.2961 ug/L	97
98)	1,2,4-Trichlorobenzene	20.29	180	1284312	98.1768 ug/L	100
99)	Hexachlorobutadiene	20.44	225	610618	99.0607 ug/L	99
100)	Naphthalene	20.66	128	2348094	98.4651 ug/L	99
101)	1,2,3-Trichlorobenzene	20.97	180	1162600	96.7443 ug/L	99

(#) = qualifier out of range (m) = manual integration
8M428963.D 8260WTR.M Tue Mar 05 10:55:04 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428963.D Vial: 9
Acq On : 4 Mar 2019 16:09 Operator: EEA
Sample : WG698192-09 100 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428964.D Vial: 10
Acq On : 4 Mar 2019 16:38 Operator: EEA
Sample : WG698192-10 200 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:55:05 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Fluorobenzene	10.74	96	565092	25.00 ug/L	0.00
57) Chlorobenzene-d5	14.60	117	432785	25.00 ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	251063	25.00 ug/L	0.00
System Monitoring Compounds					
37) Dibromofluoromethane	9.69	111	546178	96.9632 ug/L	-0.01
Spiked Amount 25.000	Range 86 - 118		Recovery = 387.84%#		
43) 1,2-Dichloroethane-d4	10.33	65	539183	96.9611 ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 387.84%#		
58) Toluene-d8	12.71	98	2011484	91.2434 ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 364.96%#		
80) p-Bromofluorobenzene	16.10	95	844391	93.1883 ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 372.76%#		
Target Compounds					Qvalue
2) Dichlorodifluoromethane	3.22	85	2004123	203.8974 ug/L	98
3) Chloromethane	3.67	50	2402052	169.9296 ug/L	97
4) Vinyl Chloride	3.90	62	2214658	192.2484 ug/L	98
5) 1,3-Butadiene	3.94	54	1233022	200.4621 ug/L	99
6) Bromomethane	4.79	94	1228006	177.2298 ug/L	98
7) Chloroethane	4.95	64	1254003	203.4216 ug/L	100
8) Trichlorofluoromethane	5.43	101	2324194	198.7129 ug/L	99
10) Isoprene	5.99	67	2324648	198.8679 ug/L	100
12) 1,1,2-Trichloro-1,2,2-Trif	6.21	101	1357837	201.5142 ug/L	99
13) Acetone	6.30	43	350194	201.1753 ug/L	92
14) 1,1-Dichloroethene	6.52	61	2353107	195.2569 ug/L	99
16) Dimethyl Sulfide	6.78	62	1737568	200.1569 ug/L	98
17) Iodomethane	7.03	142	1826830	201.8012 ug/L	100
18) Methyl acetate	7.04	43	952086	211.2223 ug/L	99
19) Methylene Chloride	7.29	84	1473339	195.6494 ug/L	99
20) Carbon Disulfide	7.33	76	4313442	191.4082 ug/L	98
21) Acrylonitrile	7.50	53	35855	16.4177 ug/L #	29
22) Methyl Tert Butyl Ether	7.51	73	3512538	195.9640 ug/L	98
23) trans-1,2-Dichloroethene	7.75	61	2274275	197.5008 ug/L	99
24) n-Hexane	7.82	57	2289573	202.5971 ug/L	100
26) Vinyl Acetate	8.34	43	1985980	187.8028 ug/L	99
27) 1,1-Dichloroethane	8.36	63	2878727	193.3825 ug/L	99
29) 2-Butanone	8.92	43	538864	210.1423 ug/L	98
31) 2,2-Dichloropropane	9.13	77	2026979	187.6584 ug/L	99
32) cis-1,2-Dichloroethene	9.21	96	1649584	200.7090 ug/L	99
33) Chloroform	9.41	83	2468111	186.8097 ug/L	99
34) 1-Bromopropane	9.55	122	362532	205.2057 ug/L	100
35) Bromochloromethane	9.64	130	957734	204.3243 ug/L	99
36) Tetrahydrofuran	9.68	42	2780	1.6113 ug/L #	40
38) 1,1,1-Trichloroethane	9.94	97	2235602	194.8137 ug/L	99
39) Cyclohexane	9.97	56	3040534	198.9270 ug/L	99
40) 1,1-Dichloropropene	10.14	75	1922547	199.5121 ug/L	99
42) Carbon Tetrachloride	10.28	117	2047091	196.3097 ug/L	100
45) 1,2-Dichloroethane	10.46	62	1787189	197.7653 ug/L	98
46) Benzene	10.49	78	5433612	180.0014 ug/L	95
47) Trichloroethene	11.24	130	1663967	202.3254 ug/L	99
48) Methylcyclohexane	11.32	83	2521969	198.0090 ug/L	99
49) 1,2-Dichloropropane	11.45	63	1659991	202.5937 ug/L	100
50) Bromodichloromethane	11.75	83	1922180	202.6060 ug/L	99
51) 1,4-Dioxane	11.74	88	2147	46.5685 ug/L #	14

(#) = qualifier out of range (m) = manual integration
8M428964.D 8260WTR.M Tue Mar 05 10:55:07 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428964.D Vial: 10
Acq On : 4 Mar 2019 16:38 Operator: EEA
Sample : WG698192-10 200 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:55:05 2019 Quant Results File: 8260WTR.RES

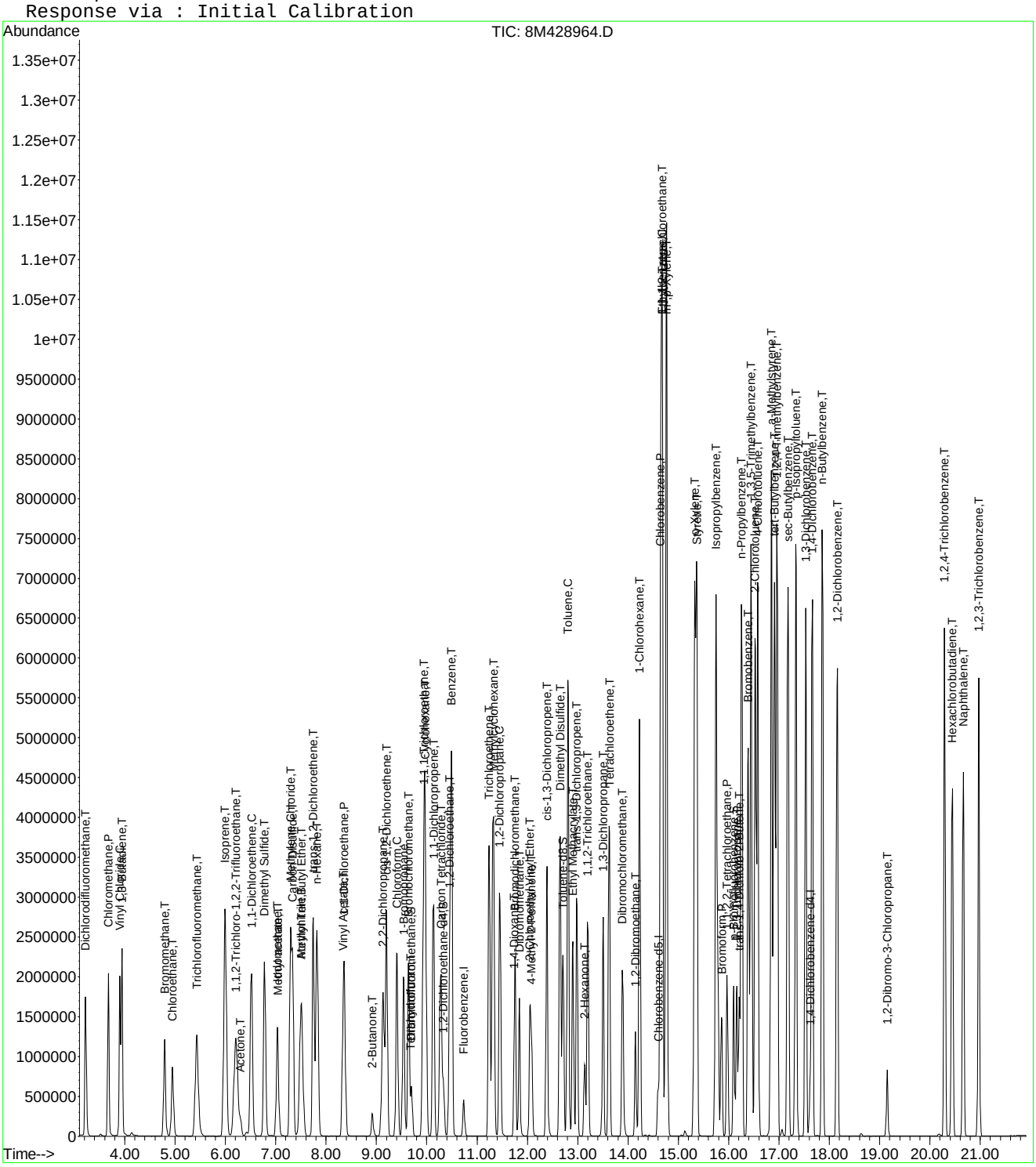
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc Unit	Qvalue
52)	Dibromomethane	11.84	93	767150	203.4077 ug/L	99
53)	2-Chloroethyl Vinyl Ether	12.05	63	781751	218.3484 ug/L	100
54)	4-Methyl-2-Pentanone	12.08	58	492715	218.7371 ug/L	99
55)	cis-1,3-Dichloropropene	12.39	75	2325494	206.0332 ug/L	98
56)	Dimethyl Disulfide	12.65	79	1426255	205.7734 ug/L	97
59)	Toluene	12.80	91	5454725	168.8066 ug/L	94
60)	Ethyl Methacrylate	12.91	69	1691777	200.2070 ug/L	99
62)	trans-1,3-Dichloropropene	12.98	75	1954014	201.1425 ug/L	98
63)	1,1,2-Trichloroethane	13.20	97	1124859	199.1497 ug/L	99
64)	2-Hexanone	13.13	58	490171	204.0804 ug/L	92
65)	1,3-Dichloropropane	13.51	76	1902968	195.6219 ug/L	99
66)	Tetrachloroethene	13.63	164	1321277	194.0302 ug/L	99
67)	Dibromochloromethane	13.89	129	1465222	204.3954 ug/L	99
68)	1,2-Dibromoethane	14.15	107	1139513	207.7613 ug/L	100
69)	1-Chlorohexane	14.23	91	2209339	197.3067 ug/L	99
70)	Chlorobenzene	14.64	112	3906155	178.3149 ug/L	95
71)	1,1,1,2-Tetrachloroethane	14.67	131	1596855	198.2750 ug/L	100
72)	Ethylbenzene	14.67	106	2320121	195.7543 ug/L	78
73)	m-,p-Xylene	14.77	106	5020397	347.6395 ug/L	77
74)	o-Xylene	15.33	106	2789652	199.0809 ug/L	87
75)	Styrene	15.37	104	4453512	191.9708 ug/L	94
76)	Bromoform	15.86	173	1003376	225.7378 ug/L	99
77)	Isopropylbenzene	15.75	105	6080157	171.7879 ug/L	90
79)	1,1,2,2-Tetrachloroethane	15.97	83	1359009	191.8702 ug/L	99
81)	1,2,3-Trichloropropane	16.16	110	417199	196.8972 ug/L	100
82)	trans-1,4-Dichloro-2-Buten	16.20	53	496588	207.3956 ug/L	99
83)	n-Propylbenzene	16.26	91	6822994	150.1692 ug/L	87
84)	Bromobenzene	16.39	156	1975669	190.0437 ug/L	98
85)	1,3,5-Trimethylbenzene	16.44	105	5450748	166.4197 ug/L	92
86)	2-Chlorotoluene	16.53	91	5047792	168.0268 ug/L	92
87)	4-Chlorotoluene	16.58	91	4250089	161.9125 ug/L	91
88)	a-Methylstyrene	16.85	118	3580082	190.4868 ug/L	96
89)	tert-Butylbenzene	16.91	134	1426368	188.7682 ug/L	87
90)	1,2,4-Trimethylbenzene	16.96	105	5486719	165.4659 ug/L	90
91)	sec-Butylbenzene	17.18	105	6582290	157.0307 ug/L	90
92)	p-Isopropyltoluene	17.33	119	5837012	162.4420 ug/L	90
93)	1,3-Dichlorobenzene	17.53	146	3620888	178.6659 ug/L	96
94)	1,4-Dichlorobenzene	17.66	146	3596351	175.2323 ug/L	95
95)	n-Butylbenzene	17.86	91	5409792	165.2351 ug/L	91
96)	1,2-Dichlorobenzene	18.16	146	3368677	179.1224 ug/L	96
97)	1,2-Dibromo-3-Chloropropan	19.15	75	258649	202.6060 ug/L	96
98)	1,2,4-Trichlorobenzene	20.29	180	2623960	192.2867 ug/L	99
99)	Hexachlorobutadiene	20.44	225	1253776	194.9869 ug/L	99
100)	Naphthalene	20.66	128	4525002	181.9028 ug/L	96
101)	1,2,3-Trichlorobenzene	20.97	180	2400819	191.5173 ug/L	99

(#) = qualifier out of range (m) = manual integration
8M428964.D 8260WTR.M Tue Mar 05 10:55:08 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428964.D Vial: 10
Acq On : 4 Mar 2019 16:38 Operator: EEA
Sample : WG698192-10 200 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428965.D Vial: 11
Acq On : 4 Mar 2019 17:07 Operator: EEA
Sample : WG698192-11 300 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:55:09 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.73	96	542966	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.60	117	396623	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	212626	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	9.69	111	971	0.1794	ug/L	-0.01
Spiked Amount 25.000	Range 86 - 118		Recovery =	0.72%#		
43) 1,2-Dichloroethane-d4	10.33	65	805	0.1507	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery =	0.60%#		
58) Toluene-d8	12.71	98	6199	0.3068	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery =	1.24%#		
80) p-Bromofluorobenzene	16.10	95	4824	0.6286	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery =	2.52%#		
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.22	85	6424	0.6802	ug/L	97
3) Chloromethane	3.67	50	41635	3.0654	ug/L	99
4) Vinyl Chloride	3.90	62	2989	0.2700	ug/L	98
5) 1,3-Butadiene	3.94	54	1715174	292.4400	ug/L	99
6) Bromomethane	4.79	94	186263	27.9775	ug/L	100
8) Trichlorofluoromethane	5.42	101	2587	0.2302	ug/L #	74
9) Diethyl ether	5.96	59	1818871	303.4656	ug/L	99
10) Isoprene	6.00	67	3378731	300.8207	ug/L	100
11) Acrolein	6.20	56	110342	160.5492	ug/L	95
12) 1,1,2-Trichloro-1,2,2-Trif	6.21	101	1873	0.2893	ug/L	99
13) Acetone	6.30	43	480528	287.2970	ug/L	93
14) 1,1-Dichloroethene	6.52	61	3073	0.2654	ug/L	97
15) Tert-Butyl Alcohol	6.63	59	329899	612.7485	ug/L	96
16) Dimethyl Sulfide	6.77	62	2528685	303.1588	ug/L	98
17) Iodomethane	7.03	142	2145401	246.3138	ug/L	99
18) Methyl acetate	7.04	43	1376364	317.7924	ug/L	98
19) Methylene Chloride	7.29	84	3022	0.4177	ug/L	99
20) Carbon Disulfide	7.33	76	5921410	273.4691	ug/L	96
21) Acrylonitrile	7.48	53	323034	153.9425	ug/L	97
22) Methyl Tert Butyl Ether	7.51	73	4004	0.2325	ug/L #	1
23) trans-1,2-Dichloroethene	7.75	61	7116	0.6431	ug/L	97
24) n-Hexane	7.82	57	3192652	294.0200	ug/L	100
25) Diisopropyl ether	8.16	45	7633508	278.6911	ug/L	96
26) Vinyl Acetate	8.34	43	3174122	312.3901	ug/L	98
28) Ethyl-Tert-Butyl ether	8.73	59	6671315	281.0184	ug/L	96
29) 2-Butanone	8.91	43	764637	310.3389	ug/L	97
30) Propionitrile	9.03	54	238789	306.5840	ug/L	99
32) cis-1,2-Dichloroethene	9.20	96	2397	0.3035	ug/L	88
33) Chloroform	9.40	83	1936	0.1525	ug/L	100
34) 1-Bromopropane	9.55	122	522744	307.9488	ug/L	98
35) Bromochloromethane	9.64	130	978	0.2172	ug/L #	32
36) Tetrahydrofuran	9.67	42	488537	294.7023	ug/L	97
39) Cyclohexane	9.97	56	4327622	294.6725	ug/L	99
40) 1,1-Dichloropropene	10.13	75	4234	0.4573	ug/L #	70
41) Tert-Amyl-Methyl ether	10.24	73	5156927	285.0554	ug/L	98
42) Carbon Tetrachloride	10.27	117	1259	0.1257	ug/L #	78
45) 1,2-Dichloroethane	10.45	62	1438	0.1656	ug/L #	38
46) Benzene	10.49	78	6854	0.2363	ug/L #	83
47) Trichloroethene	11.24	130	2826	0.3576	ug/L	96
48) Methylcyclohexane	11.32	83	3560427	290.9335	ug/L	98

(#) = qualifier out of range (m) = manual integration
8M428965.D 8260WTR.M Tue Mar 05 10:55:11 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428965.D Vial: 11
Acq On : 4 Mar 2019 17:07 Operator: EEA
Sample : WG698192-11 300 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:55:09 2019 Quant Results File: 8260WTR.RES

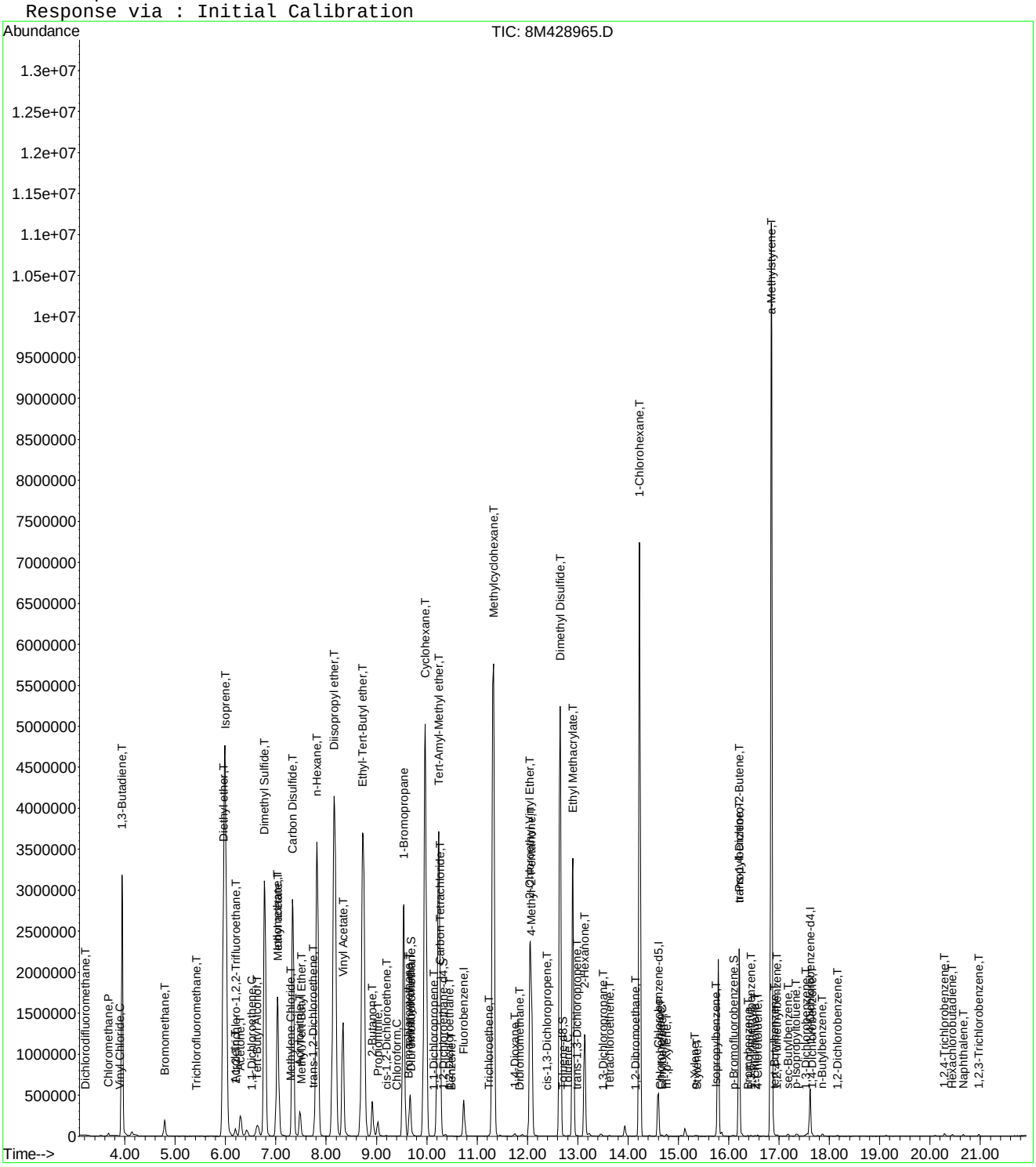
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

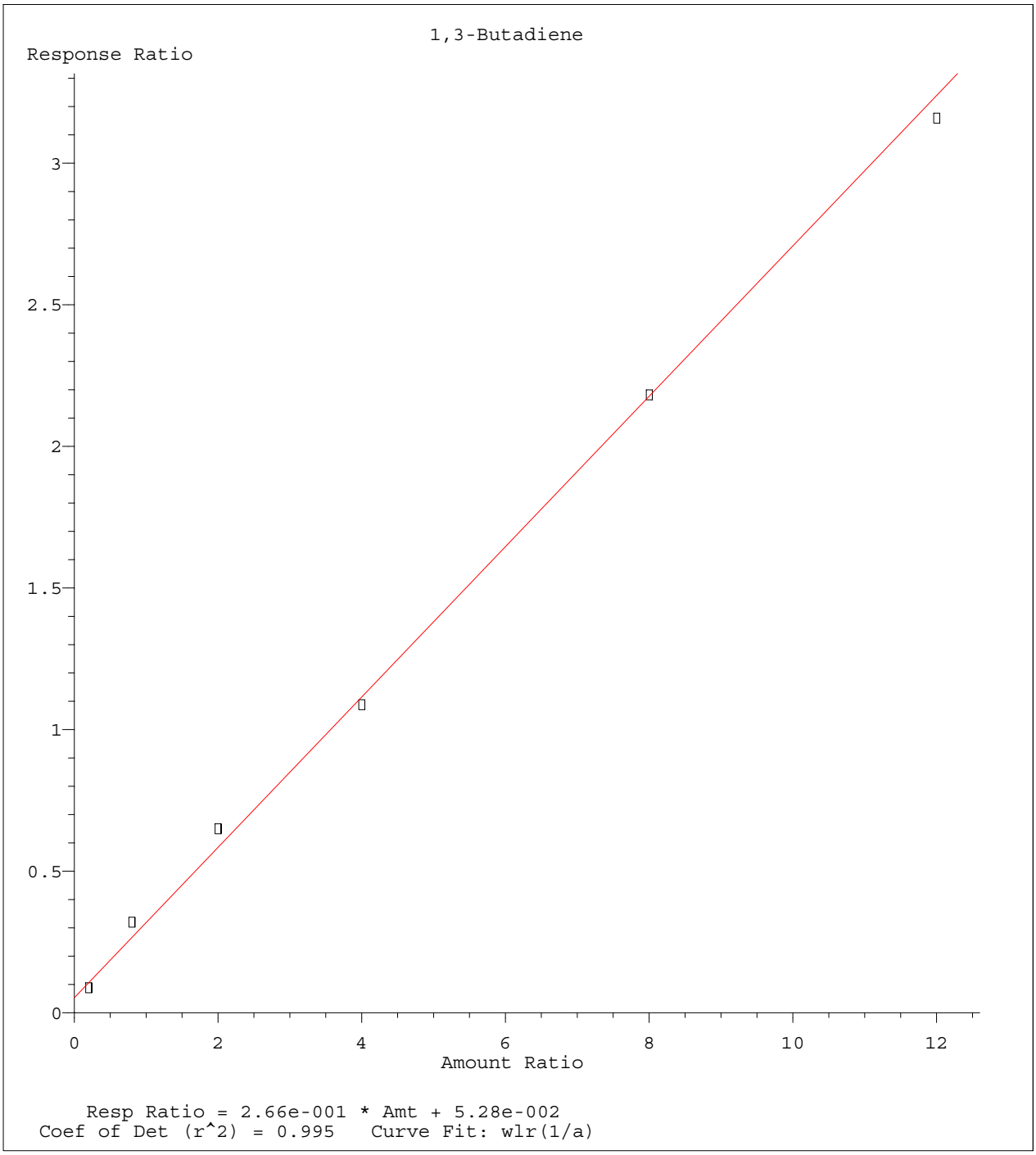
	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
51)	1,4-Dioxane	11.75	88	28018	632.4753	ug/L		92
52)	Dibromomethane	11.84	93	926	0.2555	ug/L		97
53)	2-Chloroethyl Vinyl Ether	12.05	63	1126775	327.5407	ug/L		99
54)	4-Methyl-2-Pentanone	12.08	58	693546	320.4412	ug/L		99
55)	cis-1,3-Dichloropropene	12.39	75	2506	0.2311	ug/L		95
56)	Dimethyl Disulfide	12.65	79	2029725	304.7726	ug/L		92
59)	Toluene	12.80	91	6757	0.2282	ug/L		99
60)	Ethyl Methacrylate	12.91	69	2343646	302.3930	ug/L		99
62)	trans-1,3-Dichloropropene	12.99	75	3194	0.3588	ug/L		98
64)	2-Hexanone	13.13	58	670462	303.2643	ug/L	#	47
65)	1,3-Dichloropropane	13.51	76	1201	0.1347	ug/L	#	1
66)	Tetrachloroethene	13.63	164	2546	0.4080	ug/L		88
68)	1,2-Dibromoethane	14.15	107	1277	0.2541	ug/L		75
69)	1-Chlorohexane	14.23	91	3057292	297.9276	ug/L		99
70)	Chlorobenzene	14.64	112	6538	0.3257	ug/L		87
72)	Ethylbenzene	14.67	106	3192	0.2939	ug/L		84
73)	m-,p-Xylene	14.77	106	8006	0.6049	ug/L		85
74)	o-Xylene	15.33	106	3229	0.2514	ug/L		79
75)	Styrene	15.37	104	5587	0.2628	ug/L		91
77)	Isopropylbenzene	15.75	105	23653	0.7292	ug/L		96
82)	trans-1,4-Dichloro-2-Buten	16.20	53	627246	309.3197	ug/L	#	71
83)	n-Propylbenzene	16.20	91	160201	4.1633	ug/L	#	59
84)	Bromobenzene	16.39	156	2990	0.3396	ug/L		88
85)	1,3,5-Trimethylbenzene	16.44	105	9318	0.3359	ug/L		95
86)	2-Chlorotoluene	16.52	91	8631	0.3392	ug/L		94
87)	4-Chlorotoluene	16.58	91	10061	0.4526	ug/L		93
88)	a-Methylstyrene	16.85	118	4498901	282.6472	ug/L		93
89)	tert-Butylbenzene	16.91	134	3409	0.5327	ug/L	#	1
90)	1,2,4-Trimethylbenzene	16.96	105	10435	0.3716	ug/L		84
91)	sec-Butylbenzene	17.18	105	27689	0.7800	ug/L		94
92)	p-Isopropyltoluene	17.33	119	15736	0.5171	ug/L		98
93)	1,3-Dichlorobenzene	17.53	146	9884	0.5759	ug/L		98
94)	1,4-Dichlorobenzene	17.66	146	10190	0.5863	ug/L		92
95)	n-Butylbenzene	17.86	91	20588	0.7425	ug/L		99
96)	1,2-Dichlorobenzene	18.16	146	6432	0.4038	ug/L		99
98)	1,2,4-Trichlorobenzene	20.29	180	14061	1.2167	ug/L		98
99)	Hexachlorobutadiene	20.44	225	5816	1.0680	ug/L		93
100)	Naphthalene	20.66	128	17967	0.8528	ug/L		96
101)	1,2,3-Trichlorobenzene	20.97	180	10100	0.9513	ug/L		97

(#) = qualifier out of range (m) = manual integration
8M428965.D 8260WTR.M Tue Mar 05 10:55:12 2019 Page 2

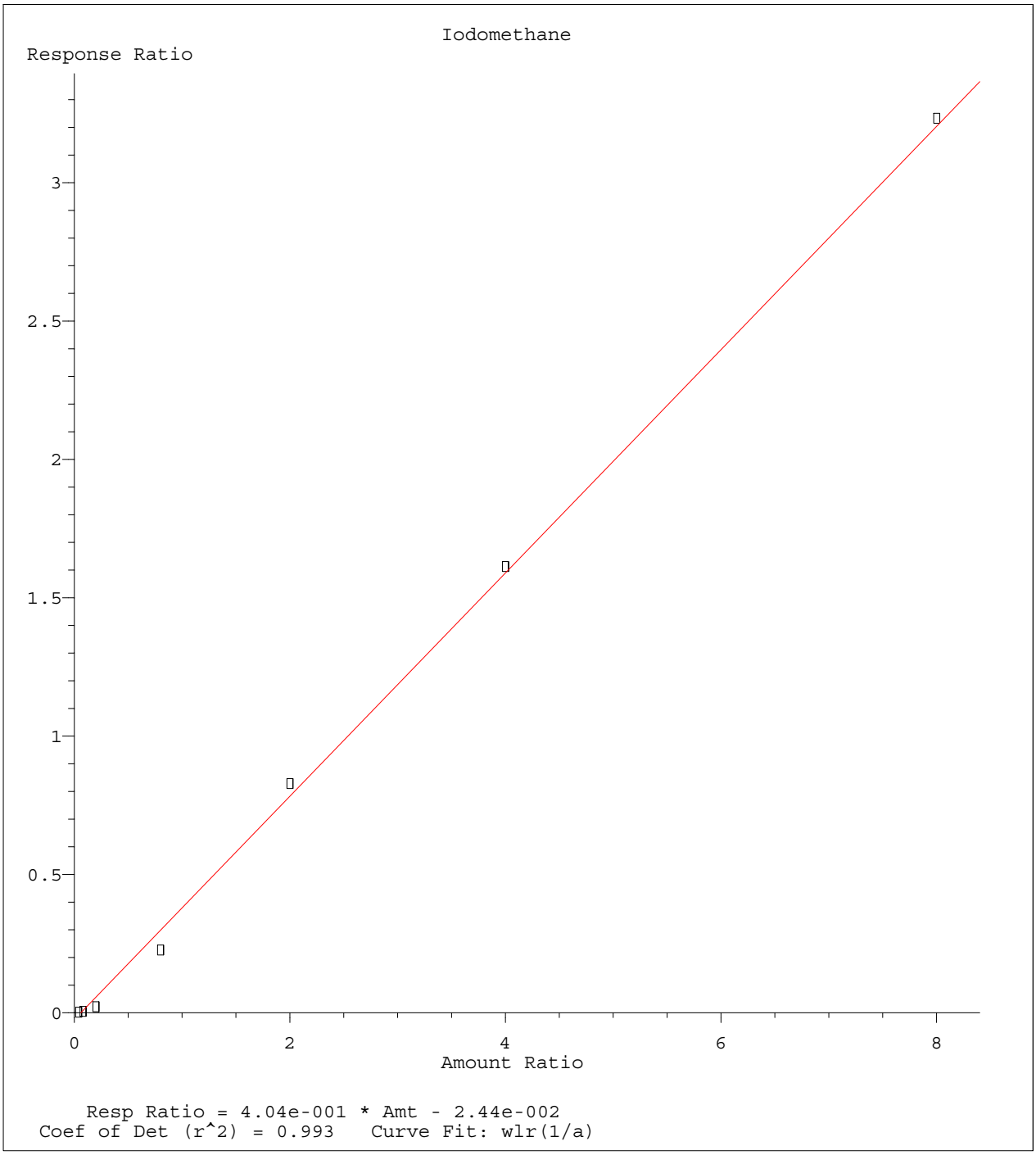
Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428965.D Vial: 11
Acq On : 4 Mar 2019 17:07 Operator: EEA
Sample : WG698192-11 300 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:54 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration

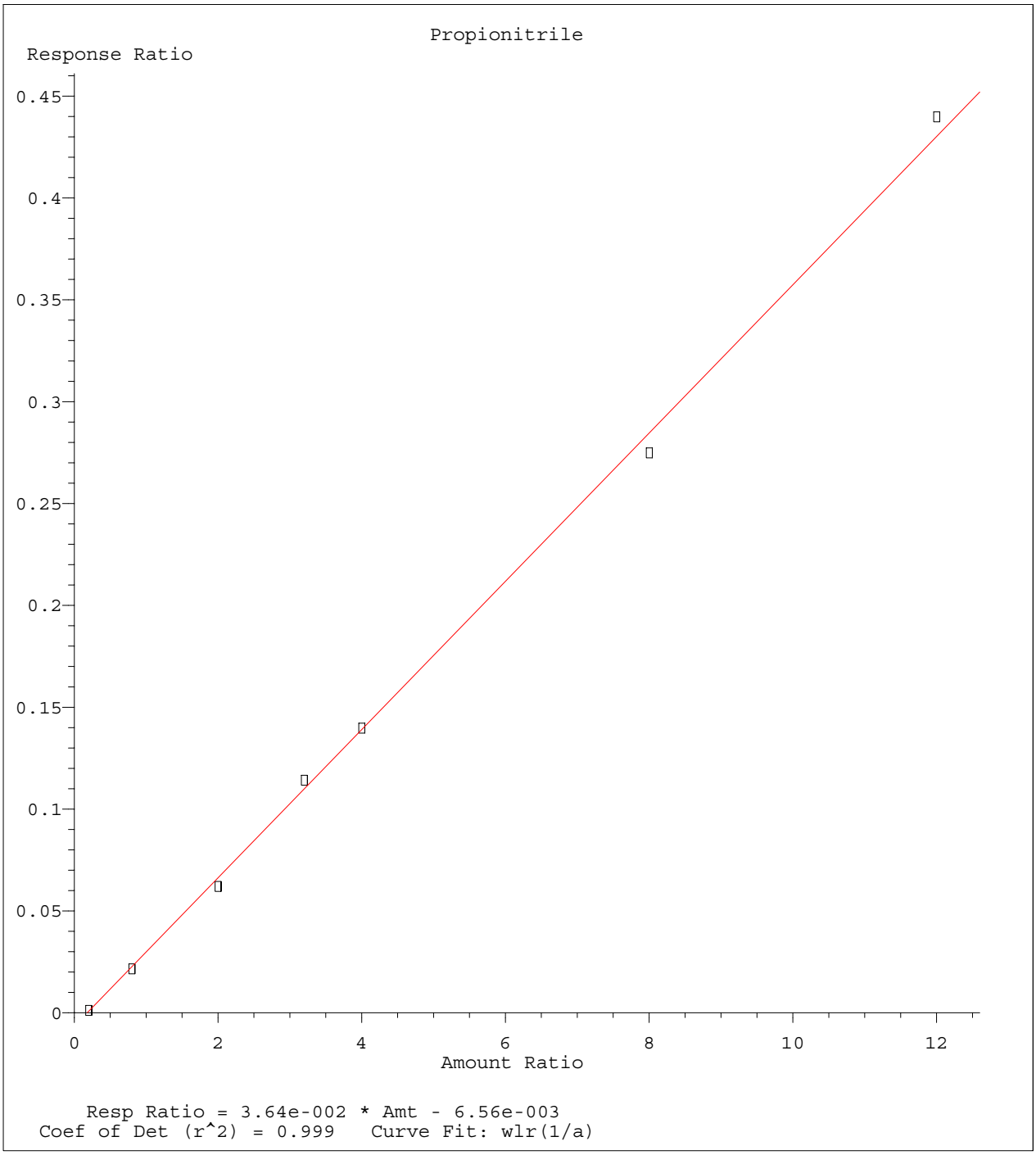




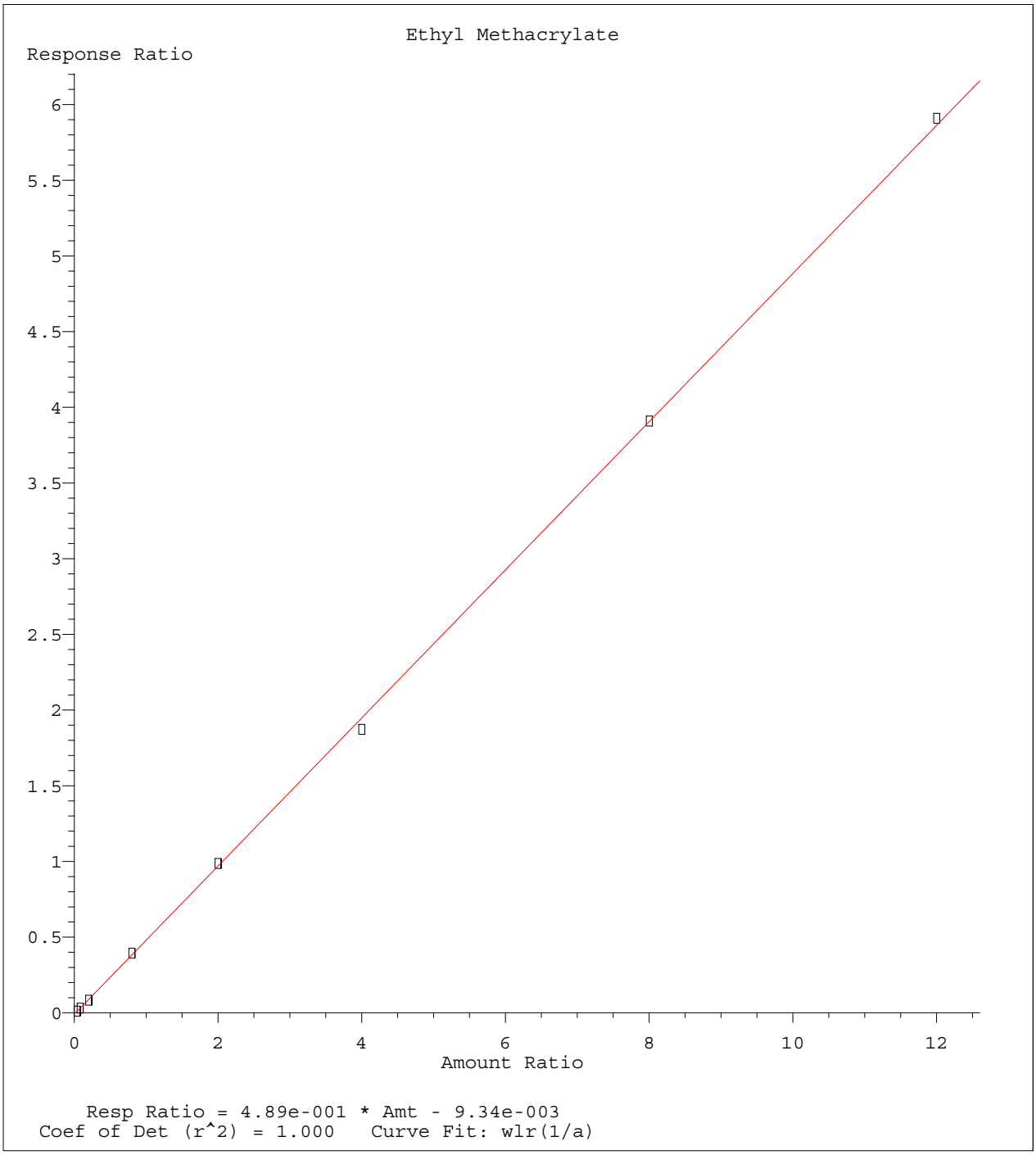
Method Name: K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M
Calibration Table Last Updated: Mon Mar 04 17:44:12 2019



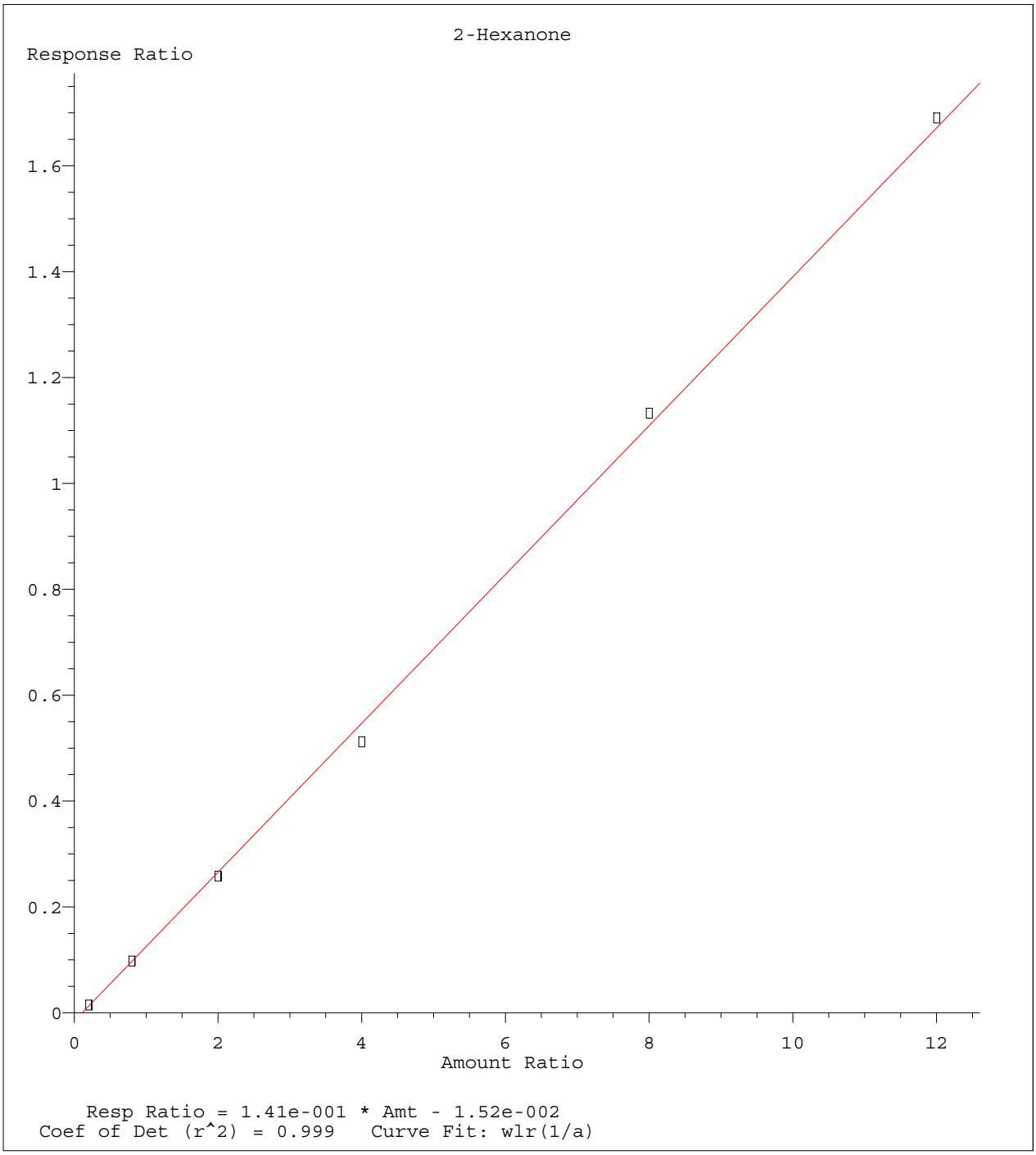
Method Name: K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M
Calibration Table Last Updated: Mon Mar 04 17:44:12 2019



Method Name: K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M
Calibration Table Last Updated: Mon Mar 04 17:44:12 2019



Method Name: K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M
Calibration Table Last Updated: Mon Mar 04 17:44:12 2019



Method Name: K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M
Calibration Table Last Updated: Mon Mar 04 17:44:12 2019

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428967.D Vial: 13
Acq On : 4 Mar 2019 18:06 Operator: EEA
Sample : WG698192-12 ALT 50 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:55:31 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	511233	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.60	117	379639	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	222101	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	9.70	111	130702	25.6481	ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 102.60%			
43) 1,2-Dichloroethane-d4	10.33	65	128013	25.4458	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 101.80%			
58) Toluene-d8	12.71	98	502661	25.9933	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 103.96%			
80) p-Bromofluorobenzene	16.09	95	198337	24.7431	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 98.96%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.23	85	501548	56.4027	ug/L	100
3) Chloromethane	3.69	50	626433	48.9848	ug/L	100
4) Vinyl Chloride	3.91	62	466984	44.8083	ug/L	100
5) 1,3-Butadiene	3.95	54	305611	51.3080	ug/L	99
6) Bromomethane	4.79	94	229789	36.6577	ug/L	100
7) Chloroethane	4.96	64	306769	55.0060	ug/L	99
8) Trichlorofluoromethane	5.43	101	520278	49.1688	ug/L	100
9) Diethyl ether	5.97	59	569381	100.8937	ug/L	99
10) Isoprene	6.00	67	555358	52.5147	ug/L	99
11) Acrolein	6.21	56	78599	121.4613	ug/L	99
12) 1,1,2-Trichloro-1,2,2-Trif	6.21	101	327198	53.6746	ug/L	99
13) Acetone	6.31	43	73026	46.3707	ug/L	98
14) 1,1-Dichloroethene	6.52	61	562302	51.5744	ug/L	100
15) Tert-Butyl Alcohol	6.65	59	97735	192.7992	ug/L	99
16) Dimethyl Sulfide	6.79	62	452865	57.6631	ug/L	98
17) Iodomethane	7.04	142	703007	86.7080	ug/L	99
18) Methyl acetate	7.06	43	204728	50.2043	ug/L	99
19) Methylene Chloride	7.29	84	359603	52.7837	ug/L	98
20) Carbon Disulfide	7.34	76	983785	48.2544	ug/L	100
21) Acrylonitrile	7.49	53	102317	51.7859	ug/L	97
22) Methyl Tert Butyl Ether	7.51	73	786663	48.5115	ug/L	99
23) trans-1,2-Dichloroethene	7.75	61	555437	53.3164	ug/L	100
24) n-Hexane	7.82	57	484655	47.4037	ug/L	99
25) Diisopropyl ether	8.16	45	2682988	104.0331	ug/L	99
26) Vinyl Acetate	8.34	43	348376	36.4146	ug/L	100
27) 1,1-Dichloroethane	8.37	63	713238	52.9604	ug/L	100
28) Ethyl-Tert-Butyl ether	8.74	59	2309943	103.3424	ug/L	100
29) 2-Butanone	8.93	43	112492	48.4905	ug/L	100
30) Propionitrile	9.03	54	71645	100.7667	ug/L	99
31) 2,2-Dichloropropane	9.13	77	490520	50.1968	ug/L	100
32) cis-1,2-Dichloroethene	9.21	96	406093	54.6158	ug/L	99
33) Chloroform	9.41	83	617839	51.6905	ug/L	100
34) 1-Bromopropane	9.55	122	84387	52.7982	ug/L	98
35) Bromochloromethane	9.64	130	226715	53.4633	ug/L	98
36) Tetrahydrofuran	9.67	42	156031	99.9656	ug/L	100
38) 1,1,1-Trichloroethane	9.94	97	566738	54.5893	ug/L	99
39) Cyclohexane	9.97	56	604026	43.6817	ug/L	99
40) 1,1-Dichloropropene	10.14	75	490681	56.2849	ug/L	99
41) Tert-Amyl-Methyl ether	10.24	73	1773558	104.1208	ug/L	100
42) Carbon Tetrachloride	10.28	117	501816	53.1924	ug/L	100

(#) = qualifier out of range (m) = manual integration
8M428967.D 8260WTR.M Tue Mar 05 10:55:33 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428967.D Vial: 13
Acq On : 4 Mar 2019 18:06 Operator: EEA
Sample : WG698192-12 ALT 50 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 05 10:55:31 2019 Quant Results File: 8260WTR.RES

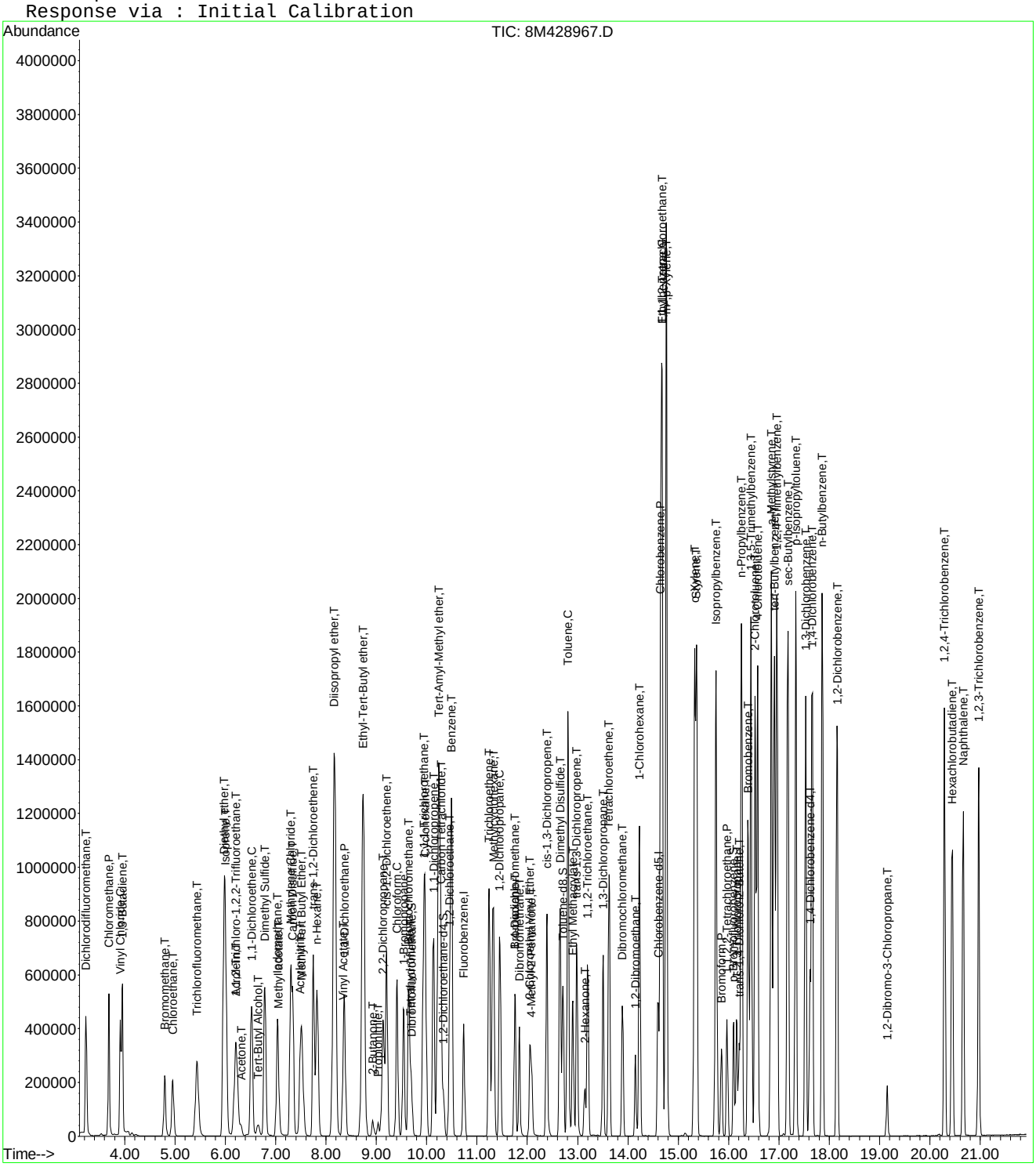
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WT

	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
45)	1,2-Dichloroethane	10.46	62	437454	53.5072	ug/L		100
46)	Benzene	10.49	78	1473129	53.9422	ug/L		99
47)	Trichloroethene	11.24	130	423874	56.9695	ug/L		99
48)	Methylcyclohexane	11.33	83	548460	47.5982	ug/L		100
49)	1,2-Dichloropropane	11.45	63	403826	54.4772	ug/L		99
50)	Bromodichloromethane	11.75	83	446692	52.0435	ug/L		99
51)	1,4-Dioxane	11.75	88	9939	238.2884	ug/L		97
52)	Dibromomethane	11.84	93	180349	52.8568	ug/L		99
53)	2-Chloroethyl Vinyl Ether	12.05	63	167899	51.8358	ug/L		99
54)	4-Methyl-2-Pentanone	12.08	58	104920	51.4855	ug/L		99
55)	cis-1,3-Dichloropropene	12.39	75	588259	57.6091	ug/L		100
56)	Dimethyl Disulfide	12.65	79	322118	51.3697	ug/L		100
59)	Toluene	12.80	91	1535304	54.1642	ug/L		100
60)	Ethyl Methacrylate	12.91	69	370417	50.3305	ug/L		96
62)	trans-1,3-Dichloropropene	12.98	75	461764	54.1873	ug/L		99
63)	1,1,2-Trichloroethane	13.20	97	264840	53.4523	ug/L		98
64)	2-Hexanone	13.15	58	97639	48.4300	ug/L		98
65)	1,3-Dichloropropane	13.51	76	475835	55.7627	ug/L		98
66)	Tetrachloroethene	13.62	164	320847	53.7124	ug/L		99
67)	Dibromochloromethane	13.89	129	339671	54.0166	ug/L		100
68)	1,2-Dibromoethane	14.15	107	264120	54.8969	ug/L		100
69)	1-Chlorohexane	14.23	91	512372	52.1635	ug/L		99
70)	Chlorobenzene	14.65	112	1033323	53.7744	ug/L		99
71)	1,1,1,2-Tetrachloroethane	14.68	131	383135	54.2320	ug/L		99
72)	Ethylbenzene	14.68	106	570055	54.8301	ug/L		100
73)	m-,p-Xylene	14.76	106	1393290	109.9851	ug/L		99
74)	o-Xylene	15.33	106	699921	56.9416	ug/L		99
75)	Styrene	15.36	104	1173006	57.6413	ug/L		100
76)	Bromoform	15.85	173	217146	55.6921	ug/L		99
77)	Isopropylbenzene	15.75	105	1683333	54.2187	ug/L		100
79)	1,1,2,2-Tetrachloroethane	15.97	83	298106	47.5760	ug/L		100
81)	1,2,3-Trichloropropane	16.16	110	97497	52.0140	ug/L		80
82)	trans-1,4-Dichloro-2-Buten	16.21	53	99098	46.7843	ug/L	#	19
83)	n-Propylbenzene	16.26	91	2083381	51.8331	ug/L		100
84)	Bromobenzene	16.39	156	471558	51.2751	ug/L		100
85)	1,3,5-Trimethylbenzene	16.44	105	1492135	51.4978	ug/L		99
86)	2-Chlorotoluene	16.53	91	1237082	46.5487	ug/L		91
87)	4-Chlorotoluene	16.58	91	1319292	56.8140	ug/L		91
88)	a-Methylstyrene	16.85	118	906508	54.5225	ug/L		100
89)	tert-Butylbenzene	16.91	134	342773	51.2786	ug/L		99
90)	1,2,4-Trimethylbenzene	16.96	105	1535622	52.3495	ug/L		100
91)	sec-Butylbenzene	17.18	105	1921041	51.8055	ug/L		100
92)	p-Isopropyltoluene	17.33	119	1678164	52.7928	ug/L		100
93)	1,3-Dichlorobenzene	17.53	146	928815	51.8070	ug/L		100
94)	1,4-Dichlorobenzene	17.66	146	951896	52.4293	ug/L		99
95)	n-Butylbenzene	17.86	91	1532126	52.8991	ug/L		99
96)	1,2-Dichlorobenzene	18.16	146	901302	54.1743	ug/L		100
97)	1,2-Dibromo-3-Chloropropan	19.15	75	59487	52.6739	ug/L		98
98)	1,2,4-Trichlorobenzene	20.29	180	667869	55.3242	ug/L		100
99)	Hexachlorobutadiene	20.45	225	314261	55.2469	ug/L		99
100)	Naphthalene	20.66	128	1234867	56.1142	ug/L		100
101)	1,2,3-Trichlorobenzene	20.97	180	605242	54.5770	ug/L		100

(#) = qualifier out of range (m) = manual integration
8M428967.D 8260WTR.M Tue Mar 05 10:55:33 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428967.D Vial: 13
Acq On : 4 Mar 2019 18:06 Operator: EEA
Sample : WG698192-12 ALT 50 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 5 10:55 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428967.D Vial: 13
Acq On : 4 Mar 2019 18:06 Operator: EEA
Sample : WG698192-12 ALT 50 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	96	0.00
2	T	Dichlorodifluoromethane	50.000	56.403	-12.8	96	0.00
3	P	Chloromethane	50.000	48.985	2.0	96	0.00
4	C	Vinyl Chloride	50.000	44.808	10.4	81	0.00
5	T	1,3-Butadiene	50.000	51.308	-2.6	88	0.00
6	T	Bromomethane	50.000	36.658	26.7#	77	-0.02
7	T	Chloroethane	50.000	55.006	-10.0	99	0.00
8	T	Trichlorofluoromethane	50.000	49.169	1.7	87	0.00
9	T	Diethyl ether	100.000	100.894	-0.9	94	0.00
10	T	Isoprene	50.000	52.515	-5.0	96	0.00
11	T	Acrolein	50.000	121.461	-142.9#	226	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	50.000	53.675	-7.3	96	0.00
13	T	Acetone	50.000	46.371	7.3	83	0.00
14	C	1,1-Dichloroethene	50.000	51.574	-3.1	94	0.00
15	T	Tert-Butyl Alcohol	200.000	192.799	3.6	98	0.02
16	T	Dimethyl Sulfide	50.000	57.663	-15.3	105	0.00
17	T	Iodomethane	50.000	86.708	-73.4#	159	0.00
18	T	Methyl acetate	50.000	50.204	-0.4	94	0.00
19	T	Methylene Chloride	50.000	52.784	-5.6	98	0.00
20	T	Carbon Disulfide	50.000	48.254	3.5	87	0.00
21	T	Acrylonitrile	50.000	51.786	-3.6	94	0.00
22	T	Methyl Tert Butyl Ether	50.000	48.511	3.0	90	0.00
23	T	trans-1,2-Dichloroethene	50.000	53.316	-6.6	97	0.00
24	T	n-Hexane	50.000	47.404	5.2	87	0.00
25	T	Diisopropyl ether	100.000	104.033	-4.0	96	0.00
26	T	Vinyl Acetate	50.000	36.415	27.2#	68	0.00
27	P	1,1-Dichloroethane	50.000	52.960	-5.9	97	0.00
28	T	Ethyl-Tert-Butyl ether	100.000	103.342	-3.3	97	0.00
29	T	2-Butanone	50.000	48.490	3.0	88	0.00
30	T	Propionitrile	100.000	100.767	-0.8	96	0.00
31	T	2,2-Dichloropropane	50.000	50.197	-0.4	93	0.00
32	T	cis-1,2-Dichloroethene	50.000	54.616	-9.2	98	0.00
33	C	Chloroform	50.000	51.690	-3.4	98	0.00
34		1-Bromopropane	50.000	52.798	-5.6	95	0.00
35	T	Bromochloromethane	50.000	53.463	-6.9	96	0.00
36	T	Tetrahydrofuran	100.000	99.966	0.0	95	0.00
37	S	Dibromofluoromethane	25.000	25.648	-2.6	94	0.00
38	T	1,1,1-Trichloroethane	50.000	54.589	-9.2	99	0.00
39	T	Cyclohexane	50.000	43.682	12.6	79	0.00
40	T	1,1-Dichloropropene	50.000	56.285	-12.6	101	0.00
41	T	Tert-Amyl-Methyl ether	100.000	104.121	-4.1	97	0.00
42	T	Carbon Tetrachloride	50.000	53.192	-6.4	96	0.00
43	S	1,2-Dichloroethane-d4	25.000	25.446	-1.8	93	0.00
44		Heptane	-1.000	0.000	0.0	0	-2.63#
45	T	1,2-Dichloroethane	50.000	53.507	-7.0	96	0.00
46	T	Benzene	50.000	53.942	-7.9	98	0.00
47	T	Trichloroethene	50.000	56.970	-13.9	102	0.00
48	T	Methylcyclohexane	50.000	47.598	4.8	87	0.00
49	C	1,2-Dichloropropane	50.000	54.477	-9.0	97	0.00
50	T	Bromodichloromethane	50.000	52.044	-4.1	93	0.00
51	T	1,4-Dioxane	200.000	238.288	-19.1	106	0.00
52	T	Dibromomethane	50.000	52.857	-5.7	97	0.00
53	T	2-Chloroethyl Vinyl Ether	50.000	51.836	-3.7	96	0.00
54	T	4-Methyl-2-Pentanone	50.000	51.486	-3.0	96	0.00

(#) = Out of Range
8M428967.D 8260WTR.M Tue Mar 05 10:56:46 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428967.D Vial: 13
Acq On : 4 Mar 2019 18:06 Operator: EEA
Sample : WG698192-12 ALT 50 ug/L ICAL 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	cis-1,3-Dichloropropene	50.000	57.609	-15.2	101	0.00
56	T	Dimethyl Disulfide	50.000	51.370	-2.7	93	0.00
57	I	Chlorobenzene-d5	25.000	25.000	0.0	95	0.00
58	S	Toluene-d8	25.000	25.993	-4.0	95	0.00
59	C	Toluene	50.000	54.164	-8.3	99	0.00
60	T	Ethyl Methacrylate	50.000	50.330	-0.7	94	0.00
61		Paraldehyde	-1.000	0.000	0.0	0	-13.45#
62	T	trans-1,3-Dichloropropene	50.000	54.187	-8.4	95	0.00
63	T	1,1,2-Trichloroethane	50.000	53.452	-6.9	95	0.00
64	T	2-Hexanone	50.000	48.430	3.1	94	0.00
65	T	1,3-Dichloropropane	50.000	55.763	-11.5	101	0.00
66	T	Tetrachloroethene	50.000	53.712	-7.4	98	0.00
67	T	Dibromochloromethane	50.000	54.017	-8.0	96	0.00
68	T	1,2-Dibromoethane	50.000	54.897	-9.8	97	0.00
69	T	1-Chlorohexane	50.000	52.163	-4.3	94	0.00
70	P	Chlorobenzene	50.000	53.774	-7.5	100	0.00
71	T	1,1,1,2-Tetrachloroethane	50.000	54.232	-8.5	98	0.00
72	C	Ethylbenzene	50.000	54.830	-9.7	98	0.00
73	T	m-,p-Xylene	100.000	109.985	-10.0	100	0.00
74	T	o-Xylene	50.000	56.942	-13.9	101	0.00
75	T	Styrene	50.000	57.641	-15.3	101	0.00
76	P	Bromoform	50.000	55.692	-11.4	97	0.00
77	T	Isopropylbenzene	50.000	54.219	-8.4	97	0.00
78	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	102	0.00
79	P	1,1,2,2-Tetrachloroethane	50.000	47.576	4.8	95	0.00
80	S	p-Bromofluorobenzene	25.000	24.743	1.0	97	0.00
81	T	1,2,3-Trichloropropane	50.000	52.014	-4.0	101	0.00
82	T	trans-1,4-Dichloro-2-Butene	50.000	46.784	6.4	91	0.00
83	T	n-Propylbenzene	50.000	51.833	-3.7	101	0.00
84	T	Bromobenzene	50.000	51.275	-2.5	100	0.00
85	T	1,3,5-Trimethylbenzene	50.000	51.498	-3.0	100	0.00
86	T	2-Chlorotoluene	50.000	46.549	6.9	90	0.00
87	T	4-Chlorotoluene	50.000	56.814	-13.6	114	0.00
88	T	a-Methylstyrene	50.000	54.523	-9.0	104	0.00
89	T	tert-Butylbenzene	50.000	51.279	-2.6	102	0.00
90	T	1,2,4-Trimethylbenzene	50.000	52.349	-4.7	101	0.00
91	T	sec-Butylbenzene	50.000	51.806	-3.6	101	0.00
92	T	p-Isopropyltoluene	50.000	52.793	-5.6	101	0.00
93	T	1,3-Dichlorobenzene	50.000	51.807	-3.6	103	0.00
94	T	1,4-Dichlorobenzene	50.000	52.429	-4.9	105	0.00
95	T	n-Butylbenzene	50.000	52.899	-5.8	101	0.00
96	T	1,2-Dichlorobenzene	50.000	54.174	-8.3	108	0.00
97	T	1,2-Dibromo-3-Chloropropane	50.000	52.674	-5.3	103	0.00
98	T	1,2,4-Trichlorobenzene	50.000	55.324	-10.6	108	0.00
99	T	Hexachlorobutadiene	50.000	55.247	-10.5	107	0.00
100	T	Naphthalene	50.000	56.114	-12.2	107	0.00
101	T	1,2,3-Trichlorobenzene	50.000	54.577	-9.2	107	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M428967.D 8260WTR.M Tue Mar 05 10:56:46 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29829.D Vial: 1
Acq On : 12 Mar 2019 11:21 Operator: KFR
Sample : WG699218-02 CCV 50ug/kg 8260 Inst : hpms11
Misc : 1,1 STD92189 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 13:42:14 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3915	96	455861	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0207	117	343984	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8330	152	179518	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3988	111	128745	24.4662	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 97.8648%			
43) 1,2-Dichloroethane-d4	10.0089	65	148139	23.4631	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 93.8524%			
57) Toluene-d8	12.2423	98	433016	25.2948	ug/L	-0.0103
Spiked Amount 25.0000	Range 88 - 110		Recovery = 101.1792%			
78) p-Bromofluorobenzene	15.4165	95	170218	24.7777	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 99.1108%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1227	85	347532	51.6060	ug/L	98
3) Chloromethane	3.5570	50	446686	34.5348	ug/L	99
4) Vinyl Chloride	3.7741	62	398360	41.2563	ug/L	99
5) 1,3-Butadiene	3.8155	54	168098	50.8291	ug/L	99
6) Bromomethane	4.6426	94	191483	51.7612	ug/L	100
7) Chloroethane	4.7977	64	179275	48.0262	ug/L	100
8) Trichlorofluoromethane	5.2734	101	457735	50.0951	ug/L	99
9) Diethyl ether	5.7904	59	437527	91.5884	ug/L	99
10) Isoprene	5.8214	67	362391	50.3539	ug/L	100
11) Acrolein	6.0178	56	35000	42.1907	ug/L	98
12) 1,1,2-Trichloro-1,2,2-Trif	6.0385	101	237628	53.0155	ug/L	97
13) Acetone	6.1109	43	67721	40.6343	ug/L	97
14) 1,1-Dichloroethene	6.3280	61	435195	49.8874	ug/L	99
15) Tert-Butyl Alcohol	6.4417	59	88246	189.8336	ug/L	98
16) Dimethyl Sulfide	6.5865	62	275244	47.7284	ug/L	99
17) Iodomethane	6.8346	142	268569	44.8924	ug/L	98
18) Methyl acetate	6.8450	43	157396	43.7837	ug/L	99
19) Methylene Chloride	7.0931	84	233883	48.1109	ug/L	97
20) Carbon Disulfide	7.1242	76	702771	52.4508	ug/L	99
21) Acrylonitrile	7.2689	53	84183	45.8203	ug/L	100
22) Methyl Tert Butyl Ether	7.2896	73	620372	45.0036	ug/L	99
23) trans-1,2-Dichloroethene	7.5274	96	244903	51.8258	ug/L	98
24) n-Hexane	7.5998	57	415691	57.1123	ug/L	99
25) Diisopropyl ether	7.9306	45	1741351	98.0258	ug/L	99
26) Vinyl Acetate	8.0961	43	380293	59.4653	ug/L	98
27) 1,1-Dichloroethane	8.1167	63	496400	48.1401	ug/L	98
28) Ethyl-Tert-Butyl ether	8.4786	59	1718516	95.7107	ug/L	99
29) 2-Butanone	8.6544	43	86859	40.9158	ug/L	97
30) Propionitrile	8.7578	54	55390	89.3043	ug/L	96
31) 2,2-Dichloropropane	8.8612	77	411617	57.7328	ug/L	100
32) cis-1,2-Dichloroethene	8.9232	96	271987	50.6984	ug/L	100
33) Chloroform	9.1197	83	448391	47.9085	ug/L	98
34) 1-Bromopropane	9.2541	122	57645	49.6081	ug/L	97
35) Bromochloromethane	9.3472	130	159466	50.6942	ug/L	97
36) Tetrahydrofuran	9.3678	42	110016	79.9917	ug/L	98
38) 1,1,1-Trichloroethane	9.6263	97	439122	51.8165	ug/L	98
39) Cyclohexane	9.6573	56	499500	49.7840	ug/L	98
40) 1,1-Dichloropropene	9.8124	75	325275	51.0491	ug/L	99
41) Carbon Tetrachloride	9.9572	117	410930	57.0223	ug/L	99
42) Tert-Amyl-Methyl ether	9.9158	73	1258790	93.9953	ug/L	98

(#) = qualifier out of range (m) = manual integration
11M29829.D 8260WT.M Tue Mar 12 13:42:14 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\031219\11M29829.D Vial: 1
Acq On : 12 Mar 2019 11:21 Operator: KFR
Sample : WG699218-02 CCV 50ug/kg 8260 Inst : hpms11
Misc : 1,1 STD92189 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 13:42:14 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

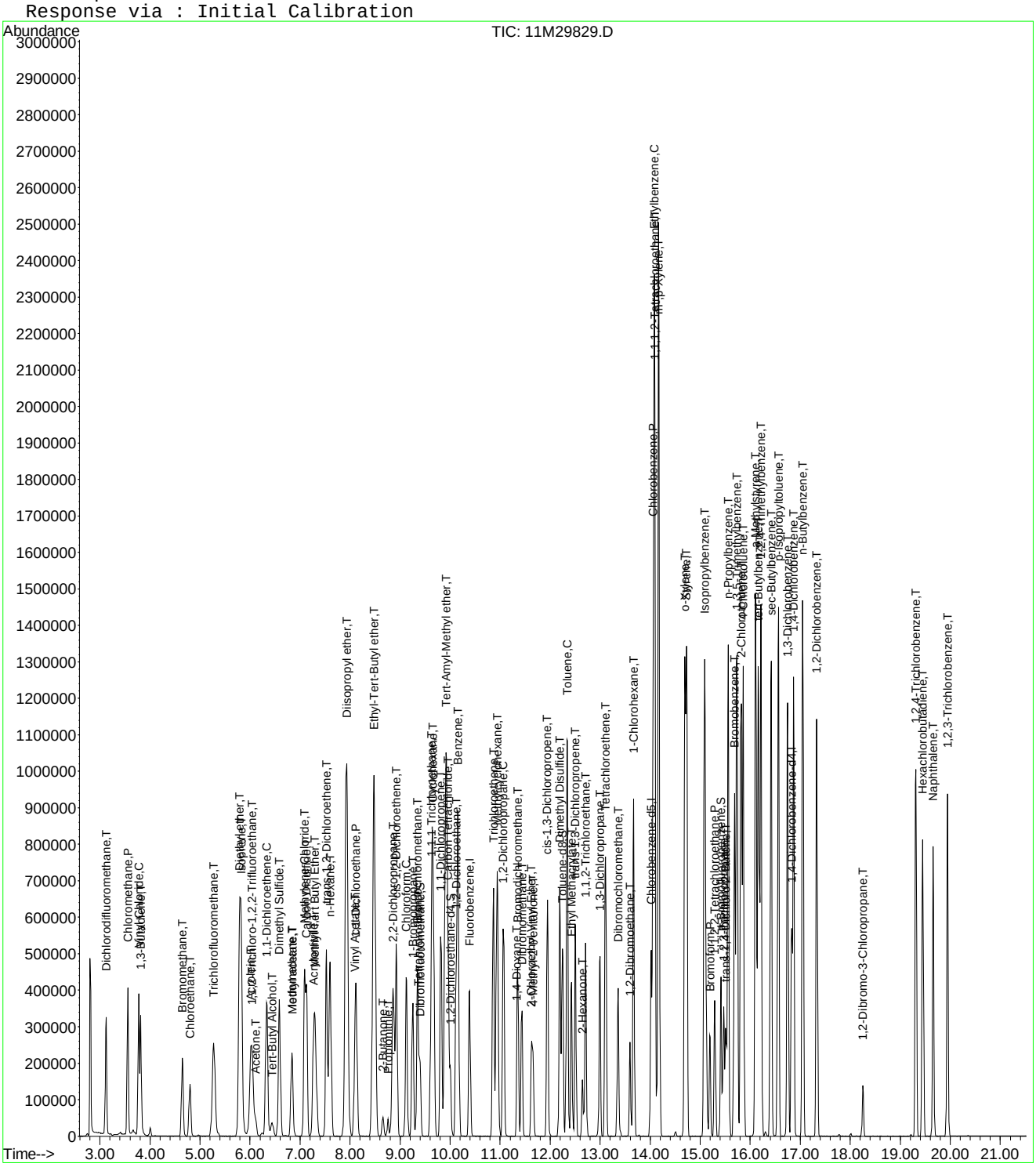
	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
44)	1,2-Dichloroethane	10.1226	62	377048	46.3511	ug/L	100
45)	Benzene	10.1537	78	928833	49.0436	ug/L	100
46)	Trichloroethene	10.8671	130	265666	49.4592	ug/L	98
47)	Methylcyclohexane	10.9395	83	405862	53.6358	ug/L	98
48)	1,2-Dichloropropane	11.0635	63	269795	47.9565	ug/L	99
49)	1,4-Dioxane	11.3324	88	7715	199.8606	ug/L	98
50)	Bromodichloromethane	11.3530	83	342923	51.5779	ug/L	100
51)	Dibromomethane	11.4358	93	148201	46.1169	ug/L	96
52)	2-Chloroethyl Vinyl Ether	11.6219	63	103727	38.1001	ug/L	98
53)	4-Methyl-2-Pentanone	11.6529	58	77324	39.8658	ug/L	97
54)	cis-1,3-Dichloropropene	11.9424	75	386178	51.5370	ug/L	99
55)	Dimethyl Disulfide	12.1906	79	234103	46.5621	ug/L	100
58)	Toluene	12.3456	91	1018915	50.0030	ug/L	100
59)	Ethyl Methacrylate	12.4284	69	265749	46.1735	ug/L	99
60)	trans-1,3-Dichloropropene	12.5007	75	337594	50.6007	ug/L	99
61)	1,1,2-Trichloroethane	12.7075	97	194151	44.7564	ug/L	100
62)	2-Hexanone	12.6455	43	128963	39.9969	ug/L	97
63)	1,3-Dichloropropane	12.9970	76	320378	45.7749	ug/L	97
64)	Tetrachloroethene	13.1108	164	225193	52.1009	ug/L	98
65)	Dibromochloromethane	13.3589	129	254619	51.5617	ug/L	99
66)	1,2-Dibromoethane	13.5967	107	193407	46.5207	ug/L	100
67)	1-Chlorohexane	13.6691	91	365194	54.2842	ug/L	96
68)	Chlorobenzene	14.0620	112	703358	49.5788	ug/L	100
69)	1,1,1,2-Tetrachloroethane	14.0930	131	290268	48.1685	ug/L	99
70)	Ethylbenzene	14.0827	106	375317	52.0044	ug/L	98
71)	m-,p-Xylene	14.1654	106	895859	102.8208	ug/L	96
72)	o-Xylene	14.6927	106	437288	51.7275	ug/L	98
73)	Styrene	14.7237	104	735525	52.6009	ug/L	99
74)	Bromoform	15.1994	173	165392	46.5121	ug/L	100
75)	Isopropylbenzene	15.0856	105	1106395	52.2805	ug/L	100
77)	1,1,2,2-Tetrachloroethane	15.2924	83	219666	46.9064	ug/L	99
79)	1,2,3-Trichloropropane	15.4682	110	68203	43.6169	ug/L	97
80)	trans-1,4-Dichloro-2-Buten	15.5096	53	89614	45.4533	ug/L	97
81)	n-Propylbenzene	15.5612	91	1356466	51.2385	ug/L	98
82)	Bromobenzene	15.6853	156	315390	48.7822	ug/L	97
83)	1,3,5-Trimethylbenzene	15.7370	105	966595	51.4315	ug/L	99
84)	2-Chlorotoluene	15.8197	91	934074	49.5850	ug/L	100
85)	4-Chlorotoluene	15.8611	91	755132	48.7728	ug/L	99
86)	a-Methylstyrene	16.1092	118	555925	51.9487	ug/L	99
87)	tert-Butylbenzene	16.1610	134	225571	48.7309	ug/L	96
88)	1,2,4-Trimethylbenzene	16.2126	105	984397	50.7502	ug/L	99
89)	sec-Butylbenzene	16.4194	105	1204516	51.6246	ug/L	99
90)	p-Isopropyltoluene	16.5642	119	1073109	52.8930	ug/L	99
91)	1,3-Dichlorobenzene	16.7503	146	611172	51.2437	ug/L	99
92)	1,4-Dichlorobenzene	16.8640	146	607155	50.9789	ug/L	100
93)	n-Butylbenzene	17.0501	91	1009476	55.2105	ug/L	99
94)	1,2-Dichlorobenzene	17.3293	146	567323	49.6317	ug/L	98
95)	1,2-Dibromo-3-Chloropropan	18.2495	75	41458	42.8531	ug/L	99
96)	1,2,4-Trichlorobenzene	19.3145	180	382644	51.7479	ug/L	99
97)	Hexachlorobutadiene	19.4489	225	209207	56.1342	ug/L	97
98)	Naphthalene	19.6557	128	724385	45.7494	ug/L	100
99)	1,2,3-Trichlorobenzene	19.9452	180	343620	49.4621	ug/L	99

(#) = qualifier out of range (m) = manual integration
11M29829.D 8260WT.M Tue Mar 12 13:42:14 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29829.D Vial: 1
Acq On : 12 Mar 2019 11:21 Operator: KFR
Sample : WG699218-02 CCV 50ug/kg 8260 Inst : hpms11
Misc : 1,1 STD92189 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 13:42 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\031219\11M29829.D Vial: 1
Acq On : 12 Mar 2019 11:21 Operator: KFR
Sample : WG699218-02 CCV 50ug/kg 8260 Inst : hpms11
Misc : 1,1 STD92189 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	1.000	1.000	0.0	115	0.00
2	T	Dichlorodifluoromethane	0.369	0.381	-3.3	109	0.00
3	P	Chloromethane	0.709	0.490	30.9#	83	0.00
4	C	Vinyl Chloride	0.530	0.437	17.5	93	0.00
5	T	1,3-Butadiene	0.290	0.184	36.6#	105	0.00
6	T	Bromomethane	0.203	0.210	-3.4	130	0.00
7	T	Chloroethane	0.205	0.197	3.9	106	0.00
8	T	Trichlorofluoromethane	0.501	0.502	-0.2	110	0.00
9	T	Diethyl ether	0.262	0.240	8.4	116	0.00
10	T	Isoprene	0.395	0.397	-0.5	112	0.00
11	T	Acrolein	0.045	0.038	15.6	99	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	0.246	0.261	-6.1	115	0.00
13	T	Acetone	0.091	0.074	18.7	92	-0.01
14	C	1,1-Dichloroethene	0.478	0.477	0.2	109	0.00
15	T	Tert-Butyl Alcohol	0.025	0.024	4.0	110	0.00
16	T	Dimethyl Sulfide	0.316	0.302	4.4	106	0.00
17	T	Iodomethane	0.273	0.295	-8.1	102	0.00
18	T	Methyl acetate	0.197	0.173	12.2	98	0.00
19	T	Methylene Chloride	0.267	0.257	3.7	108	0.00
20	T	Carbon Disulfide	0.735	0.771	-4.9	112	-0.01
21	T	Acrylonitrile	0.101	0.092	8.9	97	0.00
22	T	Methyl Tert Butyl Ether	0.756	0.680	10.1	100	-0.01
23	T	trans-1,2-Dichloroethene	0.259	0.269	-3.9	111	0.00
24	T	n-Hexane	0.399	0.456	-14.3	127	0.00
25	T	Diisopropyl ether	0.974	0.955	2.0	121	0.00
26	T	Vinyl Acetate	0.328	0.417	-27.1#	138	0.00
27	P	1,1-Dichloroethane	0.566	0.544	3.9	107	-0.01
28	T	Ethyl-Tert-Butyl ether	0.985	0.942	4.4	116	0.00
29	T	2-Butanone	0.116	0.095	18.1	90	0.00
30	T	Propionitrile	0.034	0.030	11.8	94	0.00
31	T	2,2-Dichloropropane	0.391	0.451	-15.3	126	0.00
32	T	cis-1,2-Dichloroethene	0.294	0.298	-1.4	109	-0.01
33	C	Chloroform	0.513	0.492	4.1	109	-0.01
34	T	1-Bromopropane	0.064	0.063	1.6	112	0.00
35	T	Bromochloromethane	0.173	0.175	-1.2	107	0.00
36	T	Tetrahydrofuran	0.075	0.060	20.0	96	0.00
37	S	Dibromofluoromethane	0.289	0.282	2.4	108	0.00
38	T	1,1,1-Trichloroethane	0.465	0.482	-3.7	112	0.00
39	T	Cyclohexane	0.550	0.548	0.4	110	0.00
40	T	1,1-Dichloropropene	0.349	0.357	-2.3	111	0.00
41	T	Carbon Tetrachloride	0.395	0.451	-14.2	118	0.00
42	T	Tert-Amyl-Methyl ether	0.734	0.690	6.0	112	0.00
43	S	1,2-Dichloroethane-d4	0.346	0.325	6.1	104	0.00
44	T	1,2-Dichloroethane	0.446	0.414	7.2	101	0.00
45	T	Benzene	1.039	1.019	1.9	108	0.00
46	T	Trichloroethene	0.295	0.291	1.4	108	0.00
47	T	Methylcyclohexane	0.415	0.445	-7.2	119	0.00
48	C	1,2-Dichloropropane	0.309	0.296	4.2	106	0.00
49	T	1,4-Dioxane	0.002	0.002	0.0	112	-0.01
50	T	Bromodichloromethane	0.365	0.376	-3.0	106	0.00
51	T	Dibromomethane	0.176	0.163	7.4	100	0.00
52	T	2-Chloroethyl Vinyl Ether	0.149	0.114	23.5	86	0.00
53	T	4-Methyl-2-Pentanone	0.106	0.085	19.8	88	0.00
54	T	cis-1,3-Dichloropropene	0.411	0.424	-3.2	108	0.00

(#) = Out of Range
11M29829.D 8260WT.M Tue Mar 12 13:42:23 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\031219\11M29829.D Vial: 1
Acq On : 12 Mar 2019 11:21 Operator: KFR
Sample : WG699218-02 CCV 50ug/kg 8260 Inst : hpms11
Misc : 1,1 STD92189 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	0.251	0.257	-2.4	111	0.00
56	I	Chlorobenzene-d5	1.000	1.000	0.0	115	0.00
57	S	Toluene-d8	1.244	1.259	-1.2	112	-0.01
58	C	Toluene	1.481	1.481	0.0	108	0.00
59	T	Ethyl Methacrylate	0.418	0.386	7.7	97	0.00
60	T	trans-1,3-Dichloropropene	0.485	0.491	-1.2	105	0.00
61	T	1,1,2-Trichloroethane	0.315	0.282	10.5	100	0.00
62	T	2-Hexanone	0.234	0.187	20.1	85	0.00
63	T	1,3-Dichloropropane	0.509	0.466	8.4	100	0.00
64	T	Tetrachloroethene	0.314	0.327	-4.1	115	0.00
65	T	Dibromochloromethane	0.359	0.370	-3.1	108	0.00
66	T	1,2-Dibromoethane	0.302	0.281	7.0	100	0.00
67	T	1-Chlorohexane	0.489	0.531	-8.6	117	0.00
68	P	Chlorobenzene	1.031	1.022	0.9	108	0.00
69	T	1,1,1,2-Tetrachloroethane	0.405	0.422	-4.2	110	0.00
70	C	Ethylbenzene	0.525	0.546	-4.0	109	0.00
71	T	m-,p-Xylene	0.633	0.651	-2.8	109	0.00
72	T	o-Xylene	0.614	0.636	-3.6	109	0.00
73	T	Styrene	1.016	1.069	-5.2	107	-0.01
74	P	Bromoform	0.214	0.240	-12.1	106	0.00
75	T	Isopropylbenzene	1.538	1.608	-4.6	109	0.00
76	I	1,4-Dichlorobenzene-d4	1.000	1.000	0.0	120	0.00
77	P	1,1,2,2-Tetrachloroethane	0.652	0.612	6.1	98	0.00
78	S	p-Bromofluorobenzene	0.957	0.948	0.9	110	0.00
79	T	1,2,3-Trichloropropane	0.218	0.190	12.8	95	0.00
80	T	trans-1,4-Dichloro-2-Butene	0.275	0.250	9.1	98	0.00
81	T	n-Propylbenzene	3.687	3.778	-2.5	110	0.00
82	T	Bromobenzene	0.900	0.878	2.4	107	0.00
83	T	1,3,5-Trimethylbenzene	2.617	2.692	-2.9	110	0.00
84	T	2-Chlorotoluene	2.623	2.602	0.8	110	0.00
85	T	4-Chlorotoluene	2.156	2.103	2.5	107	0.00
86	T	a-Methylstyrene	1.490	1.548	-3.9	112	0.00
87	T	tert-Butylbenzene	0.645	0.628	2.6	112	-0.01
88	T	1,2,4-Trimethylbenzene	2.701	2.742	-1.5	109	0.00
89	T	sec-Butylbenzene	3.249	3.355	-3.3	110	0.00
90	T	p-Isopropyltoluene	2.825	2.989	-5.8	112	0.00
91	T	1,3-Dichlorobenzene	1.661	1.702	-2.5	112	0.00
92	T	1,4-Dichlorobenzene	1.659	1.691	-1.9	110	0.00
93	T	n-Butylbenzene	2.546	2.812	-10.4	114	0.00
94	T	1,2-Dichlorobenzene	1.592	1.580	0.8	108	0.00
95	T	1,2-Dibromo-3-Chloropropane	0.135	0.115	14.8	92	0.00
96	T	1,2,4-Trichlorobenzene	1.030	1.066	-3.5	111	0.00
97	T	Hexachlorobutadiene	0.519	0.583	-12.3	123	0.00
98	T	Naphthalene	2.205	2.018	8.5	95	0.00
99	T	1,2,3-Trichlorobenzene	0.967	0.957	1.0	106	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29829.D 8260WT.M Tue Mar 12 13:42:23 2019 Page 2

Data File : C:\MSDCHEM\1\DATA\031219\11M29829.D Vial: 1
Acq On : 12 Mar 2019 11:21 Operator: KFR
Sample : WG699218-02 CCV 50ug/kg 8260 Inst : hpms11
Misc : 1,1 STD92189 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	115	0.00
2	T	Dichlorodifluoromethane	50.000	51.606	-3.2	109	0.00
3	P	Chloromethane	50.000	34.535	30.9#	83	0.00
4	C	Vinyl Chloride	50.000	41.256	17.5	93	0.00
5	T	1,3-Butadiene	50.000	50.829	-1.7	105	0.00
6	T	Bromomethane	50.000	51.761	-3.5	130	0.00
7	T	Chloroethane	50.000	48.026	3.9	106	0.00
8	T	Trichlorofluoromethane	50.000	50.095	-0.2	110	0.00
9	T	Diethyl ether	100.000	91.588	8.4	116	0.00
10	T	Isoprene	50.000	50.354	-0.7	112	0.00
11	T	Acrolein	50.000	42.191	15.6	99	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	50.000	53.016	-6.0	115	0.00
13	T	Acetone	50.000	40.634	18.7	92	-0.01
14	C	1,1-Dichloroethene	50.000	49.887	0.2	109	0.00
15	T	Tert-Butyl Alcohol	200.000	189.834	5.1	110	0.00
16	T	Dimethyl Sulfide	50.000	47.728	4.5	106	0.00
17	T	Iodomethane	50.000	44.892	10.2	102	0.00
18	T	Methyl acetate	50.000	43.784	12.4	98	0.00
19	T	Methylene Chloride	50.000	48.111	3.8	108	0.00
20	T	Carbon Disulfide	50.000	52.451	-4.9	112	-0.01
21	T	Acrylonitrile	50.000	45.820	8.4	97	0.00
22	T	Methyl Tert Butyl Ether	50.000	45.004	10.0	100	-0.01
23	T	trans-1,2-Dichloroethene	50.000	51.826	-3.7	111	0.00
24	T	n-Hexane	50.000	57.112	-14.2	127	0.00
25	T	Diisopropyl ether	100.000	98.026	2.0	121	0.00
26	T	Vinyl Acetate	50.000	59.465	-18.9	138	0.00
27	P	1,1-Dichloroethane	50.000	48.140	3.7	107	-0.01
28	T	Ethyl-Tert-Butyl ether	100.000	95.711	4.3	116	0.00
29	T	2-Butanone	50.000	40.916	18.2	90	0.00
30	T	Propionitrile	100.000	89.304	10.7	94	0.00
31	T	2,2-Dichloropropane	50.000	57.733	-15.5	126	0.00
32	T	cis-1,2-Dichloroethene	50.000	50.698	-1.4	109	-0.01
33	C	Chloroform	50.000	47.909	4.2	109	-0.01
34	T	1-Bromopropane	50.000	49.608	0.8	112	0.00
35	T	Bromochloromethane	50.000	50.694	-1.4	107	0.00
36	T	Tetrahydrofuran	100.000	79.992	20.0	96	0.00
37	S	Dibromofluoromethane	25.000	24.466	2.1	108	0.00
38	T	1,1,1-Trichloroethane	50.000	51.816	-3.6	112	0.00
39	T	Cyclohexane	50.000	49.784	0.4	110	0.00
40	T	1,1-Dichloropropene	50.000	51.049	-2.1	111	0.00
41	T	Carbon Tetrachloride	50.000	57.022	-14.0	118	0.00
42	T	Tert-Amyl-Methyl ether	100.000	93.995	6.0	112	0.00
43	S	1,2-Dichloroethane-d4	25.000	23.463	6.1	104	0.00
44	T	1,2-Dichloroethane	50.000	46.351	7.3	101	0.00
45	T	Benzene	50.000	49.044	1.9	108	0.00
46	T	Trichloroethene	50.000	49.459	1.1	108	0.00
47	T	Methylcyclohexane	50.000	53.636	-7.3	119	0.00
48	C	1,2-Dichloropropane	50.000	47.956	4.1	106	0.00
49	T	1,4-Dioxane	200.000	199.861	0.1	112	-0.01
50	T	Bromodichloromethane	50.000	51.578	-3.2	106	0.00
51	T	Dibromomethane	50.000	46.117	7.8	100	0.00
52	T	2-Chloroethyl Vinyl Ether	50.000	38.100	23.8	86	0.00
53	T	4-Methyl-2-Pentanone	50.000	39.866	20.3	88	0.00
54	T	cis-1,3-Dichloropropene	50.000	51.537	-3.1	108	0.00

(#) = Out of Range
11M29829.D 8260WT.M Tue Mar 12 13:42:21 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\031219\11M29829.D Vial: 1
Acq On : 12 Mar 2019 11:21 Operator: KFR
Sample : WG699218-02 CCV 50ug/kg 8260 Inst : hpms11
Misc : 1,1 STD92189 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	50.000	46.562	6.9	111	0.00
56	I	Chlorobenzene-d5	25.000	25.000	0.0	115	0.00
57	S	Toluene-d8	25.000	25.295	-1.2	112	-0.01
58	C	Toluene	50.000	50.003	-0.0	108	0.00
59	T	Ethyl Methacrylate	50.000	46.173	7.7	97	0.00
60	T	trans-1,3-Dichloropropene	50.000	50.601	-1.2	105	0.00
61	T	1,1,2-Trichloroethane	50.000	44.756	10.5	100	0.00
62	T	2-Hexanone	50.000	39.997	20.0	85	0.00
63	T	1,3-Dichloropropane	50.000	45.775	8.5	100	0.00
64	T	Tetrachloroethene	50.000	52.101	-4.2	115	0.00
65	T	Dibromochloromethane	50.000	51.562	-3.1	108	0.00
66	T	1,2-Dibromoethane	50.000	46.521	7.0	100	0.00
67	T	1-Chlorohexane	50.000	54.284	-8.6	117	0.00
68	P	Chlorobenzene	50.000	49.579	0.8	108	0.00
69	T	1,1,1,2-Tetrachloroethane	50.000	48.168	3.7	110	0.00
70	C	Ethylbenzene	50.000	52.004	-4.0	109	0.00
71	T	m-,p-Xylene	100.000	102.821	-2.8	109	0.00
72	T	o-Xylene	50.000	51.728	-3.5	109	0.00
73	T	Styrene	50.000	52.601	-5.2	107	-0.01
74	P	Bromoform	50.000	46.512	7.0	106	0.00
75	T	Isopropylbenzene	50.000	52.280	-4.6	109	0.00
76	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	120	0.00
77	P	1,1,2,2-Tetrachloroethane	50.000	46.906	6.2	98	0.00
78	S	p-Bromofluorobenzene	25.000	24.778	0.9	110	0.00
79	T	1,2,3-Trichloropropane	50.000	43.617	12.8	95	0.00
80	T	trans-1,4-Dichloro-2-Butene	50.000	45.453	9.1	98	0.00
81	T	n-Propylbenzene	50.000	51.239	-2.5	110	0.00
82	T	Bromobenzene	50.000	48.782	2.4	107	0.00
83	T	1,3,5-Trimethylbenzene	50.000	51.431	-2.9	110	0.00
84	T	2-Chlorotoluene	50.000	49.585	0.8	110	0.00
85	T	4-Chlorotoluene	50.000	48.773	2.5	107	0.00
86	T	a-Methylstyrene	50.000	51.949	-3.9	112	0.00
87	T	tert-Butylbenzene	50.000	48.731	2.5	112	-0.01
88	T	1,2,4-Trimethylbenzene	50.000	50.750	-1.5	109	0.00
89	T	sec-Butylbenzene	50.000	51.625	-3.3	110	0.00
90	T	p-Isopropyltoluene	50.000	52.893	-5.8	112	0.00
91	T	1,3-Dichlorobenzene	50.000	51.244	-2.5	112	0.00
92	T	1,4-Dichlorobenzene	50.000	50.979	-2.0	110	0.00
93	T	n-Butylbenzene	50.000	55.210	-10.4	114	0.00
94	T	1,2-Dichlorobenzene	50.000	49.632	0.7	108	0.00
95	T	1,2-Dibromo-3-Chloropropane	50.000	42.853	14.3	92	0.00
96	T	1,2,4-Trichlorobenzene	50.000	51.748	-3.5	111	0.00
97	T	Hexachlorobutadiene	50.000	56.134	-12.3	123	0.00
98	T	Naphthalene	50.000	45.749	8.5	95	0.00
99	T	1,2,3-Trichlorobenzene	50.000	49.462	1.1	106	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
11M29829.D 8260WT.M Tue Mar 12 13:42:21 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429061.D Vial: 1
Acq On : 11 Mar 2019 9:19 Operator: EEA
Sample : WG699027-02 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:31:09 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Fluorobenzene	10.74	96	591011	25.00 ug/L	0.00
57) Chlorobenzene-d5	14.59	117	447411	25.00 ug/L	-0.01
78) 1,4-Dichlorobenzene-d4	17.62	152	249471	25.00 ug/L	0.00
System Monitoring Compounds					
37) Dibromofluoromethane	9.69	111	153213	26.0071 ug/L	-0.01
Spiked Amount 25.000	Range 86 - 118		Recovery = 104.04%		
43) 1,2-Dichloroethane-d4	10.33	65	147296	25.3265 ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 101.32%		
58) Toluene-d8	12.70	98	589200	25.8531 ug/L	-0.01
Spiked Amount 25.000	Range 88 - 110		Recovery = 103.40%		
80) p-Bromofluorobenzene	16.09	95	233373	25.9198 ug/L	-0.01
Spiked Amount 25.000	Range 86 - 115		Recovery = 103.68%		
Target Compounds					Qvalue
2) Dichlorodifluoromethane	3.22	85	484597	47.1402 ug/L	99
3) Chloromethane	3.66	50	622234	42.0886 ug/L	100
4) Vinyl Chloride	3.90	62	561164	46.5768 ug/L	100
5) 1,3-Butadiene	3.94	54	351416	51.0076 ug/L	100
6) Bromomethane	4.79	94	291549	40.2320 ug/L	99
7) Chloroethane	4.94	64	300895	46.6699 ug/L	99
8) Trichlorofluoromethane	5.43	101	579559	47.3778 ug/L	100
9) Diethyl ether	5.95	59	583015	89.3644 ug/L	98
10) Isoprene	5.99	67	570222	46.6418 ug/L	100
11) Acrolein	6.19	56	34331	45.8913 ug/L	93
12) 1,1,2-Trichloro-1,2,2-Trif	6.21	101	336896	47.8054 ug/L	100
13) Acetone	6.29	43	72788	39.9806 ug/L	99
14) 1,1-Dichloroethene	6.51	61	587248	46.5918 ug/L	100
15) Tert-Butyl Alcohol	6.62	59	89803	153.2390 ug/L	98
16) Dimethyl Sulfide	6.78	62	413363	45.5286 ug/L	98
17) Iodomethane	7.02	142	418455	45.3783 ug/L	99
18) Methyl acetate	7.03	43	219768	46.6178 ug/L	100
19) Methylene Chloride	7.29	84	362036	45.9675 ug/L	97
20) Carbon Disulfide	7.33	76	1108544	47.0341 ug/L	100
21) Acrylonitrile	7.48	53	106664	46.6987 ug/L	96
22) Methyl Tert Butyl Ether	7.50	73	830155	44.2831 ug/L	99
23) trans-1,2-Dichloroethene	7.74	61	568219	47.1808 ug/L	100
24) n-Hexane	7.81	57	611845	51.7659 ug/L	98
25) Diisopropyl ether	8.15	45	2793073	93.6825 ug/L	99
26) Vinyl Acetate	8.33	43	637737	57.6624 ug/L	99
27) 1,1-Dichloroethane	8.36	63	724898	46.5605 ug/L	100
28) Ethyl-Tert-Butyl ether	8.73	59	2297647	88.9168 ug/L	99
29) 2-Butanone	8.92	43	119054	44.3917 ug/L	98
30) Propionitrile	9.02	54	69393	85.1558 ug/L	98
31) 2,2-Dichloropropane	9.13	77	566727	50.1668 ug/L	100
32) cis-1,2-Dichloroethene	9.19	96	408738	47.5512 ug/L	98
33) Chloroform	9.40	83	626567	45.3446 ug/L	100
34) 1-Bromopropane	9.54	122	85201	46.1117 ug/L	99
35) Bromochloromethane	9.64	130	229324	46.7787 ug/L	98
36) Tetrahydrofuran	9.66	42	159421	88.3504 ug/L	98
38) 1,1,1-Trichloroethane	9.93	97	563433	46.9452 ug/L	99
39) Cyclohexane	9.96	56	767077	47.9851 ug/L	99
40) 1,1-Dichloropropene	10.13	75	482944	47.9195 ug/L	99
41) Tert-Amyl-Methyl ether	10.23	73	1730185	87.8634 ug/L	100
42) Carbon Tetrachloride	10.27	117	516382	47.3477 ug/L	99

(#) = qualifier out of range (m) = manual integration
8M429061.D 8260WTR.M Mon Mar 11 15:31:10 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429061.D Vial: 1
Acq On : 11 Mar 2019 9:19 Operator: EEA
Sample : WG699027-02 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:31:09 2019 Quant Results File: 8260WTR.RES

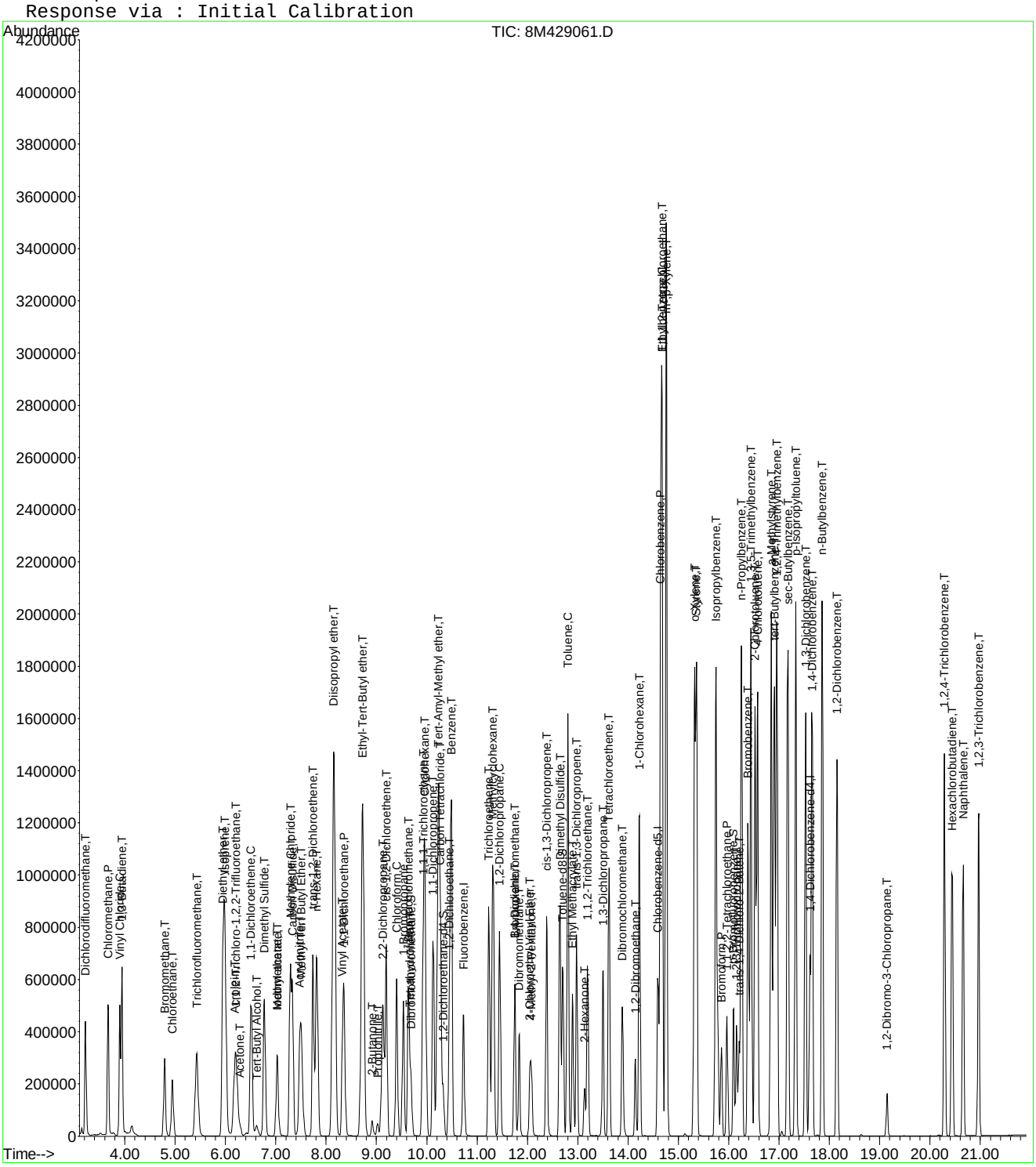
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
45)	1,2-Dichloroethane	10.45	62	442131	46.7793	ug/L	99
46)	Benzene	10.49	78	1485603	47.0559	ug/L	99
47)	Trichloroethene	11.23	130	393302	45.7252	ug/L	99
48)	Methylcyclohexane	11.31	83	640613	48.0911	ug/L	99
49)	1,2-Dichloropropane	11.45	63	411172	47.9808	ug/L	99
50)	Bromodichloromethane	11.75	83	476354	48.0078	ug/L	99
51)	1,4-Dioxane	11.75	88	8839	183.3102	ug/L	93
52)	Dibromomethane	11.83	93	180898	45.8611	ug/L	100
53)	2-Chloroethyl Vinyl Ether	12.05	63	115392	30.8163	ug/L	99
54)	4-Methyl-2-Pentanone	12.08	58	107553	45.6534	ug/L	99
55)	cis-1,3-Dichloropropene	12.38	75	585524	49.6010	ug/L	100
56)	Dimethyl Disulfide	12.65	79	331697	45.7570	ug/L	98
59)	Toluene	12.80	91	1541093	46.1329	ug/L	100
60)	Ethyl Methacrylate	12.90	69	370280	42.7633	ug/L	98
62)	trans-1,3-Dichloropropene	12.98	75	483112	48.1049	ug/L	100
63)	1,1,2-Trichloroethane	13.20	97	268007	45.8979	ug/L	100
64)	2-Hexanone	13.13	58	98638	41.9002	ug/L	98
65)	1,3-Dichloropropane	13.51	76	460455	45.7866	ug/L	99
66)	Tetrachloroethene	13.62	164	326095	46.3218	ug/L	99
67)	Dibromochloromethane	13.89	129	345451	46.6143	ug/L	100
68)	1,2-Dibromoethane	14.15	107	263514	46.4745	ug/L	99
69)	1-Chlorohexane	14.23	91	541900	46.8128	ug/L	98
70)	Chlorobenzene	14.64	112	1022326	45.1433	ug/L	99
71)	1,1,1,2-Tetrachloroethane	14.67	131	387635	46.5577	ug/L	99
72)	Ethylbenzene	14.67	106	584603	47.7120	ug/L	100
73)	m-,p-Xylene	14.76	106	1397279	93.5922	ug/L	100
74)	o-Xylene	15.33	106	694695	47.9556	ug/L	99
75)	Styrene	15.36	104	1146408	47.8010	ug/L	99
76)	Bromoform	15.85	173	217491	47.3312	ug/L	99
77)	Isopropylbenzene	15.75	105	1740410	47.5658	ug/L	100
79)	1,1,2,2-Tetrachloroethane	15.97	83	314504	44.6863	ug/L	100
81)	1,2,3-Trichloropropane	16.15	110	91112	43.2748	ug/L	97
82)	trans-1,4-Dichloro-2-Buten	16.20	53	103594	43.5412	ug/L	87
83)	n-Propylbenzene	16.26	91	2077693	46.0204	ug/L	100
84)	Bromobenzene	16.38	156	464774	44.9929	ug/L	98
85)	1,3,5-Trimethylbenzene	16.44	105	1490512	45.7980	ug/L	100
86)	2-Chlorotoluene	16.53	91	1254981	42.0414	ug/L	99
87)	4-Chlorotoluene	16.58	91	1298396	49.7797	ug/L	99
88)	a-Methylstyrene	16.85	118	859535	46.0255	ug/L	99
89)	tert-Butylbenzene	16.91	134	336065	44.7593	ug/L	98
90)	1,2,4-Trimethylbenzene	16.96	105	1516412	46.0231	ug/L	100
91)	sec-Butylbenzene	17.18	105	1931673	46.3771	ug/L	100
92)	p-Isopropyltoluene	17.33	119	1670367	46.7824	ug/L	100
93)	1,3-Dichlorobenzene	17.53	146	915690	45.4713	ug/L	99
94)	1,4-Dichlorobenzene	17.66	146	909292	44.5880	ug/L	99
95)	n-Butylbenzene	17.86	91	1537403	47.2576	ug/L	100
96)	1,2-Dichlorobenzene	18.15	146	831254	44.4823	ug/L	99
97)	1,2-Dibromo-3-Chloropropan	19.14	75	52127	41.0929	ug/L	97
98)	1,2,4-Trichlorobenzene	20.29	180	616788	45.4873	ug/L	100
99)	Hexachlorobutadiene	20.44	225	300233	46.9901	ug/L	100
100)	Naphthalene	20.66	128	1065041	43.0873	ug/L	100
101)	1,2,3-Trichlorobenzene	20.97	180	548043	43.9973	ug/L	99

(#) = qualifier out of range (m) = manual integration
8M429061.D 8260WTR.M Mon Mar 11 15:31:10 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429061.D Vial: 1
Acq On : 11 Mar 2019 9:19 Operator: EEA
Sample : WG699027-02 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:30 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429061.D Vial: 1
Acq On : 11 Mar 2019 9:19 Operator: EEA
Sample : WG699027-02 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	1.000	1.000	0.0	111	0.00
2	T	Dichlorodifluoromethane	0.435	0.410	5.7	93	-0.01
3	P	Chloromethane	0.625	0.526	15.8	96	-0.02
4	C	Vinyl Chloride	0.510	0.475	6.9	97	-0.01
5	T	1,3-Butadiene	0.329	0.297	9.7	101	0.00
6	T	Bromomethane	0.307	0.247	19.5	97	-0.02
7	T	Chloroethane	0.273	0.255	6.6	97	-0.02
8	T	Trichlorofluoromethane	0.517	0.490	5.2	97	-0.01
9	T	Diethyl ether	0.276	0.247	10.5	97	-0.02
10	T	Isoprene	0.517	0.482	6.8	98	-0.01
11	T	Acrolein	0.032	0.029	9.4	99	-0.02
12	T	1,1,2-Trichloro-1,2,2-Trifl	0.298	0.285	4.4	99	-0.01
13	T	Acetone	0.077	0.062	19.5	83	-0.02
14	C	1,1-Dichloroethene	0.533	0.497	6.8	99	-0.02
15	T	Tert-Butyl Alcohol	0.025	0.019	24.0	90	-0.01
16	T	Dimethyl Sulfide	0.384	0.350	8.9	96	-0.01
17	T	Iodomethane	0.248	0.354	-42.7#	95	0.00
18	T	Methyl acetate	0.199	0.186	6.5	101	-0.02
19	T	Methylene Chloride	0.333	0.306	8.1	98	-0.01
20	T	Carbon Disulfide	0.997	0.938	5.9	98	-0.01
21	T	Acrylonitrile	0.097	0.090	7.2	98	-0.01
22	T	Methyl Tert Butyl Ether	0.793	0.702	11.5	95	-0.01
23	T	trans-1,2-Dichloroethene	0.509	0.481	5.5	99	-0.01
24	T	n-Hexane	0.500	0.518	-3.6	109	-0.02
25	T	Diisopropyl ether	1.261	1.181	6.3	100	-0.02
26	T	Vinyl Acetate	0.468	0.540	-15.4	125	-0.01
27	P	1,1-Dichloroethane	0.659	0.613	7.0	98	-0.01
28	T	Ethyl-Tert-Butyl ether	1.093	0.972	11.1	96	-0.01
29	T	2-Butanone	0.113	0.101	10.6	94	-0.01
30	T	Propionitrile	0.029	0.029	0.0	93	-0.01
31	T	2,2-Dichloropropane	0.478	0.479	-0.2	107	-0.01
32	T	cis-1,2-Dichloroethene	0.364	0.346	4.9	99	-0.01
33	C	Chloroform	0.585	0.530	9.4	99	-0.01
34		1-Bromopropane	0.078	0.072	7.7	96	-0.01
35	T	Bromochloromethane	0.207	0.194	6.3	98	0.00
36	T	Tetrahydrofuran	0.076	0.067	11.8	97	-0.01
37	S	Dibromofluoromethane	0.249	0.259	-4.0	110	-0.01
38	T	1,1,1-Trichloroethane	0.508	0.477	6.1	98	-0.01
39	T	Cyclohexane	0.676	0.649	4.0	100	-0.01
40	T	1,1-Dichloropropene	0.426	0.409	4.0	99	-0.01
41	T	Tert-Amyl-Methyl ether	0.833	0.732	12.1	95	-0.01
42	T	Carbon Tetrachloride	0.461	0.437	5.2	99	-0.01
43	S	1,2-Dichloroethane-d4	0.246	0.249	-1.2	107	0.00
44		Heptane	0.000	0.000	0.0	0#	-2.63#
45	T	1,2-Dichloroethane	0.400	0.374	6.5	97	-0.01
46	T	Benzene	1.335	1.257	5.8	99	-0.01
47	T	Trichloroethene	0.364	0.333	8.5	95	-0.01
48	T	Methylcyclohexane	0.563	0.542	3.7	102	-0.01
49	C	1,2-Dichloropropane	0.362	0.348	3.9	99	-0.01
50	T	Bromodichloromethane	0.420	0.403	4.0	99	-0.01
51	T	1,4-Dioxane	0.002	0.002	0.0	94	0.00
52	T	Dibromomethane	0.167	0.153	8.4	97	-0.01
53	T	2-Chloroethyl Vinyl Ether	0.158	0.098	38.0#	66	0.00
54	T	4-Methyl-2-Pentanone	0.100	0.091	9.0	98	0.00

(#) = Out of Range
8M429061.D 8260WTR.M Mon Mar 11 15:31:19 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429061.D Vial: 1
Acq On : 11 Mar 2019 9:19 Operator: EEA
Sample : WG699027-02 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
55	T	cis-1,3-Dichloropropene	0.499	0.495	0.8	100	-0.01
56	T	Dimethyl Disulfide	0.307	0.281	8.5	96	0.00
57	I	Chlorobenzene-d5	1.000	1.000	0.0	112	-0.01
58	S	Toluene-d8	1.273	1.317	-3.5	111	-0.01
59	C	Toluene	1.867	1.722	7.8	99	-0.01
60	T	Ethyl Methacrylate	0.437	0.414	5.3	94	-0.01
61		Paraldehyde	0.000	0.000	0.0	158#	0.00
62	T	trans-1,3-Dichloropropene	0.561	0.540	3.7	100	-0.01
63	T	1,1,2-Trichloroethane	0.326	0.300	8.0	97	-0.01
64	T	2-Hexanone	0.122	0.110	9.8	95	-0.01
65	T	1,3-Dichloropropane	0.562	0.515	8.4	98	0.00
66	T	Tetrachloroethene	0.393	0.364	7.4	100	-0.01
67	T	Dibromochloromethane	0.414	0.386	6.8	98	0.00
68	T	1,2-Dibromoethane	0.317	0.294	7.3	96	0.00
69	T	1-Chlorohexane	0.647	0.606	6.3	100	0.00
70	P	Chlorobenzene	1.265	1.142	9.7	99	-0.01
71	T	1,1,1,2-Tetrachloroethane	0.465	0.433	6.9	99	0.00
72	C	Ethylbenzene	0.685	0.653	4.7	100	0.00
73	T	m-,p-Xylene	0.834	0.781	6.4	100	-0.01
74	T	o-Xylene	0.809	0.776	4.1	100	0.00
75	T	Styrene	1.340	1.281	4.4	99	-0.01
76	P	Bromoform	0.257	0.243	5.4	97	-0.01
77	T	Isopropylbenzene	2.045	1.945	4.9	100	0.00
78	I	1,4-Dichlorobenzene-d4	1.000	1.000	0.0	115	0.00
79	P	1,1,2,2-Tetrachloroethane	0.705	0.630	10.6	101	0.00
80	S	p-Bromofluorobenzene	0.902	0.935	-3.7	114	-0.01
81	T	1,2,3-Trichloropropane	0.211	0.183	13.3	95	-0.01
82	T	trans-1,4-Dichloro-2-Butene	0.238	0.208	12.6	95	0.00
83	T	n-Propylbenzene	4.524	4.164	8.0	101	0.00
84	T	Bromobenzene	1.035	0.932	10.0	99	-0.01
85	T	1,3,5-Trimethylbenzene	3.261	2.987	8.4	100	0.00
86	T	2-Chlorotoluene	2.991	2.515	15.9	92	0.00
87	T	4-Chlorotoluene	2.614	2.602	0.5	113	0.00
88	T	a-Methylstyrene	1.871	1.723	7.9	98	0.00
89	T	tert-Butylbenzene	0.752	0.674	10.4	100	0.00
90	T	1,2,4-Trimethylbenzene	3.302	3.039	8.0	100	0.00
91	T	sec-Butylbenzene	4.174	3.872	7.2	101	0.00
92	T	p-Isopropyltoluene	3.578	3.348	6.4	101	0.00
93	T	1,3-Dichlorobenzene	2.018	1.835	9.1	101	0.00
94	T	1,4-Dichlorobenzene	2.044	1.822	10.9	100	0.00
95	T	n-Butylbenzene	3.260	3.081	5.5	102	0.00
96	T	1,2-Dichlorobenzene	1.873	1.666	11.1	99	-0.01
97	T	1,2-Dibromo-3-Chloropropane	0.127	0.104	18.1	91	-0.01
98	T	1,2,4-Trichlorobenzene	1.359	1.236	9.1	99	0.00
99	T	Hexachlorobutadiene	0.640	0.602	5.9	102	0.00
100	T	Naphthalene	2.477	2.135	13.8	92	0.00
101	T	1,2,3-Trichlorobenzene	1.248	1.098	12.0	97	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M429061.D 8260WTR.M Mon Mar 11 15:31:19 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429061.D Vial: 1
Acq On : 11 Mar 2019 9:19 Operator: EEA
Sample : WG699027-02 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	111	0.00
2	T	Dichlorodifluoromethane	50.000	47.140	5.7	93	-0.01
3	P	Chloromethane	50.000	42.089	15.8	96	-0.02
4	C	Vinyl Chloride	50.000	46.577	6.8	97	-0.01
5	T	1,3-Butadiene	50.000	51.008	-2.0	101	0.00
6	T	Bromomethane	50.000	40.232	19.5	97	-0.02
7	T	Chloroethane	50.000	46.670	6.7	97	-0.02
8	T	Trichlorofluoromethane	50.000	47.378	5.2	97	-0.01
9	T	Diethyl ether	100.000	89.364	10.6	97	-0.02
10	T	Isoprene	50.000	46.642	6.7	98	-0.01
11	T	Acrolein	50.000	45.891	8.2	99	-0.02
12	T	1,1,2-Trichloro-1,2,2-Trifl	50.000	47.805	4.4	99	-0.01
13	T	Acetone	50.000	39.981	20.0	83	-0.02
14	C	1,1-Dichloroethene	50.000	46.592	6.8	99	-0.02
15	T	Tert-Butyl Alcohol	200.000	153.239	23.4	90	-0.01
16	T	Dimethyl Sulfide	50.000	45.529	8.9	96	-0.01
17	T	Iodomethane	50.000	45.378	9.2	95	0.00
18	T	Methyl acetate	50.000	46.618	6.8	101	-0.02
19	T	Methylene Chloride	50.000	45.968	8.1	98	-0.01
20	T	Carbon Disulfide	50.000	47.034	5.9	98	-0.01
21	T	Acrylonitrile	50.000	46.699	6.6	98	-0.01
22	T	Methyl Tert Butyl Ether	50.000	44.283	11.4	95	-0.01
23	T	trans-1,2-Dichloroethene	50.000	47.181	5.6	99	-0.01
24	T	n-Hexane	50.000	51.766	-3.5	109	-0.02
25	T	Diisopropyl ether	100.000	93.682	6.3	100	-0.02
26	T	Vinyl Acetate	50.000	57.662	-15.3	125	-0.01
27	P	1,1-Dichloroethane	50.000	46.560	6.9	98	-0.01
28	T	Ethyl-Tert-Butyl ether	100.000	88.917	11.1	96	-0.01
29	T	2-Butanone	50.000	44.392	11.2	94	-0.01
30	T	Propionitrile	100.000	85.156	14.8	93	-0.01
31	T	2,2-Dichloropropane	50.000	50.167	-0.3	107	-0.01
32	T	cis-1,2-Dichloroethene	50.000	47.551	4.9	99	-0.01
33	C	Chloroform	50.000	45.345	9.3	99	-0.01
34		1-Bromopropane	50.000	46.112	7.8	96	-0.01
35	T	Bromochloromethane	50.000	46.779	6.4	98	0.00
36	T	Tetrahydrofuran	100.000	88.350	11.7	97	-0.01
37	S	Dibromofluoromethane	25.000	26.007	-4.0	110	-0.01
38	T	1,1,1-Trichloroethane	50.000	46.945	6.1	98	-0.01
39	T	Cyclohexane	50.000	47.985	4.0	100	-0.01
40	T	1,1-Dichloropropene	50.000	47.920	4.2	99	-0.01
41	T	Tert-Amyl-Methyl ether	100.000	87.863	12.1	95	-0.01
42	T	Carbon Tetrachloride	50.000	47.348	5.3	99	-0.01
43	S	1,2-Dichloroethane-d4	25.000	25.327	-1.3	107	0.00
44		Heptane	-1.000	0.000	0.0	0	-2.63#
45	T	1,2-Dichloroethane	50.000	46.779	6.4	97	-0.01
46	T	Benzene	50.000	47.056	5.9	99	-0.01
47	T	Trichloroethene	50.000	45.725	8.5	95	-0.01
48	T	Methylcyclohexane	50.000	48.091	3.8	102	-0.01
49	C	1,2-Dichloropropane	50.000	47.981	4.0	99	-0.01
50	T	Bromodichloromethane	50.000	48.008	4.0	99	-0.01
51	T	1,4-Dioxane	200.000	183.310	8.3	94	0.00
52	T	Dibromomethane	50.000	45.861	8.3	97	-0.01
53	T	2-Chloroethyl Vinyl Ether	50.000	30.816	38.4#	66	0.00
54	T	4-Methyl-2-Pentanone	50.000	45.653	8.7	98	0.00

(#) = Out of Range
8M429061.D 8260WTR.M Mon Mar 11 15:31:17 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429061.D Vial: 1
Acq On : 11 Mar 2019 9:19 Operator: EEA
Sample : WG699027-02 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	cis-1,3-Dichloropropene	50.000	49.601	0.8	100	-0.01
56	T	Dimethyl Disulfide	50.000	45.757	8.5	96	0.00
57	I	Chlorobenzene-d5	25.000	25.000	0.0	112	-0.01
58	S	Toluene-d8	25.000	25.853	-3.4	111	-0.01
59	C	Toluene	50.000	46.133	7.7	99	-0.01
60	T	Ethyl Methacrylate	50.000	42.763	14.5	94	-0.01
61		Paraldehyde	-1.000	0.000	0.0	158	0.00
62	T	trans-1,3-Dichloropropene	50.000	48.105	3.8	100	-0.01
63	T	1,1,2-Trichloroethane	50.000	45.898	8.2	97	-0.01
64	T	2-Hexanone	50.000	41.900	16.2	95	-0.01
65	T	1,3-Dichloropropane	50.000	45.787	8.4	98	0.00
66	T	Tetrachloroethene	50.000	46.322	7.4	100	-0.01
67	T	Dibromochloromethane	50.000	46.614	6.8	98	0.00
68	T	1,2-Dibromoethane	50.000	46.474	7.1	96	0.00
69	T	1-Chlorohexane	50.000	46.813	6.4	100	0.00
70	P	Chlorobenzene	50.000	45.143	9.7	99	-0.01
71	T	1,1,1,2-Tetrachloroethane	50.000	46.558	6.9	99	0.00
72	C	Ethylbenzene	50.000	47.712	4.6	100	0.00
73	T	m-,p-Xylene	100.000	93.592	6.4	100	-0.01
74	T	o-Xylene	50.000	47.956	4.1	100	0.00
75	T	Styrene	50.000	47.801	4.4	99	-0.01
76	P	Bromoform	50.000	47.331	5.3	97	-0.01
77	T	Isopropylbenzene	50.000	47.566	4.9	100	0.00
78	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	115	0.00
79	P	1,1,2,2-Tetrachloroethane	50.000	44.686	10.6	101	0.00
80	S	p-Bromofluorobenzene	25.000	25.920	-3.7	114	-0.01
81	T	1,2,3-Trichloropropane	50.000	43.275	13.5	95	-0.01
82	T	trans-1,4-Dichloro-2-Butene	50.000	43.541	12.9	95	0.00
83	T	n-Propylbenzene	50.000	46.020	8.0	101	0.00
84	T	Bromobenzene	50.000	44.993	10.0	99	-0.01
85	T	1,3,5-Trimethylbenzene	50.000	45.798	8.4	100	0.00
86	T	2-Chlorotoluene	50.000	42.041	15.9	92	0.00
87	T	4-Chlorotoluene	50.000	49.780	0.4	113	0.00
88	T	a-Methylstyrene	50.000	46.025	8.0	98	0.00
89	T	tert-Butylbenzene	50.000	44.759	10.5	100	0.00
90	T	1,2,4-Trimethylbenzene	50.000	46.023	8.0	100	0.00
91	T	sec-Butylbenzene	50.000	46.377	7.2	101	0.00
92	T	p-Isopropyltoluene	50.000	46.782	6.4	101	0.00
93	T	1,3-Dichlorobenzene	50.000	45.471	9.1	101	0.00
94	T	1,4-Dichlorobenzene	50.000	44.588	10.8	100	0.00
95	T	n-Butylbenzene	50.000	47.258	5.5	102	0.00
96	T	1,2-Dichlorobenzene	50.000	44.482	11.0	99	-0.01
97	T	1,2-Dibromo-3-Chloropropane	50.000	41.093	17.8	91	-0.01
98	T	1,2,4-Trichlorobenzene	50.000	45.487	9.0	99	0.00
99	T	Hexachlorobutadiene	50.000	46.990	6.0	102	0.00
100	T	Naphthalene	50.000	43.087	13.8	92	0.00
101	T	1,2,3-Trichlorobenzene	50.000	43.997	12.0	97	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M429061.D 8260WTR.M Mon Mar 11 15:31:17 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29851.D Vial: 23
Acq On : 12 Mar 2019 22:39 Operator: KFR
Sample : WG699219-03 QCMRL 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 13 09:04:06 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3916	96	357416	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0208	117	276741	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8331	152	144383	25.0000	ug/L	0.0000
System Monitoring Compounds						
37) Dibromofluoromethane	9.3990	111	108020	26.1818	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 104.7272%			
43) 1,2-Dichloroethane-d4	10.0090	65	123784	25.0056	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 100.0224%			
57) Toluene-d8	12.2527	98	348345	25.2930	ug/L	0.0000
Spiked Amount 25.0000	Range 88 - 110		Recovery = 101.1720%			
78) p-Bromofluorobenzene	15.4166	95	136387	24.6843	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 98.7372%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1228	85	246271	46.6420	ug/L	97
3) Chloromethane	3.5571	50	318423	31.3991	ug/L	99
4) Vinyl Chloride	3.7742	62	328529	43.3957	ug/L	99
5) 1,3-Butadiene	3.8156	54	130428	50.2688	ug/L	99
6) Bromomethane	4.6531	94	111080	38.2973	ug/L	99
7) Chloroethane	4.7979	64	134800	46.0582	ug/L	99
8) Trichlorofluoromethane	5.2735	101	341870	47.7200	ug/L	99
9) Diethyl ether	5.7904	59	362002	96.6507	ug/L	98
10) Isoprene	5.8215	67	266399	47.2114	ug/L	100
11) Acrolein	6.0179	56	23526	36.1705	ug/L	99
12) 1,1,2-Trichloro-1,2,2-Trif	6.0386	101	171549	48.8149	ug/L	100
13) Acetone	6.1213	43	58176	44.5217	ug/L	98
14) 1,1-Dichloroethene	6.3384	61	323043	47.2309	ug/L	97
15) Tert-Butyl Alcohol	6.4418	59	73220	200.8936	ug/L	98
16) Dimethyl Sulfide	6.5866	62	216845	47.9587	ug/L	98
17) Iodomethane	6.8347	142	146851	31.7598	ug/L	99
18) Methyl acetate	6.8451	43	136099	48.2873	ug/L	97
19) Methylene Chloride	7.0932	84	184356	48.3683	ug/L	95
20) Carbon Disulfide	7.1346	76	522537	49.7409	ug/L	99
21) Acrylonitrile	7.2690	53	76606	53.1808	ug/L	99
22) Methyl Tert Butyl Ether	7.3000	73	525733	48.6429	ug/L	99
23) trans-1,2-Dichloroethene	7.5275	96	184253	49.7307	ug/L	98
24) n-Hexane	7.5999	57	237576	41.6313	ug/L	98
25) Diisopropyl ether	7.9307	45	1356100	97.3653	ug/L	99
26) Vinyl Acetate	8.0962	43	93222	19.9554	ug/L	99
27) 1,1-Dichloroethane	8.1272	63	383926	47.4877	ug/L	98
28) Ethyl-Tert-Butyl ether	8.4787	59	1412530	100.3374	ug/L	99
29) 2-Butanone	8.6545	43	76503	45.9635	ug/L	99
30) Propionitrile	8.7579	54	50387	103.6138	ug/L	100
31) 2,2-Dichloropropane	8.8613	77	196328	35.1213	ug/L	99
32) cis-1,2-Dichloroethene	8.9337	96	214062	50.8914	ug/L	90
33) Chloroform	9.1301	83	349972	47.6922	ug/L	99
34) 1-Bromopropane	9.2542	122	44266	48.5869	ug/L	97
35) Bromochloromethane	9.3473	130	129082	52.3377	ug/L	95
36) Tetrahydrofuran	9.3680	42	99551	92.3194	ug/L	97
38) 1,1,1-Trichloroethane	9.6368	97	340453	51.2387	ug/L	98
39) Cyclohexane	9.6575	56	371350	47.2059	ug/L	97
40) 1,1-Dichloropropene	9.8125	75	240720	48.1846	ug/L	98
41) Carbon Tetrachloride	9.9573	117	312695	55.3422	ug/L	99
42) Tert-Amyl-Methyl ether	9.9159	73	1068169	101.7306	ug/L	100

(#) = qualifier out of range (m) = manual integration

Data File : C:\MSDCHEM\1\DATA\031219\11M29851.D Vial: 23
Acq On : 12 Mar 2019 22:39 Operator: KFR
Sample : WG699219-03 QCMRL 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 13 09:04:06 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

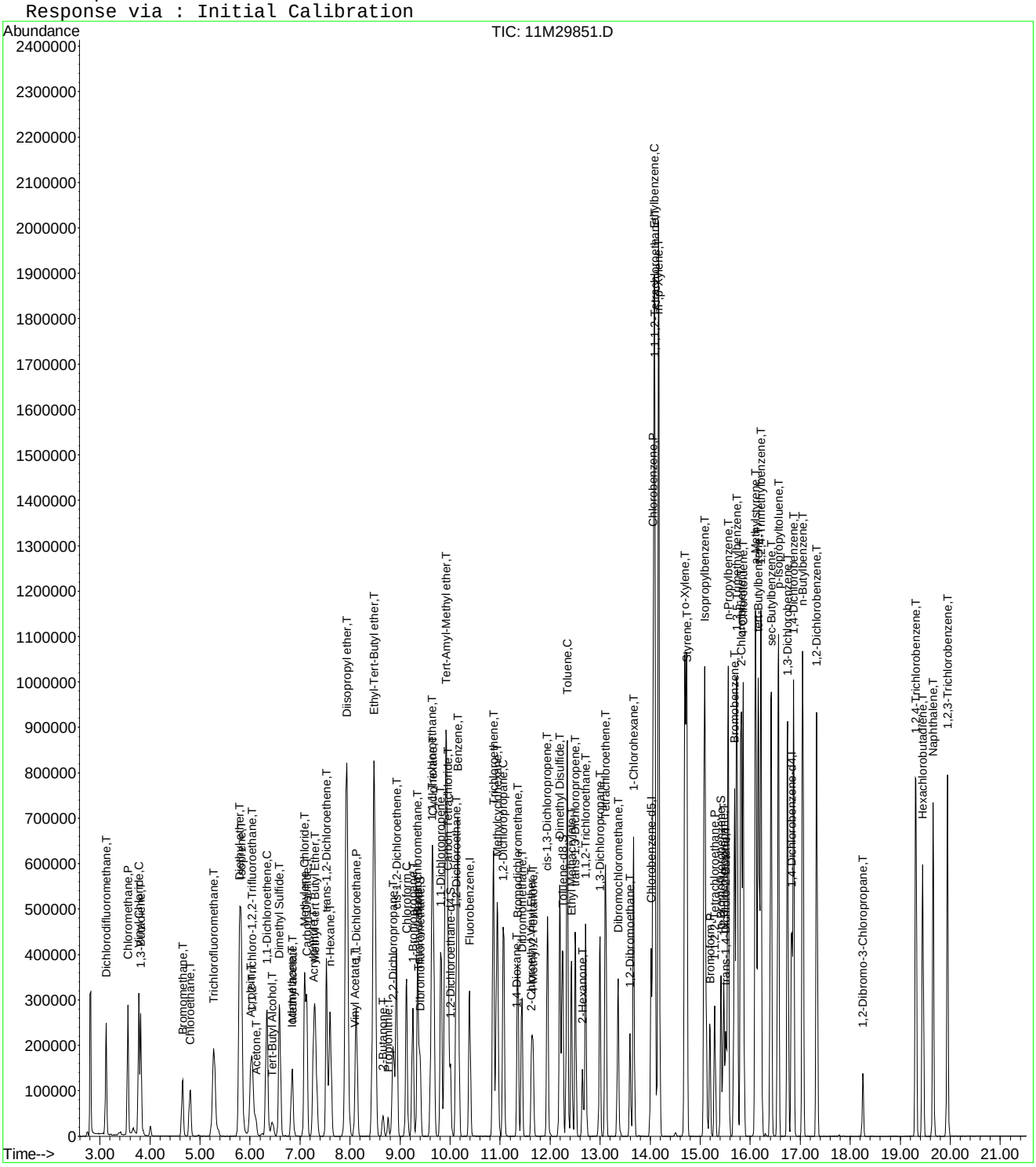
	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
44)	1,2-Dichloroethane	10.1227	62	315829	49.5192	ug/L	99
45)	Benzene	10.1538	78	737727	49.6820	ug/L	100
46)	Trichloroethene	10.8672	130	240685	57.1503	ug/L	99
47)	Methylcyclohexane	10.9396	83	291746	49.1745	ug/L	96
48)	1,2-Dichloropropane	11.0636	63	216673	49.1221	ug/L	100
49)	1,4-Dioxane	11.3325	88	5646	186.5480	ug/L	89
50)	Bromodichloromethane	11.3531	83	276618	53.0647	ug/L	99
51)	Dibromomethane	11.4359	93	128718	51.0866	ug/L	97
52)	2-Chloroethyl Vinyl Ether	11.6220	63	83391	39.0672	ug/L	100
53)	4-Methyl-2-Pentanone	11.6530	58	72320	47.5558	ug/L	96
54)	cis-1,3-Dichloropropene	11.9425	75	290443	49.4369	ug/L	99
55)	Dimethyl Disulfide	12.1907	79	187889	47.6064	ug/L	100
58)	Toluene	12.3457	91	816217	49.7885	ug/L	99
59)	Ethyl Methacrylate	12.4285	69	240005	51.8330	ug/L	98
60)	trans-1,3-Dichloropropene	12.5008	75	261870	48.7880	ug/L	99
61)	1,1,2-Trichloroethane	12.7076	97	171735	49.2083	ug/L	99
62)	2-Hexanone	12.6456	43	121358	46.7836	ug/L	98
63)	1,3-Dichloropropane	12.9971	76	275860	48.9912	ug/L	98
64)	Tetrachloroethene	13.1109	164	168540	48.4684	ug/L	100
65)	Dibromochloromethane	13.3590	129	213691	53.7882	ug/L	100
66)	1,2-Dibromoethane	13.5968	107	168121	50.2645	ug/L	98
67)	1-Chlorohexane	13.6692	91	259215	47.8933	ug/L	97
68)	Chlorobenzene	14.0621	112	560289	49.0904	ug/L	100
69)	1,1,1,2-Tetrachloroethane	14.0931	131	236697	48.8135	ug/L	99
70)	Ethylbenzene	14.0828	106	297975	51.3200	ug/L	98
71)	m-,p-Xylene	14.1655	106	706634	100.8092	ug/L	99
72)	o-Xylene	14.6928	106	350455	51.5289	ug/L	98
73)	Styrene	14.7342	104	595723	52.9548	ug/L	98
74)	Bromoform	15.1995	173	146893	51.2713	ug/L	98
75)	Isopropylbenzene	15.0857	105	871839	51.2071	ug/L	100
77)	1,1,2,2-Tetrachloroethane	15.2925	83	162183	43.0592	ug/L	99
79)	1,2,3-Trichloropropane	15.4683	110	62744	49.8902	ug/L	96
80)	trans-1,4-Dichloro-2-Buten	15.5097	53	68235	43.0318	ug/L	86
81)	n-Propylbenzene	15.5613	91	1052322	49.4229	ug/L	100
82)	Bromobenzene	15.6854	156	264007	50.7716	ug/L	90
83)	1,3,5-Trimethylbenzene	15.7371	105	753573	49.8542	ug/L	100
84)	2-Chlorotoluene	15.8198	91	735799	48.5646	ug/L	99
85)	4-Chlorotoluene	15.8612	91	589716	47.3576	ug/L	99
86)	a-Methylstyrene	16.1093	118	442391	51.3993	ug/L	98
87)	tert-Butylbenzene	16.1610	134	176440	47.3926	ug/L	97
88)	1,2,4-Trimethylbenzene	16.2128	105	776117	49.7493	ug/L	99
89)	sec-Butylbenzene	16.4195	105	934295	49.7875	ug/L	100
90)	p-Isopropyltoluene	16.5643	119	821860	50.3668	ug/L	100
91)	1,3-Dichlorobenzene	16.7504	146	480449	50.0860	ug/L	99
92)	1,4-Dichlorobenzene	16.8641	146	475995	49.6919	ug/L	99
93)	n-Butylbenzene	17.0502	91	735475	50.0133	ug/L	100
94)	1,2-Dichlorobenzene	17.3294	146	463676	50.4354	ug/L	99
95)	1,2-Dibromo-3-Chloropropan	18.2496	75	39128	50.2867	ug/L	95
96)	1,2,4-Trichlorobenzene	19.3146	180	303596	51.0489	ug/L	100
97)	Hexachlorobutadiene	19.4490	225	151279	50.4686	ug/L	97
98)	Naphthalene	19.6558	128	675701	53.0595	ug/L	99
99)	1,2,3-Trichlorobenzene	19.9453	180	295081	52.8114	ug/L	98

(#) = qualifier out of range (m) = manual integration
11M29851.D 8260WT.M Wed Mar 13 09:04:07 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29851.D Vial: 23
Acq On : 12 Mar 2019 22:39 Operator: KFR
Sample : WG699219-03 QCMRL 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 13 9:04 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration



11M29851.D 8260WT.M Wed Mar 13 09:04:07 2019 Page 3

Data File : C:\MSDCHEM\1\DATA\031219\11M29851.D Vial: 23
Acq On : 12 Mar 2019 22:39 Operator: KFR
Sample : WG699219-03 QCMRL 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	90	0.00
2	T	Dichlorodifluoromethane	50.000	46.642	6.7	77	0.00
3	P	Chloromethane	50.000	31.399	37.2#	59	0.00
4	C	Vinyl Chloride	50.000	43.396	13.2	76	0.00
5	T	1,3-Butadiene	50.000	50.269	-0.5	82	0.00
6	T	Bromomethane	50.000	38.297	23.4	76	0.01
7	T	Chloroethane	50.000	46.058	7.9	80	0.00
8	T	Trichlorofluoromethane	50.000	47.720	4.6	82	0.00
9	T	Diethyl ether	100.000	96.651	3.3	96	0.00
10	T	Isoprene	50.000	47.211	5.6	82	0.00
11	T	Acrolein	50.000	36.171	27.7#	67	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	50.000	48.815	2.4	83	0.00
13	T	Acetone	50.000	44.522	11.0	79	0.00
14	C	1,1-Dichloroethene	50.000	47.231	5.5	81	0.01
15	T	Tert-Butyl Alcohol	200.000	200.894	-0.4	91	0.00
16	T	Dimethyl Sulfide	50.000	47.959	4.1	83	0.00
17	T	Iodomethane	50.000	31.760	36.5#	56	0.00
18	T	Methyl acetate	50.000	48.287	3.4	84	0.00
19	T	Methylene Chloride	50.000	48.368	3.3	85	0.00
20	T	Carbon Disulfide	50.000	49.741	0.5	83	0.00
21	T	Acrylonitrile	50.000	53.181	-6.4	88	0.00
22	T	Methyl Tert Butyl Ether	50.000	48.643	2.7	85	0.00
23	T	trans-1,2-Dichloroethene	50.000	49.731	0.5	84	0.00
24	T	n-Hexane	50.000	41.631	16.7	73	0.00
25	T	Diisopropyl ether	100.000	97.365	2.6	94	0.00
26	T	Vinyl Acetate	50.000	19.955	60.1#	34	0.00
27	P	1,1-Dichloroethane	50.000	47.488	5.0	83	0.00
28	T	Ethyl-Tert-Butyl ether	100.000	100.337	-0.3	95	0.00
29	T	2-Butanone	50.000	45.964	8.1	79	0.00
30	T	Propionitrile	100.000	103.614	-3.6	86	0.00
31	T	2,2-Dichloropropane	50.000	35.121	29.8#	60	0.00
32	T	cis-1,2-Dichloroethene	50.000	50.891	-1.8	86	0.00
33	C	Chloroform	50.000	47.692	4.6	85	0.00
34	T	1-Bromopropane	50.000	48.587	2.8	86	0.00
35	T	Bromochloromethane	50.000	52.338	-4.7	86	0.00
36	T	Tetrahydrofuran	100.000	92.319	7.7	87	0.00
37	S	Dibromofluoromethane	25.000	26.182	-4.7	91	0.00
38	T	1,1,1-Trichloroethane	50.000	51.239	-2.5	86	0.01
39	T	Cyclohexane	50.000	47.206	5.6	82	0.00
40	T	1,1-Dichloropropene	50.000	48.185	3.6	82	0.00
41	T	Carbon Tetrachloride	50.000	55.342	-10.7	90	0.00
42	T	Tert-Amyl-Methyl ether	100.000	101.731	-1.7	95	0.00
43	S	1,2-Dichloroethane-d4	25.000	25.006	-0.0	87	0.00
44	T	1,2-Dichloroethane	50.000	49.519	1.0	85	0.00
45	T	Benzene	50.000	49.682	0.6	86	0.00
46	T	Trichloroethene	50.000	57.150	-14.3	97	0.00
47	T	Methylcyclohexane	50.000	49.174	1.7	85	0.00
48	C	1,2-Dichloropropane	50.000	49.122	1.8	85	0.00
49	T	1,4-Dioxane	200.000	186.548	6.7	82	-0.01
50	T	Bromodichloromethane	50.000	53.065	-6.1	86	0.00
51	T	Dibromomethane	50.000	51.087	-2.2	87	0.00
52	T	2-Chloroethyl Vinyl Ether	50.000	39.067	21.9	69	0.00
53	T	4-Methyl-2-Pentanone	50.000	47.556	4.9	83	0.00
54	T	cis-1,3-Dichloropropene	50.000	49.437	1.1	82	0.00

(#) = Out of Range
11M29851.D 8260WT.M Wed Mar 13 09:06:30 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\031219\11M29851.D Vial: 23
Acq On : 12 Mar 2019 22:39 Operator: KFR
Sample : WG699219-03 QCMRL 50ug/L 8260 Inst : hpms11
Misc : 1,1 STD92320 Multiplr: 1.00
MS Integration Params: rteint.p

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	Dimethyl Disulfide	50.000	47.606	4.8	89	0.00
56	I	Chlorobenzene-d5	25.000	25.000	0.0	92	0.00
57	S	Toluene-d8	25.000	25.293	-1.2	90	0.00
58	C	Toluene	50.000	49.788	0.4	87	0.00
59	T	Ethyl Methacrylate	50.000	51.833	-3.7	88	0.00
60	T	trans-1,3-Dichloropropene	50.000	48.788	2.4	82	0.00
61	T	1,1,2-Trichloroethane	50.000	49.208	1.6	88	0.00
62	T	2-Hexanone	50.000	46.784	6.4	80	0.00
63	T	1,3-Dichloropropane	50.000	48.991	2.0	86	0.00
64	T	Tetrachloroethene	50.000	48.468	3.1	86	0.00
65	T	Dibromochloromethane	50.000	53.788	-7.6	90	0.00
66	T	1,2-Dibromoethane	50.000	50.264	-0.5	87	0.00
67	T	1-Chlorohexane	50.000	47.893	4.2	83	0.00
68	P	Chlorobenzene	50.000	49.090	1.8	86	0.00
69	T	1,1,1,2-Tetrachloroethane	50.000	48.814	2.4	90	0.00
70	C	Ethylbenzene	50.000	51.320	-2.6	86	0.00
71	T	m-,p-Xylene	100.000	100.809	-0.8	86	0.00
72	T	o-Xylene	50.000	51.529	-3.1	87	0.00
73	T	Styrene	50.000	52.955	-5.9	87	0.00
74	P	Bromoform	50.000	51.271	-2.5	94	0.00
75	T	Isopropylbenzene	50.000	51.207	-2.4	86	0.00
76	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	97	0.00
77	P	1,1,2,2-Tetrachloroethane	50.000	43.059	13.9	72	0.00
78	S	p-Bromofluorobenzene	25.000	24.684	1.3	88	0.00
79	T	1,2,3-Trichloropropane	50.000	49.890	0.2	87	0.00
80	T	trans-1,4-Dichloro-2-Butene	50.000	43.032	13.9	75	0.00
81	T	n-Propylbenzene	50.000	49.423	1.2	86	0.00
82	T	Bromobenzene	50.000	50.772	-1.5	90	0.00
83	T	1,3,5-Trimethylbenzene	50.000	49.854	0.3	86	0.00
84	T	2-Chlorotoluene	50.000	48.565	2.9	87	0.00
85	T	4-Chlorotoluene	50.000	47.358	5.3	83	0.00
86	T	a-Methylstyrene	50.000	51.399	-2.8	89	0.00
87	T	tert-Butylbenzene	50.000	47.393	5.2	87	-0.01
88	T	1,2,4-Trimethylbenzene	50.000	49.749	0.5	86	0.00
89	T	sec-Butylbenzene	50.000	49.787	0.4	86	0.00
90	T	p-Isopropyltoluene	50.000	50.367	-0.7	86	0.00
91	T	1,3-Dichlorobenzene	50.000	50.086	-0.2	88	0.00
92	T	1,4-Dichlorobenzene	50.000	49.692	0.6	87	0.00
93	T	n-Butylbenzene	50.000	50.013	-0.0	83	0.00
94	T	1,2-Dichlorobenzene	50.000	50.435	-0.9	88	0.00
95	T	1,2-Dibromo-3-Chloropropane	50.000	50.287	-0.6	87	0.00
96	T	1,2,4-Trichlorobenzene	50.000	51.049	-2.1	88	0.00
97	T	Hexachlorobutadiene	50.000	50.469	-0.9	89	0.00
98	T	Naphthalene	50.000	53.059	-6.1	89	0.00
99	T	1,2,3-Trichlorobenzene	50.000	52.811	-5.6	91	0.00

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429083.D Vial: 23
Acq On : 11 Mar 2019 20:23 Operator: EEA
Sample : WG699028-04 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 08:50:19 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Fluorobenzene	10.74	96	501182	25.00 ug/L	0.00
57) Chlorobenzene-d5	14.59	117	389505	25.00 ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.61	152	219082	25.00 ug/L	0.00
System Monitoring Compounds					
37) Dibromofluoromethane	9.69	111	128846	25.7910 ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 103.16%		
43) 1,2-Dichloroethane-d4	10.33	65	128808	26.1173 ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 104.48%		
58) Toluene-d8	12.70	98	500363	25.2191 ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 100.88%		
80) p-Bromofluorobenzene	16.09	95	200405	25.3456 ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 101.40%		
Target Compounds					Qvalue
2) Dichlorodifluoromethane	3.22	85	435102	49.9117 ug/L	100
3) Chloromethane	3.68	50	605358	48.2862 ug/L	100
4) Vinyl Chloride	3.91	62	517648	50.6657 ug/L	99
5) 1,3-Butadiene	3.95	54	434413	76.6333 ug/L	97
6) Bromomethane	4.80	94	260837	42.4452 ug/L	99
7) Chloroethane	4.96	64	279019	51.0336 ug/L	99
8) Trichlorofluoromethane	5.44	101	527483	50.8494 ug/L	99
9) Diethyl ether	5.96	59	547586	98.9776 ug/L	97
10) Isoprene	6.00	67	517872	49.9521 ug/L	99
11) Acrolein	6.20	56	28001	44.1385 ug/L	99
12) 1,1,2-Trichloro-1,2,2-Trif	6.21	101	298559	49.9588 ug/L	100
13) Acetone	6.30	43	69860	45.2500 ug/L	97
14) 1,1-Dichloroethene	6.52	61	541683	50.6796 ug/L	99
15) Tert-Butyl Alcohol	6.63	59	53159	106.9683 ug/L	96
16) Dimethyl Sulfide	6.78	62	381168	49.5073 ug/L	98
17) Iodomethane	7.04	142	375792	47.9667 ug/L	99
18) Methyl acetate	7.05	43	205479	51.3990 ug/L	98
19) Methylene Chloride	7.29	84	331174	49.5856 ug/L	95
20) Carbon Disulfide	7.34	76	1007388	50.4031 ug/L	100
21) Acrylonitrile	7.48	53	98614	50.9127 ug/L	94
22) Methyl Tert Butyl Ether	7.51	73	788951	49.6283 ug/L	99
23) trans-1,2-Dichloroethene	7.75	61	525771	51.4809 ug/L	99
24) n-Hexane	7.82	57	486841	48.5724 ug/L	97
25) Diisopropyl ether	8.16	45	2628935	103.9815 ug/L	99
26) Vinyl Acetate	8.34	43	340333	36.2873 ug/L	99
27) 1,1-Dichloroethane	8.36	63	674013	51.0515 ug/L	100
28) Ethyl-Tert-Butyl ether	8.73	59	2156279	98.4023 ug/L	99
29) 2-Butanone	8.92	43	106144	46.6717 ug/L	97
30) Propionitrile	9.03	54	58096	84.1282 ug/L	99
31) 2,2-Dichloropropane	9.14	77	445551	46.5093 ug/L	100
32) cis-1,2-Dichloroethene	9.20	96	376229	51.6141 ug/L	100
33) Chloroform	9.40	83	582757	49.7332 ug/L	99
34) 1-Bromopropane	9.55	122	77110	49.2127 ug/L	97
35) Bromochloromethane	9.64	130	211667	50.9157 ug/L	96
36) Tetrahydrofuran	9.67	42	146481	95.7292 ug/L	97
38) 1,1,1-Trichloroethane	9.94	97	518442	50.9388 ug/L	100
39) Cyclohexane	9.96	56	700011	51.6383 ug/L	98
40) 1,1-Dichloropropene	10.13	75	440334	51.5226 ug/L	99
41) Tert-Amyl-Methyl ether	10.23	73	1632668	97.7717 ug/L	98
42) Carbon Tetrachloride	10.28	117	474722	51.3296 ug/L	99

(#) = qualifier out of range (m) = manual integration
8M429083.D 8260WTR.M Tue Mar 12 08:50:19 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429083.D Vial: 23
Acq On : 11 Mar 2019 20:23 Operator: EEA
Sample : WG699028-04 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 08:50:19 2019 Quant Results File: 8260WTR.RES

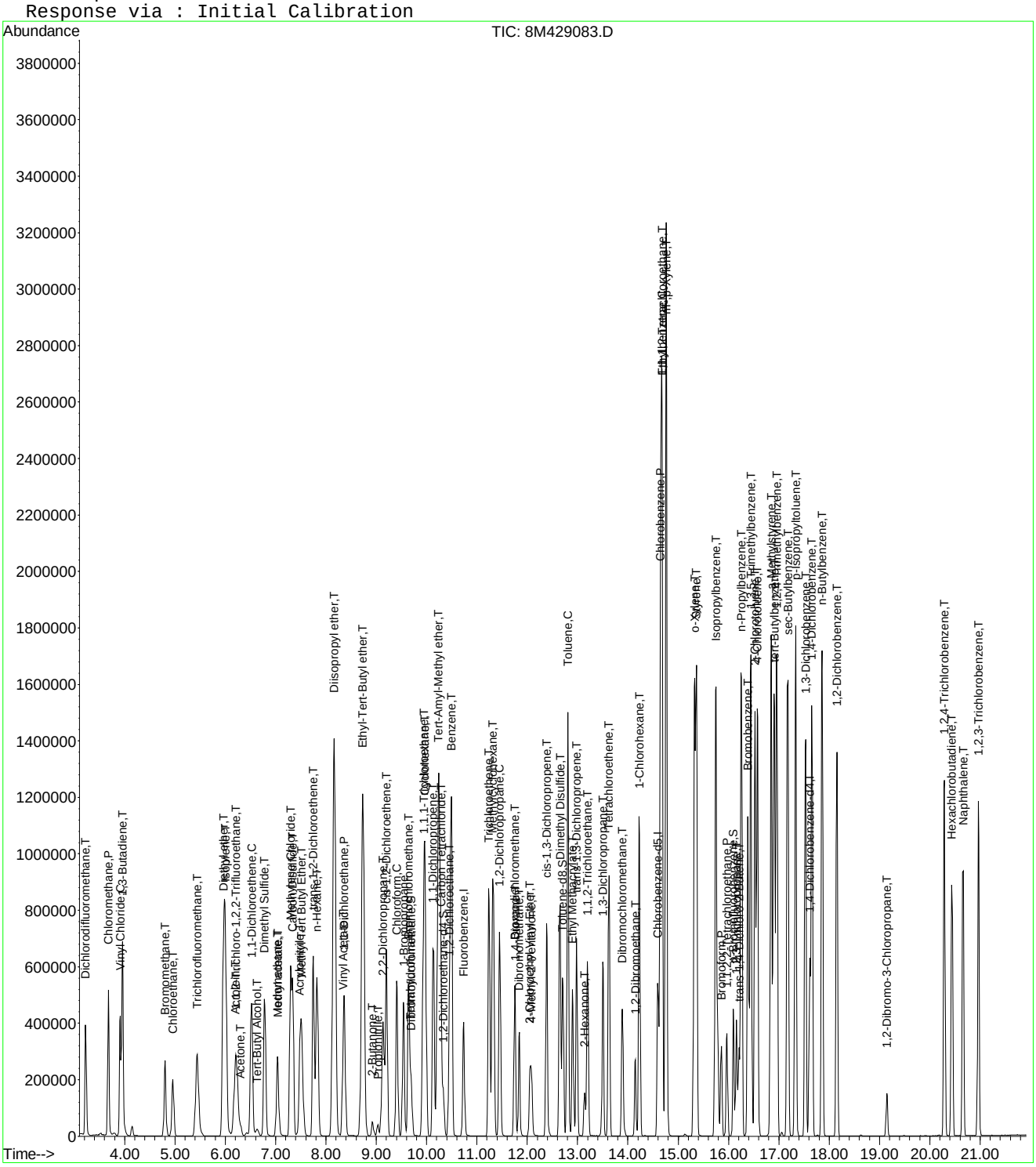
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc	Unit	Qvalue
45)	1,2-Dichloroethane	10.45	62	416841	52.0084	ug/L	99
46)	Benzene	10.49	78	1370368	51.1857	ug/L	99
47)	Trichloroethene	11.23	130	394861	54.1344	ug/L	99
48)	Methylcyclohexane	11.32	83	559944	49.5694	ug/L	99
49)	1,2-Dichloropropane	11.45	63	376721	51.8398	ug/L	100
50)	Bromodichloromethane	11.75	83	439754	52.2627	ug/L	100
51)	1,4-Dioxane	11.76	88	2790	68.2320	ug/L	91
52)	Dibromomethane	11.83	93	169419	50.6492	ug/L	100
53)	2-Chloroethyl Vinyl Ether	12.05	63	101631	32.0060	ug/L	99
54)	4-Methyl-2-Pentanone	12.08	58	94950	47.5275	ug/L	98
55)	cis-1,3-Dichloropropene	12.38	75	519058	51.8515	ug/L	100
56)	Dimethyl Disulfide	12.65	79	305783	49.7427	ug/L	100
59)	Toluene	12.81	91	1415175	48.6615	ug/L	100
60)	Ethyl Methacrylate	12.90	69	352346	46.6972	ug/L	96
62)	trans-1,3-Dichloropropene	12.98	75	435049	49.7592	ug/L	100
63)	1,1,2-Trichloroethane	13.20	97	251669	49.5074	ug/L	99
64)	2-Hexanone	13.14	58	85952	41.9368	ug/L	92
65)	1,3-Dichloropropane	13.50	76	434868	49.6710	ug/L	97
66)	Tetrachloroethene	13.62	164	294260	48.0138	ug/L	99
67)	Dibromochloromethane	13.89	129	319271	49.4864	ug/L	100
68)	1,2-Dibromoethane	14.15	107	249001	50.4435	ug/L	98
69)	1-Chlorohexane	14.23	91	479007	47.5314	ug/L	97
70)	Chlorobenzene	14.65	112	938482	47.6018	ug/L	100
71)	1,1,1,2-Tetrachloroethane	14.68	131	354350	48.8871	ug/L	100
72)	Ethylbenzene	14.68	106	531255	49.8039	ug/L	98
73)	m-,p-Xylene	14.76	106	1269999	97.7133	ug/L	99
74)	o-Xylene	15.33	106	636263	50.4517	ug/L	99
75)	Styrene	15.36	104	1043462	49.9768	ug/L	99
76)	Bromoform	15.86	173	201028	50.2523	ug/L	99
77)	Isopropylbenzene	15.75	105	1582114	49.6678	ug/L	100
79)	1,1,2,2-Tetrachloroethane	15.97	83	254017	41.0983	ug/L	100
81)	1,2,3-Trichloropropane	16.16	110	86400	46.7290	ug/L	95
82)	trans-1,4-Dichloro-2-Buten	16.21	53	87780	42.0121	ug/L	92
83)	n-Propylbenzene	16.26	91	1875101	47.2941	ug/L	100
84)	Bromobenzene	16.38	156	425884	46.9469	ug/L	97
85)	1,3,5-Trimethylbenzene	16.45	105	1353677	47.3631	ug/L	100
86)	2-Chlorotoluene	16.53	91	1155616	44.0825	ug/L	100
87)	4-Chlorotoluene	16.57	91	1142096	49.8610	ug/L	99
88)	a-Methylstyrene	16.85	118	771772	47.0584	ug/L	98
89)	tert-Butylbenzene	16.91	134	304430	46.1701	ug/L	98
90)	1,2,4-Trimethylbenzene	16.96	105	1367512	47.2610	ug/L	100
91)	sec-Butylbenzene	17.18	105	1734328	47.4149	ug/L	99
92)	p-Isopropyltoluene	17.33	119	1489155	47.4923	ug/L	100
93)	1,3-Dichlorobenzene	17.53	146	824584	46.6270	ug/L	100
94)	1,4-Dichlorobenzene	17.65	146	816006	45.5640	ug/L	99
95)	n-Butylbenzene	17.86	91	1345813	47.1067	ug/L	100
96)	1,2-Dichlorobenzene	18.15	146	763922	46.5496	ug/L	100
97)	1,2-Dibromo-3-Chloropropan	19.14	75	49492	44.4276	ug/L	99
98)	1,2,4-Trichlorobenzene	20.29	180	557700	46.8348	ug/L	99
99)	Hexachlorobutadiene	20.44	225	252665	45.0305	ug/L	99
100)	Naphthalene	20.66	128	1017102	46.8555	ug/L	100
101)	1,2,3-Trichlorobenzene	20.96	180	506273	46.2817	ug/L	100

(#) = qualifier out of range (m) = manual integration
8M429083.D 8260WTR.M Tue Mar 12 08:50:20 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429083.D Vial: 23
Acq On : 11 Mar 2019 20:23 Operator: EEA
Sample : WG699028-04 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 8:49 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429083.D Vial: 23
Acq On : 11 Mar 2019 20:23 Operator: EEA
Sample : WG699028-04 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	1.000	1.000	0.0	94	0.00
2	T	Dichlorodifluoromethane	0.435	0.434	0.2	84	0.00
3	P	Chloromethane	0.625	0.604	3.4	93	0.00
4	C	Vinyl Chloride	0.510	0.516	-1.2	89	0.00
5	T	1,3-Butadiene	0.329	0.433	-31.6#	125	0.00
6	T	Bromomethane	0.307	0.260	15.3	87	0.00
7	T	Chloroethane	0.273	0.278	-1.8	90	0.00
8	T	Trichlorofluoromethane	0.517	0.526	-1.7	88	0.00
9	T	Diethyl ether	0.276	0.273	1.1	91	0.00
10	T	Isoprene	0.517	0.517	0.0	89	0.00
11	T	Acrolein	0.032	0.028	12.5	81	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	0.298	0.298	0.0	88	0.00
13	T	Acetone	0.077	0.070	9.1	80	0.00
14	C	1,1-Dichloroethene	0.533	0.540	-1.3	91	0.00
15	T	Tert-Butyl Alcohol	0.025	0.013	48.0#	53	0.00
16	T	Dimethyl Sulfide	0.384	0.380	1.0	89	0.00
17	T	Iodomethane	0.248	0.375	-51.2#	85	0.00
18	T	Methyl acetate	0.199	0.205	-3.0	94	0.00
19	T	Methylene Chloride	0.333	0.330	0.9	90	0.00
20	T	Carbon Disulfide	0.997	1.005	-0.8	89	0.00
21	T	Acrylonitrile	0.097	0.098	-1.0	91	0.00
22	T	Methyl Tert Butyl Ether	0.793	0.787	0.8	90	0.00
23	T	trans-1,2-Dichloroethene	0.509	0.525	-3.1	92	0.00
24	T	n-Hexane	0.500	0.486	2.8	87	0.00
25	T	Diisopropyl ether	1.261	1.311	-4.0	94	0.00
26	T	Vinyl Acetate	0.468	0.340	27.4#	67	0.00
27	P	1,1-Dichloroethane	0.659	0.672	-2.0	91	0.00
28	T	Ethyl-Tert-Butyl ether	1.093	1.076	1.6	90	0.00
29	T	2-Butanone	0.113	0.106	6.2	83	0.00
30	T	Propionitrile	0.029	0.029	0.0	78	0.00
31	T	2,2-Dichloropropane	0.478	0.445	6.9	84	0.00
32	T	cis-1,2-Dichloroethene	0.364	0.375	-3.0	91	0.00
33	C	Chloroform	0.585	0.581	0.7	92	0.00
34		1-Bromopropane	0.078	0.077	1.3	87	0.00
35	T	Bromochloromethane	0.207	0.211	-1.9	90	0.00
36	T	Tetrahydrofuran	0.076	0.073	3.9	89	0.00
37	S	Dibromofluoromethane	0.249	0.257	-3.2	92	0.00
38	T	1,1,1-Trichloroethane	0.508	0.517	-1.8	90	0.00
39	T	Cyclohexane	0.676	0.698	-3.3	92	0.00
40	T	1,1-Dichloropropene	0.426	0.439	-3.1	91	0.00
41	T	Tert-Amyl-Methyl ether	0.833	0.814	2.3	90	0.00
42	T	Carbon Tetrachloride	0.461	0.474	-2.8	91	0.00
43	S	1,2-Dichloroethane-d4	0.246	0.257	-4.5	93	0.00
44		Heptane	0.000	0.000	0.0	0#	-2.63#
45	T	1,2-Dichloroethane	0.400	0.416	-4.0	92	0.00
46	T	Benzene	1.335	1.367	-2.4	91	0.00
47	T	Trichloroethene	0.364	0.394	-8.2	95	0.00
48	T	Methylcyclohexane	0.563	0.559	0.7	89	0.00
49	C	1,2-Dichloropropane	0.362	0.376	-3.9	90	0.00
50	T	Bromodichloromethane	0.420	0.439	-4.5	91	0.00
51	T	1,4-Dioxane	0.002	0.001	50.0#	30#	0.01
52	T	Dibromomethane	0.167	0.169	-1.2	91	0.00
53	T	2-Chloroethyl Vinyl Ether	0.158	0.101	36.1#	58	0.00
54	T	4-Methyl-2-Pentanone	0.100	0.095	5.0	86	0.00

(#) = Out of Range
8M429083.D 8260WTR.M Tue Mar 12 08:55:13 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429083.D Vial: 23
Acq On : 11 Mar 2019 20:23 Operator: EEA
Sample : WG699028-04 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)
55	T	cis-1,3-Dichloropropene	0.499	0.518	-3.8	89	0.00
56	T	Dimethyl Disulfide	0.307	0.305	0.7	88	0.00
57	I	Chlorobenzene-d5	1.000	1.000	0.0	97	0.00
58	S	Toluene-d8	1.273	1.285	-0.9	95	0.00
59	C	Toluene	1.867	1.817	2.7	91	0.00
60	T	Ethyl Methacrylate	0.437	0.452	-3.4	89	0.00
61		Paraldehyde	0.000	0.000	0.0	117	0.00
62	T	trans-1,3-Dichloropropene	0.561	0.558	0.5	90	0.00
63	T	1,1,2-Trichloroethane	0.326	0.323	0.9	91	0.00
64	T	2-Hexanone	0.122	0.110	9.8	83	0.00
65	T	1,3-Dichloropropane	0.562	0.558	0.7	92	0.00
66	T	Tetrachloroethene	0.393	0.378	3.8	90	0.00
67	T	Dibromochloromethane	0.414	0.410	1.0	90	0.00
68	T	1,2-Dibromoethane	0.317	0.320	-0.9	91	0.00
69	T	1-Chlorohexane	0.647	0.615	4.9	88	0.00
70	P	Chlorobenzene	1.265	1.205	4.7	91	0.00
71	T	1,1,1,2-Tetrachloroethane	0.465	0.455	2.2	90	0.00
72	C	Ethylbenzene	0.685	0.682	0.4	91	0.00
73	T	m-,p-Xylene	0.834	0.815	2.3	91	0.00
74	T	o-Xylene	0.809	0.817	-1.0	91	0.00
75	T	Styrene	1.340	1.339	0.1	90	0.00
76	P	Bromoform	0.257	0.258	-0.4	89	0.00
77	T	Isopropylbenzene	2.045	2.031	0.7	91	0.00
78	I	1,4-Dichlorobenzene-d4	1.000	1.000	0.0	101	0.00
79	P	1,1,2,2-Tetrachloroethane	0.705	0.580	17.7	81	0.00
80	S	p-Bromofluorobenzene	0.902	0.915	-1.4	98	0.00
81	T	1,2,3-Trichloropropane	0.211	0.197	6.6	90	0.00
82	T	trans-1,4-Dichloro-2-Butene	0.238	0.200	16.0	81	0.00
83	T	n-Propylbenzene	4.524	4.279	5.4	91	0.00
84	T	Bromobenzene	1.035	0.972	6.1	91	0.00
85	T	1,3,5-Trimethylbenzene	3.261	3.089	5.3	91	0.00
86	T	2-Chlorotoluene	2.991	2.637	11.8	84	0.00
87	T	4-Chlorotoluene	2.614	2.607	0.3	99	0.00
88	T	a-Methylstyrene	1.871	1.761	5.9	88	0.00
89	T	tert-Butylbenzene	0.752	0.695	7.6	91	0.00
90	T	1,2,4-Trimethylbenzene	3.302	3.121	5.5	90	0.00
91	T	sec-Butylbenzene	4.174	3.958	5.2	91	0.00
92	T	p-Isopropyltoluene	3.578	3.399	5.0	90	0.00
93	T	1,3-Dichlorobenzene	2.018	1.882	6.7	91	0.00
94	T	1,4-Dichlorobenzene	2.044	1.862	8.9	90	0.00
95	T	n-Butylbenzene	3.260	3.071	5.8	89	0.00
96	T	1,2-Dichlorobenzene	1.873	1.743	6.9	91	0.00
97	T	1,2-Dibromo-3-Chloropropane	0.127	0.113	11.0	86	0.00
98	T	1,2,4-Trichlorobenzene	1.359	1.273	6.3	90	0.00
99	T	Hexachlorobutadiene	0.640	0.577	9.8	86	0.00
100	T	Naphthalene	2.477	2.321	6.3	88	0.00
101	T	1,2,3-Trichlorobenzene	1.248	1.155	7.5	89	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M429083.D 8260WTR.M Tue Mar 12 08:55:13 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429083.D Vial: 23
Acq On : 11 Mar 2019 20:23 Operator: EEA
Sample : WG699028-04 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
1	I	Fluorobenzene	25.000	25.000	0.0	94	0.00
2	T	Dichlorodifluoromethane	50.000	49.912	0.2	84	0.00
3	P	Chloromethane	50.000	48.286	3.4	93	0.00
4	C	Vinyl Chloride	50.000	50.666	-1.3	89	0.00
5	T	1,3-Butadiene	50.000	76.633	-53.3#	125	0.00
6	T	Bromomethane	50.000	42.445	15.1	87	0.00
7	T	Chloroethane	50.000	51.034	-2.1	90	0.00
8	T	Trichlorofluoromethane	50.000	50.849	-1.7	88	0.00
9	T	Diethyl ether	100.000	98.978	1.0	91	0.00
10	T	Isoprene	50.000	49.952	0.1	89	0.00
11	T	Acrolein	50.000	44.139	11.7	81	0.00
12	T	1,1,2-Trichloro-1,2,2-Trifl	50.000	49.959	0.1	88	0.00
13	T	Acetone	50.000	45.250	9.5	80	0.00
14	C	1,1-Dichloroethene	50.000	50.680	-1.4	91	0.00
15	T	Tert-Butyl Alcohol	200.000	106.968	46.5#	53	0.00
16	T	Dimethyl Sulfide	50.000	49.507	1.0	89	0.00
17	T	Iodomethane	50.000	47.967	4.1	85	0.00
18	T	Methyl acetate	50.000	51.399	-2.8	94	0.00
19	T	Methylene Chloride	50.000	49.586	0.8	90	0.00
20	T	Carbon Disulfide	50.000	50.403	-0.8	89	0.00
21	T	Acrylonitrile	50.000	50.913	-1.8	91	0.00
22	T	Methyl Tert Butyl Ether	50.000	49.628	0.7	90	0.00
23	T	trans-1,2-Dichloroethene	50.000	51.481	-3.0	92	0.00
24	T	n-Hexane	50.000	48.572	2.9	87	0.00
25	T	Diisopropyl ether	100.000	103.981	-4.0	94	0.00
26	T	Vinyl Acetate	50.000	36.287	27.4#	67	0.00
27	P	1,1-Dichloroethane	50.000	51.052	-2.1	91	0.00
28	T	Ethyl-Tert-Butyl ether	100.000	98.402	1.6	90	0.00
29	T	2-Butanone	50.000	46.672	6.7	83	0.00
30	T	Propionitrile	100.000	84.128	15.9	78	0.00
31	T	2,2-Dichloropropane	50.000	46.509	7.0	84	0.00
32	T	cis-1,2-Dichloroethene	50.000	51.614	-3.2	91	0.00
33	C	Chloroform	50.000	49.733	0.5	92	0.00
34		1-Bromopropane	50.000	49.213	1.6	87	0.00
35	T	Bromochloromethane	50.000	50.916	-1.8	90	0.00
36	T	Tetrahydrofuran	100.000	95.729	4.3	89	0.00
37	S	Dibromofluoromethane	25.000	25.791	-3.2	92	0.00
38	T	1,1,1-Trichloroethane	50.000	50.939	-1.9	90	0.00
39	T	Cyclohexane	50.000	51.638	-3.3	92	0.00
40	T	1,1-Dichloropropene	50.000	51.523	-3.0	91	0.00
41	T	Tert-Amyl-Methyl ether	100.000	97.772	2.2	90	0.00
42	T	Carbon Tetrachloride	50.000	51.330	-2.7	91	0.00
43	S	1,2-Dichloroethane-d4	25.000	26.117	-4.5	93	0.00
44		Heptane	-1.000	0.000	0.0	0	-2.63#
45	T	1,2-Dichloroethane	50.000	52.008	-4.0	92	0.00
46	T	Benzene	50.000	51.186	-2.4	91	0.00
47	T	Trichloroethene	50.000	54.134	-8.3	95	0.00
48	T	Methylcyclohexane	50.000	49.569	0.9	89	0.00
49	C	1,2-Dichloropropane	50.000	51.840	-3.7	90	0.00
50	T	Bromodichloromethane	50.000	52.263	-4.5	91	0.00
51	T	1,4-Dioxane	200.000	68.232	65.9#	30	0.01
52	T	Dibromomethane	50.000	50.649	-1.3	91	0.00
53	T	2-Chloroethyl Vinyl Ether	50.000	32.006	36.0#	58	0.00
54	T	4-Methyl-2-Pentanone	50.000	47.528	4.9	86	0.00

(#) = Out of Range
8M429083.D 8260WTR.M Tue Mar 12 08:55:11 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429083.D Vial: 23
Acq On : 11 Mar 2019 20:23 Operator: EEA
Sample : WG699028-04 CCV 50 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92326 Multiplr: 1.00
MS Integration Params: RTEINT.P

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Multiple Level Calibration

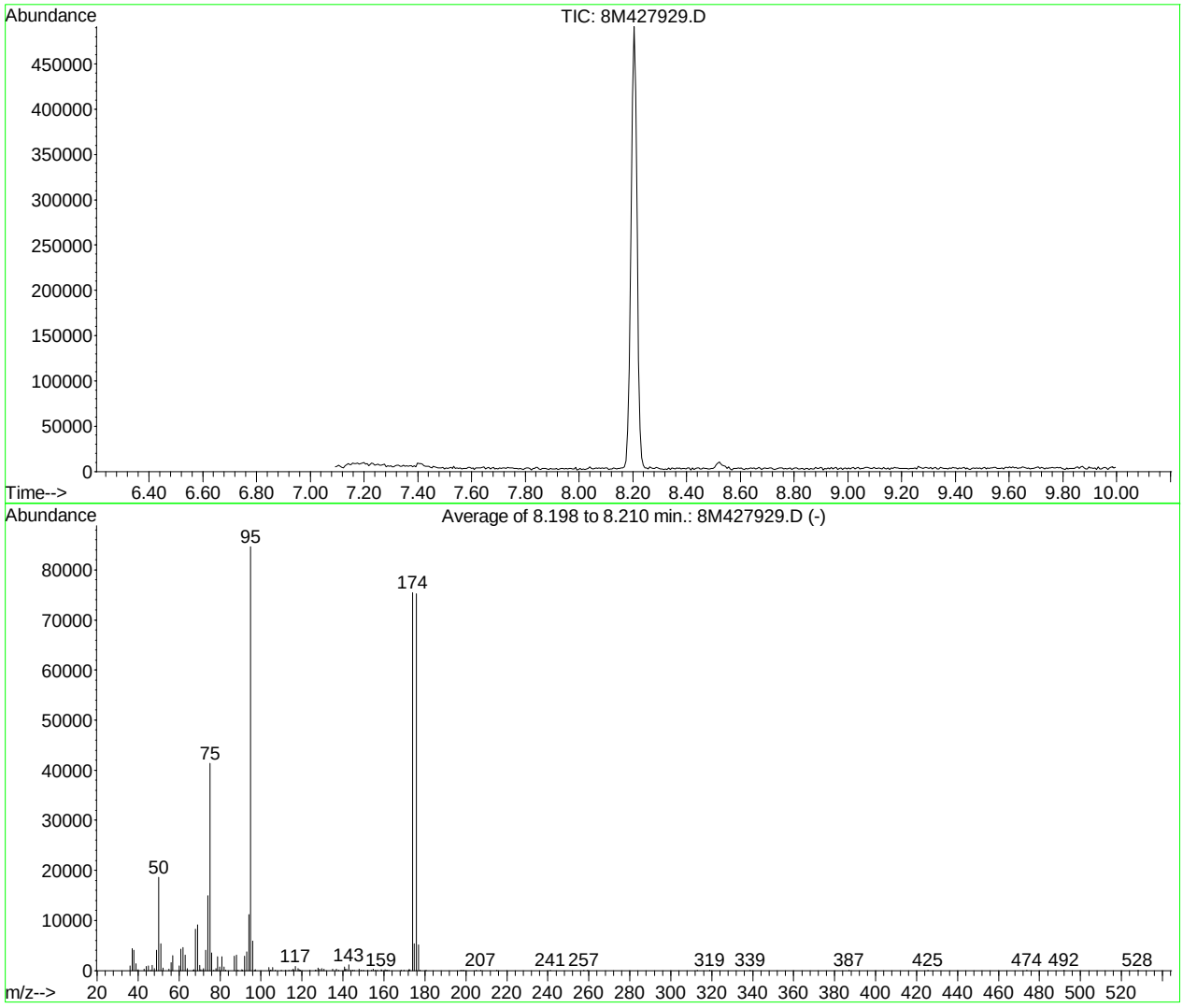
Min. RRF : 0.000 Min. Rel. Area : 50% Max. R.T. Dev 0.50min
Max. RRF Dev : 25% Max. Rel. Area : 150%

		Compound	Amount	Calc.	%Dev	Area%	Dev(min)
55	T	cis-1,3-Dichloropropene	50.000	51.852	-3.7	89	0.00
56	T	Dimethyl Disulfide	50.000	49.743	0.5	88	0.00
57	I	Chlorobenzene-d5	25.000	25.000	0.0	97	0.00
58	S	Toluene-d8	25.000	25.219	-0.9	95	0.00
59	C	Toluene	50.000	48.662	2.7	91	0.00
60	T	Ethyl Methacrylate	50.000	46.697	6.6	89	0.00
61		Paraldehyde	-1.000	0.000	0.0	117	0.00
62	T	trans-1,3-Dichloropropene	50.000	49.759	0.5	90	0.00
63	T	1,1,2-Trichloroethane	50.000	49.507	1.0	91	0.00
64	T	2-Hexanone	50.000	41.937	16.1	83	0.00
65	T	1,3-Dichloropropane	50.000	49.671	0.7	92	0.00
66	T	Tetrachloroethene	50.000	48.014	4.0	90	0.00
67	T	Dibromochloromethane	50.000	49.486	1.0	90	0.00
68	T	1,2-Dibromoethane	50.000	50.444	-0.9	91	0.00
69	T	1-Chlorohexane	50.000	47.531	4.9	88	0.00
70	P	Chlorobenzene	50.000	47.602	4.8	91	0.00
71	T	1,1,1,2-Tetrachloroethane	50.000	48.887	2.2	90	0.00
72	C	Ethylbenzene	50.000	49.804	0.4	91	0.00
73	T	m-,p-Xylene	100.000	97.713	2.3	91	0.00
74	T	o-Xylene	50.000	50.452	-0.9	91	0.00
75	T	Styrene	50.000	49.977	0.0	90	0.00
76	P	Bromoform	50.000	50.252	-0.5	89	0.00
77	T	Isopropylbenzene	50.000	49.668	0.7	91	0.00
78	I	1,4-Dichlorobenzene-d4	25.000	25.000	0.0	101	0.00
79	P	1,1,2,2-Tetrachloroethane	50.000	41.098	17.8	81	0.00
80	S	p-Bromofluorobenzene	25.000	25.346	-1.4	98	0.00
81	T	1,2,3-Trichloropropane	50.000	46.729	6.5	90	0.00
82	T	trans-1,4-Dichloro-2-Butene	50.000	42.012	16.0	81	0.00
83	T	n-Propylbenzene	50.000	47.294	5.4	91	0.00
84	T	Bromobenzene	50.000	46.947	6.1	91	0.00
85	T	1,3,5-Trimethylbenzene	50.000	47.363	5.3	91	0.00
86	T	2-Chlorotoluene	50.000	44.083	11.8	84	0.00
87	T	4-Chlorotoluene	50.000	49.861	0.3	99	0.00
88	T	a-Methylstyrene	50.000	47.058	5.9	88	0.00
89	T	tert-Butylbenzene	50.000	46.170	7.7	91	0.00
90	T	1,2,4-Trimethylbenzene	50.000	47.261	5.5	90	0.00
91	T	sec-Butylbenzene	50.000	47.415	5.2	91	0.00
92	T	p-Isopropyltoluene	50.000	47.492	5.0	90	0.00
93	T	1,3-Dichlorobenzene	50.000	46.627	6.7	91	0.00
94	T	1,4-Dichlorobenzene	50.000	45.564	8.9	90	0.00
95	T	n-Butylbenzene	50.000	47.107	5.8	89	0.00
96	T	1,2-Dichlorobenzene	50.000	46.550	6.9	91	0.00
97	T	1,2-Dibromo-3-Chloropropane	50.000	44.428	11.1	86	0.00
98	T	1,2,4-Trichlorobenzene	50.000	46.835	6.3	90	0.00
99	T	Hexachlorobutadiene	50.000	45.030	9.9	86	0.00
100	T	Naphthalene	50.000	46.856	6.3	88	0.00
101	T	1,2,3-Trichlorobenzene	50.000	46.282	7.4	89	0.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
8M429083.D 8260WTR.M Tue Mar 12 08:55:11 2019 Page 2

2.1.1.5 Raw QC Data

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\111218\8M427929.D Vial: 1
Acq On : 12 Nov 2018 13:12 Operator: EEA
Sample : WG684281-01 50ng/ BFB STD Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\A9FOOWT.M (RTE Integrator)
Title : A9-FOO Water SOP:MSV01 111218 HPMS8

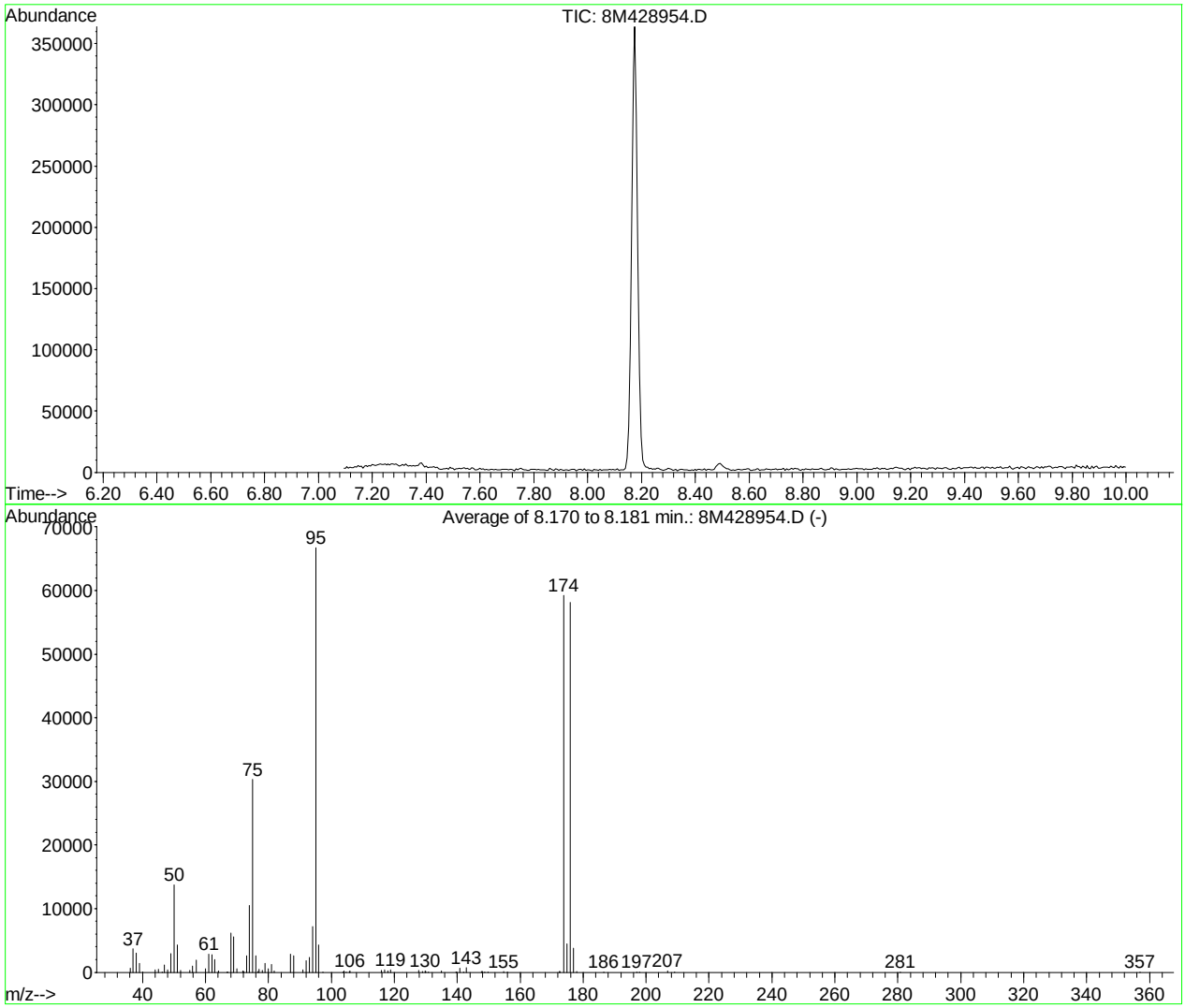


AutoFind: Scans 189, 190, 191; Background Corrected with Scan 181

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	22.0	18596	PASS
75	95	30	60	48.9	41416	PASS
95	95	100	100	100.0	84642	PASS
96	95	5	9	7.0	5906	PASS
173	174	0.00	2	0.3	193	PASS
174	95	50	100	89.2	75469	PASS
175	174	5	9	7.0	5319	PASS
176	174	95	101	99.7	75216	PASS
177	176	5	9	6.9	5164	PASS

8M427929.D A9FOOWT.M Tue Nov 13 12:15:58 2018

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\030419\8M428954.D Vial: 1
Acq On : 4 Mar 2019 11:54 Operator: EEA
Sample : WG698192-01 50ng BFB 8260 Inst : HPMS8
Misc : 1,1 STD91948 Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8



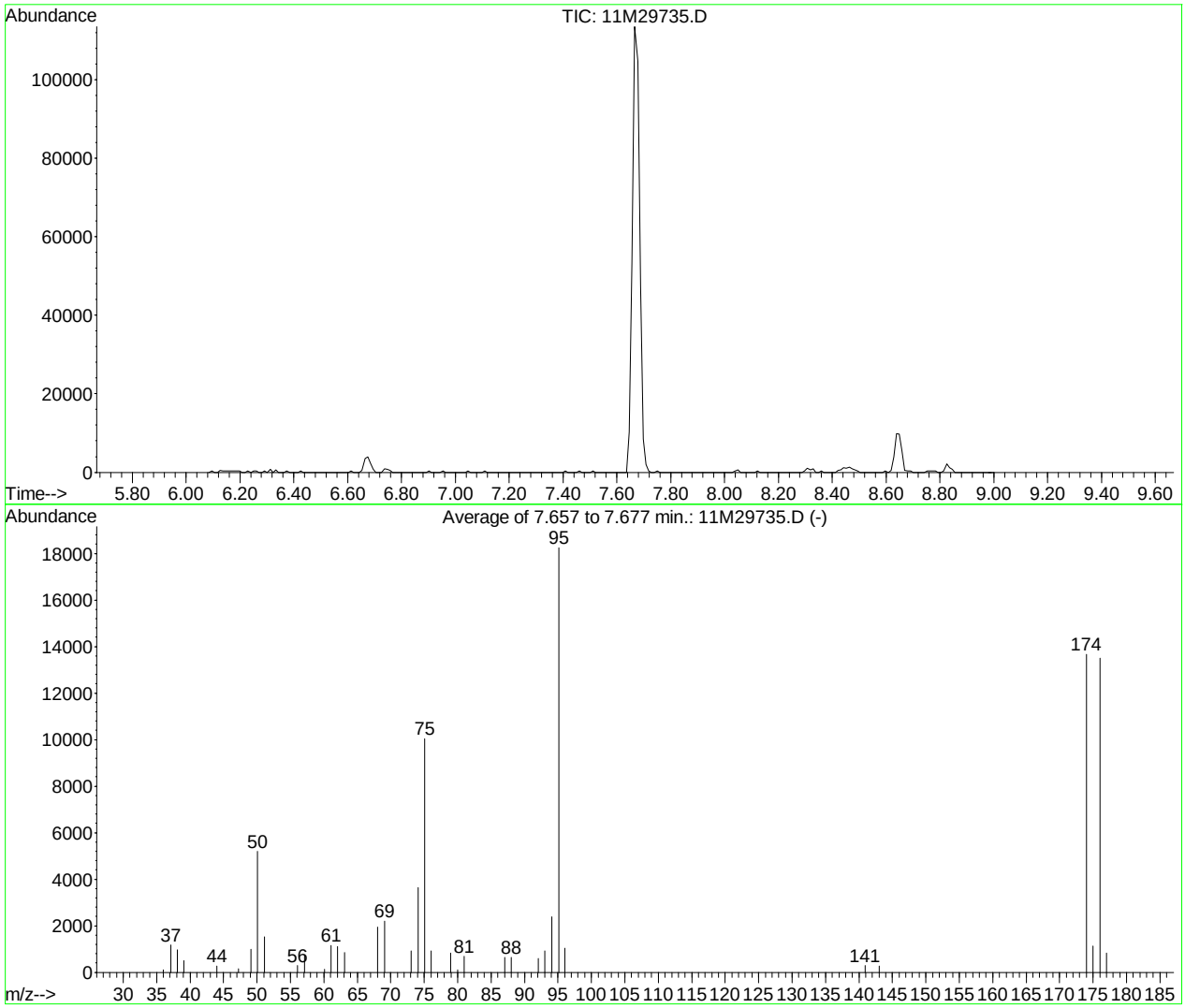
AutoFind: Scans 184, 185, 186; Background Corrected with Scan 176

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	20.6	13778	PASS
75	95	30	60	45.4	30314	PASS
95	95	100	100	100.0	66746	PASS
96	95	5	9	6.5	4307	PASS
173	174	0.00	2	0.2	137	PASS
174	95	50	100	88.7	59210	PASS
175	174	5	9	7.6	4497	PASS
176	174	95	101	98.1	58093	PASS
177	176	5	9	6.5	3763	PASS

8M428954.D 8260WTR.M Tue Mar 05 10:49:48 2019

BFB

Data File : C:\MSDCHEM\1\DATA\030519\11M29735.D Vial: 1
Acq On : 5 Mar 2019 15:39 Operator: KFR
Sample : WG698387-01 50ng BFB 8260 Inst : hpms11
Misc : 1,1 STD91899 Multiplr: 1.00
MS Integration Params: rteint.p
Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11



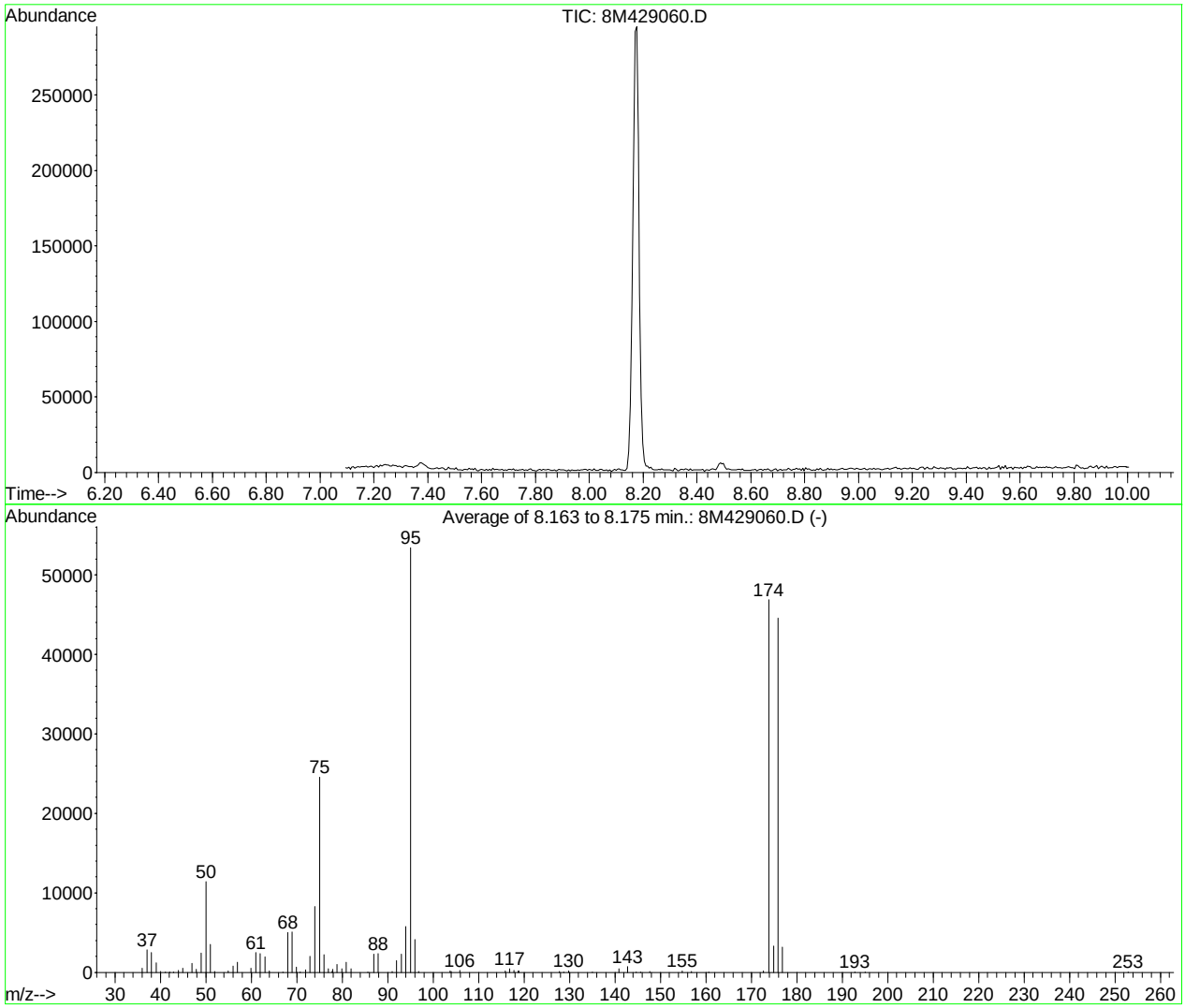
AutoFind: Scans 153, 154, 155; Background Corrected with Scan 149

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	28.5	5208	PASS
75	95	30	60	55.0	10035	PASS
95	95	100	100	100.0	18251	PASS
96	95	5	9	5.7	1034	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	100	74.8	13653	PASS
175	174	5	9	8.3	1135	PASS
176	174	95	101	98.9	13499	PASS
177	176	5	9	6.2	837	PASS

11M29735.D 8260WT.M Thu Mar 07 09:41:24 2019

BFB

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429060.D Vial: 1
Acq On : 11 Mar 2019 8:56 Operator: EEA
Sample : WG699027-01 50ng BFB 8260 Inst : HPMS8
Misc : 1,1 STD92421 Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8



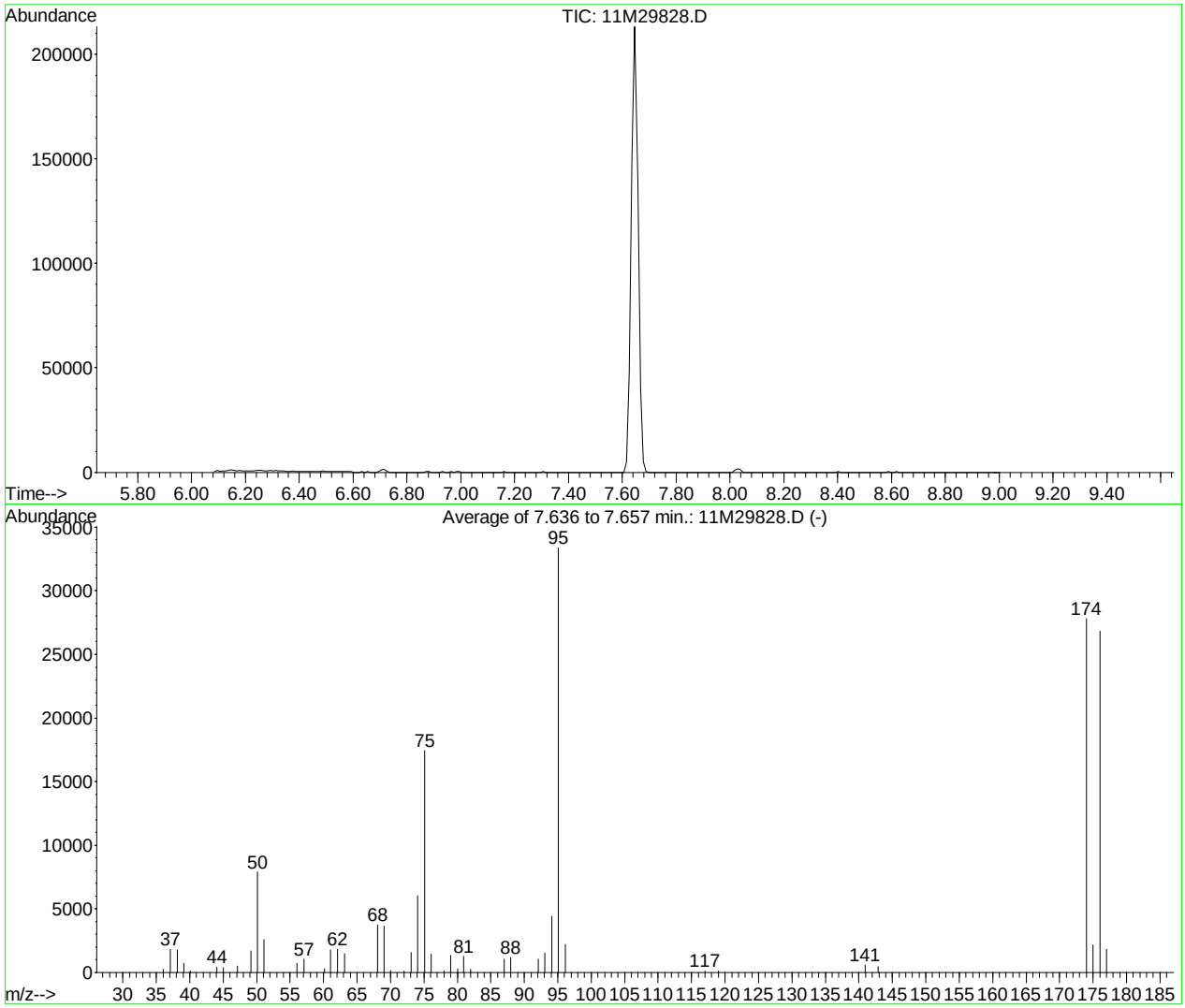
AutoFind: Scans 183, 184, 185; Background Corrected with Scan 176

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	21.3	11408	PASS
75	95	30	60	45.9	24533	PASS
95	95	100	100	100.0	53437	PASS
96	95	5	9	7.7	4118	PASS
173	174	0.00	2	0.4	184	PASS
174	95	50	100	87.8	46904	PASS
175	174	5	9	7.1	3330	PASS
176	174	95	101	95.1	44586	PASS
177	176	5	9	7.2	3188	PASS

8M429060.D 8260WTR.M Mon Mar 11 15:30:57 2019

BFB

Data File : C:\MSDCHEM\1\DATA\031219\11M29828.D Vial: 1
Acq On : 12 Mar 2019 10:56 Operator: KFR
Sample : WG699218-01 50ng BFB 8260 Inst : hpms11
Misc : 1,1 STD92290 Multiplr: 1.00
MS Integration Params: rteint.p
Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11



AutoFind: Scans 151, 152, 153; Background Corrected with Scan 146

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	23.7	7906	PASS
75	95	30	60	52.2	17441	PASS
95	95	100	100	100.0	33392	PASS
96	95	5	9	6.5	2173	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	100	83.3	27800	PASS
175	174	5	9	7.7	2131	PASS
176	174	95	101	96.6	26850	PASS
177	176	5	9	6.7	1801	PASS

11M29828.D 8260WT.M Tue Mar 12 13:42:38 2019

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29831.D Vial: 3
Acq On : 12 Mar 2019 12:31 Operator: KFR
Sample : WG699219-01 BLANK 8260 Inst : hpms11
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 16 10:12:49 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

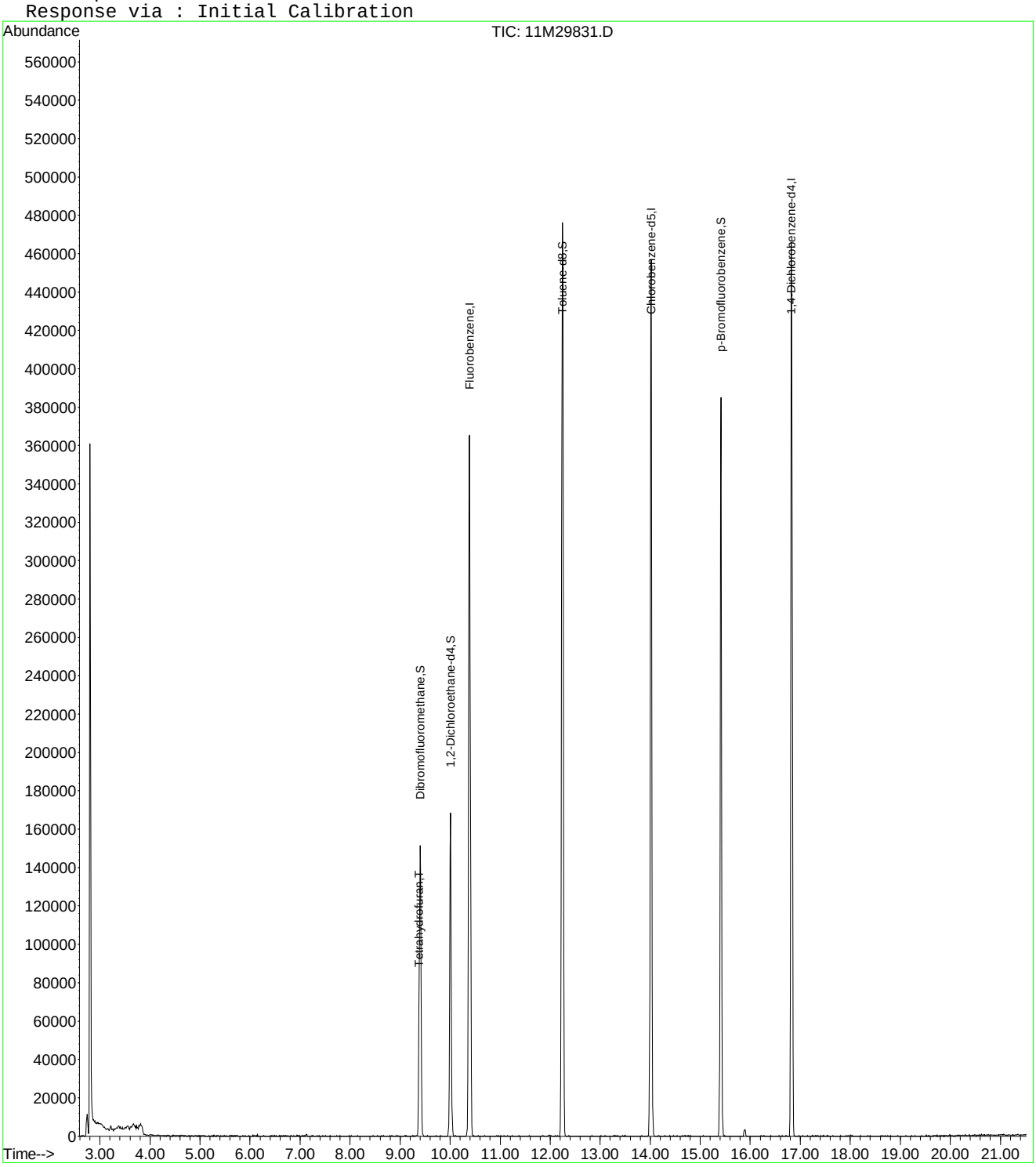
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3911	96	428800	25.0000	ug/L	0.0000
56) Chlorobenzene-d5	14.0203	117	314358	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8223	152	149164	25.0000	ug/L	-0.0107
System Monitoring Compounds						
37) Dibromofluoromethane	9.3985	111	122393	24.7269	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 98.9076%			
43) 1,2-Dichloroethane-d4	10.0085	65	142125	23.9311	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 95.7244%			
57) Toluene-d8	12.2418	98	399276	25.5219	ug/L	-0.0107
Spiked Amount 25.0000	Range 88 - 110		Recovery = 102.0876%			
78) p-Bromofluorobenzene	15.4161	95	151075	26.4662	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 105.8648%			
Target Compounds						Qvalue
36) Tetrahydrofuran	9.3778	42	1222	0.9446	ug/L #	37

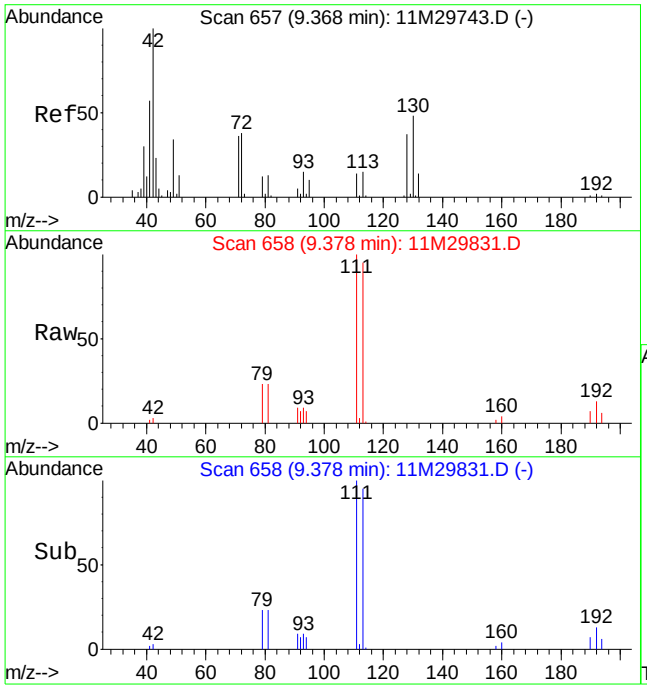
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29831.D Vial: 3
Acq On : 12 Mar 2019 12:31 Operator: KFR
Sample : WG699219-01 BLANK 8260 Inst : hpms11
Misc : 1,1 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 16 10:12 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration

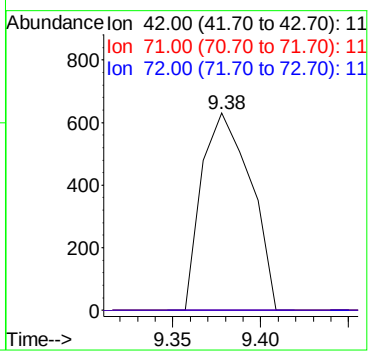




#36
Tetrahydrofuran
Concen: 0.9446 ug/L
RT: 9.38 min Scan# 658
Delta R.T. 0.01 min
Lab File: 11M29831.D
Acq: 12 Mar 2019 12:31

Tgt Ion: 42 Resp: 1222

Ion	Ratio	Lower	Upper
42	100		
71	0.0	22.1	51.7#
72	0.0	22.9	53.3#



Quantitation Report (Not Reviewed)

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429063.D Vial: 3
Acq On : 11 Mar 2019 10:41 Operator: EEA
Sample : WG699028-01 BLANK 8260 Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 09:00:08 2019 Quant Results File: 8260WTR.RES

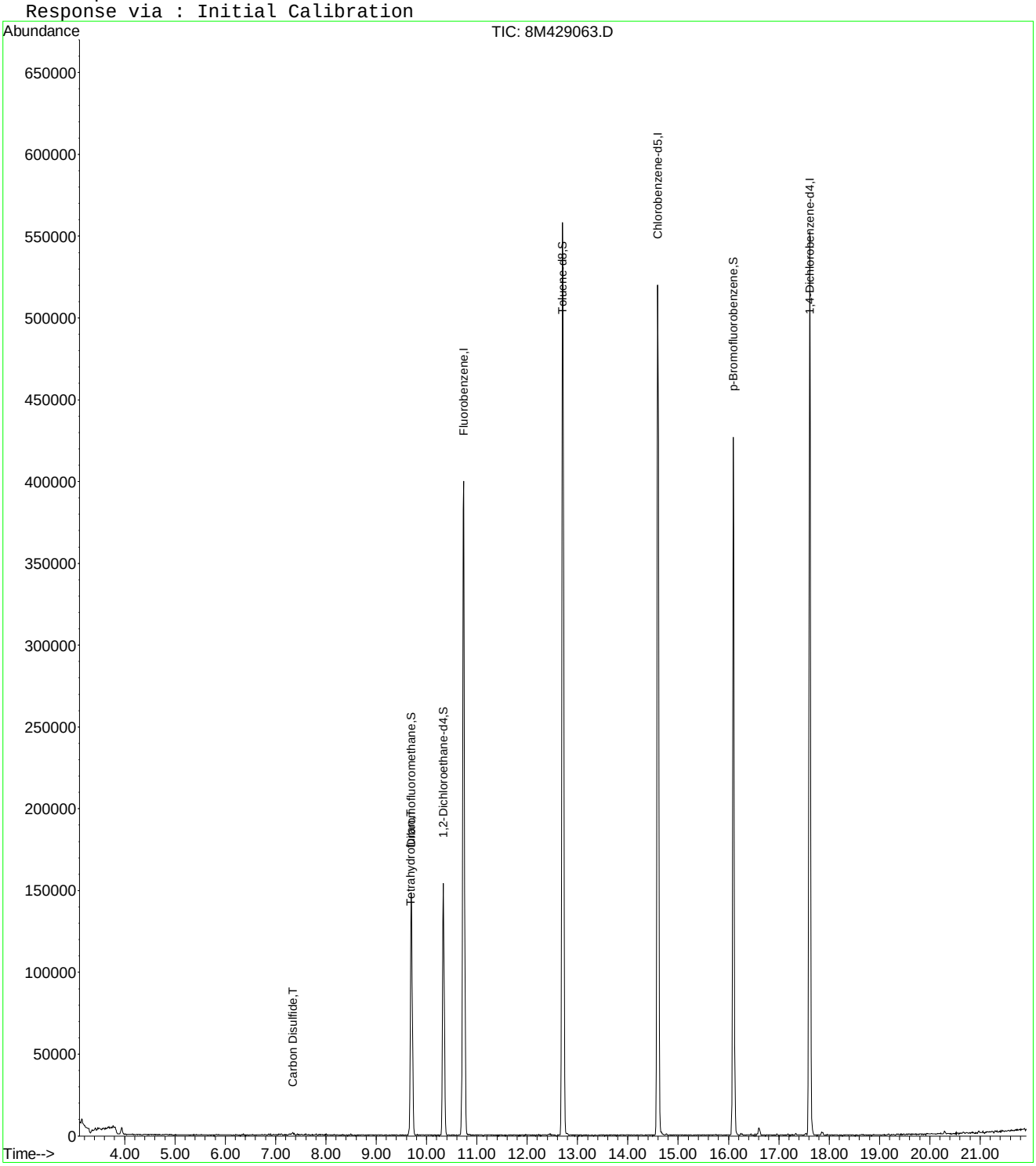
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

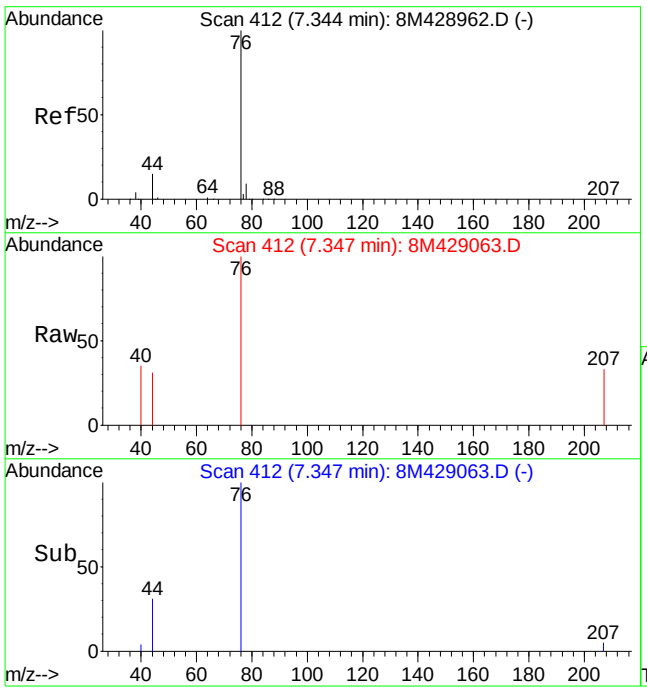
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.74	96	508811	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.59	117	381131	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.61	152	196164	25.00	ug/L	0.00
System Monitoring Compounds						
37) Dibromofluoromethane	9.69	111	130977	25.8244	ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 103.28%			
43) 1,2-Dichloroethane-d4	10.33	65	129467	25.8573	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 103.44%			
58) Toluene-d8	12.70	98	504906	26.0072	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 104.04%			
80) p-Bromofluorobenzene	16.09	95	193043	27.2669	ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 109.08%			
Target Compounds						Qvalue
20) Carbon Disulfide	7.35	76	2807	0.1383	ug/L #	74
36) Tetrahydrofuran	9.68	42	1365	0.8787	ug/L #	40

(#) = qualifier out of range (m) = manual integration
8M429063.D 8260WTR.M Tue Mar 12 09:00:09 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429063.D Vial: 3
Acq On : 11 Mar 2019 10:41 Operator: EEA
Sample : WG699028-01 BLANK 8260 Inst : HPMS8
Misc : 1,1 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 12 8:59 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration

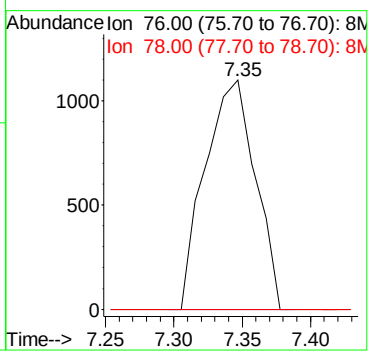


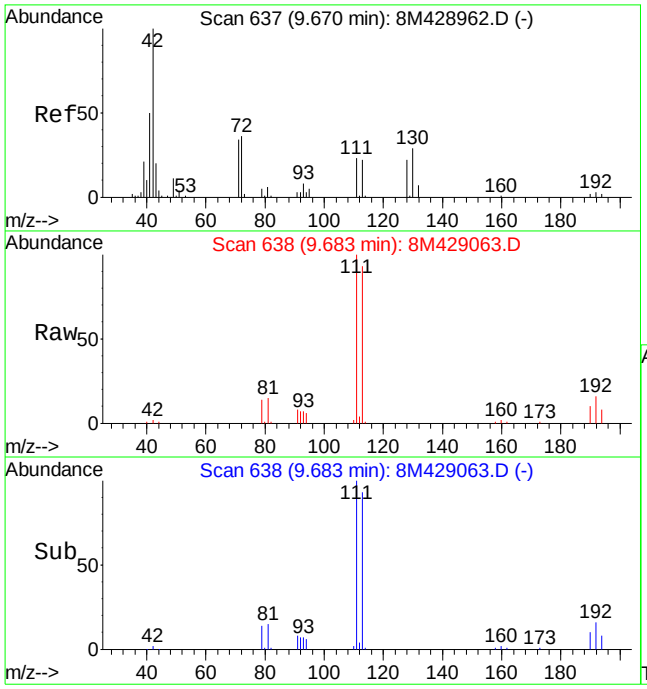


#20
Carbon Disulfide
Concen: 0.14 ug/L
RT: 7.35 min Scan# 412
Delta R.T. 0.00 min
Lab File: 8M429063.D
Acq: 11 Mar 2019 10:41

Tgt Ion: 76 Resp: 2807

Ion	Ratio	Lower	Upper
76	100		
78	0.0	5.6	13.0#

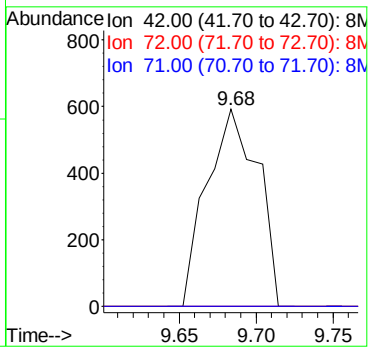




#36
Tetrahydrofuran
Concen: 0.88 ug/L
RT: 9.68 min Scan# 638
Delta R.T. 0.01 min
Lab File: 8M429063.D
Acq: 11 Mar 2019 10:41

Tgt Ion: 42 Resp: 1365

Ion	Ratio	Lower	Upper
42	100		
72	0.0	21.9	51.1#
71	0.0	20.2	47.2#



Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29832.D Vial: 4
Acq On : 12 Mar 2019 13:00 Operator: KFR
Sample : WG699219-02 LCS 20ug/L 8260 Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 13:42:01 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.3812	96	402710	25.0000	ug/L	-0.0103
56) Chlorobenzene-d5	14.0207	117	309185	25.0000	ug/L	0.0000
76) 1,4-Dichlorobenzene-d4	16.8227	152	156356	25.0000	ug/L	-0.0103
System Monitoring Compounds						
37) Dibromofluoromethane	9.3989	111	117749	25.3299	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 118		Recovery = 101.3196%			
43) 1,2-Dichloroethane-d4	10.0090	65	137384	24.6315	ug/L	0.0000
Spiked Amount 25.0000	Range 80 - 120		Recovery = 98.5260%			
57) Toluene-d8	12.2423	98	383757	24.9404	ug/L	-0.0103
Spiked Amount 25.0000	Range 88 - 110		Recovery = 99.7616%			
78) p-Bromofluorobenzene	15.4166	95	149808	25.0371	ug/L	0.0000
Spiked Amount 25.0000	Range 86 - 115		Recovery = 100.1484%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.1124	85	88271	14.8376	ug/L	99
3) Chloromethane	3.5467	50	144669	12.6611	ug/L	99
4) Vinyl Chloride	3.7639	62	130239	15.2685	ug/L	100
5) 1,3-Butadiene	3.8052	54	49375	14.8118	ug/L	99
6) Bromomethane	4.6324	94	72299	22.1231	ug/L	99
7) Chloroethane	4.7875	64	60993	18.4960	ug/L	100
8) Trichlorofluoromethane	5.2631	101	148260	18.3673	ug/L	98
9) Diethyl ether	5.7801	59	407724	96.6144	ug/L	97
10) Isoprene	5.8111	67	120889	19.0144	ug/L	96
11) Acrolein	6.0075	56	63824	87.0908	ug/L	98
12) 1,1,2-Trichloro-1,2,2-Trif	6.0282	101	80948	20.4433	ug/L	98
13) Acetone	6.1109	43	21691	14.7329	ug/L	98
14) 1,1-Dichloroethene	6.3281	61	148388	19.2551	ug/L	96
15) Tert-Butyl Alcohol	6.4418	59	64261	156.4824	ug/L	99
16) Dimethyl Sulfide	6.5865	62	106646	20.9336	ug/L	97
17) Iodomethane	6.8244	142	89750	17.9109	ug/L	98
18) Methyl acetate	6.8450	43	54867	17.2771	ug/L	99
19) Methylene Chloride	7.0828	84	87965	20.4831	ug/L	89
20) Carbon Disulfide	7.1242	76	205391	17.3524	ug/L	99
21) Acrylonitrile	7.2690	53	30006	18.4877	ug/L	96
22) Methyl Tert Butyl Ether	7.2896	73	226316	18.5845	ug/L	99
23) trans-1,2-Dichloroethene	7.5275	96	87451	20.9487	ug/L	96
24) n-Hexane	7.5998	57	113265	17.6155	ug/L	99
25) Diisopropyl ether	7.9307	45	1551747	98.8815	ug/L	99
26) Vinyl Acetate	8.0961	43	141949	26.2713	ug/L	98
27) 1,1-Dichloroethane	8.1168	63	178564	19.6024	ug/L	99
28) Ethyl-Tert-Butyl ether	8.4787	59	1624371	102.4076	ug/L	99
29) 2-Butanone	8.6545	43	33989	18.1240	ug/L	99
30) Propionitrile	8.7579	54	51314	93.6519	ug/L	99
31) 2,2-Dichloropropane	8.8613	77	144234	22.9001	ug/L	100
32) cis-1,2-Dichloroethene	8.9233	96	100581	21.2228	ug/L	94
33) Chloroform	9.1197	83	165133	19.9724	ug/L	100
34) 1-Bromopropane	9.2542	122	20850	20.3113	ug/L	96
35) Bromochloromethane	9.3472	130	58985	21.2262	ug/L	96
36) Tetrahydrofuran	9.3679	42	111623	91.8719	ug/L	97
38) 1,1,1-Trichloroethane	9.6264	97	164645	21.9923	ug/L	97
39) Cyclohexane	9.6574	56	139264	15.7121	ug/L	96
40) 1,1-Dichloropropene	9.8125	75	117521	20.8782	ug/L	99
41) Carbon Tetrachloride	9.9573	117	145340	22.8298	ug/L	99
42) Tert-Amyl-Methyl ether	9.9159	73	1238293	104.6686	ug/L	99

(#) = qualifier out of range (m) = manual integration
11M29832.D 8260WT.M Tue Mar 12 13:42:02 2019 Page 1

Data File : C:\MSDCHEM\1\DATA\031219\11M29832.D Vial: 4
Acq On : 12 Mar 2019 13:00 Operator: KFR
Sample : WG699219-02 LCS 20ug/L 8260 Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 13:42:01 2019 Quant Results File: 8260WT.RES

Quant Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

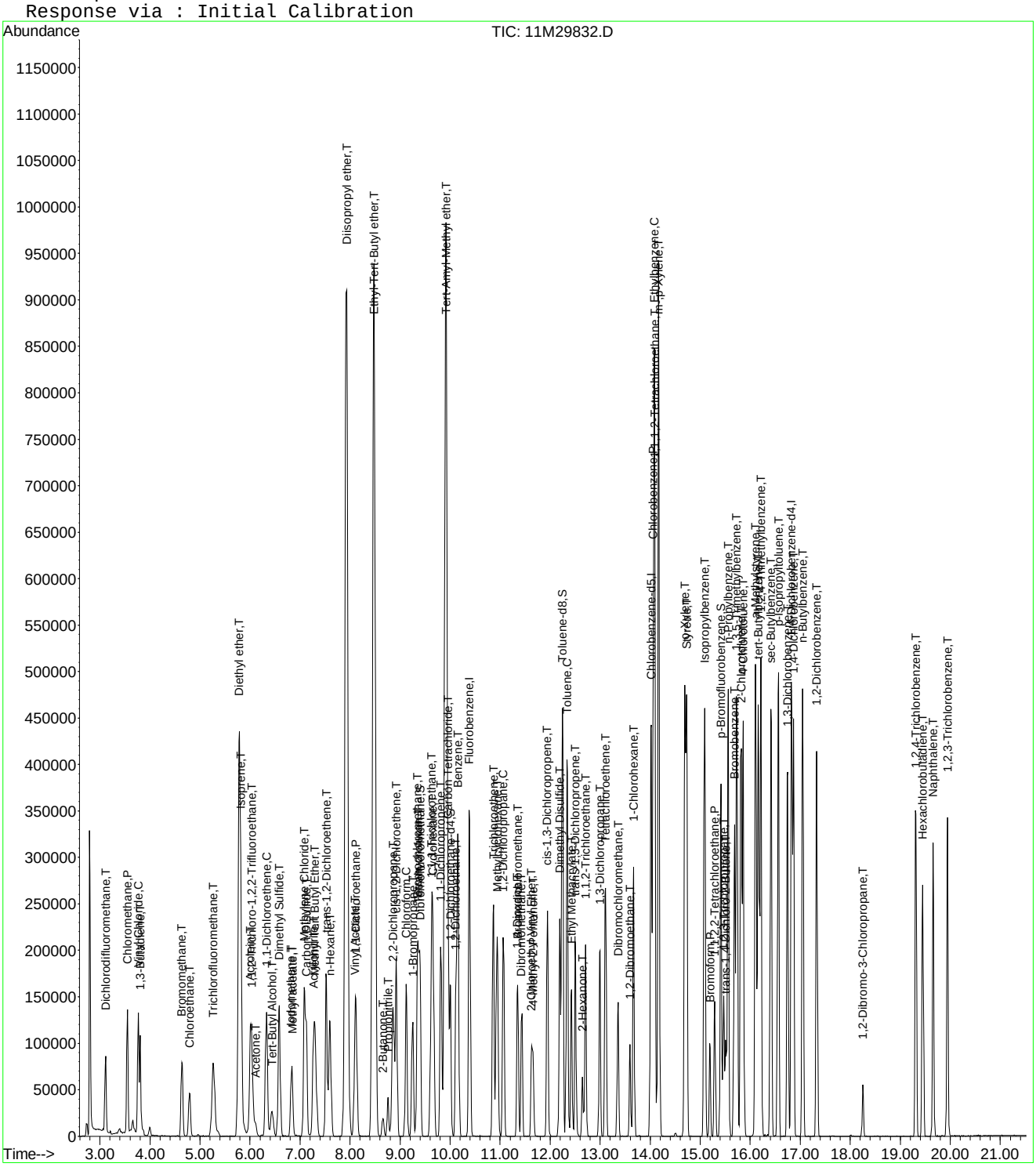
	Compound	R.T.	QIon	Response	Conc	Unit		Qvalue
44)	1,2-Dichloroethane	10.1123	62	144963	20.1725	ug/L		99
45)	Benzene	10.1537	78	341887	20.4347	ug/L		99
46)	Trichloroethene	10.8671	130	95368	20.0981	ug/L		100
47)	Methylcyclohexane	10.9395	83	122605	18.3411	ug/L		96
48)	1,2-Dichloropropane	11.0636	63	99560	20.0326	ug/L		97
49)	1,4-Dioxane	11.3428	88	3524	103.3397	ug/L		86
50)	Bromodichloromethane	11.3531	83	122553	20.8656	ug/L		99
51)	Dibromomethane	11.4255	93	57847	20.3765	ug/L		96
52)	2-Chloroethyl Vinyl Ether	11.6219	63	39012	16.2208	ug/L		99
53)	4-Methyl-2-Pentanone	11.6530	58	31500	18.3839	ug/L		97
54)	cis-1,3-Dichloropropene	11.9424	75	144696	21.8589	ug/L		100
55)	Dimethyl Disulfide	12.1906	79	78617	19.1926	ug/L		92
58)	Toluene	12.3354	91	377129	20.5906	ug/L		98
59)	Ethyl Methacrylate	12.4284	69	102550	19.8233	ug/L		98
60)	trans-1,3-Dichloropropene	12.5008	75	122509	20.4291	ug/L		100
61)	1,1,2-Trichloroethane	12.7076	97	74876	19.2034	ug/L		99
62)	2-Hexanone	12.6455	43	52686	18.1792	ug/L	#	73
63)	1,3-Dichloropropane	12.9971	76	128467	20.4209	ug/L		97
64)	Tetrachloroethene	13.1108	164	77633	19.9828	ug/L		99
65)	Dibromochloromethane	13.3590	129	93894	21.1541	ug/L		98
66)	1,2-Dibromoethane	13.5968	107	76127	20.3720	ug/L		99
67)	1-Chlorohexane	13.6692	91	115894	19.1660	ug/L		96
68)	Chlorobenzene	14.0621	112	256481	20.1138	ug/L		99
69)	1,1,1,2-Tetrachloroethane	14.0931	131	101030	19.0623	ug/L		99
70)	Ethylbenzene	14.0828	106	130731	20.1530	ug/L		96
71)	m-,p-Xylene	14.1655	106	322539	41.1854	ug/L		94
72)	o-Xylene	14.6928	106	158802	20.8992	ug/L		99
73)	Styrene	14.7238	104	267340	21.2706	ug/L		99
74)	Bromoform	15.1994	173	58569	18.7671	ug/L		98
75)	Isopropylbenzene	15.0857	105	391966	20.6062	ug/L		100
77)	1,1,2,2-Tetrachloroethane	15.2925	83	85109	20.8659	ug/L		99
79)	1,2,3-Trichloropropane	15.4682	110	28090	20.6251	ug/L		76
80)	trans-1,4-Dichloro-2-Buten	15.5096	53	31188	18.1623	ug/L		85
81)	n-Propylbenzene	15.5613	91	503230	21.8247	ug/L		99
82)	Bromobenzene	15.6854	156	113791	20.2076	ug/L		75
83)	1,3,5-Trimethylbenzene	15.7267	105	348221	21.2732	ug/L		99
84)	2-Chlorotoluene	15.8198	91	342570	20.8791	ug/L		99
85)	4-Chlorotoluene	15.8612	91	263859	19.5668	ug/L		100
86)	a-Methylstyrene	16.1093	118	195280	20.9512	ug/L		99
87)	tert-Butylbenzene	16.1610	134	80869	20.0584	ug/L		97
88)	1,2,4-Trimethylbenzene	16.2127	105	350403	20.7410	ug/L		99
89)	sec-Butylbenzene	16.4092	105	435408	21.4256	ug/L		99
90)	p-Isopropyltoluene	16.5642	119	380149	21.5130	ug/L		99
91)	1,3-Dichlorobenzene	16.7504	146	210729	20.2859	ug/L		98
92)	1,4-Dichlorobenzene	16.8641	146	217067	20.9256	ug/L		100
93)	n-Butylbenzene	17.0502	91	337982	21.2233	ug/L		100
94)	1,2-Dichlorobenzene	17.3294	146	209056	20.9983	ug/L		98
95)	1,2-Dibromo-3-Chloropropan	18.2496	75	16737	19.8630	ug/L		95
96)	1,2,4-Trichlorobenzene	19.3146	180	135928	21.1057	ug/L		99
97)	Hexachlorobutadiene	19.4490	225	70536	21.7298	ug/L		98
98)	Naphthalene	19.6558	128	291099	21.1082	ug/L		100
99)	1,2,3-Trichlorobenzene	19.9453	180	126570	20.9179	ug/L		99

(#) = qualifier out of range (m) = manual integration
11M29832.D 8260WT.M Tue Mar 12 13:42:02 2019 Page 2

Quantitation Report (Not Reviewed)

Data File : C:\MSDCHEM\1\DATA\031219\11M29832.D Vial: 4
Acq On : 12 Mar 2019 13:00 Operator: KFR
Sample : WG699219-02 LCS 20ug/L 8260 Inst : hpms11
Misc : 1,1 STD92316 Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Mar 12 13:42 2019 Quant Results File: 8260WT.RES

Method : C:\MSDCHEM\1\METHODS\8260WT.M (RTE Integrator)
Title : 8260B(SOP: OVL MSV01) Water 030519 HPMS11
Last Update : Wed Mar 06 14:13:24 2019
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429064.D Vial: 4
Acq On : 11 Mar 2019 11:09 Operator: EEA
Sample : WG699028-02 LCS 20 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:31:47 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Fluorobenzene	10.73	96	523789	25.00	ug/L	0.00
57) Chlorobenzene-d5	14.60	117	399992	25.00	ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.61	152	215609	25.00	ug/L	-0.01
System Monitoring Compounds						
37) Dibromofluoromethane	9.70	111	135824	26.0143	ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 104.04%			
43) 1,2-Dichloroethane-d4	10.33	65	135138	26.2181	ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 104.88%			
58) Toluene-d8	12.71	98	517518	25.3999	ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 101.60%			
80) p-Bromofluorobenzene	16.09	95	202468	26.0190	ug/L	-0.01
Spiked Amount 25.000	Range 86 - 115		Recovery = 104.08%			
Target Compounds						Qvalue
2) Dichlorodifluoromethane	3.23	85	151396	16.6175	ug/L	100
3) Chloromethane	3.68	50	224720	17.1511	ug/L	99
4) Vinyl Chloride	3.91	62	199262	18.6614	ug/L	99
5) 1,3-Butadiene	3.95	54	135009	19.2929	ug/L	99
6) Bromomethane	4.80	94	122166	19.0217	ug/L	99
7) Chloroethane	4.96	64	115532	20.2192	ug/L	99
8) Trichlorofluoromethane	5.44	101	200977	18.5380	ug/L	100
9) Diethyl ether	5.96	59	572928	99.0886	ug/L	99
10) Isoprene	6.00	67	209562	19.3412	ug/L	99
11) Acrolein	6.20	56	83083	125.3129	ug/L	98
12) 1,1,2-Trichloro-1,2,2-Trif	6.22	101	127970	20.4894	ug/L	100
13) Acetone	6.31	43	23651	14.6581	ug/L	98
14) 1,1-Dichloroethene	6.52	61	224151	20.0663	ug/L	99
15) Tert-Butyl Alcohol	6.63	59	60801	117.0653	ug/L	99
16) Dimethyl Sulfide	6.79	62	169657	21.0845	ug/L	98
17) Iodomethane	7.03	142	149591	19.2059	ug/L	99
18) Methyl acetate	7.05	43	70693	16.9201	ug/L	98
19) Methylene Chloride	7.29	84	140627	20.1469	ug/L	98
20) Carbon Disulfide	7.34	76	365449	17.4955	ug/L	100
21) Acrylonitrile	7.49	53	35240	17.4085	ug/L	100
22) Methyl Tert Butyl Ether	7.51	73	310032	18.6606	ug/L	99
23) trans-1,2-Dichloroethene	7.75	61	218612	20.4815	ug/L	100
24) n-Hexane	7.82	57	202859	19.3658	ug/L	100
25) Diisopropyl ether	8.16	45	2748749	104.0280	ug/L	99
26) Vinyl Acetate	8.34	43	232411	23.7108	ug/L	98
27) 1,1-Dichloroethane	8.37	63	282697	20.4881	ug/L	100
28) Ethyl-Tert-Butyl ether	8.73	59	2305047	100.6513	ug/L	99
29) 2-Butanone	8.93	43	41743	17.5623	ug/L	94
30) Propionitrile	9.03	54	61071	84.5930	ug/L	98
31) 2,2-Dichloropropane	9.13	77	212405	21.2152	ug/L	99
32) cis-1,2-Dichloroethene	9.20	96	158023	20.7432	ug/L	97
33) Chloroform	9.41	83	245335	20.0335	ug/L	100
34) 1-Bromopropane	9.55	122	32497	19.8449	ug/L	99
35) Bromochloromethane	9.64	130	87672	20.1790	ug/L	98
36) Tetrahydrofuran	9.67	42	151475	94.7203	ug/L	98
38) 1,1,1-Trichloroethane	9.94	97	226239	21.2694	ug/L	100
39) Cyclohexane	9.97	56	240478	16.9739	ug/L	99
40) 1,1-Dichloropropene	10.14	75	192634	21.5669	ug/L	100
41) Tert-Amyl-Methyl ether	10.24	73	1765666	101.1726	ug/L	100
42) Carbon Tetrachloride	10.28	117	197841	20.4684	ug/L	100

(#) = qualifier out of range (m) = manual integration
8M429064.D 8260WTR.M Mon Mar 11 15:31:48 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429064.D Vial: 4
Acq On : 11 Mar 2019 11:09 Operator: EEA
Sample : WG699028-02 LCS 20 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:31:47 2019 Quant Results File: 8260WTR.RES

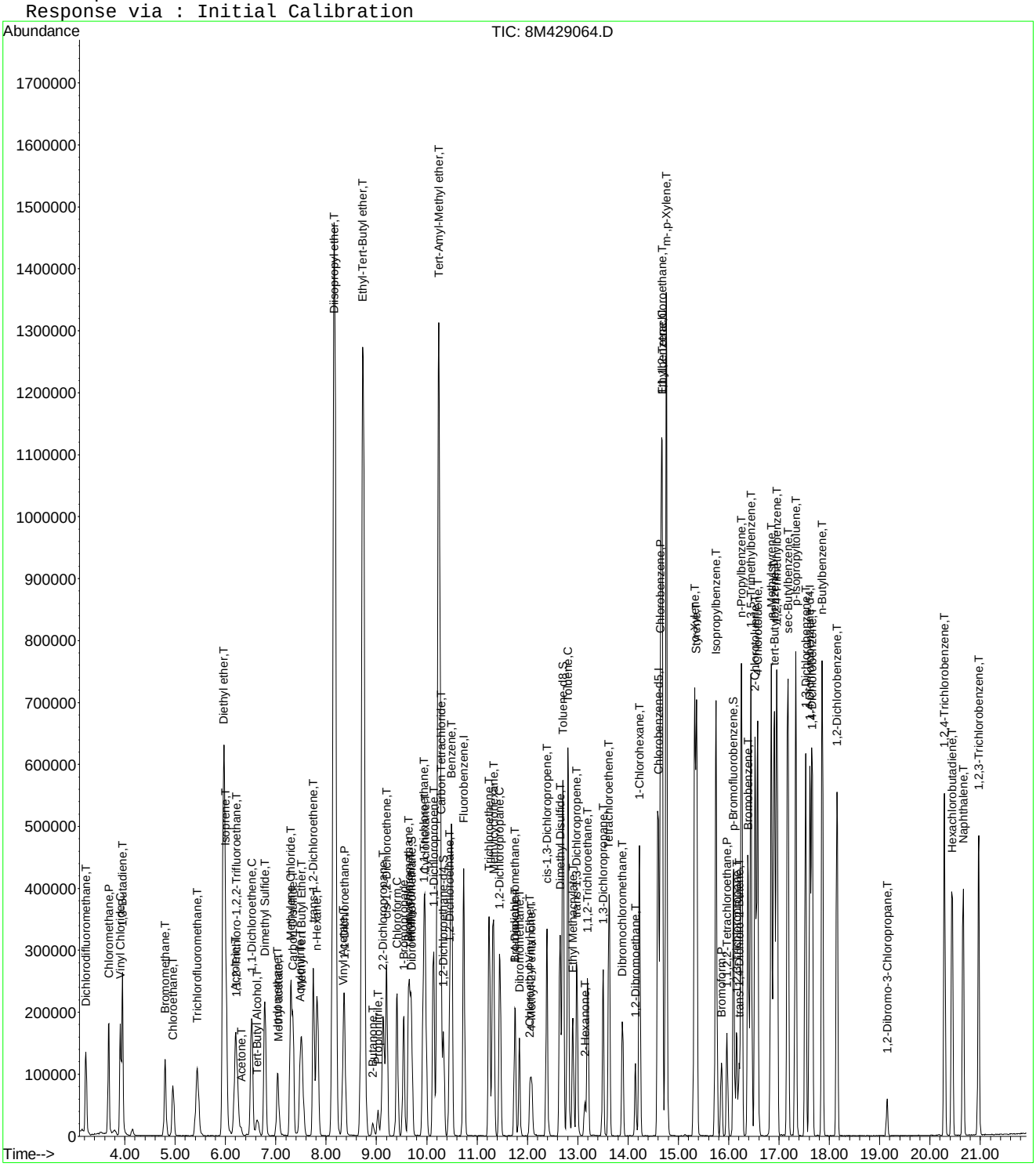
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc Unit		Qvalue
45)	1,2-Dichloroethane	10.46	62	174114	20.7862 ug/L		100
46)	Benzene	10.49	78	588082	21.0178 ug/L		99
47)	Trichloroethene	11.24	130	159454	20.9172 ug/L		100
48)	Methylcyclohexane	11.32	83	219888	18.6256 ug/L		99
49)	1,2-Dichloropropane	11.45	63	159717	21.0297 ug/L		98
50)	Bromodichloromethane	11.75	83	176027	20.0171 ug/L		99
51)	1,4-Dioxane	11.75	88	3800	88.9214 ug/L		89
52)	Dibromomethane	11.84	93	71088	20.3351 ug/L		99
53)	2-Chloroethyl Vinyl Ether	12.05	63	41068	12.3751 ug/L		99
54)	4-Methyl-2-Pentanone	12.08	58	37538	17.9788 ug/L		98
55)	cis-1,3-Dichloropropene	12.39	75	231886	22.1646 ug/L		100
56)	Dimethyl Disulfide	12.65	79	118828	18.4958 ug/L		92
59)	Toluene	12.80	91	607977	20.3575 ug/L		99
60)	Ethyl Methacrylate	12.91	69	139408	18.2852 ug/L		99
62)	trans-1,3-Dichloropropene	12.98	75	183852	20.4770 ug/L		100
63)	1,1,2-Trichloroethane	13.20	97	105666	20.2413 ug/L		99
64)	2-Hexanone	13.14	58	30903	16.4379 ug/L		83
65)	1,3-Dichloropropane	13.51	76	186335	20.7253 ug/L		99
66)	Tetrachloroethene	13.62	164	130129	20.6762 ug/L		98
67)	Dibromochloromethane	13.89	129	131379	19.8296 ug/L		99
68)	1,2-Dibromoethane	14.15	107	102243	20.1697 ug/L		99
69)	1-Chlorohexane	14.23	91	199422	19.2696 ug/L		98
70)	Chlorobenzene	14.64	112	406390	20.0725 ug/L		100
71)	1,1,1,2-Tetrachloroethane	14.67	131	145735	19.5789 ug/L		99
72)	Ethylbenzene	14.67	106	224357	20.4815 ug/L		97
73)	m-,p-Xylene	14.76	106	554236	41.5247 ug/L		97
74)	o-Xylene	15.33	106	273803	21.1416 ug/L		98
75)	Styrene	15.36	104	450889	21.0292 ug/L		99
76)	Bromoform	15.85	173	78900	19.2061 ug/L		99
77)	Isopropylbenzene	15.75	105	673442	20.5873 ug/L		99
79)	1,1,2,2-Tetrachloroethane	15.97	83	111817	18.3827 ug/L		98
81)	1,2,3-Trichloropropane	16.16	110	36409	20.0088 ug/L		67
82)	trans-1,4-Dichloro-2-Buten	16.20	53	34280	16.6709 ug/L	#	26
83)	n-Propylbenzene	16.26	91	841976	21.5785 ug/L		99
84)	Bromobenzene	16.39	156	178031	19.9412 ug/L		98
85)	1,3,5-Trimethylbenzene	16.44	105	581393	20.6697 ug/L		100
86)	2-Chlorotoluene	16.53	91	489690	18.9808 ug/L		92
87)	4-Chlorotoluene	16.58	91	513565	22.7821 ug/L		90
88)	a-Methylstyrene	16.85	118	329328	20.4041 ug/L		100
89)	tert-Butylbenzene	16.91	134	132350	20.3956 ug/L		100
90)	1,2,4-Trimethylbenzene	16.96	105	583247	20.4816 ug/L		100
91)	sec-Butylbenzene	17.18	105	765412	21.2627 ug/L		99
92)	p-Isopropyltoluene	17.33	119	649564	21.0497 ug/L		99
93)	1,3-Dichlorobenzene	17.53	146	347215	19.9499 ug/L		99
94)	1,4-Dichlorobenzene	17.66	146	350068	19.8619 ug/L		98
95)	n-Butylbenzene	17.86	91	585078	20.8090 ug/L		99
96)	1,2-Dichlorobenzene	18.15	146	325621	20.1613 ug/L		99
97)	1,2-Dibromo-3-Chloropropan	19.15	75	19791	18.0520 ug/L		98
98)	1,2,4-Trichlorobenzene	20.29	180	236870	20.2124 ug/L		100
99)	Hexachlorobutadiene	20.44	225	115509	20.9178 ug/L		99
100)	Naphthalene	20.66	128	417358	19.5364 ug/L		100
101)	1,2,3-Trichlorobenzene	20.97	180	213612	19.8422 ug/L		99

(#) = qualifier out of range (m) = manual integration
8M429064.D 8260WTR.M Mon Mar 11 15:31:48 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429064.D Vial: 4
Acq On : 11 Mar 2019 11:09 Operator: EEA
Sample : WG699028-02 LCS 20 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:31 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429065.D Vial: 5
Acq On : 11 Mar 2019 11:38 Operator: EEA
Sample : WG699028-03 LCS DUP 20 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:31:49 2019 Quant Results File: 8260WTR.RES

Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

Internal Standards	R.T.	QIon	Response	Conc Units	Dev(Min)
1) Fluorobenzene	10.73	96	524940	25.00 ug/L	0.00
57) Chlorobenzene-d5	14.60	117	402726	25.00 ug/L	0.00
78) 1,4-Dichlorobenzene-d4	17.62	152	217474	25.00 ug/L	0.00
System Monitoring Compounds					
37) Dibromofluoromethane	9.70	111	138268	26.4243 ug/L	0.00
Spiked Amount 25.000	Range 86 - 118		Recovery = 105.68%		
43) 1,2-Dichloroethane-d4	10.33	65	136855	26.4930 ug/L	0.00
Spiked Amount 25.000	Range 80 - 120		Recovery = 105.96%		
58) Toluene-d8	12.71	98	523088	25.4989 ug/L	0.00
Spiked Amount 25.000	Range 88 - 110		Recovery = 102.00%		
80) p-Bromofluorobenzene	16.10	95	200664	25.5660 ug/L	0.00
Spiked Amount 25.000	Range 86 - 115		Recovery = 102.28%		
Target Compounds					Qvalue
2) Dichlorodifluoromethane	3.23	85	146155	16.0070 ug/L	99
3) Chloromethane	3.68	50	211116	16.0775 ug/L	100
4) Vinyl Chloride	3.91	62	191666	17.9106 ug/L	100
5) 1,3-Butadiene	3.95	54	128152	18.0099 ug/L	99
6) Bromomethane	4.80	94	112116	17.4186 ug/L	99
7) Chloroethane	4.95	64	111164	19.4121 ug/L	100
8) Trichlorofluoromethane	5.44	101	194321	17.8847 ug/L	100
9) Diethyl ether	5.97	59	558937	96.4569 ug/L	99
10) Isoprene	6.00	67	203314	18.7234 ug/L	100
11) Acrolein	6.21	56	81683	122.9311 ug/L	98
12) 1,1,2-Trichloro-1,2,2-Trif	6.22	101	123936	19.8000 ug/L	99
13) Acetone	6.31	43	24068	14.8839 ug/L	97
14) 1,1-Dichloroethene	6.53	61	213760	19.0942 ug/L	99
15) Tert-Butyl Alcohol	6.64	59	65999	126.7948 ug/L	99
16) Dimethyl Sulfide	6.78	62	167223	20.7364 ug/L	98
17) Iodomethane	7.03	142	164731	20.9540 ug/L	100
18) Methyl acetate	7.05	43	71604	17.1006 ug/L	98
19) Methylene Chloride	7.30	84	136698	19.5410 ug/L	98
20) Carbon Disulfide	7.34	76	353950	16.9078 ug/L	100
21) Acrylonitrile	7.49	53	36740	18.1097 ug/L	97
22) Methyl Tert Butyl Ether	7.51	73	306992	18.4371 ug/L	99
23) trans-1,2-Dichloroethene	7.75	61	212602	19.8748 ug/L	100
24) n-Hexane	7.83	57	190889	18.1832 ug/L	98
25) Diisopropyl ether	8.16	45	2688389	101.5206 ug/L	99
26) Vinyl Acetate	8.34	43	213747	21.7589 ug/L	99
27) 1,1-Dichloroethane	8.37	63	274055	19.8182 ug/L	99
28) Ethyl-Tert-Butyl ether	8.74	59	2271239	98.9576 ug/L	99
29) 2-Butanone	8.93	43	42830	17.9801 ug/L	94
30) Propionitrile	9.03	54	60624	83.8325 ug/L	97
31) 2,2-Dichloropropane	9.14	77	202782	20.2096 ug/L	100
32) cis-1,2-Dichloroethene	9.20	96	154451	20.2299 ug/L	99
33) Chloroform	9.41	83	239118	19.4830 ug/L	99
34) 1-Bromopropane	9.55	122	31741	19.3407 ug/L	99
35) Bromochloromethane	9.64	130	87067	19.9958 ug/L	99
36) Tetrahydrofuran	9.67	42	152088	94.8951 ug/L	98
38) 1,1,1-Trichloroethane	9.94	97	216632	20.3216 ug/L	100
39) Cyclohexane	9.97	56	230381	16.2256 ug/L	100
40) 1,1-Dichloropropene	10.13	75	189524	21.1722 ug/L	99
41) Tert-Amyl-Methyl ether	10.24	73	1728726	98.8388 ug/L	99
42) Carbon Tetrachloride	10.28	117	191924	19.8127 ug/L	99

(#) = qualifier out of range (m) = manual integration
8M429065.D 8260WTR.M Mon Mar 11 15:31:50 2019 Page 1

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429065.D Vial: 5
Acq On : 11 Mar 2019 11:38 Operator: EEA
Sample : WG699028-03 LCS DUP 20 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:31:49 2019 Quant Results File: 8260WTR.RES

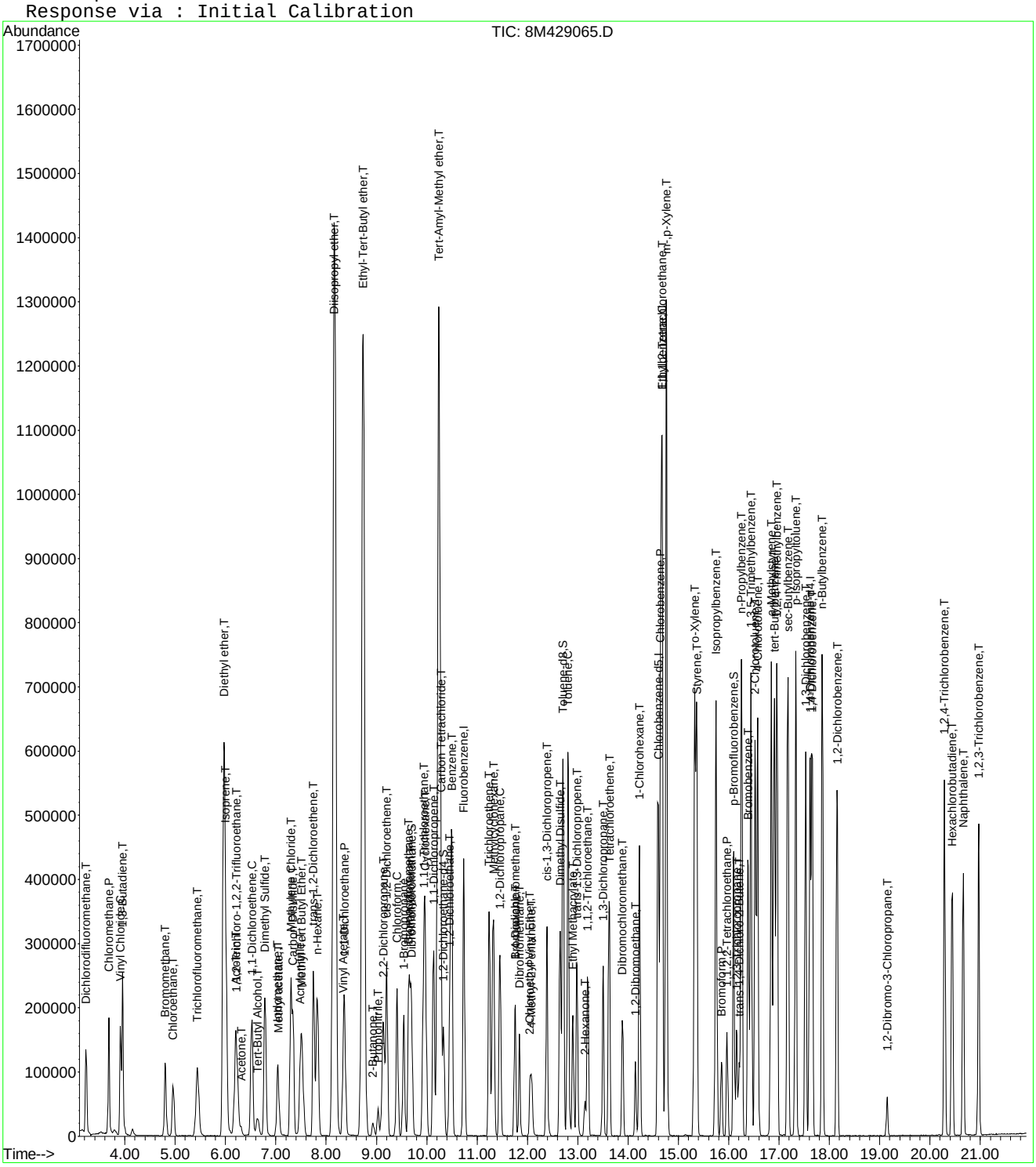
Quant Method : K:\ORGANICS\V...\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration
DataAcq Meth : 8260WTR

	Compound	R.T.	QIon	Response	Conc Unit		Qvalue
45)	1,2-Dichloroethane	10.46	62	170763	20.3415 ug/L		99
46)	Benzene	10.50	78	569440	20.3070 ug/L		100
47)	Trichloroethene	11.24	130	156275	20.4552 ug/L		100
48)	Methylcyclohexane	11.32	83	212793	17.9851 ug/L		99
49)	1,2-Dichloropropane	11.46	63	155300	20.4033 ug/L		98
50)	Bromodichloromethane	11.76	83	170606	19.3581 ug/L		99
51)	1,4-Dioxane	11.76	88	5284	123.3764 ug/L		94
52)	Dibromomethane	11.84	93	69814	19.9269 ug/L		100
53)	2-Chloroethyl Vinyl Ether	12.05	63	42683	12.8335 ug/L		99
54)	4-Methyl-2-Pentanone	12.08	58	36454	17.4213 ug/L		99
55)	cis-1,3-Dichloropropene	12.39	75	227721	21.7187 ug/L		99
56)	Dimethyl Disulfide	12.65	79	117885	18.3088 ug/L		94
59)	Toluene	12.80	91	594164	19.7599 ug/L		99
60)	Ethyl Methacrylate	12.91	69	138560	18.0567 ug/L		99
62)	trans-1,3-Dichloropropene	12.99	75	178085	19.7000 ug/L		100
63)	1,1,2-Trichloroethane	13.20	97	103204	19.6354 ug/L		98
64)	2-Hexanone	13.14	58	31330	16.5331 ug/L		85
65)	1,3-Dichloropropane	13.51	76	186262	20.5766 ug/L		100
66)	Tetrachloroethene	13.63	164	123884	19.5503 ug/L		99
67)	Dibromochloromethane	13.89	129	126669	18.9889 ug/L		99
68)	1,2-Dibromoethane	14.15	107	101792	19.9444 ug/L		100
69)	1-Chlorohexane	14.23	91	192038	18.4302 ug/L		99
70)	Chlorobenzene	14.64	112	399541	19.6003 ug/L		99
71)	1,1,1,2-Tetrachloroethane	14.67	131	145810	19.4559 ug/L		98
72)	Ethylbenzene	14.67	106	217569	19.7270 ug/L		97
73)	m-,p-Xylene	14.76	106	532747	39.6437 ug/L		96
74)	o-Xylene	15.33	106	265659	20.3735 ug/L		99
75)	Styrene	15.37	104	436083	20.2006 ug/L		100
76)	Bromoform	15.85	173	78082	18.8779 ug/L		98
77)	Isopropylbenzene	15.75	105	649697	19.7265 ug/L		99
79)	1,1,2,2-Tetrachloroethane	15.97	83	109965	17.9232 ug/L		99
81)	1,2,3-Trichloropropane	16.16	110	36092	19.6645 ug/L		65
82)	trans-1,4-Dichloro-2-Buten	16.20	53	33797	16.2951 ug/L	#	30
83)	n-Propylbenzene	16.26	91	809731	20.5742 ug/L		99
84)	Bromobenzene	16.39	156	174279	19.3535 ug/L		99
85)	1,3,5-Trimethylbenzene	16.44	105	561022	19.7744 ug/L		100
86)	2-Chlorotoluene	16.52	91	540245	20.7608 ug/L		99
87)	4-Chlorotoluene	16.58	91	421664	18.5449 ug/L		100
88)	a-Methylstyrene	16.85	118	316970	19.4700 ug/L		100
89)	tert-Butylbenzene	16.91	134	127245	19.4408 ug/L		99
90)	1,2,4-Trimethylbenzene	16.96	105	566431	19.7205 ug/L		99
91)	sec-Butylbenzene	17.18	105	740880	20.4047 ug/L		99
92)	p-Isopropyltoluene	17.33	119	628854	20.2038 ug/L		99
93)	1,3-Dichlorobenzene	17.53	146	337125	19.2041 ug/L		99
94)	1,4-Dichlorobenzene	17.66	146	343541	19.3244 ug/L		99
95)	n-Butylbenzene	17.86	91	570034	20.1001 ug/L		98
96)	1,2-Dichlorobenzene	18.16	146	318530	19.5531 ug/L		100
97)	1,2-Dibromo-3-Chloropropan	19.15	75	20541	18.5754 ug/L		98
98)	1,2,4-Trichlorobenzene	20.29	180	231567	19.5904 ug/L		99
99)	Hexachlorobutadiene	20.44	225	110924	19.9153 ug/L		99
100)	Naphthalene	20.66	128	418301	19.4126 ug/L		99
101)	1,2,3-Trichlorobenzene	20.97	180	211241	19.4537 ug/L		100

(#) = qualifier out of range (m) = manual integration
8M429065.D 8260WTR.M Mon Mar 11 15:31:50 2019 Page 2

Data File : K:\ORGANICS\VOLATILE\HPMS8\DATA\031119\8M429065.D Vial: 5
Acq On : 11 Mar 2019 11:38 Operator: EEA
Sample : WG699028-03 LCS DUP 20 ug/L 8260 Inst : HPMS8
Misc : 1,1 STD92354 Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Mar 11 15:31 2019 Quant Results File: 8260WTR.RES

Method : K:\ORGANICS\VOLATILE\HPMS8\METHODS\8260WTR.M (RTE Integrator)
Title : Method 8260B WTR-SOP:OVL MSV01 03-04-19 HPMS8
Last Update : Mon Mar 04 17:44:12 2019
Response via : Initial Calibration



2.2 General Chromatography Data

2.2.1 6850 LC/MS Data

2.2.1.1 Summary Data

Microbac Laboratories
Case Narrative

Login Number: L19030638
Department: General Chromatography
Analyst: John W. Richards Jr.

METHOD

Analysis SW-846 6850

HOLDING TIMES

Sample Preparation: All holding times were met.

Sample Analysis: All holding times were met.

PREPARATION

Sample preparation proceeded normally.

CALIBRATION

Initial Calibration: For all compounds that yielded a %RSD greater than 15%, linear or higher order equations were applied. All acceptance criteria were met.

Alternate Source Standards: All acceptance criteria were met.

Continuing Calibration and Tune: All acceptance criteria were met.

BATCH QA/QC

Method Blank: All acceptance criteria were met.

Laboratory Control Sample: All acceptance criteria were met.

Matrix Spikes: Recovery out of range was observed for the following analyte: Perchlorate. Please see the applicable QC report for a detailed presentation of the failures.

Sample #	Analyte	Date	Result	Lower	Upper	Type
L19030638-03	Perchlorate	2019-03-18 20:48:40	80.5	84	119	Recovery

SAMPLES

Samples: All acceptance criteria were met.

Internal Standards: All acceptance criteria were met.

Manual Integration Reason Codes

Reason #1: Data System Fails to Select Correct Peak In some cases the chromatography system selects and integrates the 'wrong peak'. In this case the analyst must correct the selection and force the system to integrate the proper peak. Other times the system may miss the peak completely.

Reason #2: Data System Splits the Peak Incorrectly or Integrates a False Peak as a Rider Peak This phenomena is common at low concentrations where the signal:noise ratio is low. A single compound (peak) is incorrectly split into multiple peaks or integrated as a main peak with one or more rider peaks resulting in low area counts for the target compound.

Reason #3: Improperly Integrated Isomers and/or coeluting compounds. This system often fails to distinguish coeluting compounds and or isomers. The integration areas and concentrations are wrong, and they must be corrected by manual integration. Prime examples are benzo(k)fluoranthene and benzo(b)fluoranthene which are often unresolved and integrated improperly when both are present at low concentrations in standards or samples.

Reason #4: System Establishes Incorrect Baseline There are numerous situations in chromatography where the system establishes the baseline incorrectly. Some baseline errors will be obvious to the analyst and should be corrected via manual procedures.

Reason #5: Miscellaneous Other situations involving integration errors may require in-depth review and technical judgment. These cases should be brought to the attention of the laboratory management. If the form of manual integration is not clearly covered by these four cases, then review and approval by the Laboratory Director or the QA/QC Supervisor will be required.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and Microbac Laboratories Inc., both technically and for completeness, except for the conditions noted above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or designated person, as verified by the following signature.

Narrative ID: 147535
Approved By: Eric Lawson



Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Sample #: L19030638-01 **PrePrep Method:** N/A **Instrument:** LCMS1
Client ID: SW1 **Prep Method:** 6850 **Prep Date:** 03/15/2019 16:30
Matrix: Water **Analytical Method:** 6850 **Cal Date:** 03/18/2019 18:39
Workgroup #: WG699914 **Analyst:** JWR **Run Date:** 03/18/2019 20:22
Collect Date: 03/07/2019 11:30 **Dilution:** 1 **File ID:** 1LM.LM45229
Sample Tag: 01 **Units:** ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.542		0.400	0.200	0.100

Sample #: L19030638-02 **PrePrep Method:** N/A **Instrument:** LCMS1
Client ID: SW1 MS **Prep Method:** 6850 **Prep Date:** 03/15/2019 16:30
Matrix: Water **Analytical Method:** 6850 **Cal Date:** 03/18/2019 18:39
Workgroup #: WG699914 **Analyst:** JWR **Run Date:** 03/18/2019 20:35
Collect Date: 03/07/2019 11:30 **Dilution:** 1 **File ID:** 1LM.LM45230
Sample Tag: 01 **Units:** ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.735		0.400	0.200	0.100

Sample #: L19030638-03 **PrePrep Method:** N/A **Instrument:** LCMS1
Client ID: SW1 MSD **Prep Method:** 6850 **Prep Date:** 03/15/2019 16:30
Matrix: Water **Analytical Method:** 6850 **Cal Date:** 03/18/2019 18:39
Workgroup #: WG699914 **Analyst:** JWR **Run Date:** 03/18/2019 20:48
Collect Date: 03/07/2019 11:30 **Dilution:** 1 **File ID:** 1LM.LM45231
Sample Tag: 01 **Units:** ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.703		0.400	0.200	0.100

Sample #: L19030638-04 **PrePrep Method:** N/A **Instrument:** LCMS1
Client ID: SW2 **Prep Method:** 6850 **Prep Date:** 03/15/2019 16:30
Matrix: Water **Analytical Method:** 6850 **Cal Date:** 03/18/2019 18:39
Workgroup #: WG699914 **Analyst:** JWR **Run Date:** 03/18/2019 21:01
Collect Date: 03/07/2019 12:30 **Dilution:** 1 **File ID:** 1LM.LM45232
Sample Tag: 01 **Units:** ug/L

Microbac

Lab Report #: L19030638
Lab Project #: 2886.016
Project Name: Longhorn Army Ammunition DOD
Lab Contact: Stephanie Mossburg

Certificate of Analysis

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.530		0.400	0.200	0.100

Sample #: L19030638-05 **PrePrep Method:** N/A **Instrument:** LCMS1
Client ID: SW3 **Prep Method:** 6850 **Prep Date:** 03/15/2019 16:30
Matrix: Water **Analytical Method:** 6850 **Cal Date:** 03/18/2019 18:39
Workgroup #: WG699914 **Analyst:** JWR **Run Date:** 03/18/2019 21:14
Collect Date: 03/07/2019 13:00 **Dilution:** 1 **File ID:** 1LM.LM45233
Sample Tag: 01 **Units:** ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.486		0.400	0.200	0.100

Sample #: L19030638-06 **PrePrep Method:** N/A **Instrument:** LCMS1
Client ID: SW4 **Prep Method:** 6850 **Prep Date:** 03/15/2019 16:30
Matrix: Water **Analytical Method:** 6850 **Cal Date:** 03/18/2019 18:39
Workgroup #: WG699914 **Analyst:** JWR **Run Date:** 03/18/2019 21:27
Collect Date: 03/07/2019 14:45 **Dilution:** 1 **File ID:** 1LM.LM45234
Sample Tag: 01 **Units:** ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.430		0.400	0.200	0.100

Sample #: L19030638-07 **PrePrep Method:** N/A **Instrument:** LCMS1
Client ID: DUP01 **Prep Method:** 6850 **Prep Date:** 03/15/2019 16:30
Matrix: Water **Analytical Method:** 6850 **Cal Date:** 03/18/2019 18:39
Workgroup #: WG699914 **Analyst:** JWR **Run Date:** 03/18/2019 21:40
Collect Date: 03/07/2019 10:00 **Dilution:** 1 **File ID:** 1LM.LM45235
Sample Tag: 01 **Units:** ug/L

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.548		0.400	0.200	0.100

2.2.1.2 QC Summary Data

Example Calculation 6850 - Perchlorate

Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, y = mx + b

y = response ratio = response of analyte / response of internal standard (IS) = Rx/Ristd

x = amount ratio = concentration analyte/concentration internal standard (IS) = Cx / Cistd

m = slope from curve (1.45)

b = intercept from curve (-0.00242)

y = 1.45x + -0.00242

Step 2: Substitute the value for y

where y = 12600/226000 = 0.055752

Step 3: Solve for x

x = (y - b)/m = 0.0040119

Step 4: Solve for analyte concentration Cx

Cx = (Cis)(x) = (5 ug/L)(0.040119) = 0.200594 ug/L

Example Calculation - Water:

Slope from curve, m:	1.45
Intercept from curve, b:	-0.00242
Response of analyte, Rx:	12600
Response of Internal Standard , Ristd:	226000
Concentration of IS, Cistd (ug/L):	5.00
Response Ratio:	0.05575
Amount Ratio:	0.04012
Analyte Concentration, Cx (ug/L) :	0.200594

Example Calculation - Soil:

Analyte Concentration, Cx (ug/L):	0.20059
Amount of soil extracted (g):	5.00
Final volume of extract (mL):	50.00
Percent solids (Pct wt.)	100
Concentration in soil (ug/kg):	2.005938

Perchlorate Conductivity Check
(perchlorate1)

Conductivity Probe Calibration Check: 1388 /1410 µs/cm

Working MCT Level: 10,000 µs/cm

Sample	Conductivity (µs/cm)	Pretreatment or Dilution Needed
WG699914-01 MCT	10,010.	
-02 Blank	0.44	
-03 LCS	0.72	
L19030638-01 RS	119.1	
-02 MS	119.0	
-03 MSD	118.3	
-04	114.6	
-05	111.6	
-06	104.3	
-07	117.7	
L19030972-01	341.	
L19030973-01	1716.	
L19030974-01	396.	

Analyst: John Richards

Date/Time: 03/19/19 / 16:00

DCN#140283

Microbac Laboratories Inc.

Run Log ID: **95845**

Instrument Run Log

Instrument: LCMS1 Dataset: 031819_JWR.TXT

Analyst1: JWR Analyst2: NA

Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: Syringe Filter Lot#: 180728254

Eluent ID#:

Column 1 ID: KP-RPPX250 Column 2 ID: NA

Workgroups: Analytical WG699914 (waters)

Internal STD: COA21170 Surrogate STD: NA Calibration STD WG700056 (03/18/19)

CCV STD: STD87532 LCS STD: STD87534 MS/MSD STD: STD87534

Comments: ICAL WG700056 : Alternate Source STD87534
Analytical Column : RPPX 5um (250x4.6mm)
K'Prime S/N RPPX250-02115

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM45214	WG700056-01 CCB	1	1		03/18/19 17:08
2	1LM.LM45215	WG700056-02 STD (0.1 ug/L)	1	1	STD87532	03/18/19 17:21
3	1LM.LM45216	WG700056-03 STD (0.2 ug/L)	1	1	STD87532	03/18/19 17:34
4	1LM.LM45217	WG700056-04 STD (0.5 ug/L)	1	1	STD87532	03/18/19 17:47
5	1LM.LM45218	WG700056-05 STD (1.0 ug/L)	1	1	STD87532	03/18/19 18:00
6	1LM.LM45219	WG700056-06 STD (2.0 ug/L)	1	1	STD87532	03/18/19 18:13
7	1LM.LM45220	WG700056-07 STD (5.0 ug/L)	1	1	STD87532	03/18/19 18:26
8	1LM.LM45221	WG700056-08 STD (10 ug/L)	1	1	STD87532	03/18/19 18:39
9	1LM.LM45222	WG700056-09 SSCV (1.0 ug/L)	1	1	STD87534	03/18/19 18:52
10	1LM.LM45223	WG699915-01 CCB	1	1		03/18/19 19:05
11	1LM.LM45224	WG699915-02 CCV (1.0ug/L)	1	1	STD87532	03/18/19 19:18
12	1LM.LM45225	WG699914-07 MRL (0.2ug/L)	1	1	STD87532	03/18/19 19:31
13	1LM.LM45226	WG699914-01 MCT (0.2ug/L)	1	1	STD87534	03/18/19 19:43
14	1LM.LM45227	WG699914-02 BLANK	1	1		03/18/19 19:56
15	1LM.LM45228	WG699914-03 LCS (0.2ug/L)	1	1	STD87534	03/18/19 20:09
16	1LM.LM45229	L19030638-01 RS	1	1		03/18/19 20:22
17	1LM.LM45230	L19030638-02 MS	1	1	STD87534	03/18/19 20:35
18	1LM.LM45231	L19030638-03 MSD	1	1	STD87534	03/18/19 20:48
19	1LM.LM45232	L19030638-04	1	1		03/18/19 21:01
20	1LM.LM45233	L19030638-05	1	1		03/18/19 21:14
21	1LM.LM45234	L19030638-06	1	1		03/18/19 21:27
22	1LM.LM45235	L19030638-07	1	1		03/18/19 21:40
23	1LM.LM45236	WG699915-03 CCV (1.0ug/L)	1	1	STD87532	03/18/19 21:53
24	1LM.LM45237	WG699914-08 MRL (0.2ug/L)	1	1	STD87532	03/18/19 22:06
25	1LM.LM45238	WG699915-04 CCB	1	1		03/18/19 22:19
26	1LM.LM45239	L19030972-01	1	1		03/18/19 22:32
27	1LM.LM45240	L19030973-01	1	1		03/18/19 22:45
28	1LM.LM45241	L19030974-01	1	1		03/18/19 22:58
29	1LM.LM45242	WG699915-05 CCV (1.0ug/L)	1	1	STD87532	03/18/19 23:10
30	1LM.LM45243	WG699914-09 MRL (0.2ug/L)	1	1	STD87532	03/18/19 23:23
31	1LM.LM45244	WG699915-06 CCB	1	1		03/18/19 23:36

Comments

Page: 1 Approved: 20-MAR-19



Microbac Laboratories Inc.

Run Log ID:

Instrument Run Log

Instrument: LCMS1 Dataset: 031819_JWR.TXT

Analyst1: JWR Analyst2: NA

Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: Syringe Filter Lot#: 180728254

Eluent ID#:

Column 1 ID: KP-RPPX250 Column 2 ID: NA

Workgroups: Analytical WG699914 (waters)

Internal STD: COA21170 Surrogate STD: NA WG700056 (03/18/19)

CCV STD: STD87532 LCS STD: STD87534 STD87534

Comments

Seq.	Rerun	Dil.	Reason	Analytes
18				
	L19030638-03 MSD : The MSD percent recovery is below the DOD5-LCL(84%).			

Page: 2 Approved: 20-MAR-19

Microbac Laboratories Inc.

Checklist ID: 151744

Data Checklist

Date: 18-MAR-2019
Analyst: JWR
Analyst: NA
Method: 6850
Instrument: LCMS1
Curve Workgroup: WG700056
Runlog ID: 95845
Analytical Workgroups: L19030638, L19030972, L19030973, L19030974

ANALYTICAL	
System Performance Check	X
DFTPP (GCMS)	NA
Endrin/DDT breakdown (8081/GCMS)	NA
Pentachlorophenol/benzidine tailing (GCMS)	NA
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	X
Average RF	NA
Linear regression or higher order curve	X
Alternate source standard (ICV) % Difference	X
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (GCMS)	X
Continuing calibration blank (CCB) (IC/LCMS)	X
Limit of quantitation verification (LOQV) (LCMS)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	X
Recoveries	X
%RPD	X
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	X
Surrogate recoveries	NA
Internal standard areas (MS)	X
Library searches (GCMS)	NA
Calculations & correct factors	X
Compounds above calibration range	NA
Reruns	NA
Manual integrations	X
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	X
Check for completeness	X
Primary Reviewer	JWR
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	ECL

Primary Reviewer:
19-MAR-2019

John Richards

Secondary Reviewer:
20-MAR-2019

Eric C. Zimmerman

CHECKLIST1 - Modified 03/05/2008
Generated: MAR-20-2019 16:02:53

Microbac Laboratories Inc.

HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 6850 **AAB#:** WG699914

Login Number: L19030638

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
SW1	01	03/07/19					03/15/2019	8.2	28		03/18/19	3.2	28	
SW1 MS	02	03/07/19					03/15/2019	8.2	28		03/18/19	3.2	28	
SW1 MSD	03	03/07/19					03/15/2019	8.2	28		03/18/19	3.2	28	
SW2	04	03/07/19					03/15/2019	8.2	28		03/18/19	3.2	28	
SW3	05	03/07/19					03/15/2019	8.1	28		03/18/19	3.2	28	
SW4	06	03/07/19					03/15/2019	8.1	28		03/18/19	3.2	28	
DUP01	07	03/07/19					03/15/2019	8.3	28		03/18/19	3.2	28	

* = SEE PROJECT QAPP REQUIREMENTS

HOLD_TIMES - Modified 03/06/2008
PDF File ID: 6354682
Report generated 03/20/2019 16:39

METHOD BLANK SUMMARY

Login Number: L19030638
Blank File ID: 1LM.LM45227
Prep Date: 03/15/19 16:30
Analyzed Date: 03/18/19 19:56
Analyst: JWR

Work Group: WG699914
Blank Sample ID: WG699914-02
Instrument ID: LCMS1
Method: 6850

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
QCMRL	WG699914-07	1LM.LM45225	03/18/19 19:31	01
MCT	WG699914-01	1LM.LM45226	03/18/19 19:43	01
LCS	WG699914-03	1LM.LM45228	03/18/19 20:09	01
SW1	L19030638-01	1LM.LM45229	03/18/19 20:22	01
SW1 MS	L19030638-02	1LM.LM45230	03/18/19 20:35	01
SW1 MSD	L19030638-03	1LM.LM45231	03/18/19 20:48	01
SW2	L19030638-04	1LM.LM45232	03/18/19 21:01	01
SW3	L19030638-05	1LM.LM45233	03/18/19 21:14	01
SW4	L19030638-06	1LM.LM45234	03/18/19 21:27	01
DUP01	L19030638-07	1LM.LM45235	03/18/19 21:40	01
QCMRL	WG699914-08	1LM.LM45237	03/18/19 22:06	01
QCMRL	WG699914-09	1LM.LM45243	03/18/19 23:23	01

Report Name: BLANK_SUMMARY
PDF File ID: 6354683
Report generated 03/20/2019 16:39

Microbac Laboratories Inc.
METHOD BLANK REPORT

Login Number: L19030638 Prep Date: 03/15/19 16:30 Sample ID: WG699914-02
Instrument ID: LCMS1 Run Date: 03/18/19 19:56 Prep Method: 6850
File ID: 1LM.LM45227 Analyst: JWR Method: 6850
Workgroup (AAB#): WG699914 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-18-MAR-19

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Perchlorate	0.100	0.400	0.100	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name:BLANK
PDF ID: 6354684
20-MAR-2019 16:39

Microbac Laboratories Inc.
LABORATORY CONTROL SAMPLE (LCS)

Login Number: L19030638 **Run Date:** 03/18/2019 **Sample ID:** WG699914-03
Instrument ID: LCMS1 **Run Time:** 20:09 **Prep Method:** 6850
File ID: 1LM.LM45228 **Analyst:** JWR **Method:** 6850
Workgroup (AAB#): WG699914 **Matrix:** Water **Units:** ug/L
QC Key: DOD5 **Lot#:** STD87534 **Cal ID:** LCMS1-18-MAR-19

Analytes	Expected	Found	% Rec	LCS Limits	Q
Perchlorate	0.200	0.203	102	84 - 119	

LCS - Modified 03/06/2008
PDF File ID: 6354685
Report generated: 03/20/2019 16:39

Microbac Laboratories Inc.

MS/MSD REPORT

Loginnum:L19030638 Cal ID:LCMS1- 18-MAR-19 Worknum:WG699914

Instrument ID:LCMS1 Contract #: Prep Method:6850

Parent ID:L19030638-01 File ID:1LM.LM45229 Dil:1 Method:6850

Sample ID:L19030638-02 MS File ID:1LM.LM45230 Dil:1 Matrix:Water

Sample ID:L19030638-03 MSD File ID:1LM.LM45231 Dil:1 Units:ug/L

Analyte	Parent	MS Spiked	MS Found	MS %Rec	MSD Spiked	MSD Found	MSD %Rec	%RPD	%Rec Limits	RPD Limit	Q
Perchlorate	0.542	0.200	0.735	96.5	0.200	0.703	80.5	4.45	84 - 119	15	*

* FAILS %REC LIMIT

FAILS RPD LIMIT

MS_MSD - Modified 03/06/2008

PDF File ID: 6354686

Report generated 03/20/2019 16:39

Microbac Laboratories Inc.
INITIAL CALIBRATION SUMMARY

Login Number: L19030638
Analytical Method: 6850
ICAL Workgroup: WG700056

Instrument ID: LCMS1
Initial Calibration Date: 18-MAR-19 18:39
Column ID: F

Analyte		AVG RF	% RSD	LINEAR (R)	QUAD (R^2)
Perchlorate		1.377	2.02	1.00000	

R = Correlation coefficient; 0.995 minimum
R^2 = Coefficient of determination; 0.99 minimum

INT_CAL - Modified 03/06/2008
PDF File ID: 6354688
Report generated 03/20/2019 16:39

Login Number: L19030638
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 18-MAR-19 18:39
Column ID: F

Analyte	WG700056-02			WG700056-03			WG700056-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	35100.0000	1.437	0.200	70600.0000	1.432	0.500	169000.000	1.342

INT_CAL - Modified 03/06/2008
PDF File ID: 6354688
Report generated 03/20/2019 16:39

Login Number: L19030638
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 18-MAR-19 18:39
Column ID: F

Analyte	WG700056-05			WG700056-06			WG700056-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	344000.000	1.354	2.00	700000.000	1.329	5.00	1760000.00	1.387

INT_CAL - Modified 03/06/2008
PDF File ID: 6354688
Report generated 03/20/2019 16:39

Login Number: L19030638
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 18-MAR-19 18:39
Column ID: F

Analyte	WG700056-08		
	CONC	RESP	RF
Perchlorate	10.0	3360000.00	1.360

INT_CAL - Modified 03/06/2008
PDF File ID: 6354688
Report generated 03/20/2019 16:39

Microbac Laboratories Inc.
ALTERNATE SOURCE CALIBRATION REPORT

Login Number: L19030638 Run Date: 03/18/2019 Sample ID: WG700056-09
Instrument ID: LCMS1 Run Time: 18:52 Method: 6850
File ID: 1LM.LM45222 Analyst: JWR QC Key: DOD5
ICal Workgroup: WG700056 Cal ID: LCMS1 - 18-MAR-19

Analyte		Expected	Found	Units	RF	%D	UCL	Q
Perchlorate		1.00	0.999	ug/L	1.37	0.100	15	

* Exceeds %D Limit

ALT - Modified 09/06/2007
Version 1.5 PDF File ID: 6354689
Report generated 03/20/2019 16:39

Microbac Laboratories Inc.
CONTINUING CALIBRATION BLANK (CCB)

Login Number: L19030638 | Run Date: 03/18/2019 | Sample ID: WG699915-01
Instrument ID: LCMS1 | Run Time: 19:05 | Method: 6850
File ID: 1LM.LM45223 | Analyst: JWR | Units: ug/L
Workgroup (AAB#): WG699914 | Cal ID: LCMS1 - 18-MAR-19
Matrix: WATER | QAPP: DOD5

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 6354691
Report generated 03/20/2019 16:40

Microbac Laboratories Inc.
CONTINUING CALIBRATION BLANK (CCB)

Login Number:	L19030638	**Run Date:**	03/18/2019	**Sample ID:**	WG699915-04
Instrument ID:	LCMS1	**Run Time:**	22:19	**Method:**	6850
File ID:	1LM.LM45238	**Analyst:**	JWR	**Units:**	ug/L
Workgroup (AAB#):	WG699914	**Cal ID:**	LCMS1 - 18-MAR-19		
Matrix:	WATER	**QAPP:**	DOD5		

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 6354691
Report generated 03/20/2019 16:40

Microbac Laboratories Inc.
CONTINUING CALIBRATION BLANK (CCB)

Login Number:	L19030638	Run Date:	03/18/2019	Sample ID:	WG699915-06
Instrument ID:	LCMS1	Run Time:	23:36	Method:	6850
File ID:	1LM.LM45244	Analyst:	JWR	Units:	ug/L
Workgroup (AAB#):	WG699914	Cal ID:	LCMS1 - 18-MAR-19		
Matrix:	WATER	QAPP:	DOD5		

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 6354691
Report generated 03/20/2019 16:40

Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L19030638 Run Date: 03/18/2019 Sample ID: WG699915-02

Instrument ID: LCMS1 Run Time: 19:18 Method: 6850

File ID: 1LM.LM45224 Analyst: JWR QC Key: DOD5

Workgroup (AAB#): WG699914 Cal ID: LCMS1 - 18-MAR-19

Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	1.00	ug/L	1.37	0	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008

PDF File ID: 6354690

Report generated 03/20/2019 16:40

Microbac Laboratories Inc.

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L19030638 Run Date: 03/18/2019 Sample ID: WG699915-03
Instrument ID: LCMS1 Run Time: 21:53 Method: 6850
File ID: 1LM.LM45236 Analyst: JWR QC Key: DOD5
Workgroup (AAB#): WG699914 Cal ID: LCMS1 - 18-MAR-19
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	0.997	ug/L	1.36	0.300	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
PDF File ID: 6354690
Report generated 03/20/2019 16:40

Microbac Laboratories Inc.
CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L19030638 **Run Date:** 03/18/2019 **Sample ID:** WG699915-05
Instrument ID: LCMS1 **Run Time:** 23:10 **Method:** 6850
File ID: 1LM.LM45242 **Analyst:** JWR **QC Key:** DOD5
Workgroup (AAB#): WG699914 **Cal ID:** LCMS1 - 18-MAR-19
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	0.984	ug/L	1.35	1.60	15	

*** Exceeds %D Criteria**

CCV - Modified 03/05/2008
PDF File ID: 6354690
Report generated 03/20/2019 16:40

Login Number: L19030638 Run Date: 03/18/2019 Sample ID: WG699914-07
Instrument ID: LCMS1 Run Time: 19:31 Prep Method: 6850
File ID: 1LM.LM45225 Analyst: JWR Method: 6850
Workgroup (AAB#): WG699914 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-18-MAR-19

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.205	103	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 6354687
Report generated 03/20/2019 16:39

Login Number: L19030638 Run Date: 03/18/2019 Sample ID: WG699914-08
Instrument ID: LCMS1 Run Time: 22:06 Prep Method: 6850
File ID: 1LM.LM45237 Analyst: JWR Method: 6850
Workgroup (AAB#): WG699914 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-18-MAR-19

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.212	106	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 6354687
Report generated 03/20/2019 16:39

Login Number: L19030638 Run Date: 03/18/2019 Sample ID: WG699914-09
Instrument ID: LCMS1 Run Time: 23:23 Prep Method: 6850
File ID: 1LM.LM45243 Analyst: JWR Method: 6850
Workgroup (AAB#): WG699914 Matrix: Water Units: ug/L
Contract #: Cal ID: LCMS1-18-MAR-19

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.208	104	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 6354687
Report generated 03/20/2019 16:39

Microbac Laboratories Inc.
INTERNAL STANDARD AREA SUMMARY
(COMPARED TO AVERAGE OF ICAL)

Login Number: L19030638
Instrument ID: LCMS1
Workgroup (AAB#): WG699914

ICAL CCV Number: WG700056-05
CAL ID: LCMS1-18-MAR-19
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG700056	NA	NA	1260000
Upper Limit	NA	NA	1890000
Lower Limit	NA	NA	630000
L19030638-05	1.00	01	1410000
L19030638-06	1.00	01	1390000
L19030638-07	1.00	01	1410000
WG699914-02	1.00	01	1420000
WG699914-03	1.00	01	1420000

IS-1 - O18LP

Underline = Response outside limits

INTERNAL_STD_AVG_ICAL - Modified 03/10/2010
PDF File ID: 6354692
Report generated 03/19/2019 14:44

Microbac Laboratories Inc.
INTERNAL STANDARD AREA SUMMARY
(COMPARED TO AVERAGE OF ICAL)

Login Number: L19030638
Instrument ID: LCMS1
Workgroup (AAB#): WG699914

ICAL CCV Number: WG700056-05
CAL ID: LCMS1-18-MAR-19
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG700056	NA	NA	1260000
Upper Limit	NA	NA	1890000
Lower Limit	NA	NA	630000
L19030638-01	1.00	01	1440000
L19030638-02	1.00	01	1370000

IS-1 - O18LP

Underline = Response outside limits

INTERNAL_STD_AVG_ICAL - Modified 03/10/2010
PDF File ID: 6354692
Report generated 03/19/2019 14:44

Microbac Laboratories Inc.
INTERNAL STANDARD AREA SUMMARY
(COMPARED TO AVERAGE OF ICAL)

Login Number: L19030638
Instrument ID: LCMS1
Workgroup (AAB#): WG699914

ICAL CCV Number: WG700056-05
CAL ID: LCMS1-18-MAR-19
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG700056	NA	NA	1260000
Upper Limit	NA	NA	1890000
Lower Limit	NA	NA	630000
L19030638-03	1.00	01	1410000
L19030638-04	1.00	01	1380000

IS-1 - O18LP

Underline = Response outside limits

INTERNAL_STD_AVG_ICAL - Modified 03/10/2010
PDF File ID: 6354692
Report generated 03/19/2019 14:44

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	L19030638-01
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45229
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 20:22	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	214000	72000	2.97	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	L19030638-02
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45230
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 20:35	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	276000	86300	3.20	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	L19030638-03
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45231
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 20:48	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	271000	92300	2.94	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	L19030638-04
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45232
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 21:01	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	201000	64500	3.12	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	L19030638-05
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45233
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 21:14	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	189000	62500	3.02	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	L19030638-06
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45234
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 21:27	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	165000	52300	3.15	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	L19030638-07
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45235
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 21:40	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	212000	68100	3.11	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	WG699914-01
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45226
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 19:43	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	79900	24800	3.22	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	WG699914-02
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45227
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 19:56	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	936	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	WG699914-03
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45228
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 20:09	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	80200	24500	3.27	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	WG699914-07
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45225
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 19:31	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	80800	25000	3.23	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	WG699914-08
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45237
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 22:06	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	92400	31900	2.90	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**	6850	**Samplenum:**	WG699914-09
Instrument:	LCMS1	**Prep Date:**	03/15/2019 16:30	**File ID:**	1LM.LM45243
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 23:23	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	91800	27400	3.35	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG699915-01
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45223
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 19:05	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG699915-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45224
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 19:18	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	379000	119000	3.18	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG699915-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45236
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 21:53	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	426000	136000	3.13	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG699915-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45238
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 22:19	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	773	978	0.790	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG699915-05
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45242
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 23:10	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	436000	139000	3.14	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG699915-06
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45244
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 23:36	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	535	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG700056-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45215
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 17:21	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	35100	11700	3.00	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG700056-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45216
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 17:34	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	70600	21300	3.31	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG700056-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45217
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 17:47	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	169000	55400	3.05	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG700056-05
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45218
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 18:00	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	344000	109000	3.16	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG700056-06
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45219
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 18:13	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	700000	228000	3.07	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG700056-07
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45220
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 18:26	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1760000	550000	3.20	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG700056-08
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45221
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 18:39	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	3360000	1060000	3.17	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L19030638	**Prep Method:**		**Samplenum:**	WG700056-09
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM45222
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG699914	**Analysis Date:**	03/18/2019 18:52	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	373000	122000	3.06	2.3	3.8	

2.2.1.3 Sample Data

Applied Biosystems | MDS SCIEX

Created with Analyst Reporter
Printed: 3/19/2019 2:01 PM

Data File	LM45229.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 8:22:48 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

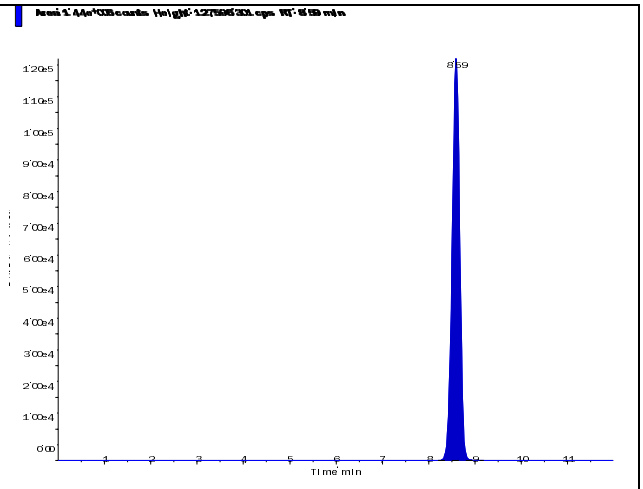
Sample Name	L19030638-01 RS	**Injection Vial**	13.00
Data File	LM45229.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 8:22:48 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699914-04	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.440e+06	8.59	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	2.140e+05	8.60	N/A	0.542
Perchlorate conf	7.200e+04	8.59	N/A	0.573

O18LP (Internal Standard)

RT (Exp. RT): 8.59(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)

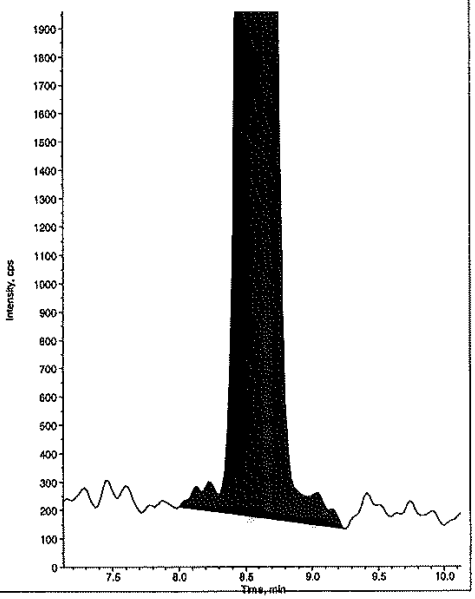


Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.60 (8.63) min 0.542 ng/ml 0.149 (Unknown)
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.59 (8.63) min 0.573 ng/ml 0.05 (Unknown)

Printing Time: 10:54:07 AM
Printing Date: Tuesday, March 19, 2019

Sample Name: "L19030638-01 RS" Sample ID: "WG699914-04" File: "LM45229.wiff"
Peak Name: "Perchlorate" Mass(es): "98.8/83.3 amu"
Comment: "1,1" Annotation: ""

Sample Index:	1	
Sample Type:	Unknown	
Concentration:	N/A	
Calculated Conc:	0.556	ug/L
Acq. Date:	3/18/2019	
Acq. Time:	8:22:46 PM	
Modified:	No	
Proc. Algorithm:	Analyst Classic	
Bunching Factor:	3	
Noise Threshold:	18.48	cps
Area Threshold:	92.40	cps
Num. Smooths:	5	
Sep. Width:	0.20	
Sep. Height:	0.01	
Exp. Peak Ratio:	5.00	
Exp. Adj. Ratio:	4.00	
Exp. Val. Ratio:	3.00	
RT Window:	30.000	sec
Expected RT:	8.63	min
Use Relative RT:	Yes	
Int. Type:	Base To Base	
Retention Time:	8.60	min
Area:	2.20e+005	counts
Height:	19453.105	cps
Start Time:	7.999	min
End Time:	9.255	min

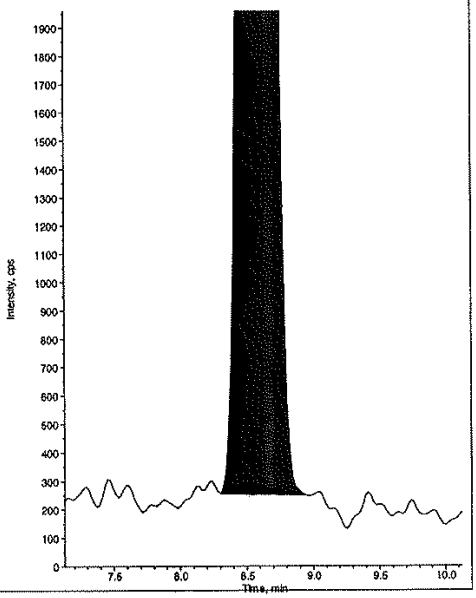


Collected by: N/A
Electronic Signature: no
Operator: Administrator

Printing Time: 10:55:08 AM
Printing Date: Tuesday, March 19, 2019

Sample Name: "L19030638-01 RS" Sample ID: "WG699914-04" File: "LM45229.wiff"
Peak Name: "Perchlorate" Mass(es): "98.8/83.3 amu"
Comment: "1,1" Annotation: ""

Sample Index:	1
Sample Type:	Unknown
Concentration:	N/A
Calculated Conc:	0.542 ug/L
Acq. Date:	3/18/2019
Acq. Time:	8:22:48 PM
Modified:	Yes
Proc. Algorithm:	Analyst Classic
Bunching Factor:	2
Noise Threshold:	18.48 cps
Area Threshold:	92.40 cps
Num. Smooths:	5
Sep. Width:	0.20
Sep. Height:	0.01
Exp. Peak Ratio:	5.00
Exp. Adj. Ratio:	4.00
Exp. Val. Ratio:	3.00
RT Window:	30.000 sec
Expected RT:	8.63 min
Use Relative RT:	Yes
Int. Type:	Base To Base
Retention Time:	8.60 min
Area:	2.14e+005 counts
Height:	19374.273 cps
Start Time:	8.301 min
End Time:	8.951 min



#4
JWR/03/19/19

EK2 3-20-19

Collected by: N/A
Electronic Signature: no
Operator: Administrator

Applied Biosystems | MDS SCIEX

Created with Analyst Reporter
Printed: 3/19/2019 2:01 PM

Data File	LM45230.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 8:35:44 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

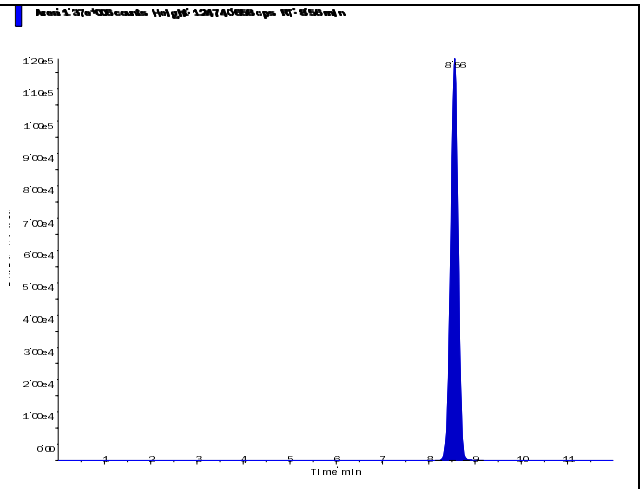
Sample Name	L19030638-02 MS	**Injection Vial**	14.00
Data File	LM45230.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 8:35:44 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699914-05	**Dilution Factor**	1.00
Sample Comment	1,1 STD87534	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.370e+06	8.56	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	2.760e+05	8.57	N/A	0.735
Perchlorate conf	8.630e+04	8.56	N/A	0.725

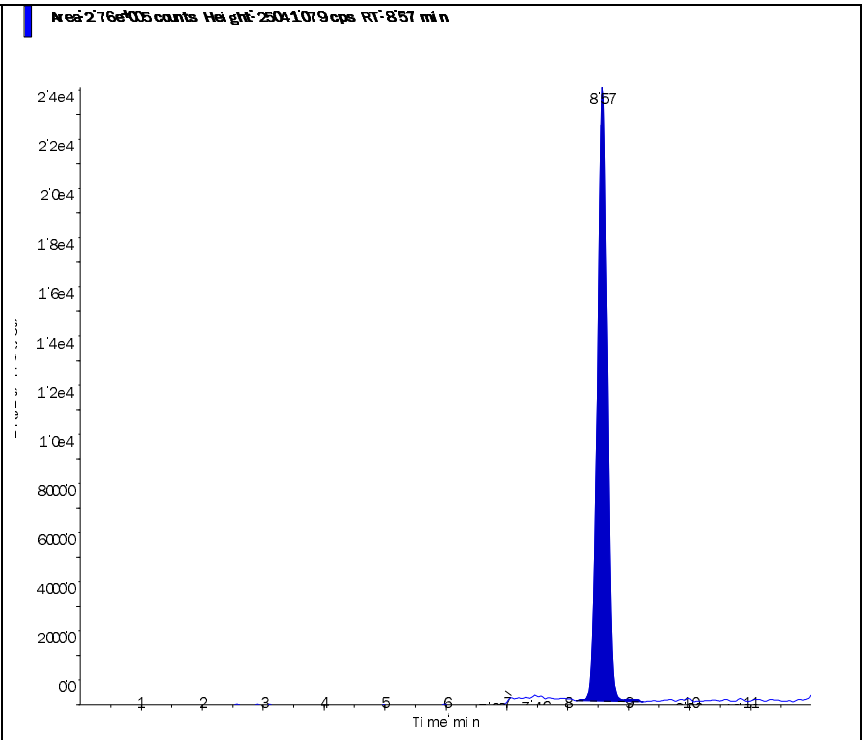
O18LP (Internal Standard)

RT (Exp. RT): 8.56(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



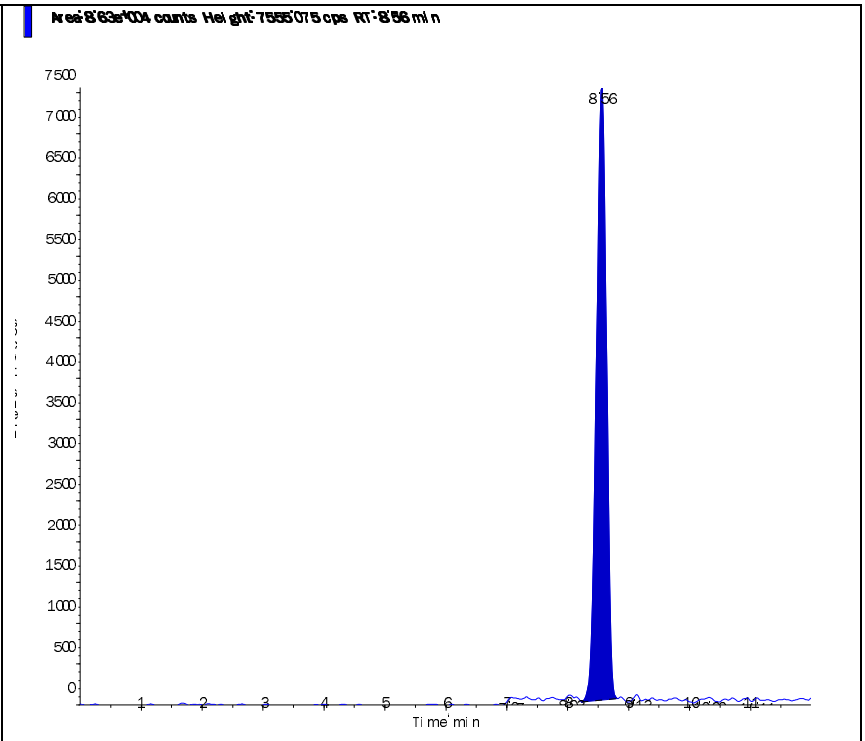
Perchlorate (98.8/83.3 amu)

RT (Exp. RT):	8.57 (8.63) min
Calculated conc:	0.735 ng/ml
Area Ratio:	0.201
Sample Type:	(Unknown)



Perchlorate conf (100.8/85.2 amu)

RT (Exp. RT):	8.56 (8.63) min
Calculated conc:	0.725 ng/ml
Area Ratio:	0.063
Sample Type:	(Unknown)



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Data File	LM45231.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 8:48:40 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

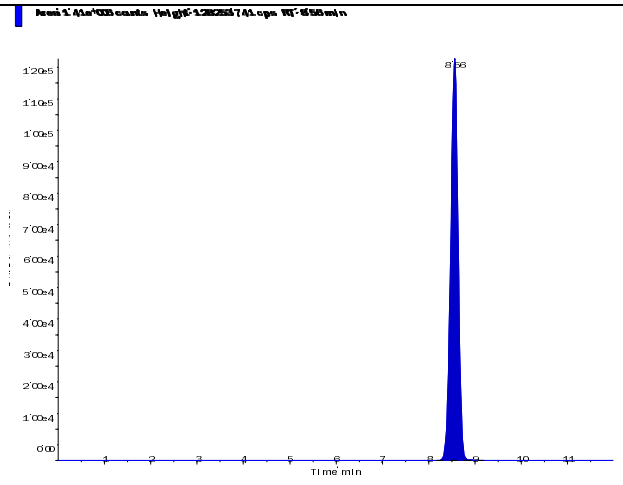
Sample Name	L19030638-03 MSD	**Injection Vial**	15.00
Data File	LM45231.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 8:48:40 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699914-06	**Dilution Factor**	1.00
Sample Comment	1,1 STD87534	**Weight to Volume**	0.00

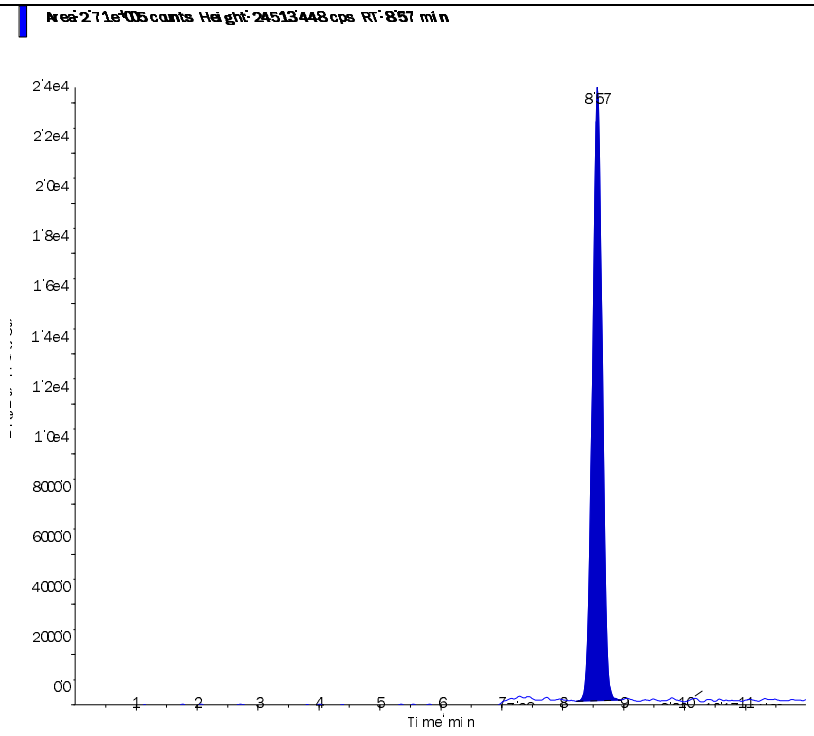
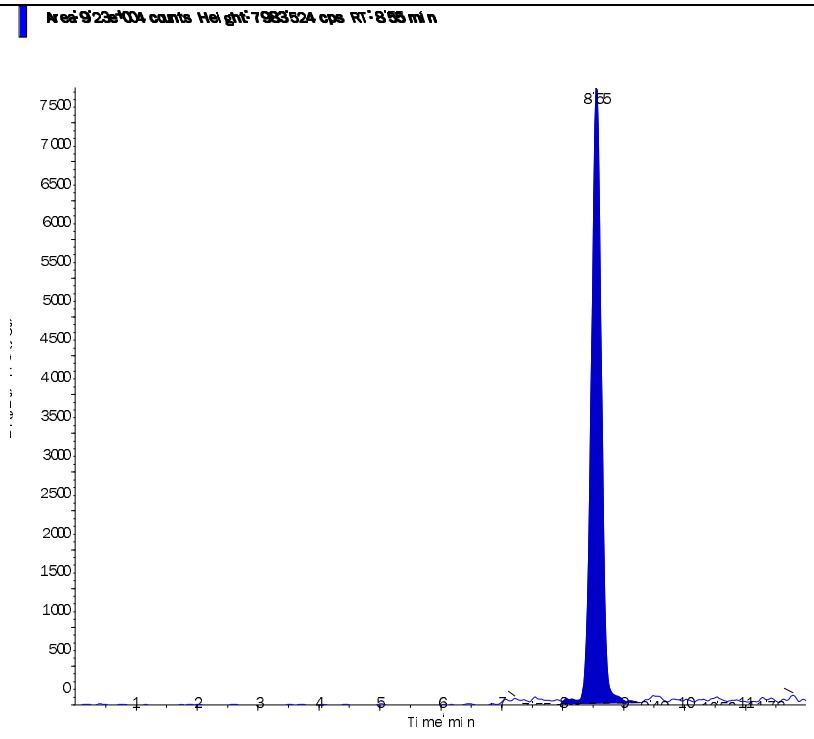
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.410e+06	8.56	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	2.710e+05	8.57	N/A	0.703
Perchlorate conf	9.230e+04	8.55	N/A	0.753

O18LP (Internal Standard)

RT (Exp. RT): 8.56(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.57 (8.63) min Calculated conc: 0.703 ng/ml Area Ratio: 0.193 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.55 (8.63) min Calculated conc: 0.753 ng/ml Area Ratio: 0.065 Sample Type: (Unknown)	

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Data File	LM45232.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 9:01:36 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

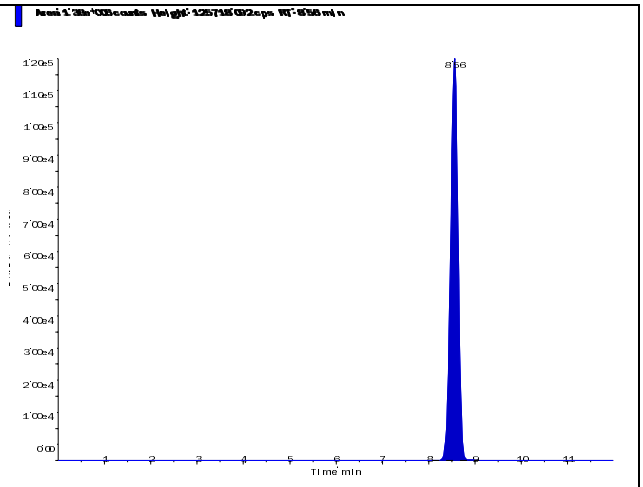
Sample Name	L19030638-04	**Injection Vial**	16.00
Data File	LM45232.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 9:01:36 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	L19030638-04	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

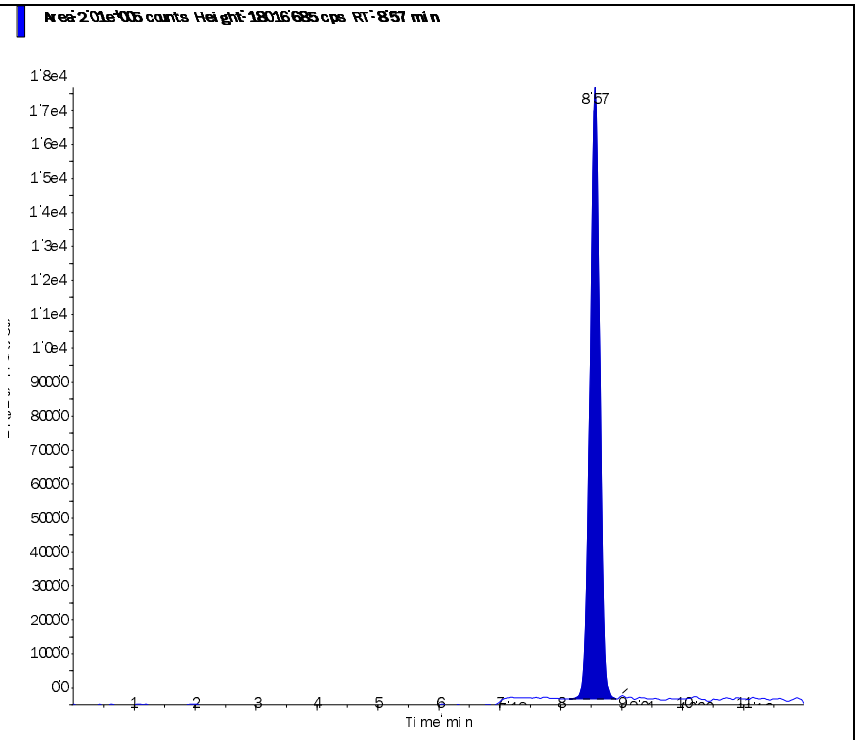
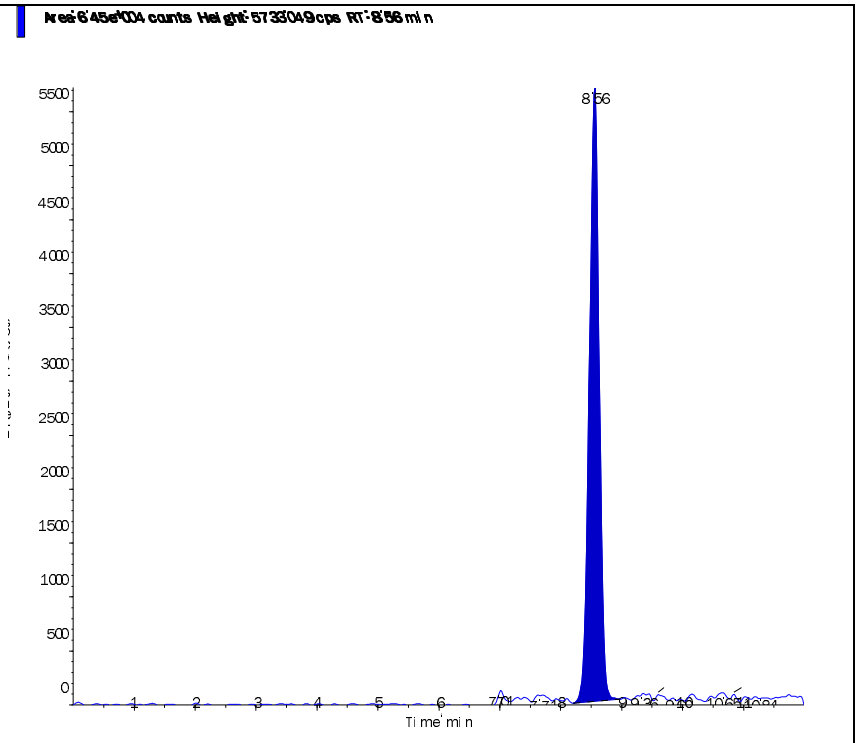
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.380e+06	8.56	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	2.010e+05	8.57	N/A	0.53
Perchlorate conf	6.450e+04	8.56	N/A	0.535

O18LP (Internal Standard)

RT (Exp. RT): 8.56(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.57 (8.63) min Calculated conc: 0.53 ng/ml Area Ratio: 0.146 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.56 (8.63) min Calculated conc: 0.535 ng/ml Area Ratio: 0.047 Sample Type: (Unknown)	

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Data File	LM45233.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 9:14:31 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

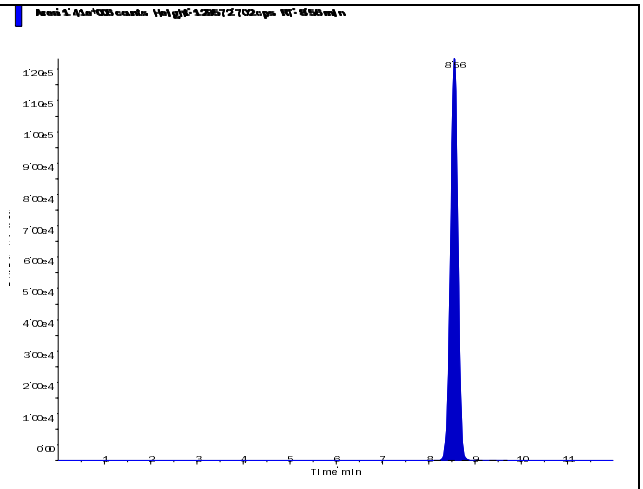
Sample Name	L19030638-05	**Injection Vial**	17.00
Data File	LM45233.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 9:14:31 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	L19030638-05	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

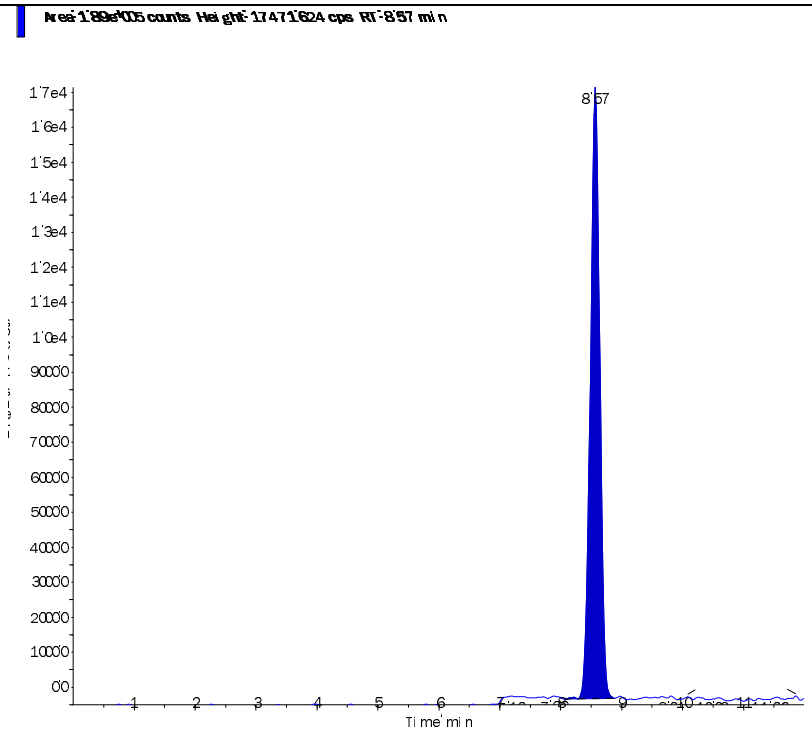
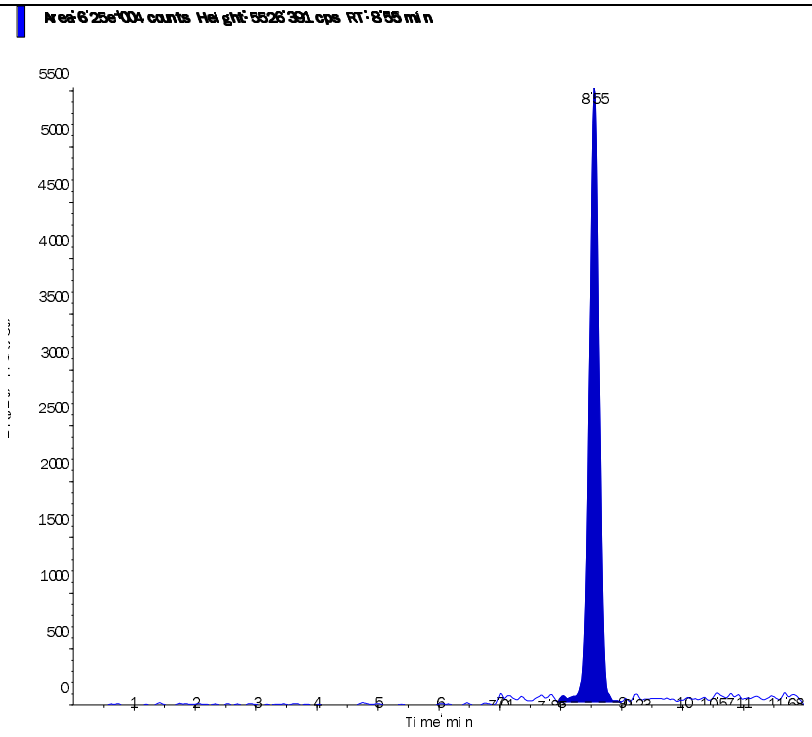
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.410e+06	8.56	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.890e+05	8.57	N/A	0.486
Perchlorate conf	6.250e+04	8.55	N/A	0.506

O18LP (Internal Standard)

RT (Exp. RT): 8.56(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.57 (8.63) min Calculated conc: 0.486 ng/ml Area Ratio: 0.134 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.55 (8.63) min Calculated conc: 0.506 ng/ml Area Ratio: 0.044 Sample Type: (Unknown)	

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Data File	LM45234.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 9:27:26 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

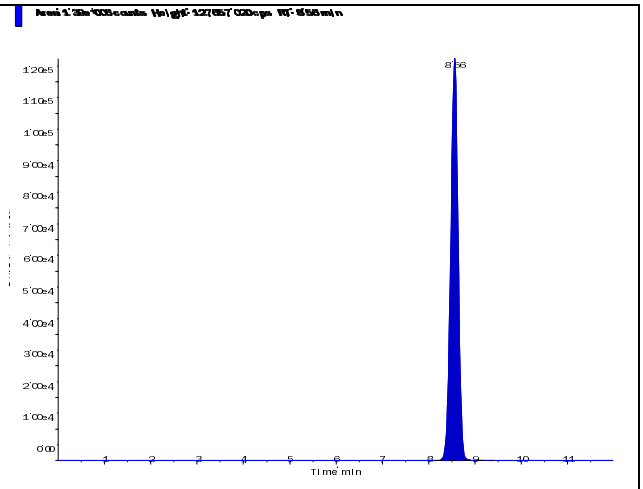
Sample Name	L19030638-06	**Injection Vial**	18.00
Data File	LM45234.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 9:27:26 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	L19030638-06	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

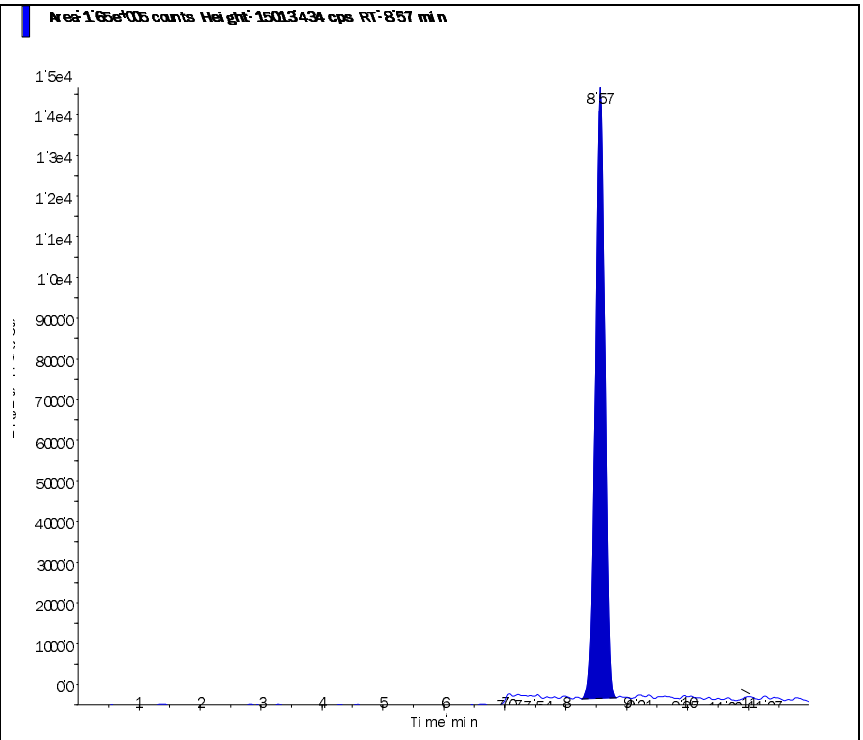
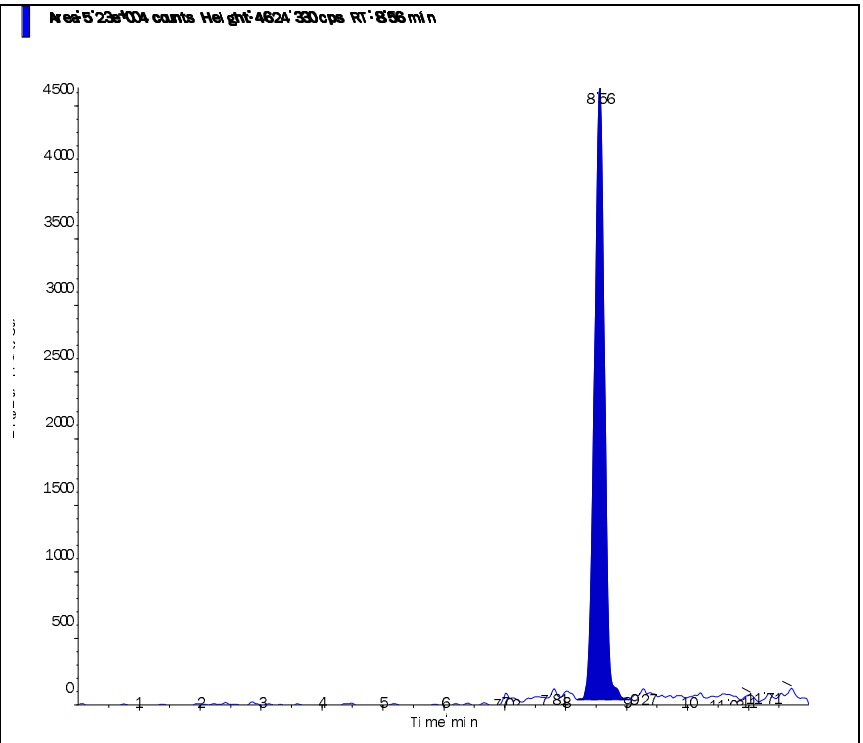
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.390e+06	8.56	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.650e+05	8.57	N/A	0.43
Perchlorate conf	5.230e+04	8.56	N/A	0.429

O18LP (Internal Standard)

RT (Exp. RT): 8.56(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.57 (8.63) min Calculated conc: 0.43 ng/ml Area Ratio: 0.118 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.56 (8.63) min Calculated conc: 0.429 ng/ml Area Ratio: 0.038 Sample Type: (Unknown)	

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Data File	LM45235.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 9:40:26 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

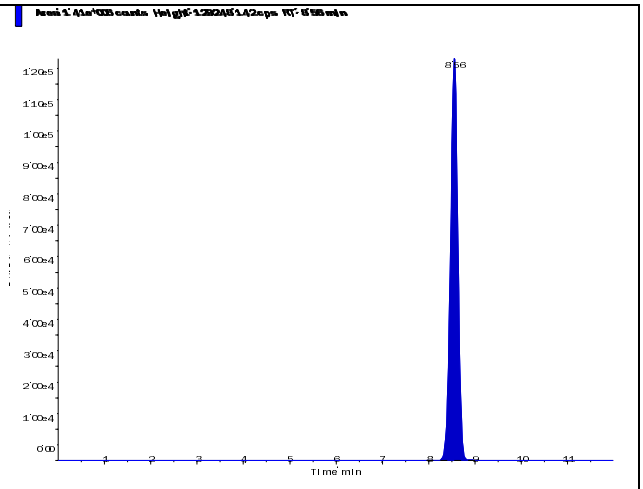
Sample Name	L19030638-07	**Injection Vial**	19.00
Data File	LM45235.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 9:40:26 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	L19030638-07	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.410e+06	8.56	5.00	-

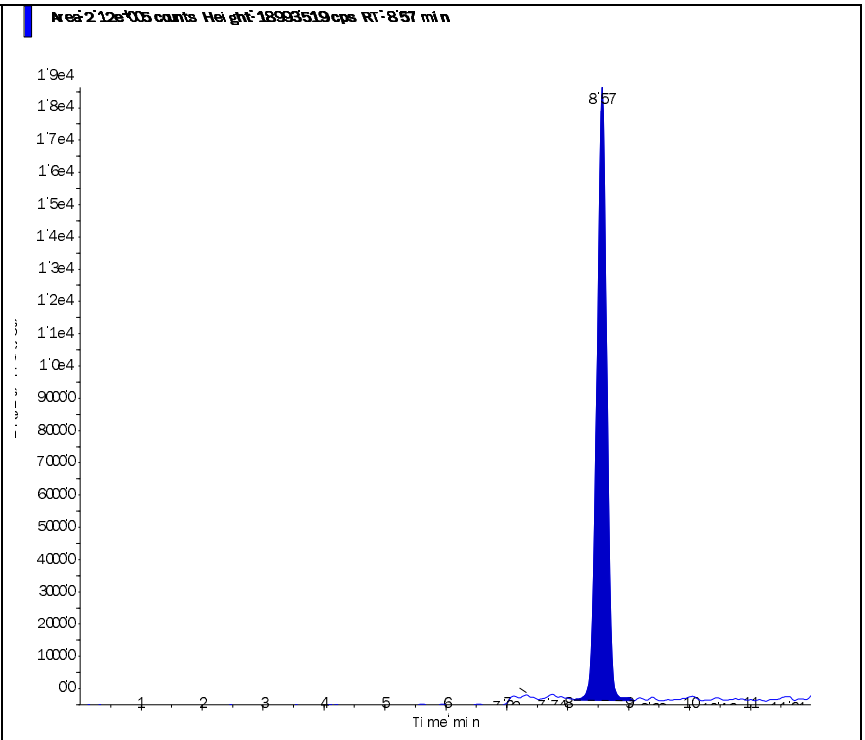
Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	2.120e+05	8.57	N/A	0.548
Perchlorate conf	6.810e+04	8.55	N/A	0.552

O18LP (Internal Standard)

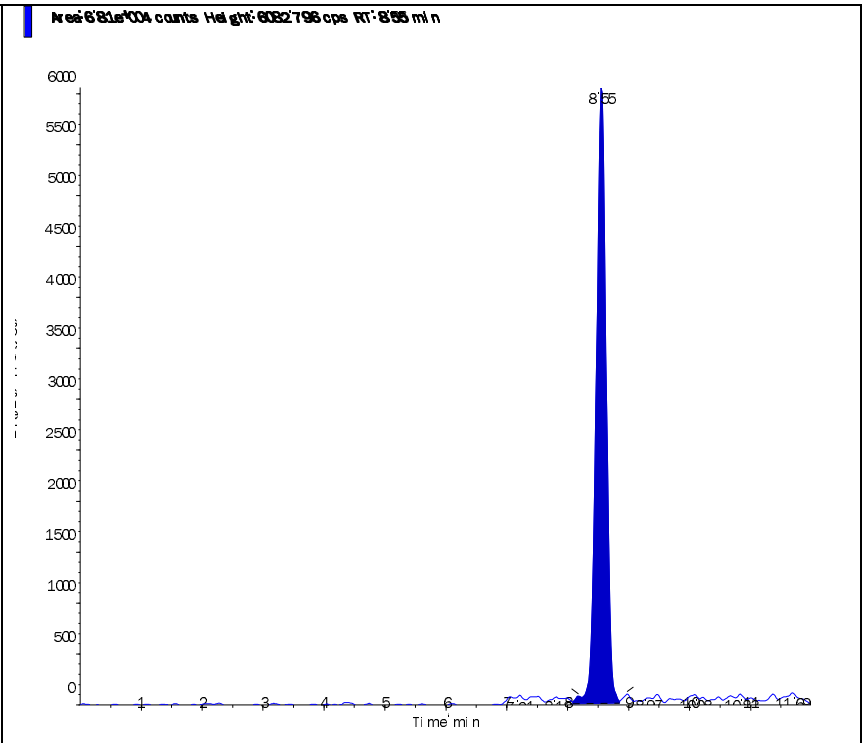
RT (Exp. RT): 8.56(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 8.57 (8.63) min 0.548 ng/ml 0.15 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 8.55 (8.63) min 0.552 ng/ml 0.048 (Unknown)



2.2.1.4 Standards Data

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Data File	LM45215.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 5:21:42 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

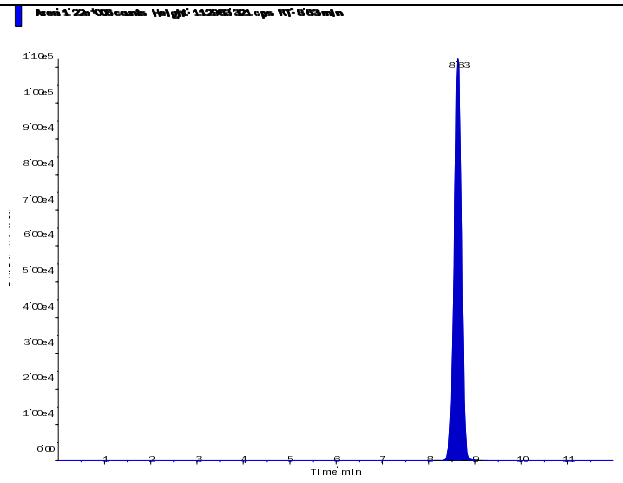
Sample Name	WG700056-02 STD (0.1 ug/L)	**Injection Vial**	2.00
Data File	LM45215.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 5:21:42 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG700056-02	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

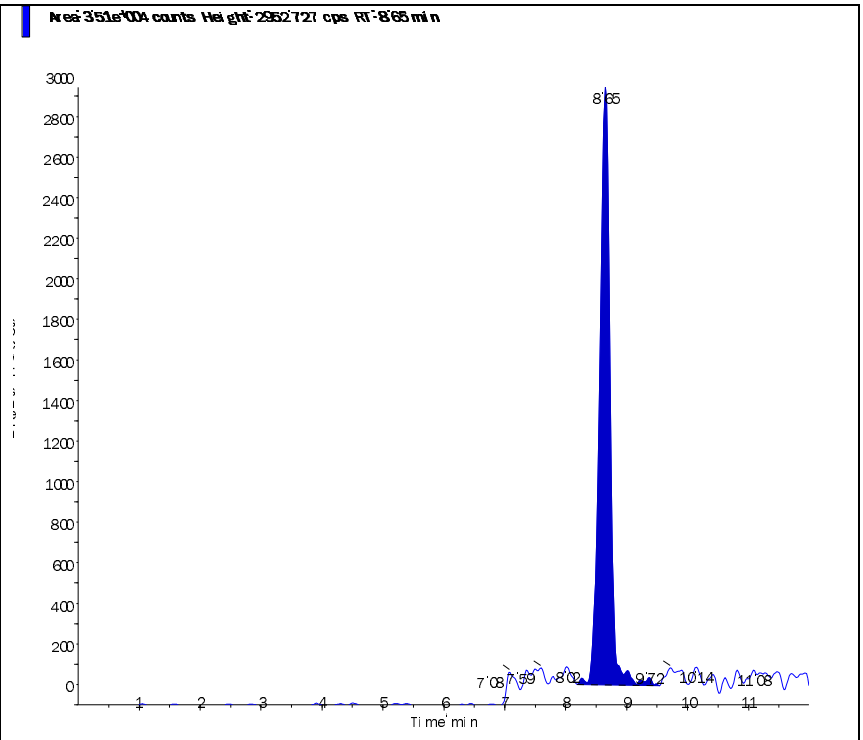
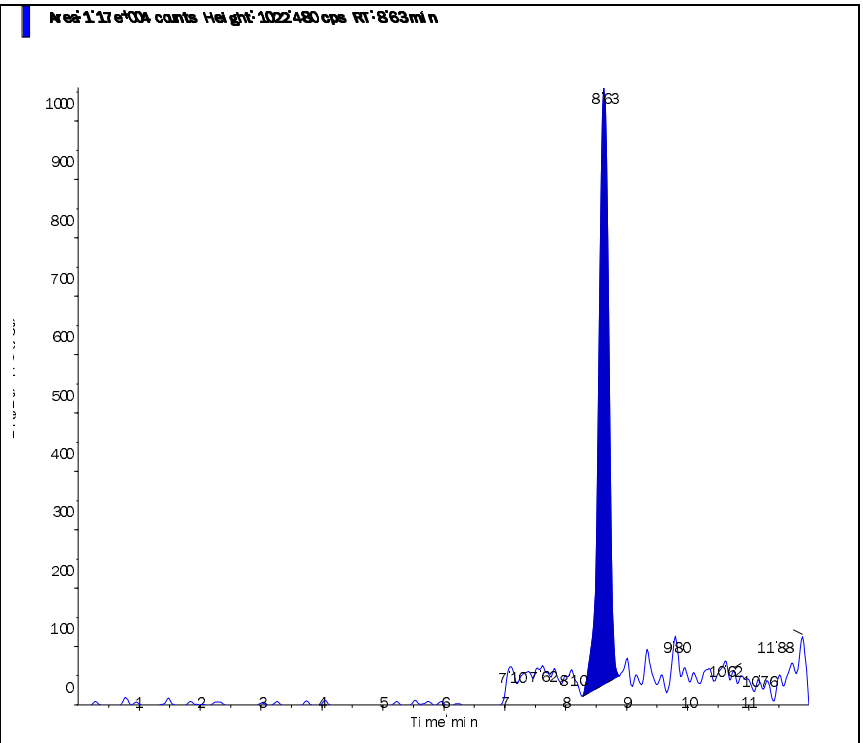
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.220e+06	8.63	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.510e+04	8.65	0.10	0.101
Perchlorate conf	1.170e+04	8.63	0.10	0.104

O18LP (Internal Standard)

RT (Exp. RT): 8.63(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.65 (8.63) min Calculated conc: 0.101 ng/ml Area Ratio: 0.029 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.63 (8.63) min Calculated conc: 0.104 ng/ml Area Ratio: 0.01 Sample Type: (Standard)	

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Data File	LM45216.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 5:34:37 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

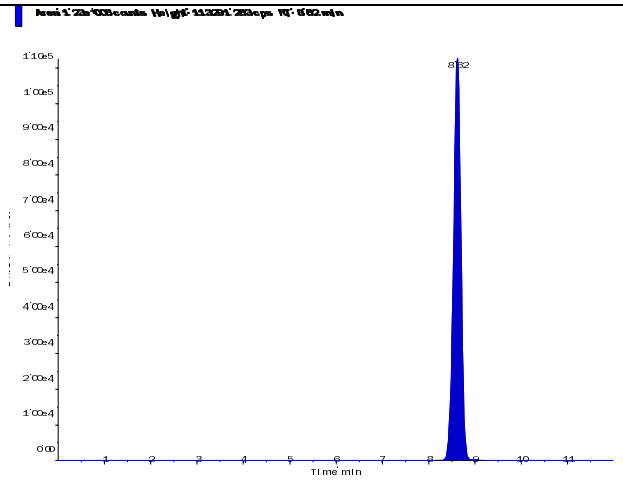
Sample Name	WG700056-03 STD (0.2 ug/L)	**Injection Vial**	3.00
Data File	LM45216.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 5:34:37 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG700056-03	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

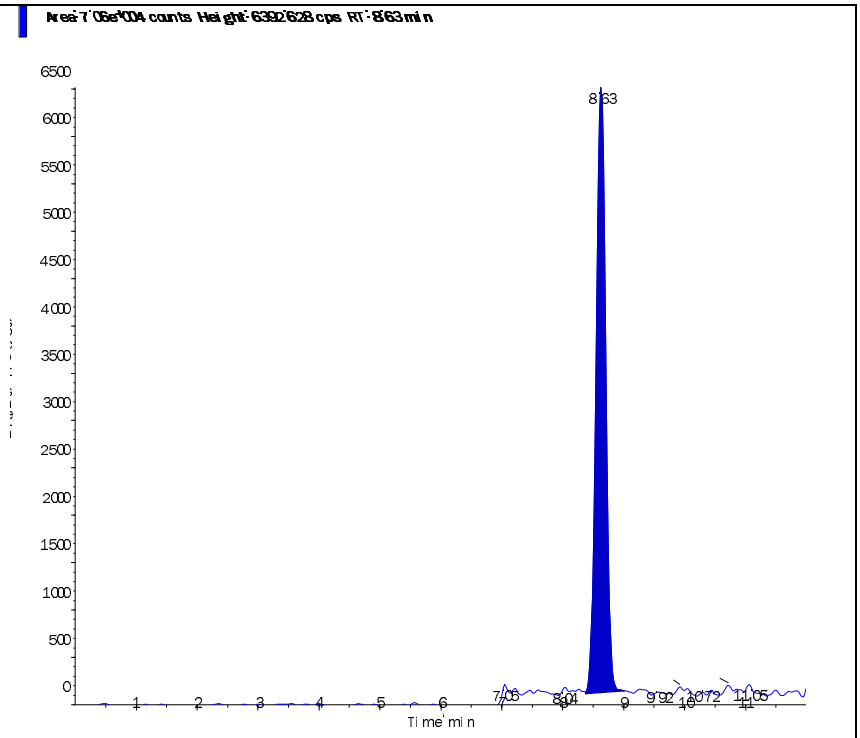
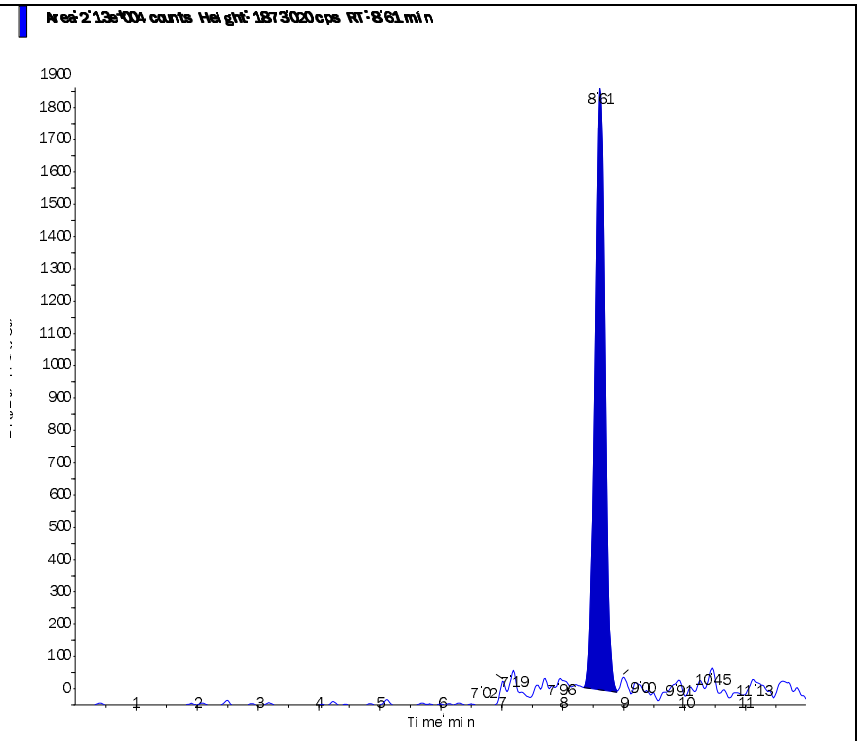
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.230e+06	8.62	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	7.060e+04	8.63	0.20	0.206
Perchlorate conf	2.130e+04	8.61	0.20	0.193

O18LP (Internal Standard)

RT (Exp. RT): 8.62(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.63 (8.63) min Calculated conc: 0.206 ng/ml Area Ratio: 0.057 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.61 (8.63) min Calculated conc: 0.193 ng/ml Area Ratio: 0.017 Sample Type: (Standard)	

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Data File	LM45217.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 5:47:35 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

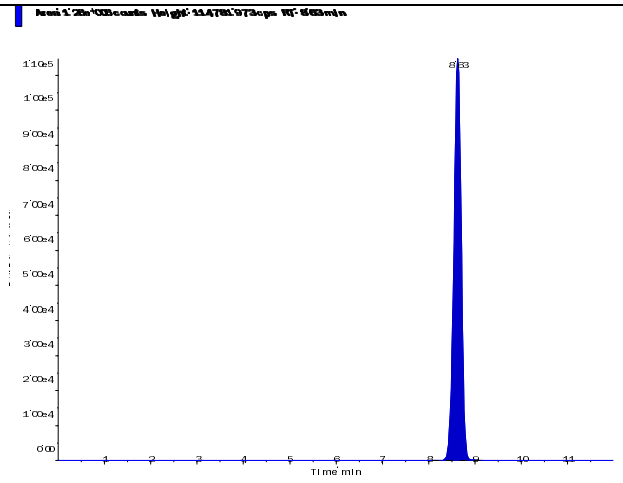
Sample Name	WG700056-04 STD (0.5 ug/L)	**Injection Vial**	4.00
Data File	LM45217.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 5:47:35 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG700056-04	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

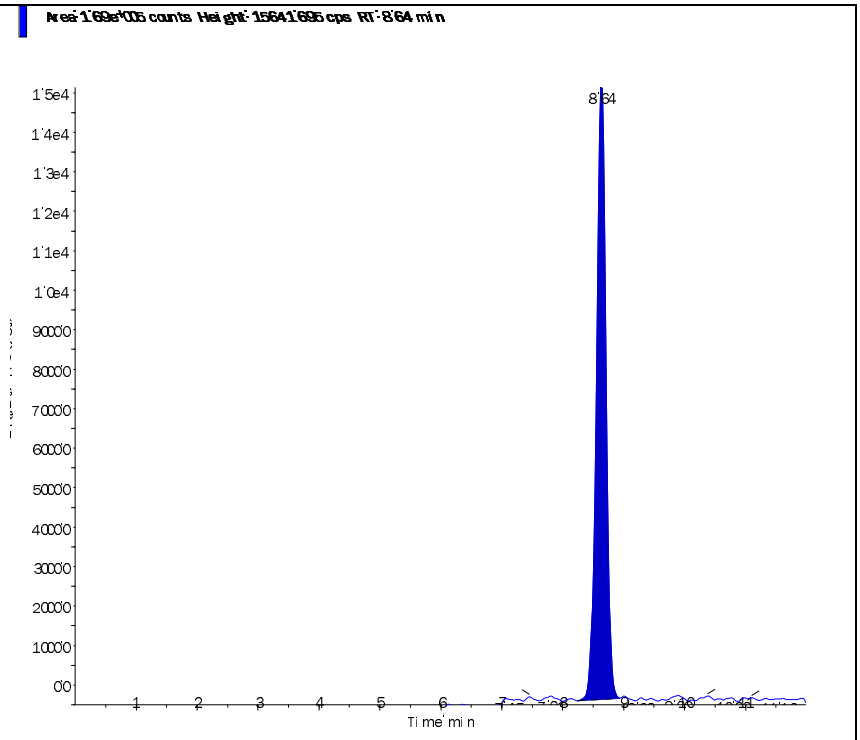
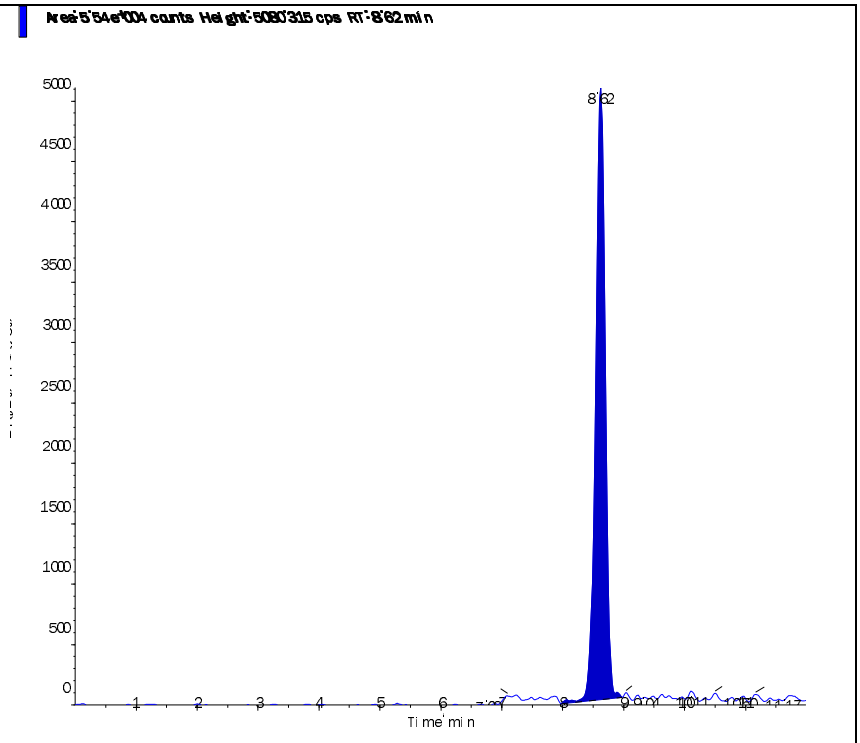
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.260e+06	8.63	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.690e+05	8.64	0.50	0.488
Perchlorate conf	5.540e+04	8.62	0.50	0.503

O18LP (Internal Standard)

RT (Exp. RT): 8.63(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.64 (8.63) min Calculated conc: 0.488 ng/ml Area Ratio: 0.134 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.62 (8.63) min Calculated conc: 0.503 ng/ml Area Ratio: 0.044 Sample Type: (Standard)	

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Data File	LM45218.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 6:00:31 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

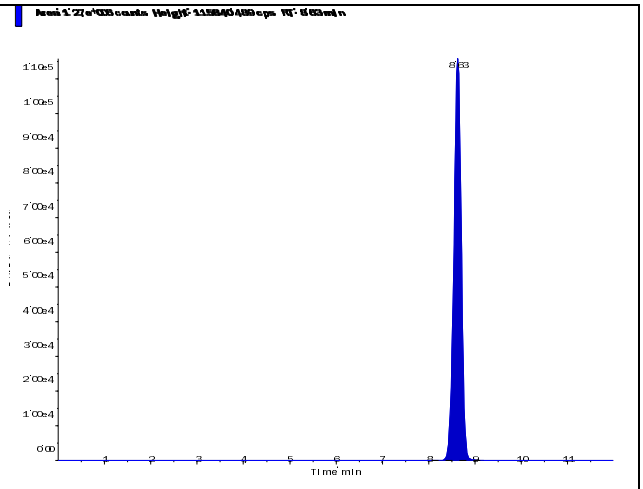
Sample Name	WG700056-05 STD (1.0 ug/L)	**Injection Vial**	5.00
Data File	LM45218.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 6:00:31 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG700056-05	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.270e+06	8.63	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.440e+05	8.64	1.00	0.99
Perchlorate conf	1.090e+05	8.63	1.00	0.989

O18LP (Internal Standard)

RT (Exp. RT): 8.63(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



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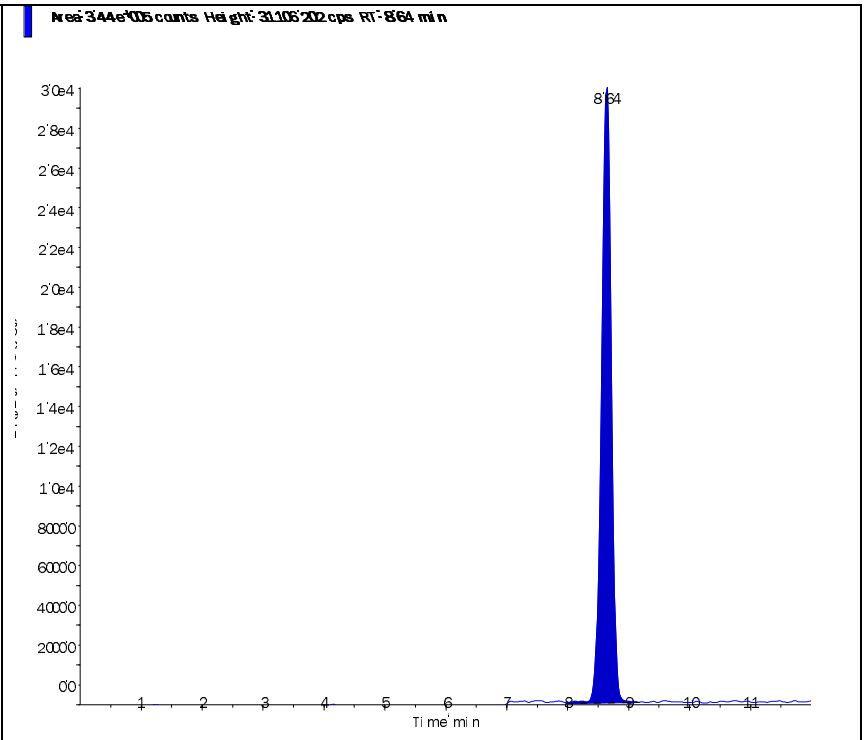
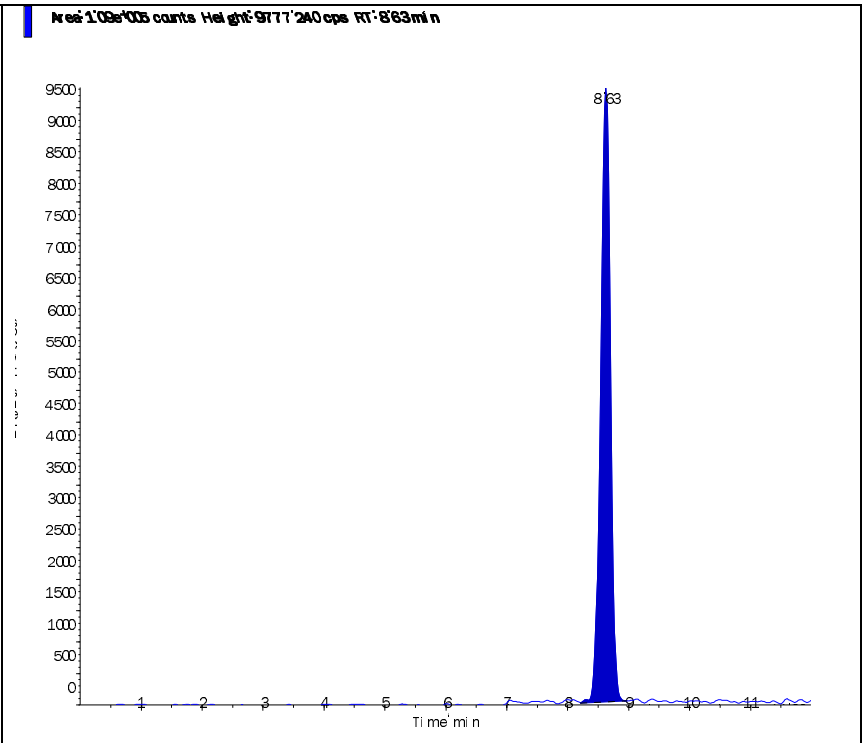
Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.64 (8.63) min Calculated conc: 0.99 ng/ml Area Ratio: 0.271 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.63 (8.63) min Calculated conc: 0.989 ng/ml Area Ratio: 0.086 Sample Type: (Standard)	

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Data File	LM45219.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 6:13:24 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

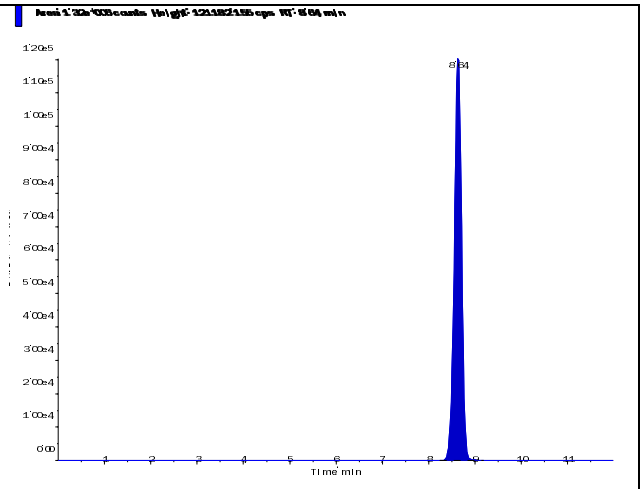
Sample Name	WG700056-06 STD (2.0 ug/L)	**Injection Vial**	6.00
Data File	LM45219.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 6:13:24 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG700056-06	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

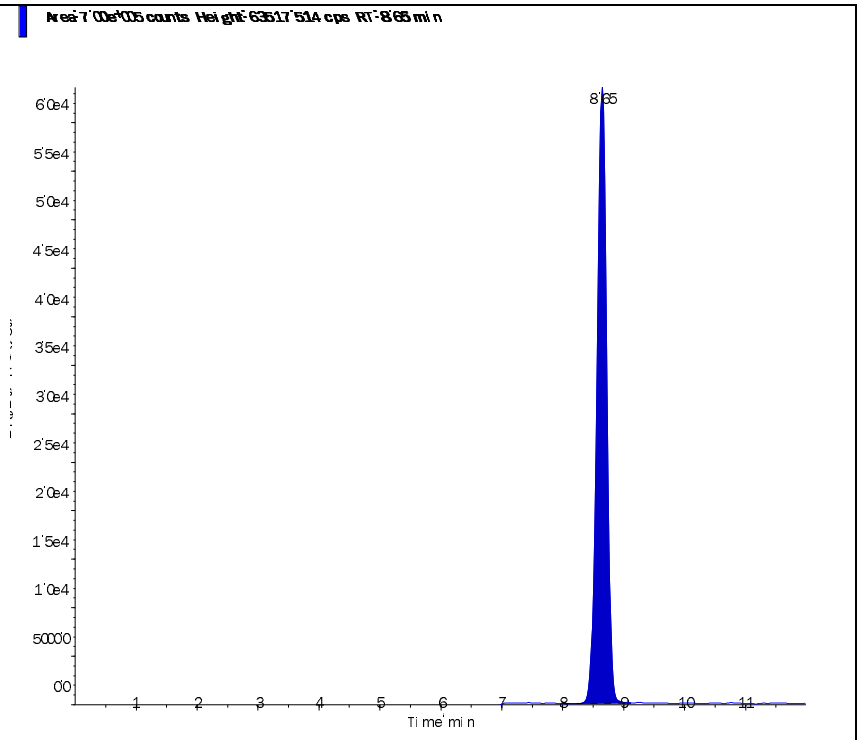
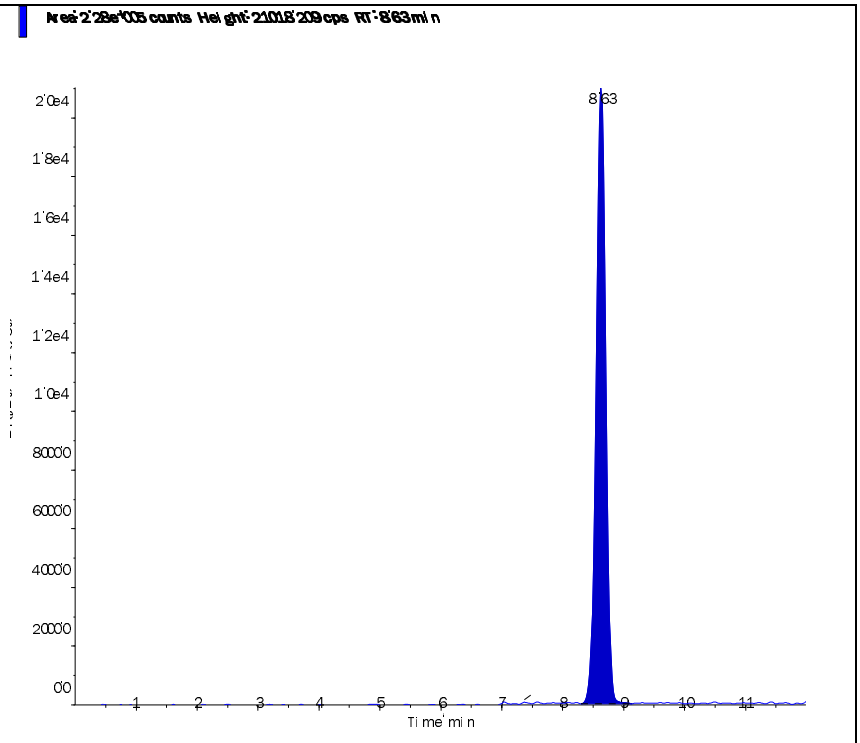
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.320e+06	8.64	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	7.000e+05	8.65	2.00	1.95
Perchlorate conf	2.280e+05	8.63	2.00	2.00

O18LP (Internal Standard)

RT (Exp. RT): 8.64(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.65 (8.63) min Calculated conc: 1.95 ng/ml Area Ratio: 0.532 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.63 (8.63) min Calculated conc: 2.00 ng/ml Area Ratio: 0.173 Sample Type: (Standard)	

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Data File	LM45220.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 6:26:23 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

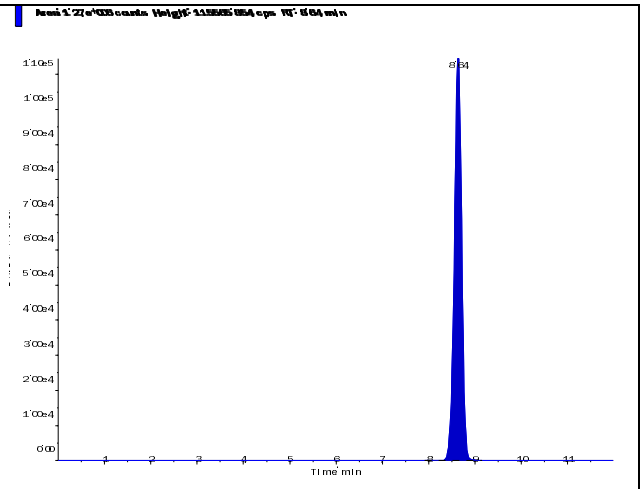
Sample Name	WG700056-07 STD (5.0 ug/L)	**Injection Vial**	7.00
Data File	LM45220.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 6:26:23 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG700056-07	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

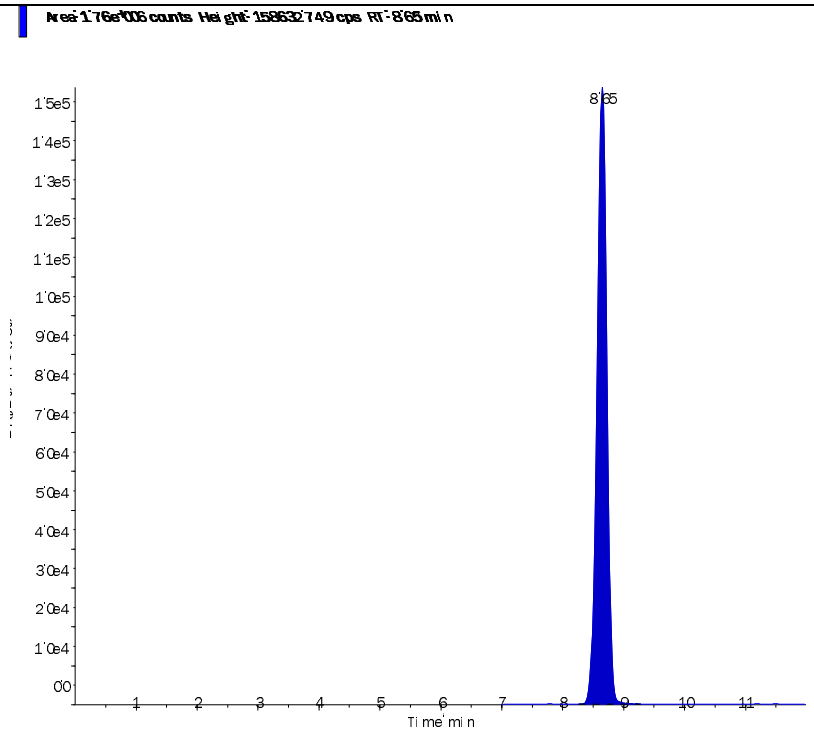
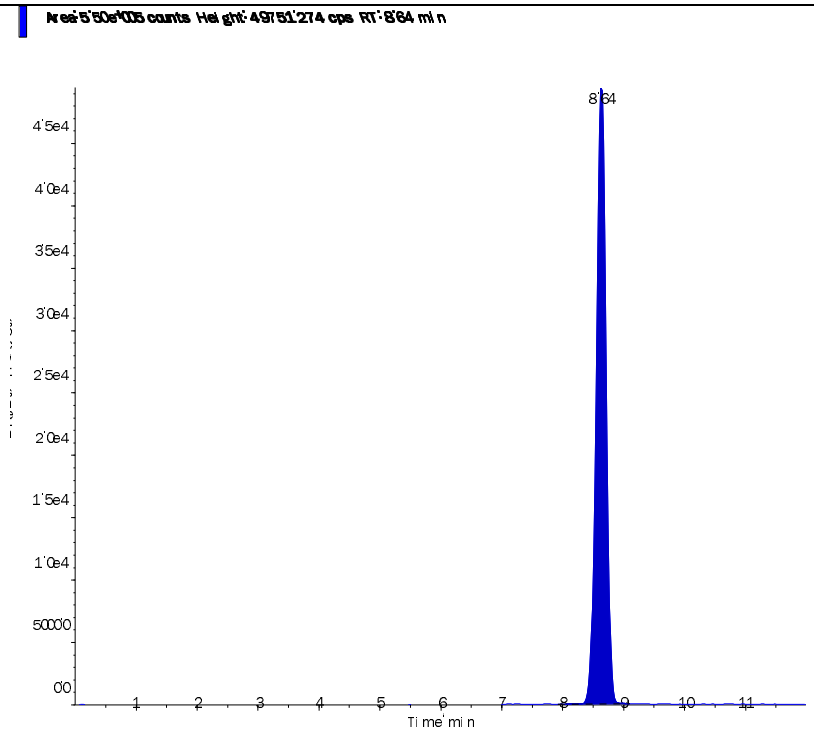
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.270e+06	8.64	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	1.760e+06	8.65	5.00	5.09
Perchlorate conf	5.500e+05	8.64	5.00	5.03

O18LP (Internal Standard)

RT (Exp. RT): 8.64(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.65 (8.63) min Calculated conc: 5.09 ng/ml Area Ratio: 1.387 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.64 (8.63) min Calculated conc: 5.03 ng/ml Area Ratio: 0.433 Sample Type: (Standard)	

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Data File	LM45221.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 6:39:19 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

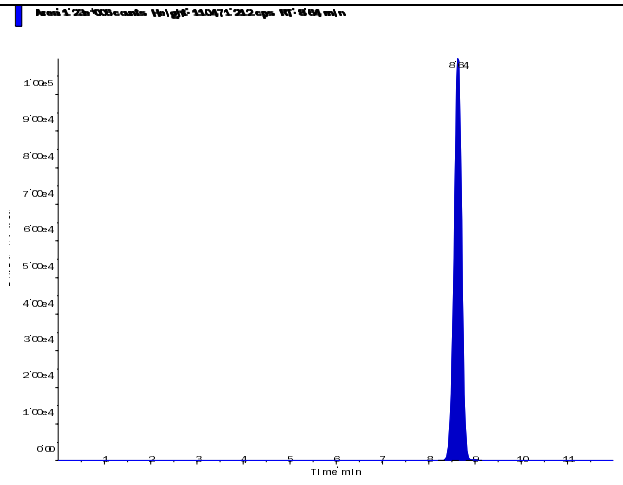
Sample Name	WG700056-08 STD (10 ug/L)	**Injection Vial**	8.00
Data File	LM45221.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 6:39:19 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Standard
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG700056-08	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

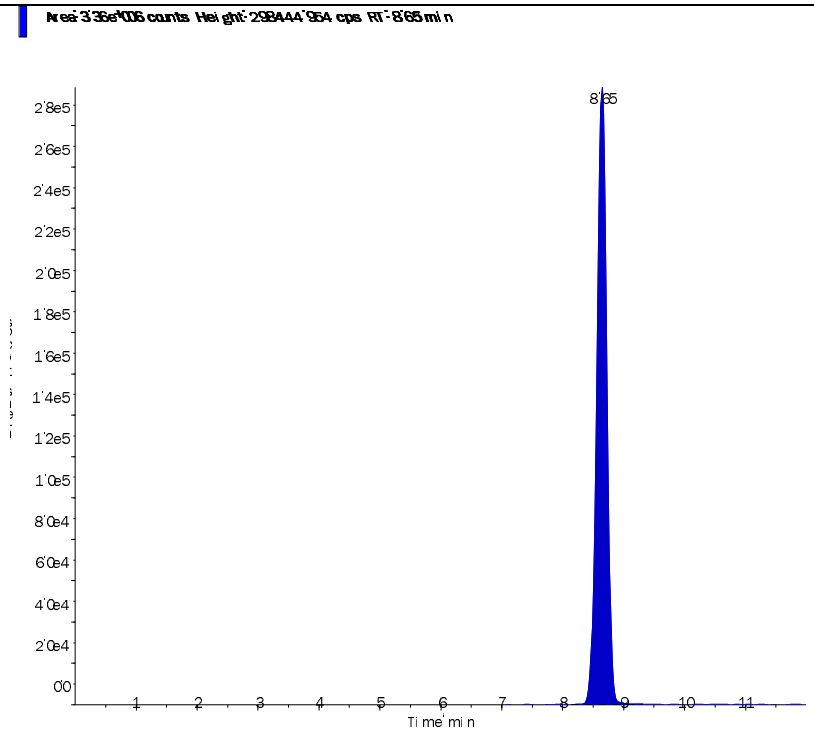
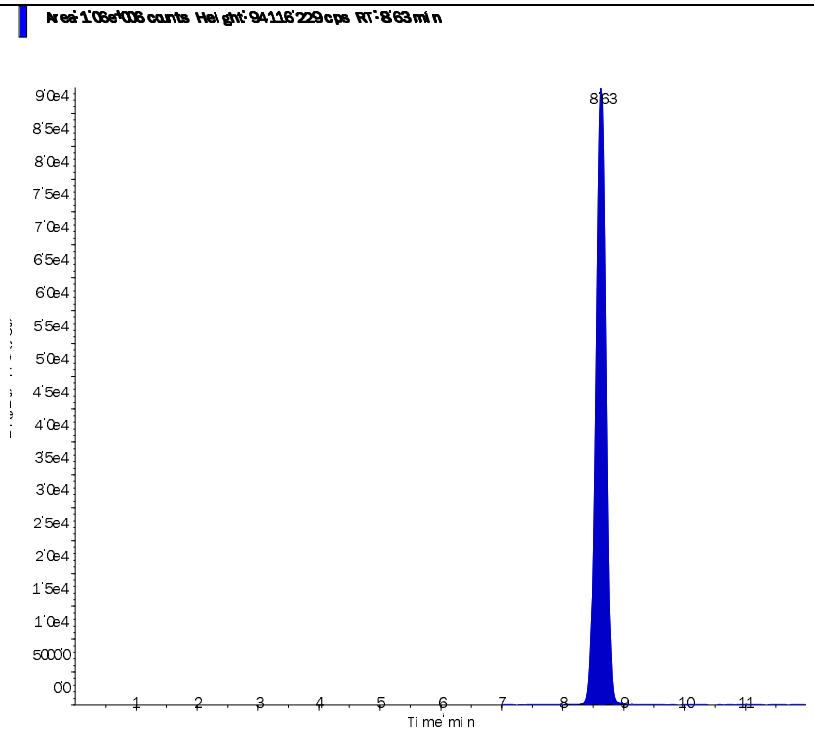
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.230e+06	8.64	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.360e+06	8.65	10.00	9.98
Perchlorate conf	1.060e+06	8.63	10.00	9.98

O18LP (Internal Standard)

RT (Exp. RT): 8.64(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Standard)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.65 (8.63) min Calculated conc: 9.98 ng/ml Area Ratio: 2.72 Sample Type: (Standard)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.63 (8.63) min Calculated conc: 9.98 ng/ml Area Ratio: 0.859 Sample Type: (Standard)	

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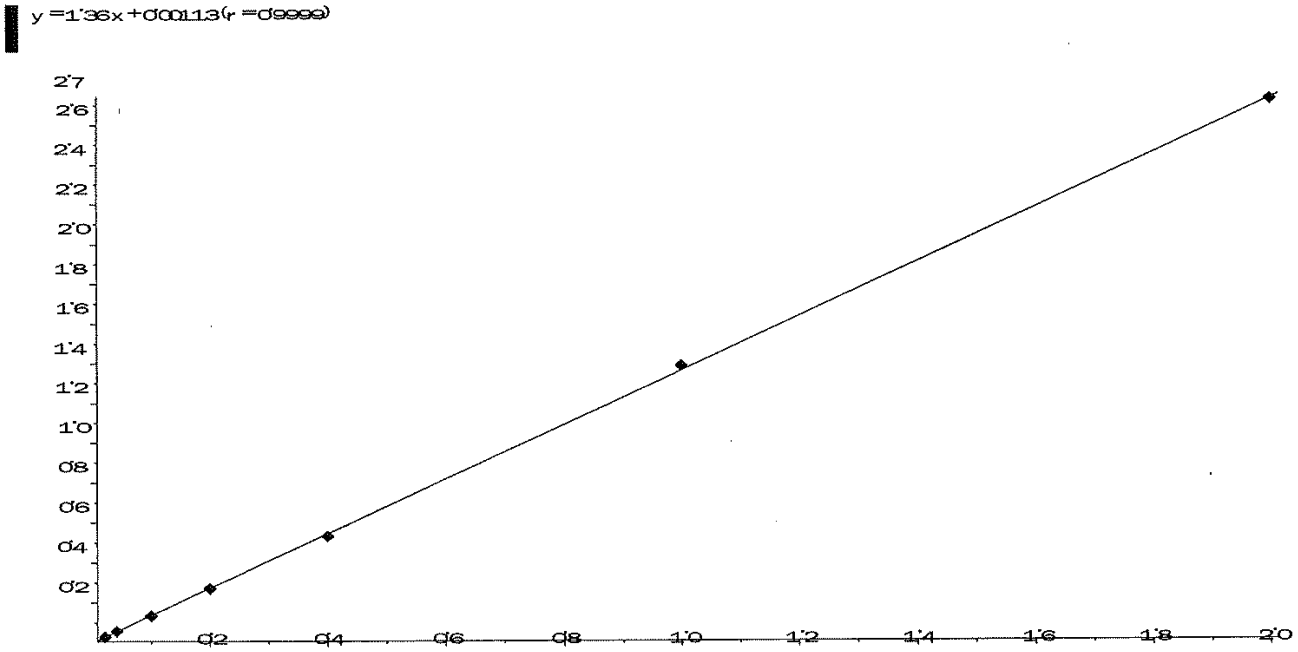
Analyte Name: **Perchlorate**
Internal Standard: O18LP

Data File	LM45214.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 5:08:52 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

Regression Equation: y = 1.36 x + 0.00113 (r = 0.9999)

Expected Concentration	Number of Values	Mean Calculated Concentration	% Accuracy	Std. Deviation	%CV
0.10	1	0.10	101.3	N/A	N/A
0.20	1	0.21	103.1	N/A	N/A
0.50	1	0.49	97.7	N/A	N/A
1.00	1	0.99	99.0	N/A	N/A
2.00	1	1.95	97.4	N/A	N/A
5.00	1	5.09	101.7	N/A	N/A
10.00	1	9.98	99.8	N/A	N/A



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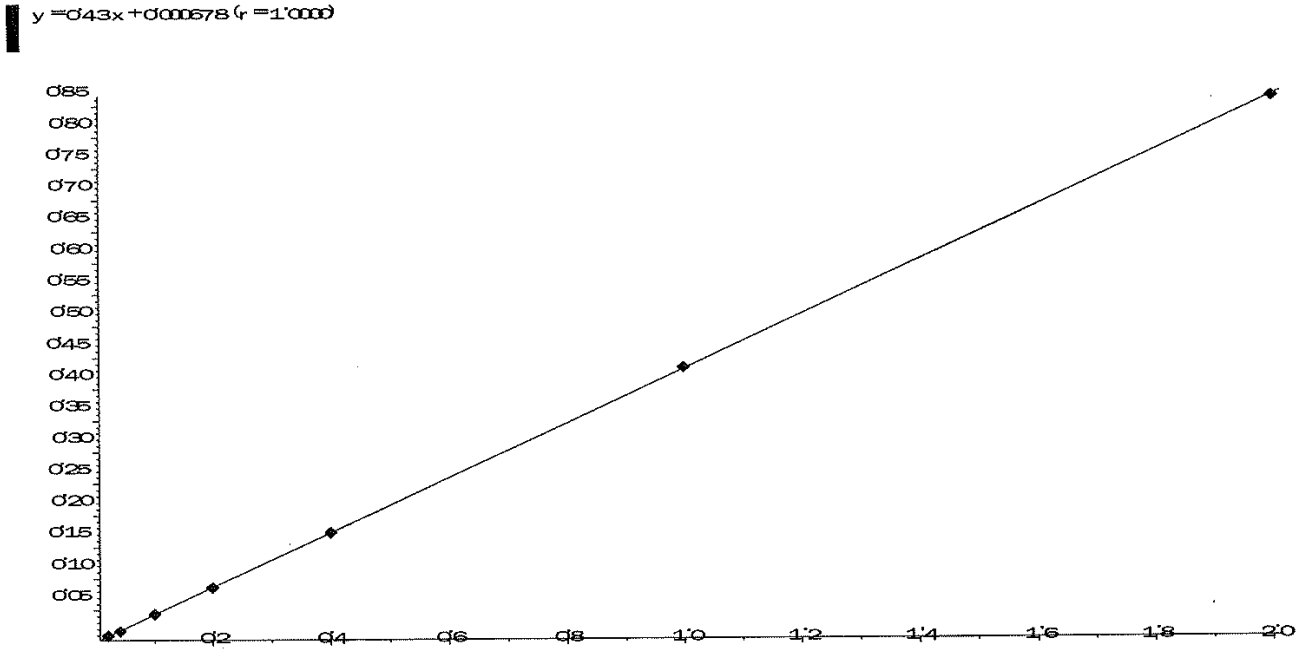
Printed: 3/19/2019 1:23 PM

Analyte Name: **Perchlorate conf**
Internal Standard: O18LP

Data File	LM45214.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 5:08:52 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

Regression Equation: y = 0.43 x + 0.000678 (r = 1.0000)

Expected Concentration	Number of Values	Mean Calculated Concentration	% Accuracy	Std. Deviation	%CV
0.10	1	0.10	103.6	N/A	N/A
0.20	1	0.19	96.4	N/A	N/A
0.50	1	0.50	100.6	N/A	N/A
1.00	1	0.99	98.9	N/A	N/A
2.00	1	2.00	100.2	N/A	N/A
5.00	1	5.03	100.5	N/A	N/A
10.00	1	9.98	99.8	N/A	N/A



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Printed: 3/19/2019 2:00 PM

Data File	LM45222.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 6:52:15 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

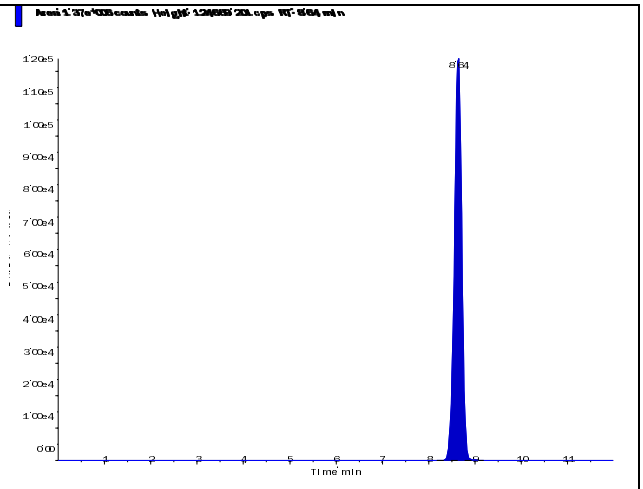
Sample Name	WG700056-09 SSCV (1.0 ug/L)	**Injection Vial**	9.00
Data File	LM45222.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 6:52:15 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG700056-09	**Dilution Factor**	1.00
Sample Comment	1,1 STD87534	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.370e+06	8.64	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.730e+05	8.65	1.00	0.999
Perchlorate conf	1.220e+05	8.63	1.00	1.03

O18LP (Internal Standard)

RT (Exp. RT): 8.64(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



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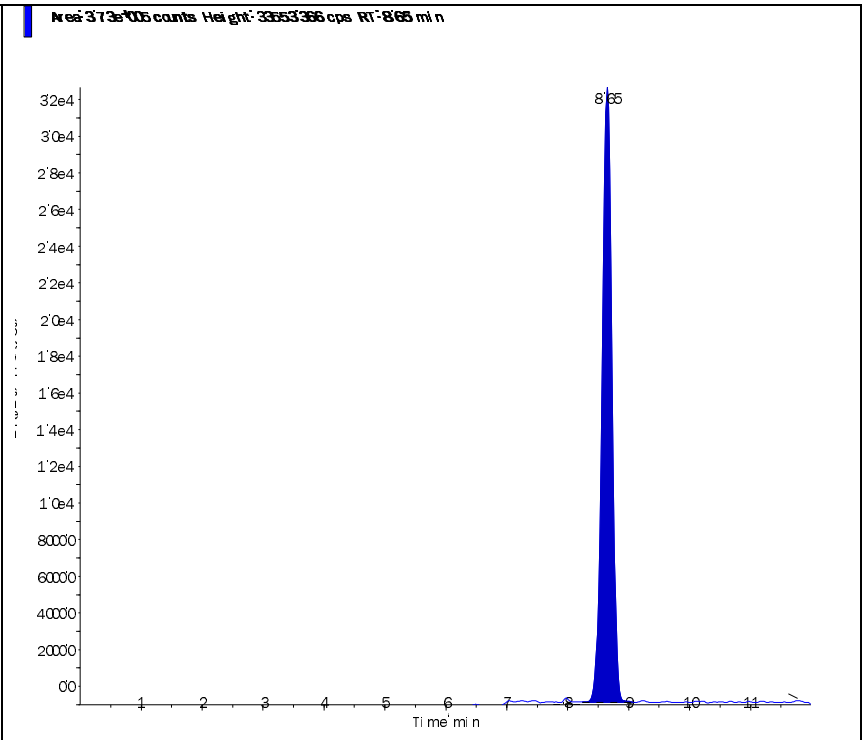
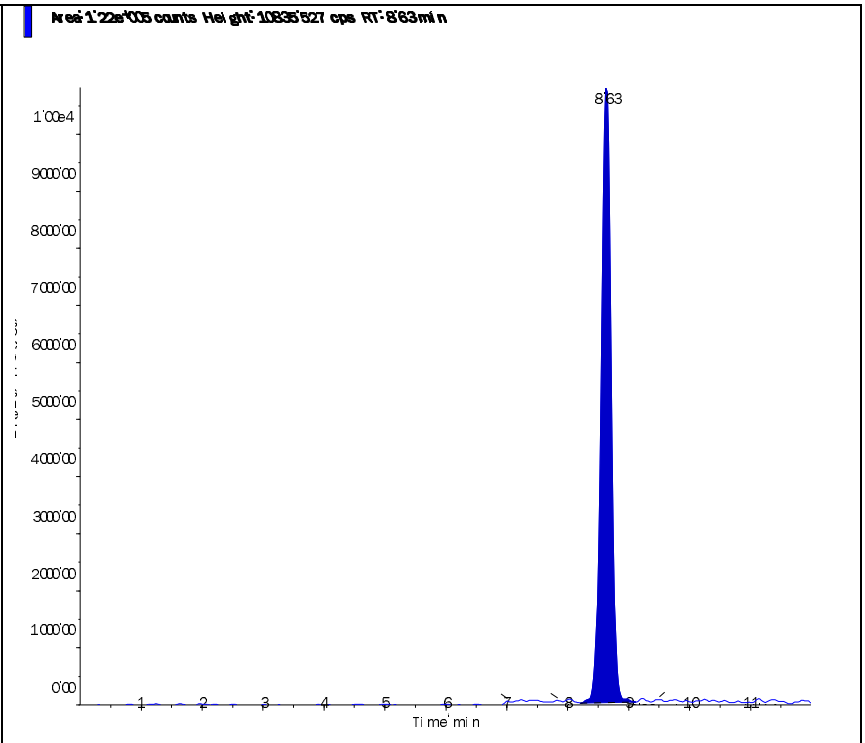
Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.65 (8.63) min 0.999 ng/ml 0.273 (Quality Control)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.63 (8.63) min 1.03 ng/ml 0.089 (Quality Control)



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Data File	LM45224.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 7:18:09 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

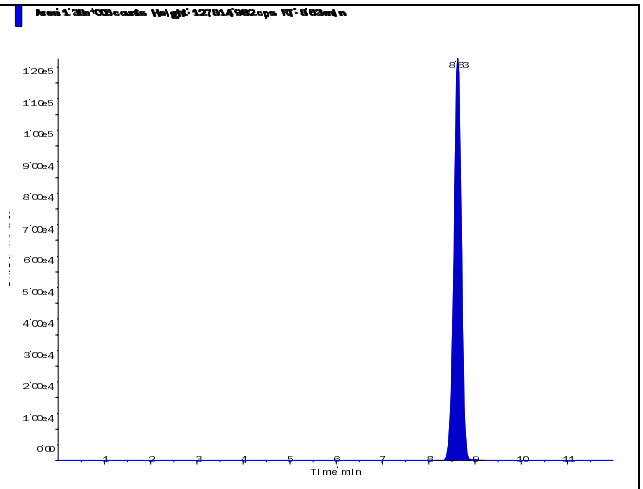
Sample Name	WG699915-02 CCV (1.0ug/L)	**Injection Vial**	5.00
Data File	LM45224.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 7:18:09 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699915-02	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

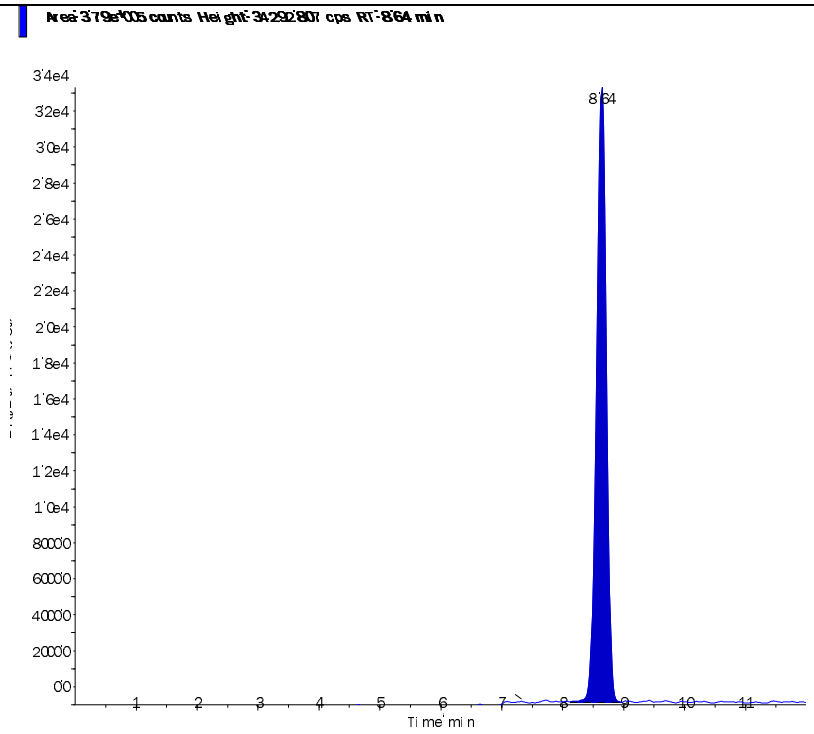
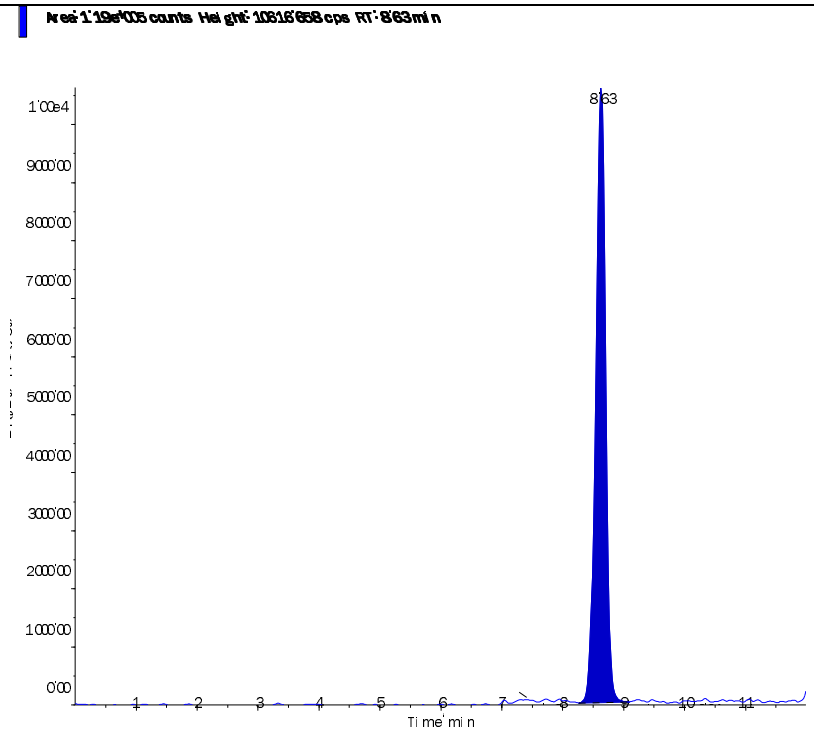
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.380e+06	8.63	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	3.790e+05	8.64	1.00	1.00
Perchlorate conf	1.190e+05	8.63	1.00	0.99

O18LP (Internal Standard)

RT (Exp. RT): 8.63(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.64 (8.63) min Calculated conc: 1.00 ng/ml Area Ratio: 0.274 Sample Type: (Quality Control)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.63 (8.63) min Calculated conc: 0.99 ng/ml Area Ratio: 0.086 Sample Type: (Quality Control)	

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Data File	LM45236.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 9:53:21 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

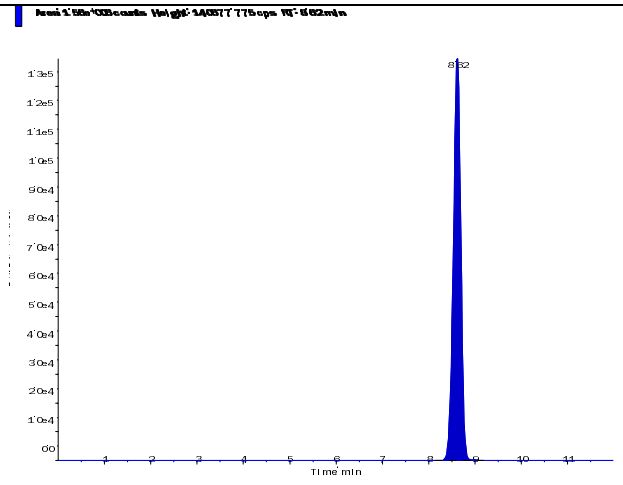
Sample Name	WG699915-03 CCV (1.0ug/L)	**Injection Vial**	5.00
Data File	LM45236.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 9:53:21 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699915-03	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.560e+06	8.62	5.00	-

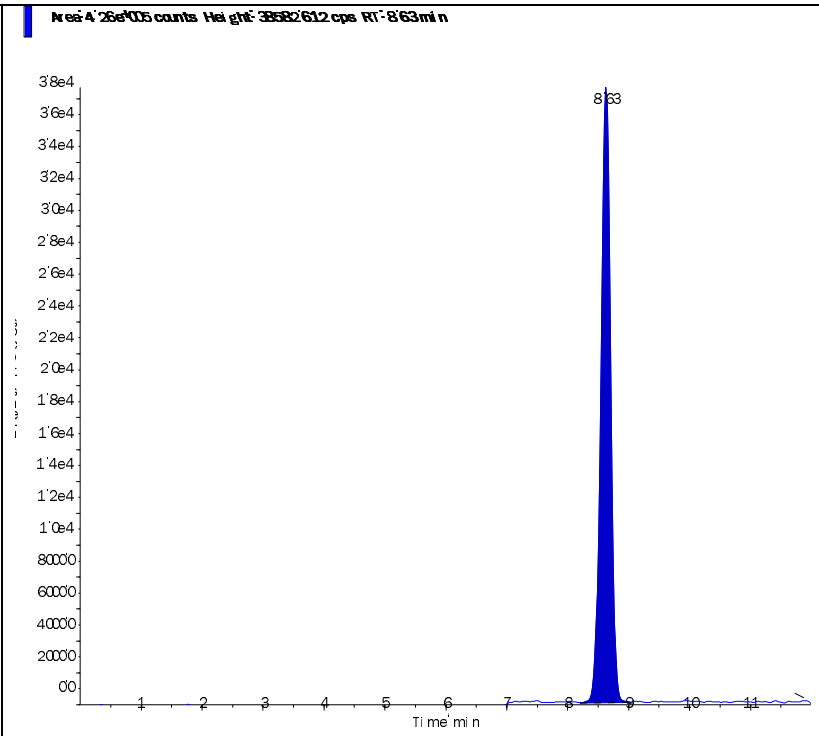
Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	4.260e+05	8.63	1.00	0.997
Perchlorate conf	1.360e+05	8.61	1.00	1.01

O18LP (Internal Standard)

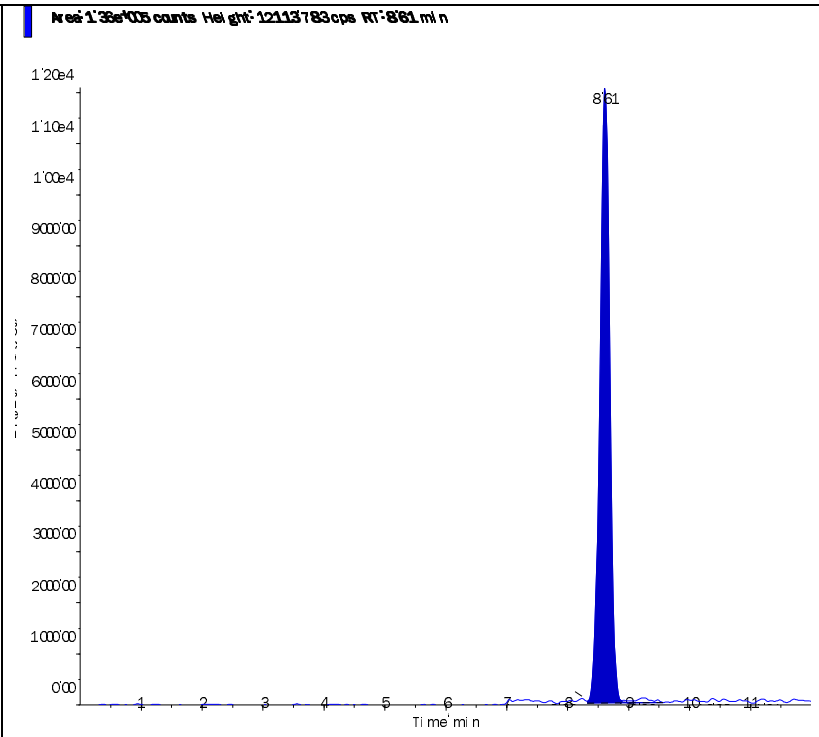
RT (Exp. RT): 8.62(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.63 (8.63) min 0.997 ng/ml 0.273 (Quality Control)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.61 (8.63) min 1.01 ng/ml 0.087 (Quality Control)



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Data File	LM45242.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 11:10:55 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

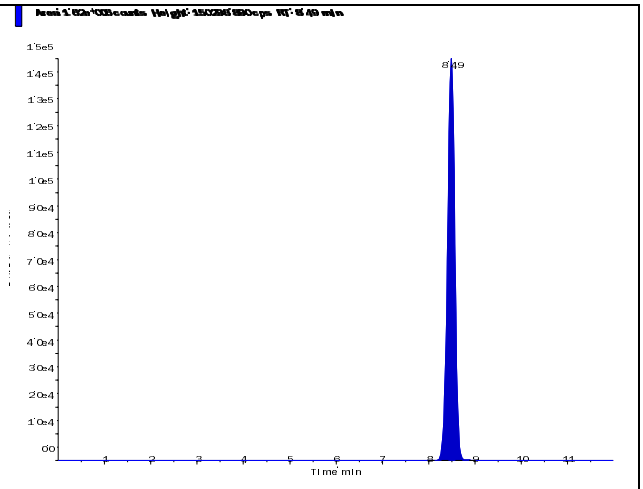
Sample Name	WG699915-05 CCV (1.0ug/L)	**Injection Vial**	5.00
Data File	LM45242.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 11:10:55 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Quality Control
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699915-05	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

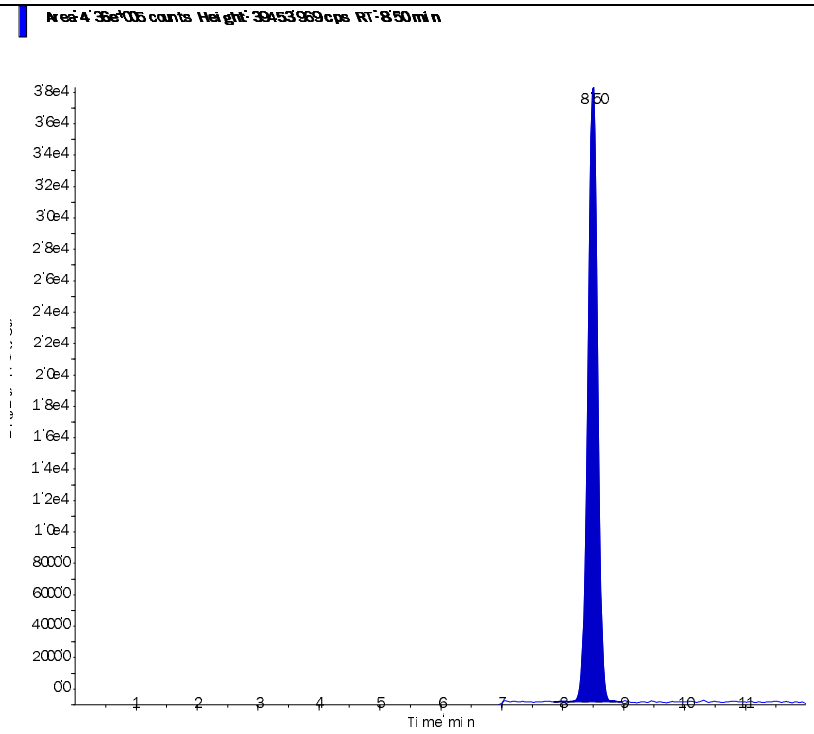
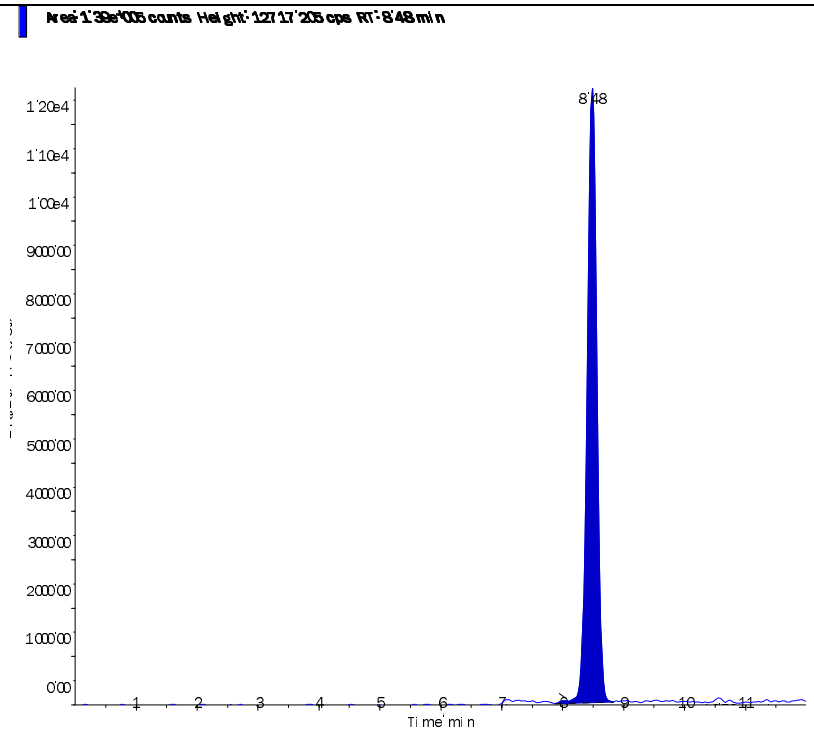
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.620e+06	8.49	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	4.360e+05	8.50	1.00	0.984
Perchlorate conf	1.390e+05	8.48	1.00	0.994

O18LP (Internal Standard)

RT (Exp. RT): 8.49(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Quality Control)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.50 (8.63) min Calculated conc: 0.984 ng/ml Area Ratio: 0.269 Sample Type: (Quality Control)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.48 (8.63) min Calculated conc: 0.994 ng/ml Area Ratio: 0.086 Sample Type: (Quality Control)	

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Printed: 3/19/2019 2:00 PM

Data File	LM45225.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 7:31:05 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

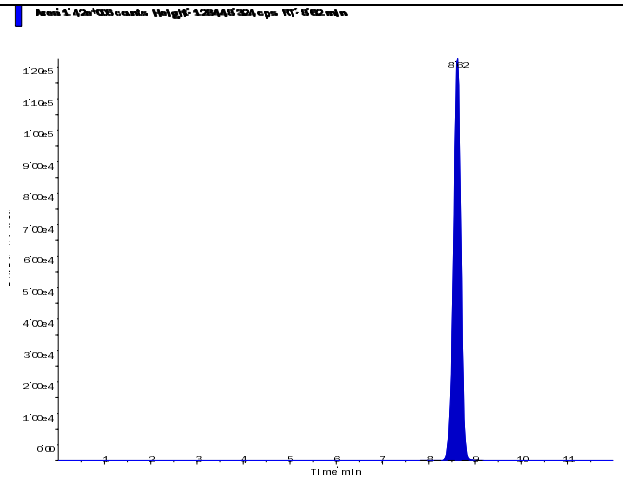
Sample Name	WG699914-07 MRL (0.2ug/L)	**Injection Vial**	3.00
Data File	LM45225.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 7:31:05 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699914-07	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

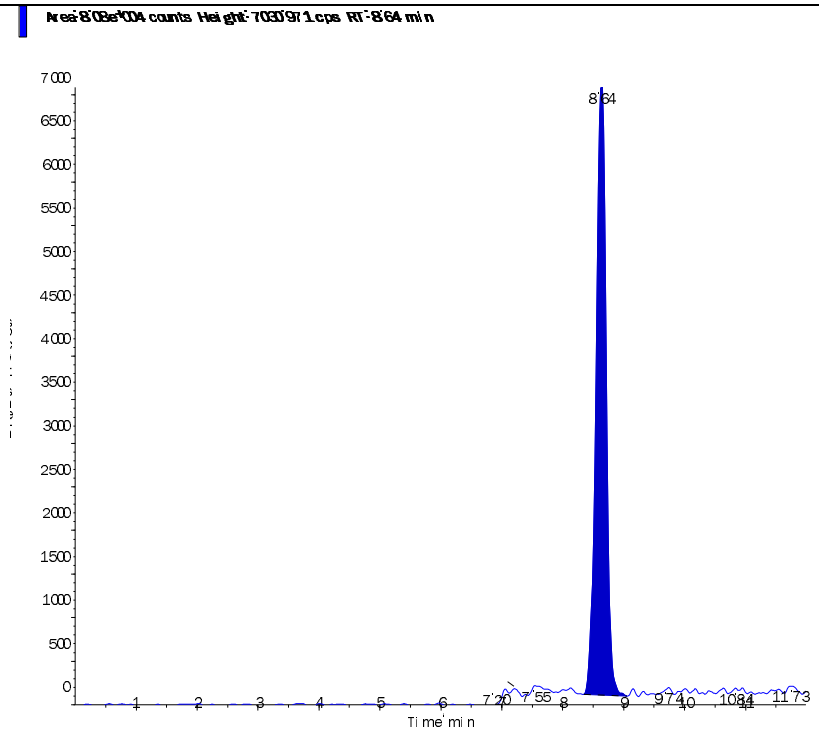
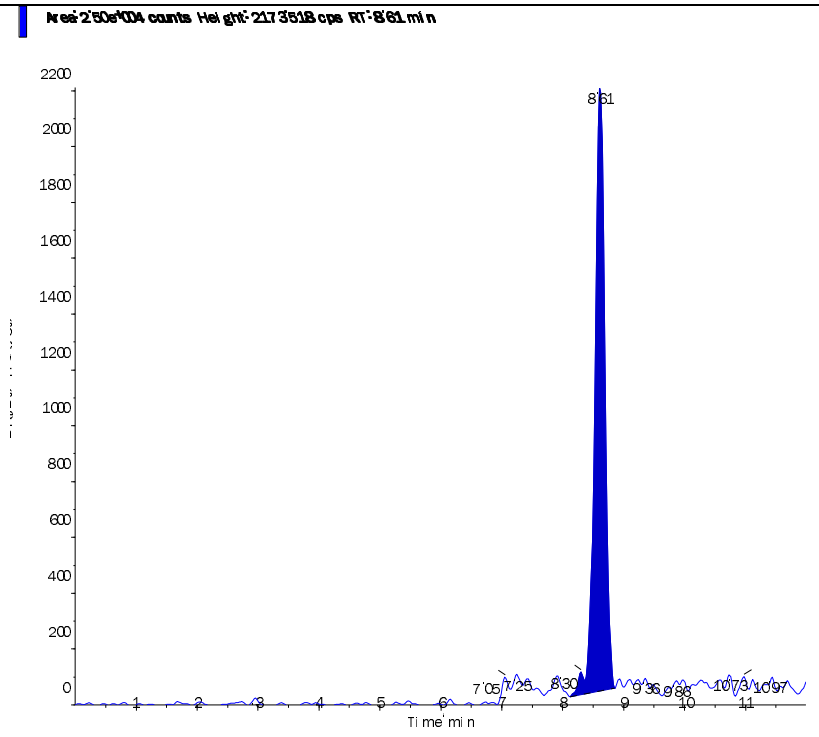
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.420e+06	8.62	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	8.080e+04	8.64	N/A	0.205
Perchlorate conf	2.500e+04	8.61	N/A	0.197

O18LP (Internal Standard)

RT (Exp. RT): 8.62(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.64 (8.63) min Calculated conc: 0.205 ng/ml Area Ratio: 0.057 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.61 (8.63) min Calculated conc: 0.197 ng/ml Area Ratio: 0.018 Sample Type: (Unknown)	

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Data File	LM45237.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 10:06:16 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

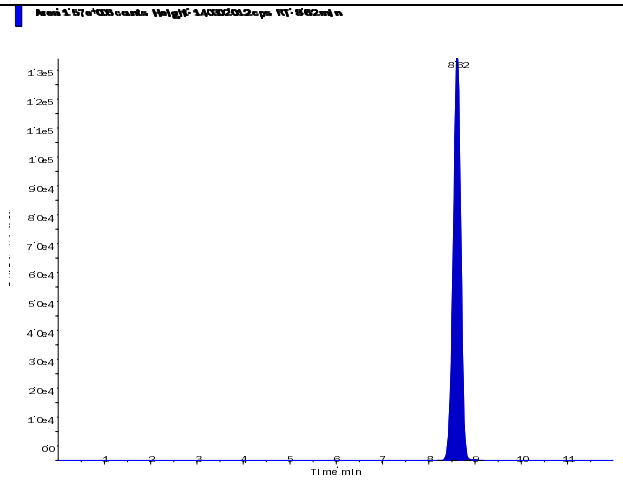
Sample Name	WG699914-08 MRL (0.2ug/L)	**Injection Vial**	3.00
Data File	LM45237.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 10:06:16 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699914-08	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

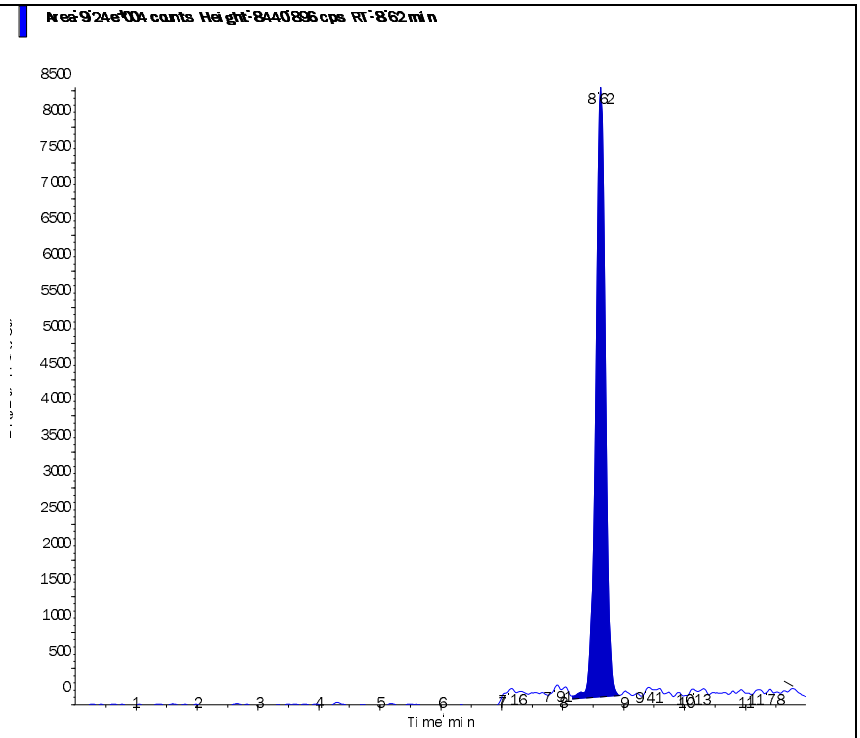
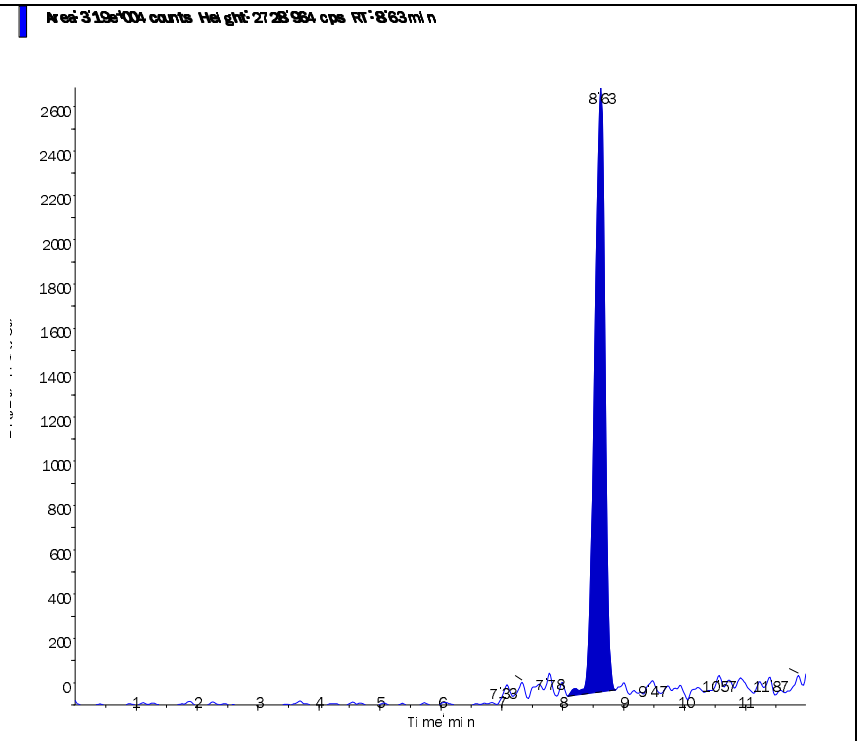
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.570e+06	8.62	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	9.240e+04	8.62	N/A	0.212
Perchlorate conf	3.190e+04	8.63	N/A	0.229

O18LP (Internal Standard)

RT (Exp. RT): 8.62(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.62 (8.63) min Calculated conc: 0.212 ng/ml Area Ratio: 0.059 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.63 (8.63) min Calculated conc: 0.229 ng/ml Area Ratio: 0.02 Sample Type: (Unknown)	

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Data File	LM45243.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 11:23:52 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

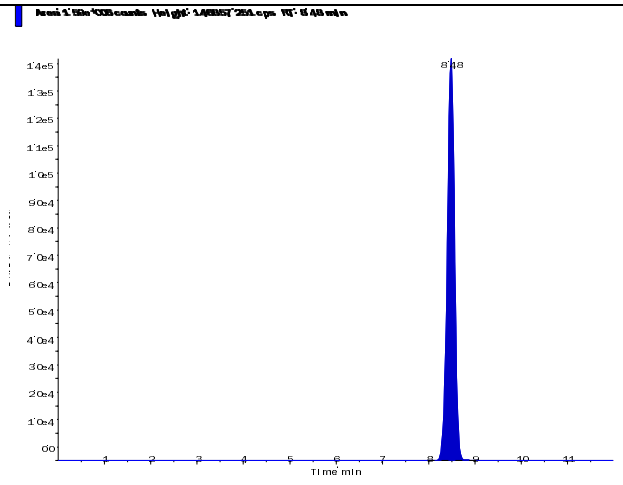
Sample Name	WG699914-09 MRL (0.2ug/L)	**Injection Vial**	3.00
Data File	LM45243.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 11:23:52 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699914-09	**Dilution Factor**	1.00
Sample Comment	1,1 STD87532	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.590e+06	8.48	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	9.180e+04	8.49	N/A	0.208
Perchlorate conf	2.740e+04	8.48	N/A	0.192

O18LP (Internal Standard)

RT (Exp. RT): 8.48(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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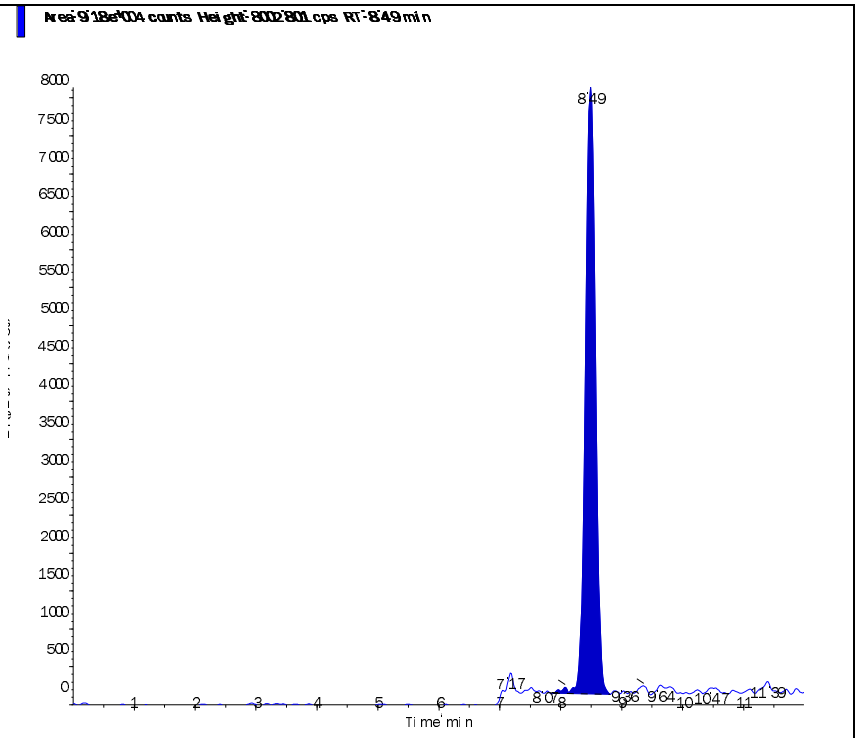
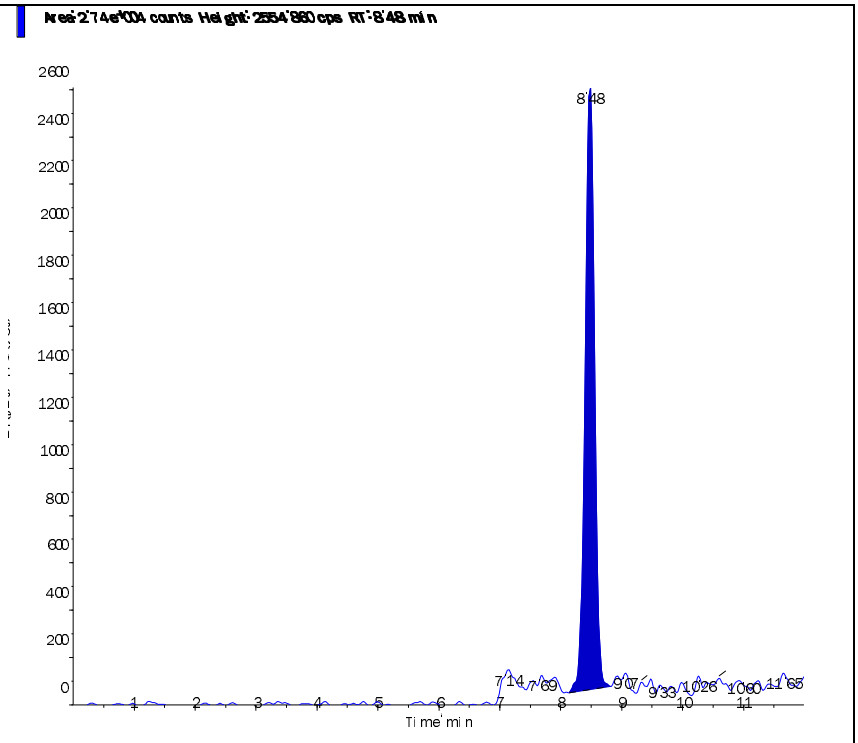
Printed: 3/19/2019 2:03 PM

Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.49 (8.63) min 0.208 ng/ml 0.058 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.48 (8.63) min 0.192 ng/ml 0.017 (Unknown)



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Printed: 3/19/2019 2:00 PM

Data File	LM45223.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 7:05:13 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

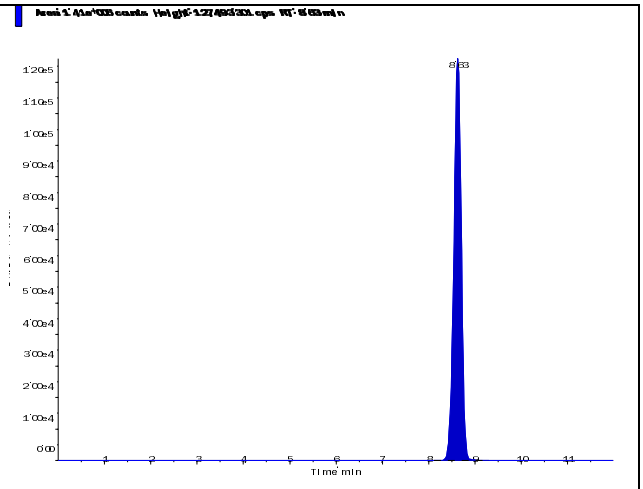
Sample Name	WG699915-01 CCB	**Injection Vial**	1.00
Data File	LM45223.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 7:05:13 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699915-01	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

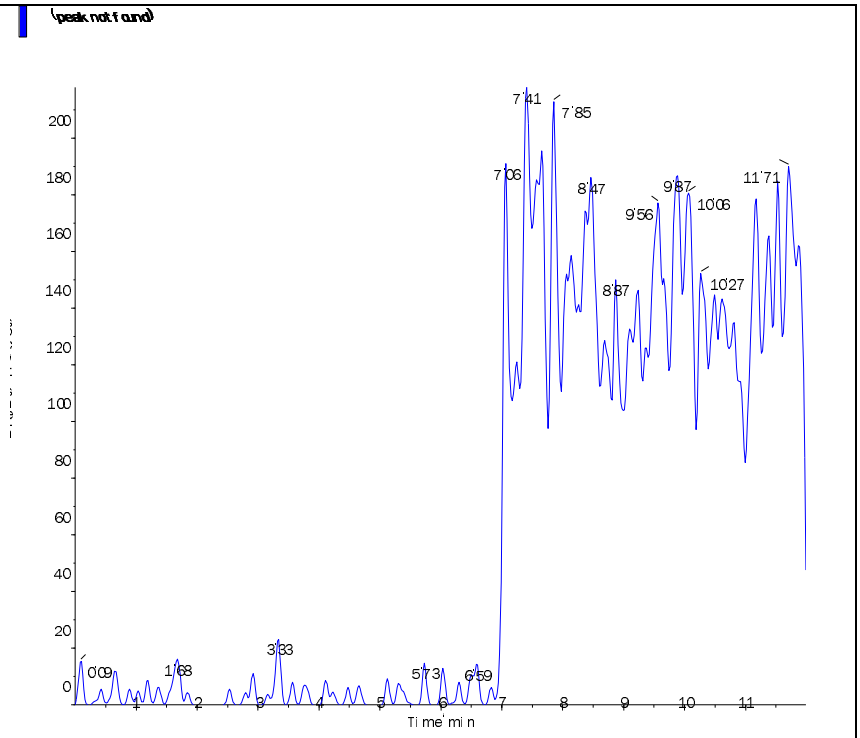
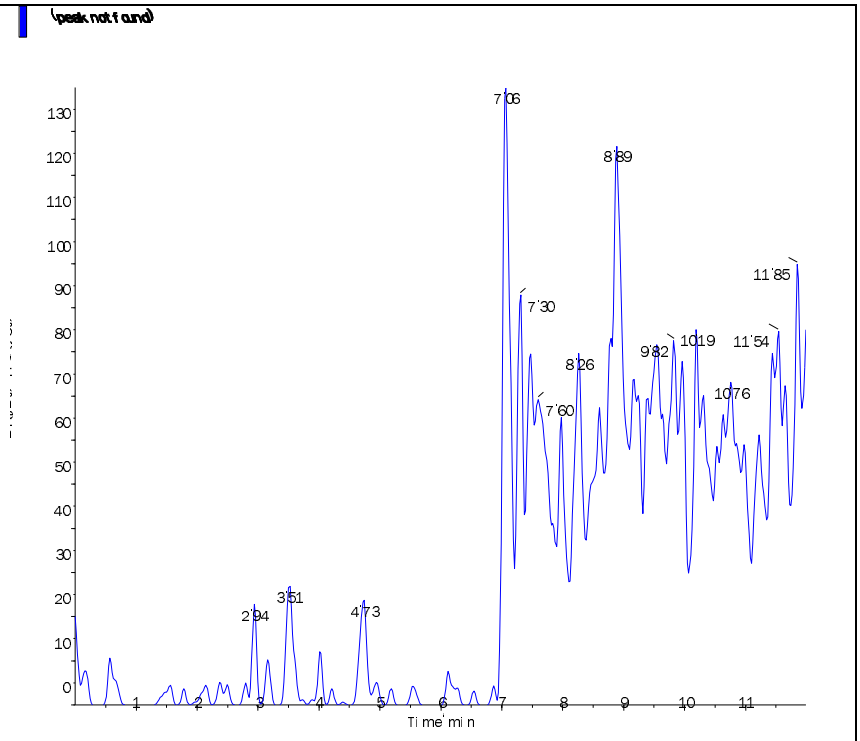
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.410e+06	8.63	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	0.000e+00	0.00	N/A	No Peak

O18LP (Internal Standard)

RT (Exp. RT): 8.63(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 0.00 (8.63) min Calculated conc: No Peak ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 0.00 (8.63) min Calculated conc: No Peak ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	

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Data File	LM45238.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 10:19:13 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

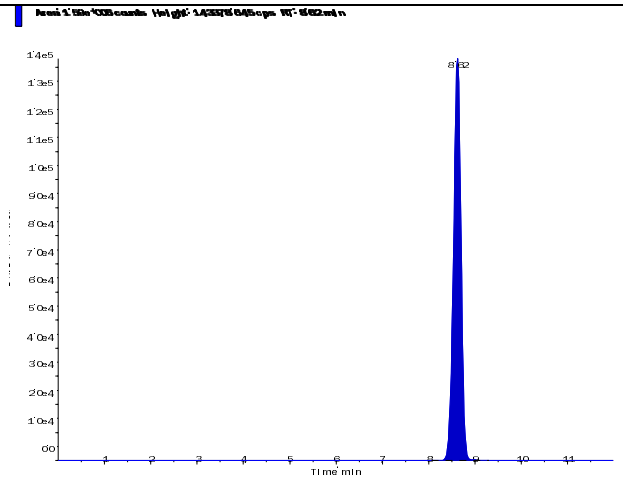
Sample Name	WG699915-04 CCB	**Injection Vial**	1.00
Data File	LM45238.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 10:19:13 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699915-04	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

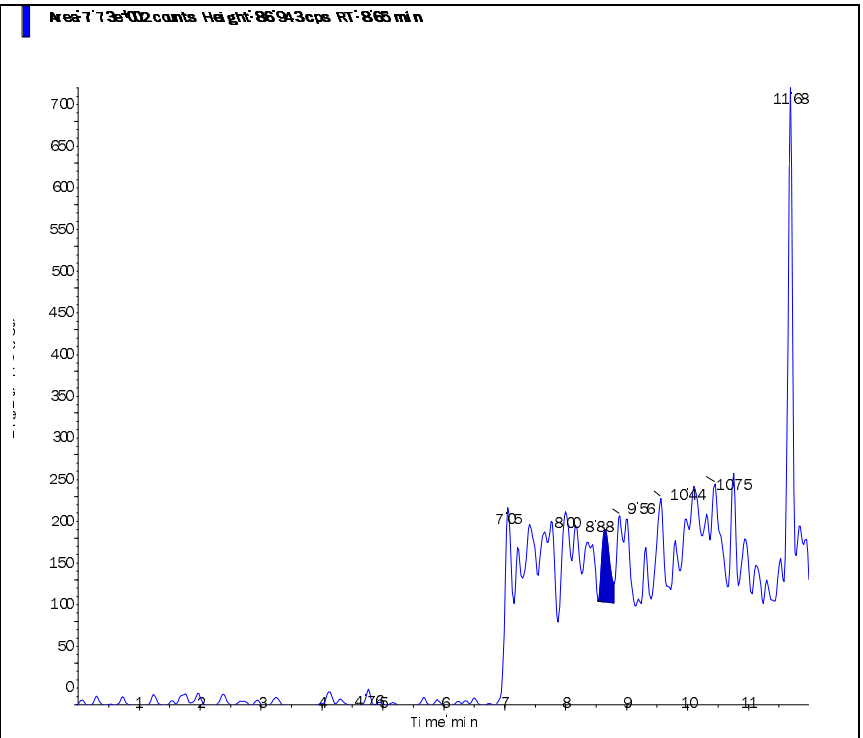
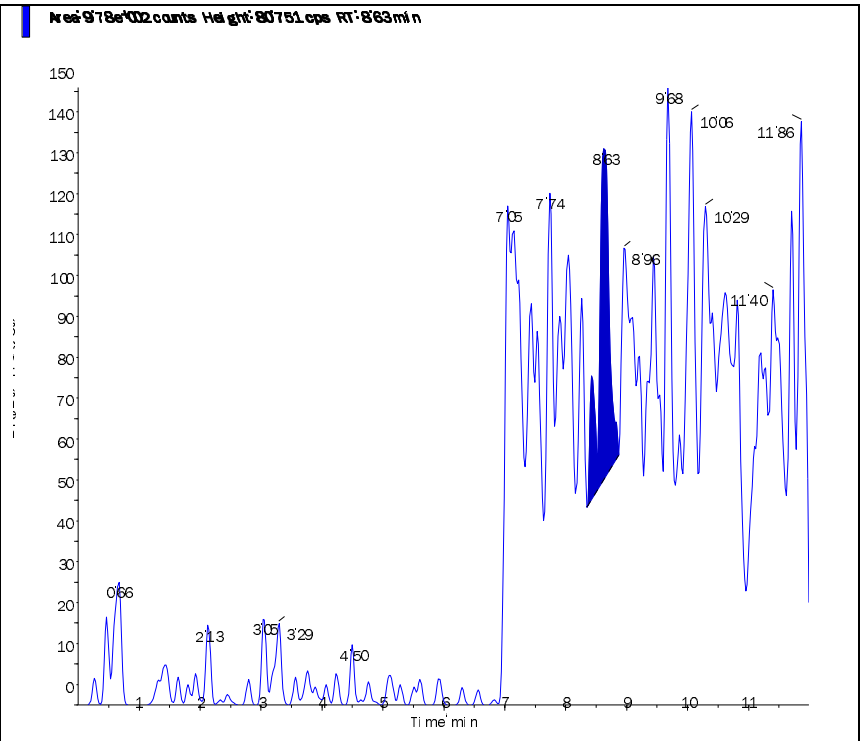
Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.590e+06	8.62	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	7.730e+02	8.65	N/A	< 0
Perchlorate conf	9.780e+02	8.63	N/A	< 0

O18LP (Internal Standard)

RT (Exp. RT): 8.62(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): 8.65 (8.63) min Calculated conc: < 0 ng/ml Area Ratio: 0.00 Sample Type: (Unknown)	
Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): 8.63 (8.63) min Calculated conc: < 0 ng/ml Area Ratio: 0.001 Sample Type: (Unknown)	

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Printed: 3/19/2019 2:03 PM

Data File	LM45244.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 11:36:47 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

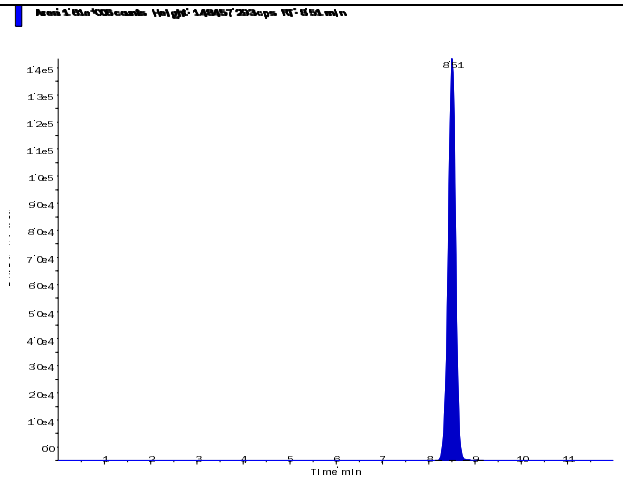
Sample Name	WG699915-06 CCB	**Injection Vial**	1.00
Data File	LM45244.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 11:36:47 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699915-06	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.610e+06	8.51	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	0.000e+00	0.00	N/A	No Peak
Perchlorate conf	5.350e+02	8.51	N/A	< 0

O18LP (Internal Standard)

RT (Exp. RT): 8.51(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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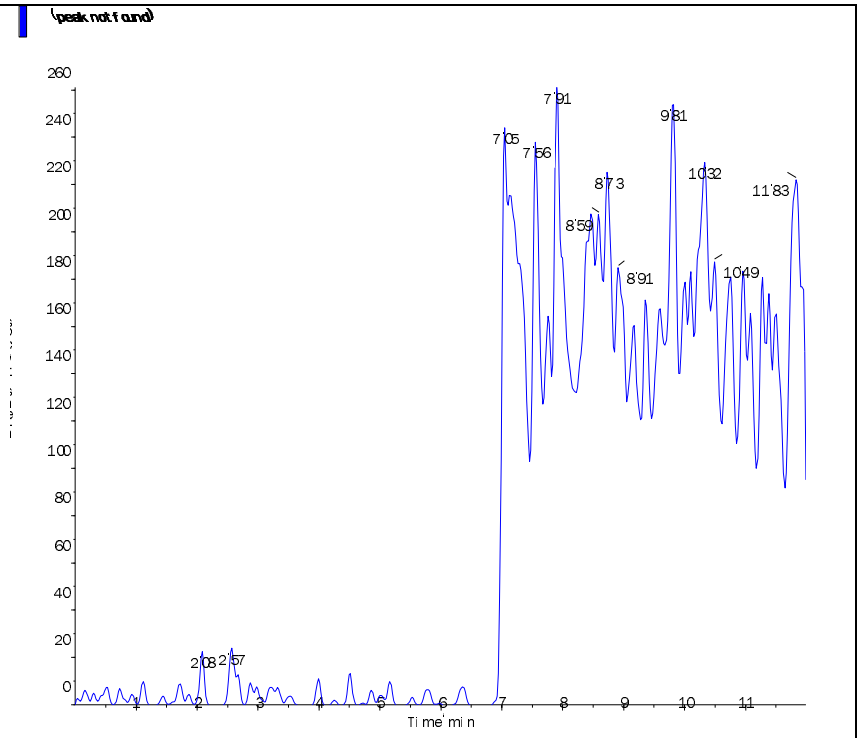
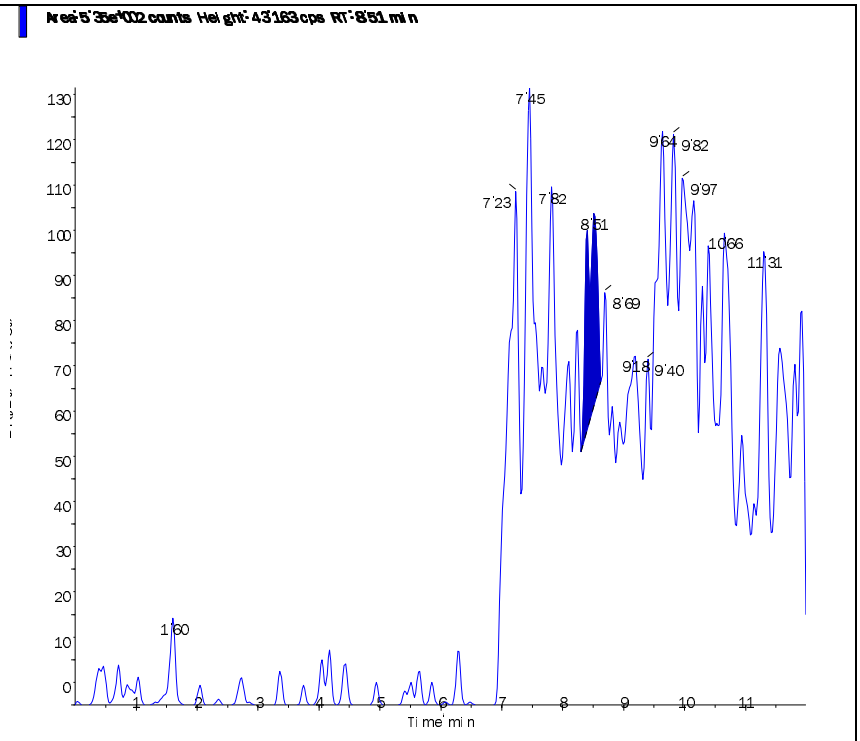
Printed: 3/19/2019 2:03 PM

Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	0.00 (8.63) min No Peak ng/ml 0.00 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	8.51 (8.63) min < 0 ng/ml 0.00 (Unknown)



2.2.1.5 Raw QC Data

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Printed: 3/19/2019 2:00 PM

Data File	LM45227.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 7:56:57 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

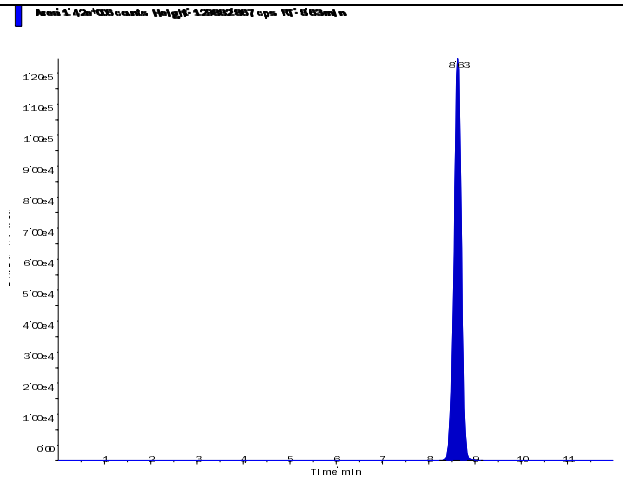
Sample Name	WG699914-02 BLANK	**Injection Vial**	11.00
Data File	LM45227.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 7:56:57 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699914-02	**Dilution Factor**	1.00
Sample Comment	11.00	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.420e+06	8.63	5.00	-

Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	9.360e+02	8.68	N/A	< 0
Perchlorate conf	0.000e+00	0.00	N/A	No Peak

O18LP (Internal Standard)

RT (Exp. RT): 8.63(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



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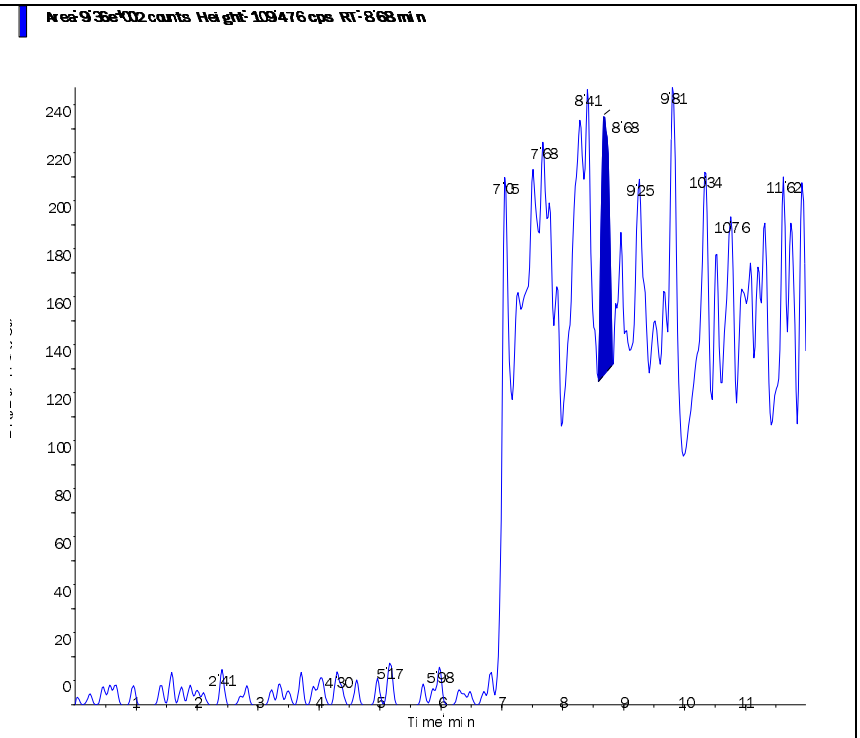
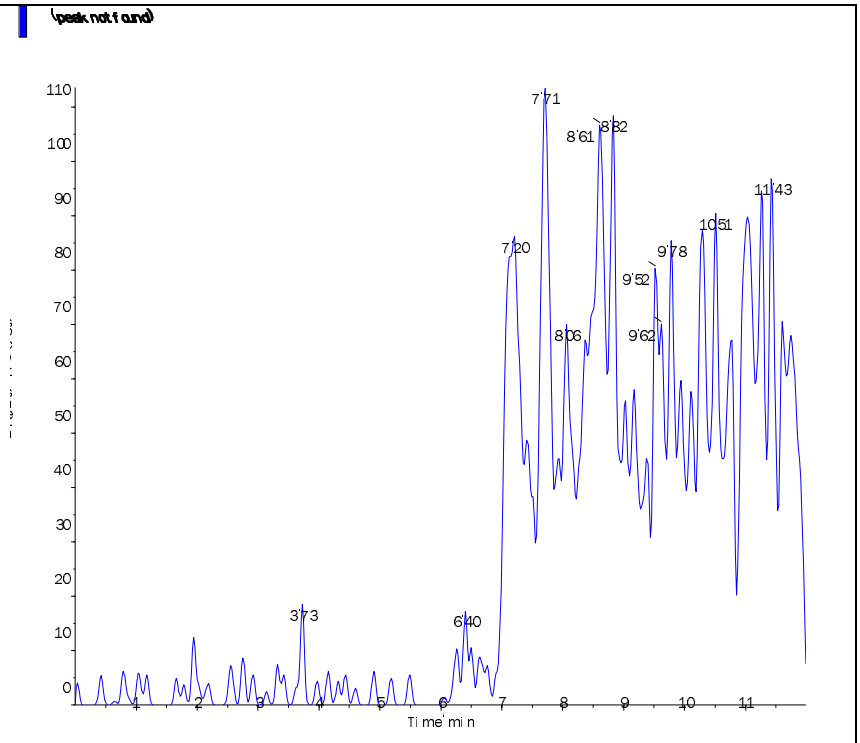
Created with Analyst Reporter
Printed: 3/19/2019 2:00 PM

Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 8.68 (8.63) min < 0 ng/ml 0.001 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 0.00 (8.63) min No Peak ng/ml 0.00 (Unknown)



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Printed: 3/19/2019 2:00 PM

Data File	LM45228.wiff	**Result Table**	031819_JWR.rdb
Acquisition Date	3/18/2019 8:09:53 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Instrument Name**	API 4000
Project	Perchlorate\2009_07_22		

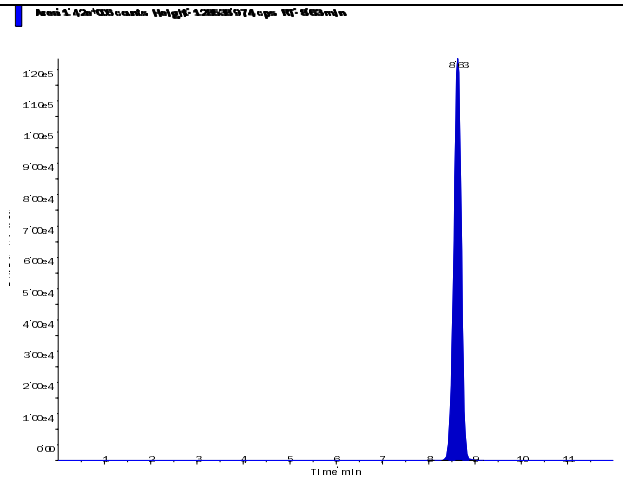
Sample Name	WG699914-03 LCS (0.2ug/L)	**Injection Vial**	12.00
Data File	LM45228.wiff	**Injection Volume**	10.00
Acquisition Date	3/18/2019 8:09:53 PM	**Algorithm Used**	Analyst Classic
Acquisition Method	062911.dam	**Sample Type**	Unknown
Instrument Name	API 4000	**Result Table**	031819_JWR.rdb
Sample ID	WG699914-03	**Dilution Factor**	1.00
Sample Comment	1,1 STD87534	**Weight to Volume**	0.00

Internal Standard	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
O18LP	1.420e+06	8.63	5.00	-

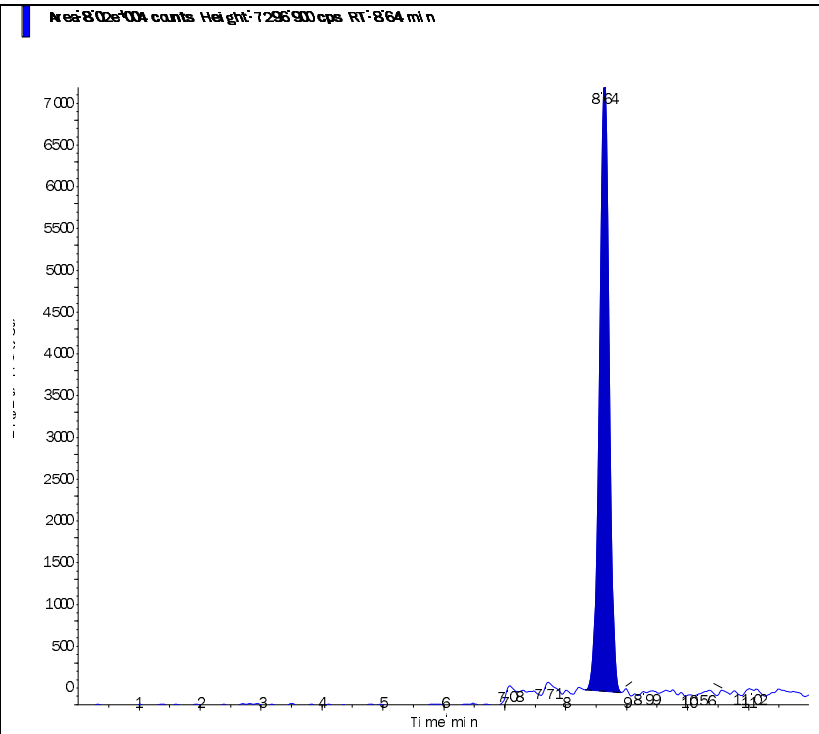
Target Analyte	Area (cps)	RT (min)	Target conc. (ug/L)	Calc. Conc. (ug/L)
Perchlorate	8.020e+04	8.64	N/A	0.203
Perchlorate conf	2.450e+04	8.63	N/A	0.193

O18LP (Internal Standard)

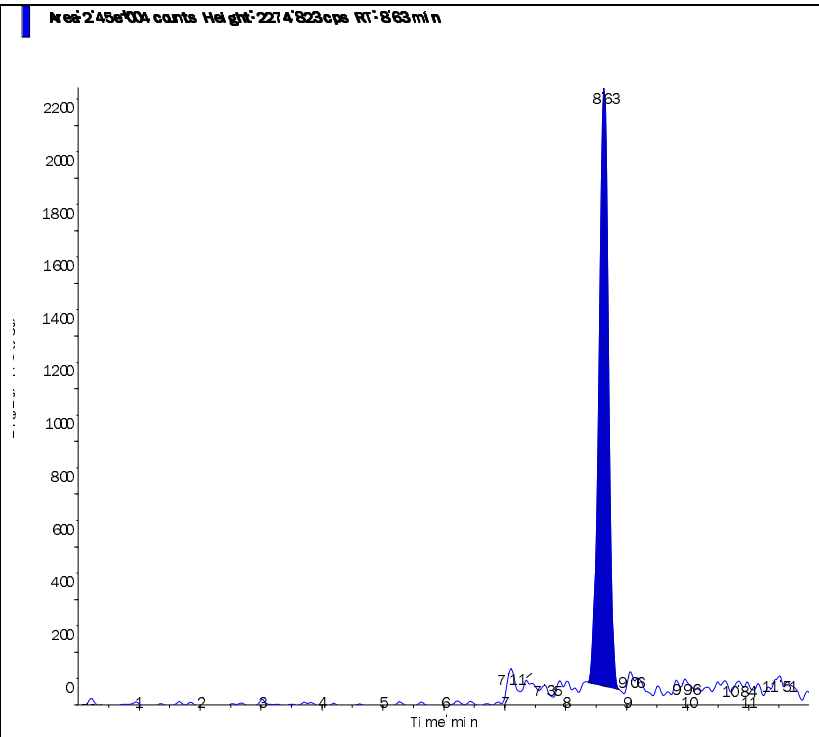
RT (Exp. RT): 8.63(8.63) min
Concentration: 5.00 ug/L
Sample Type: (Unknown)



Perchlorate (98.8/83.3 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 8.64 (8.63) min 0.203 ng/ml 0.056 (Unknown)



Perchlorate conf (100.8/85.2 amu) RT (Exp. RT): Calculated conc: Area Ratio: Sample Type:	 8.63 (8.63) min 0.193 ng/ml 0.017 (Unknown)



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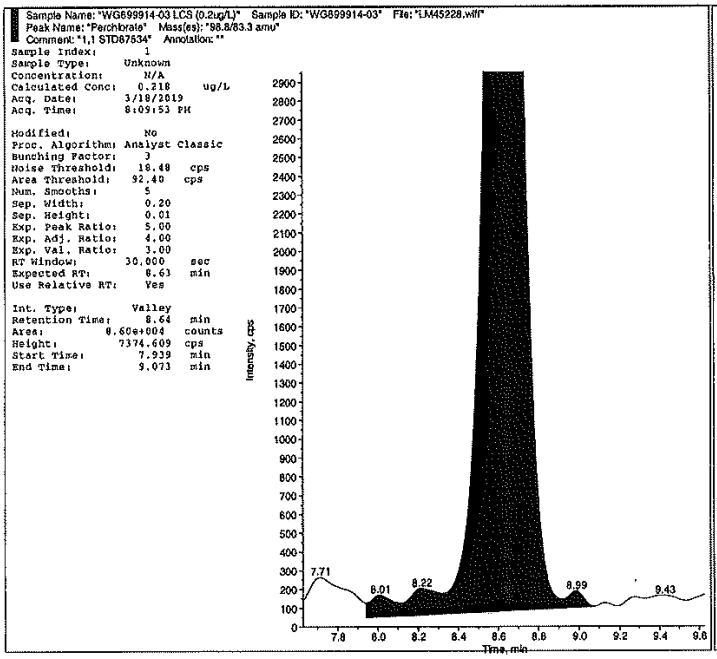
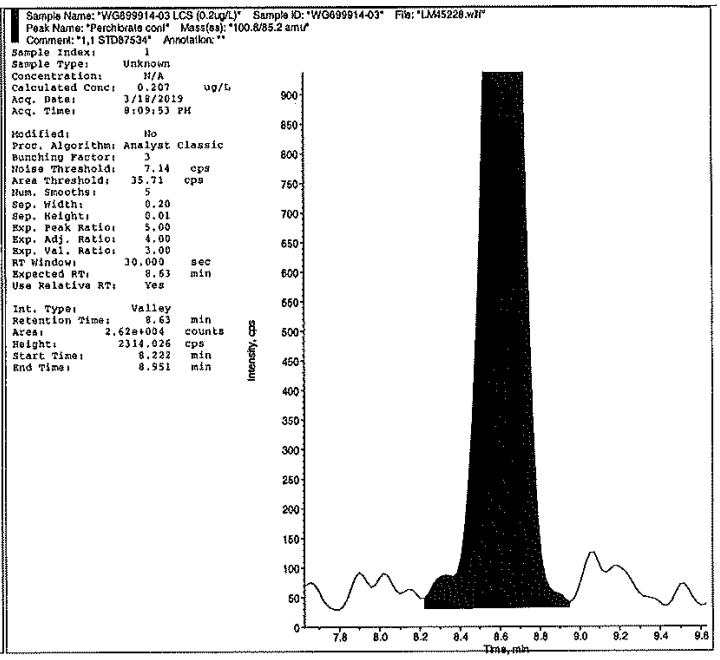
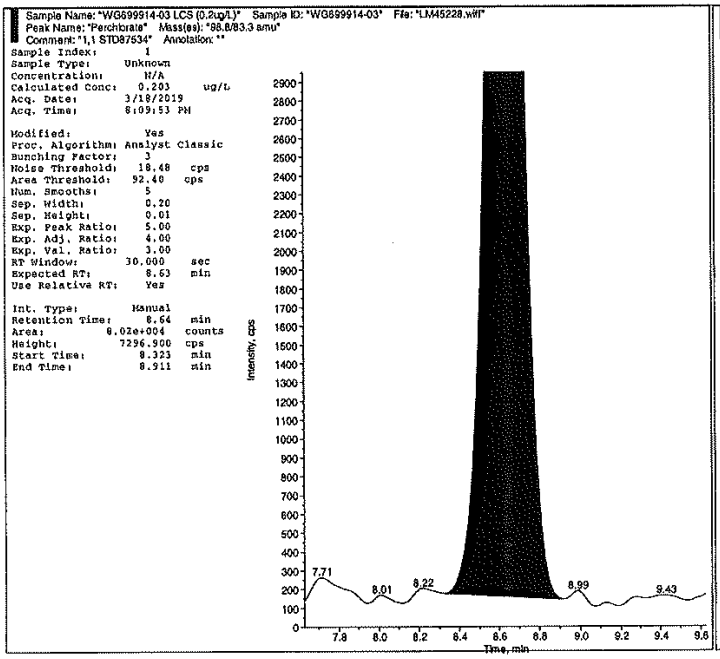
Printing Date: Tuesday, March 19, 2019

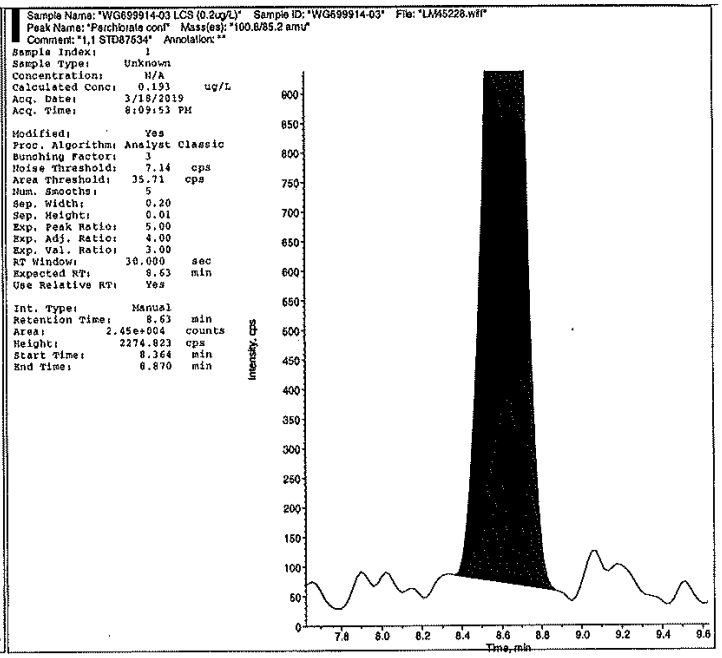




Collected by: N/A
Electronic Signature: no
Operator: Administrator

Printing Time: 10:44:10 AM
Printing Date: Tuesday, March 19, 2019





#4
JWR/03/19/19
J EC2 3-20-19

Collected by: N/A
Electronic Signature: no
Operator: Administrator

3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
March 25, 2019

---

001 – BIO-CHEM TESTING WVDEP 220	002 – REIC Consultants, Inc. WVDEP 060
003 – Sturm Environmental	004 – MICROBAC PITTSBURGH
005 – ES LABORATORIES	006 – ALCOSAN LABORATORIES
007 – ALS LABORATORIES	008 – BENCHMARK LABORATORIES
010 – MICROBAC CHICAGOLAND	AC – AMBER R. CARMICHAEL
ACG – ALEX C. GEDON	ADC – ANTHONY D. CANTER
ADG – APRIL D. GREENE	ADW – ALICIA D. WALKER
ALS – ADRIANE L. STEED	APH – ANDREW P. HOUT
AT – Asa R. Timmons	ATK – ALEX T. KLINTWORTH
AWE – ANDREW W. ESSIG	AZH – AFTER HOURS
BLG – BRENDA L. GREENWALT	BRG – BRENDA R. GREGORY
CAS – Craig A. Smith	CEB – CHAD E. BARNES
CLC – CHRYS L. CRAWFORD	COR – Corporate IT
CPD – CHAD P. DAVIS	CSH – CHRIS S. HILL
DIH – DEANNA I. HESSON	DLB – DAVID L. BUMGARNER
DLP – DOROTHY L. PAYNE	DSM – DAVID S. MOSSOR
ECL – ERIC C. LAWSON	EEA – EMILY E. ALLEN
EGS – EMILY G. SHILLING	EPT – ETHAN P. TIDD
ERP – ERIN R. PORTER	JAO – Jeff A. Ogle
JDH – JUSTIN D. HESSON	JDS – JARED D. SMITH
JDW – JAMES D. WRIGHT	JKP – JACQUELINE K. PARSONS
JLR – JIMMY L. RUSH	JRH – Justin R. Hill
JST – JOSHUA S. TAYLOR	JTP – JOSHUA T. PEMBERTON
JWR – JOHN W. RICHARDS	JYH – JI Y. HU
KAK – KATHY A. KIRBY	KEB – KATIE E. BARNES
KEH – Katelyn E. Hoover	KFR – KARISSA F. REYNOLDS
KHR – KIM H. RHODES	KKB – KERRI K. BUCK
KMC – KAYLA M. CHEVALIER	KMG – KALEN M. GANDOR
KRA – KATHY R. ALBERTSON	KRP – KATHY R. PARSONS
KWD – Kurtis W. Decker	LLS – LARRY L. STEPHENS
LSB – LESLIE S. BUCINA	LSJ – LAURA S. JONES
MAP – MARLA A. PORTER	MES – MARY E. SCHILLING
MMB – MAREN M. BEERY	MRT – MICHELLE R. TAYLOR
PDM – PIERCE D. MORRIS	PIT – MICROBAC WARRENDALE
RLB – BOB BUCHANAN	RNM – Rene N. Miller
RNP – RICK N. PETTY	SAV – SARAH A. VANDENBERG
SCB – SARAH C. BOGOLIN	SLM – STEPHANIE L. MOSSBURG
TB – TODD BOYLE	TMM – TAMMY M. MORRIS
VC – VICKI COLLIER	XXX – UNAVAILABLE OR SUBCONTRACT
ZTB – ZACH T. BARNES	

Microbac Laboratories Inc.
List of Valid Qualifiers
March 25, 2019

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
B4,A	The BOD unseeded dilution water blank exceeded 0.2 mg/L. See the report narrative.
B4,F	The BOD unseeded dilution water blank exceeded 0.2 mg/L. Analyte present below the reporting limit (RL).
B4,F,A	The BOD unseeded dilution water blank exceeded 0.2 mg/L. Analyte present below the reporting limit (RL). See the report
B4,ND	The BOD unseeded dilution water blank exceeded 0.2 mg/L. Not detected at or above the reporting limit..
B4,ND,A	The BOD unseeded dilution water blank exceeded 0.2 mg/L. Not detected at or above the reporting limit. See the report na
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample reciept exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out.
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,A	Sample analysis performed past holding time.See the report narrative
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Concentrations >40% difference between the two GC columns
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,A	Present below nominal reporting limit. See case narrative.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample reciept exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	Found between MDL and RL, but has quality control issue.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentativlely identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,A	Not detected. See report narrative.
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns

Microbac Laboratories Inc.
List of Valid Qualifiers
March 25, 2019

Qualkey: DOD

Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound
TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample reciept exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Analyte was not detected. The concentration is below the reported LOD. One or more quality control criteria fail. See nar
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below

L19030638 / Revision: 0 / 457 total pages

MICROBAC Return to: 158 Starlite Drive Marietta Ohio 45750

CHAIN OF CUSTODY RECORD

Number
Instructions on back
TO BE COMPLETED BY MICROBAC

Lab Report Address
Client Name: HDR
Address:
City, State, Zip:
Contact: LYNN LUTZ
Telephone No.:

Invoice Address
Client Name: HDR
Address:
City, State, Zip:
Contact: LYNN LUTZ
Telephone No.:

Turnaround Time
[ ] Routine (5 to 7 business days)
[ ] RUSH* (notify lab)
(needed by)
Report Type
[ ]Results Only [ ]Level 1 [ ]Level 2 [ ]Level3 [ ]Level 4 [ ]EDD

Temperature Upon Receipt (°C)
Therm ID
Holding Time
Samples Received on Ice? Yes No N/A
Custody Seals Intact? Yes No N/A

Send Report via: [ ] Mail [ ]Fax [ ] e-mail (address) LYNN.LUTZ@HDRINC.COM
Send Invoice via: [ ] Mail [ ] Fax [ ] e-mail (address)

Project: LHAAP-47 PSI
Location:
PO No.: 10097916 TASK 8.0
Compliance Monitoring? [ ] Yes [ ] No
( ) Agency/Program

Sampled by (PRINT): ERIC NORTH
Sampler Signature:
Sampler Phone No.: 512 775 7848

* Matrix Types: Soil/Solid (S), Sludge, Oil, Wipe, Drinking Water (DW), Groundwater (GW), Surface Water (SW), Waste Water (WW), Other (specify)
** Preservative Types: (1) HNO3, (2) H2SO4, (3) HCl, (4) NaOH, (5) Zinc Acetate, (6) Methanol, (7) Sodium Bisulfate, (8) Sodium Thiosulfate, (9) Hexane, (U) Unpreserved

REQUESTED ANALYSIS

Lab ID	Client Sample ID	Date Collected	Time Collected	No. of Containers	Matrix	Grab / Comp	Preservative Types **	VOC	Perchlorate	Additional Notes
	SW1	03/07/19	1130	4	SW	X		X	X	
	SW1 MS	03/07/19	1130	4	SW	X		X	X	
	SW1 MSD	03/07/19	1130	4	SW	X		X	X	
	SW2	03/07/19	1230	4	SW	X		X	X	
	SW3	03/07/19	1300	4	SW	X		X	X	
	SW4	03/07/19	1445	4	SW	X		X	X	
	DUP01	03/07/19	1000	4	SW	X		X	X	
	TB01	03/07/19	0800	2	TB			X		

Microbac OVD
Received: 03/09/2019 09:22 221000134669
Kayla Clemlo

Possible Hazard Identification [ ] Hazardous [ ] Non-Hazardous [ ] Radioactive
Sample Disposition [ ] Dispose as appropriate [ ] Return [ ] Archive
Comments

Relinquished By (signature)	Date/Time	Received By (signature)	Date/Time
	03/08/19 1100	FedEx	03/08/19 1100
Relinquished By (signature)	Date/Time	Received By (signature)	Date/Time
Relinquished By (signature)	Date/Time	Received By (signature)	Date/Time

Rev: 07/18/2018

Page of

Generated: 03/25/2019 13:09

00936887

MICROBAC®

Cooler ID 4669

COOLER TEMP >6° C LOG

SAMPLE ID	Bottle 1 °C	Bottle 2 °C	Bottle 3 °C	Bottle 4 °C	Bottle 5 °C	Bottle 6 °C

Line 3/9/19

pH Lot # HC0634623 pH Exceptions

SAMPLE ID	Bottle 1	Bottle 2	Bottle 3	Bottle 4	Bottle 5	Bottle 6

Line 3/9/19

PRESERVATIVE EXCEPTIONS
✓ NONE
__ AS NOTED
Line 3/9/19

Document Control # 1957
Last 10-07-2016

Issued to: Document Master File

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L19030638
Account: 2886
Project: 2886.016
Samples: 8
Due Date: 22-MAR-2019

Samplenum	Container ID	Products
L19030638-01	307542	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Samplenum	Container ID	Products
L19030638-01	307543	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	11-MAR-2019 14:01	BRG		
2	ANALYZ	W1	SEM	15-MAR-2019 14:03	JWR	BRG	
3	STORE	SEM	A2	20-MAR-2019 15:15	BRG	CAS	

Samplenum	Container ID	Products
L19030638-02	307544	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L19030638
Account: 2886
Project: 2886.016
Samples: 8
Due Date: 22-MAR-2019

Samplenum	Container ID	Products
L19030638-02	307545	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	11-MAR-2019 14:01	BRG		
2	ANALYZ	W1	SEM	15-MAR-2019 14:03	JWR	BRG	
3	STORE	SEM	A2	20-MAR-2019 15:15	BRG	CAS	

Samplenum	Container ID	Products
L19030638-03	307546	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Samplenum	Container ID	Products
L19030638-03	307547	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	11-MAR-2019 14:01	BRG		
2	ANALYZ	W1	SEM	15-MAR-2019 14:03	JWR	BRG	
3	STORE	SEM	A2	20-MAR-2019 15:15	BRG	CAS	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L19030638
Account: 2886
Project: 2886.016
Samples: 8
Due Date: 22-MAR-2019

Samplenum	Container ID	Products
L19030638-04	307548	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Samplenum	Container ID	Products
L19030638-04	307549	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	11-MAR-2019 14:01	BRG		
2	ANALYZ	W1	SEM	15-MAR-2019 14:03	JWR	BRG	
3	STORE	SEM	A2	20-MAR-2019 15:15	BRG	CAS	

Samplenum	Container ID	Products
L19030638-05	307550	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:18	EEA	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L19030638
Account: 2886
Project: 2886.016
Samples: 8
Due Date: 22-MAR-2019

Samplenum	Container ID	Products
L19030638-05	307551	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	11-MAR-2019 14:01	BRG		
2	ANALYZ	W1	SEM	15-MAR-2019 14:03	JWR	BRG	
3	STORE	SEM	A2	20-MAR-2019 15:14	BRG	CAS	

Samplenum	Container ID	Products
L19030638-06	307552	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:19	EEA	BRG	

Samplenum	Container ID	Products
L19030638-06	307553	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	11-MAR-2019 14:01	BRG		
2	ANALYZ	W1	SEM	15-MAR-2019 14:03	JWR	BRG	
3	STORE	SEM	A2	20-MAR-2019 15:15	BRG	CAS	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L19030638
Account: 2886
Project: 2886.016
Samples: 8
Due Date: 22-MAR-2019

Samplenum	Container ID	Products
L19030638-07	307554	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:18	EEA	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:18	EEA	BRG	

Bottle: 3

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:18	EEA	BRG	

Samplenum	Container ID	Products
L19030638-07	307555	6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	11-MAR-2019 14:01	BRG		
2	ANALYZ	W1	SEM	15-MAR-2019 14:03	JWR	BRG	
3	STORE	SEM	A2	20-MAR-2019 15:15	BRG	CAS	

Samplenum	Container ID	Products
L19030638-08	307556	826-SPE

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:18	EEA	BRG	

Bottle: 2

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	V1	11-MAR-2019 14:01	BRG		
2	ANALYZ	V1	ORG1	11-MAR-2019 16:18	EEA	BRG	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

NELAP Addendum - January 3, 2019

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
Total Halide by Bomb Combustion (TX)
Particle Sizing - 200 Mesh (PS200)
Specific Gravity/Density (SPGRAV)
Total Residual Chlorine (CL-TRL)
Total Volatile Solids (all forms) (TVS)
Total Coliform Bacteria (all methods)
Fecal Coliform Bacteria (all methods)
Sulfite (SO3)
Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS
Nitrogen, Ammonia by Method 350.1
Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
Phenolics, Total by Method 420.1
ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD HPLC02/HPLC-UV

Nitroglycerin
Acetic acid
Butyric acid
Lactic acid
Propionic acid
Pyruvic acid

OVD MSS01/GC-MS

1,4-Phenylenediamine
1-Methylnaphthalene
1,4-Dioxane
Atrazine
Benzaldehyde
Biphenyl
Caprolactam
Hexamethylphosphoramide (HMPA)
Pentachlorobenzene
Pentachloroethane

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

NELAP Accreditation by Laboratory SOP

SOLID AND HAZARDOUS CHEMICALS

OVD MSS0I/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP

SOLID AND HAZARDOUS CHEMICALS

OVD MSV0I/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
lsoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)

B

Data Validation Report

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DATA VALIDATION REPORT

Volatile Organic Compounds (VOCs) by USEPA SW-846 Method 8260B
Perchlorate by USEPA SW-846 Method 6850

Project:	USACE Longhorn Army Ammunition Plant (LHAAP), Texas Surface Waters – March 2019
Project/Task Number:	10097916 8.0
Sample Data Package:	L19030638
Laboratory:	Microbac Labs, Marietta, Ohio
Sample Matrix:	Surface water
Sampling Dates:	07 March 2019
Validation Guidelines:	Project QAPP *(Final Quality Assurance Project Plan for Longhorn Army Ammunition Plant, Karnack, Texas [July 2014]*); United States Environmental Protection Agency (USEPA) *Test Methods for Evaluating Solid Waste, Physical/Chemical Meth*ods, *3rd edition* (SW-846); *National Functional Guidelines for Inorganic Superfund Data Review (USEPA, September 2016); National Functional Guidelines for Organic Superfund Data Review (USEPA, September 2016)* and professional judgment
Validation Level:	Stage 2BVM (100% of data), Stage 3VM (10% of data)
Data Reviewer:	Jennifer Chandler, HDR

Sample ID	Lab ID	Matrix	VOCs	Perchlorate
SW1	L19030638-01	SW	X	X
SW1 MS	L19030638-02	SW	X	X
SW1 MSD	L19030638-03	SW	X	X
SW2	L19030638-04	SW	X	X
SW3	L19030638-05	SW	X	X
SW4	L19030638-06	SW	X	X
DUP01	L19030638-07	SW	X	X
TB01	L19030638-08	QC Water	X	

SUMMARY

One hundred percent of the data underwent Stage 2BVM level validation. Ten percent of the data underwent Stage 3VM level validation.

Laboratory data were acceptable with qualification as noted below. No data were rejected. Completeness was 100%, which met the goal of 90% for the project.

I. SAMPLE RECEIPT / CHAIN OF CUSTODY

The chains of custody (COC) were filled out and signed. Samples were received within the correct temperature range (at 3.0°C). No qualification was required.

II. SAMPLES ANALYZED

All planned samples were collected and all scheduled analyses were performed. The correct analyte lists were reported. No qualification was required.

VOCs: Samples were analyzed by USEPA SW-846 Method 8260B. Results are reported in µg/L.

Perchlorate: Samples were analyzed by USEPA Method SW-846 6850. Results are reported in µg/L.

III. HOLDING TIMES AND PRESERVATION
All holding time criteria were met and no qualification was required except as noted below.

VOCs: Samples were analyzed within 14 days of collection.

Perchlorate: Samples were analyzed within 28 days of collection. No qualification was required.

IV. BLANKS
METHOD BLANKS
Target analytes were not detected in method blanks except as noted below.

VOCs: VOCs were not detected in the MBs. No qualification was required.

Perchlorate: Perchlorate was not detected in the MBs. No qualification was required.

TRIP BLANKS
VOCs: One trip blank was collected (TB-01). Acetone was detected at 2.67 µg/L, below the limit of quantitation (LOQ) of 10 µg/L. The following samples were detected at less than five times the blank and has been qualified as estimated with a possible high bias (J+): SW-1, SW-2, SW-3, and DUP01.

Perchlorate: Not applicable.

EQUIPMENT RINSE BLANK
Equipment rinse blanks were not required.

INITIAL AND CONTINUING CALIBRATION BLANKS (ICBs and CCBs)
VOCs: Not applicable.

Perchlorate: Perchlorate was not detected in the CCBs. No qualification was required.

V. LABORATORY CONTROL SAMPLES / LABORATORY CONTROL SAMPLE DUPLICATE (LCS/LCSD)
Recoveries and relative percent differences (RPDs) were generally within control limits except as noted below.

VOCs: Recoveries were within control limits. No qualification was required.

Perchlorate: Recoveries were within control limits. No qualification was required.

VI. MATRIX SPIKE / MATRIX SPIKE DUPLICATE (MS/MSD)
VOCs: Sample SW-1 was designated on the COC for MS/MSD analysis. All recoveries and RPDs were within control limits. No qualification was required.

Perchlorate: Sample SW-1 was designated on the COC for MS/MSD analysis. The MSD recovery 80.5% was below the control limits of 84-119%. Sample results were qualified as estimated (J-).

VI. DILUTION TEST AND POST DIGESTION SPIKE (PDS)
A dilution test was performed for analytes detected at least 50 times the concentration of the MRL, and results agreed within ten percent. A post digestion spike (PDS) was performed on

samples and the recoveries were between 80 and 120 percent except as noted below. These tests are applicable only to metals by SW6010C and SW6020.

VOCs: Not applicable.

Perchlorate: Not applicable.

VIII. FIELD DUPLICATES

Field duplicate (FD) samples were collected as shown in the table below. Control limits listed in the QAPP were used.

Field Duplicate Sample	Parent Sample
DUP-01	SW1 (VOCs and perchlorate)

VOCs: Results were within the control limits. No qualification was required.

Perchlorate: Results were within the control limits. No qualification was required.

IX. LABORATORY DUPLICATES

Laboratory duplicate (LD) analyses were not performed on any samples from this project.

X. INSTRUMENT CALIBRATION

INITIAL CALIBRATION

VOCs: The calibration curve included a standard at or below the LOQ. Calibration requirements were met. No qualification was required.

Perchlorate: The calibration curve included a standard at or below the LOQ. Calibration requirements were met. No qualification was required.

INITIAL CALIBRATION VERIFICATION (ICV)

VOCs: ICV results were within the required limits. No qualification was required.

Perchlorate: ICV results were within the required limits. No qualification was required.

CONTINUING CALIBRATION VERIFICATION (CCV)

VOCs: CCV results were within the required limits. No qualification was required.

Perchlorate: CCV results were within the required limits. No qualification was required.

XI. SURROGATES, INTERNAL STANDARDS AND ION RATIOS

VOCs: Internal standard areas and retention times were within required limits. Surrogate recoveries were within control limits. No qualification was required.

Perchlorate: Internal standard areas and ion ratios were within required limits. No qualification was required.

XII. INTERFERENCE CHECK SAMPLES

Interference check sample solutions ICSA and ICSAB were analyzed (methods 6010C and 6020 only).

VOCs: Not applicable.

Perchlorate: Not applicable.

XIII. SAMPLE LIMITS OF QUANTITATION (LOQs)

Limits of quantitation (LOQs) should be less than the applicable cleanup levels as listed in the project QAPP.

VOCs: LOQs were below the groundwater MCLs/cleanup levels.

Perchlorate: LOQs were below the groundwater MCLs/cleanup levels.

XIV. SAMPLE RESULTS / TRANSCRIPTION VERIFICATION

Transcription between the data package and the EDDs was verified. Results reported below the LOQs but above the DLs were qualified as estimated (J). Non-detect results were reported down to the limits of detection (LODs).

VOCs: No issues.

Perchlorate: No issues.

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

August 1, 2019

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: August 2019 Underground Injection Control Substantive Requirements Notification for Remedy at LHAAP-04, Longhorn Army Ammunition Plant, Karnack, Texas

Dear Ms. Palmie,

The above-referenced document is being transmitted to you for your records. We are presumptively complying with the substantive requirements of 30 Texas Administrative Code (TAC) §331, Subchapters A, C, and H for Class V Injection Wells. Therefore, unless we hear in the negative within 30 calendar days (August 31, 2019), the injections will be implemented at Site LHAAP-04.

The document was prepared by Bhate Environmental Associates, Inc., 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:
R. Mayer, USEPA Region 6, Dallas, TX (1 hard copy and 1 CD)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK (electronic only)
A. Sherman, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

MEMORANDUM FOR RECORD

DATE: August 1, 2019

PROJECT NAME: Remedy for LHAAP-04, Longhorn Army Ammunition Plant, Karnack, Texas

TO:

Rose Zeiler	Site Manager
Rick Smith	Project Manager
Aaron Williams	Project Engineer
Kimberly Nemmers	Bhate Project Manager

FROM: Praveen Srivastav — Bhate Team Deputy Project Manager, Aptim Federal Services, LLC (APTIM), Cell No. 281-639-8743

SUBJECT: **LHAAP-04 Underground Injection Control Substantive Requirements Notification, Longhorn Army Ammunition Plant, Karnack, TX (Contract No. W9128F-13-D-0012, Task Order No. W912BV17F0150)**

INTRODUCTION

Remedial activities are required under the Record of Decision (ROD) issued for the LHAAP-04 Former Pilot Wastewater Treatment Plant (AECOM 2016). The Draft Final (DF) Remedial Design/Remedial Action Work Plan (RD/RAWP) was submitted to Texas Commission on Environmental Quality (TCEQ) for review in April 2019 (U.S. Army 2019). No further comments were received from the regulators, and the RD/RAWP DF became the final document. The RAWP was developed using the basis and details of the RD for LHAAP-04.

As part of the selected remedy, in situ bioremediation (ISB) will be conducted in the area of perchlorate contaminated shallow groundwater with concentrations exceeding five times the TCEQ's Protective Concentration Level (PCL) of 17 µg/L and is planned to be conducted in September 2019. The ISB remedy will be implemented by injection of food-grade emulsified vegetable oil (EVO) to act as an electron donor to enhance populations of indigenous microorganisms that are capable of degrading perchlorate to harmless byproducts (chloride and oxygen).

The enclosed Class V Injection Well Inventory Form (**Enclosure 1**) and TCEQ Core Data Form (**Enclosure 2**) comply with the substantive requirements for construction, operation, and closure under 30 Texas Administrative Code (TAC) §331, Subchapters, A, C, and H (the Applicable or Relevant and Appropriate Requirements [ARARs] for underground injection control).

SITE HISTORY

LHAAP-04, known as Site 04 or the former pilot wastewater treatment plant, is approximately 0.5 acres and is located in the central portion of LHAAP (Class V Injection Well Inventory Form, **Enclosure 1**, Attachment A, Figure 1-2, LHAAP-04 Site Location). The demolition of the former pilot wastewater treatment facility structures, tanks, and piping, and the disposal of the associated wastes were completed in the summer of 1997 as part of the Resource Conservation and Recovery Act (RCRA) closure of the plant. Under the Comprehensive Environmental Response, Compensation, and Liability Act of

1980 (CERCLA) program, excavation of soil impacted with mercury and perchlorate at the LHAAP-04 site was completed in 2009 along the southern edge of the slab, which formerly housed storage tanks for the former pilot wastewater treatment facility.

The U.S. Department of the Army (U.S. Army) issued the Final ROD for LHAAP-04 (AECOM 2016) in October 2016 that was signed by the Army on December 15, 2016, and the U.S. Environmental Protection Agency (USEPA) on March 30, 2017. The Texas Commission on Environmental Quality (TCEQ) issued a letter concurring with the ROD on February 7, 2017. The ROD identified perchlorate as the only constituent of concern (COC) in groundwater for LHAAP-04. The remedy selected in the ROD included in-situ bioremediation (ISB) for perchlorate concentrations in groundwater, long-term monitoring (LTM) of groundwater, and LUCs to maintain the remedy and prohibit groundwater use until COC concentrations are reduced to levels supportive of unlimited use and unrestricted exposure.

PLANNED ACTION

The remedy will include ISB at LHAAP-04 to remediate the area of perchlorate contaminated groundwater with concentrations exceeding five times the PCL. Since the ROD, two shallow groundwater monitoring wells and one intermediate monitoring groundwater well were installed to better define the area of groundwater contamination prior to ISB. The Remedial Design was based on the most recent results and plume as shown on in the Class V Injection Well Inventory Form, **Enclosure 1**, Attachment E. Multiple injections of substrate may be needed based on effectiveness of the ISB.

The implementation of ISB will use a biogrid application for the injection of an electron donor to biodegrade the perchlorate. The Material Safety Data Sheet for the injectate (an emulsified vegetable oil mixture) is included in the Class V Injection Well Inventory Form, **Enclosure 1**, Attachment H.

Implementation of the remedy is planned for September 2019. Per Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7, the Army is presumptively complying with substantive requirement of construction, operation and closure 30 TAC §331, Subchapters, A, C, and H (ARARs for underground injection control).

Enclosures:

1. Class V Injection Well Inventory Form
2. TCEQ Core Data Form

ENCLOSURE 1

CLASS V INJECTION WELL INVENTORY FORM

Texas Commission on Environmental Quality
Class V Injection Well
Inventory/Authorization Form

Submit To:
TCEQ
UIC Permits Team
Radioactive Materials Division
MC233
PO Box 13087
Austin, Texas 78711-3087
512/239-6466

For TCEQ Use Only
Reg. No. _____
Date Received _____
Date Authorized _____

Section I General Information
Provide the information in items 1 through 8

1. TCEQ Program Area (PST, VCP, IHW, etc.):
2. Agent/Consultant:
3. Facility Name: Longhorn Army Ammunition Plant, LHAAP-04

   Address (Street, City, County, State, and Zip Code) or location description (if no address is available): Northeast corner of Harrison County, located between State Highway 43 in Karnack, Texas, and the western shore of Caddo Lake
4. Latitude and Longitude (degrees-minutes-seconds) and method of determination (GPS, TOPO, etc.) (Attach a Topographic Quadrangle map which identifies the facility location relative to major streets or roadways as Attachment A.)

   Latitude: 32° 40' 58.67" N; Longitude: 94° 9' 5.80" W. LHAAP-04 Site Location Map (Figure 1-2 from the RD/RAWP) is also included in **Attachment A**.
5. Type of Well Construction (Vertical Injection, Subsurface Fluid Distribution System, Infiltration Gallery, Temporary Injection Points, etc.) and Number of Injection Wells:

   25 temporary direct-push injection points will be used to distribute the injectate mixture into the shallow zone.
6. Description regarding purpose of Injection System. Attach a Site Map as Attachment B (Attach the Approved Remediation Plan [if appropriate]):

   LHAAP-04 is a former pilot wastewater treatment plant located in the central portion of LHAAP near the former fire station. Wastewater treatment operations began at LHAAP-04 in 1984. The demolition of the former pilot wastewater treatment facility structures, tanks, and piping, and the disposal of the associated wastes were completed in the summer of 1997. Perchlorate is the only constituent of concern (COC) in groundwater

for LHAAP-04. The remedy selected in the ROD included in-situ bioremediation (ISB) for perchlorate concentrations in groundwater, long-term monitoring (LTM) of groundwater, and LUCs to maintain the remedy and prohibit groundwater use until COC concentrations are reduced to levels supportive of unlimited use and unrestricted exposure.

To implement ISB, emulsified vegetable oil (EVO), diammonium phosphate (microbial nutrient), and water will be injected into the subsurface at 25 locations shown on **Attachment B** (Figure 5-1 from the RD/RAWP) The injectate mixture will consist of approximately 1% (by volume) solution of EVO.

The Remedial Design/Remedial Action Work Plan (RD/RAWP) has been approved by TCEQ and USEPA and the approved injection plan from the RD/RAWP is included as **Attachment B.**

7. Water Well Driller/Installer:

Section II Proposed Down Hole Design

Attach a diagram signed and sealed by a licensed engineer as Attachment C

Name of String	Size	Setting Depth	Sacks Cement/Grout - Slurry Volume - Top of Cement	Hole Size	Weight (lbs/ft) PVC/Steel
Casing	N/A (See Note 1 below)	N/A	N/A	N/A	N/A
Tubing	N/A	N/A	N/A	N/A	N/A
Screen	N/A	N/A	N/A	N/A	N/A

Note 1: The injection of the amendments will be performed via direct-push injection points. The description of the direct-push injection points is provided in Section III below. There will be no permanent casing, tubing, or screens associated with the direct-push injection points.

Section III Proposed Trench System, Subsurface Fluid Distribution System, or Infiltration Gallery

Attach a diagram signed and sealed by a licensed engineer as Attachment D

12. System(s) Dimensions: Approximately 11,025 square feet based on the 85 μg/L perchlorate contour in shallow groundwater.
13. System(s) Construction: The fluid distribution system will consist of a temporary/mobile tanks/containers, hoses, a bulk storage tank, mixing equipment, injection pump, and volume and metering control equipment. Injection points will be advanced using via a tractor mounted rig with a direct-push technology (DPT) hammer. The injectate mixture will be injected using at each proposed direct-push point at 4-foot intervals in the target treatment area. Under this approach, drilling rods (injection probes) are advanced to the proposed injection interval. Injectate mixture will be pumped down through the DPT drilling rods (acting as a temporary well casing) to the injection interval and injectate will be forced through the ports in the rods to the surrounding formation. The tools are then advanced to the next injection depth and the material is again pumped through the rods. This cycle is repeated to provide coverage across the entire vertical treatment interval. Injection flow rates are expected to range from 2 to 6 gallons per minute and an attempt will be made to keep injection pressures below 25 pounds per square inch (psi).

    The injection target intervals are shown in **Attachment C**, and a sample temporary DPT injection point diagram is included as **Attachment D.**

Section IV Site Hydrogeological and Injection Zone Data
Provide the information in items 14 through 31

14. Name of Contaminated Aquifer: Shallow Aquifer
15. Receiving Formation Name of Injection Zone: Unconsolidated Material
16. Well/Trench Total Depth: Injection point depths are vary from 6 to 20 feet (ft) below ground surface (bgs).
17. Surface Elevation: Approximately 205-215 ft
18. Depth to Ground Water: Depth to groundwater measured in monitoring wells ranges from approximately 2 to 10 ft bgs, with the saturated zone generally encountered between 6 and 15 feet bgs
19. Injection Zone Depth: 6 to 20 feet bgs
20. Injection Zone vertically isolated geologically? ☒Y/☐N Impervious Strata between Injection Zone and nearest Underground Source of Drinking Water:

    Name: Intermediate, Upper Deep and Deep Aquifer Zones (clay layers)
    Thickness:
    Intermediate Zone: 35 to 62 ft bgs
    Upper Deep Groundwater: 80 to 151 ft bgs
    Deep Groundwater: Extends below 220 ft bgs
21. Provide a list of contaminants and the levels (parts per million [ppm]) in contaminated aquifer.

    Attach as Attachment E: Perchlorate is the only COC in groundwater. See **Attachment E** showing recent levels of contamination in parts per billion.
22. Horizontal and Vertical extent of contamination and injection plume

    Attach as Attachment F: The horizontal extent of contamination shown in **Attachment E**. The contamination is limited to the shallow zone. There is no impact to the intermediate zone of the aquifer. A separate Attachment F is not provided.
23. Formation (Injection Zone) Water Chemistry (Background levels) TDS, etc.

    Attach as Attachment G: Water chemistry data (dissolved oxygen, oxidation reduction potential, pH, turbidity, etc.) will be collected in the baseline sampling event and will be reported in the Remedial Action Completion Report. A separate Attachment G is not provided.
24. Injection Fluid Chemistry in ppm at point of injection

    Attach as Attachment H: The injection fluid chemistry consists of approximately 1% (by volume) solution of EVO (carbon substrate). The EVO product, EDS-ER™, will be supplied by Tersus Environmental. See **Attachment H** for Safety Data Sheet.

    Water for the solution will be procured from the Leigh Water Company in Karnack, Texas from their potable water supply.
25. Lowest Known Depth of Ground Water with < 10,000 ppm TDS: Unknown

26. Maximum injection Rate/Volume/Pressure: Rate: 2 to 10 gallons per minute; Volume: 1,478 gallons per point; Pressure: 10 to 40 psi (An attempt will be made to keep injection pressures below 25 psi). However, in some cases, depending on the lithology the injection pressure may be higher.
27. Water wells within 1/4 mile radius (attach map as Attachment I): None
28. Injection wells within 1/4 mile radius (attach map as Attachment I): None
29. Monitor wells within 1/4 mile radius (attach driller's logs and map as Attachment I): See **Attachment I**, quarter mile map which indicates approximately 21 monitoring wells within a quarter mile radius from the planned injections.
30. Sampling frequency: Baseline sampling will be conducted prior to the injections followed by quarterly sampling events for eight quarters. The sample results will be included in monitoring reports that will be submitted to TCEQ. Samples will be monitored for perchlorate, field parameters, and biogeochemical parameters to monitor the progress of ISB injections.
31. Known hazardous components in injection fluid: There are no hazardous components in the injection fluid.

Section V Site History
Provide the information in items 32 through 35

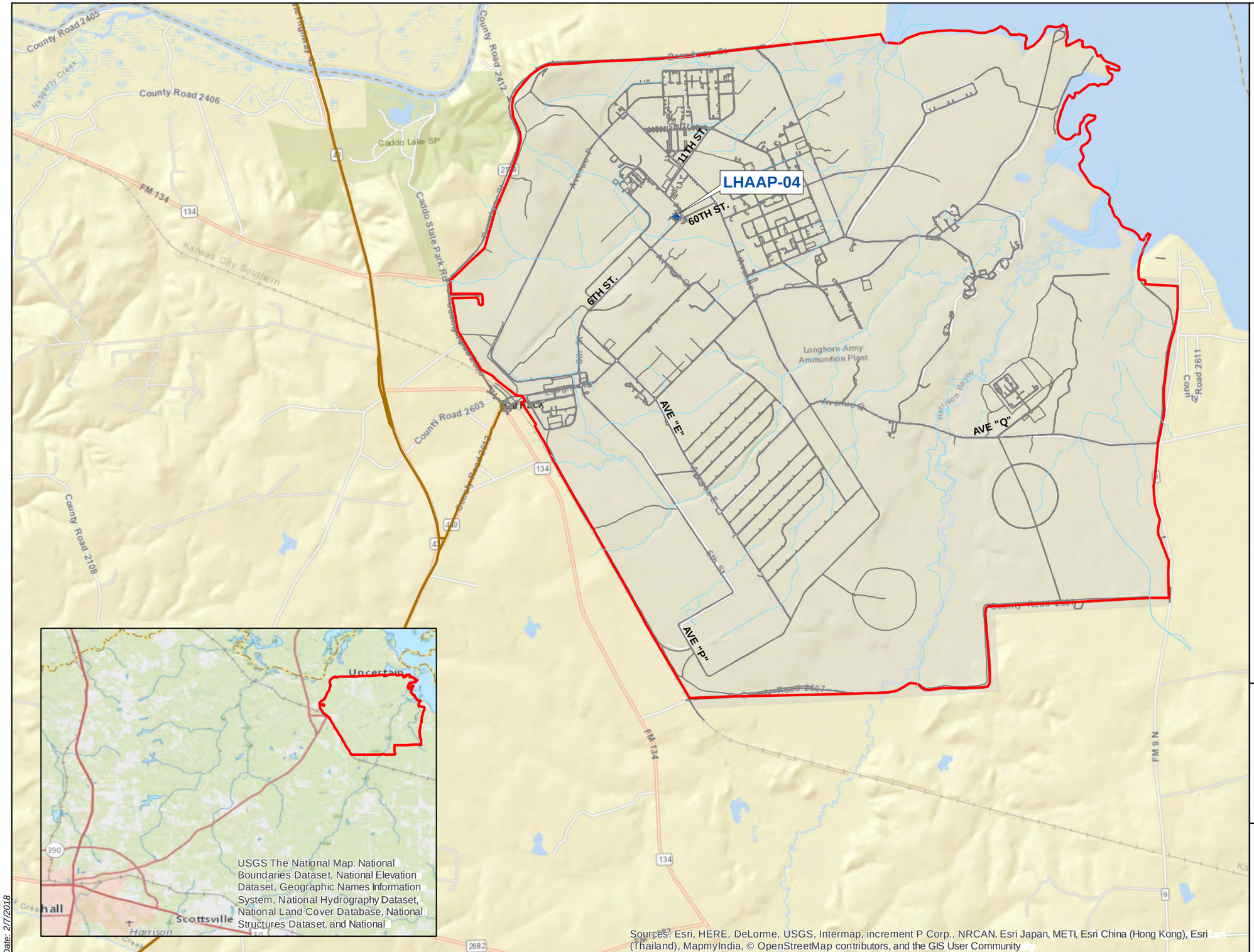
32. Type of Facility: Former Longhorn Army Ammunition Plant
33. Contamination Dates: 1940s to 1980s
34. Original Contamination (VOCs, TPH, BTEX, etc.) and Concentrations (Attach as Attachment J): The COC at LHAAP-04 is perchlorate from the wastewater treatment plant formerly located at the site. No separate Attachment J is provided.
35. Previous Remediation: Attach results of any previous remediation as Attachment K. Soil Remedial Action involved excavation of soil contaminated with perchlorate and was documented in the *Final Completion Report Non-Time-Critical Removal Action* dated August 2011. A separate Attachment K is not provided.

<<NOTE>> Authorization Form should be completed in detail and authorization given by TCEQ before construction, operation, and/or conversion can begin. Attach additional pages as necessary.

Attachment A

Site Topographic Map & Site Vicinity Map

- **Figure 1-2, LHAAP-04 Site Location Map**



U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

bhate ENVIRONMENT & INFRASTRUCTURE

APTIM

Figure 1-2

LHAAP Site Location Map
LHAAP-04
Remedial Design/Remedial Action Work Plan
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

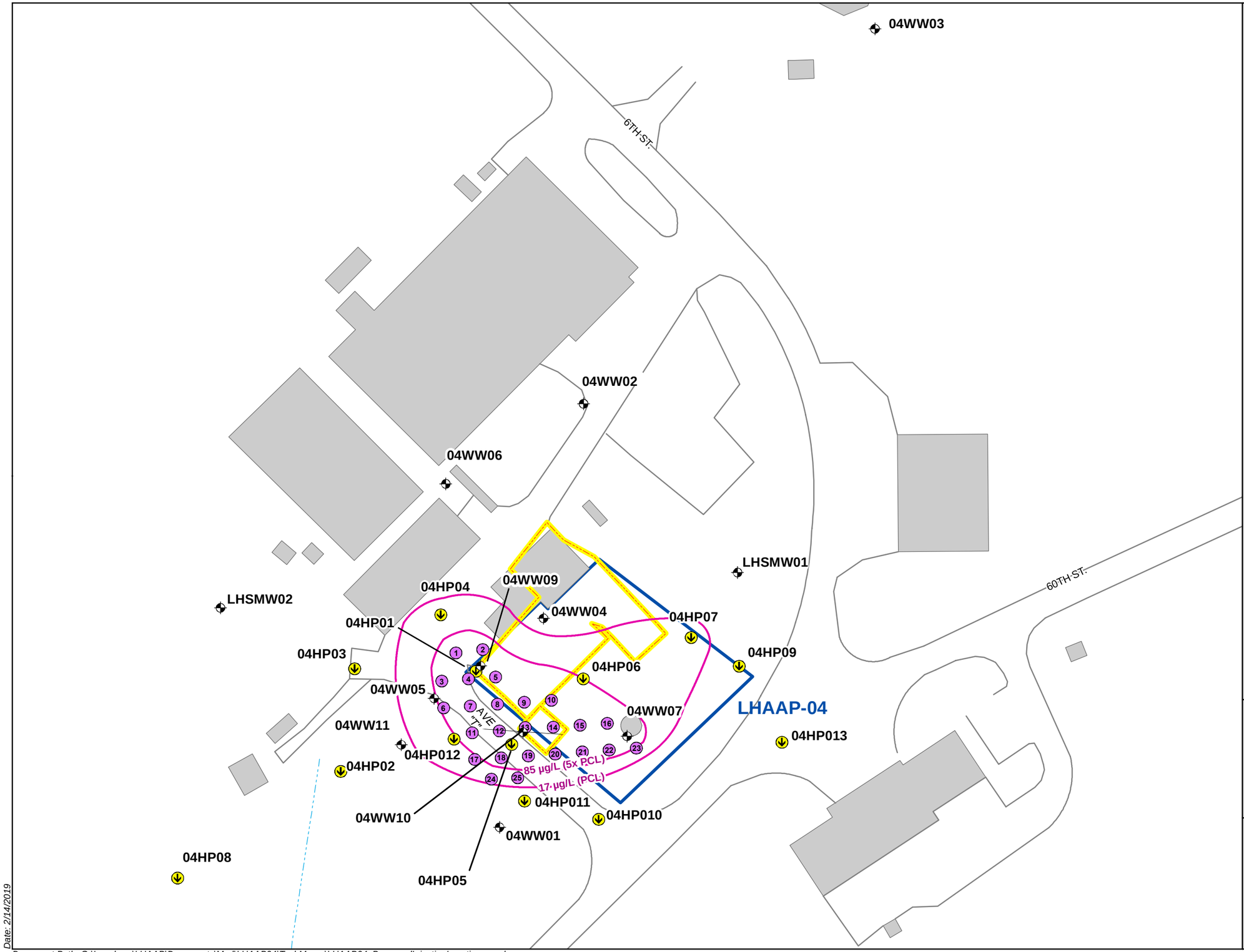
Date: 2/7/2018

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RD_RAWP\Fig1-2_LHAAP_SiteLocationMap.mxd

Attachment B

Proposed Injection Locations

- **Figure 5-1, LHAAP-04 Injection Plan, RD/RAWP**



Shallow Monitoring Well

Proposed Injection Location

Hydropunch Location

Perchlorate Plume

Stream

Limits of Excavation at Surface (*Source: LHAAP-04 Final Completion Report, Shaw, 2011*)

Road

Building

Site Boundary

Note:
1. Plume boundaries based on most recent results available at each well (2018).
2. PCL - Texas Risk Reduction Program Protective Concentration Level for Residential Groundwater
3. The injection pattern generally targets the area within the 85 µg/L contour, but has been shifted to the southwest to account for potential future migration.

N

0 50 100 Feet

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

bhate ENVIRONMENT & INFRASTRUCTURE

APTIM

Figure 5-1

Injection Plan
LHAAP-04

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/14/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP04\TechMemo\LHAAP04_ProposedInjectionLocations.mxd

Attachment C

Target Injection Intervals

- **Table 5-1, Injection Locations and Amendment Volumes, RD/RAWP**

Table 5-1
Injection Locations and Amendment Volumes

DPT Location	Amendment Volume per Location			Nearest Monitoring Well	DPT Injection Depths (ft bgs)
	Gallons of EVO (EDS-ER or Equivalent)	Gallons of Nutrients (DAP)	Gallons of Water		
04DPT03, -06, and -07	15	6	1,463	04WW05	12 - 20
04DPT01, -02, -04, and -05	15	6	1,463	04WW09	6 - 14
04DPT08, -09, -10, -11, -12, -13, -14, -17, -18, -19, -20, -24, and -25	15	6	1,463	04WW10	7 - 15
04DPT15, -16, -21, -22, and -23	15	6	1,463	04WW07	7 - 15

Notes:

ft bgs - feet below ground surface

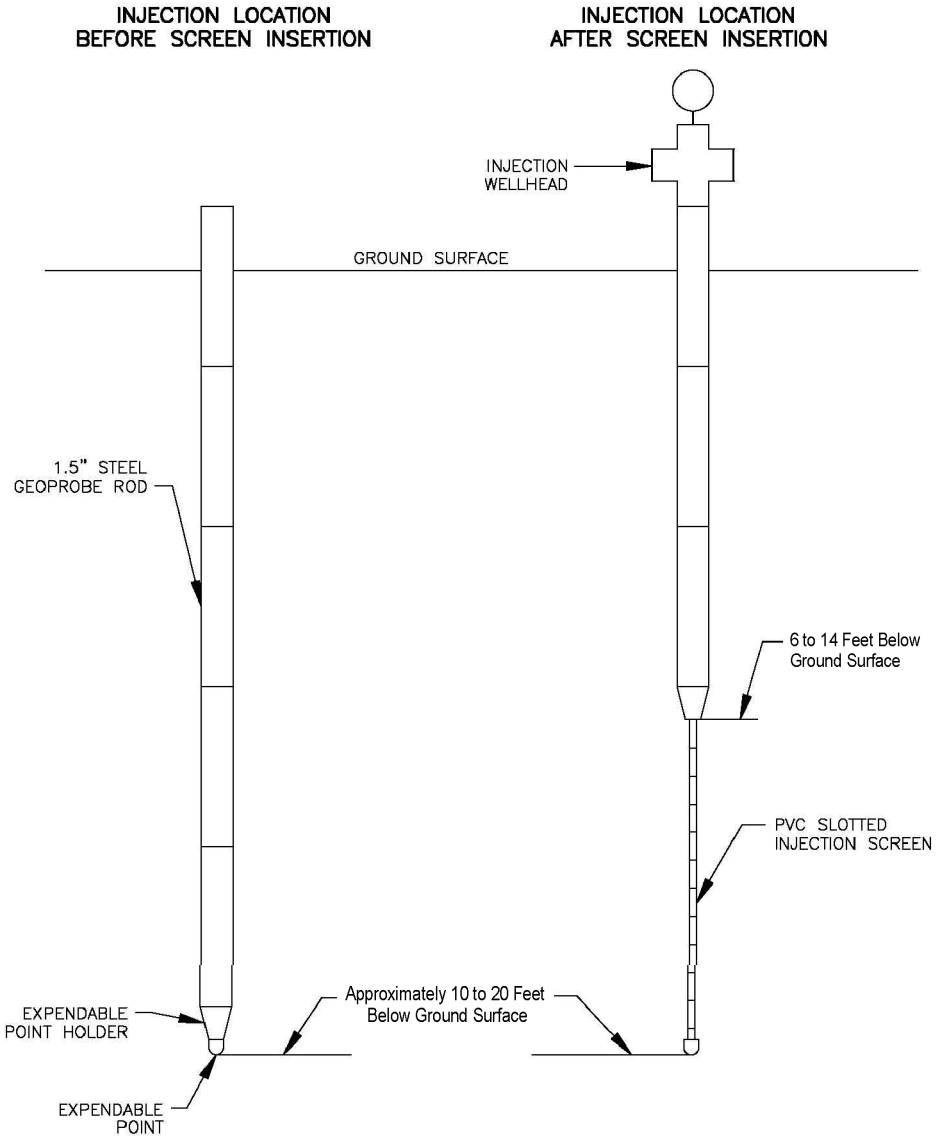
DAP - Diammonium phosphate

DPT - direct-push technology

evo - emulsified vegetable oil

Attachment D

Typical DPT Temporary Injection Point Diagram



Not to Scale

Attachment A
Typical DPT Temporary Injection Point Diagram

Longhorn Army Ammunition Plant
Karnack, Texas

bhate ENVIRONMENT & INFRASTRUCTURE

APTIM

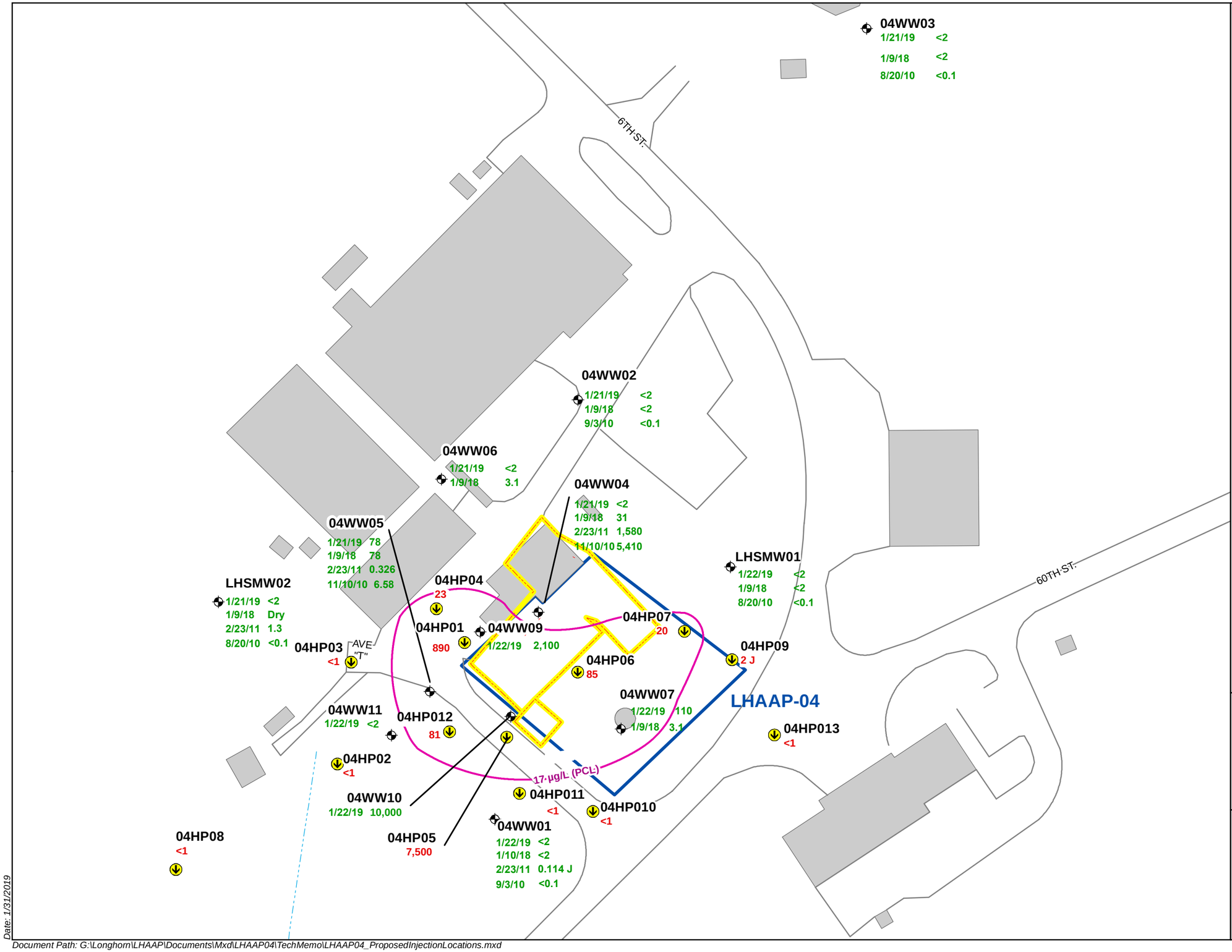
Project Number: 501032

Attachment E

COC concentrations in Shallow Groundwater

- **Figure 2-3, Perchlorate Concentrations in Shallow Groundwater at LHAAP-04, RD/RAWP**

00936922



Shallow Monitoring Well

Hydropunch Location

Perchlorate Plume

Stream

Limits of Excavation at Surface (*Source: LHAAP-04 Final Completion Report, Shaw, 2011*)

Road

Building

Site Boundary

Note:
1. Perchlorate concentrations reported in micrograms per liter (µg/L).
2. Plume boundaries based on most recent results available at each well (2018-2019).
3. PCL - Texas Risk Reduction Program Protective Concentration Level for Residential Groundwater
4. 85 = Hydropunch November-December 2018 data
110 = 2010, 2011, 2018, and 2019 monitoring well data

N

0 50 100 Feet

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

bhate ENVIRONMENT & INFRASTRUCTURE

APTIM

Figure 2-3

Perchlorate Concentrations in Shallow Groundwater at LHAAP-04

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/31/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP04\TechMemo\LHAAP04_ProposedInjectionLocations.mxd

Attachment F

Not Applicable

Attachment G

Not Applicable

Attachment H

Safety Data Sheets

- **Electron Donor Solution (EDS-ER™)**

Material Safety Data Sheet

Electron Donor Solution

Section 1: Chemical Product and Company Identification

Product Name: Electron Donor Solution Extended Release
Catalog Codes: EDS-ER
CAS#: 8001-22-7
TSCA: TSCA 8(b) inventory: Soybean oil
HMIS Code: H F R P: 10 0 A
Trade Name and Synonyms: EDS-ER
Chemical Family: Glyceride Oils

Contact Information:
Tersus Environmental, LLC
109 E. 17th Street, Suite #3880
Cheyenne, WY 82001
Ph: 307.638.2822 • info@tersusenv.com
www.tersusenv.com
For emergency assistance, call: 919.638.7892

Section 2: Composition and Information on Ingredients

COMPONANT	CAS #	OSHA TWA	OSHA STEL	ACGIH TWA	ACGIH STEL
Soybean Oil	8001-22-7	---	10 mg/m^3	---	---
Vegetable Oil Derived Fatty Acid Esters	Confidential	---	---	---	---

HAZARDOUS INGREDIENTS: NONE AS DEFINED UNDER THE U.S. OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) OR THE CANADIAN HAZARDOUS PRODUCTS. ACT S.C. 1987, C.30 (PART 1).

THE PRECISE COMPOSITION OF THIS PRODUCT IS PROPRIETARY INFORMATION. A MORE COMPLETE DISCLOSURE WILL BE PROVIDED TO A PHYSICIAN IN THE EVENT OF A MEDICAL EMERGENCY.

SARA HAZARD: NONE NOTED (SECTION 311/312) TITLE III SECTION 313 - NOT LISTED
All components of this product are listed on the TSCA registry.

Section 3: Physical/Chemical Characteristics

BOILING RANGE: Not applicable VAPOR DENSITY: Exceeds 1.0

SPECIFIC GRAVITY (H20=1.0): 0.92 - 0.925 VAPOR PRESSURE: Not applicable

PERCENT VOLATILE BY VOLUME: 0% SOLUBILITY IN WATER: Miscible

EVAPORATION RATE: Not applicable
APPEARANCE AND ODOR: A pale yellow, oily liquid - only a faint odor.
WEIGHT PER GALLON: 7.7 lbs. at 60F.

Section 4: Fire and Explosion Data

FLAMMABILITY CLASSIFICATION: Combustible Liquid - Class IIIB.
FLASHPOINT: Greater than 550 F (288 C).
METHOD USED: Tag Closed Cup.
EXTINGUISHING MEDIA: CO2, dry chemical, foam, sand.
SPECIAL FIREFIGHTING PROCEDURES: Avoid use of water as it may spread fire by dispersing oil. Use water to keep fire-exposed containers cool. Water spray may be used to flush spills away from fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Rags soaked with any oil or solvent can present a fire hazard and should always be stored in UL Listed or Factory Mutual approved, covered containers. Improperly stored rags can create conditions that lead to oxidation. Oxidation, under certain conditions can lead to spontaneous combustion.

Section 5: Reactivity Data

STABILITY: Generally stable. Spontaneous combustion can occur. See Unusual Fire and Explosion Procedures, Section IV.

CONDITIONS TO AVOID: High surface area exposure to oxygen can result in polymerization and release of heat.

INCOMPATABILITY (MATERIALS TO AVOID): Avoid contact with strong oxidizing agents.

HAZARDOUS DECOMPOSITIONS OR BY-PRODUCTS: Decomposition may produce carbon dioxide and carbon monoxide.

HAZARDOUS POLYMERIZATION: Will not occur.

Section 6: Health Hazard Data

THRESHHOLD LIMIT VALUE: As a liquid - none. As oil mist - 10 mg/m3 total particulate.

INHALATION HEALTH RISKS AND SYMPTOMS OF EXPOSURE: Excessive inhalation of oil mist may affect the respiratory system. Oil mist is classified as a nuisance particulate by ACGIH.

SKIN ABSORPTION HEALTH RISKS AND SYMPTOMS OF EXPOSURE: Not classified as a primary skin irritant or corrosive material. Sensitive individuals may experience dermatitis after long exposure of oil on skin.

HEALTH HAZARDS (ACUTE AND CHRONIC): Acute: none observed by inhalation. Chronic: none reported.

EMERGENCY AND FIRST AID PROCEDURES FOR:

SKIN CONTACT: May be removed from skin by washing with soap and warm water.

EYE CONTACT: Immediately flush eyes with plenty of cool water for at least 15 minutes. Do NOT let victim rub eyes.

INHALATION: Immediately remove exposed individual to fresh air source. If victim has stopped breathing give artificial respiration, get medical attention immediately.

Section 7: Precautions for Safe Handling and Use

ENVIRONMENTAL PRECAUTIONS: Where large spills are possible, a comprehensive spill response plan should be developed and implemented.

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wear appropriate respiratory protection and protective clothing as described in section VIII. Depending on quantity of spill: (a) Small spill - add solid adsorbent, shovel into disposable container and wash the area. Clean area with detergent. (b) Large spill - Squeegee or pump into holding container. Clean area with detergent. In the event of an uncontrolled release of this material, the user should determine if this release is reportable under applicable laws and regulations.

WASTE DISPOSAL METHOD: All recovered material should be packaged, labeled, transported, and disposed or reclaimed in accordance with local, state, and federal regulations and good engineering practices.

Section 8: Control Measures

RESPIRATORY PROTECTION: Not normally needed. A qualified health specialist should evaluate whether there is a need for respiratory protection under specific conditions.

VENTILATION: Handle in the presence of adequate ventilation. Intermittent clean air exchanges recommended, but not required.

PROTECTIVE GLOVES: Not normally needed. However, protective clothing is always recommended when handling chemicals.

EYE PROTECTION: Eye protection is always recommended when handling chemicals. Wear safety glasses meeting the specifications established in ANSI Standard Z87.1.

Section 9: Special Precautions

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Store away from flame, fire, and excessive heat.

Section 10: Disposal Considerations

General Information: Do not discharge into drains, watercourses or onto the ground. Discharge, treatment, or disposal may be subject to national, state, or local laws. Empty containers may contain product residues.

Disposal Methods: No specific disposal method required.

Container: Since emptied containers retain product residue, follow label warnings even after container is emptied.

Section 11: Transportation Information

DOT Not regulated.
TDG Not regulated.
IATA Not regulated.
IMDG Not regulated.

Section 12: Other Information

Hazard Ratings

	Health Hazard	Fire Hazard	Instability	Special Hazard
NFPA	1	1	0	NONE

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
NFPA Label colored diamond code: Blue - Health; Red - Flammability; Yellow - Instability; White - Special Hazards

	Health Hazard	Flammability	Physical Hazard	Personal Protection
HMIS	1	1	0	--

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
HMIS Label colored bar code: Blue - Health; Red - Flammability; Orange - Physical Hazards; White - Special

Section 13: Disclaimer and/or Comments

We suggest that containers be either professionally reconditioned for re-use by certified firms or properly disposed of by certified firms to help reduce the possibility of an accident. Disposal of containers should be in accordance with applicable federal, state and local laws and regulations. "Empty" drums should not be given to individuals.

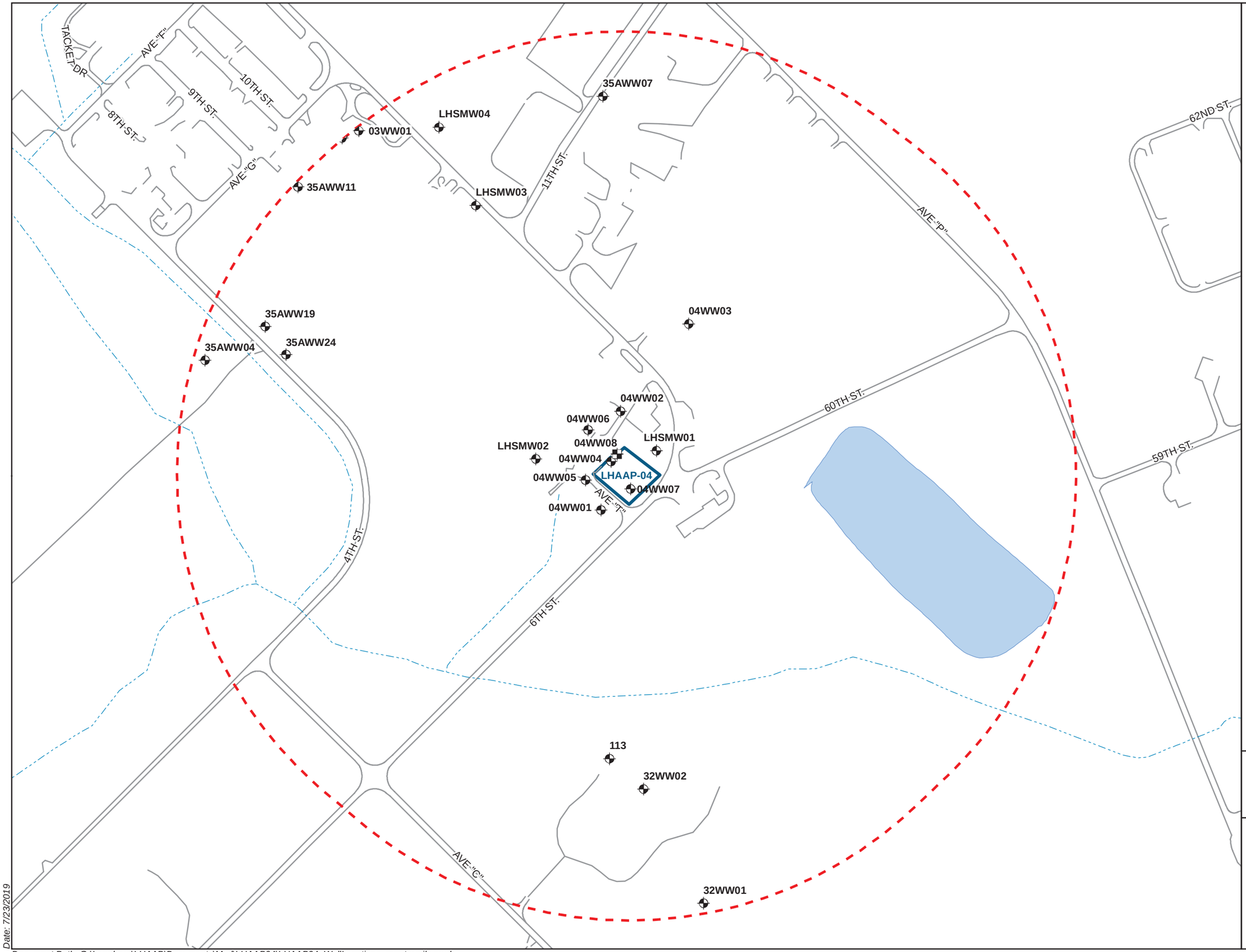
The conditions of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Tersus Environmental be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Tersus Environmental has been advised of the possibility of such damages.

Attachment I

Quarter Mile Radius Map and Boring Logs

00936931



Shallow Monitor Well
Intermediate Monitor Well
Deep Monitor Well
1/4 Mile Radius
Road
Stream
Site Boundary
Lakes

N

0 150 300 Feet

APTIM

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

Figure X

Wells within 1/4 Mile Radius
LHAAP-04

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 7/23/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP04\LHAAP04_WellLocations_quartermile.mxd

STATE OF TEXAS WELL REPORT for Tracking #162475

Owner:	**Longhorn Army Ammunition Plant**	Owner Well #:	**03WW01**
Address:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Grid #:	**35-23-6**
Well Location:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Latitude:	**32° 41' 10" N**
Well County:	**Harrison**	Longitude:	**094° 09' 15" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin e-trex**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **11/18/2008**
Completed: **11/18/2008**

Diameter of Hole: Diameter: **8.25 in From Surface To 30 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Gravel Packed From: **18 ft to 30 ft**
Gravel Pack Size: **20/40**

Annular Seal Data: 1st Interval: **From 16 ft to 18 ft with 1 Bentonite (#sacks and material)**
2nd Interval: **From 0 ft to 16 ft with 5 Cement (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Tremmie Pipe**
Cemented By: **Driller**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Sleeve Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **ETTL Engineers & Consultants Inc.**
1717 E. Erwin

	Tyler , TX 75702
Driller License Number:	**2126**
Licensed Well Driller Signature:	**H. Douglas Hinds**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #**162475**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0-9.5 Sandy lean clay - brown
9.5-15.5 Silty sand - brown-gray
15.5-23.5 Clayey sand - brown
23.5-30 Sandy clay - gray

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Sch. 40 0 - 20
2 New PVC Sch. 40 - slotted 20 - 30 0.010"

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028430

Hole No. 04WWD1

DRILLING LOG	DIVISION USACE - Tulsa	INSTALLATION LHAAP - Karnack, TX	SHEET 1 OF 2 SHEETS
1. PROJECT LHAAP - Supplemental RI site 04		10. SIZE AND TYPE OF BIT Auger Bits	
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (GSM or MSL)	
3. DRILLING AGENCY ETTL - Tyler, TX		12. MANUFACTURER'S DESIGNATION OF DRILL SS = Soil Sample: Mobil B-51 / 5' Cont. Sampler	
4. HOLE NO. (As shown on drawing title and file number) 04 WW01		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5	UNDISTURBED 0
5. NAME OF DRILLER Tom Cook		14. TOTAL NUMBER CORE BOXES N/A	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER	
		16. DATE HOLE: STARTED 11-29-00	COMPLETED 11-29-00
7. THICKNESS OF OVERBURDEN Penetrated 24.0'		17. ELEVATION TOP OF HOLE	
8. DEPTH DRILLED INTO ROCK N/A		18. TOTAL CORE RECOVERY FOR BORING N/A %	
9. TOTAL DEPTH OF HOLE 23.0' below grade		19. SIGNATURE OF INSPECTOR [signature] PG Cika	

ELEVATION a	DEPTH (ft) b	LEGEND (USC) c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	1	CL	6" of Med to dark brown topsoil with roots over		SS #1	1300 Commenced HSA Pilot hole ≥ 4¼" I.D.
	2		Silty clay - Med to dark brown and yellowish-brown - mottled, some Med. gray layering (½"). Trace to some fine sand - Damp	3.8' / 4.0'	0.0' to 4.0'	Augers for 04 WW0 HNu calib to isobutylene (10.2eV) Lamp
	3					
	4					Ambient air = 0ppm
	5		Silty clay Lt. to med. brown, gray, and yellowish-orange mottled, streaked, and stained, some occ DK brown streaks and inclusions, some fine sand throughout - Damp to sl Moist (v. stiff)	4.2' / 5.0'	SS #2 4.0' to 9.0'	HNu Reading in Sampler = 0ppm
	6					HNu Reading @ Augers = 0ppm
	7					
	8					Ambient Air = 0ppm
	9					1325
	10		Silty clay Lt. to med. brown and orange - Lower - mottled, some occ Med. gray streaking and staining, trace fine sand throughout - Moist (v. stiff)	4.2' / 5.0'	SS #3 9.0' to 14.0'	HNu Reading in Sampler = 0 ppm
	11					HNu Reading @ Augers = 0 ppm
	12					
	13		Becoming Lt. to dark gray and layered @ 12.8' (Damp)			Ambient air = 0ppm
	14	↓	Vis. moisture content inc. with depth			
	15	(CL)	Silty clay Lt. to med. gray v. thin layering and laminated texture/ structure, trace lignite, horiz. bedding in thin to v. thin layers - Damp to Dry - v. stiff to Hard (clay shale properties)	5.0' / 5.0'	SS #4 14.0' to 19.0'	HNu Reading in Sampler = 0ppm
	16					HNu Reading @ Augers = 0ppm
	17					
	18					
	19	↓	Water in sample @ 18.5' along "fractured" texture of clays (shaley) Note some v. thin fine sand layers - light gray - interbedded			1355
					SS #5	

00936935

028431

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE | Hole No. 04WWD1

PROJECT: Supplemental RI Site 04 | INSTALLATION: LHAAP-Karnack, TX | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV. ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	21	(CL)	Silty Clay Med. to dark gray with abundant v. thin Lt. gray horiz. lenses, "breaks" along horiz. bedding, sample fractures easily along bedding - Clay intervals Damp and v. stiff	5.0' / 5.0'	19.0' to 24.0'	HNu Reading in Sampler: 0ppm HNu Reading @ Augers: 0ppm
	22					
	23					
	24					- Picked up augers off bottom @ 1400 for W.L. check from 18.5' Zone
	25		T.D. @ 24.0' below grade in Dry to Damp layered silty clay			- Water in "hole" @ 1445
	26					
	27					
	28					1455 Commenced overdrilling pilot hole with 11" O.D. "plugged" HSA for 4" SS monitoring well installation
	29					
	30					

- Bent./cement 8' to grade Grout
- Bent. Seal 11' - 8' (20 - 40)
- Filterpack 23' - 11'
- 4" SS #10 slot screen 23' - 13'

T.D. @ 23.0' below grade

ENG FORM 1836-A (ER 1110-1-1801) OPO 1980 OF - 628 - 803

PROJECT: LHAAP - Karnack, TX | HOLE NO. 04WWD1

00936936

028432

Hole No. 04WW02

DRILLING LOG	DIVISION USACE-Tulsa	INSTALLATION 04WW02	SHEET 1 OF 2 SHEETS

1. PROJECT LHAAP	10. SIZE AND TYPE OF BIT 8 IN OD HS / 10 IN OD HS
2. LOCATION (Coordinates or Station) 04WW07	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY ETTL	12. MANUFACTURER'S DESIGNATION OF DRILL FOREMOST B-5500
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED 4 — UNDISTURBED 0
5. NAME OF DRILLER DOUG HEINTZ	14. TOTAL NUMBER CORE BOXES N/A
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 11-30-00 — COMPLETED 11-30-00
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE	19. SIGNATURE OF INSPECTOR Neil Hockel

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	1	GC	0-3 BLACK ORGANIC TOPSOIL BROWN AND GRAY MOTTLED SILTY CLAY, SOFT, MOIST, SOME ROUNDED GRAVEL SMALL TO MED FILL	22"/24"	ST1	0738 Drillers on Location 0728 HNU 0PPM
	2	SC	BROWN AND GRAY MOTTLED CLAYEY FINE SAND, MOIST, LOOSE, SOME ROOTLETS, RUST STAINING	12/12	ST2	HNU 0PPM
	3					
	4		GRAY AND RED MOTTLED CLAY WITH FINE SAND STIFF, MOIST, PLASTIC	60"/60"	CS1	HNU 0PPM
	5	CL				
	6					
	7	CL	BROWN AND GRAY CLAY WITH FINE SAND, STIFF MOIST BROWN NODLES			
	8					0817
	9	OL	BROWN CLAY WITH FINE SAND INCREASE OF FINE SAND CONTENT, MOIST, LOOSE, NOT PLASTIC, TRACE BROWN NODLES, TRACE ROUND SMALL GRAVEL	60"/60"	CS2	HNU 0PPM
	10					
	11					
	12					
	13	ML	BROWN CLAYEY SILT, FIRM DRY, NOT PLASTIC	60"/60"	CS3	HNU 0PPM
	14					
	15					
	16	MH	BROWN FINE SAND, LOOSE, MOIST,			
	17					
	18		BROWN CLAY, FIRM, MOIST, PLASTIC			

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT LHAAP — HOLE NO. 04WW02

00936937

028433

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE — Hole No. 04WW02

PROJECT: LHAAP — INSTALLATION: LHAAP — SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	19	ML	GRAY CLAYEY FINE SAND, FIRM WET, HORIZONTAL DELINEATION	60"	654	HNU 0PPM
	20			60"		0843 DECIDE TO INSTALL WELL
			GRAY SILT, TRACE FINE SAND, STIFF, DRY			PULL 8 IN OD HS
	21	MH	NOT PLASTIC			REAM HOLE W/ 10 IN OD HS
	22					INSTALL SS
	23		EOB 23'			23 - 13 Screen
						13 - 11 SAND PACK ABOVE SCREEN
						11 - 8 BENTONITE
						8 - 0 GROUT
						0914 PERFED OUT CASING PLUG AND INSTALLED WELL

ENG FORM 1836-A JUN 67 (ER 1110-1-1801) GPO 1980 OF-626-603

PROJECT: LHAAP — HOLE NO. 04WW02

Hole No. OHWW03

00936938

028434

DRILLING LOG	DIVISION USACE - Tulsa	INSTALLATION LHAAP	SHEET 1 OF 2 SHEETS
1. PROJECT LHAAP		10. SIZE AND TYPE OF BIT 8 IN OD HS	
2. LOCATION (Coordinates or Station) Site 4 OHWW03		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY ETTL		12. MANUFACTURER'S DESIGNATION OF DRILL FOREMOST B-5500	
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7	UNDISTURBED 0
5. NAME OF DRILLER Doug Heintz		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED 11-29-00 COMPLETED 11-29-00	
8. DEPTH DRILLED INTO ROCK N/A		17. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE		18. TOTAL CORE RECOVERY FOR BORING N/A %	
		19. SIGNATURE OF INSPECTOR Stella Hockett	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–1		FILL BROWN & GRAY MOTTLED FINE SAND, LOOSE, MOIST, VEGITATION	22"/24"	ST1	HNU 0 ppm 12123 ST = Shelby Tube
	1–2	SM	BROWN AND GRAY MOTTLED CLAYEY FINE SAND, LOOSE, MOIST, ROOTLETS, RUST STAINING, BLACK NODULES			
	2–3	SM		17/12	ST2	HNU 0 ppm
	3–4		BROWN AND GRAY MOTTLED FINE SANDY CLAY, STIFF, MOIST, PLASTIC, RUST STAIN			HNU 0 ppm CS = 5 ft continuous sampler
	4–5	SM		54"/60"	CS1	
	5–6					
	6–7					
	7–8					
	8–9		BROWN AND GRAY MOTTLED SILTY CLAY WITH FINE SAND STIFF, DRY LOW PLASTICITY			HNU 0 ppm
	9–10	SM-SC		60"/60"	CS2	
	10–11					
	11–12					
	12–13					
	13–14	SM-SC	SAME			HNU 0 ppm
	14–15			55"/60"	CS3	
	15–16					
	16–17	OL	GRAY CLAYEY SILT, TRACE FINE SAND, VERY STIFF, DRY, NOT PLASTIC INCREASE IN FINE SAND IN DEPTH			
	17–18					
	18–					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT LHAAP HOLE NO. OHWW03

00936939

028435

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE | Hole No. 04 MW 03

PROJECT: LHAAP | INSTALLATION: LHAAP | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	19					
	20	SM	ALTERNATE LENSES OF BROWN AND GRAY CLAYEY FINE SAND TRACE LIGNITE PIECES MOIST, LOOSE	42" / 30"		1415 DRY HOLE. PULL UP AUGERS 2 FT TO SEE IF WATER PRESENT Dry hole BT heat.
	21	PT	BLACK LIGNITE, SOFT DRY, GRAY FINE SAND HORZ. LAYERS		CS1	1450 Advance AUGERS TO 23 FT, AWAIT TO SEE IF WATER COMES IN can hear water.
	22					SS: SPLIT SPOON
	23	SM-SP	GRAY CLAYEY SILT, STIFF DRY, HORZ. LAYERS 2 in LIGHT GRAY FINE SAND	24" / 24"	SS1	1538 WE TAKE WATER LEVEL @ WELL ON SITE X 5,20 TO 11.8 ft
	24					
	25		EOB 25'			Dave Oaks Well
	26					23 - 13 screen
	27					13 - 11 over screen w/ SAND
	28					11 - 8 BENTONITE
	29					5 - 0 grout
	30					START TO REMOVE 8 in OD HS. REAM w/ 10 in OD HS
						1700 COMPLETE BENTONITE SEAL
						TIME 1 HOUR FAST

ENG FORM 1836-A (ER 1110-1-1801) GPO 1980 OF-626-603 | PROJECT: LHAAP | HOLE NO. 04MW03

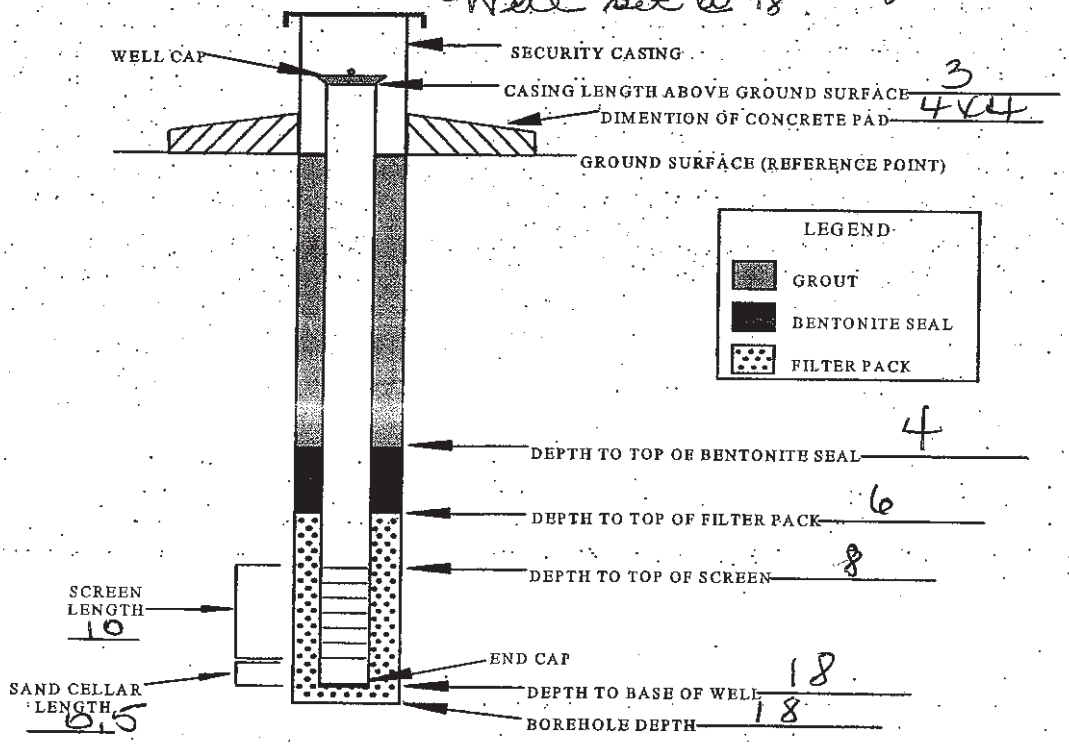
00936940

WELL COMPLETION FORM (Stickup or Above Grade Completion Well)

FIELD REPRESENTATIVE: Allen, S.
DRILLING CONTRACTOR: ETTL
DRILLING TECHNIQUE: Rotary
AUGER SIZE AND TYPE: 4"
BOREHOLE IDENTIFICATION: 04WW04
BOREHOLE DIAMETER: 4"
WELL IDENTIFICATION: 04WW04
WELL CONSTRUCTION START DATE: 08/18/10
WELL CONSTRUCTION COMPLETE DATE:
SCREEN MATERIAL: Sch 40 PVC
SCREEN DIAMETER: ~~4"~~ 2"
STRATUM-SCREENED INTERVAL (FT): 8-18
CASING MATERIAL: Sch 40 PVC
CASING DIAMETER: 2"

TYPE OF FILTER PACK: Sand
GRADIATION: 30/40
AMOUNT OF FILTER PACK USED: 9
TYPE OF BENTONITE: Pellets
AMOUNT BENTONITE USED: 5 (1) for seal
TYPE OF CEMENT: Portland
AMOUNT CEMENT USED: 8
GROUT MATERIALS USED: -
DIMENSIONS OF SECURITY CASING: 3X3
TYPE OF WELL CAP: Sch 40 PVC
TYPE OF END CAP: Sch 40 PVC
COMMENTS: 4 buckets of pellets used to fill from 18-28 ft. Well Set @ 18'.

SPECIAL CONDITIONS (describe and draw)



NOT TO SCALE

INSTALLED BY: ETTL - B Reagan INSTALLATION OBSERVED BY: S. Allen
DISCREPANCIES: NONE

00936941

HOLE NO. 04WW04

BORING LOG	DIVISION	INSTALLATION: LHAAP-04	SHEET 1 OF 2 SHEETS
1. PROJECT: LHAAP		9. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL	
2. LOCATION: LHAAP-04		10. MANUFACTURER'S DESIGNATION OF DRILL: B5500	
3. DRILLING AGENCY: ETTL		11. OVERBURDEN SAMPLES: DISTURBED —	UNDISTURBED —
4. HOLE NO. (As shown on drawing title and file number): 04WW04		12. TOTAL NUMBER CORE BOXES —	
		13. ELEVATION GROUND WATER: 15.5 (DTW)	
5. NAME OF DRILLER: B Reagan		14. DATE HOLE: STARTED 08/17/10	COMPLETED 08/18/10
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED 0 DEG. FROM VERT.		15. ELEVATION TOP OF HOLE —	
7. TOTAL DEPTH OF HOLE: 27		16. TOTAL CORE RECOVERY FOR BORING: 100 %	
8. SIZE AND TYPE OF BIT: 4" auger		17. LOGGED BY: [illegible] S	QC: KE

PID (ppm) a	DEPTH b	USCS c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		Backfill put in place during Shaw excavation activities.			
0.0	12	CL	Clay, sandy, low plasticity, dense, dry, friable, black	100%		

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE | Hole No. D4WW04

PROJECT: LHAAP | INSTALLATION: LHAAP-04 | SHEET 2 OF 2 SHEETS

ELEVATION (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
	13	SC	Sand, clayey, medgrain, med to well sorted, dry, grey			
	14	CL	Clay, sandy, low to no plasticity dense, dry, black to grey			
0.0	15	CL/CH	- becomes more moist, high plasticity, soft			▼
	16		- Saturated			
	17	CL	- becomes dry, low to no plasticity, dense			Bentonite up to 18'. Set screen from 8 to 18.
	18					
	19					
0.0	20					
	21					
	22					
	23					
	24					
	25					
0.0	26					
	27		End of Boring			

ENG FORM 1836—APREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: LHAAP | HOLE NO.: D4WW04

STATE OF TEXAS WELL REPORT for Tracking #233508

Owner:	**USACE - LHAAP**	Owner Well #:	**04WW04**
Address:	**Spur 449 @ Hwy 134 Karnack , TX 75661**	Grid #:	**35-23-6**
Well Location:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Latitude:	**32° 40' 59" N**
Well County:	**Harrison**	Longitude:	**094° 09' 06" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin 12 GPS**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **8/17/2010** Completed: **8/18/2010**
Diameter of Hole:	Diameter: **7 7/8 in From Surface To 28 ft**
Drilling Method:	**Mud Rotary Hollow Stem Auger**
Borehole Completion:	Gravel Packed From: **6 ft to 18 ft** Gravel Pack Size: **20/40**
Annular Seal Data:	1st Interval: **From 0 ft to 4 ft with 1 cement (#sacks and material)** 2nd Interval: **From 4 ft to 6 ft with 1 bentonite (#sacks and material)** 3rd Interval: **From 18 ft to 28 ft with 4 bentonite (#sacks and material)** Method Used: **Tremie pipe** Cemented By: **Driller** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Sleeve Installed**

Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**

Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No Data** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**ETTL Engineers & Consultants Inc.** **1717 E. Erwin**

	Tyler , TX 75702
Driller License Number:	**54683**
Licensed Well Driller Signature:	**Wilburn Ragon, Jr.**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #**233508**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0-12 Fill
12-12.5 Sandy lean clay - black
12.5-13.5 Clayey sand - gray
13.5-28 Sandy lean clay - black & gray

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Sch. 40 0 - 8
2 New PVC Sch. 40 - slotted 8 - 18 0.010"

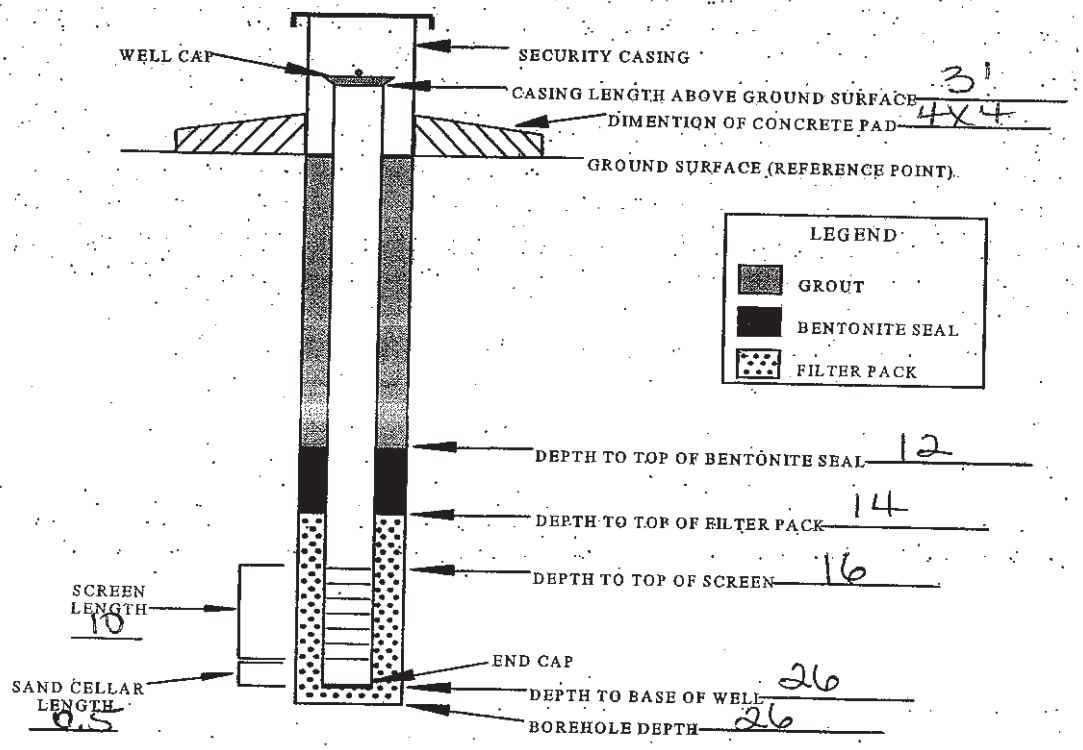
00936945

WELL COMPLETION FORM (Stickup or Above Grade Completion Well)

FIELD REPRESENTATIVE: S. Allen
DRILLING CONTRACTOR: ETTL
DRILLING TECHNIQUE: Rotary
AUGER SIZE AND TYPE: 4"
BOREHOLE IDENTIFICATION: 04WW05
BOREHOLE DIAMETER: 4"
WELL IDENTIFICATION: 04WW05
WELL CONSTRUCTION START DATE: 08/18/10
WELL CONSTRUCTION COMPLETE DATE:
SCREEN MATERIAL: Sch 40 PVC
SCREEN DIAMETER: 4" 2"
STRATUM-SCREENED INTERVAL (FT): 16-26'
CASING MATERIAL: Sch 40 PVC
CASING DIAMETER: 4" 2"

TYPE OF FILTER PACK: Sand
GRADIATION: 20/40
AMOUNT OF FILTER PACK USED: 7 Bags
TYPE OF BENTONITE: Pellet
AMOUNT BENTONITE USED: 1 Bucket
TYPE OF CEMENT: Portland
AMOUNT CEMENT USED: 8
GROUT MATERIALS USED: —
DIMENSIONS OF SECURITY CASING: 3" X 3"
TYPE OF WELL CAP: Sch 40 PVC
TYPE OF END CAP: Sch 40 PVC
COMMENTS:

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: ETTL- B Reagan
INSTALLATION OBSERVED BY: S. Allen
DISCREPANCIES: NONE

00936946

HOLE NO. 04WW05

BORING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS
		LHAAP-04	

1. PROJECT: LHAAP	9. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
2. LOCATION: LHAAP-04	10. MANUFACTURER'S DESIGNATION OF DRILL: B5500
3. DRILLING AGENCY: ETTL	11. OVERBURDEN SAMPLES: DISTURBED — UNDISTURBED —
4. HOLE NO. (As shown on drawing title and file number): 04WW05	12. TOTAL NUMBER CORE BOXES: —
	13. ELEVATION GROUND WATER: 22' (DTW)
5. NAME OF DRILLER: B. Reagan	14. DATE HOLE: STARTED 08/18/10 COMPLETED 08/18/10
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED 0 DEG. FROM VERT.	15. ELEVATION TOP OF HOLE: —
7. TOTAL DEPTH OF HOLE: 26'	16. TOTAL CORE RECOVERY FOR BORING: 99.9%
8. SIZE AND TYPE OF BIT: 4" auger	17. LOGGED BY: Allen S QC: KL

PID (ppm) a	DEPTH b	USCS c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0	OH	Topsoil			
	1	CL	Clay, sandy, no plasticity, hard, dry, rocky, brown			
	2	SC	Sand, clayey, med grain med sorting, dry, rocky, brown			
0.0	3	CL	Clay, sandy, low to no plasticity, hard, dry, brown to reddish brown	100%		
	4					
	5					
	6					
	7					
0.0	8			100%		
	9					
	10					
	11					
	12					
		SC	Sand, clayey, rocky, med grain, poorly sorted,			

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE — | Hole No. 04WW05

PROJECT LHAAP | INSTALLATION LHAAP-04 | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	13		friable w/ dark red-brown staining, dry, yellow to reddish brown			
0.0	14	CL	Clay, sandy, no plasticity dense-hard, dry, black to grey	100%		
	15					
	16					
	17					
0.0	18					
	19			100%		
	20					
	21			0%		Expansive clay had caused core to become lodged in auger. Will go to shoot pushes
0.0	22		saturated			
	23					
	24					
0.0	25	CL	Clay, sandy, no plasticity, hard, dry, black-grey mottled			
	26		END of Boring			Set well @ 26' screen 16-26'
	27					

ENG FORM 1836—APREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT LHAAP | HOLE NO. 04WW05

STATE OF TEXAS WELL REPORT for Tracking #233509

Owner:	**USACE - LHAAP**	Owner Well #:	**04WW05**
Address:	**Spur 449 @ Hwy 134 Karnack , TX 75661**	Grid #:	**35-23-6**
Well Location:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Latitude:	**32° 40' 58" N**
Well County:	**Harrison**	Longitude:	**094° 09' 07" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin 12 GPS**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **8/18/2010** Completed: **8/18/2010**
Diameter of Hole:	Diameter: **8.25 in From Surface To 26 ft**
Drilling Method:	**Hollow Stem Auger**
Borehole Completion:	Gravel Packed From: **14 ft to 26 ft** Gravel Pack Size: **20/40**
Annular Seal Data:	1st Interval: **From 0 ft to 12 ft with 3 cement (#sacks and material)** 2nd Interval: **From 12 ft to 14 ft with 1 bentonite (#sacks and material)** 3rd Interval: **No Data** Method Used: **Tremie pipe** Cemented By: **Driller** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Sleeve Installed**

Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**

Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No Data** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**ETTL Engineers & Consultants Inc.** **1717 E. Erwin**

	Tyler , TX 75702
Driller License Number:	**54683**
Licensed Well Driller Signature:	**Wilburn Ragon, Jr.**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

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Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0-0.5 Top soil
0.5-1.5 Sandy clay - brown
1.5-3 Clayey sand - brown
3-12.5 Sandy lean clay - brown & reddish brown
12.5-13.5 Clayey sand - red-brown, yellow, & reddish brown
13.5-26 Sandy lean clay - black & gray

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Sch. 40 0 - 16
2 New PVC Sch. 40 - slotted 16 - 26 0.010"

00936950

APTIM

Well / Boring Log

BORING NO.: _____

MONITORING WELL NO.: 04WW06

SHEET 1 OF 1

PROJECT NAME	PROJECT NUMBER	ELEVATION AND DATUM	LOCATION
Longhorn Army Ammunition Plant	APTIM Project 501032	Northing: 6959225.38, Easting: 3305871.99	LHAAP-04

DRILLING COMPANY	DRILLERS	DATE AND TIME STARTED	DATE AND TIME COMPLETED
Best Drilling	Sonny Tobola	1030 : 12.12.2017	1150 : 12.12.2017

DRILLING EQUIPMENT	DRILLING METHOD	HOLE DIAMETER	DP TOTAL DEPTH ____ HSA TOTAL DEPTH____	TOTAL NO. OF SAMPLES / THICKNESS
CME 75 Mobile Rig	Hand Auger (0-5 feet)	10 1/4		HA:
	Direct Push (_____)			DP:
	HSA (25)			HSA: 13 / 2'6"

DRILLING FLUID:	DRILLING ANGLE:	WATER LEVEL	LOGGED BY: / DATE:	CHECKED BY: / DATE:
NA	90 degrees (vertical)	DURING DRILLING: ~10'6" FOLLOWING DRILLING: _____ ___ HRS AFTER DRILLING: See Sample Form	D. Rowan 12.12.2017	B. Foss 12.12.2017

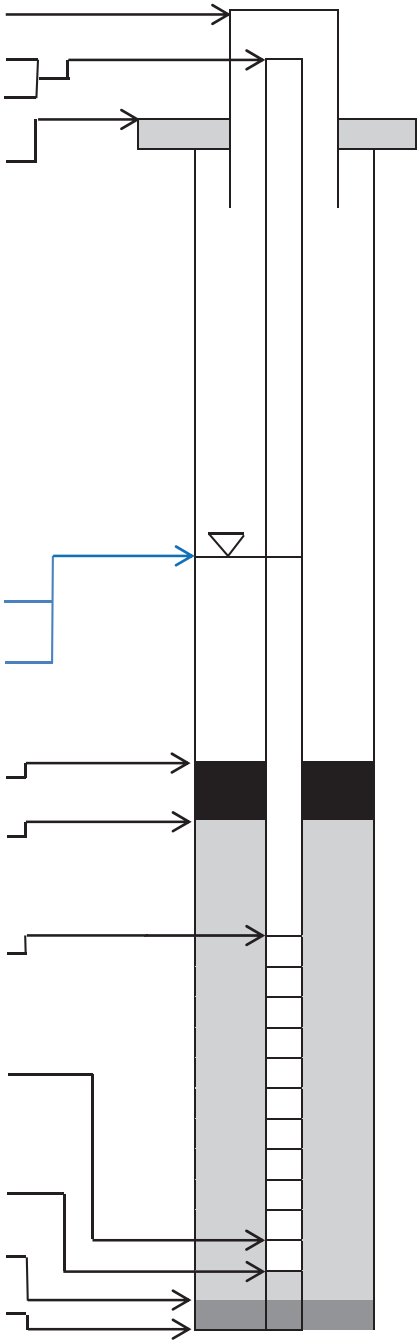
LITHOLOGY	DEPTH (FEET)	SAMPLE NO.	RECOVERY (INCHES)	STRENGTH (TCF)	PID READING (PPM)	DESCRIPTION: Grading Term, Soil Group Name, Color (Code), Moisture, Consistency, Plasticity, Max Particle Sizes, Angularity, Shape, Other	USCS SYMBOL	ESTIMATED PERCENT OF GRAVEL	ESTIMATED PERCENT OF SAND	ESTIMATED PERCENT OF FINES	COMMENTS
						Note: First 48" using post hole digger for utility clearance then probed to 60", boring drilled using ~10 1/4" diameter hollow stem augers, logged from split spoon @ 2.5' intervals					4" PVC Casing 10' 0.010 slot screen from 15 to 25'
		1	30		0	0 to 2'6" - Sandy clay, topsoil, some red silty clay	SC				
10		2	18		0	2'6" to 4' - Gray silty clay, firm to soft, moist, mottled orange Fe staining, slight plasticity, platy layers	CL				
		3	12		0	4' to 5' - Tan sandy clay, moist, soft, mottled orange Fe staining, few calcite nodules, few intermittent pebbles	SC				
		4	18		0	5' to 6'6" - Dark gray to black silty clay, v. moist, lessening of sand concentration, orange Fe staining	CL				
		5	12		0	6'6" to 7'6" - Light gray silty clay, firm slightly plastic, moist, orange Fe staining, cont. lessening of sand concentration	CL				
20		6	30		0	7'6" to 9' - Gray silty clay moist to v. moist, inter-bedded sand lenses, few calcite nodules	CL				
		7	12		0	9' to 10' - Tan sandy clay w/ inter-bedded gray clay lenses, v. moist, slightly mottled orange Fe staining	SC				
		8	18		0	10' to 12'6" - Light gray silty clay w/ inter-bedded sand lenses, moist to damp, firm to soft, plastic when wet	CL				
30		9	30		0	12'6" to 15' - Same as above with the addition of int. orange Fe staining	CL				
		10	30		0	15' to 17'6" - Same as above	CL				
		11	30		0	17'6" to 20' - Same as above with the addition of int. black Fe Mn stained or black organics lenses	CL				
		12	30		0	20' to 22'6" - Dark gray to black silty clay w/ int. tan sand, firm, damp	CL				
40		13	30		0	22'6" to 25' - Same as above w/o sand 25' - End Boring	CL				

MONITORING WELL CONSTRUCTION

APTIM

Project: **Longhorn Army Ammunition Plant**
Location: **Karnack, Texas**
Client: **US Army Corp of Engineers**
Subcontractor: **Best Drilling**
Driller: **Sonny Tobola**
Field Representative: **B. Foss / D. Rowan**

Well Number: **04WW06**
Site Location: **LHAAP-04**
Installation Date: **12.12.2017**
Northing: **6959225.38**
Easting: **3305871.99**



Protective Cover Elevation (ft): **NM**
Top of Casing Elv. (ft): **215.63**
Top of Casing Stickup (ft): **3.11**
Land Surface Elv. (ft): **212.52**

Approximate Diameter of Borehole (in): **10 ¼"**

Well Casing Diameter (in): **4"**

Depth to Water (ft):
During Drilling: **20-22.5**
Date: **12.12.2017**
Post Development **7.5**
Date: **1/9/2018**

Top of Bentonite Seal (ft): **10**
Top of Filter Pack (ft): **12**
Top of Screen Interval (ft): **15**
Bottom of Screen Interval (ft): **25**
Bottom of Well (ft): **25**
Bottom of Filter Pack (ft): **25**
Bottom of Borehole (ft): **25**

Protective Casing:
Type: **Steel Box Stick-up**
Dimensions (in): **6**
Length (ft): **5**
Guard Post: **4 bollards**

Ground Seal (Surface Pad)
Dimensions: **4' x 4'**
Type: **Concrete**

Annular Space Seal
Type: **Bentonite/Portland Cement Grout**
Installation: ~~**Gravity**~~ Tremie ~~Pumped~~

Bentonite Seal:
Type: **Pellets** ~~Slurry~~
Installation: ~~6 in Lifts~~ **One Section**
Gravity ~~Tremie~~ ~~Pumped~~
Hydration Time (hrs): **2 hours**

Filter Pack Material:
Product Name **Silica Sand**
Size: **12/20**
Volume Added (ft^3):
Installation **11 x 50# bags**
Gravity ~~Tremie~~

Well Casing:
Type: **PVC**
Diameter (in): **4**

Well Screen Casing:
Type: **PVC**
Slot Size (in): **0.010** | %Open
~~Continuous Wrap~~ | **Factory Slot**

Sump/End Cap: **Cap**

00936952

APTIM

Well / Boring Log

BORING NO.: _____

MONITORING WELL NO.: 04WW07

SHEET 1 OF 1

PROJECT NAME	PROJECT NUMBER	ELEVATION AND DATUM	LOCATION
Longhorn Army Ammunition Plant	APTIM Project 501032	orthing: 5 038. 3 asting 330 00 .11	P-04

DRILLING COMPANY	DRILLERS	DATE AND TIME STARTED	DATE AND TIME COMPLETED
est rilling	onn To ola	1430 : 12.12.2017	1530 : 12.12.2017

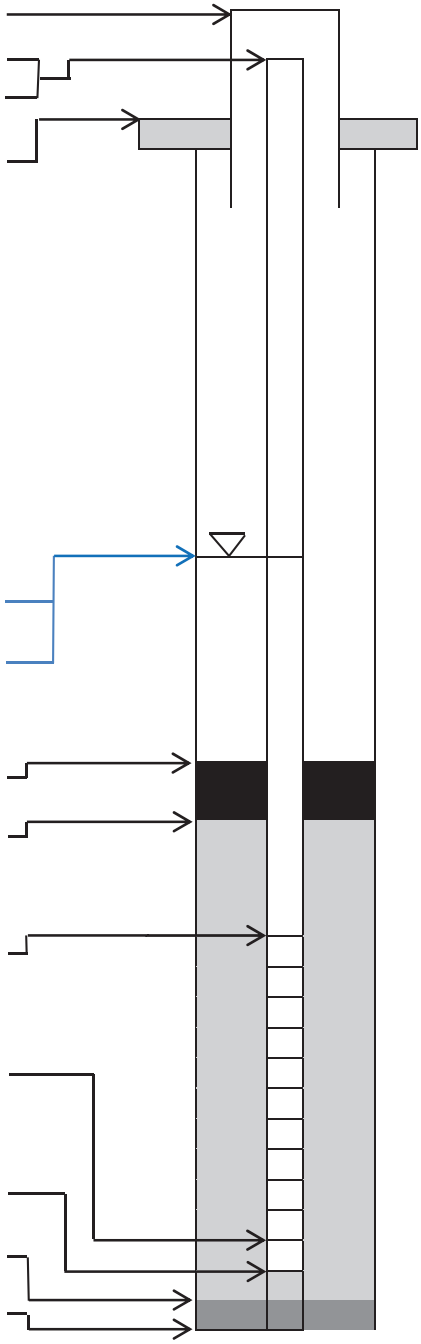
DRILLING EQUIPMENT	DRILLING METHOD	HOLE DIAMETER	DP TOTAL DEPTH / HSA TOTAL DEPTH	TOTAL NO. OF SAMPLES / THICKNESS
75 o ile Rig	Hand Auger (0-5 feet) Direct Push (_____) HSA (20)	10 1/4	DP TOTAL DEPTH ____ HSA TOTAL DEPTH____	HA: _____ DP: _____ HSA: 11 / 2

DRILLING FLUID:	DRILLING ANGLE:	WATER LEVEL	LOGGED BY: / DATE:	CHECKED BY: / DATE:
NA	90 degrees (vertical)	DURING DRILLING: _____ FOLLOWING DRILLING: _____ ___ HRS AFTER DRILLING: ee a ple or	. Rowan 12.12.2017	. oss 12.12.2017

LITHOLOGY	DEPTH (FEET)	SAMPLE NO.	RECOVERY (INCHES)	STRENGTH (TCF)	PID READING (PPM)	DESCRIPTION Grading Term, Soil Group Name, Color (Code), Moisture, Consistency, Plasticity, Max Particle Sizes, Angularity, Shape, Other	USCS SYMBOL	ESTIMATED PERCENT OF GRAVEL	ESTIMATED PERCENT OF SAND	ESTIMATED PERCENT OF FINES	COMMENTS
						ote: irst 48 sing post hole digger for tilit clearance then pro ed to 0 oring drilled sing 10 1/4 dia eter hollow ste a gers logged fro split spoon 2.5 inter als					4 P asing 10 screen fro 10 to 20
		1	18		0	1 to 2 - Tan to gra silt cla w/ int. sand lenses orange e staining w/ lack e n or organic nod les oist w/ areas of . oist					
10		2	30		0	2 to 5 - a e as a o e w/ increase in e staining higher concentration of sand in otto 1					
		3	30		0	5 to 7 - ilt la w/ loss of sand fir oist plastic ottled orange e staining lessening silt concentration with depth					
		4	30		0	7 to 10 - a e as a o e w/ so e int. sand lenses					
		5	30		0	10 to 12 - a e as a o e w/ lessening e staining					
20			30		0	12 to 15 - ight gra to lack silt cla w/ ottled orange e staining nod les tr. sand/silica thro gho t fir to soft oist to da p little to no plasticit e en when wet					
		7	24		0	15 to 17 - a e as a o e w/ lack e n or organic nod les at 17 w/ darkening of color at 1					
		8	12		0	17 to 18 - sa e as a o e					
					0	18 to 18 - lack dr cla w/ few nod les of orange e staining					
30		10	12		0	18 to 1 - lack dr silt cla fir . dense					
		11	30		0	1 to 22 - a e as a o e					
						20 - nd oring e tra 2 sa ple description fro split spoon sa ple onl did not ore down to 22 .					
40											

MONITORING WELL CONSTRUCTION

Project: **Longhorn Army Ammunition Plant**	Well Number: **04WW07**
Location: **Karnack, Texas**	Site Location: **LHAAP-04**
Client: **US Army Corp of Engineers**	Installation Date: **12.12.2017**
Subcontractor: **Best Drilling**	Northing: **6959038.63**
Driller: **Sonny Tobola**	Easting: **3306006.11**
Field Representative: **B. Foss / D. Rowan**	



Protective Cover Elevation (ft):	**NM**
Top of Casing Elv. (ft):	**214.64**
Top of Casing Stickup (ft):	**2.98**
Land Surface Elv. (ft):	**211.66**
Approximate Diameter of Borehole (in)	**10 ¼"**
Well Casing Diameter (in):	**4"**
Depth to Water (ft):	
During Drilling:	**NM**
Date:	**12.12.2017**
Post Development	**8.00**
Date:	**1/9/2018**
Top of Bentonite Seal (ft):	**5**
Top of Filter Pack (ft):	**7**
Top of Screen Interval (ft):	**10**
Bottom of Screen Interval (ft):	**20**
Bottom of Well (ft):	**20**
Bottom of Filter Pack (ft):	**20**
Bottom of Borehole (ft):	**20**

Protective Casing:

Type:	**Steel Box Stick-up**
Dimensions (in):	**6**
Length (ft):	**5**
Guard Post:	**4 bollards**

Ground Seal (Surface Pad)

Dimensions:	**4' x 4'**
Type:	**Concrete**

Annular Space Seal

Type:	**Bentonite/Portland Cement Grout**
Installation:	~~**Gravity**~~ Tremie ~~Pumped~~

Bentonite Seal:

Type:	**Pellets** ~~Slurry~~
Installation:	~~6-in Lifts~~ **One Section**
	Gravity ~~Tremie~~ ~~Pumped~~
Hydration Time (hrs):	**2 hours**

Filter Pack Material:

Product Name	**Silica Sand**
Size:	**16/34**
Volume Added (ft^3):	
Installation	**12 x 50# bags**
	Gravity ~~Tremie~~

Well Casing:

Type:	**PVC**
Diameter (in):	**4**

Well Screen Casing:

Type:	**PVC**
Slot Size (in):	**0.010** | ~~%Open~~
	~~Continuous Wrap~~ | **Factory Slot**

Sump/End Cap: **Cap**

00936954

APTIM

Well / Boring Log

BORING NO.: _____

MONITORING WELL NO.: 04WW0

SHEET 1 OF 1

PROJECT NAME	PROJECT NUMBER	ELEVATION AND DATUM	LOCATION
Longhorn Army Ammunition Plant	APTIM Project 501032	orthing: 95914 .15 asting: 33059 3.41	P-04

DRILLING COMPANY	DRILLERS	DATE AND TIME STARTED	DATE AND TIME COMPLETED
est rilling	onn To ola	0725 : 12.12.2017	1100 : 12.14.2017

DRILLING EQUIPMENT	DRILLING METHOD	HOLE DIAMETER	DP TOTAL DEPTH / HSA TOTAL DEPTH	TOTAL NO. OF SAMPLES / THICKNESS
75 o ile Rig	Hand Auger (0-5 feet) Direct Push (_____) HSA (45)	14 10.25	DP TOTAL DEPTH ____ HSA TOTAL DEPTH____	HA: _____ DP: _____ HSA: 1 / 2 to 5

DRILLING FLUID:	DRILLING ANGLE:	WATER LEVEL	LOGGED BY: / DATE:	CHECKED BY: / DATE:
NA	90 degrees (vertical)	DURING DRILLING: 32 FOLLOWING DRILLING: _____ ___ HRS AFTER DRILLING: ee a ple or	. Rowan 12.12-14.2017	. oss 12.14.2017

LITHOLOGY	DEPTH (FEET)	SAMPLE NO.	RECOVERY (INCHES)	STRENGTH (TCF)	PID READING (PPM)	DESCRIPTION Grading Term, Soil Group Name, Color (Code), Moisture, Consistency, Plasticity, Max Particle Sizes, Angularity, Shape, Other	USCS SYMBOL	ESTIMATED PERCENT OF GRAVEL	ESTIMATED PERCENT OF SAND	ESTIMATED PERCENT OF FINES	COMMENTS
		1			0.0	ote: irst 4 sing post hole digger for tilit clearance then pro ed to 0 . irst 23 drilled with 14 dia eter and logged 2.5 inter als sing split spoon. ro 23 to 41 was drilled with 10.25 and logged 5 inter als sing split spoon 0 to - and cla topsoil so e silts and red cla					12 P s rface casing set in the shallow one fro 0 to 23 on 12.12.2017. 4 P casing set 41 w/ 10 screen fro 31 to 41 . on 12.14.17 Top 12 ost likel ackfill fro e ca ation as denoted 04WW04 oring log. ro 23 to T sa ples were collected for logging 5 inter als. arrel eca e st ck in a ger 0930 d ring 23 to 25 sa pling r n. P lled a gers drilling res ed 1010 Water 32
		2			0.0	to 5 - ra cla e sand silt fir increasing cla concentration w/ decreasing sand with depth					
5		3	30		0.0	5 to 7 - Red sand cla fir oist with depth there is increasing oist re content as well as decreasing sand concentration					
		4	30		0.0	7 to 10 - Red silt cla soft oist to . oist tr. orange e staining w/ so e nod les of lack e n or organics					
10		5	1		0.0	10 to 11 - a e as a o e					
			12		0.0	11 to 12 - Transition to nati e gra silt cla da p tr. sand ottled orange e staining w/ int. lack nod les of e n or organics					
		7			0.0	12 to 15 - oss of red cla gra silt cla . fir da p sheeted plastic when wet tr. int. sand/silica particles					
15			30								
			30		0.0	15 to 17 - a e as a o e w/ increasing tr. of sand starting at 1 so e orange e staining					
		9	30		0.0	17 to 20 - ight gra to dark gra cla w/silt and tr. sand fir oist plastic when wet					
20		10	30		0.0	20 to 22 - a e as a o e w/ so e orange e staining starting at 21					
		11			0.0	22 to 23 - a e as a o e 23 - et shallow one casing					
		12	24		5.0	23 to 25 - ight to dark gra silt cla fir dr w/ int. lack organic nod les					
25		13	0		3.0	25 to 30 - edi to dark gra silt cla . fir dense dr int. lack organic nod les. ncrease in oist re to a oist consistenc aro nd 2 thro gh rest of core. Transition to light gra silt 29					
		14	12		.0	30 to 31 - ark gra cla oist so e orange e staining fir to soft plastic when wet					
30											

00936955

APTIM

Well / Boring Log

BORING NO.: _____

MONITORING WELL NO.: 04WW0

SHEET 2 OF 1

PROJECT NAME	PROJECT NUMBER	ELEVATION AND DATUM	LOCATION
Longhorn Army Ammunition Plant	APTIM Project 501032	orthing: 95914 .15 asting: 33059 3.41	P-04

DRILLING COMPANY	DRILLERS	DATE AND TIME STARTED	DATE AND TIME COMPLETED
est rilling	onn To ola	0725 : 12.12.2017	1100 : 12.14.2017

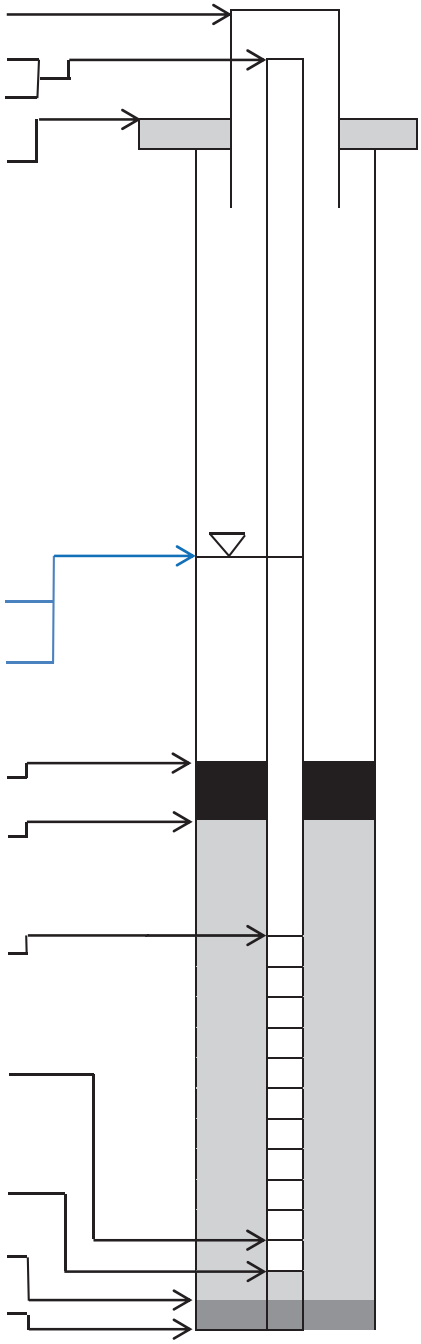
DRILLING EQUIPMENT	DRILLING METHOD	HOLE DIAMETER	DP TOTAL DEPTH / HSA TOTAL DEPTH	TOTAL NO. OF SAMPLES / THICKNESS
75 o ile Rig	Hand Auger (0-5 feet) Direct Push (_____) HSA (45)	14 10.25	DP TOTAL DEPTH ____ HSA TOTAL DEPTH____	HA: _____ DP: _____ HSA: 1 / 2 to 5

DRILLING FLUID:	DRILLING ANGLE:	WATER LEVEL	LOGGED BY: / DATE:	CHECKED BY: / DATE:
NA	90 degrees (vertical)	DURING DRILLING: 32 FOLLOWING DRILLING: _____ ___ HRS AFTER DRILLING: ee a ple or	. Rowan 12.12-14.2017	. oss 12.14.2017

LITHOLOGY	DEPTH (FEET)	SAMPLE NO.	RECOVERY (INCHES)	STRENGTH (TCF)	PID READING (PPM)	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF GRAVEL	SAND	FINES	COMMENTS
		15	1		.0	31 to 32 - lack cla w/silt dr so e che ical odor . fir and dense.					32 to 35 no reco er hard cla pl g for ed in arrel. Partial sand reco er at otto inferred sat rated silt sand fro 32 to 35 .
35		1	4		7.5	35 to 39 - ark gra to lack silt cla fro top to otto sat rated to oist tr. of che ical odor fir to stiff slight plasticit					
		17	12		9.2	39 to 40 - ight gra cla e silt da p no odor sheeted fir to soft no plasticit					
40		1	0		.	40 to 45 - a e as a o e					
						45 - nd oring. Well et at 41					
45											

MONITORING WELL CONSTRUCTION

Project: **Longhorn Army Ammunition Plant**	Well Number: **04WW08**
Location: **Karnack, Texas**	Site Location: **LHAAP-04**
Client: **US Army Corp of Engineers**	Installation Date: **12.12-14.2017**
Subcontractor: **Best Drilling**	Northing: **6959148.15**
Driller: **Sonny Tobola**	Easting: **3305963.41**
Field Representative: **B. Foss / D. Rowan**	



Protective Cover Elevation (ft): **NM**
Top of Casing Elv. (ft): **214.82**
Top of Casing Stickup (ft): **2.75**
Land Surface Elv. (ft): **212.07**
Approximate Diameter of Borehole (in): **10 ¼"**
Well Casing Diameter (in): **4"**
Depth to Water (ft):
During Drilling: **~31 - 32**
Date: **12.14.2017**
Post Development **13.4**
Date: **1/9/2018**
Top of Bentonite Seal (ft): **27**
Top of Filter Pack (ft): **29**
Top of Screen Interval (ft): **31**
Bottom of Screen Interval (ft): **41**
Bottom of Well (ft): **41**
Bottom of Filter Pack (ft): **41**
Bottom of Borehole (ft): **45**

Protective Casing:
Type: **Steel Box Stick-up**
Dimensions (in): **6**
Length (ft): **5**
Guard Post: **4 bollards**

Ground Seal (Surface Pad)
Dimensions: **4' x 4'**
Type: **Concrete**

Annular Space Seal
Type: **Bentonite/Portland Cement Grout**
Installation: ~~**Gravity**~~ Tremie ~~Pumped~~

Bentonite Seal:
Type: **Pellets** ~~Slurry~~
Installation: ~~6 in Lifts~~ **One Section**
Gravity ~~Tremie~~ ~~Pumped~~
Hydration Time (hrs): **2 hours**

Filter Pack Material:
Product Name **Silica Sand**
Size: **16/34**
Volume Added (ft^3):
Installation **11 x 50# bags**
Gravity ~~Tremie~~

Well Casing:
Type: **PVC**
Diameter (in): **4**

Well Screen Casing:
Type: **PVC**
Slot Size (in): **0.010** | %Open
~~Continuous Wrap~~ | **Factory Slot**

Sump/End Cap: **Cap**

Hole No. 32WW-01

00936957

DRILLING LOG	DIVISION USACE Tulsa	INSTALLATION LHAAP-Karnack TX	SHEET 1 OF 3 SHEETS

1. PROJECT LHAAP Phase III Site 32	10. SIZE AND TYPE OF BIT Auger Bit
2. LOCATION (Coordinates or Station) (Southern Side of Site 32)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
3. DRILLING AGENCY GPI, Inc. - Austin, TX	12. MANUFACTURER'S DESIGNATION OF DRILL CME-75 S CME Cont. Sampler / 3 1/4" I.D. 7" O.D. / 11" O.D. Augers
4. HOLE NO. (As shown on drawing title and file number) 32WW "01"	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED 10 — UNDISTURBED —
5. NAME OF DRILLER Jose Landeros	14. TOTAL NUMBER CORE BOXES N/A
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER -
	16. DATE HOLE — STARTED 7-22-98 — COMPLETED 7-24-98
7. THICKNESS OF OVERBURDEN Penetrated	17. ELEVATION TOP OF HOLE -
8. DEPTH DRILLED INTO ROCK N/A	18. TOTAL CORE RECOVERY FOR BORING N/A %
9. TOTAL DEPTH OF HOLE Ft. Below Grade	19. SIGNATURE OF INSPECTOR [illegible]

ELEVATION a	DEPTH (Ft.) b	USC LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0–1	OL CL	3" of Light brown DRY topsoil, some roots, over-		SS #1	Commenced HSA @ 1:16 = 3 1/4" I.D. 7" O.D.
	1–4		- Silty clay/Clayey silt, Lt. to med. brown and gray, some fine sand throughout trace roots - DRY (stiff)	10'	0.0' to 4.0'	HNu Reading = 0ppm in sampler
	4–9		- Silty clay, Med. brown, tan, Lt. gray and orange-brown, mottled, streaked, and stained, some fine sand - Dry-Damp (stiff)	5.0'	SS #2 4.0' to 9.0'	HNu Reading = 0ppm in sampler
	9–14		- Silty clay, Lt. to med. gray, tan, orange-brown and yellow-brown mottled streaked and stained. Some apparent layerings, trace to some fine sand - Damp to Moist (stiff)	5.0'	SS #3 9.0' to 14.0'	HNu Reading = 0ppm in sampler
	14–19		- Silty clay/clayey silt, Lt. gray, brown, tan, and yellow-brown mottled, streaked, and stained, some very silty sections from 14' to 16.0. Becoming moist to sl. wet @ 17' to 18' trace to some fine sand throughout - Moist (stiff)	5.0'	SS #4 14.0' to 19.0'	HNu Reading = 0ppm in sampler
	19–20				SS #5	Water @ 18' BEG. w/ [illegible]

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT / [illegible] HOLE NO.

00936958

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE | Hole No. 32WW "01"

PROJECT LHAAP Phase III Group IV | INSTALLATION LHAAP | SHEET 2 OF 3 SHEETS

ELEVATION a	DEPTH ft. b	USC LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
		CL	med. gray color in G		19.0' to 24.0'	
	21		- silty clay / clayey silt, med. gray, tan, and yellow-brown, mottled, streaked, and stained, some abundant within horiz layering of Lt. gray and tan silty sand/sandy silt layers throughout sample, trace to some fine sand throughout, Moist to wet (stiff)	5.0'		HNu Reading = 0ppm in sample
	22					
	23					
	24				SS #6 24.0' to 29.0'	
	25		- silty clay / clayey silt med. to dark gray with abundant within horiz. Lighter gray sandy silt/silty sand layers, some are tan and rust/yellow-brown layers, trace to some fine sand throughout - Dry to Damp - (v. stiff)	5.0'		HNu Reading = 0ppm in sample
	26					
	27					
	28					
	29		- Silty clay, some as a clay shale, Dark gray with abundant med. gray within irregular fine sandy silt/silty sand laminations, some fine sand throughout, crumbles easily along laminations - Dry to Damp (Hard)	5.0'	SS #7 29.0' to 34.0'	Stopped drilling @ HSA @ 1455 on 7/22/98 @ 29 ft. Hole Dry *1000 7/24/98 - Resumed HSA @ 29.0'
	30					
	31					
	32					
	33					
	34		- Clayey silt, some as a sandy silt along laminations, Med. gray with some to abundant within silty sand irregular lenses/laminations, some clayey zones as clay shales, fine sand throughout sample - Dry to Damp (stiff to Hard)	5.0'	SS #8 34.0' to 39.0'	1038 - 7/24/98 (@ 34 ft.) HNu Reading in sampler = 0ppm
	35					
	36					
	37					
	38	SM				
	39		- Sandy silt, very clayey, in some zones, med. gray to med. blue-gray, fine grained sand throughout, some apparent layering, crumbles easily by hand, silt and sand content inc. with depth - Damp to sl. moist, (can shape by hand) (Dense to loose)	5.0'	SS #9 39.0' to 44.0'	HNu Reading in sampler = 0ppm
	40					
	41					
	42					
	43					
	44					

ENG FORM 1836 A (ER 1110-1-1801) GPO 1980 OF - 626-603 | PROJECT LHAAP Group III | HOLE NO.

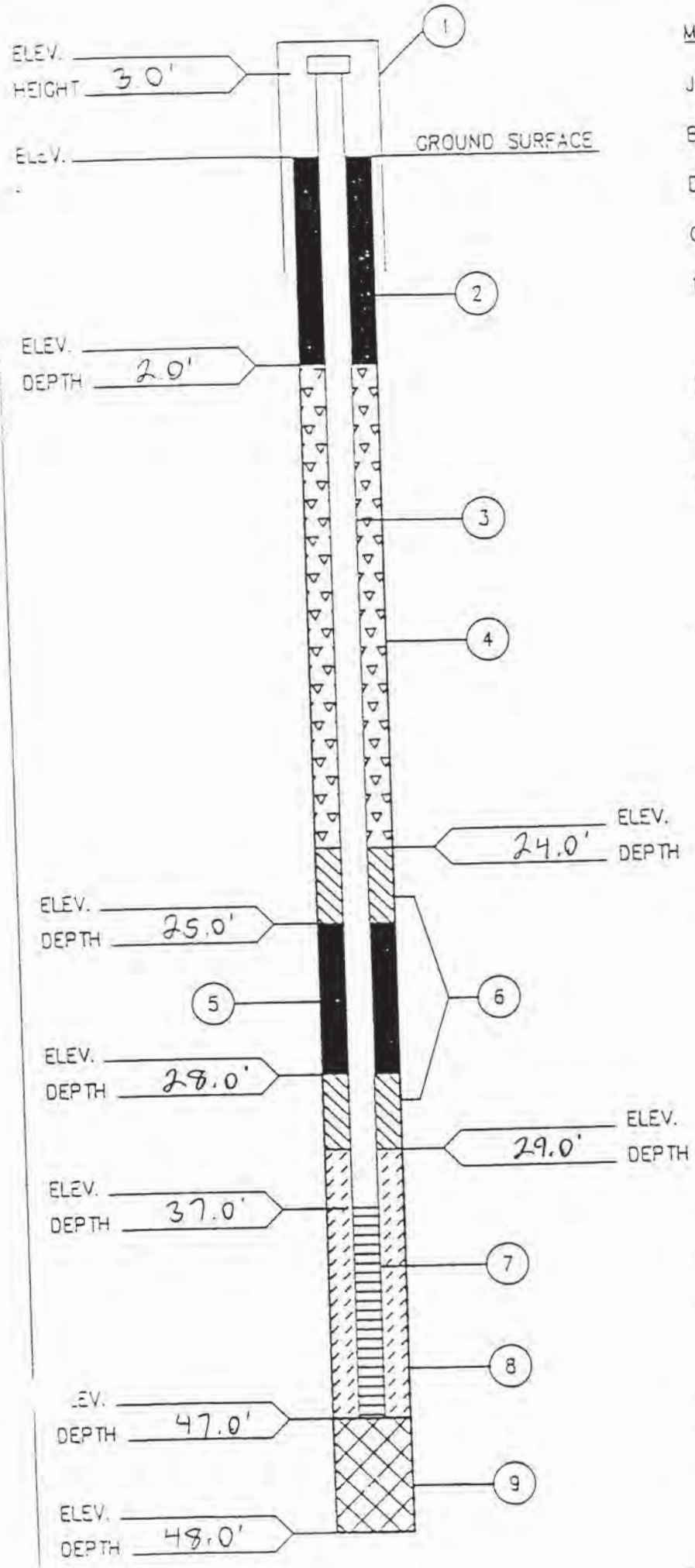
00936959

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE	Hole No. 32WW01
PROJECT	INSTALLATION LHAAP - Karnack, TX	SHEET 3 OF 3 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	45	SM	- Sandy silt, some of silty sand, med. gray to med. blue-gray, fine grained sand, some apparent layering, some med. gray fine v. fine sand layers - Damp to moist - (Dense to loose)	5.0'	SS #6 44.0' to 47.0'	HNu Reading [illegible] Offn
	46					
	47					
	48					
	49					1304 Commenced Overdrilling of Pilot hole ≈ 11" O.D. HSA
	50					4" Monitor Install.
						Bent Grout 24' to grade
						Sugar Sand 25'-24'
						Bent. seal 28' + 25'
						Sugar Sand 29'-28' (30-20)
						Primary Sand 48'-29' (6-30
						4" SS Screen 47'-31'
						T.D. - 48'

ENG FORM 1836-A JUN 67 (ER 1110-1-1801) GPO 1980 OF-628-603 PROJECT LHAAP HOLE NO. 32WW01

00936960



MONITORING WELL CONSTRUCTION INFORMATION

JOB. NO. 000187

BORING/WELL NO. 32WW01(S)

DATE 7-24-98

CHIEF/UNIT DWC/CME-75

1. PROTECTIVE CASING YES NO

LOCKING YES NO

2. TYPE OF SURFACE SEAL (IF INSTALLED)
cement

3. SOLID PIPE TYPE Stainless Steel

SOLID PIPE LENGTH 39.0 ft.

JOINT TYPE SLIP/GLUED/THREADED

4. TYPE OF BACKFILL Bent./cement Grout

HOW INSTALLED - TREMIE Pipe

FROM SURFACE

5. TYPE OF LOWER SEAL (IF INSTALLED)
Bentonite (hydrated)

6. TYPE OF SECONDARY FILTER PACK
Sand (30-70)

7. SCREEN TYPE Stainless steel

SCREEN LENGTH 10.0 ft.

SLOT SIZE #10 machine in.

SCREEN DIAMETER 4 in.(I.D.)

8. TYPE OF PRIMARY FILTER PACK
Primary Sand (16-30)

9. TYPE OF BACKFILL Primary Filter pack (16-30)

10. DRILLING METHOD HSA

WATER LEVEL _____ DATE _____

*ALL DEPTHS MEASURED FROM GROUND SURFACE

Sverdrup
ENVIRONMENTAL

Hole No. 32WW02

00936961

DRILLING LOG	DIVISION: CE-Tulsa	INSTALLATION: LHAAP-Karnack TX	SHEET 1 OF 3 SHEETS
1. PROJECT: LHAAP - Site 32		10. SIZE AND TYPE OF BIT: Auger Bit	
2. LOCATION (Coordinates or Station): South of Well 113 - Northern side of site 32		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: GPI, Inc. - Austin, Tx		12. MANUFACTURER'S DESIGNATION OF DRILL: CME-75 / 5' continuous CME Sampler	3¼" ID 7" OD Augers (11" OD Augers)
4. HOLE NO. (As shown on drawing title and file number): 32WW02		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 10	UNDISTURBED —
5. NAME OF DRILLER: Jose Londeros		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER	
		16. DATE HOLE: STARTED 7-23-98 COMPLETED 7-24-98	
7. THICKNESS OF OVERBURDEN: Penetrated 49 ft		17. ELEVATION TOP OF HOLE: —	
8. DEPTH DRILLED INTO ROCK: N/A		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
9. TOTAL DEPTH OF HOLE: 49 ft. Pilot hole B.E.G.		19. SIGNATURE OF INSPECTOR: [signature] CAG	

ELEVATION (a)	DEPTH (ft) (b)	USC LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
	1	OL	6" of sandy med. brown and gray topsoil, some roots / leaves, Damp overlying -		SS #1 @ 0.0' to 4.0'	Commenced HSA @ 3¼" ID HSA @ 0840
	2	CL	- Silty clay / clayey silt, Lt. to med. Tan and gray, some dk red/brn mottling from 3.0 to 4.0', some fine sand throughout - Dry to Damp (V. stiff)	4.0'	4.0'	HNu Reading @ Sampler = (102 ev PID) Oppm
	3					
	4					
	5		- Silty clay and clayey silt, Lt. to med. brown, gray, tan, yellow-brown, and reddish-brown mottled, streaked, and stained, some apparent layering, some less plastic (clayey silts), some fine sand throughout - Damp to Sl. moist (stiff) (tree roots / veg. @ 9.0') (Competent red-brown clay-shale @ 10.0')		SS #2 @ 4.0' to 9.0'	
	6			5.0'		HNu Reading @ Sampler = Oppm
	7					
	8					
	9					
	10				SS #3 @ 9.0' to 14.0'	
	11		- Clayey silt, Lt. to med. gray and tan, some Dark gray streaking, Striping, no mottling, Some apparent layering with less sl. plastic thin layers, Some fine sand throughout - Damp (med. stiff) No vis. H2O in B.H. while Sampling	5.0'		HNu Reading @ Sampler = Oppm
	12					
	13					
	14					
	15		- Clayey silt, Lt. to dk gray, tan, and orange-brown V. thin layering with laminated V. thin Lt. gray sandy silt / silty sand layers, Clayey silts sl. plastic, Damp to Sl. moist (med. stiff) No vis. water while Drilling and sampling		SS #4 @ 14.0' to 19.0'	
	16			5.0'		HNu Reading @ Sampler = Oppm
	17	SM-CL				
	18					
	19					
	20				SS #5	

00936962

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE | Hole No. 32WW"02"

PROJECT LHAAP | INSTALLATION LHAAP - Karnack, TX | SHEET 2 OF 3 SHEETS

ELEVATION a	DEPTH (ft.) b	USC LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	20	SM-CL	- Sandy silt, w. thin interlayered with clayey silt, some irregular layering, med. blue gray to dark gray. Sl. plastic to non-plastic sandy silts, fine sandy silts, some to abundant fine sands throughout clayey silts - Damp (No vis. H_2O w.D.'s sampling)	5.0'	19.0' to 24.0'	HNu reading @ sampler = Oppm
	21					
	22					
	23					
	24	CL	- Silty clay/clayey silt, med. to dark gray with abundant v. thin lighter gray silty sand/sandy silt layers - horiz. and irregular, some fine sand throughout - Dry to Damp (stiff) No vis H_2O W.D.	5.0'	SS #6 24.0' To 29.0'	HNu Reading @ sampler = Oppm
	25					
	26					
	27					
	28	(coal)	- Black shaley "lignite" coal seam - Damp			
	29	CL	- Clayey silt, blue gray to med. gray, v. thin horiz. and irregular fine sandy silt and silty sand layers - Dry to Damp (STIFF)		SS #7 29.0' to 34.0'	Bottom of hole dry @ 29 ft. @ 0900 - Pulled augers up 3 ft.; waiting on water till 1000 - still dry inside augers (called Cliff Murray - Tulsa Corps advised of Drilling to 50 ft. to find a shallow water zone)
	30					
	31		- Silty clay, Dark gray with some med. gray v. thin sandy silt lenses - horiz. and irreg., some apparent layering, trace "lignite" fragments embedded in more stiffer clays, some fine sand throughout - Sl. Damp (V. Stiff) No vis, water W.D. and sampling.	5.0'		
	32					
	33					
	34				SS #8 34.0' to 39.0'	HNu Reading in Sampler = Oppm
	35					
	36		- Silty clay, (Approaching) clay-shale in Texture.) Dark gray, some v. thin med. gray sandy silt lenses, breaks into layers, some fine sand throughout - Dry to Sl. Damp. (HARD) (No vis. water while Drilling sampling)	5.0'		
	37					
	38					
	39				SS #9 39.0' to 44.0'	HNu Reading in sampler = Oppm
	40		Silt content increasing			
	41	SM	- Sandy silt (sl. clayey), Med. blue gray, fine grained sand, some sl. compacted clayey layering - Damp (Med. Dense to loose) No vis Water W.D./ sampling	5.0		
	42					
	43					
	44					

ENG FORM [illegible] (RR 1110-1-1801) [illegible] | PROJECT | HOLE NO.

00936963

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE | Hole No. 32WW"02"

PROJECT LHAAP | INSTALLATION LHAAP - Karnack, TX | SHEET 3 OF 3 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) Time g
	45	SM	- Sandy silt, Med. to darker blue-gray and gray, some more competent interbedded U. thin clay-shale layers, fine grained sand, Sl. Mo. St @ 47' to 48' - Damp overall (Dense to loose) (crumbles easily in hand)	S.0	SS # 10 44.0' To 49.0'	HNu reading in sample = 0 ppm
	46					
	47					
	48					
	49		T.D. = 49.0 ft. BEG in Damp sandy silt			1035 - T.D. @ 50.0 ft. below grade - Hole dry inside augers at base of hole. Pulled up augers 4 ft. waiting on water yield
	50					1300 - Water @ 47 ft. BEG in side of augers and dripping from 45' (augers)

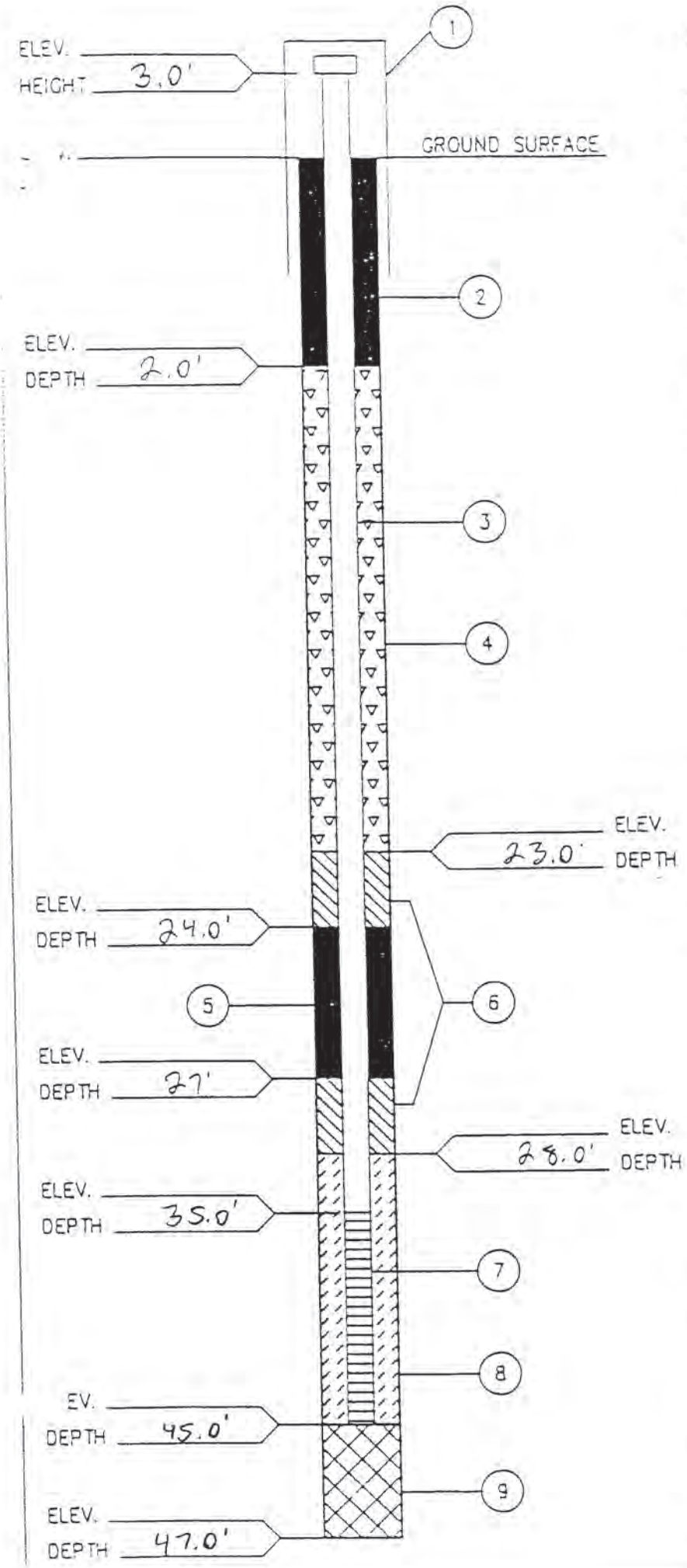
1405 Overdrilled hole with 11" HSA augers (plugged) to 47.0 ft. to install 4" well
- 23' Grout to surface
- 23' Top of sugar sand
- 24' Top of Bentonite seal
- 27' Top of sugar sand
- 28' Top of Primary Filter pack
- 35' Top of 4" SS #10 slot screen
- 45' Bottom of 4" SS #10 slot screen
- 47' Bottom of 11" hole
- 47' Bottom of Primary Filter pack

7-24-98

*0715 - Water Level @ 33.9 ft. below grade

ENG FORM 1836-A (ER 1110-1-1801) GPO 1980 OF - 626 - 603 | PROJECT LHAAP Group TT | HOLE NO.

00936964



MONITORING WELL CONSTRUCTION INFORMATION

JOB. NO. 000187

BORING/WELL NO. 32WW02 (S)

DATE 7-24-98

CHIEF/UNIT DWC / CME-75

1. PROTECTIVE CASING YES NO

LOCKING YES NO

2. TYPE OF SURFACE SEAL (IF INSTALLED)
cement

3. SOLID PIPE TYPE Stainless steel

SOLID PIPE LENGTH 38.0' ft.

JOINT TYPE SLIP/GLUED/THREADED

4. TYPE OF BACKFILL Bent. /cement Grout

HOW INSTALLED - TREMIE Pipe

FROM SURFACE

5. TYPE OF LOWER SEAL (IF INSTALLED)
Bentonite (hydrated)

6. TYPE OF SECONDARY FILTER PACK
Sand (30-70)

7. SCREEN TYPE stai

SCREEN LENGTH 10.0 ft.

SLOT SIZE #10 machine in.

SCREEN DIAMETER 4 in. (I.D.)

8. TYPE OF PRIMARY FILTER PACK
Primary Sand (16-30)

9. TYPE OF BACKFILL Primary Sand

10. DRILLING METHOD HSA

WATER LEVEL _____ DATE _____

*ALL DEPTHS MEASURED FROM GROUND SURFACE

Sverdrup
ENVIRONMENTAL

00936965

027623

Hole No. 35AWL04

DRILLING LOG	DIVISION: USACE - Tulsa	INSTALLATION: LHAAP Karnack, TX	SHEET 1 OF 2 SHEETS
1. PROJECT: LHAAP		10. SIZE AND TYPE OF BIT: Auger Bits	
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY: GPI, Inc. Austin, TX		12. MANUFACTURER'S DESIGNATION OF DRILL: CME 75 / 3¼" ID HSA / CME 5" split spoon	11" OD HSA
4. HOLE NO. (As shown on drawing title and title number): 35AWL04		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7	UNDISTURBED —
5. NAME OF DRILLER: Jose Landros		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN: Penetrated 24 ft.		16. DATE HOLE: STARTED 8-23-98	COMPLETED 8-23-98
8. DEPTH DRILLED INTO ROCK: N/A		17. ELEVATION TOP OF HOLE	
9. TOTAL DEPTH OF HOLE: 24 ft. Below grade		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. SIGNATURE OF INSPECTOR: Brian Baker / Dan Cilke	

ELEVATION (a)	DEPTH (ft) (b)	USC LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
	1	SM	Sandy silt - Lt. brown, tan, mottled Lt. gray. Fine grained sand, poorly sorted, some roots - Dry to Sl. Damp (loose)	4'/4'	SS #1 0.0' to 4.0'	1000 Commenced HSA 35AWL04 @ 7" O.D. HSA HNu Reading in sampler = 0 ppm
	2					
	3	CL	- Silty clay - med. gray and dark reddish-brown (mottled), trace roots and fine sand, v. plastic - Damp (V. stiff)			
	4					
	5		- Silty clay - Lt. gray, Lt. greenish-gray, tan, yellowish-orange and med. brown mottled, streaked, and stained, trace to some fine sand, some apparent v. thin layering, trace roots - Damp (stiff to V. stiff)	5'/5'	SS #2 4.0' to 9.0'	HNu Reading in sampler: 0 ppm
	6					
	7					
	8					
	9					
	10		- Silty clay - Lt. gray, Lt. greenish-gray, yellowish-orange and tan (mottled) abundant black v. thin "root-like" structures throughout, some fine sand, plastic - Damp to Moist @ 13' (stiff)	5'/5'	SS #3 9.0' to 14.0'	HNu Reading in Sampler = 0 ppm
	11					
	12					
	13		- V. Moisture content inc. (sticking to sampler)			
	14	SC CL	- Sandy clay - Lt. gray and greenish gray (mottled) layered in silty clay, fine grained sand - Wet/Saturated (soft)	5'/5'	SS #4 14.0' to 19.0'	Water @ 14' W.D. HNu Reading in sampler = 0 ppm
	15	SC CL				
	16					
	17	SC	- Clayey sand - Lt. brown, gray, tan (mottled) - some silty, fine grained sand, trace med. gravel - Wet/Saturated (med. dense to loose)			
	18					
	19	CL SP	- Sand/silty sand - med. gray, tan, and brown, fine to med. grained, some coarse, subangular subrounded, poorly sorted, trace clayey zones - wet/saturated (loose)	1'/1'	SS #5 19' to 20'	HNu Reading in sample = 10 ppm
	20					
	21					
	22					
	23					
	24					

PROJECT | HOLE NO.

000200

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE	Hole No. 35AWW04
PROJECT	INSTALLATION	SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
		SP	- Sand - Mod brown and reddish-brown fine to coarse grained, trace gravel, poorly sorted - Wet/Saturated	1'/1'	SS#6 20' to 21'	
	21	SP-GP	- Sand and gravel - Dark "rust" brown fine to coarse sand and gravel; some cobble - wet - Saturated	3'/3'	SS#7 21' to 24'	HNu Reading in sample = 11 ppm
	22	SP				
	23	CL	Silty clay - L-1 gray, greenish gray and tan, mottled, trace to some fine sand - Damp (v. stiff)			
	24		T.D. @ 24.0' ft below grade in Silty clay - Damp to moist			Overdrilled pilot hole with 11" O.D. HSA plugged augers to T.D. of 2? ft. below grade. Completion details for mon. installation of 35AWW04

Bent/cement grout 7' to grade
Bent seal 10' to 7'
Sugar sand (30-70) 11' to 10'
Primary filter pack (16-30) 23' to 11'
4" 10' #10 slot screen 23' to 13'
T.D. -23.0' below grade

00936967

HOLE NO. 36AWW07

DRILLING LOG	DIVISION: FEDERAL	INSTALLATION: Longhorn AAP	SHEET 1 OF 3 SHEETS
1. PROJECT: Longhorn MARC		10. SIZE AND TYPE OF BIT: HSA 10"	
2. LOCATION (Coordinates or Station): HARNACK, TX		11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL	
3. DRILLING AGENCY: ETTL		12. MANUFACTURER'S DESIGNATION OF DRILL: FOREMOST 5500	
4. HOLE NO. (As shown on drawing title and file number): 36AWW07		13. OVERBURDEN SAMPLES: DISTURBED ✓	UNDISTURBED
5. NAME OF DRILLER: Billy Ragon		14. TOTAL NUMBER CORE BOXES: NR	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED 0° DEG. FROM VERT.		15. ELEVATION GROUND WATER: NR	
7. THICKNESS OF OVERBURDEN: —		16. DATE HOLE: STARTED 11/13/08	COMPLETED 11/14/08
8. DEPTH DRILLED INTO ROCK: NA		17. ELEVATION TOP OF HOLE: NR	
9. TOTAL DEPTH OF HOLE: 30'		18. TOTAL CORE RECOVERY FOR BORING: NR %	
		ALLEN WILLMORE INSPECTOR	

ELEVATION PID (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc. if significant) (g)
0.0			TOP SOIL			
			CLAY, SILTY, LOW TO NO PLASTICITY BROWN, SOFT, NO ODOR	65%		
0.0						
			-BECOMES SANDY, STIFF, MOIST			
0.0	5					
				100%		
0.0						
			SAND, SILTY, DENSE, BROWN, IRON STAINING TO GRAY MOIST, NO ODOR			
0.0	10					
				60%		
0.0						
0.0						

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE: N/A

Hole No. 35AWW07

PROJECT: Longhorn MARC

INSTALLATION: Longhorn AAP

SHEET 2 OF 3 SHEETS

ELEVATION (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
0.0			SAME AS ABOVE			
0.0	15	CL	CLAY, SILTY, BROWN, SLIGHT PLASTICITY, MOIST, SOFT, NO ODOR	70%		
0.0			SAND, SILTY, MOIST, GRAY, IRON STAINING, MOTTLING, NO ODOR, MODERATELY DENSE			
0.0	20		- MORE IRON, MORE ORGANICS	100%		
0.0		CL	CLAY, SILTY, STIFF, MOIST, HIGH PLASTICITY, NO ODOR			
0.0	25			100%		
0.0		MLS	SILT, SAND & CLAY, MOIST, IRON STAING, GRAY, DENSE			
0.0				100%		

ENG FORM 1836—APREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT

HOLE NO.

DRILLING LOG (Cont Sheet)

ELEVATION TOP OF HOLE: NA

Hole No. 36AWW07

PROJECT: Longhorn MARC

INSTALLATION: Longhorn AAP

SHEET 3 OF 3 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
0.0	30		-BECOMES MORE CLAYE	100%		
			END OF BORING @ 30' bgs			

ENG FORM 1836—PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT

HOLE NO.

00936970

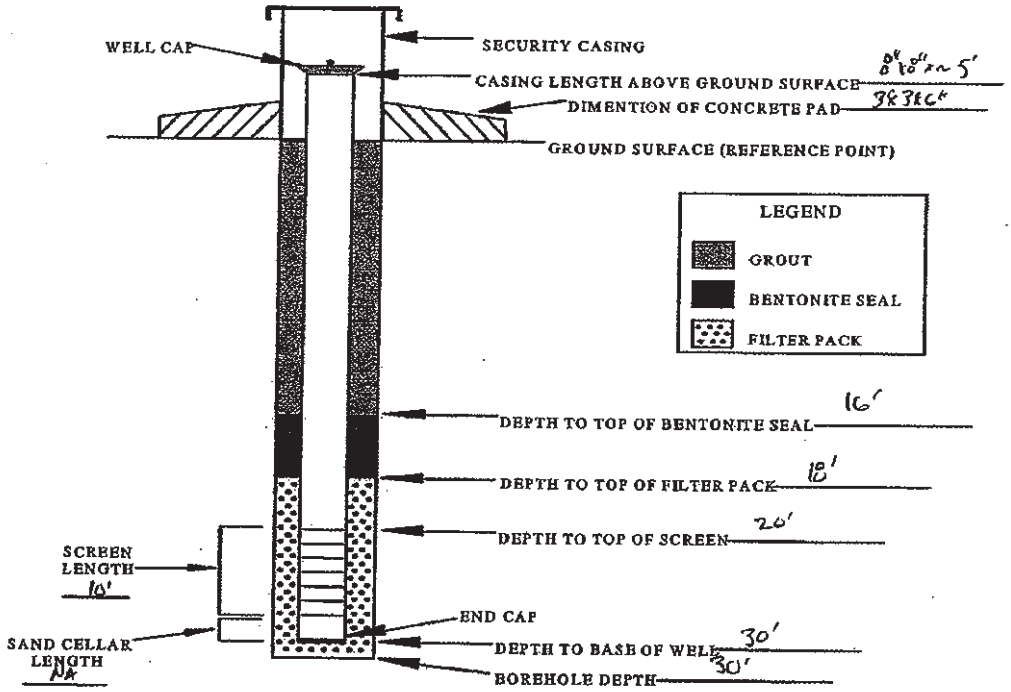
35AWW07

WELL COMPLETION FORM (Stickup or Above Grade Completion Well)

FIELD REPRESENTATIVE: Allen Willmore
DRILLING CONTRACTOR: ETC
DRILLING TECHNIQUE: HSA
AUGER SIZE AND TYPE: 10"
BOREHOLE IDENTIFICATION: 35AWW07
BOREHOLE DIAMETER: 10"
WELL IDENTIFICATION: 35AWW07
WELL CONSTRUCTION START DATE: 11/13/08
WELL CONSTRUCTION COMPLETE DATE: 11/14/08
SCREEN MATERIAL: sch. 40 PVC
SCREEN DIAMETER: 4"
STRATUM-SCREENED INTERVAL (FT): 10'
CASING MATERIAL: sch. 40 PVC
CASING DIAMETER: 4"

TYPE OF FILTER PACK: silica sand
GRADIATION: 20/40
AMOUNT OF FILTER PACK USED: 18-bgs (50 lbs)
TYPE OF BENTONITE: pellet
AMOUNT BENTONITE USED: 1- 50lb bucket
TYPE OF CEMENT: portland-cement
AMOUNT CEMENT USED: NR
GROUT MATERIALS USED: bentonite slurry
DIMENSIONS OF SECURITY CASING: 8"x8"x~3'
TYPE OF WELL CAP: plugging cap
TYPE OF END CAP: sch. 40 PVC
COMMENTS:

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: Billy Ragon
INSTALLATION OBSERVED BY: Allen Willmore
DISCREPANCIES: None

STATE OF TEXAS WELL REPORT for Tracking #162467

Owner:	**Longhorn Army Ammunition Plant**	Owner Well #:	**35AWW07**
Address:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Grid #:	**35-23-6**
Well Location:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Latitude:	**32° 41' 10" N**
Well County:	**Harrison**	Longitude:	**094° 09' 06" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin e-trex**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **11/13/2008**
Completed: **11/14/2008**

Diameter of Hole: Diameter: **10.25 in From Surface To 30 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Gravel Packed From: **18 ft to 30 ft**
Gravel Pack Size: **20/40**

Annular Seal Data: 1st Interval: **From 16 ft to 18 ft with 1 Bentonite (#sacks and material)**
2nd Interval: **From 0 ft to 16 ft with 7 Cement (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Tremmi pipe**
Cemented By: **Driller**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Sleeve Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers:

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **ETTL Engineers & Consultants Inc.**
1717 E. Erwin

	Tyler , TX 75702
Driller License Number:	**54683**
Licensed Well Driller Signature:	**Wilburn Ragon, Jr.**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #**162467**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0-8.5 Silty clay - brown
8.5-14.5 Silty sand - brown to gray
14.5-17 Silty clay - brown
17-22 Silty sand - gray
22-25.5 Silty clay
25.5-30 Silty sand - gray

CASING, BLANK PIPE & WELL SCREEN DATA

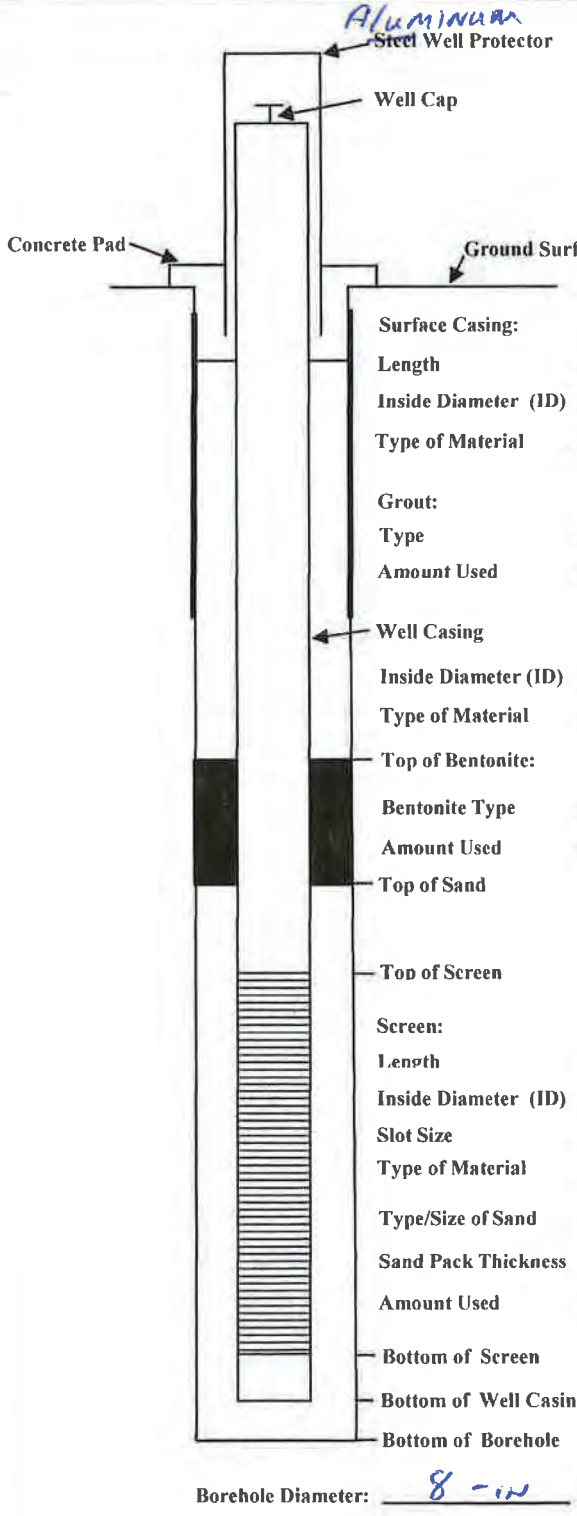
Dia. New/Used Type Setting From/To
4 New PVC Sch. 40 0 - 20
4 New PVC Sch. 40 - slotted 20 - 30 0.010"

00936973

AECOM

Client: USAGE	WELL ID: 35AWW11
Project Number: 60256135	Date Installed: 8-23-13
Site Location: Site 58	Borehole Diameter: 8-in
Well Location: Coords:	Contractor: FUGRO
Method: HSA	

MONITORING WELL CONSTRUCTION DETAIL



Depth from G.S. (feet)

Surface Casing:		
Length	NA	
Inside Diameter (ID)	NA	
Type of Material	NA	
Grout:		
Type	Portland/Bentonite	
Amount Used	40 GAL	
Well Casing		
Inside Diameter (ID)	2.0-in	
Type of Material	SCH 40 PVC	
Top of Bentonite:		13.7
Bentonite Type	Pellets	
Amount Used	1.5 Pails	
Top of Sand		16.9
Top of Screen		~~20.1~~ 19.7
Screen:		
Length	14.6	
Inside Diameter (ID)	2.0-in	
Slot Size	0.010-in	
Type of Material	SCH 40 PVC	
Type/Size of Sand	Unimin 20/40	
Sand Pack Thickness		
Amount Used	9 ½ Bags	
Bottom of Screen		34.3
Bottom of Well Casing		34.9
Bottom of Borehole		35.5
Borehole Diameter:	8-in	

Comments:

Installation Observed By: M. Hartford

00203362

STATE OF TEXAS WELL REPORT for Tracking #352610

Owner:	**Longhorn AAP- USACE**	Owner Well #:	**35AWW11**
Address:	**Highway 43** **Karnack , TX 75661**	Grid #:	**35-23-6**
Well Location:	**Highway 43** **Karnack , TX 75661**	Latitude:	**32° 41' 08" N**
Well County:	**Harrison**	Longitude:	**094° 09' 17" W**
Elevation:	**218 ft.**	GPS Brand Used:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **8/23/2013**
Completed: **8/23/2013**

Diameter of Hole: Diameter: **8 in From Surface To 35.5 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Gravel Packed From: **35.5 ft to 16.9 ft**
Gravel Pack Size: **20 / 40**

Annular Seal Data: 1st Interval: **From 35.5 ft to 16.9 ft with 9.5 (#sacks and material)**
2nd Interval: **From 16.9 ft to 13.7 ft with 1.5 (#sacks and material)**
3rd Interval: **From 13.7 ft to 0 ft with 2 Portland (#sacks and material)**
Method Used: **Tremie**
Cemented By: **Donald Edwards**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No Data**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **Fugro**
6105 Rookin St
Houston , TX 77074

Driller License Number: **56013**

Licensed Well Driller Signature:	**Donald Edwards**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking **#352610**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft)	To (ft)	Description
		Gray / Brown clay with layers of sand

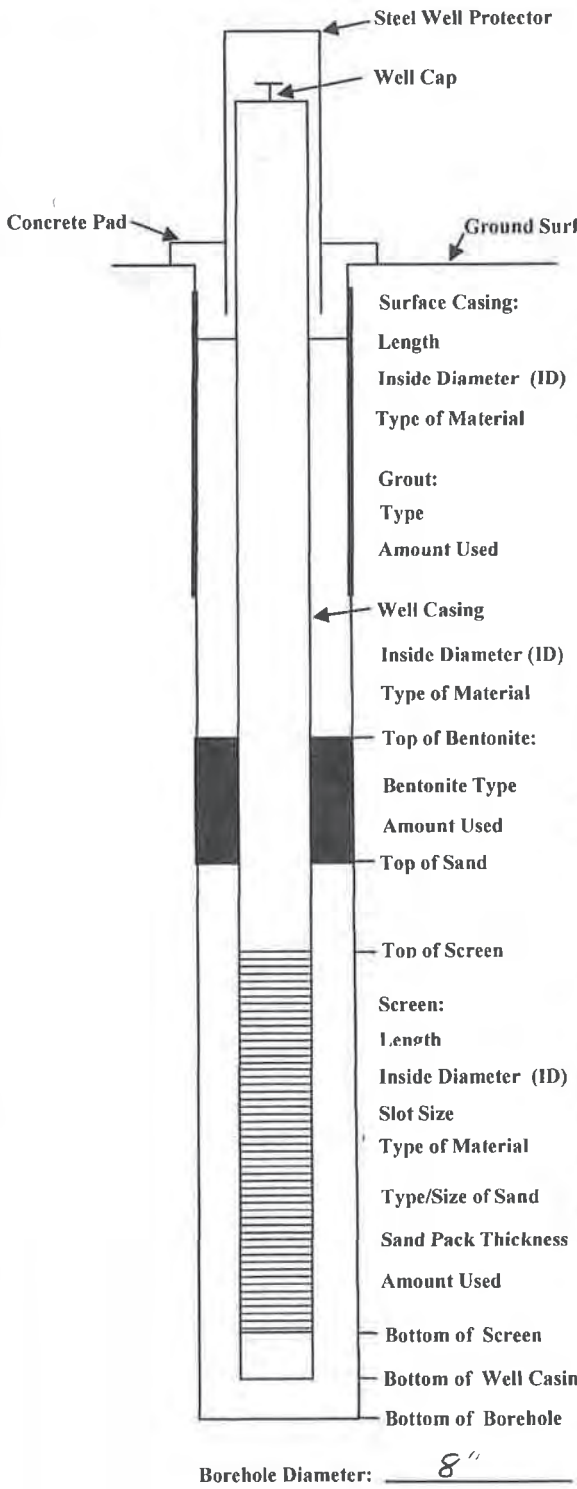
CASING, BLANK PIPE & WELL SCREEN DATA

Dia.	New/Used	Type	Setting From/To
2in	**new**	**pvc screen**	**34.9ft to 19.7ft .010 slot**
2in	**new**	**pvc casing**	**19.7ft to 0**

AECOM

Client: USACE	WELL ID: SWMU 35AWW19
Project Number: 60258135	
Site Location: Site 58	Date Installed: 9/19/13
Well Location: Coords:	Borehole Diameter: 8"
Method: HSA	Contractor: Fugro

MONITORING WELL CONSTRUCTION DETAIL



Depth from G.S. (feet)

Surface Casing:
- Length: _____
- Inside Diameter (ID): _____
- Type of Material: _____

Grout:
- Type: Bentonite/Portland
- Amount Used: 2 x 94 lb. Bags

Well Casing
- Inside Diameter (ID): 2"
- Type of Material: SCH 40 PVC

- Top of Bentonite: 9'
  - Bentonite Type: 3/8" Chips
  - Amount Used: 4.5 x 50 lb. bags
- Top of Sand: 11'
- Top of Screen: 13.9'

Screen:
- Length: 14.1'
- Inside Diameter (ID): 2"
- Slot Size: 0.010"
- Type of Material: SCH 40 PVC
- Type/Size of Sand: 20/40
- Sand Pack Thickness: 20'
- Amount Used: 9 x 50 lb. bags

- Bottom of Screen: 28.4
- Bottom of Well Casing: 29'
- Bottom of Borehole: 38'

Comments: Backfilled w/ Bentonite chips from 38' to 31' Bgs
Filter sand from 31' to 11' Bgs

Installation Observed By: Mr. Law

00936977

STATE OF TEXAS WELL REPORT for Tracking #352655

Owner:	**Longhorn AAP-USACE**	Owner Well #:	**35AWW19**
Address:	**Highway 43** **Houston , TX 75661**	Grid #:	**35-23-6**
Well Location:	**Highway 43** **Karnack , TX 75661**	Latitude:	**32° 41' 04" N**
Well County:	**Harrison**	Longitude:	**094° 09' 18" W**
Elevation:	**217 ft.**	GPS Brand Used:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **9/19/2013**
Completed: **9/19/2013**

Diameter of Hole: Diameter: **8 in From Surface To 38 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Gravel Packed From: **38 ft to 11 ft**
Gravel Pack Size: **20/40**

Annular Seal Data: 1st Interval: **From 38 ft to 11 ft with 9 sand (#sacks and material)**
2nd Interval: **From 11 ft to 9 ft with 1 bentonite (#sacks and material)**
3rd Interval: **From 9 ft to 0 ft with 2 Portland (#sacks and material)**
Method Used: **Tremie**
Cemented By: **Donald Edwards**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No Data**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **Fugro**
6105 Rookin St
Houston , TX 77074

Driller License Number: **56013**

Licensed Well Driller Signature:	**Donald Edwards**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking **#352655**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 38ft Gray / Brown clay with layers of sand

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2in new pvc screen 28.4ft to 13.9ft .010 slot
2in new pvc casing 13.9 to 0

bhate ENVIRONMENT INFRASTRUCTURE

BORING NUMBER 35AWW24

CLIENT AFCEC
PROJECT NAME Longhorn Army Ammunition Plant
PROJECT NUMBER NWO1312.0150.012.0001.02
PROJECT LOCATION 15600 FM 134 Karnack, Texas 75661
DATE STARTED 2/20/18 **COMPLETED** 2/20/18
GROUND ELEVATION _____ **HOLE SIZE** 6
DRILLING CONTRACTOR Walker Hill
GROUND WATER LEVELS:
DRILLING METHOD Geoprobe - Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY J. Cook
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		100	CL-ML		Dark brown silty clay/ organics. High plasticity. Wet. 7.5 YR 2.5/2	0
		100	CL		2.0 Light brown high plasticity clay. High plasticity. Moist. 7.5 YR 4/4	0
5		100	CL		4.0 Grey/red brown clay. Medium plasticity. Dry. 7.5 YR 4/1	0
		100	CL-ML		6.0 Light grey silty clay. Low plasticity. Dry. 7.5 YR 5/1	0
10		100				0
		100	CL		10.0 Light grey/brown silty clay. Dry. 7.5 YR 6/1	0
		100				0
15		100	CL-ML		14.0 Light brown silty clay. Medium plasticity. Dry. 7.5 YR 5/6	0
		100				0
20		100			20.0	0
		100			Light brown sandy clay. Dry. 7.5 YR 5/6	0
		100	CL-ML		22.0 Brown high plasticity silty clay. High plasticity. Moist. 7.5 YR 4/3	0
25		100	CL-ML		24.0 Light brown silty clay. High plasticity. Wet at 26'. 7.5 YR 4/4	0
		100			26.0 Light grey/brown silty clay. High plasticity. Wet. 7.5 YR 5/1	0
30		100	CL-ML			0
		100				0
					32.0 Bottom of hole at 32.1 feet.	

STATE OF TEXAS WELL REPORT for Tracking #472959

Owner:	**USACE**	Owner Well #:	**35AWW24**
Address:	**1645 S. 101st. East Ave. Tulsa, OK 74128**	Grid #:	**35-23-6**
Well Location:	**15600 FM 134 Karnack, TX 75661**	Latitude:	**32° 41' 02.9" N**
		Longitude:	**094° 09' 18.16" W**
Well County:	**Harrison**	Elevation:	**No Data**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Start Date: **2/19/2018** Drilling End Date: **2/23/2018**

	Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
Borehole:	**8**	**0**	**32**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Filter Packed**

	Top Depth (ft.)	*Bottom Depth (ft.)*	*Filter Material*	*Size*
Filter Pack Intervals:	**20**	**32**	**Sand**	**20/40**

	Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
Annular Seal Data:	**0**	**15**	**Cement 5 Bags/Sacks**
	15	**20**	**Bentonite 0 Bags/Sacks**

Seal Method: **Tremie**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **26.98 ft.** below land surface on **2018-02-23** Measurement Method: **Electric Line**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	No Data

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

The driller did certify that while drilling, deepening or otherwise altering the above described well, injurious water or constituents was encountered and the landowner or person having the well drilled was informed that such well must be completed or plugged in such a manner as to avoid injury or pollution.

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Walker-Hill Environmental, Inc.**

PO 1147
Foxworth, MS 39483

Driller Name: **Gary P Hill** License Number: **58141**

Apprentice Name: **Eric Meitzler**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	2	CL-ML, Dark Brown, Silty Clay
2	4	CL, Light brown, high plasticity clay
4	8	CL grey,reddish brown, Clay
8	12	CL-ML, Light grey, silty clay
12	18	CL-ML, Light grewy/brown, silty clay
18	20	CL-ML, Light Brown, Silty Clay
20	22	CLS, Light Brown, Sandy Clay
22	24	CL-ML, Brown, High plasticity, Silty clay
24	28	CL-ML, Light Brown, silty clay
28	32	CL-ML, Light Grey/Brown, Silty Clay

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	Riser	New Plastic (PVC)	40	0	22
2	Screen	New Plastic (PVC)	40 0.010	22	32

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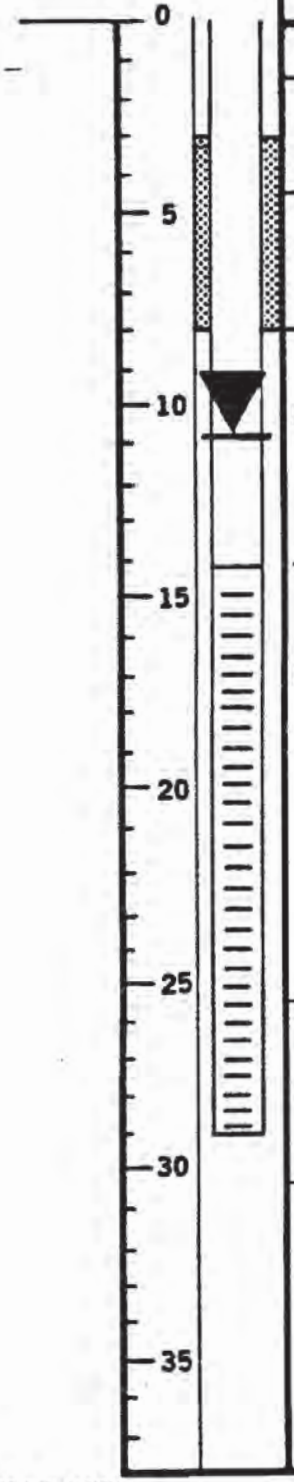
Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540



VISUAL U/S	BLOW COUNT*	MATERIAL CLASSIFICATION	% FINES	AQUIFER PERMEABILITY
SM	7/11	Silty sand		
SC	9/7	Slightly clayey sand Brown mottled w/yellowish brown	25	
CL	5/7 9/13	Slightly sandy clay w/thin silty sand seams		
SM+CL	12/15 20/25	Silty sand layers & sandy clay layers 60% silty sand 40% clay Light brownish grey & yellowish brown		
SM+CL	10/15 19/23	Thin silty sand & clay layers Light brownish grey Dark greyish brown w/some iron stain 60% silty sand Yellowish brown 40% clay		
	19/35 25/3"	Dense silty sand & consolidated sandy clay Light brown silty sand Seams light grey & dark grey clay		
SM-ML	12/25 /30	Slightly clayey silty sand Grey 5% clay 35% silt	40	
	19/29 50/4.5"			

*BLOWS PER 6 INCH USING 18, 24, or 36 SPLITSPOON

VERTICAL SCALE 1" = 5.0'

WELL 113 DATE DRILLED 6/29/82
STUDY AREA Former TNT Waste Disp. Plant
VATION TOP OF STEEL CASING = 214.87 ft
ELEVATION TOP OF PVC RISER = 214.53 ft
ELEVATION OF GROUND SURFACE = 211.97 ft

SOURCE: ENVIRONMENTAL PROTECTION SYSTEMS, INC. - 1983

CONTAMINATION SURVEY
LONGHORN ARMY AMMUNITION PLANT
MARSHALL, TEXAS

U. S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY
ABERDEEN PROVING GROUND, MARYLAND

HOLE NO. LHS-MW1

DRILLING LOG	DIVISION SOUTHWEST	INSTALLATION LHAAP	SHEET 1 OF 1 SHEETS
1. PROJECT LHAAP-WASTE SUMPS		10. SIZE AND TYPE OF BIT 8" AUGER	
2. LOCATION (Coordinates or Station) 6959157.90 3306087.10		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY TULSA DISTRICT COE		12. MANUFACTURER'S DESIGNATION OF DRILL CME 75	
4. HOLE NO. (As shown on drawing title and file number) LHS-MW1		13. OVERBURDEN SAMPLES DISTURBED 7	UNDISTURBED 0
5. NAME OF DRILLER TOM BEAVERS		14. TOTAL NUMBER CORE BOXES 0	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER SEE REMARKS	
7. THICKNESS OF OVERBURDEN 16.0		16. DATE HOLE STARTED 08/19/1994	COMPLETED 08/19/1994
8. DEPTH DRILLED INTO ROCK 0.0		17. ELEVATION TOP OF HOLE 211.2	
9. TOTAL DEPTH OF HOLE 16.0		18. TOTAL CORE RECOVERY FOR BORING 0.0 %	
		MERLIN DEAN	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			LEAN CLAY (CL) (0.0 – 4.5) WITH SAND, LIGHT YELLOWISH BROWN, MOIST.		J-1	WATER ENCOUNTERED @ 11.7' SAMPLE TYPE ZONE AUGER 0.0– 10.0 SPLITSPOON 10.0– 16.0 SAMPLE DEPTH J-1 0.0– 4.5 J-2 4.5– 7.2 J-3 7.2– 11.7 J-4 11.7– 12.7 J-5 13.0– 14.0 J-6 14.0– 15.0 J-7 15.0– 16.0
206.7	2 4					
			FAT CLAY (CH) (4.5 – 11.7) WITH SAND, LIGHT BROWNISH GRAY MOIST.		J-2	
	6 8					
					J-3	
199.5	10					
	12		FAT CLAY (CH) (11.7 – 16.0) DARK GRAY TO OLIVE BROWN, MOIST, 12.8–14.0 VERY MOIST.		J-4	
					J-5	
	14				J-6	
					J-7	
195.2	16					
	18					
	20					

PROJECT LHAAP-WASTE SUMPS | HOLE NO. LHS-MW1

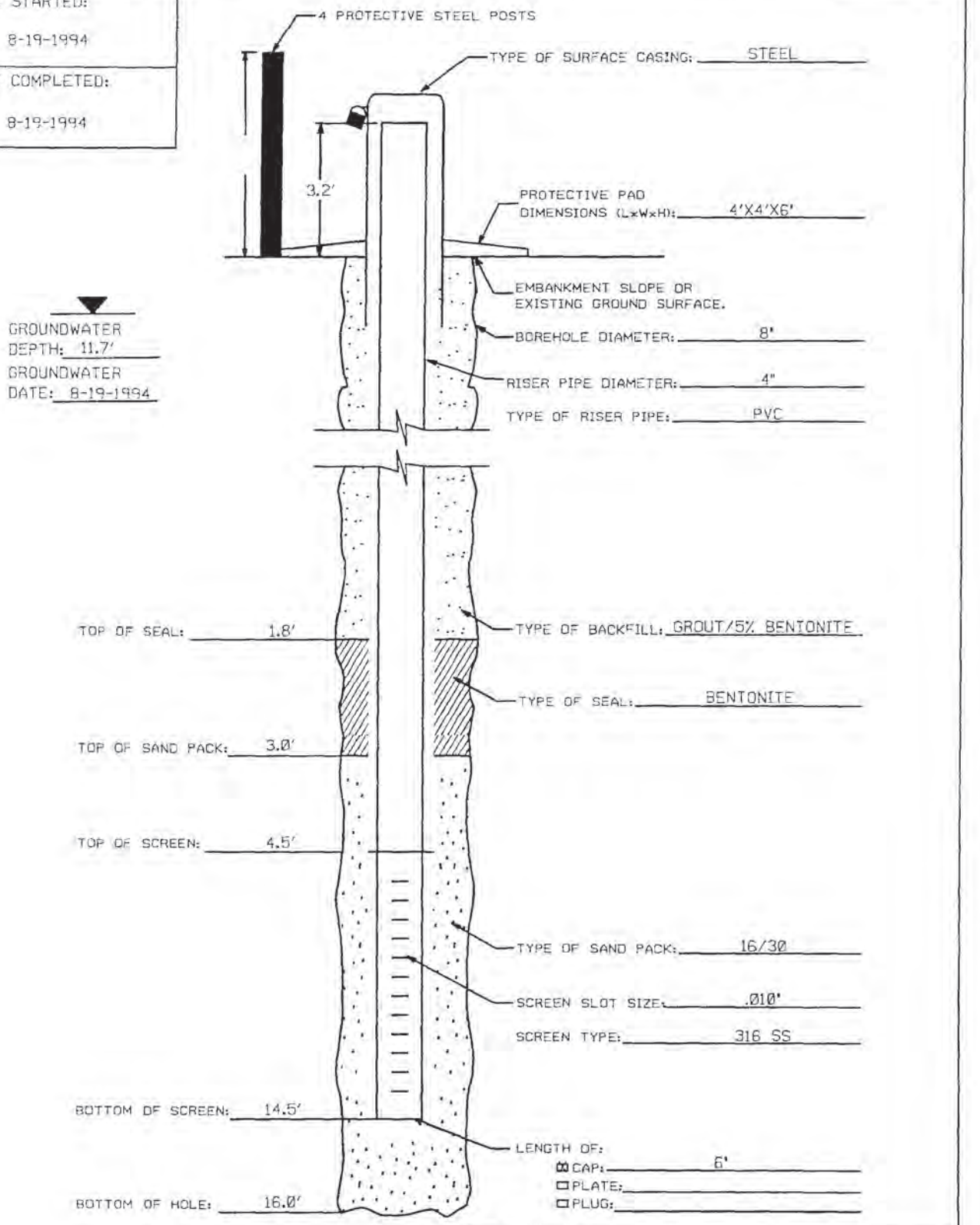
WELL NO. LHS-MW1

MONITORING WELL SHEET

PROJECT & INSTALLATION:
LONGHORN ARMY AMMUNITION PLANT - SUMPS

DATE STARTED:
8-19-1994

DATE COMPLETED:
8-19-1994



INSPECTOR:
MERLIN DEAN

LHWCD.DGN LORI KRUSE

HOLE NO. LHS-MW2

DRILLING LOG	DIVISION SOUTHWEST	INSTALLATION LHAAP	SHEET 1 OF 1 SHEETS
1. PROJECT LHAAP-WASTE SUMPS		10. SIZE AND TYPE OF BIT 8" AUGER	
2. LOCATION (Coordinates or Station) 6959135.90 3305704.50		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY TULSA DISTRICT COE		12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number) LHS-MW2		13. OVERBURDEN SAMPLES DISTURBED 0	UNDISTURBED 11
5. NAME OF DRILLER TOM BEAVERS		14. TOTAL NUMBER CORE BOXES 0	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER NOT DETERMINED	
		16. DATE HOLE STARTED 05/19/1994	COMPLETED 05/20/1994
7. THICKNESS OF OVERBURDEN 16.0		17. ELEVATION TOP OF HOLE 211.7	
8. DEPTH DRILLED INTO ROCK 0.0		18. TOTAL CORE RECOVERY FOR BORING 0.0 %	
9. TOTAL DEPTH OF HOLE 16.0		MERLIN DEAN	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
211.2			LEAN CLAY (CL) (0.0 – 1.5) SANDY, BROWN, MOIST, VERY STIFF NUMEROUS ROOTS IN TOP, FEW SCATTERED GRAVELS TO 3/4", MORE SAND IN BOTTOM 0.3'.		ST-1	SAMPLE TYPE SHELBY ZONE 0.0– 16.0 SAMPLE DEPTH ST-1 0.0– 1.5 ST-2 1.5– 3.0 ST-3 3.0– 4.5 ST-4 4.5– 6.0 ST-5 6.0– 7.5 ST-6 7.5– 9.0 ST-7 9.0– 10.5 ST-8 10.5– 12.0 ST-9 12.0– 13.5 ST-10 13.5– 15.0 ST-11 15.0– 16.0
208.7	2		LEAN CLAY (CL) (1.5 – 3.0) GRAYISH BROWN, MOIST, STIFF TO VERY STIFF, VERY FRIABLE, VERY SANDY IN TOP 0.4'.		ST-2	
205.7	4		LEAN CLAY (CL) (3.0 – 6.0) WITH SAND, BROWNISH GRAY AND YELLOW, MOIST, STIFF, VERY FRIABLE, VERY SANDY IN TOP 0.4'		ST-3	
	6				ST-4	
	8		FAT CLAY (CH) (6.0 – 13.5) OLIVE AND GRAY WITH YELLOW, MOIST, STIFF TO VERY STIFF, FRIABLE, LAMINATIONS OF VERY FINE SAND AND SILT, CALCAREOUS TO SLIGHTLY CACLAREOUS, FRIABLE FISSILITY, 10.5–12.0 VERY WET.		ST-5	
					ST-6	
	10				ST-7	
	12				ST-8	
198.2					ST-9	
196.7	14		FAT CLAY (CH) (13.5 – 15.0) DARK OLIVE GRAY, MOIST, HARD, FISSILITY, SLIGHTLY SLICKENSIDED, LAMINATIONS OF SILT.		ST-10	
195.7	16		FAT CLAY (CH) (15.0 – 16.0) DARK OLIVE GRAY, MOIST, VERY STIFF, FRIABLE, FISSILITY, LAMINATIONS OF VERY FINE SAND AND SILT, TOP 0.2' VERY WET.		ST-11	
	18					
	20					

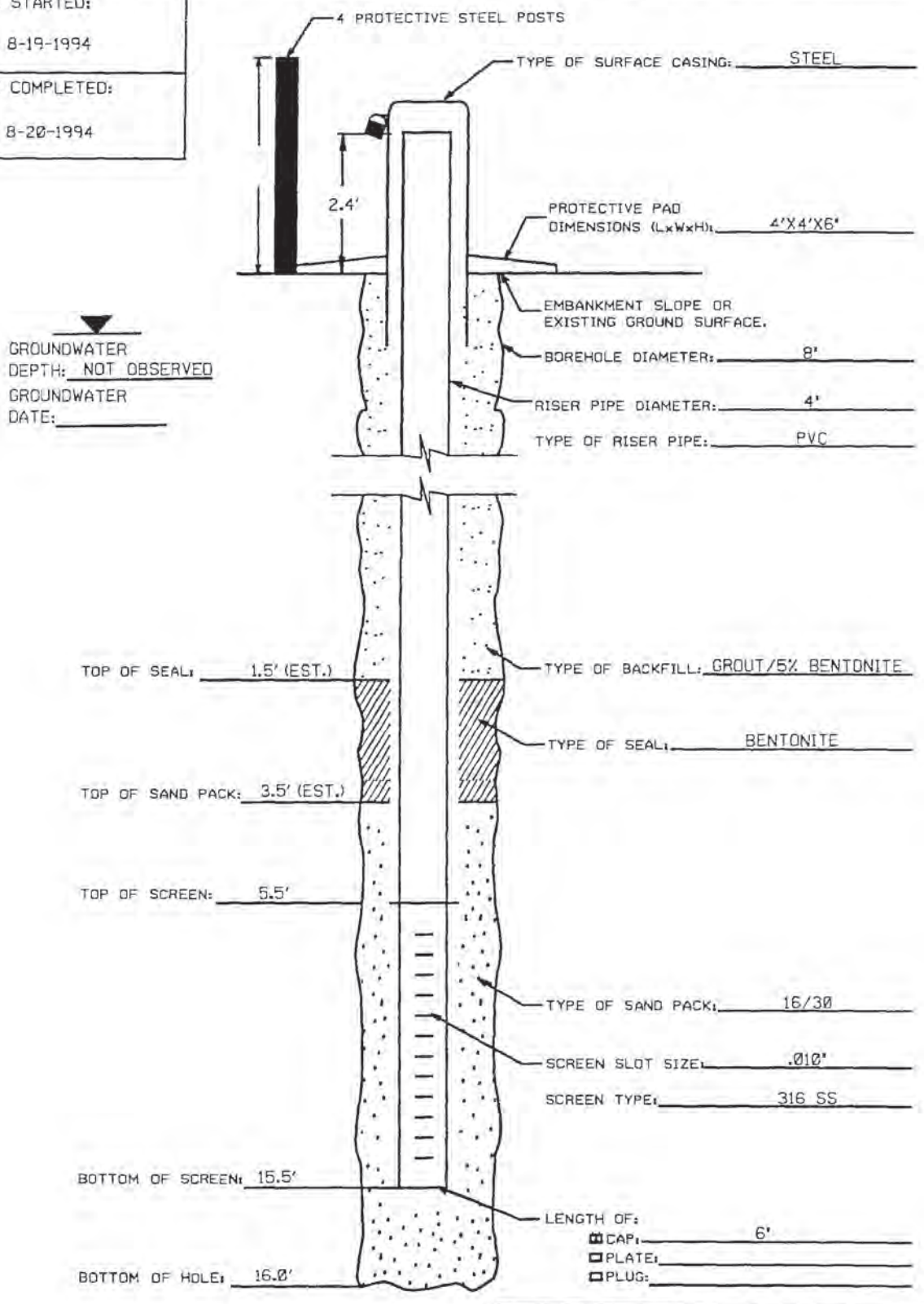
WELL NO. LHS-MW2

MONITORING WELL SHEET

PROJECT & INSTALLATION:
LONGHORN ARMY AMMUNITION PLANT - SUMPS

DATE STARTED:
8-19-1994

DATE COMPLETED:
8-20-1994



INSPECTOR:
MERLIN DEAN

LHWCD.DGN LORI KRUSE

HOLE NO. LHS-MW3

DRILLING LOG	DIVISION SOUTHWEST	INSTALLATION LHAAP	SHEET 1 OF 2 SHEETS
1. PROJECT: LHAAP-WASTE SUMPS		10. SIZE AND TYPE OF BIT: 8" AUGER	
2. LOCATION (Coordinates or Station): 695993S.80	3305514.20	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL	
3. DRILLING AGENCY: TULSA DISTRICT COE		12. MANUFACTURER'S DESIGNATION OF DRILL: CME 75	
4. HOLE NO. (As shown on drawing title and file number): LHS-MW3		13. OVERBURDEN SAMPLES: DISTURBED 4	UNDISTURBED 13
5. NAME OF DRILLER: TOM BEAVERS		14. TOTAL NUMBER CORE BOXES: 0	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: NOT DETERMINED	
		16. DATE HOLE: STARTED 08/20/1994	COMPLETED 08/20/1994
7. THICKNESS OF OVERBURDEN: 32.0		17. ELEVATION TOP OF HOLE: 214.1	
8. DEPTH DRILLED INTO ROCK: 0.0		18. TOTAL CORE RECOVERY FOR BORING: 0.0 %	
9. TOTAL DEPTH OF HOLE: 32.0		MERLIN DEAN	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
212.0	2		LEAN CLAY (CL) (0.0 – 2.0) SANDY, BROWN, MOIST, VERY STIFF, FEW GRAVELS TO 3/8",TOP 0.5' SILTY SAND (SM) DARK BROWN, CALCAREOUS, ROOTS.		ST-1	SAMPLE TYPE ZONE SHELBY 0.0– 22.8 SPLITSPOON 22.8– 32.0 SAMPLE DEPTH ST-1 0.0– 2.0 ST-2 2.0– 4.0 ST-3 4.0– 4.4 ST-4 6.0– 8.0 ST-5 8.0– 9.7 ST-6 9.7– 10.2 ST-7 10.2– 12.0 ST-8 12.0– 13.8 ST-9 13.8– 15.6 ST-10 15.6– 17.4 ST-11 17.4– 18.9 ST-12 18.9– 21.0 ST-13 21.0– 22.8 J-1 22.8– 23.4 J-2 24.2– 24.8 J-3 24.8– 26.6 J-4 31.5– 32.0
210.0	4		LEAN CLAY (CL) (2.0 – 4.0) SANDY, BROWNISH YELLOW WITH GRAY, VERY MOIST, VERY STIFF, FEW GRAVELS TO 3/8", FEW BLACK IRON-OXIDE STAINS.		ST-2	
209.6			LEAN CLAY (CL) (4.0 – 4.4) SANDY, GRAY AND YELLOW WITH RED, MOIST, HARD.		ST-3	
208.0	6		FAT CLAY (CH) (4.4 – 6.0) SANDY, RED WITH GRAY, MOIST, VERY STIFF.			
206.6			LEAN CLAY (CL) (6.0 – 7.4) WITH SAND, YELLOW WITH GRAY, MOIST, HARD.		ST-4	
206.0	8		FAT CLAY (CH) (7.4 – 8.0) GRAY WITH YELLOW, MOIST, HARD.			
205.4			CLAY SAND (SC) (8.0 – 8.6) WITH GRAVEL, BROWN, MOIST, GRAVELS TO 3/4".		ST-5	
204.6			LEAN CLAY (CL) (8.6 – 9.4) SANDY, GRAY WITH YELLOW AND BROWN, MOIST, HARD.			
204.3	10		CLAY SAND (SC) (9.4 – 9.7) WITH GRAVEL, MOIST, GRAVEL TO 1/2".		ST-6	
	12		LEAN CLAY (CL) (9.7 – 13.8) WITH SAND, GRAY AND YELLOW, MOIST, HARD, POCKETS OF SAND THROUGHOUT, 12.0–13.8 VERY STIFF TO HARD.		ST-7	
200.2					ST-8	
	14		LEAN CLAY (CL) (13.8 – 17.4) YELLOW WITH GRAY, MOIST, VERY STIFF.		ST-9	
196.6	16				ST-10	
	18		LEAN CLAY (CL) (17.4 – 21.0) YELLOW WITH GRAY, VERY MOIST TO WET, STIFF.		ST-11	
194.1	20				ST-12	

HOLE NO. LHS-MW3

DRILLING LOG	DIVISION SOUTHWEST	INSTALLATION LHAAP	SHEET 2 OF 2 SHEETS
1. PROJECT LHAAP-WASTE SUMPS		10. SIZE AND TYPE OF BIT 8" AUGER	
2. LOCATION (Coordinates or Station) 695939.80 3305514.20		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY TULSA DISTRICT COE		12. MANUFACTURER'S DESIGNATION OF DRILL CME 75	
4. HOLE NO. (As shown on drawing title and file number) LHS-MW3		13. OVERBURDEN SAMPLES DISTURBED 4	UNDISTURBED 13
5. NAME OF DRILLER TOM BEAVERS		14. TOTAL NUMBER CORE BOXES 0	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER NOT DETERMINED	
		16. DATE HOLE STARTED 05/20/1994	COMPLETED 05/20/1994
7. THICKNESS OF OVERBURDEN 32.0		17. ELEVATION TOP OF HOLE 214.1	
8. DEPTH DRILLED INTO ROCK 0.0		18. TOTAL CORE RECOVERY FOR BORING 0.0 %	
9. TOTAL DEPTH OF HOLE 32.0		MERLIN DEAN	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
193.0			LEAN CLAY (CL) (17.4 – 21.0) YELLOW WITH GRAY, VERY MOIST TO WET, STIFF.		ST-12	
191.2	22		LEAN CLAY (CL) (21.0 – 22.8) WITH SAND, YELLOW WITH GRAY VERY MOIST, STIFF, SCATTERED BLACK IRON-OXIDE STAINS, BOTTON 0.4' SANDY LEAN CLAY.		ST-13	
189.8	24		LEAN CLAY (CL) (22.8 – 24.2) WITH SAND, LIGHT OLIVE BROWN, MOIST.		J-1	
189.2			LEAN CLAY (CL) (24.2 – 24.8) OLIVE YELLOW, MOIST.		J-2	
182.5	26 28 30		LEAN CLAY (CL) (24.8 – 31.5) WITH SAND, LIGHT OLIVE BROWN, MOIST.		J-3	
182.1	32		LEAN CLAY (CL) (31.5 – 32.0) LIGHT OLIVE BROWN, MOIST.		J-4	
	34 36 38 40					

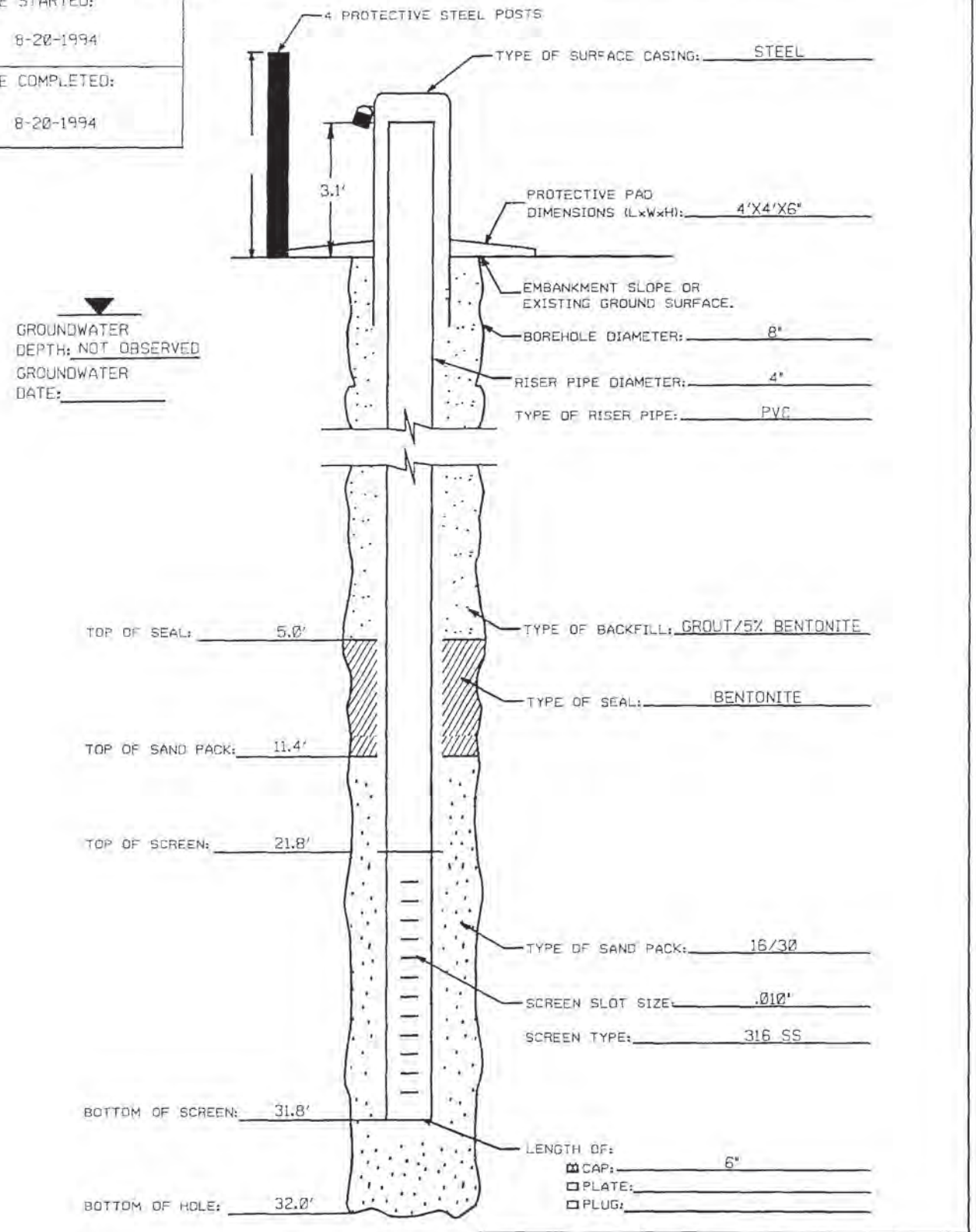
WELL NO. LHS-MW3

MONITORING WELL SHEET

PROJECT & INSTALLATION:
LONGHORN ARMY AMMUNITION PLANT - SUMPS

DATE STARTED:
8-20-1994

DATE COMPLETED:
8-20-1994



INSPECTOR:
MERLIN DEAN

LHWCO.DGN LORI KRUSE

HOLE NO. LHS-MW4

DRILLING LOG	DIVISION SOUTHWEST	INSTALLATION LHAAP	SHEET 1 OF 1 SHEETS
1. PROJECT LHAAP-WASTE SUMPS		10. SIZE AND TYPE OF BIT 8" AUGER	
2. LOCATION (Coordinates or Station) 6960183.80 3305398.40		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL	
3. DRILLING AGENCY TULSA DISTRICT COE		12. MANUFACTURER'S DESIGNATION OF DRILL CME 75	
4. HOLE NO. (As shown on drawing title and file number) LHS-MW4		13. OVERBURDEN SAMPLES DISTURBED 12	UNDISTURBED 0
5. NAME OF DRILLER TOM BEAVERS		14. TOTAL NUMBER CORE BOXES 0	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER SEE REMARKS	
		16. DATE HOLE STARTED 08/22/1994	COMPLETED 08/23/1994
7. THICKNESS OF OVERBURDEN 30.0		17. ELEVATION TOP OF HOLE 214.0	
8. DEPTH DRILLED INTO ROCK 0.0		18. TOTAL CORE RECOVERY FOR BORING 0.0 %	
9. TOTAL DEPTH OF HOLE 30.0		STEVE BREWER	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
205.0	0		LEAN CLAY (CL) (0.0 – 9.0) SANDY, OLIVE BROWN TO BROWNISH GRAY, MOIST, ROOTS TO 3.4'.		J-1	WATER ENCOUNTERED @ 13.2'
					J-2	SAMPLE TYPE ZONE SPLITSPOON 0.0– 30.0
	3					SAMPLE DEPTH J-1 0.3– 1.2 J-2 1.2– 3.4 J-3 3.4– 9.0 J-4 9.0– 13.2 J-5 13.2– 16.0 J-6 16.0– 18.9 J-7 18.9– 23.8 J-8 23.8– 25.2 J-9 25.2– 27.2 J-10 27.2– 28.1 J-11 28.1– 29.0 J-12 29.0– 30.0
	6				J-3	
198.0	9		LEAN CLAY (CL) (9.0 – 16.0) OLIVE YELLOW, MOIST.		J-4	
	12					
	15				J-5	
195.1	18		LEAN CLAY (CL) (16.0 – 18.9) SANDY, LIGHT YELLOWISH BROWN, MOIST.		J-6	
190.2	21		LEAN CLAY (CL) (18.9 – 23.8) WITH SAND, YELLOWISH BROWN, MOIST, SILTY.		J-7	
188.8	24		CLAY SAND (SC) (23.8 – 25.2) WITH GRAVEL, REDDISH BROWN, MOIST, GRAVELS TO 1/2".		J-8	
			CLAY SAND (SC) (25.2 – 27.2) PALE BROWN, MOIST, ROOTS.		J-9	
186.8	27		LEAN CLAY (CL) (27.2 – 28.1) SANDY, REDDISH BROWN, MOIST, GRAVELS TO 1/2".		J-10	
185.9			FAT CLAY (CH) (28.1 – 29.0) SANDY, REDDISH BROWN, MOIST, GRAVEL TO 1/2".		J-11	
185.0			FAT CLAY (CH) (29.0 – 30.0) WITH SAND, LIGHT BROWNISH GRAY MOIST.		J-12	
184.0	30					

00936992

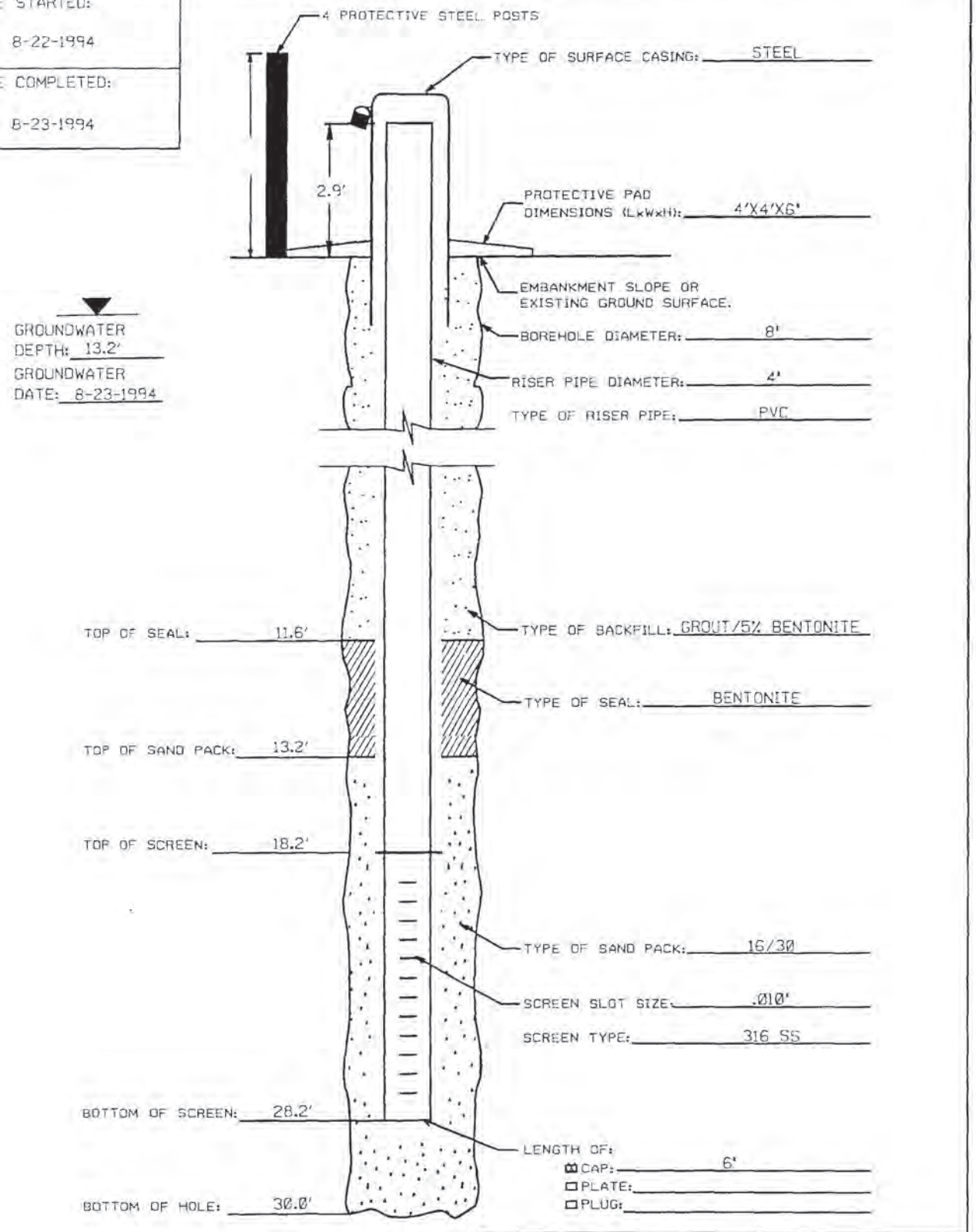
WELL NO. LHS-MW4

MONITORING WELL SHEET

PROJECT & INSTALLATION:
LONGHORN ARMY AMMUNITION PLANT - SUMPS

DATE STARTED:
8-22-1994

DATE COMPLETED:
8-23-1994



INSPECTOR:
STEVE BREWER

LHWCD.DGN LORI KRUSE

ENCLOSURE 2

TCEQ CORE DATA FORM

00936994

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided.)*

☐ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.)*

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number *(if issued)*
CN		RN

SECTION II: Customer Information

4. General Customer Information | 5. Effective Date for Customer Information Updates (mm/dd/yyyy)

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).

6. Customer Legal Name *(If an individual, print last name first: eg: Doe, John)* | *If new Customer, enter previous Customer below:*

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number *(if applicable)*

11. Type of Customer: ☐ Corporation ☐ Individual Partnership: ☐ General ☐ Limited
Government: ☐ City ☐ County ☐ Federal ☐ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

13. Independently Owned and Operated?
☐ Yes ☐ No

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following:*

☐ Owner ☐ Operator ☐ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other:

15. Mailing Address:

City		State		ZIP		ZIP + 4	

16. Country Mailing Information *(if outside USA)*	17. E-Mail Address *(if applicable)*

18. Telephone Number	19. Extension or Code	20. Fax Number *(if applicable)*
( ) -		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC.)

22. Regulated Entity Name *(Enter name of the site where the regulated action is taking place.)*

23. Street Address of the Regulated Entity: *(No PO Boxes)*								
	City		State		ZIP		ZIP + 4	
24. County								

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:	LHAAP is located in the northeast corner of Harrison County between SH43 and the western shore of Caddo Lake

26. Nearest City	State	Nearest ZIP Code
Karnack	TX	75661

27. Latitude (N) In Decimal:	32.6665	28. Longitude (W) In Decimal:	94.1265

Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
32	39	59.64	94	07	35.4

29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)	31. Primary NAICS Code (5 or 6 digits)	32. Secondary NAICS Code (5 or 6 digits)

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

34. Mailing Address:								
	City		State		ZIP		ZIP + 4	
35. E-Mail Address:								

36. Telephone Number	37. Extension or Code	38. Fax Number *(if applicable)*
( ) -		( ) -

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☒ Other:

SECTION IV: Preparer Information

40. Name:	Praveen Srivastav	41. Title:	Project Manager

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(281) 639-8743		( ) -	praveen.srivastav@aptim.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:		Job Title:	
Name*(In Print)* :		Phone:	( ) -
Signature:		Date:	

Subject: Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)
Location of Meeting: Karnack Community Center, Karnack, Texas
Date of Meeting: 25 July 2019– 10:30 AM Central Daylight Time (CDT)

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
EPA:	Dorelle Harrison
TCEQ:	April Palmie (AP)
USACE:	Aaron Williams (AW)
AEC:	Amanda Sherman (AS)
USGS:	Kent Becher (KB)
Bhate:	Kim Nemmers (KN)
USFWS:	Paul Bruckwicki (PB)
APTIM:	Praveen Srivastav (PS) and Susan Watson (SW)

Action Items

Bhate/APTIM: PS stated that a proposed subset of wells for the baseline resampling at LHAAP-16 was provided to the Army for review. RMZ stated that the proposed wells could be discussed with the team later in the day. PS stated that the sites are drying out and waste characterization soil samples for LHAAP-17 were collected. KN stated that a field kick-off meeting was planned for later in the day.

KN stated that the water line to well 18WW17 needed to be repaired which had been held up by wet conditions. KN stated that Scott Beesinger was assessing the area and working with the contractor to schedule the repairs. RMZ asked how long the line has been down. KN stated that she would have to confirm the date, but that repairs in June 2019 led to the discovery that the line to well 18WW17 was leaking (the 2-inch line within the 4-inch line).

For the Oil and Gas Water Well Drilling Impact Update, PB stated that no additional information was available. RMZ stated that the action item is with the USFWS Regional office. AS requested more information on the subject. RMZ explained that this action item stems from a comment made during the Five Year Review (FYR). The question was whether there was a land use control for water resources during oil and gas water well drilling that would restrict drilling near a plume. RMZ stated that the main concern is where there is not a clay over the Wilcox Formation, which narrows down the sites to LHAAP-18/24. RMZ stated that the property at LHAAP-18/24 has not been transferred.

Defense Environmental Restoration Program (DERP) Performance Based Remediation (PBR) Update

KN stated the groundwater treatment plant (GWTP) is operating via the generator so LHAAP-16 remains down. AW stated that the transformer will be installed by August 20, 2019 followed by completing connections and testing for a few days. RMZ asked what takes so long. AW clarified that a whole new transformer is being installed and thus entire system needs to be tested. AP asked how long LHAAP-16 will be operated after the transformer is operational. KN stated that she recalled two weeks being the agreed upon time period. AP then confirmed that baseline groundwater samples would be collected after the system was operational for two weeks of time to

which KN concurred. KN explained that poles and lines damaged over the past few months are still requiring repairs, which will be completed ahead of the transformer installation to ensure that the system is operational as soon as possible. PS stated that the water elevations at LHAAP-16, collected in June 2019, show that water level elevations are up which may be a function of lack of pumping and the rainfall. KN stated that most months have received at least 10-inches of rain since September 2018. PS asked if the goal was to have the water table return to previous conditions. RMZ stated that the design was based upon having an operational extraction system and the goal is to have the aquifer behave like the system is operating again. PS stated that the groundwater flow directions based upon the June 2019 data have not changed significantly compared to 2018 groundwater flow, even though the system is not operating. SW clarified that the system has to operate per the remedy so ensuring that the extraction system is operational is important. AP concurred stating that the extraction system is part of the remedy for recirculation also. KN stated that the baseline sampling will allow for evaluation of possible changes from the October 2018 sampling event also. PS stated that approximately 19 of the original 39 monitoring wells (approximately 50-percent) were selected for baseline resampling at LHAAP-16 based upon detections and/or potential influence from extraction. RMZ stated that the wells selected could be discussed further during the kick-off meeting. KB asked how deep the injection was going to be along the bayou wall. PS stated injections along wall would be around 20 feet. KB expressed concern that the intermediate contamination in that area might be missed. RMZ stated that deeper injections were not part of the Remedial Design (RD) being implemented.

PS stated that monitoring wells were being installed, weather allowing, the following week. The intermediate well at LHAAP-16 will be completed because only the outer casing had been installed in October 2018. If conditions are right, the two LHAAP-16 wells on east side of Harrison Bayou will be installed. PS stated that wells are also planned to be installed at LHAAP-12, -50 and -67. PS stated that Scott Beesinger had scouted the location of the wells, and all of the locations at LHAAP-12, -50 and -67 looked to be accessible except a well at LHAAP-50, which is near the creek. PS also discussed the monitoring well with tree roots at LHAAP-46, which likely will need to be replaced if rehabilitation is not effective. RMZ then clarified that installation of wells at LHAAP-16 should be the highest priority, followed by LHAAP-50. SW confirmed that the priority was understood. PS stated that Scott Beesinger will attempt to make an alternate route for installation of the two monitoring wells across the creek at LHAAP-16. PS stated that Scott Beesinger planned to use the dozer to cut the alternative route for the monitoring wells at LHAAP-16 the following week, if the alternative route looks good. PS stated that a surveyor would be onsite to survey the new wells installed in the fall of 2018. RMZ mentioned the replacement well at LHAAP-12 needs to be installed at the same location and depth as the old abandoned monitoring well 12WW10. The new well will be labeled as 12WW10R.

KN asked everyone to refer to the Document and Issues Tracking Table dated July 25, 2019.

- **Task 1** (Project Management) -
    - KN stated that the next MMM is schedule for August 15, 2019 and requested the meeting be moved to August 22, 2019. RMZ concurred with the change to the date. KN stated that the June 2019 MMM Minutes were final.
    - KN stated that the Restoration Advisory Board (RAB) Meeting is being held at the Community Center tonight. The April 2019 meeting minutes were ready for approval at the RAB Meeting. The next RAB meeting is planned for October 17, 2019.

- **Task 3** (LHAAP-03) – PS stated that the Regulators (TCEQ and EPA) have approved the Draft Final RD/Remedial Action Work Plan (RAWP) for LHAAP-03.
- **Task 4** (LHAAP-04) – PS stated that there are no current documents.
- **Task 5** (LHAAP-12) – PS stated that the 2018 Annual Remedial Action Operation [RA (O)] Report was finalized. RMZ then asked if the new well at LHAAP-12 would be installed prior to the next sampling event.
- **Task 6** (LHAAP-16) – KN stated that the 1st Quarter 2019 GWTP Report that was just delivered to the Regulators contains the groundwater sample results from select wells.
- **Task 7** (LHAAP-17) – PS stated that no documents are currently in process for LHAAP-17.
- **Task 9** (LHAAP-37) – PS stated that the validated data from the May 2019 sampling event is provided with the data for this July 2019 MMM. AW stated that the data still shows a blip to the north. KN stated that the Year 2 Quarter 4 RA-O sampling event is planned for early August 2019. KN clarified that the priority, however, is the other work PS discussed, and so it is possible that the sampling events may be pushed until later in the month.
- **Task 10** (LHAAP-46) – PS stated that the Year 5 2nd Semi-Annual RA-O event is planned for August 2019. RMZ asked about the operating properly and successfully (OPS) determination. PS stated that a monitoring natural attenuation (MNA) evaluation will be completed in conjunction with the Year 5 RA-O Report, using all the prior data including the August 2019 data. PS stated that he thought an Army Draft could be provided in October 2019 and then the OPS report could be provided after that. SW clarified that the validated data was due in October 2019 and not the Army Draft report. RMZ stated to AP that the OPS determination was not a statutory requirement but is a transfer requirement for USFWS. RMZ continued that the EPA typically reviews the OPS determination. PS further discussed the monitoring well that has tree roots down into the screen interval, which is surprising since this is approximately 20 feet below the ground surface (bgs). PS explained that the driller has indicated that there is no easy way to remove the tree roots without damaging the well. PS stated that the best option is to install another well within 5 feet of this well. AS asked if the well could be "roto-rooted." SW stated that the concern is damaging the screen. PS stated that the groundwater is not higher than the roots. KN asked if the well could be replaced because that seemed like the best alternative for the issue. AP stated that it seemed reasonable but that she wanted to look at the monitoring well logs.
- **Task 11** (LHAAP-50) – PS stated that Year 5 2nd semi-annual RA-O sampling event was completed in May and the validated data was presented for this July 2019 MMM meeting. PS stated that TCEQ approved the Draft Final Explanation of Significant Difference (ESD) for a contingency remedy. The EPA issued an email on July 15, 2019 indicated no comment on the Draft Final ESD. PS stated that the Army Draft RD/RAWP was under Army review. PS stated that the new monitoring well is being installed next week and the RD/RAWP might be modified based upon the data from the new well. PS stated that the monitoring well will be sampled after it is installed and then any necessary revisions to the RD/RAWP will be completed.
- **Task 12** (LHAAP-58) – KN stated that the LHAAP-58 sampling was completed in June 2019, and that validated data was included with the July 2019 validated data. KN stated that the Year 5 RA(O)Report is being prepared to evaluate the first four quarters of the western plume remedy implementation as well as the continued performance of the eastern plume remedy. KN stated that the Year 5 RA(O) Report was planned for submittal to the Regulators in October 2019. The next groundwater sampling event is the quarterly groundwater monitoring for the western plume in September 2019. KN clarified that the

western plume has another full year of quarterly groundwater monitoring prior to evaluation for OPS.

- **Task 13** (LHAAP-67) – PS stated that the Year 5 2nd semi-annual RA-O validated data was included in the package for this July 2019 MMM.
- **Task 14** (LHAAP-001-R and –003-R) - KN stated that no documents are in process but that the land use control (LUC) inspections were planned for July 2019.
- **Task 16** (GWTP) **–** KN stated that the Regulator comments were received on the 4th Quarter 2018 GWTP report, which are discussed in the 1st Quarter 2019 GWTP Report that was just submitted. KN indicated that the 2nd Quarter 2019 GWTP was being prepared and is anticipated for delivery to the Regulators in October 2019.
- **Task 17** (LHAAP-18/24) – KN stated that two of the monitoring wells from LHAAP-18/24 still need to be sampled and that the hope was that the samples would be collected the following week. KN explained that one monitoring well also had to be sampled in July 2019 due to the wet conditions. AS asked if there was any issues with the wells being sampled over such a long period of time, KN stated that sampling of wells over a month after a majority of the monitoring wells were sampled was not ideal but the only other option was to not sample the wells. KN stated that discussion of the effects of sampling at different times would be discussed in the report. KN also stated that data is compared to historic data and could identify if there was a significant variances. KN stated that the report will likely be prepared with or without this data, at least for the Army Draft. KN stated that the LHAAP-18/24 data will be included the 2nd Quarter 2019 GWTP Report, which is due to the Regulators in October 2019.
- **Task 18** (Surface Water) – KN stated that surface water was collected for analysis in July 2019.
- **Task 19** (LUC Management) - RMZ stated that there will be the three RDs (LHAAP-03, LHAAP-04, and LHAAP-17) that need to be included in the update to the LUC Management Plan. SW asked what the cutoff date was to which RMZ stated September 30, 2019. RMZ stated that the LUC portion of the RD is what goes into the LUC Management Plan. RMZ stated that nothing changed on LHAAP-50 for the LUC for the site. RMZ noted that the recordation for LHAAP-16 will need to eventually be included. RMZ stated that even if LHAAP-16 gets re-surveyed that the new LUC boundary would not go into the 2019 revision to the LUC Management Plan due to timing for completion likely after the cutoff date for the 2019 LUC Management Plan update. RMZ stated that LHAAP-03 did not have a recordation so it is just the RD (LUC portion).
- **Administrative Record (AR) –** SW said that the December 2018 AR hard copies were placed into the site trailer before the meeting. SW said that the list of documents for the AR is being reviewed for the 1st quarter. SW stated that the April through June document list is also being prepared. RMZ stated that the letters for the draft submittal has to be included in the AR for primary documents.

Update on other DERP Sites

- **LHAAP 18/24** – AW explained that the Final Proposed Plan (PP) for LHAAP-18/24 will be placed into the AR. AW stated that he could provide the letter for the draft PP, if needed, for the AR. SW stated that the PP is in the January through March 2019 list and that she would double check if she had the letter transmitting the draft. AW stated that the Record of Decision (ROD) is being prepared for submittal to the Regulators on September 6, 2019.
- **LHAAP-29** – AW stated that the LHAAP-29 PP is ready for AR. Regulator comments on the ROD have been addressed and the Draft Final ROD was issued to the Regulators. RMZ stated that the Army had noticed text was added that should not have been included on one

of the pages with the applicable or relevant and appropriate requirements (ARARs). AW stated that a change page would be issued. AP stated that an email with the change page would be sufficient.

- **LHAAP-47** – AW stated that the Post-Screening Investigation (PSI) Report is ready for the AR. AW stated that the EPA had three comments on the Addendum to the PSI Report, which was submitted on July 1, 2019. AP stated that the EPA comments cover the TCEQ comments. KB stated that Rich Mayer (not present) had mentioned an issue with LHAAP-47. RMZ stated that she felt the issue was the one she called him about and that it might be resolved. RMZ stated that there is one replacement monitoring well with 120,000 parts per billion (ppb) of trichloroethylene (TCE), which may be indicative of dense non-aqueous phase liquid (DNAPL). RMZ stated that only having one point with those levels does not tell us much about how contaminated the aquifer is with TCE. KB suggested understanding the distribution of the contamination along the screen length would be helpful and suggested using passive samplers. PS then explained that the bioremediation process is slow, and high TCE concentrations can be toxic to bacteria. Bioremediation is known to release chlorinated solvents from the soil matrix, allowing contamination to be treated by the bacteria over time, but the process is very slow. RMZ stated that the Army and Regulators don't want to sign a ROD knowing that the remedy will not work, to which AP concurred. AP proposed that the Army write a letter stating that the recently collected data changes the site information and may require that the remedy selected previously also be changed. RMZ asked if there was a quicker way to complete the remedy change other than completing a new PP. PS asked how deep the contamination was located, to which RMZ stated that the contamination was 20 to 30 feet bgs. AW stated that there are borings in the area that were clean that could be used to help bound the contamination. KN asked if the Army could dig the area to which RMZ said excavation would be her preference and that excavation was an element of the selected remedy, but for perchlorate, not TCE. PS cautioned that the contamination will likely rebound with just bioremediation based upon his experience. AS suggested an interim removal action and continue with the current ROD since the issue is limited to one area. Options under CERCLA were discussed for LHAAP-47, but the main issued identified by RMZ is whether the EPA will approve a change to the enforceable schedule. AP pointed out that this is a site held up by the dispute and that the data represents a change condition for LHAAP-47. AS asked if the site would need to be dewatered. RMZ stated that the groundwater was at the clay layer. AP stated that there is no measurable groundwater in many of the wells, which is why the investigation was completed.
- **FYR** – AW stated that the FYR was ready for the AR with the insertion of the errata.
- **Other items -** AP asked about the underground injection control (UIC) submittals. SW explained that the LHAAP-50 submittal is awaiting the additional groundwater sampled to determine if there will be any change in the remedial design. However, the LHAAP-04 UIC was under Army review and will be submitted to TCEQ soon. AP clarified that injection field work can begin only 30 days after UIC submittal. This should be factored into the field work planning.

Schedule Next Managers' Meeting
The next MMM will be held on August 22, 2019 at 10:00 am CDT via a conference call.

Meeting concluded at 11:35 am CDT.

ACRONYM LIST
AP April Palmie

APTIM	APTIM Federal Services, LLC
AR	Administrative Record
ARAR	Applicable or relevant and appropriate requirements
AS	Amanda Sherman
AW	Aaron Williams
bgs	below ground surface
Bhate	Bhate Environmental Associates, Inc.
BRAC	Base Realignment and Closure
CDT	Central Daylight Time
DERP	Defense Environmental Restoration Program
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five Year Review
GWTP	Ground Water Treatment Plant
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
MMM	Monthly Managers' Meeting
PBR	Performance-Based Remediation
PP	Proposed Plan
ppb	Parts per billion
PS	Praveen Srivastav
PSI	Post-Screening Investigation
RAB	Restoration Advisory Board
RA(O)	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
RMZ	Rose M. Zeiler
ROD	Record of Decision
RTC	Response to Comment
SW	Susan Watson
TCE	trichloroethylene
TCEQ	Texas Commission on Environmental Quality
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

LHAAP Validated Data Packages for
July 2019 Monthly Manager's Meeting

LHAAP Area	Analytic Method
LHAAP-35B(37)	***Year 2 Quarter 3 Remedial Action Operation Sampling - May 2019*** VOCs (SW8260)
LHAAP-50	***Year 5 Semiannual Remedial Action Operation Sampling Event #2 - May 2019*** VOCs (SW8260) Perchlorate (SW6850)
LHAAP-67	***Year 5 Semiannual Remedial Action Operation Sampling Event #2 - May 2019*** VOCs (SW8260)
GWTP Effluent	***Weekly Perchlorate Sampling – June 2019*** Perchlorate (6850)
GWTP Effluent	***Weekly, Bi-Weekly, and Monthly Sampling – June 2019*** 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 – June 2019*** Metals (6020A) Perchlorate (6850) Hexavalent Chromium (7196A)
LHAAP-58	***Semi-Annual Sampling Event– June 2019*** Anions (9056) VOC (8260C) Total Organic Carbon (415.1) Metabolic Acids (HPLC-METACIDS) Dechlorinating Bacteria (CENSUS) Dissolved Gases (RSK-175) Arsenic (6020A)

LHAAP-37 RA-O Sampling - Year 2, Quarter 3, May 2019

Location Code			35BWW01				35BWW04		35BWW05		35BWW07		35BWW08	
Sample ID			35BWW01-190520		35BWW01-190520-FD		35BWW04-190520		35BWW05-190521		35BWW07-190522		35BWW08-190520	
Sample Date			5/20/2019		5/20/2019		5/20/2019		5/21/2019		5/22/2019		5/20/2019	
Location Description			Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
VOCs														
1,1-Dichloroethene	µg/L	7	< 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	< 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	4.7		1.1		< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	0.58	J	5.5		< 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

Notes:

Blue highlighting indicates concentrations above the MCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

Val Qual - validation qualifier

VOCs - volatile organic compounds

LHAAP-37 RA-O Sampling - Year 2, Quarter 3, May 2019

		Location Code	35BWW09		35BWW10		35BWW11		35BWW12				35BWW13	
		Sample ID	35BWW09-190521		35BWW10-190520		35BWW11-190521		35BWW12-190521		35BWW12-190521-FD		35BWW13-190522	
		Sample Date	5/21/2019		5/20/2019		5/21/2019		5/21/2019		5/21/2019		5/22/2019	
		Location Description	Shallow zone, impacted outside site boundary		Shallow, impacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, unimpacted, crossgradient	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
VOCs														
1,1-Dichloroethene	µg/L	7	5.5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	1.8		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5	41		5.5		< 0.5	U	6.2		5.7		< 0.5	U
Trichloroethene	µg/L	5	20		9.4		< 0.5	U	0.55	J	0.53	J	< 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

Notes:

Blue highlighting indicates concentrations above the MCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

Val Qual - validation qualifier

VOCs - volatile organic compounds

LHAAP-37 RA-O Sampling - Year 2, Quarter 3, May 2019

			Location Code		35BWW14		35BWW15		35BWW16		35BWW17		35BWW18		35BWW19	
			Sample ID		35BWW14-190521		35BWW15-190522		35BWW16-190523		35BWW17-190523		35BWW18-190520		35BWW19-190520	
			Sample Date		5/21/2019		5/22/2019		5/23/2019		5/22/2019		5/20/2019		5/20/2019	
			Location Description		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
VOCs																
1,1-Dichloroethene	µg/L	7	< 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	0.66	J	< 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	7.8		9.5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	110		7.1		3.6		< 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

Notes:

Blue highlighting indicates concentrations above the MCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

Val Qual - validation qualifier

VOCs - volatile organic compounds

LHAAP-37 RA-O Sampling - Year 2, Quarter 3, May 2019

Location Code			35BWW20				35BWW23		35BWW24		35BWW25		35BWW26		LHSMW58	
Sample ID			35BWW20-190522		35BWW20-190522-FD		35BWW23-190521		35BWW24-190522		35BWW25-190522		35BWW26-190520		LHSMW58-190522	
Sample Date			5/22/2019		5/22/2019		5/21/2019		5/22/2019		5/22/2019		5/20/2019		5/22/2019	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
VOCs																
1,1-Dichloroethene	µg/L	7	< 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	< 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	12		12		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	3.6	
Trichloroethene	µg/L	5	2.8		2.9		< 0.5	U	1.1		6.3		< 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

Notes:

Blue highlighting indicates concentrations above the MCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

Val Qual - validation qualifier

VOCs - volatile organic compounds

LHAAP-50 Year 5, Semiannual RA-O Sampling Event #2

		Location Code	50WW05		50WW06		50WW08		50WW09			
		Sample ID	50WW05-190507		50WW06-190506		50WW08-190507		50WW09-190507		50WW09-190507-FD	
		Sample Date	5/7/2019		5/6/2019		5/7/2019		5/7/2019		5/7/2019	
		Location Description	Site 50 - NE, lower shallow, outside site boundary		Site 50 - ENE, outside site boundary		Site 50 - E, upper shallow, inside site boundary		Site 50 - E, lower shallow, inside site boundary		Site 50 - E, lower shallow, inside site boundary	
Parameter	Units	MCL/ PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate												
Perchlorate	µg/L	17	< 2	U	4.3		230		7.2		7.8	
Volatiles												
1,1-Dichloroethene	µg/L	7	1.2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	0.94	J	< 0.5	U	2.1		< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	28		< 0.5	U	20		2.2		2.1	
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	0.75	J	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	110		1.4		210		16		16	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL/PCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

RA-O - Remedial Action Operation

Val Qual - validation qualifier

LHAAP-50 Year 5, Semiannual RA-O Sampling Event #2

		Location Code	50WW10		50WW11		50WW12				50WW13	
		Sample ID	50WW10-190507		50WW11-190506		50WW12-190516		50WW12-190516-FD		50WW13-190506	
		Sample Date	5/7/2019		5/6/2019		5/16/2019		5/16/2019		5/6/2019	
		Location Description	Site 50 - E, intermediate, inside site boundary		Site 50 - ENE, upper shallow, outside site boundary		Site 50 - ENE, upper shallow, outside site boundary		Site 50 - ENE, upper shallow, outside site boundary		Site 50 - E, upper shallow, outside site boundary	
Parameter	Units	MCL/ PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate												
Perchlorate	µg/L	17	< 2	U	450		65,000		76,000		160	
Volatiles												
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 0.5	U	2.2		2.2		0.57	J
1,2-Dichloroethane	µg/L	5	< 0.5	U	0.75	J	1.5		1.5		1.3	
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	3.1		< 0.5	U	< 0.5	U	12	
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	95		170		170		250	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL/PCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

RA-O - Remedial Action Operation

Val Qual - validation qualifier

LHAAP-50 Year 5, Semiannual RA-O Sampling Event #2

		Location Code	50WW14		50WW15		50WW16		50WW17		50WW18	
		Sample ID	50WW14-190506		50WW15-190523		50WW16-190506		50WW17-190516		50WW18-190516	
		Sample Date	5/6/2019		5/23/2019		5/6/2019		5/16/2019		5/16/2019	
		Location Description	Site 50 - E, lower shallow, outside site boundary, along S. Crockett Ave		Site 50 - NNE, upper shallow, outside site boundary, along Goose Prairie Creek bridge		Site 50 - NE, upper shallow, outside site boundary, along Goose Prairie Creek		Site 50 - NE, fully penetrating shallow, outside site boundary, near Goose Prairie Creek		Site 50 - NE, upper shallow, outside site boundary, along Goose Prairie Creek	
Parameter	Units	MCL/ PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate												
Perchlorate	µg/L	17	< 2	U	< 2	U	< 2	U	< 2	U	< 2	U
Volatiles												
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 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	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	1.9		2.9		< 0.5	U	< 0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	0.87	J	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	27		2.3		0.61	J	< 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

Notes:

Blue highlighting indicates concentrations above the MCL/PCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

RA-O - Remedial Action Operation

Val Qual - validation qualifier

LHAAP-50 Year 5, Semiannual RA-O Sampling Event #2

		Location Code	50WW21		50WW22		50WW23		50WW24		50WW27	
		Sample ID	50WW21-190516		50WW22-190506		50WW23-190507		50WW24-190507		50WW27-190523	
		Sample Date	5/16/2019		5/6/2019		5/7/2019		5/7/2019		5/23/2019	
		Location Description	Site 50 - E, upper shallow, outside site boundary, east side of S. Crockett Ave		Site 50 - SE, upper shallow, outside site boundary		Site 50 - E, upper shallow, outside site boundary		Site 50 - ENE, upper shallow, outside site boundary		Site 50 - N, upper shallow, outside site boundary, east of S. Crockett Ave	
Parameter	Units	MCL/ PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate												
Perchlorate	µg/L	17	< 2	U	< 2	U	< 2	U	< 2	U	< 2	U
Volatiles												
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 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	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	0.74	J
Tetrachloroethene	µg/L	5	< 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
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL/PCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

RA-O - Remedial Action Operation

Val Qual - validation qualifier

LHAAP-67 Year 5, Semiannual RA-O Sampling Event #2

			Location Code	67WW01		67WW02		67WW05		67WW07		67WW08		67WW09	
			Sample ID	67WW01-190503		67WW02-190501		67WW05-190502		67WW07-190503		67WW08-190501		67WW09-190503	
			Sample Date	5/3/2019		5/1/2019		5/2/2019		5/3/2019		5/1/2019		5/3/2019	
			Location Description	Site 67-Central, within site boundary		Site 67 - NW, within site boundary		Site 67 - WNW, outside site boundary		Site 67 - E, outside site boundary		Site 67-S, within site boundary		Site 67-S outside site boundary	
Parameter	Units	MCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Volatiles															
1,1,1-Trichloroethane	µg/L	200		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloroethane	µg/L	5		1.4		1.2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		280		180		< 0.5	U	< 0.5	U	110		< 0.5	U
1,2-Dichloroethane	µg/L	5		21		4.7		< 0.5	U	< 0.5	U	5.1		< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		0.86	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5		1.3		0.87	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		0.92	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

RA-O - Remedial Action Operation

Val Qual - validation qualifier

LHAAP-67 Year 5, Semiannual RA-O Sampling Event #2

			Location Code	67WW09A		67WW10		67WW11		67WW12		67WW13		
			Sample ID	67WW09A-190502		67WW10-190502		67WW11-190501		67WW12-190502		67WW13-190501		67WW13-190501-FD
			Sample Date	5/2/2019		5/2/2019		5/1/2019		5/2/2019		5/1/2019		5/1/2019
			Location Description	Site 67 - S outside site boundary		Site 67 - SE, outside site boundary		Site 67- SW, outside site boundary		Site 67 - NE, within site boundary		Site 67 - NE, within site boundary		Site 67 - NE, within site boundary
Parameter	Units	MCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Volatiles															
1,1,1-Trichloroethane	µg/L	200		< 0.5	U	< 0.5	U	< 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	< 0.5	U	3.9		3.8	
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	2.8		2.1		200		160	
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	24		23	
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	0.94	J	0.81	J
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.1		1	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

RA-O - Remedial Action Operation

Val Qual - validation qualifier

LHAAP-67 Year 5, Semiannual RA-O Sampling Event #2

			Location Code	67WW14		67WW15		67WW16I	
			Sample ID	67WW14-190502		67WW15-190503		67WW16I-190501	
			Sample Date	5/2/2019		5/3/2019		5/1/2019	
			Location Description	Site 67 - SW, outside the site boundary beside Ignatius Ave		67-W, outside site boundary		67 - S, within site boundary	
Parameter	Units	MCL		Result	Val Qual	Result	Val Qual	Result	Val Qual
Volatiles									
1,1,1-Trichloroethane	µg/L	200		< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	5.4		< 0.5	U
1,1-Dichloroethene	µg/L	7		5.3		330		< 0.5	U
1,2-Dichloroethane	µg/L	5		1.8		22		< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	1.3		< 0.5	U
Trichloroethene	µg/L	5		< 0.5	U	1.1		< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

FD - field duplicate

MCL - Maximum Contaminant Limit

RA-O - Remedial Action Operation

Val Qual - validation qualifier

GWTP Weekly/Effluent Perchlorate Sampling - June 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_060419_BIX 6/4/19	LH18/24-SP650_060419_BIX 6/4/19	LH18/24-SP650_061219_BIX 6/12/19
Location Description			Collected from a spigot on the discharge of effluent TK-650.		
			Monthly EFF	Weekly	Weekly
Perchlorate (6850)					
Perchlorate	µg/L	589	< 2.0 U	< 2.0 U	< 2.0 U

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

BIX - before ion exchange

GWTP Weekly Sampling - June 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_060419 6/4/19	LH18/24-SP650_061219 6/12/19
Location Description			**GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.**	
Ammonia as N (350.3)				
Ammonia as N	mg/L	NV	**7.5**	**10**
Ortho-Phosphate (365.3)				
Ortho-Phosphate	mg/L	NV	**2.11**	**2.37**
Organic Carbon (415.1)				
Total Organic Carbon (TOC)	mg/L	NV	**2.21**	**2.04**

mg/L - milligrams per liter

NV - No Value

GWTP Bi-Weekly Sampling - June 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_061219 6/12/19
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	**0.46 J**
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 1.0 UJ
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	**0.64 J**
Vinyl chloride	µg/L	72	< 0.5 U
Anions (9056)			
Chloride	mg/L	NV	**362**
Sulfate	mg/L	NV	**33.4**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

NV - No Value

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

UJ - estimated non-detect due to quality control issues

GWTP Monthly Effluent Sampling - June 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_060419 6/4/19
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled monthly**
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	< 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	**0.76 J**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Barium	mg/L	2	**0.175**
Lead	mg/L	0.0046	< 0.00100 U
Selenium	mg/L	0.012	< 0.00250 UJ
Silver	mg/L	0.003	< 0.000500 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	**6.2**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

UJ - estimated non-detect due to quality control issues

GWTP Monthly Influent Sampling - June 2019

Location ID: Sample Date:	Units	LH18/24-SP140_060419 6/4/19
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.**
Metals (6020A)		
Selenium	mg/L	< 0.00250 U
Silver	mg/L	< 0.000500 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**6,800**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

LHAAP-58 Remedial Action Operation Validated Data - June 2019

Location ID: / Sample Date:	Units	MCL/MSC	03WW01_060419 6/4/19	35AWW01_061019 6/10/19	35AWW05_061019 6/10/19	35AWW06_060419 6/4/19	35AWW08_060419 6/4/19	35AWW09_060319 6/3/19	35AWW10_060419 6/4/19	35AWW10_060419_a 6/4/19	35AWW11_060319 6/3/19	35AWW12_061019 6/10/19	35AWW12_061019a 6/10/19	35AWW13_060719 6/7/19	35AWW14_060719 6/7/19	35AWW15_060719 6/7/19
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, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - ESE, inside site boundary. Duplicate	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, outside site boundary. Field duplicate.	Site 58 - SE, outside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary.
Location Depth			Shallow	Intermediate	Intermediate	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow		Shallow	Shallow
Lab Package			HS19060185	HS19060573	HS19060573	HS19060185	HS19060185	HS19060123	HS19060185	HS19060185	HS19060123	HS19060573	HS19060573	HS19060461	HS19060461	HS19060461
Total Organic Carbon (415.1/SM5310C)																
Total Organic Carbon	mg/L	NV	**66.1**	NA	NA	**331**	**306**	**3.96**	**4.69**	**4.11**	**94.6**	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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 2.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	5	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	10000	< 2.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**11**	< 0.5 U
1,1-Dichloroethene	µg/L	7	< 2.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**12**	< 0.5 U
1,1-Dichloropropene	µg/L	2.9	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	5100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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-Dichloropropane	µg/L	5	< 2.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	5100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	3100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	61000	< 5.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**70**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Chlorotoluene	µg/L	2000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	6100	< 5.0 U	< 1.0 U	< 1.0 U	**1.8 J**	< 5.0 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	2000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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-Isopropyltoluene	µg/L	10000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	8200	< 5.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 5.0 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
Acetone	µg/L	92000	< 5.0 U	< 1.0 U	< 1.0 U	**220**	13 UB	< 1.0 U	< 1.0 U	2.7 UB	**77**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Benzene	µg/L	5	< 2.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromobenzene	µg/L	2000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	4100	< 2.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	10000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 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
Carbon tetrachloride	µg/L	5	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	41000	< 2.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	1000	< 2.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	**41**	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**5.2**	< 0.5 U
cis-1,3-Dichloropropene	µg/L	5.3	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	20000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 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
Isopropylbenzene	µg/L	10000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	10000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 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
Methylene chloride	µg/L	5	< 5.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 5.0 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
n-Butylbenzene	µg/L	4100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	4100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Naphthalene	µg/L	2000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	10000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	4100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	4100	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	**3.2 J**	< 0.5 U	< 0.5 U	< 0.5 U	**4.8 J**	**130**	< 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	1000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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	< 2.5 U	< 0.5 U	< 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	**2.9 J**	< 0.5 U	< 0.5 U	< 0.5 U	**13**	**38**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**12**	< 0.5 U
Trichlorofluoromethane	µg/L	31000	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 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		2	**11**	< 0.5 UJ	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	NA	NA	**120**	**20**	< 1.0 U	< 1.0 U	< 1.0 U	**110**	NA	NA	NA	NA	NA
Butyric Acid	mg/L	NV	NA	NA	NA	**7.7 J**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	**3.1 J**	NA	NA	NA	NA	NA
Lactic Acid	mg/L	NV	NA	NA	NA	< 2.5 U	12	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	NA	NA	NA	NA
Propionic Acid	mg/L	51	NA	NA	NA	< 2.5 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**170**	NA	NA	NA	NA	NA
Pyruvic Acid	mg/L	NV	NA	NA	NA	< 1.3 U	< 0.5 U	< 0.5 U	< 0.50 U	< 0.50 U	< 0.5 U	NA	NA	NA	NA	NA
ICP-MS Metals (6020A)																
Arsenic	mg/L	0.01	**0.0133**	NA	NA	NA	**0.116**	**0.00308**	NA	NA	NA	NA	NA	NA	NA	NA
Anions (9056A)																
Chloride	mg/L	NV	**809**	NA	NA	**964**	**2510**	**1340**	**6.59**	**6.56**	**1920**	NA	NA	NA	NA	NA
Nitrate	mg/L	10	**0.196 J**	NA	NA	**0.180 J**	**0.219 J**	< 0.500 U	**0.0497 J**	**0.0480 J**	< 0.500 U	NA	NA	NA	NA	NA
Sulfate	mg/L	NV	**239**	NA	NA	**2.08 J**	**1.42 J**	**908**	**68.4**	**68.2**	**210**	NA	NA	NA	NA	NA

LHAAP-58 Remedial Action Operation Validated Data - June 2019

Location ID: / Sample Date:	Units	MCL/MSC	03WW01_060419 6/4/19	35AWW01_061019 6/10/19	35AWW05_061019 6/10/19	35AWW06_060419 6/4/19	35AWW08_060419 6/4/19	35AWW09_060319 6/3/19	35AWW10_060419 6/4/19	35AWW10_060419_a 6/4/19	35AWW11_060319 6/3/19	35AWW12_061019 6/10/19	35AWW12_061019a 6/10/19	35AWW13_060719 6/7/19	35AWW14_060719 6/7/19	35AWW15_060719 6/7/19
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, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - ESE, inside site boundary. Duplicate	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, outside site boundary. Field duplicate.	Site 58 - SE, outside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary.
Location Depth			Shallow	Intermediate	Intermediate	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow		Shallow	Shallow
Dissolved Gases (RSK-175)																
Carbon Dioxide	µg/L	NV	**520,000**	NA	NA	**750,000**	**260,000**	**620,000**	**670,000**	**620,000**	**750,000**	NA	NA	NA	NA	NA
Ethane	µg/L	NV	< 0.47 U	NA	NA	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	NA	NA	NA	NA	NA
Ethene	µg/L	NV	**1.6**	NA	NA	< 0.55 U	**4.1**	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	NA	NA	NA	NA	NA
Methane	µg/L	NV	**2,900**	NA	NA	**1,500**	**3,000**	**2**	< 1.0 U	< 1.0 U	**590**	NA	NA	NA	NA	NA
Dechlorinating Bacteria																
BAV1 Vinyl Chloride Reductase	cells/mL	NV	< 0.50 U	NA	NA	**0.80 J**	< 3.0 U	< 0.7 U	< 0.5 U	NA	< 0.5 U	NA	NA	NA	NA	NA
Dehalobacter spp.	cells/mL	NV	**292**	NA	NA	**159**	**139000**	**73.3**	**261**	NA	**2570000**	NA	NA	NA	NA	NA
Dehalococoides	cells/mL	NV	**6040**	NA	NA	**26.8**	**3790000**	**5.8**	**96.6**	NA	**2100**	NA	NA	NA	NA	NA
tceA Reductase	cells/mL	NV	**2.1**	NA	NA	< 1.6 U	**480000**	< 0.7 U	**6.5**	NA	< 0.5 U	NA	NA	NA	NA	NA
Vinyl Chloride Reductase	cells/mL	NV	**2020**	NA	NA	**0.90 J**	**265000**	< 0.7 U	**6.4**	NA	**174**	NA	NA	NA	NA	NA

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

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.

NV - No Value

UB - considered an artifact of blank contamination

LHAAP-58 Remedial Action Operation Validated Data - June 2019

Location ID: / Sample Date:	Units	MCL/MSC	35AWW16_061019 6/10/19	35AWW17_061019 6/10/19	35AWW18_060419 6/4/19	35AWW19_060319 6/3/19	35AWW20_060419 6/4/19	34AWW21_061019 6/10/19	34AWW21_061019_a 6/10/19	35AWW22_061019 6/10/19	35AWW23_060319 6/3/198	35AWW24_060319 6/3/19	LHSMW06_060719 6/7/19	LHSMW07_060319 6/3/19	35ASW03_060719 6/7/19
Location Description			Site 58 - SW, outside site boundary, near Building 744-A.	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - S, outside site boundary.	Site 58 - SW, inside site boundary.	Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ESE, outside site boundary, beside Building 725. Field Duplicate	Site 58 - ENE, outside site boundary.	Site 58 - SW, outside site boundary.	Downgradient Western Plume well	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow		Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Lab Package			HS19060573	HS19060573	HS19060185	HS19060123	HS19060185	HS19060573	HS19060573	HS19060573	HS19060123	HS19060123	HS19060461	HS19060123	HS19060461
Total Organic Carbon (415.1/SM5310C)															
Total Organic Carbon	mg/L	NV	NA	NA	NA	**1.88**	**12.9**	NA	NA	NA	**1360**	**1.55 J**	NA	**4.13**	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	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**45**	< 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	10000	**1.4**	< 0.5 U	**0.76 J**	**0.65 J**	**270**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**2.2**	**9.6**	< 0.5 U
1,1-Dichloroethene	µg/L	7	< 0.5 U	< 0.5 U	**3.5**	**2.6**	**1800**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**4.3**	**16**	< 0.5 U
1,1-Dichloropropene	µg/L	2.9	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	5100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**13**	< 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	< 0.5 U	< 0.5 U	< 0.5 U	**1.1**	**21**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**0.62 J**	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	5100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	3100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	61000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**220**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Chlorotoluene	µg/L	2000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	6100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 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	2000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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-Isopropyltoluene	µg/L	10000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	8200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 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
Acetone	µg/L	92000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**210**	< 2.0 U	< 1.0 U	**3.4**	< 2.0 U
Benzene	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**4.4 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
Bromobenzene	µg/L	2000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	10000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 5.0 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	41000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**0.75 J**	< 0.5 U	< 0.5 U
Chloroform	µg/L	1000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**79**	< 0.5 U	< 0.5 U	< 0.5 U	**4.3**	< 0.5 U	**29**	**0.70 J**	< 0.5 U
cis-1,3-Dichloropropene	µg/L	5.3	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	20000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 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
Isopropylbenzene	µg/L	10000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	10000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 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
Methylene chloride	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 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
n-Butylbenzene	µg/L	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Naphthalene	µg/L	2000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	10000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	< 2.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**1.4**	< 0.5 U	< 0.5 U
Toluene	µg/L	1000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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	**13**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**0.46 J**	< 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	< 2.5 U	< 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	**230**	< 0.5 U	< 0.5 U	< 0.5 U	**1.8**	< 0.5 U	**7.5**	**1.8**	< 0.5 U
Trichlorofluoromethane	µg/L	31000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U	< 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		2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**140**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**1.2**	< 0.5 U	< 0.5 U
Volatile Fatty Acids (HPLC-METACIDS)															
Acetic Acid	mg/L	NV	NA	NA	NA	< 1.0 U	< 1.0 U	NA	NA	NA	**430**	< 1.0 U	NA	< 1.0 U	NA
Butyric Acid	mg/L	NV	NA	NA	NA	< 2.0 U	< 2.0 U	NA	NA	NA	**370 J**	< 2.0 U	NA	< 2.0 U	NA
Lactic Acid	mg/L	NV	NA	NA	NA	< 1.0 U	< 1.0 U	NA	NA	NA	< 10 U	< 1.0 U	NA	< 1.0 U	NA
Propionic Acid	mg/L	51	NA	NA	NA	< 1.0 U	< 1.0 U	NA	NA	NA	**1000**	< 1.0 U	NA	< 1.0 U	NA
Pyruvic Acid	mg/L	NV	NA	NA	NA	< 0.50 U	< 0.50 U	NA	NA	NA	< 5.0 U	< 0.50 U	NA	< 0.50 U	NA
ICP-MS Metals (6020A)															
Arsenic	mg/L	0.01	NA	NA	NA	NA	**0.00194 J**	NA	NA	NA	NA	NA	**0.00123 J**	NA	NA
Anions (9056A)															
Chloride	mg/L	NV	NA	NA	NA	**1080**	**1180**	NA	NA	NA	**732**	**106**	NA	**1,780**	NA
Nitrate	mg/L	10	NA	NA	NA	< 0.500 U	**0.194 J**	NA	NA	NA	< 0.500 U	< 0.100 U	NA	< 0.500 U	NA
Sulfate	mg/L	NV	NA	NA	NA	**966**	**1240**	NA	NA	NA	**14.1**	**74.9**	NA	**2,470**	NA

LHAAP-58 Remedial Action Operation Validated Data - June 2019

Location ID: / Sample Date:	Units	MCL/MSC	35AWW16_061019 6/10/19	35AWW17_061019 6/10/19	35AWW18_060419 6/4/19	35AWW19_060319 6/3/19	35AWW20_060419 6/4/19	34AWW21_061019 6/10/19	34AWW21_061019_a 6/10/19	35AWW22_061019 6/10/19	35AWW23_060319 6/3/198	35AWW24_060319 6/3/19	LHSMW06_060719 6/7/19	LHSMW07_060319 6/3/19	35ASW03_060719 6/7/19
Location Description			Site 58 - SW, outside site boundary, near Building 744-A.	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - S, outside site boundary.	Site 58 - SW, inside site boundary.	Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ESE, outside site boundary, beside Building 725. Field Duplicate	Site 58 - ENE, outside site boundary.	Site 58 - SW, outside site boundary.	Downgradient Western Plume well	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow		Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Dissolved Gases (RSK-175)															
Carbon Dioxide	µg/L	NV	NA	NA	NA	**560,000**	**730,000**	NA	NA	NA	**750,000**	**530,000**	NA	**660,000**	NA
Ethane	µg/L	NV	NA	NA	NA	< 0.47 U	**0.19 J**	NA	NA	NA	< 0.47 U	< 0.47 U	NA	**0.20**	NA
Ethene	µg/L	NV	NA	NA	NA	< 0.55 U	**1.3**	NA	NA	NA	< 0.55 U	< 0.55 U	NA	**3.9**	NA
Methane	µg/L	NV	NA	NA	NA	**1.4**	**920**	NA	NA	NA	**1,300**	**4.2**	NA	**78**	NA
Dechlorinating Bacteria															
BAV1 Vinyl Chloride Reductase	cells/mL	NV	NA	NA	NA	< 0.50 U	**2370**	NA	NA	NA	**2.5 J**	< 0.5 U	NA	< 1.0 U	NA
Dehalobacter spp.	cells/mL	NV	NA	NA	NA	**62700**	< 21.7 U	NA	NA	NA	< 38.5 U	**24.7**	NA	< 9.5 U	NA
Dehalococoides	cells/mL	NV	NA	NA	NA	**3.30**	**15500**	NA	NA	NA	**652**	**0.90**	NA	**7580**	NA
tceA Reductase	cells/mL	NV	NA	NA	NA	< 0.50 U	< 2.20 U	NA	NA	NA	< 3.8 U	< 0.5 U	NA	< 1.0 U	NA
Vinyl Chloride Reductase	cells/mL	NV	NA	NA	NA	**0.10 J**	< 2.20 U	NA	NA	NA	**72.7**	< 0.5 U	NA	**1620.0**	NA

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: Between the method detection limit and reporting limit and/or due to disc

UJ - The analyte was not detected; however, the result is estimated due to discrepancies

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered an artifact of blank contamination

Subject:	**Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**
Location of Meeting:	**Karnack Community Center, Karnack, Texas**
Date of Meeting:	**21 August 2019– 2:00PM Central Daylight Time (CDT)**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
EPA:	Rich Mayer (RM) and Dorelle Harrison
TCEQ:	April Palmie (AP)
USACE:	Aaron Williams (AW)
AEC:	Amanda Sherman
USGS:	Kent Becher (KB)
Bhate:	Kim Nemmers (KN)
USFWS:	Paul Bruckwicki (PB)
APTIM:	Praveen Srivastav (PS) and Bill Foss (BF)

Action Items

Bhate/APTIM: KN stated that the proposed subset of wells for baseline sampling at LHAAP-16 had been discussed with the Army and that the proposed subset would be provided to the TCEQ and EPA by the end of the week for comment.

KN stated that the water line to extraction well 18WW17 repairs had not been scheduled. KN indicated that the Regulators would be notified once the repairs were scheduled.

Defense Environmental Restoration Program (DERP) Performance Based Remediation (PBR) Update

KN stated the groundwater treatment plant (GWTP) is operating properly. KN stated that the repairs to the conveyance lines at LHAAP-18/24 had resulted in improvements in the difference between the influent and effluent readings for the GWTP based upon the July 2019 evaluation of flow readings. KN also stated that the effluent started to be discharged to the INF pond as of August 20, 2019. KN explained that the effluent is going through the Fluidized Bed Reactor (FBR) and then the ion exchange vessels before discharging to the pond.

AW stated that the transformer was delivered and was to be tested on Wednesday, August 21, 2019. It is expected to be fully operational on Thursday, August 22, 2019. RM asked if the transformer had a warranty on it. AW confirmed that the transformer has a one year warranty. AP asked if there was additional surge protection. AW responded that the transformer should be able to withstand a power surge from lightning strike or storm.

PS stated that monitoring wells were installed at LHAAP-16, -12, -50 and -67. PS stated that the monitoring well at LHAAP-46 needs to be rehabilitated, which is planned for the next Tuesday, August 27, 2019. PS stated that the new wells have been surveyed. PS stated that the groundwater samples have been collected from new wells at LHAAP-16 and LHAAP-50, and data is expected by the end of next week. PS stated that LHAAP-17 is being excavated with mobilization on Monday, August 19, 2019. PS stated that the first loads of soil from LHAAP-17 went off on August 21, 2019. BF stated that 10 total loads were expected to go offsite based upon the turnaround time for each truck of 3.25 hours. PS stated that the plan was to increase to six trucks running the next day (Thursday, August 22, 2019). RMZ asked about the capacity of each truck. BF stated that the trucks are about 18 cubic yards each. KN stated that work was planned for Saturdays also. PS

stated that the landfill is open for part of a day on Saturdays. KN stated that the excavation is starting on the outside of the site. BF stated that the area being excavated is along the western edge of Area H and the excavation is working inwards. AP stated that the daily reports have been helpful.

KN asked everyone to refer to the Document and Issues Tracking Table dated August 21, 2019.

- **Task 1** (Project Management) -KN stated that concurrence/comments were received by the TCEQ on the MMM minutes and the Restoration Advisory Board (RAB) minutes. RM stated the DH and KB would review and that he would provide concurrence/comments.
- **Task 3** (LHAAP-03) – PS stated that there are no current documents. BF stated that the plan is to mark the areas to excavate at LHAAP-03, following removal at LHAAP-17.
- **Task 4** (LHAAP-04) – PS stated that there are no current documents.
- **Task 5** (LHAAP-12) – PS stated that the monitoring well was installed and developed in August 2019, and that the new monitoring well would be sampled in December 2019 during the annual RA-O event.
- **Task 6** (LHAAP-16) – PS stated that injections will begin mid-September and is likely to occur the week of September 23, 2019. PS stated that pre-injection, baseline sampling will be completed prior to the injections and following two weeks of extraction. KN stated that once power is restored, the system at LHAAP-16 will be assessed to determine if or what repairs are needed. Repairs to the extraction system at LHAAP-16 could push the schedule out. KN stated that the requirements for repairs should be known by Friday.
- **Task 7** (LHAAP-17) – PS stated that no documents are currently in progress for LHAAP-17. PS explained that even the area on the northern eastern end of the site is dried up.
- **Task 9** (LHAAP-37) – PS stated that the Year 2, Quarter 4 sampling was completed in August 2019.
- **Task 10** (LHAAP-46) – PS stated that the Year 5 2nd Semi-Annual RA-O event was completed in August 2019. PS stated that the monitoring well rehabilitation/ replacement is planned for Tuesday, 8/27/19. If this well can be sampled, PS explained that the data will be included in the Year 5 2nd Semi-Annual sampling event and in the Year 5 Annual RA-O Report.
- **Task 11** (LHAAP-50) – PS stated that the annual report will be prepared with the last sampling event that occurred in May 2019. PS stated that the new monitoring well had been installed, developed and sampled on 8/15/19. PS explained that the results were due by Friday based upon a 5-day turnaround time. The results will be evaluated to determine if changes to the Contingency RD/RAWP were needed. PS asked RM if there was an update on the EPA's signature of the ESD. RM stated that he would find out the status of the ESD signatures.
- **Task 12** (LHAAP-58) – KN stated that the Year 5 RA(O)Report was in Bhate's internal quality control (QC) review and was planned for delivery to the Regulators in October 2019.
- **Task 13** (LHAAP-67) – PS stated that the Year 5 Annual RA-O Report will be prepared with the last sampling event that occurred in May 2019. PS stated that the two new monitoring wells had been installed and developed in August 2019. PS stated that the monitoring well would be sampled in November 2019 during the Year 6 Annual sampling event.
- **Task 14** (LHAAP-001-R and –003-R) - KN stated that the Annual LTM Report was in Bhate's internal QC review and was planned for delivery to the Regulators in October 2019.
- **Task 16** (GWTP) **–**KN indicated that the 2nd Quarter 2019 GWTP was under Bhate's internal QC and is anticipated for delivery to the Regulators in October 2019.

- **Task 17** (LHAAP-18/24) – KN stated that the validated data available for LHAAP-18/24 had been provided with the validated data provided for the MMM. KN explained that the data from two monitoring wells that could not be sampled due to physically not being able to access the area. KN stated that those wells were sampled in August 2019.
- **Task 18** (Surface Water) – KN stated that surface water had been sampled in July 2019. KN asked if that data had been shared with the TCEQ and EPA. AP and RM stated that they knew of the surface water sample that had exceeded and understood that the resample did not exceed. KN confirmed this to be correct.
- **Task 19** (LUC Management Plan) – KN stated that the LUC Management Plan Update was being completed, but that the DI tracker did not show it being delivered to the Regulators until December 2019. KN stated that the goal was to beat this date.
- **Administrative Record (AR) –** BF stated that additional documents were received for the April 2019 list but that he didn't have an update on the production of January through March 2019 AR. PS stated that he thought the AR for that time period was being compiled still.

Update on other DERP Sites

- **LHAAP 18/24** – AW explained that the Final Proposed Plan (PP) for LHAAP-18/24 will be placed into the AR. AW stated that Record of Decision (ROD) is with Army's Environmental Law Division (ELD) and Assistant Chief of Staff for Installation Management (ACSIM) and that the Army is working to meet the enforceable schedule date of September 6, 2019.
- **LHAAP-29** – AW stated that the LHAAP-29 PP was placed into the AR. AW stated that the ROD was submitted by the Army for EPA signature and TCEQ concurrence in August 2019.
- **LHAAP-47** – AW stated that the Post-Screening Investigation (PSI) Report will be placed into the latest March 2019 AR. AW stated that the Addendum to the PSI Report, will be included in the follow on update to the AR. AW stated that based upon the results at monitoring well WW25R [replacement monitoring well with 120,000 parts per billion of trichloroethylene] that the ROD is being delayed for additional investigation in the area, which will be included in Addendum Number 2 to the PSI Report. AW pointed out that the ROD submittal data was pushed out in the DI tracker to September 30, 2020.
- **Other items –**
  RMZ asked PB if he knew the transfer status of the Environmental Condition of Property 7 parcels and PB said he had not.
  KB stated that two of the samplers had been removed from the Bayou and Goose Prairie Creek. KB stated that the pipe was left in these locations however.

Schedule Next Managers' Meeting

The next MMM will be held on September 18, 2019 at 1:00 CDT via a conference call. In general, calls will be the third Wednesday of each month.

Meeting concluded at 2:38 pm CDT.

ACRONYM LIST

AP	April Palmie
APTIM	APTIM Federal Services, LLC
AR	Administrative Record
AW	Aaron Williams
BF	Bill Foss

Bhate	Bhate Environmental Associates, Inc.
BRAC	Base Realignment and Closure
CDT	Central Daylight Time
DERP	Defense Environmental Restoration Program
DNAPL	Dense Non-Aqueous Phase Liquid
ELD	Environmental Law Division
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FBR	Fluidized Bed Reactor
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
PP	Proposed Plan
PS	Praveen Srivastav
PSI	Post-Screening Investigation
RAB	Restoration Advisory Board
RA(O)	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
RMZ	Rose M. Zeiler
ROD	Record of Decision
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

LHAAP Data Validated
August MMM Validated Data

LHAAP Surface Water	*Quarterly Perchlorate Sampling - July 2019* Perchlorate (6850)
GWTP Effluent	*Weekly Perchlorate Sampling – July 2019* Perchlorate (6850)
GWTP Effluent	*Weekly, Bi-Weekly, and Monthly Sampling – July 2019* 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 2019* Metals (6020A) Perchlorate (6850) Hexavalent Chromium (7196A)
LHAAP-18/24	*Sampling – June 2019* Perchlorate (6850) Metals (6020A) VOCs (8260C) 1,4- Dioxane (8270D SIM)

LHAAP-Quarterly Surface Water Sampling - July 2019

Location ID: / Sample Date:	Units	PCL	HBW7-071119 7/11/19	HBW7-073019 7/30/19*	HBW10_071119 7/11/19	HBW1_071119 7/11/19	GPW1_071119 7/11/19	GPW1_071119_a 7/11/19	GPW3_071119 7/11/19
Perchlorate (6850)				Harrison Bayou			Goose Prairie Creek		
Perchlorate	µg/L	17	**27**	**1.2 J**	< 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 and reported to the limit of detection.

Exceeded PCL screening criteria

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

*resampled

GWTP Weekly Sampling - July 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_070919 7/9/19	LH18/24-SP650_071619 7/16/19	LH18/24-SP650_072319 7/23/19	LH18/24-SP650_073019 7/30/19
Location Description			**GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.**			
Ammonia as N (350.3)						
Ammonia as N	mg/L	NV	**6.9**	**7.5**	**9.2**	**7.2**
Ortho-Phosphate (365.3)						
Ortho-Phosphate	mg/L	NV	**2.19**	**0.276**	**2.68**	**0.19**
Organic Carbon (415.1)						
Total Organic Carbon (TOC)	mg/L	NV	**5.09 J**	**2.52**	**1.96**	**2.33**

mg/L - milligrams per liter

NV - No Value

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Bi-Weekly Sampling - July 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_070919 7/9/19	LH18/24-SP650_072319 7/23/19
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	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	181	< 0.5 U	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 0.5 U
Acetone	µg/L	2,395	< 1.0 U	**4.6**
Benzene	µg/L	181	< 0.5 U	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U	< 1.0 U
o-Xylene	µg/L	83.6	< 0.5 U	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	181	**1.0**	**0.88 J**
Vinyl chloride	µg/L	72	< 0.5 U	< 0.5 U
Anions (9056)				
Chloride	mg/L	NV	**292**	**494**
Sulfate	mg/L	NV	**29.9**	**32.3**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

NV - No Value

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Monthly Effluent Sampling - July 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_071619 7/16/19
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled monthly**
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	**0.52 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	**0.99 J**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Barium	mg/L	2	**0.0903**
Lead	mg/L	0.0046	< 0.00100 U
Selenium	mg/L	0.012	< 0.00250 U
Silver	mg/L	0.003	< 0.000500 U
Hexavalent Chromium (7196A)			
Hexavalent Chromium	mg/L	0.1244	**0.0100**
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**12**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Weekly/Effluent Perchlorate Sampling - July 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_070919_BIX 7/9/19	LH18/24-SP650_071619-BIX 7/16/19	LH18/24-SP650_071619_BIX 7/16/19	LH18/24-SP650_072319_BIX 7/23/19	LH18/24-SP650_073019_BIX 7/30/19
Location Description			**Collected from a spigot on the discharge of effluent TK-650.**				
			Weekly	Monthly EFF	Weekly	Weekly	Weekly
Perchlorate (6850)							
Perchlorate	µg/L	589	**5.8**	< 2.0 U	< 2.0 U	**42**	< 2.0 U

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

BIX - before ion exchange

GWTP Monthly Influent Sampling - July 2019

Location ID: Sample Date:	Units	LH18/24-SP140_071619 7/16/19
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.**
Metals (6020A)		
Selenium	mg/L	< 0.00250 U
Silver	mg/L	< 0.00250 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**6,900**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	AWD1_062019 6/20/19	AWD3_062119 6/21/19	AWD4_062619 6/26/19	AWD4_062619_a 6/26/19	18CPTMW01DW_061919 6/19/19	18CPTMW01SW_061919 6/19/19	18CPTMW03SW_062119 6/21/19	18CPTMW04_061919 6/19/19	18CPTMW04SW_061919 6/19/19	18CPTMW06_062119 6/21/19	18CPTMW06_062119_a 6/21/19	18CPTMW07_062519 6/25/19	18CPTMW08SW-061819 6/18/19	18CPTMW08DW-061819 6/18/19	18CPTMW10SW_062019 6/20/19	18CPTMW10DW_062019 6/20/19	18CPTMW12SW_061719 6/17/19	18CPTMW12SW_061719_a 6/17/19	18CPTMW12DW_061719 6/17/19	18CPTMW14_062519 6/25/19
Lab Package			HS19061164	HS19061210	HS19061482	HS19061482	HS19061083	HS19061083	HS19061210	HS19061083	HS19061083	HS19061210	HS19061210	HS19061383	HS19060986	HS19060986	HS19061157	HS19061157	HS19060929	HS19060929	HS19060929	HS19061383
Well ID			AWD-1	AWD-3	AWD-4	AWD-4	18CPTMW01DW	18CPTMW01SW	18CPTMW03SW	18CPTMW04	18CPTMW04SW	18CPTMW06	18CPTMW06	18CPTMW07	18CPTMW08SW	18CPTMW08DW	18CPTMW10SW	18CPTMW10DW	18CPTMW12SW	18CPTMW12SW	18CPTMW12DW	18CPTMW14
Perchlorate (6850)																						
Perchlorate	µg/L	17*	NA	**1.8 J**	**23**	**27**	< 2.0 U	< 2.0 U	**9.9**	**620**	< 2.0 U	**1.7 J**	< 2.0 U	**1.4 J**	**23,000**	**4,300**	< 2.0 U	**9.1**	< 2.0 U	< 2.0 U	**1.2 J**	**1,300**
Volatile Organic Compounds (8260C)																						
1,1,1,2-Tetrachloroethane	µg/l	110	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2,2-Tetrachloroethane	µg/l	14	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/l	5	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**2.1**	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1-Dichloroethene	µg/l	7	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,1-Dichloropropene	µg/l	2.9	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 12 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichlorobenzene	µg/l	600	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/l	5	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	**1.3**	**0.75 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**2.1**
1,2-Dichloropropane	µg/l	5	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,3-Dichloropropane	µg/l	29	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,4-Dichlorobenzene	µg/l	75	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2,2-Dichloropropane	µg/l	42	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Butanone	µg/l	61,000	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 25 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Chlorotoluene	µg/l	2,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
2-Hexanone	µg/l	6,100	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 25 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Chlorotoluene	µg/l	2,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
4-Isopropyltoluene	µg/l	10,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 25 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Acetone	µg/l	92,000	NA	< 10 U	< 1.0 U	**6.8**	5.1 UB	< 25 U	**5.2**	4.6 UB	5 UB	**3.1**	< 1.0 U	< 1.0 U	2.7 UB	NA	5.4 UB	3.3 UB	2.9 UB	3 UB	3.2 UB	< 1.0 U
Benzene	µg/l	5	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**1.3**
Bromobenzene	µg/l	2,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromochloromethane	µg/l	4,100	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromodichloromethane	µg/l	4.6	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromoform	µg/l	36	NA	< 5.0 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 12 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Bromomethane	µg/l	140	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Carbon disulfide	µg/l	10,000	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 25 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon tetrachloride	µg/l	5	NA	**35**	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chlorobenzene	µg/l	100	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroethane	µg/l	41,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroform	µg/l	1,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**6.7 J**
Chloromethane	µg/l	220	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	**1.7**	**16**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**11**	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**51**
cis-1,3-Dichloropropene	µg/l	5.3	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dibromochloromethane	µg/l	34	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dibromomethane	µg/l	380	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Dichlorodifluoromethane	µg/l	20,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	µg/l	700	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Hexachlorobutadiene	µg/l	20	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 25 U	< 0.5 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Isopropylbenzene	µg/l	10,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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**	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 12 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Methylene chloride	µg/l	5	NA	< 10 U	< 1.0 U	< 1.0 U	**1.1 J**	**100**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Naphthalene	µg/l	2,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
n-Butylbenzene	µg/l	4,100	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	AWD1_062019 6/20/19	AWD3_062119 6/21/19	AWD4_062619 6/26/19	AWD4_062619_a 6/26/19	18CPTMW01DW_061919 6/19/19	18CPTMW01SW_061919 6/19/19	18CPTMW03SW_062119 6/21/19	18CPTMW04_061919 6/19/19	18CPTMW04SW_061919 6/19/19	18CPTMW06_062119 6/21/19	18CPTMW06_062119_a 6/21/19	18CPTMW07_062519 6/25/19	18CPTMW08SW-061819 6/18/19	18CPTMW08DW-061819 6/18/19	18CPTMW10SW_062019 6/20/19	18CPTMW10DW_062019 6/20/19	18CPTMW12SW_061719 6/17/19	18CPTMW12SW_061719_a 6/17/19	18CPTMW12DW_061719 6/17/19	18CPTMW14_062519 6/25/19
n-Propylbenzene	µg/l	4,100	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
o-Xylene	µg/l	10,000**	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
sec-Butylbenzene	µg/l	4,100	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Styrene	µg/l	100	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
tert-Butylbenzene	µg/l	4,100	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/l	5	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**1.1**
Toluene	µg/l	1,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	**1.4**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 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	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Trichloroethene	µg/l	5	NA	**580**	< 0.5 U	< 0.5 U	< 0.5 U	**32**	**19**	**510**	< 0.5 U	**0.98 J**	**0.88 J**	**0.66 J**	**40**	NA	< 0.5 U	**1.2**	**0.65 J**	**0.60 J**	< 0.5 U	**700**
Trichlorofluoromethane	µg/l	31,000	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Vinyl chloride	µg/l	2	NA	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 12 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**5.0**	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Metals (6020A)																						
Aluminum	mg/L	100	NA	**0.157**	**20.1 J**	**9.41 J**	**0.110**	**0.0504**	**0.0446**	NA	**0.0645**	NA	NA	NA	NA	NA	NA	**0.611**	**0.0204**	**0.0248**	**0.0201**	**0.427**
Antimony	mg/L	0.006	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	**0.000408 J**	< 0.000500 U	< 0.000500 U	NA	< 0.000500 U	NA	NA	NA	NA	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	**0.000406 J**	0.000513 UB
Arsenic	mg/L	0.01	NA	< 0.000500 U	**0.00257 J**	**0.00158 J**	**0.00152 J**	**0.00871**	**0.00272 J**	NA	**0.00326 J**	NA	NA	NA	NA	NA	NA	**0.00262 J**	**0.000866 J**	**0.00106 J**	**0.00401 J**	**0.00240 J**
Barium	mg/L	2	NA	**0.0352**	**0.267**	**0.239**	**0.412**	**1.07**	**0.172**	NA	**0.911**	NA	NA	NA	NA	NA	NA	**0.108**	**0.803**	**0.825**	**0.133**	**6.03**
Beryllium	mg/L	0.004	NA	< 0.000500 U	**0.000982 J**	**0.000691 J**	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	< 0.000500 U	NA	NA	NA	NA	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Cadmium	mg/L	0.005	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	**0.000345 J**	< 0.000500 U	**0.000367 J**	NA	< 0.000500 U	NA	NA	NA	NA	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	**0.000243 J**
Calcium	mg/L	NV	NA	**0.817**	**11.3**	**10.7**	**40.3**	**32.9**	**21.0**	NA	**30.3**	NA	NA	NA	NA	NA	NA	**6.74**	**58.5**	**58.7**	**9.65**	**466**
Chromium	mg/L	0.1	NA	**0.0808**	**0.387 J**	**0.193 J**	**0.0949**	**0.00638**	**0.0163**	NA	**0.0219**	NA	NA	NA	NA	NA	NA	**0.00736**	**0.0159**	**0.0160**	**0.0136**	**0.00598**
Cobalt	mg/L	6.1	NA	**0.000846 J**	**0.0121 J**	**0.00828 J**	**0.00121 J**	**0.000511 J**	**0.00263 J**	NA	**0.00473 J**	NA	NA	NA	NA	NA	NA	**0.000393 J**	**0.00248 J**	**0.00304 J**	**0.000115 J**	**0.0142**
Copper	mg/L	1.3	NA	< 0.00100 U	**0.0215 J**	**0.0140 J**	0.00332 UB	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	0.00188 UB	< 0.00100 U	< 0.00100 U	< 0.00100 U	**0.00130 J**
Iron	mg/L	NV	NA	**0.430**	**22.3 J**	**11.0 J**	**1.65**	**51.3**	**1.75**	NA	**10.4**	NA	NA	NA	NA	NA	NA	**2.80**	**0.540**	**0.669**	**1.10**	**2.89**
Lead	mg/L	0.015	NA	< 0.00100 U	**0.00842 J**	**0.00448 J**	**0.00104 J**	< 0.00100 U	< 0.00100 U	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	**0.000967 J**	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U
Magnesium	mg/L	NV	NA	**0.586**	**5.94**	**5.31**	**11.7**	**22.6**	**7.22**	NA	**18.3**	NA	NA	NA	NA	NA	NA	**5.34**	**38.8**	**39.2**	**4.67**	**157**
Manganese	mg/L	1.1*	NA	**0.00771**	**0.0703**	**0.0536**	**0.115**	**0.635**	**0.0478**	NA	**0.455**	NA	NA	NA	NA	NA	NA	**0.0448**	**0.181**	**0.232**	**0.0329**	**0.793**
Nickel	mg/L	0.49*	NA	**0.0253**	**0.240**	**0.227**	**0.00669**	**0.00112 J**	**0.00956**	NA	**0.00641**	NA	NA	NA	NA	NA	NA	**0.00202 J**	**0.00382 J**	**0.00361 J**	**0.000995 J**	**0.00836**
Potassium	mg/L	NV	NA	**0.746**	**1.29 J**	**0.827 J**	**147**	**18.4**	**233**	NA	**108**	NA	NA	NA	NA	NA	NA	**111**	**75.5**	**75.0**	**108**	**17.5**
Selenium	mg/L	0.05	NA	**0.00434 J**	**0.00245 J**	**0.00328 J**	< 0.00250 U	< 0.00250 U	< 0.00250 U	NA	< 0.00250 U	NA	NA	NA	NA	NA	NA	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U
Silver	mg/L	0.51	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	< 0.000500 U	NA	NA	NA	NA	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Sodium	mg/L	NV	NA	**30.1**	**62.6**	**62.3**	**370**	**115**	**265**	NA	**130**	NA	NA	NA	NA	NA	NA	**184**	**234**	**229**	**184**	**605**
Thallium	mg/L	0.002	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	< 0.000500 U	NA	NA	NA	NA	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Vanadium	mg/L	0.72	NA	0.00191 UB	**0.0366 J**	**0.0207 J**	0.00102 UB	< 0.00100 U	0.00183 UB	NA	< 0.00100 U	NA	NA	NA	NA	NA	NA	0.00163 UB	0.00102 UB	0.00150 UB	0.00169 UB	**0.00212 J**
Zinc	mg/L	31	NA	**0.0177**	**0.0883 J**	**0.0588 J**	**0.0266**	**0.0209**	**0.0987**	NA	**0.0400**	NA	NA	NA	NA	NA	NA	**0.0244**	**0.0181**	**0.0159**	**0.0198**	**0.0184**
Mercury	mg/L	0.002	NA	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	NA	< 0.000100 U	NA	NA	NA	NA	NA	NA	< 0.000100 U	< 0.000100 U	< 0.000100 U	**0.0000310 J**	< 0.000100 U
1,4-Dioxane (8270D SIM)																						
1,4-Dioxane	µg/l	9.1	**0.99**	NA	< 0.010 U	< 0.010 U	**0.27**	< 0.010 U	**0.67**	**1.3**	< 0.010 U	**0.46 J**	**0.052 J**	**0.077**	**1.7**	**0.38**	< 0.010 U	NA	**0.073 J**	**0.18 J**	**0.11**	**0.13**

Notes:

Blue highlighting indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

a - duplicate sample

mg/L - milligrams per liter

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.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, manganese, and nickel compared to the PCL

** Value is for total xylenes

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18CPTMW15_062119 6/21/19	18CPTMW16_062719 6/27/19	18CPTMW18_062619 6/26/19	18CPTMW19_062019 6/20/19	18CPTMW19SW_062019 6/20/19	18CPTMW22R_061319 6/13/19	18CPTMW22SW_061319 6/13/19	18CPTMW22DW_061319 6/13/19	18CPTMW23-061719 6/17/19	18CPTMW23SW-061719 6/17/19	18CPTMW24_062519 6/25/19	18CPTMW26SW_061319 6/13/19	17WW08_062519 6/25/19	18WW02_062019 6/20/19	18WW03_062419 6/24/19	18WW03_062419_a 6/24/19	18WW06_062019 6/20/19	18WW08_062719 6/27/19	18WW09_062719 6/27/19	18WW10_062519 6/25/19	18WW10_062519-a 6/25/19	18WW14_061719 6/17/19
Lab Package			HS19061210	HS19061547	HS19061486	HS19061157	HS19061157	HS19060835	HS19060835	HS19060835	HS19060929	HS19060929	HS19061383	HS19060835	HS19061386	HS19061157	HS19061279	HS19061279	HS19061157	HS19061547	HS19061547	HS19061386	HS19061386	HS19060929
Well ID			18CPTMW15	18CPTMW16	18CPTMW18	18CPTMW19	18CPTMW19SW	18CPTMW22R	18CPTMW22SW	18CPTMW22DW	18CPTMW23	18CPTMW23SW	18CPTMW24	18CPTMW26SW	17WW08	18WW02	18WW03	18WW03	18WW06	18WW08	18WW09	18WW10	18WW10	18WW14
Perchlorate (6850)																								
Perchlorate	µg/L	17*	**410**	<2.0 U	<2.0 U	**4.1**	**39**	<2.0 U	**590**	<2.0 U	**5,700**	< 2.0 U	**89**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	<2.0 U	<2.0 U	< 2.0 U
Volatile Organic Compounds (8260C)																								
1,1,1,2-Tetrachloroethane	µg/l	110	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,1,1-Trichloroethane	µg/l	200	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,1,2,2-Tetrachloroethane	µg/l	14	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,1,2-Trichloroethane	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,1-Dichloroethane	µg/l	10,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,1-Dichloroethene	µg/l	7	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,1-Dichloropropene	µg/l	2.9	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,2,3-Trichlorobenzene	µg/l	310	< 0.5 U	NA	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 UJ	< 0.5 UJ	NA
1,2,3-Trichloropropane	µg/l	0.041	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,2,4-Trichlorobenzene	µg/l	70	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,2,4-Trimethylbenzene	µg/l	5,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,2-Dibromo-3-chloropropane	µg/l	0.2	< 0.5 UJ	NA	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 UJ	< 0.5 UJ	NA
1,2-Dibromoethane	µg/l	0.05	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,2-Dichlorobenzene	µg/l	600	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,2-Dichloroethane	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**150**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
1,2-Dichloropropane	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,3,5-Trimethylbenzene	µg/l	5,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,3-Dichlorobenzene	µg/l	3,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,3-Dichloropropane	µg/l	29	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
1,4-Dichlorobenzene	µg/l	75	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
2,2-Dichloropropane	µg/l	42	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
2-Butanone	µg/l	61,000	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 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	NA	< 1.0 U	< 1.0 U	NA
2-Chlorotoluene	µg/l	2,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
2-Hexanone	µg/l	6,100	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 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	NA	< 1.0 U	< 1.0 U	NA
4-Chlorotoluene	µg/l	2,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
4-Isopropyltoluene	µg/l	10,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
4-Methyl-2-pentanone	µg/l	8,200	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 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	NA	< 1.0 U	< 1.0 U	NA
Acetone	µg/l	92,000	**5.0**	NA	**5.6**	4.8 UB	< 1.0 U	< 1.0 U	**3.4**	**2.8**	< 10 U	2.7 UB	5.1 UB	**4.2**	< 1.0 U	5.4 UB	**4.2**	**2.4**	3.0 UB	2.1 UB	NA	**3.9 J**	**2.0 J**	NA
Benzene	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Bromobenzene	µg/l	2,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Bromochloromethane	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Bromodichloromethane	µg/l	4.6	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Bromoform	µg/l	36	< 0.5 UJ	NA	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 UJ	< 0.5 UJ	NA
Bromomethane	µg/l	140	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Carbon disulfide	µg/l	10,000	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 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	NA	< 1.0 U	< 1.0 U	NA
Carbon tetrachloride	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Chlorobenzene	µg/l	100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Chloroethane	µg/l	41,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Chloroform	µg/l	1,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Chloromethane	µg/l	220	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
cis-1,2-Dichloroethene	µg/l	70	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**150**	< 0.5 U	**26**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
cis-1,3-Dichloropropene	µg/l	5.3	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Dibromochloromethane	µg/l	34	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Dibromomethane	µg/l	380	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Dichlorodifluoromethane	µg/l	20,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Ethylbenzene	µg/l	700	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Hexachlorobutadiene	µg/l	20	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 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	NA	< 1.0 U	< 1.0 U	NA
Isopropylbenzene	µg/l	10,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
m,p-Xylene	µg/l	10,000**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 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	NA	< 1.0 U	< 1.0 U	NA
Methylene chloride	µg/l	5	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 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	NA	< 1.0 U	< 1.0 U	NA
Naphthalene	µg/l	2,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
n-Butylbenzene	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18CPTMW15_062119 6/21/19	18CPTMW16_062719 6/27/19	18CPTMW18_062619 6/26/19	18CPTMW19_062019 6/20/19	18CPTMW19SW_062019 6/20/19	18CPTMW22R_061319 6/13/19	18CPTMW22SW_061319 6/13/19	18CPTMW22DW_061319 6/13/19	18CPTMW23-061719 6/17/19	18CPTMW23SW-061719 6/17/19	18CPTMW24_062519 6/25/19	18CPTMW26SW_061319 6/13/19	17WW08_062519 6/25/19	18WW02_062019 6/20/19	18WW03_062419 6/24/19	18WW03_062419_a 6/24/19	18WW06_062019 6/20/19	18WW08_062719 6/27/19	18WW09_062719 6/27/19	18WW10_062519 6/25/19	18WW10_062519-a 6/25/19	18WW14_061719 6/17/19
n-Propylbenzene	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
o-Xylene	µg/l	10,000**	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
sec-Butylbenzene	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Styrene	µg/l	100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
tert-Butylbenzene	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Tetrachloroethene	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Toluene	µg/l	1,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
trans-1,2-Dichloroethene	µg/l	100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
trans-1,3-Dichloropropene	µg/l	29	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Trichloroethene	µg/l	5	**2.3**	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**2,900**	< 0.5 U	**9.1**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	< 0.5 U	< 0.5 U	NA
Trichlorofluoromethane	µg/l	31,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Vinyl chloride	µg/l	2	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 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	NA	< 0.5 U	< 0.5 U	NA
Metals (6020A)																								
Aluminum	mg/L	100	NA	NA	0.0122 UB	NA	**0.0745**	**1.54**	**0.284**	**0.133**	NA	NA	NA	NA	0.0212 UB	**1.56**	0.0156 UB	0.0175 UB	NA	NA	**0.0863**	NA	NA	**0.138**
Antimony	mg/L	0.006	NA	NA	< 0.000500 U	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	NA	NA	NA	< 0.005000 U	< 0.005000 U	< 0.005000 U	< 0.005000 U	NA	NA	< 0.005000 U	NA	NA	< 0.005000 U
Arsenic	mg/L	0.01	NA	NA	**0.00127 J**	NA	**0.00543**	**0.00317 J**	**0.00358 J**	**0.00316 J**	NA	NA	NA	NA	**0.00576**	**0.000675 J**	**0.000834 J**	**0.000750 J**	NA	NA	**0.00754**	NA	NA	**0.000663 J**
Barium	mg/L	2	NA	NA	**0.608**	NA	**0.198**	**0.0493**	**0.0799**	**0.0930**	NA	NA	NA	NA	**0.539**	**0.0506**	**0.194**	**0.185**	NA	NA	**0.239**	NA	NA	**1.19**
Beryllium	mg/L	0.004	NA	NA	< 0.000500 U	NA	< 0.000500 U	**0.000337 J**	< 0.000500 U	< 0.000500 U	NA	NA	NA	NA	< 0.005000 U	< 0.000500 U	< 0.005000 U	< 0.005000 U	NA	NA	< 0.005000 U	NA	NA	< 0.005000 U
Cadmium	mg/L	0.005	NA	NA	< 0.000500 U	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	NA	NA	NA	< 0.005000 U	< 0.000500 U	< 0.005000 U	< 0.005000 U	NA	NA	**0.000214 J**	NA	NA	**0.000783 J**
Calcium	mg/L	NV	NA	NA	**281**	NA	**11.2**	**0.683**	**24.5**	**12.4**	NA	NA	NA	NA	**129**	**7.84**	**8.98**	**8.70**	NA	NA	**17.9**	NA	NA	**50.8**
Chromium	mg/L	0.1	NA	NA	**0.00200 J**	NA	**0.00171 J**	**0.00400 J**	**0.0486**	**0.000531 J**	NA	NA	NA	NA	**0.438**	**0.00851**	**0.0540 J**	**0.0356 J**	NA	NA	**0.0175**	NA	NA	**0.409**
Cobalt	mg/L	6.1	NA	NA	**0.0139**	NA	**0.0104**	**0.00659**	< 0.000500 U	**0.000402 J**	NA	NA	NA	NA	**0.0156**	**0.000341 J**	**0.000142 J**	< 0.005000 U	NA	NA	**0.00123 J**	NA	NA	**0.0132**
Copper	mg/L	1.3	NA	NA	< 0.00100 U	NA	< 0.00100 U	0.00172 UB	< 0.00100 U	< 0.00100 U	NA	NA	NA	NA	**0.00484 J**	0.00663 UB	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	NA	NA	**0.0119**
Iron	mg/L	NV	NA	NA	**1.06**	NA	**16.1**	**2.90**	**0.0723 J**	**0.832**	NA	NA	NA	NA	**29.0**	**2.46**	**5.60**	**5.40**	NA	NA	**39.4**	NA	NA	**1.90**
Lead	mg/L	0.015	NA	NA	< 0.00100 U	NA	< 0.00100 U	**0.000894 J**	< 0.00100 U	< 0.00100 U	NA	NA	NA	NA	< 0.00100 U	**0.00123 J**	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	NA	NA	< 0.00100 U
Magnesium	mg/L	NV	NA	NA	**194**	NA	**5.98**	**0.800**	**2.20**	**6.18**	NA	NA	NA	NA	**85.6**	**1.44**	**6.34**	**6.12**	NA	NA	**9.91**	NA	NA	**40.4**
Manganese	mg/L	1.1*	NA	NA	**2.21**	NA	**0.477**	**0.0807**	**0.0223**	**0.0603**	NA	NA	NA	NA	**1.62**	**0.0988**	**0.117**	**0.112**	NA	NA	**0.792**	NA	NA	**0.876**
Nickel	mg/L	0.49*	NA	NA	**0.0131**	NA	**0.00246 J**	**0.00370 J**	**0.00100 J**	**0.000918 J**	NA	NA	NA	NA	**0.370**	**0.00574**	**0.00325 J**	**0.00335 J**	NA	NA	**0.0111**	NA	NA	**0.306**
Potassium	mg/L	NV	NA	NA	**2.98**	NA	**1.68**	**0.542**	**379**	**2.85**	NA	NA	NA	NA	**2.12**	**2.12**	**1.97**	**1.85**	NA	NA	**2.58**	NA	NA	**4.38**
Selenium	mg/L	0.05	NA	NA	< 0.00250 U	NA	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	NA	NA	NA	NA	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	NA	NA	< 0.00250 U	NA	NA	< 0.00250 U
Silver	mg/L	0.51	NA	NA	< 0.000500 U	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	NA	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	NA	< 0.000500 U	NA	NA	< 0.000500 U
Sodium	mg/L	NV	NA	NA	**746**	NA	**28.1**	**20.8**	**313**	**234**	NA	NA	NA	NA	**527**	**25.4**	**111**	**106**	NA	NA	**42.5**	NA	NA	**137**
Thallium	mg/L	0.002	NA	NA	< 0.000500 U	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	NA	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	NA	< 0.000500 U	NA	NA	< 0.000500 U
Vanadium	mg/L	0.72	NA	NA	< 0.00100 U	NA	0.00184 UB	**0.00954**	0.00200 UB	0.00216 UB	NA	NA	NA	NA	**0.00169 J**	0.00394 UB	0.00237 UB	0.00240 UB	NA	NA	0.00236 UB	NA	NA	0.00422 UB
Zinc	mg/L	31	NA	NA	**0.0225**	NA	**0.0247**	**0.0183**	**0.0294**	**0.0220**	NA	NA	NA	NA	**0.0291**	**0.0147**	**0.0171**	**0.0163**	NA	NA	**0.0131**	NA	NA	**0.0390**
Mercury	mg/L	0.002	NA	NA	< 0.000100 U	NA	< 0.000100 U	< 0.000100 U	**0.0000360 J**	< 0.000100 U	NA	NA	NA	NA	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	NA	NA	< 0.000100 U	NA	NA	< 0.000100 U
1,4-Dioxane (8270D SIM)																								
1,4-Dioxane	µg/l	9.1	**0.43**	**0.048**	**0.021**	**0.068**	< 0.010 U	< 0.010 U	**0.95**	**0.15**	**8.1**	< 0.010 U	< 0.010 U	**0.024**	NA	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	< 0.010 U	NA

Notes:

Blue highlighting indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

a - duplicate sample

mg/L - milligrams per liter

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.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, manganese, and nickel compared to the PCL

** Value is for total xylenes

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18WW16_062619 6/26/19	18WW17_062419 6/24/19	18WW18_062419 6/24/19	18WW19	18WW20	18WW22_062019 6/20/19	18WW24_062619 6/26/19	18WW25_062719 6/27/19	C01_062119 6/21/19	C02_062519 6/25/19	C03_062619 6/26/19	C04_062019 6/20/19	C06_062619 6/26/19	C08_062119 6/21/19	C09_062619 6/26/19	MW1_061919 6/19/19	MW2_061919 6/19/19	MW2_061919_a 6/19/19	MW3_062519 6/25/19	MW5_061819 6/18/19	MW6_061819 6/18/19	MW7_061719 6/17/19
Lab Package			HS19061486	HS19061279	HS19061279	not collected		HS19061157	HS19061482	HS19061547	HS19061210	HS19061386	HS19061486	HS19061157	HS19061486	HS19061210	HS19061486	HS19061083	HS19061083	HS19061083	HS19061383	HS19060986	HS19060986	HS19060929
Well ID			18WW16	18WW17	18WW18			18WW22	18WW24	18WW25	C-01	C-02	C-03	C-04	C-06	C-08	C-09	MW-1	MW-2	MW-2	MW-3	MW-5	MW-6	MW-7
Perchlorate (6850)																								
Perchlorate	µg/L	17*	**4.4**	**85,000**	< 2.0 U			<2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	**54**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	**590**	<2.0 U	<2.0 U	**11,000**	**26,000**	**4,400**	**26,000**
Volatile Organic Compounds (8260C)																								
1,1,1,2-Tetrachloroethane	µg/l	110	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,1,1-Trichloroethane	µg/l	200	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,1,2,2-Tetrachloroethane	µg/l	14	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,1,2-Trichloroethane	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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,1-Dichloroethane	µg/l	10,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 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	< 10 U	< 25 U	< 25 U	**1.4**	**1.1**	< 0.5 U	< 2.5 U
1,1-Dichloroethene	µg/l	7	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,1-Dichloropropene	µg/l	2.9	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,2,3-Trichlorobenzene	µg/l	310	< 0.5 UJ	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 UJ	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,2,3-Trichloropropane	µg/l	0.041	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,2,4-Trichlorobenzene	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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,2,4-Trimethylbenzene	µg/l	5,100	< 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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 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	< 0.5 U	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 UJ	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,2-Dibromoethane	µg/l	0.05	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,2-Dichlorobenzene	µg/l	600	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,2-Dichloroethane	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	**300**	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	**26**
1,2-Dichloropropane	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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,3,5-Trimethylbenzene	µg/l	5,100	< 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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,3-Dichlorobenzene	µg/l	3,100	< 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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	**0.62 J**	< 2.5 U
1,3-Dichloropropane	µg/l	29	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
1,4-Dichlorobenzene	µg/l	75	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
2,2-Dichloropropane	µg/l	42	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
2-Butanone	µg/l	61,000	< 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	< 1.0 U	< 20 U	< 50 U	< 50 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U
2-Chlorotoluene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
2-Hexanone	µg/l	6,100	< 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	< 1.0 U	< 20 U	< 50 U	< 50 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U
4-Chlorotoluene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
4-Isopropyltoluene	µg/l	10,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
4-Methyl-2-pentanone	µg/l	8,200	< 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	< 1.0 U	< 20 U	< 25 U	< 25 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U
Acetone	µg/l	92,000	**11**	< 1.0 U	**2.4**			9.1 UB	< 1.0 U	2.3 UB	< 1.0 U	**5.1**	**5.7**	4.8 UB	< 1.0 U	< 1.0 U	**4.2**	< 20 U	< 50 U	< 50 U	< 1.0 U	4.9 UB	< 1.0 U	< 5.0 U
Benzene	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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Bromobenzene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Bromochloromethane	µg/l	4,100	< 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 UJ	< 10 U	**660 J**	**460 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Bromodichloromethane	µg/l	4.6	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Bromoform	µg/l	36	< 0.5 UJ	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Bromomethane	µg/l	140	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Carbon disulfide	µg/l	10,000	< 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	< 1.0 U	< 20 U	< 50 U	< 50 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U
Carbon tetrachloride	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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Chlorobenzene	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 UJ	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Chloroethane	µg/l	41,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Chloroform	µg/l	1,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 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	< 10 U	**75**	**74**	< 0.5 U	< 0.5 U	< 0.5 U	**3.4 J**
Chloromethane	µg/l	220	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 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	**4,000**	**58,000**	**59,000**	**52**	**8.5**	**4.7**	**10**
cis-1,3-Dichloropropene	µg/l	5.3	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Dibromochloromethane	µg/l	34	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Dibromomethane	µg/l	380	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Dichlorodifluoromethane	µg/l	20,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Ethylbenzene	µg/l	700	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	**32 J**	**33 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Hexachlorobutadiene	µg/l	20	< 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	< 1.0 U	< 20 U	< 50 U	< 50 U	< 0.5 U	< 1.0 U	< 1.0 U	< 5.0 U
Isopropylbenzene	µg/l	10,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
m,p-Xylene	µg/l	10,000**	< 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	< 1.0 U	< 20 U	< 50 U	< 50 U	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U
Methylene chloride	µg/l	5	< 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	< 1.0 U	< 20 U	**510,000**	**500,000**	< 1.0 U	< 1.0 U	< 1.0 U	< 5.0 U
Naphthalene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
n-Butylbenzene	µg/l	4,100	< 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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18WW16_062619 6/26/19	18WW17_062419 6/24/19	18WW18_062419 6/24/19	18WW19	18WW20	18WW22_062019 6/20/19	18WW24_062619 6/26/19	18WW25_062719 6/27/19	C01_062119 6/21/19	C02_062519 6/25/19	C03_062619 6/26/19	C04_062019 6/20/19	C06_062619 6/26/19	C08_062119 6/21/19	C09_062619 6/26/19	MW1_061919 6/19/19	MW2_061919 6/19/19	MW2_061919_a 6/19/19	MW3_062519 6/25/19	MW5_061819 6/18/19	MW6_061819 6/18/19	MW7_061719 6/17/19
n-Propylbenzene	µg/l	4,100	< 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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
o-Xylene	µg/l	10,000**	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
sec-Butylbenzene	µg/l	4,100	< 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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Styrene	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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
tert-Butylbenzene	µg/l	4,100	< 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	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 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	< 10 U	**43 J**	**44 J**	**0.7 J**	< 0.5 U	< 0.5 U	< 2.5 U
Toluene	µg/l	1,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	**30 J**	**31 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 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	< 10 U	**150**	**150**	**0.99 J**	< 0.5 U	< 0.5 U	< 2.5 U
trans-1,3-Dichloropropene	µg/l	29	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 U
Trichloroethene	µg/l	5	< 0.5 U	**34**	< 0.5 U			< 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**	< 0.5 U	**15,000**	**1,400**	**1,400**	**240**	**30**	**14**	**1,300**
Trichlorofluoromethane	µg/l	31,000	< 0.5 U	< 0.5 U	< 0.5 U			< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 25 U	< 25 U	< 0.5 U	< 0.5 U	< 0.5 U	< 2.5 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	< 10 U	< 25 U	< 25 U	**3.0**	**1.6**	< 0.5 U	< 2.5 U
Metals (6020A)																								
Aluminum	mg/L	100	**0.649**	0.0219 UB	0.0389 UB			**0.213**	**0.482**	**0.255**	NA	NA	0.00694 UB	NA	**0.0222**	NA	**0.370**	**0.0775**	NA	NA	**0.00644 J**	NA	**0.0152**	NA
Antimony	mg/L	0.006	**0.00244 J**	< 0.005000 U	< 0.005000 U			< 0.000500 U	< 0.00500 U	< 0.00500 U	NA	NA	< 0.00500 U	NA	< 0.00500 U	NA	**0.000800 J**	< 0.00500 U	NA	NA	< 0.000500 U	NA	< 0.000500 U	NA
Arsenic	mg/L	0.01	**0.00640**	**0.00328 J**	**0.00567**			**0.00175 J**	**0.000998 J**	**0.00770**	NA	NA	**0.00318 J**	NA	**0.00101 J**	NA	< 0.00500 U	< 0.00500 U	NA	NA	**0.000625 J**	NA	**0.00204 J**	NA
Barium	mg/L	2	**0.141**	**4.13**	**1.34**			**0.145**	**0.0582**	**0.316**	NA	NA	**1.39**	NA	**1.03**	NA	**0.238**	**0.406**	NA	NA	**0.370**	NA	**0.700**	NA
Beryllium	mg/L	0.004	**0.00310**	< 0.005000 U	**0.000322 J**			< 0.000500 U	< 0.00500 U	< 0.00500 U	NA	NA	< 0.00500 U	NA	< 0.00500 U	NA	< 0.00500 U	< 0.00500 U	NA	NA	< 0.000500 U	NA	< 0.000500 U	NA
Cadmium	mg/L	0.005	**0.00858**	**0.000710 J**	< 0.005000 U			< 0.000500 U	**0.000207 J**	< 0.00500 U	NA	NA	< 0.00500 U	NA	< 0.00500 U	NA	< 0.00500 U	< 0.00500 U	NA	NA	< 0.000500 U	NA	**0.000205 J**	NA
Calcium	mg/L	NV	**182**	**371**	**58.2**			**15.2**	**8.52**	**20.6**	NA	NA	**46.7**	NA	**19.7**	NA	**76.3**	**17.9**	NA	NA	**26.5**	NA	**26.9**	NA
Chromium	mg/L	0.1	**9.14**	**1.80**	**0.00520**			**0.0245**	**0.000791 J**	**0.000744 J**	NA	NA	< 0.000500 U	NA	**0.000674 J**	NA	**0.00659**	**0.358**	NA	NA	**0.00222 J**	NA	**0.228**	NA
Cobalt	mg/L	6.1	**0.418**	**0.0122**	**0.000122 J**			**0.000243 J**	**0.00641**	**0.00410 J**	NA	NA	**0.000279 J**	NA	**0.00214 J**	NA	**0.000529 J**	**0.0170**	NA	NA	**0.00313 J**	NA	**0.00561**	NA
Copper	mg/L	1.3	**0.755**	**0.109**	< 0.00100 U			< 0.00100 U	**0.00151 J**	< 0.00100 U	NA	NA	< 0.00100 U	NA	< 0.00100 U	NA	**0.00119 J**	0.00256 UB	NA	NA	**0.00658**	NA	0.00520 UB	NA
Iron	mg/L	NV	**29.7**	**25.2**	**113**			**0.0577 J**	**0.483**	**27.0**	NA	NA	**87.5**	NA	**63.2**	NA	**0.354**	**5.03**	NA	NA	**0.218**	NA	**2.15**	NA
Lead	mg/L	0.015	**0.00364 J**	**0.00130 J**	**0.000647 J**			< 0.00100 U	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	NA	< 0.00100 U	NA	< 0.00100 U	< 0.00100 U	NA	NA	< 0.00100 U	NA	< 0.00100 U	NA
Magnesium	mg/L	NV	**166**	**249**	**36.3**			**3.50**	**6.41**	**12.5**	NA	NA	**30.1**	NA	**12.4**	NA	**3.79**	**14.4**	NA	NA	**16.4**	NA	**22.9**	NA
Manganese	mg/L	1.1*	**3.12**	**0.308**	**2.33**			**0.00169 J**	**2.89**	**2.92**	NA	NA	**1.52**	NA	**0.994**	NA	**0.0798**	**0.703**	NA	NA	**0.295**	NA	**0.137 J**	NA
Nickel	mg/L	0.49*	**14.3**	**0.886**	**0.00103 J**			< 0.00100 U	**0.206**	**0.00273 J**	NA	NA	< 0.00100 U	NA	**0.00170 J**	NA	**0.00408 J**	**1.07**	NA	NA	**0.00306 J**	NA	**0.168**	NA
Potassium	mg/L	NV	**4.36**	**1.55**	**3.49**			**4.81**	**1.08**	**1.51**	NA	NA	**3.38**	NA	**4.20**	NA	**0.511**	**2.47**	NA	NA	**1.56**	NA	**2.16**	NA
Selenium	mg/L	0.05	**0.0130**	**0.00181 J**	< 0.00250 U			< 0.00250 U	< 0.00250 U	< 0.00250 U	NA	NA	< 0.00250 U	NA	< 0.00250 U	NA	< 0.00250 U	< 0.00250 U	NA	NA	< 0.00250 U	NA	< 0.00250 U	NA
Silver	mg/L	0.51	**0.000338 J**	**0.000215 J**	< 0.000500 U			< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	NA	< 0.000500 U	NA	< 0.000500 U	NA	< 0.000500 U	< 0.000500 U	NA	NA	< 0.000500 U	NA	< 0.000500 U	NA
Sodium	mg/L	NV	**532**	**1,270**	**148**			**39.1**	**208**	**35.7**	NA	NA	**168**	NA	**233**	NA	**14.3**	**170**	NA	NA	**254**	NA	**203**	NA
Thallium	mg/L	0.002	< 0.000500 U	< 0.000500 U	< 0.000500 U			< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	NA	< 0.000500 U	NA	< 0.000500 U	NA	**0.000881 J**	< 0.000500 U	NA	NA	< 0.000500 U	NA	< 0.000500 U	NA
Vanadium	mg/L	0.72	**0.0771**	**0.0203**	< 0.00100 U			**0.0148**	**0.00210 J**	0.000983 UB	NA	NA	< 0.00100 U	NA	< 0.00100 U	NA	**0.00199 J**	0.00117 UB	NA	NA	**0.00152 J**	NA	0.00378 UB	NA
Zinc	mg/L	31	**0.175**	**0.185**	**0.0145**			0.0168	**0.138**	**0.0183**	NA	NA	**0.0216**	NA	**0.0188**	NA	**0.0252**	**0.00816**	NA	NA	**0.0217**	NA	**0.0358**	NA
Mercury	mg/L	0.002	**0.0000520 J**	< 0.000100 U	< 0.000100 U			< 0.000100 U	< 0.000100 U	< 0.000100 U	NA	NA	< 0.000100 U	NA	< 0.000100 U	NA	< 0.000100 U	< 0.000100 U	NA	NA	< 0.000100 U	NA	< 0.000100 U	NA
1,4-Dioxane (8270D SIM)																								
1,4-Dioxane	µg/l	9.1	NA	NA	< 0.010 U			**0.017**	NA	< 0.010 U	NA	NA	**0.012**	NA	NA	< 0.010 U	NA	NA	**3.5 J**	**6.2 J**	NA	< 0.010 U	NA	**9.7**

Notes:

Blue highlighting indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

a - duplicate sample

mg/L - milligrams per liter

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.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, manganese, and nickel compared to the PCL

** Value is for total xylenes

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	MW8_062119 6/21/19	MW9_062519 6/25/19	MW10_062519 6/25/19	MW12_062019 6/20/19	MW13_062519 6/25/19	MW14_062019 6/20/19	MW14_062019-a 6/20/19
Lab Package			HS19061210	HS19061386	HS19061386	HS19061164	HS19061386	HS19061164	HS19061164
Well ID			MW-8	MW-9	MW-10	MW-12	MW-13	MW-14	MW-14
Perchlorate (6850)									
Perchlorate	µg/L	17*	**7,100**	**520**	<2.0 U	<2.0 U	< 2.0 U	**240,000**	**230,000**
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/l	110	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,1,1-Trichloroethane	µg/l	200	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,1,2,2-Tetrachloroethane	µg/l	14	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,1,2-Trichloroethane	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,1-Dichloroethane	µg/l	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,1-Dichloroethene	µg/l	7	< 0.5 U	< 0.5 U	< 0.5 U	**1.0**	< 0.5 U	**130**	**140 J**
1,1-Dichloropropene	µg/l	2.9	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,2,3-Trichlorobenzene	µg/l	310	< 0.5 U	< 0.5 UJ	< 0.5 UJ	< 0.5 U	< 0.5 UJ	< 10 U	< 10 U
1,2,3-Trichloropropane	µg/l	0.041	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,2,4-Trichlorobenzene	µg/l	70	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,2,4-Trimethylbenzene	µg/l	5,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,2-Dibromo-3-chloropropane	µg/l	0.2	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 10 UJ	< 10 UJ
1,2-Dibromoethane	µg/l	0.05	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,2-Dichlorobenzene	µg/l	600	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,2-Dichloroethane	µg/l	5	**0.75 J**	< 0.5 U	< 0.5 U	**0.57 J**	< 0.5 U	**100**	**110 J**
1,2-Dichloropropane	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,3,5-Trimethylbenzene	µg/l	5,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,3-Dichlorobenzene	µg/l	3,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,3-Dichloropropane	µg/l	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
1,4-Dichlorobenzene	µg/l	75	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
2,2-Dichloropropane	µg/l	42	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
2-Butanone	µg/l	61,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 20 U
2-Chlorotoluene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
2-Hexanone	µg/l	6,100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 20 U
4-Chlorotoluene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
4-Isopropyltoluene	µg/l	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
4-Methyl-2-pentanone	µg/l	8,200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 20 U
Acetone	µg/l	92,000	< 1.0 U	**2.1**	< 1.0 U	**3.5**	< 1.0 U	< 20 U	< 20 U
Benzene	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Bromobenzene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Bromochloromethane	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Bromodichloromethane	µg/l	4.6	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Bromoform	µg/l	36	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 10 UJ	< 10 UJ
Bromomethane	µg/l	140	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Carbon disulfide	µg/l	10,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 20 U
Carbon tetrachloride	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Chlorobenzene	µg/l	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Chloroethane	µg/l	41,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Chloroform	µg/l	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	**25 J**
Chloromethane	µg/l	220	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
cis-1,2-Dichloroethene	µg/l	70	< 0.5 U	**25**	< 0.5 U	**15**	< 0.5 U	**1,800**	**2,000 J**
cis-1,3-Dichloropropene	µg/l	5.3	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Dibromochloromethane	µg/l	34	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Dibromomethane	µg/l	380	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Dichlorodifluoromethane	µg/l	20,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Ethylbenzene	µg/l	700	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Hexachlorobutadiene	µg/l	20	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 20 U
Isopropylbenzene	µg/l	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
m,p-Xylene	µg/l	10,000**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 20 U
Methylene chloride	µg/l	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 20 U
Naphthalene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
n-Butylbenzene	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	MW8_062119 6/21/19	MW9_062519 6/25/19	MW10_062519 6/25/19	MW12_062019 6/20/19	MW13_062519 6/25/19	MW14_062019 6/20/19	MW14_062019-a 6/20/19
n-Propylbenzene	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
o-Xylene	µg/l	10,000**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
sec-Butylbenzene	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Styrene	µg/l	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
tert-Butylbenzene	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Tetrachloroethene	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Toluene	µg/l	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
trans-1,2-Dichloroethene	µg/l	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
trans-1,3-Dichloropropene	µg/l	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Trichloroethene	µg/l	5	**120**	**1,100**	**22**	**160**	< 0.5 U	**11,000**	**11,000**
Trichlorofluoromethane	µg/l	31,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Vinyl chloride	µg/l	2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 10 U
Metals (6020A)									
Aluminum	mg/L	100	NA	**0.0255**	NA	NA	**0.336**	**0.0408**	**0.0353**
Antimony	mg/L	0.006	NA	< 0.000500 U	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U
Arsenic	mg/L	0.01	NA	< 0.000500 U	NA	NA	**0.000513 J**	**0.00702**	**0.00636**
Barium	mg/L	2	NA	**0.119**	NA	NA	**0.234**	**0.311**	**0.297**
Beryllium	mg/L	0.004	NA	< 0.000500 U	NA	NA	< 0.000500 U	**0.000305 J**	**0.000276 J**
Cadmium	mg/L	0.005	NA	< 0.000500 U	NA	NA	**0.000407 J**	**0.000877 J**	**0.000834 J**
Calcium	mg/L	NV	NA	**15.0**	NA	NA	**14.8**	**122**	**116**
Chromium	mg/L	0.1	NA	**0.156**	NA	NA	**0.738**	**0.0974**	**0.0866**
Cobalt	mg/L	6.1	NA	**0.00255 J**	NA	NA	**0.00531**	**0.0252**	**0.0240**
Copper	mg/L	1.3	NA	< 0.00100 U	NA	NA	**0.0274**	0.00394 UB	0.00362 UB
Iron	mg/L	NV	NA	**0.830**	NA	NA	**37.1**	**128**	**120**
Lead	mg/L	0.015	NA	< 0.00100 U	NA	NA	< 0.00100 U	< 0.00100 U	< 0.00100 U
Magnesium	mg/L	NV	NA	**3.78**	NA	NA	**7.96**	**72.8**	**68.8**
Manganese	mg/L	1.1*	NA	**0.0495**	NA	NA	**0.844**	**4.58**	**4.81**
Nickel	mg/L	0.49*	NA	**0.127**	NA	NA	**0.247**	**0.158**	**0.150**
Potassium	mg/L	NV	NA	**0.438**	NA	NA	**3.58**	**14.0**	**13.5**
Selenium	mg/L	0.05	NA	< 0.00250 U	NA	NA	< 0.00250 U	< 0.00250 U	< 0.00250 U
Silver	mg/L	0.51	NA	< 0.000500 U	NA	NA	< 0.000500	< 0.000500	< 0.000500
Sodium	mg/L	NV	NA	**17.2**	NA	NA	**56.0**	**449**	**482**
Thallium	mg/L	0.002	NA	< 0.000500 U	NA	NA	< 0.000500 U	< 0.000500	< 0.000500
Vanadium	mg/L	0.72	NA	**0.000919 J**	NA	NA	**0.00339 J**	< 0.00100 U	< 0.00100 U
Zinc	mg/L	31	NA	**0.0279**	NA	NA	**0.0257**	**0.467**	**0.439**
Mercury	mg/L	0.002	NA	< 0.000100 U	NA	NA	< 0.000100 U	< 0.000100 U	< 0.000100 U
1,4-Dioxane (8270D SIM)									
1,4-Dioxane	µg/l	9.1	**0.5**	**2**	**0.12**	NA	NA	**280 J**	**390 J**

Notes:

Blue highlighting indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

a - duplicate sample

mg/L - milligrams per liter

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.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, manganese, and nickel compared to the PCL

** Value is for total xylenes

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	MW16_062619 6/26/19	MW17_062519 6/25/19	MW18_062619 6/26/19	MW19_062619 6/2619	MW20_061319 6/13/19	MW21-061819 6/18/19	MW22_062119 6/21/19	MW23_062419 6/24/19	102_062419 6/24/19	109_061819 6/18/19	120_062019 6/20/19	125_062419 6/24/19	126_062419 6/24/19	129_062419 6/24/19	130_062519 6/25/19	130_062519-a 6/25/19	ICT2_062819 6/28/19	ICT4_062819 6/28/19	ICT7_062819 6/28/19	ICT8_062819 6/28/19	ICT11_062819 6/28/19	ICT11_062819-a 6/28/19	ICT12B_062819 6/28/19
Lab Package			HS19061482	HS19061386	HS19061486	HS19061482	HS19060835	HS19060986	HS19061210	HS19061279	HS19061279	HS19060986	HS19061164	HS19061279	HS19061279	HS19061279	HS19061386	HS19070016	HS19070016	HS19070016	HS19070016	HS19070016	HS19070016	HS19070016	HS19070016
Well ID			MW-16	MW-17	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23	MW-102	MW-109	MW-120	MW-125	MW-126	MW-129	MW-130	MW-130	ICT-2	ICT-4	ICT-7	ICT-8	ICT-11	ICT-11	ICT-12B
Perchlorate (6850)																									
Perchlorate	µg/L	17*	**2,900**	< 2.0 U	<2.0 U	<2.0 U	<2.0 U	**24,000**	**95**	**67,000**	**33**	**10,000**	**13,000**	**260**	**5.9 J**	**4,200**	<2.0 U	<2.0 U	**6,900**	**7,700**	**260**	**140**	**2,500**	**2,600**	**140,000**
Volatile Organic Compounds (8260C)																									
1,1,1,2-Tetrachloroethane	µg/l	110	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 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	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
1,1,1-Trichloroethane	µg/l	200	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 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	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
1,1,2,2-Tetrachloroethane	µg/l	14	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 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	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
1,1,2-Trichloroethane	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**0.73 J**	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
1,1-Dichloroethane	µg/l	10,000	**0.89 J**	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**0.55 J**	< 0.5 U	**9.3 J**	< 0.5 U	< 0.5 U	**11**
1,1-Dichloroethene	µg/l	7	**15**	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	**78**	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**2.0**	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,1-Dichloropropene	µg/l	2.9	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,2,3-Trichlorobenzene	µg/l	310	< 0.5 UJ	NA	< 0.5 U	< 0.5 UJ	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,2,3-Trichloropropane	µg/l	0.041	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,2,4-Trichlorobenzene	µg/l	70	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,2,4-Trimethylbenzene	µg/l	5,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,2-Dibromo-3-chloropropane	µg/l	0.2	< 0.5 UJ	NA	< 0.5 U	< 0.5 UJ	< 0.5 U	< 10 U	< 0.5 UJ	< 2.5 U	< 0.5 U	< 0.5 U	< 10 UJ	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,2-Dibromoethane	µg/l	0.05	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,2-Dichlorobenzene	µg/l	600	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,2-Dichloroethane	µg/l	5	**84**	NA	< 0.5 U	< 0.5 U	< 0.5 U	**38**	**4.7**	**66**	< 0.5 U	< 0.5 U	**17 J**	< 5.0 U	< 0.5 U	**15**	< 0.5 U	< 0.5 U	**40**	**110**	< 0.5 U	**47**	**0.99 J**	**0.87 J**	**91**
1,2-Dichloropropane	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,3,5-Trimethylbenzene	µg/l	5,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,3-Dichlorobenzene	µg/l	3,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,3-Dichloropropane	µg/l	29	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
1,4-Dichlorobenzene	µg/l	75	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
2,2-Dichloropropane	µg/l	42	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
2-Butanone	µg/l	61,000	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 20 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U
2-Chlorotoluene	µg/l	2,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
2-Hexanone	µg/l	6,100	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 20 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U
4-Chlorotoluene	µg/l	2,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
4-Isopropyltoluene	µg/l	10,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
4-Methyl-2-pentanone	µg/l	8,200	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 20 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U
Acetone	µg/l	92,000	< 1.0 U	NA	**3.3**	< 1.0 U	**2.1**	< 20 U	< 1.0 U	< 5.0 U	< 1.0 U	7.8 UB	< 20 U	< 10 U	< 1.0 U	**4.0**	< 1.0 U	**5.8**	< 1.0 U	< 1.0 U	**2.8**	< 10 U	**6.4 J**	**3.6 J**	< 10 U
Benzene	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**1.2**	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	**16 J**
Bromobenzene	µg/l	2,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Bromochloromethane	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**8.8 J**	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Bromodichloromethane	µg/l	4.6	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Bromoform	µg/l	36	< 0.5 UJ	NA	< 0.5 U	< 0.5 UJ	< 0.5 U	< 10 U	< 0.5 UJ	< 2.5 U	< 0.5 U	< 0.5 U	< 10 UJ	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Bromomethane	µg/l	140	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Carbon disulfide	µg/l	10,000	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 20 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	**1.3 J**	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U
Carbon tetrachloride	µg/l	5	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**13**	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	**68 J**
Chlorobenzene	µg/l	100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Chloroethane	µg/l	41,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Chloroform	µg/l	1,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	**20 J**	< 0.5 U	< 0.5 U	**27**	**26 J**	< 0.5 U	**1.2 J**	< 0.5 U	< 0.5 U	< 0.5 U	**9.1**	< 0.5 U	**16**	< 0.5 U	< 0.5 U	**74**
Chloromethane	µg/l	220	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
cis-1,2-Dichloroethene	µg/l	70	**52**	NA	**1.2**	< 0.5 U	< 0.5 U	**190**	**0.90 J**	**8.1**	< 0.5 U	**57**	**790**	< 5.0 U	< 0.5 U	**2.8**	< 0.5 U	< 0.5 U	**35**	**2,000**	< 0.5 U	**3,200**	**32**	**27**	**930**
cis-1,3-Dichloropropene	µg/l	5.3	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Dibromochloromethane	µg/l	34	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Dibromomethane	µg/l	380	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Dichlorodifluoromethane	µg/l	20,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Ethylbenzene	µg/l	700	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
Hexachlorobutadiene	µg/l	20	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 0.5 U	< 5.0 U	< 1.0 U	< 1.0 U	< 20 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U
Isopropylbenzene	µg/l	10,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 1.0 U	< 1.0 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
m,p-Xylene	µg/l	10,000**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 20 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U
Methylene chloride	µg/l	5	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 20 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 20 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**8,400**	< 1.0 U	< 1.0 U	**12 J**
Naphthalene	µg/l	2,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U
n-Butylbenzene	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	MW16_062619 6/26/19	MW17_062519 6/25/19	MW18_062619 6/26/19	MW19_062619 6/2619	MW20_061319 6/13/19	MW21-061819 6/18/19	MW22_062119 6/21/19	MW23_062419 6/24/19	102_062419 6/24/19	109_061819 6/18/19	120_062019 6/20/19	125_062419 6/24/19	126_062419 6/24/19	129_062419 6/24/19	130_062519 6/25/19	130_062519-a 6/25/19	ICT2_062819 6/28/19	ICT4_062819 6/28/19	ICT7_062819 6/28/19	ICT8_062819 6/28/19	ICT11_062819 6/28/19	ICT11_062819-a 6/28/19	ICT12B_062819 6/28/19
n-Propylbenzene	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
o-Xylene	µg/l	10,000**	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
sec-Butylbenzene	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
Styrene	µg/l	100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
tert-Butylbenzene	µg/l	4,100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
Tetrachloroethene	µg/l	5	**1.4**	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**0.90 J**	**1.8**	< 0.5 U	**240**	< 0.5 U	< 0.5 U	**6.6 J**
Toluene	µg/l	1,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
trans-1,2-Dichloroethene	µg/l	100	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**1.0**	**5.2**	< 0.5 U	**9.8 J**	< 0.5 U	< 0.5 U	**5.3 J**
trans-1,3-Dichloropropene	µg/l	29	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
Trichloroethene	µg/l	5	**1,200**	NA	**25**	**0.63 J**	< 0.5 U	**6,300**	**230**	**2,600**	< 0.5 U	**130**	**7,900**	< 5.0 U	< 0.5 U	**820**	< 0.5 U	< 0.5 U	**670**	**6,000**	**1.0**	**7,500**	**270**	**210**	**14,000**
Trichlorofluoromethane	µg/l	31,000	< 0.5 U	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 10 U	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 0.5 U	< 0.5 U	< 5.0 U
Vinyl chloride	µg/l	2	**2.1**	NA	< 0.5 U	< 0.5 U	< 0.5 U	**18 J**	< 0.5 U	< 2.5 U	< 0.5 U	< 0.5 U	< 10 U	< 5.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**0.95 J**	**10**	< 0.5 U	**13**	< 0.5 U	< 0.5 U	**28**
Metals (6020A)																									
Aluminum	mg/L	100	NA	NA	NA	**1.54**	**1.12**	**0.0299**	**0.0158**	NA	**10.3**	NA	NA	**0.324**	**0.0917**	**2.44**	**5.22**	**5.34**	**0.139**	**0.0112**	**0.211**	**0.0188**	**0.00846 J**	**0.0149 J**	**0.0271**
Antimony	mg/L	0.006	NA	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	NA	< 0.000500 U	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	0.000493 UB	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Arsenic	mg/L	0.01	NA	NA	NA	**0.0137**	**0.00104 J**	**0.00241 J**	**0.00145 J**	NA	**0.00262 J**	NA	NA	**0.000450 J**	**0.00462 J**	**0.00120 J**	**0.00360 J**	**0.00349 J**	**0.00229 J**	**0.000680 J**	**0.000594 J**	**0.00649**	< 0.000500 U	**0.000576 J**	< 0.000500 U
Barium	mg/L	2	NA	NA	NA	**0.467**	**0.479**	**9.21**	**0.683**	NA	**0.276**	NA	NA	**0.0647**	**10.4**	**0.119**	**0.0930**	**0.0899**	**0.167**	**0.134**	**0.217**	**0.303**	**0.443**	**0.446**	**0.286**
Beryllium	mg/L	0.004	NA	NA	NA	**0.000294 J**	< 0.000500 U	**0.000301 J**	< 0.000500 U	NA	**0.00113 J**	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	**0.000454 J**	**0.000469 J**	< 0.000500 U	< 0.000500 U	**0.000549 J**	< 0.000500 U	**0.000285 J**	**0.000280 J**	< 0.000500 U
Cadmium	mg/L	0.005	NA	NA	NA	**0.00227**	**0.000359 J**	**0.000837 J**	< 0.000500 U	NA	**0.000225 J**	NA	NA	**0.000218 J**	**0.000370 J**	**0.000738 J**	**0.000499 J**	**0.000533 J**	< 0.000500 U	**0.000394 J**	< 0.000500 U	< 0.000500 U	**0.000354 J**	**0.000314 J**	< 0.000500 U
Calcium	mg/L	NV	NA	NA	NA	**44.1**	**44.7**	**223**	**76.1**	NA	**3.53**	NA	NA	**1.25**	**344**	**4.49**	**8.03**	**8.07**	**19.5**	**35.8**	**2.41**	**12.8**	**10.3**	**10.4**	**26.6**
Chromium	mg/L	0.1	NA	NA	NA	**0.791**	**0.0188**	**1.09**	**0.0930**	NA	**0.0141**	NA	NA	**0.00412 J**	**0.000825 J**	**0.00567**	**0.00929**	**0.00918**	**0.00284 J**	**0.0321**	**0.00142 J**	**0.00144 J**	**0.142 J**	**0.219 J**	**0.0412**
Cobalt	mg/L	6.1	NA	NA	NA	**0.0171**	**0.0154**	**0.117**	**0.00142 J**	NA	**0.00925**	NA	NA	**0.000344 J**	**0.00777**	**0.00936**	**0.00947**	**0.00954**	**0.0116**	**0.00928**	**0.00298 J**	**0.00314 J**	**0.00481 J**	**0.00468 J**	**0.00545**
Copper	mg/L	1.3	NA	NA	NA	**0.0244**	0.00576 UB	**0.219**	**0.00249 J**	NA	**0.0139**	NA	NA	< 0.00100 U	< 0.00100 U	**0.00326 J**	**0.00755**	**0.00743**	**0.0501**	< 0.00100 U	**0.00281 J**	< 0.00100 U	**0.00472 J**	**0.00424 J**	**0.0824**
Iron	mg/L	NV	NA	NA	NA	**67.1**	**3.14**	**15.2**	**1.13**	NA	**15.7**	NA	NA	**0.466**	**4.05**	**3.29**	**7.93**	**7.87**	**4.17**	**0.404**	**0.836**	**16.0**	**1.00**	**1.58**	**1.68**
Lead	mg/L	0.015	NA	NA	NA	**0.00323 J**	**0.00155 J**	**0.000663 J**	< 0.00100 U	NA	**0.0113**	NA	NA	**0.00128 J**	< 0.00100 U	**0.00297 J**	**0.00546**	**0.00565**	**0.00446 J**	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U	< 0.00100 U
Magnesium	mg/L	NV	NA	NA	NA	**26.1**	**12.5**	**178**	**34.5**	NA	**3.81**	NA	NA	**0.937**	**269**	**3.31**	**5.19**	**5.20**	**20.0**	**31.8**	**2.46**	**10.3**	**7.04**	**7.20**	**18.6**
Manganese	mg/L	1.1*	NA	NA	NA	**1.50**	**0.274**	**2.59**	**0.0164**	NA	**0.0964**	NA	NA	**0.00625**	**0.150**	**0.176**	**0.285**	**0.287**	**0.336**	**0.311**	**0.0961**	**0.228**	**0.205**	**0.200**	**0.165**
Nickel	mg/L	0.49*	NA	NA	NA	**0.214**	**0.540**	**1.49**	**0.179**	NA	**0.0255**	NA	NA	**0.0022 J**	**0.0137**	**0.00812**	**0.00933**	**0.00981**	**0.0139**	**0.265**	**0.0181**	**0.0213**	**0.564**	**0.547**	**0.345**
Potassium	mg/L	NV	NA	NA	NA	**4.36**	**0.862**	**3.20**	**1.93**	NA	**1.73**	NA	NA	**0.321**	**3.57**	**0.647**	**1.88**	**1.89**	**1.24**	**1.54**	**1.45**	**1.48**	**0.934**	**0.968**	**0.743**
Selenium	mg/L	0.05	NA	NA	NA	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	NA	**0.00243 J**	NA	NA	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U
Silver	mg/L	0.51	NA	NA	NA	< 0.000500	< 0.000500	< 0.000500	< 0.000500 U	NA	< 0.000500 U	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Sodium	mg/L	NV	NA	NA	NA	**453**	**48.6**	**552**	**383**	NA	**17.0**	NA	NA	**28.8**	**949**	**69.6**	**123**	**126**	**155**	**259**	**13.3**	**69.6**	**64.8**	**67.2**	**195**
Thallium	mg/L	0.002	NA	NA	NA	< 0.000500 U	< 0.000500	< 0.000500 U	< 0.000500 U	NA	**0.000275 J**	NA	NA	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	**0.000618 J**	< 0.000500 U	< 0.000500 U
Vanadium	mg/L	0.72	NA	NA	NA	**0.0102**	0.00507 UB	0.00433 UB	0.00257 UB	NA	**0.0237**	NA	NA	0.00142 UB	0.00257 UB	**0.00659**	**0.0165**	**0.0168**	0.00189 UB	0.00174 UB	0.00136 UB	0.00195 UB	0.00109 UB	0.00243 UB	**0.000667 J**
Zinc	mg/L	31	NA	NA	NA	**0.0441**	**0.102**	**0.0462**	**0.0241**	NA	**0.0748**	NA	NA	**0.0207**	**0.0423**	**0.0356**	**0.0478**	**0.0456**	**0.196**	**0.0164**	**0.0553**	**0.0101**	**0.0902**	**0.0793**	**0.105**
Mercury	mg/L	0.002	NA	NA	NA	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	NA	< 0.000100 U	NA	NA	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U
1,4-Dioxane (8270D SIM)																									
1,4-Dioxane	µg/l	9.1	**12**	**0.31**	NA	NA	NA	**1.2 J**	NA	NA	NA	**0.500**	**9.9**	< 0.010 U	< 0.010 U	**1.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Blue highlighting indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

a - duplicate sample

mg/L - milligrams per liter

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.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, manganese, and nickel compared to the PCL

** Value is for total xylenes

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	ICT12B_062819-a 6/28/19	ICT12C_062819 6/28/19	ICT12D_062819 6/28/19	ICT12E_062819 6/28/19	ICT13A_071118 7/11/18
Lab Package			HS19070016	HS19070016	HS19070016	HS19070016	HS19070622
Well ID			ICT-12B	ICT-12C	ICT-12D	ICT-12E	ICT-13A
Perchlorate (6850)							
Perchlorate	µg/L	17*	**150,000**	**6,500**	**13,000**	**28,000**	**540**
Volatile Organic Compounds (8260C)							
1,1,1,2-Tetrachloroethane	µg/l	110	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,1,1-Trichloroethane	µg/l	200	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,1,2,2-Tetrachloroethane	µg/l	14	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,1,2-Trichloroethane	µg/l	5	< 5.0 U	< 5.0 U	**9.8 J**	**14**	< 0.5 U
1,1-Dichloroethane	µg/l	10,000	**12**	< 5.0 U	**75**	**100**	**1.3 J**
1,1-Dichloroethene	µg/l	7	< 5.0 U	< 5.0 U	**370**	**550**	**5.5 J**
1,1-Dichloropropene	µg/l	2.9	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,2,3-Trichlorobenzene	µg/l	310	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,2,3-Trichloropropane	µg/l	0.041	< 5.0 U	< 5.0 U	**350**	< 5.0 U	< 0.5 U
1,2,4-Trichlorobenzene	µg/l	70	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,2,4-Trimethylbenzene	µg/l	5,100	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,2-Dibromo-3-chloropropane	µg/l	0.2	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,2-Dibromoethane	µg/l	0.05	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,2-Dichlorobenzene	µg/l	600	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,2-Dichloroethane	µg/l	5	**68**	**27**	**160**	**63**	**18 J**
1,2-Dichloropropane	µg/l	5	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,3,5-Trimethylbenzene	µg/l	5,100	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,3-Dichlorobenzene	µg/l	3,100	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,3-Dichloropropane	µg/l	29	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
1,4-Dichlorobenzene	µg/l	75	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
2,2-Dichloropropane	µg/l	42	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
2-Butanone	µg/l	61,000	< 10 U	< 10 U	< 10 U	< 10 U	< 1.0 U
2-Chlorotoluene	µg/l	2,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
2-Hexanone	µg/l	6,100	< 10 U	< 10 U	< 10 U	< 10 U	< 1.0 U
4-Chlorotoluene	µg/l	2,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
4-Isopropyltoluene	µg/l	10,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
4-Methyl-2-pentanone	µg/l	8,200	< 10 U	< 10 U	< 10 U	< 10 U	< 1.0 U
Acetone	µg/l	92,000	< 10 U	< 10 U	< 10 U	**180**	< 1.0 U
Benzene	µg/l	5	**11 J**	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Bromobenzene	µg/l	2,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Bromochloromethane	µg/l	4,100	< 5.0 U	< 5.0 U	**55**	**40**	< 0.5 U
Bromodichloromethane	µg/l	4.6	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Bromoform	µg/l	36	< 5.0 U	< 5.0 U	**7.8 J**	< 5.0 U	< 0.5 UJ
Bromomethane	µg/l	140	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Carbon disulfide	µg/l	10,000	< 10 U	< 10 U	< 10 U	< 10 U	< 1.0 U
Carbon tetrachloride	µg/l	5	**49 J**	**11**	< 5.0 U	< 5.0 U	< 0.5 U
Chlorobenzene	µg/l	100	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Chloroethane	µg/l	41,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Chloroform	µg/l	1,000	**70**	**16**	**61**	**84**	< 0.5 U
Chloromethane	µg/l	220	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
cis-1,2-Dichloroethene	µg/l	70	**1,100**	**140**	**10,000**	**17,000**	**86 J**
cis-1,3-Dichloropropene	µg/l	5.3	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Dibromochloromethane	µg/l	34	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Dibromomethane	µg/l	380	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Dichlorodifluoromethane	µg/l	20,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Ethylbenzene	µg/l	700	< 5.0 U	< 5.0 U	**6.0 J**	**7.7 J**	< 0.5 U
Hexachlorobutadiene	µg/l	20	< 10 U	< 10 U	< 10 U	< 10 U	< 1.0 U
Isopropylbenzene	µg/l	10,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
m,p-Xylene	µg/l	10,000**	< 10 U	< 10 U	**7.1 J**	**12 J**	< 1.0 U
Methylene chloride	µg/l	5	**11 J**	< 10 U	**11,000**	**120,000**	< 1.0 U
Naphthalene	µg/l	2,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
n-Butylbenzene	µg/l	4,100	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	ICT12B_062819-a 6/28/19	ICT12C_062819 6/28/19	ICT12D_062819 6/28/19	ICT12E_062819 6/28/19	ICT13A_071118 7/11/18
n-Propylbenzene	µg/l	4,100	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
o-Xylene	µg/l	10,000**	< 5.0 U	< 5.0 U	**5.3 J**	**8.6 J**	< 0.5 U
sec-Butylbenzene	µg/l	4,100	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Styrene	µg/l	100	< 5.0 U	< 5.0 U	< 5.0 U	**41**	< 0.5 U
tert-Butylbenzene	µg/l	4,100	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Tetrachloroethene	µg/l	5	< 5.0 U	< 5.0 U	**10**	**14**	**2.2 J**
Toluene	µg/l	1,000	< 5.0 U	< 5.0 U	**17**	**28**	< 0.5 U
trans-1,2-Dichloroethene	µg/l	100	**5.2 J**	< 5.0 U	**29**	**43**	**1.1 J**
trans-1,3-Dichloropropene	µg/l	29	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Trichloroethene	µg/l	5	**15,000**	**3,900**	**44,000**	**84,000**	**920**
Trichlorofluoromethane	µg/l	31,000	< 5.0 U	< 5.0 U	< 5.0 U	< 5.0 U	< 0.5 U
Vinyl chloride	µg/l	2	**32**	< 5.0 U	**320**	**440**	**6.4 J**
Metals (6020A)							
Aluminum	mg/L	100	**0.0285**	**0.0415**	**0.595**	**0.0433**	**0.677**
Antimony	mg/L	0.006	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Arsenic	mg/L	0.01	< 0.000500 U	< 0.000500 U	**0.00524**	**0.00106 J**	**0.00149 J**
Barium	mg/L	2	**0.285**	**0.123**	**0.444**	**0.197**	**0.0656 J**
Beryllium	mg/L	0.004	< 0.000500 U	< 0.000500 U	**0.000829 J**	**0.000205 J**	**0.000221 J**
Cadmium	mg/L	0.005	< 0.000500 U	< 0.000500 U	**0.000738 J**	**0.000355 J**	< 0.000500 U
Calcium	mg/L	NV	**27.2**	**6.85**	**20.5**	**37.7**	**3.93**
Chromium	mg/L	0.1	**0.0449**	**0.0972**	**0.338**	**0.142**	**0.0155**
Cobalt	mg/L	6.1	**0.00515**	**0.000998 J**	**0.0404**	**0.0315**	**0.00696**
Copper	mg/L	1.3	**0.0802**	< 0.00250 U	**0.721**	**0.0229**	**0.00803**
Iron	mg/L	NV	**1.58**	**0.969**	**20.4**	**3.22**	**5.49**
Lead	mg/L	0.015	< 0.00100 U	< 0.00100 U	**0.0259**	< 0.00100 U	**0.000925 J**
Magnesium	mg/L	NV	**18.6**	**5.56**	**17.2**	**29.8**	**3.51**
Manganese	mg/L	1.1*	**0.155**	**0.0176**	**1.13**	**1.28**	**0.132**
Nickel	mg/L	0.49*	**0.328**	**0.0408**	**0.850**	**0.178**	**0.0145**
Potassium	mg/L	NV	**0.749**	**0.301**	**1.05**	**2.43**	**0.708**
Selenium	mg/L	0.05	< 0.00250 U	< 0.00250 U	**0.00224 J**	**0.00349 J**	**0.00127 J**
Silver	mg/L	0.51	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Sodium	mg/L	NV	**192**	**96.2**	**175**	**339**	**70.0**
Thallium	mg/L	0.002	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	**0.000243 J**
Vanadium	mg/L	0.72	**0.000792 J**	**0.00125 J**	**0.00303 J**	< 0.000500 U	**0.00425 J**
Zinc	mg/L	31	**0.120**	**0.0188**	**0.0862**	**0.0387**	**0.288**
Mercury	mg/L	0.002	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U
1,4-Dioxane (8270D SIM)							
1,4-Dioxane	µg/l	9.1	NA	NA	NA	NA	NA

Notes:

Blue highlighting indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

a - duplicate sample

mg/L - milligrams per liter

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.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, manganese, and nickel compared to the PCL

** Value is for total xylenes

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - June 2019

Location ID: Sample Date:	Units	MCL/MSC/PCL	ICT13B_062819 6/28/19	ICT13D_062819 6/28/19	ICT13E_062819 6/28/19	ICT13F_062819 6/28/19	ICT14B_062819 6/28/19	ICT14C_062819 6/28/19	ICT14D_062819 6/28/19
Lab Package			HS19070016	HS19070016	HS19070016	HS19070016	HS19070016	HS19070016	HS19070016
Well ID			ICT-13B	ICT-13D	ICT-13E	ICT-13F	ICT-14B	ICT-14C	ICT-14D
Perchlorate (6850)									
Perchlorate	µg/L	17*	< 2.0 U	**43**	**3.8 J**	< 2.0 U	**12,000**	< 2.0 U	**210**
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/l	110	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,1,1-Trichloroethane	µg/l	200	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,1,2,2-Tetrachloroethane	µg/l	14	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,1,2-Trichloroethane	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**5.1 J**	< 5.0 U
1,1-Dichloroethane	µg/l	10,000	**1.0**	< 0.5 U	< 0.5 U	< 0.5 U	**1.4**	**10**	**25**
1,1-Dichloroethene	µg/l	7	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**140**	< 5.0 U
1,1-Dichloropropene	µg/l	2.9	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,2,3-Trichlorobenzene	µg/l	310	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,2,3-Trichloropropane	µg/l	0.041	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,2,4-Trichlorobenzene	µg/l	70	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,2,4-Trimethylbenzene	µg/l	5,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,2-Dibromo-3-chloropropane	µg/l	0.2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,2-Dibromoethane	µg/l	0.05	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,2-Dichlorobenzene	µg/l	600	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,2-Dichloroethane	µg/l	5	**42**	**10**	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	**13**
1,2-Dichloropropane	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,3,5-Trimethylbenzene	µg/l	5,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,3-Dichlorobenzene	µg/l	3,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,3-Dichloropropane	µg/l	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
1,4-Dichlorobenzene	µg/l	75	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
2,2-Dichloropropane	µg/l	42	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
2-Butanone	µg/l	61,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 10 U
2-Chlorotoluene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
2-Hexanone	µg/l	6,100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 10 U
4-Chlorotoluene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
4-Isopropyltoluene	µg/l	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
4-Methyl-2-pentanone	µg/l	8,200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 10 U
Acetone	µg/l	92,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**6.2**	< 10 U	< 10 U
Benzene	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Bromobenzene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Bromochloromethane	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	**22**
Bromodichloromethane	µg/l	4.6	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Bromoform	µg/l	36	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Bromomethane	µg/l	140	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Carbon disulfide	µg/l	10,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 10 U
Carbon tetrachloride	µg/l	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Chlorobenzene	µg/l	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Chloroethane	µg/l	41,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Chloroform	µg/l	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**39**	**29**
Chloromethane	µg/l	220	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
cis-1,2-Dichloroethene	µg/l	70	**140**	**37**	< 0.5 U	< 0.5 U	**31**	**11,000**	**21,000**
cis-1,3-Dichloropropene	µg/l	5.3	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Dibromochloromethane	µg/l	34	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Dibromomethane	µg/l	380	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Dichlorodifluoromethane	µg/l	20,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Ethylbenzene	µg/l	700	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Hexachlorobutadiene	µg/l	20	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.5 U	< 10 U	< 10 U
Isopropylbenzene	µg/l	10,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
m,p-Xylene	µg/l	10,000**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 10 U	< 10 U
Methylene chloride	µg/l	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**1,000**	**11,000 J**
Naphthalene	µg/l	2,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
n-Butylbenzene	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U

LHAAP-18/24 Sampling Event - June 2019

Location ID: / Sample Date:	Units	MCL/MSC/PCL	ICT13B_062819 6/28/19	ICT13D_062819 6/28/19	ICT13E_062819 6/28/19	ICT13F_062819 6/28/19	ICT14B_062819 6/28/19	ICT14C_062819 6/28/19	ICT14D_062819 6/28/19
n-Propylbenzene	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
o-Xylene	µg/l	10,000**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
sec-Butylbenzene	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Styrene	µg/l	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
tert-Butylbenzene	µg/l	4,100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Tetrachloroethene	µg/l	5	**1.2**	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	**13**
Toluene	µg/l	1,000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
trans-1,2-Dichloroethene	µg/l	100	**1.2**	< 0.5 U	< 0.5 U	< 0.5 U	**0.6 J**	**51**	**44**
trans-1,3-Dichloropropene	µg/l	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 5.0 U	< 5.0 U
Trichloroethene	µg/l	5	**1,200**	**160**	< 0.5 U	< 0.5 U	**190**	**120**	**1,400**
Trichlorofluoromethane	µg/l	31,000	< 0.5 U	< 0.5 U	0.5 U	0.5 U	0.5 U	< 5.0 U	< 5.0 U
Vinyl chloride	µg/l	2	**3.5**	**1.5**	0.5 U	0.5 U	**0.68 J**	**1,600**	**1,100**
Metals (6020A)									
Aluminum	mg/L	100	**0.0158**	**1.41**	**6.70**	**3.09**	**0.0254**	**0.00742 J**	**0.0223 J**
Antimony	mg/L	0.006	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Arsenic	mg/L	0.01	**0.00630**	**0.00193 J**	**0.00294 J**	**0.00162 J**	**0.00114 J**	**0.0108**	**0.00810**
Barium	mg/L	2	**0.203**	**0.0962**	**0.136**	**0.115**	**0.447**	**1.07**	**1.18**
Beryllium	mg/L	0.004	**0.000547 J**	< 0.000500 U	**0.00102 J**	**0.000645 J**	**0.000259 J**	< 0.000500 U	**0.000518 J**
Cadmium	mg/L	0.005	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	**0.000225 J**	**0.000219 J**	**0.000514 J**
Calcium	mg/L	NV	**13.3**	**3.50**	**1.16**	**1.05**	**12.4**	**78.9**	**80.0**
Chromium	mg/L	0.1	**0.0230**	**0.121**	**0.0248**	**0.0124**	**0.0489**	**0.0341**	**0.00422 J**
Cobalt	mg/L	6.1	**0.105**	**0.00316 J**	**0.00491 J**	**0.00302 J**	**0.00274 J**	**0.0331**	**0.0141**
Copper	mg/L	1.3	**0.0276**	**0.00533**	**0.0168**	**0.0127**	**0.00307 J**	**0.00281 J**	**0.00411 J**
Iron	mg/L	NV	**20.3**	**9.93**	**12.1**	**6.24**	**0.842**	**274**	**19.5**
Lead	mg/L	0.015	< 0.00100 U	**0.00505**	**0.00889**	**0.00438 J**	< 0.00100 U	< 0.00100 U	< 0.00100 U
Magnesium	mg/L	NV	**17.7**	**4.38**	**1.63**	**1.14**	**11.6**	**80.4**	**57.2**
Manganese	mg/L	1.1*	**4.05**	**0.0744**	**0.0546**	**0.0357**	**0.239**	**2.33**	**1.31**
Nickel	mg/L	0.49*	**0.0245**	**0.0578**	**0.0192**	**0.00929**	**0.0822**	**0.120**	**0.0474**
Potassium	mg/L	NV	**2.37**	**0.918**	**2.09**	**1.90**	**0.565**	**1.41**	**1.46**
Selenium	mg/L	0.05	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	< 0.00250 U	**0.0109**	< 0.000500 U
Silver	mg/L	0.51	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Sodium	mg/L	NV	**103**	**34.2**	**5.75**	**4.44**	**85.8**	**265**	**295**
Thallium	mg/L	0.002	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U	< 0.000500 U
Vanadium	mg/L	0.72	**0.00112 J**	**0.00524**	**0.0267**	**0.0146**	0.00184 UB	< 0.000500 U	**0.000634 J**
Zinc	mg/L	31	**0.0910**	**0.491**	**0.0557**	**0.0596**	**0.0305**	**0.0439**	**0.141**
Mercury	mg/L	0.002	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U	< 0.000100 U
1,4-Dioxane (8270D SIM)									
1,4-Dioxane	µg/l	9.1	NA	NA	NA	NA	NA	NA	NA

Notes:

Blue highlighting indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

a - duplicate sample

mg/L - milligrams per liter

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.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, manganese, and nickel compared to the PCL

** Value is for total xylenes

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

September 13, 2019

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency, Region 6
1201 Elm Street, Suite 500
Dallas, TX 75270-2102

Re: Final Signature Page for the Explanation of Significant Differences, Record of Decision for Contingency Remedy at LHAAP-50, Former Sump Water Tank
Longhorn Army Ammunition Plant, July 2019

Dear Mr. Mayer,

Please find attached two replacement signature pages signed by the Army and EPA, and one electronic copy (compact disc) of the Final Explanation of Significant Differences for LHAAP-50, Former Sump Water Tank for your records.

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 (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
A. Sherman, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 hard copy and 1 CD for project files)
P. Srivastav, APTIM, Houston, TX

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

September 13, 2019

DAIM-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality (TCEQ)
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Final Signature Page for the Explanation of Significant Differences, Record of Decision for Contingency Remedy at LHAAP-50, Former Sump Water Tank
Longhorn Army Ammunition Plant, July 2019

Dear Ms. Palmie,

Please find attached one replacement signature page signed by the Army and EPA, and one electronic copy (compact disc) of the Final Explanation of Significant Differences for LHAAP-50, Former Sump Water Tank for your records.

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 (letter only):
R. Mayer, USEPA, Region 6, Dallas, TX
P. Bruckwicki, Caddo Lake NWR, TX
A. Williams, USACE, Tulsa District, OK
A. Sherman, USAEC, San Antonio, TX
K. Nemmers, Bhate, Lakewood, CO (for project files)
P. Srivastav, APTIM, Houston, TX

FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
RECORD OF DECISION FOR
CONTINGENCY REMEDY AT LHAAP-50
FORMER SUMP WATER TANK
LONGHORN ARMY AMMUNITION PLANT

July 2019

Contract Number: W9128F-13-D-0012
Task Order Number: W912BV17F0150

Performance-Based Remediation
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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ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AECOM	AECOM Technical Services, Inc.
APTIM	Aptim Federal Services, LLC
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tank
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
COC	chemical of concern
DCA	dichloroethane
DCE	dichloroethene
EPA	see USEPA
ESD	Explanation of Significant Differences
GWP-Ind	soil MSC for industrial use based on groundwater protection
GW-Res	groundwater MSC for residential use
ISB	in situ bioremediation
Jacobs	Jacobs Engineering Group, Inc.
LHAAP	Longhorn Army Ammunition Plant
LTM	long-term monitoring
LUC	land use control
MCL	maximum contaminant level
MNA	monitored natural attenuation
MSC	medium-specific concentration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	operations and maintenance
PCE	tetrachloroethene
PCL	protective concentration level
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	remedial design
ROD	Record of Decision
SDC-9™	APTIM's dechlorinating culture
Shaw	Shaw Environmental, Inc.
TCE	trichloroethene
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resources Conservation Commission
TRRP	Texas Risk Reduction Program
U.S. Army	U.S. Department of the Army
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

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1 INTRODUCTION AND STATEMENT OF PURPOSE

Site and Location: LHAAP-50 is in the north-central section of Longhorn Army Ammunition Plant (LHAAP) and covers approximately 1 acre.

Lead Agency and Supporting Agency:
Lead Agency – U.S. Department of the Army (U.S. Army)
Lead Oversight Agency – U.S. Environmental Protection Agency (USEPA) Region 6
Support Agency – Texas Commission on Environmental Quality (TCEQ)

This Explanation of Significant Differences (ESD) is in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §117 (c), 42 United States Code (U.S.C.) Section (§) 9617 (c) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 Code of Federal Regulations (C.F.R.) §300.435(c)(2)(i).

Date of Record of Decision (ROD) Signature: September 2010, Administrative Record, Bate Stamp 00098892-00098976.

Need for ESD: The September 2010 ROD (Shaw, 2010), Section 1.4, specified the implementation of monitored natural attenuation (MNA) for the volatile organic compounds (VOCs) and perchlorate plume to verify that the plumes are stable, and that natural attenuation is occurring. The ROD also specified that performance objectives will be evaluated after two years of monitoring MNA and if MNA is found to be ineffective, a contingency remedy to enhance MNA will be implemented and documented in an ESD.

The 3rd Annual Remedial Action Operation Report for LHAAP-50 (APTIM, 2018) evaluated the performance of MNA for the VOCs and perchlorate plume. The report presented evidence of plume migration, increasing concentrations of perchlorate and trichloroethene (TCE), and geochemical conditions that are not optimal for MNA and recommended that an in situ bioremediation (ISB) contingency remedy be implemented at this time to enhance MNA.

The purpose of this ESD is to document the significant change from the ROD selected remedy of MNA and the proposed implementation of the ISB contingency remedy to enhance MNA. The ISB contingency remedy is consistent with the ROD requirement to enhance MNA, and is capable of degrading perchlorate and TCE to address the increased concentrations detected.

This ESD will become part of the Administrative Record file in accordance with NCP 40 CFR §300.825(a)(2). The file will be located at the Marshall Public Library:

Marshall Public Library
300 South Alamo Blvd.
Marshall, Texas 75670
Phone: 903 935 4465

Hours:
Monday, Tuesday, and Thursday 9:30 am to 7:30 pm
Wednesday and Friday 9:30 am to 5:30 pm
Saturday 9:30 am to 3:30 pm

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2 SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

2.1 SITE HISTORY AND CONTAMINATION

LHAAP-50, Former Sump Water Tank, contained a 47,000-gallon capacity aboveground storage tank (AST) which received industrial wastewater from various industrial waste production sumps throughout LHAAP between 1955 and 1988. After the solids were filtered, the storage tank contents were discharged into Goose Prairie Creek upstream of the Goose Prairie Creek bridge on South Crockett Avenue, south of 51st Street. The flow in the creek was sufficient to dilute the water to safe levels (Jacobs, 2002). If natural flow in the creek was considered insufficient, clean water was reportedly pumped into the creek to dilute the contents. The AST is no longer present.

The chemicals of concern (COCs) identified in the LHAAP-50 ROD include dissolved phase perchlorate and VOCs including tetrachloroethene (PCE), TCE, 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride in groundwater, and perchlorate in soil. There are no COCs in other environmental media at the site. The presence of these COCs at concentrations exceeding the human health cleanup levels in the soil and groundwater represented the primary driver for remedial action, as there were no ecological risks at the site.

Approximately 183 cubic yards of perchlorate-contaminated soil was removed and disposed offsite in September 2013 as described in the Final Remedial Action Completion Report (AECOM, 2016). An area of groundwater contamination is present in the shallow groundwater (upper and lower zones) that poses an unacceptable carcinogenic risk and non-carcinogenic hazard to a future maintenance worker under an industrial exposure scenario. There is no groundwater contamination in the intermediate groundwater zone.

The cleanup levels are the maximum contaminant level (MCL) for the VOCs and the Texas Risk Reduction Program (TRRP) protective concentration level (PCL) for residential use for perchlorate (USEPA, 2014). Concentrations of perchlorate, TCE, 1,1-DCE, and 1,2-DCA have been detected above the cleanup levels. The maximum concentration of perchlorate was detected in the eastern portion of the plume at 91,000 micrograms per liter (µg/L) in May 2018 above the Texas Residential Groundwater PCL. The maximum concentration of TCE as of May 2018 was detected at 620 µg/L in the central part of the plume; 1,1-DCE concentrations were below the MCL as of May 2018; an isolated detection of 1,2-DCA was observed at 83 µg/L as of May 2018.

A Federal Facility Agreement became effective December 30, 1991, among USEPA, the U.S. Army, and the Texas Natural Resources Conservation Commission (TNRCC), now the TCEQ. LHAAP-50 has been added to the list of National Priorities List sites at LHAAP with concurrence from the U.S. Army and USEPA Headquarters.

2.2 SELECTED REMEDY

The selected remedy identified as Alternative 2 in Section 2.12.2 of the ROD for LHAAP-50 includes soil removal, MNA and land use controls (LUCs). This alternative was selected because it was consistent with the intended future use of the site as a wildlife refuge. The alternative also satisfied the remedial action objectives (RAOs) for the site through LUC groundwater restriction, which would ensure protection of human health by preventing human exposure to contaminated groundwater. MNA, and a contingency remedy to enhance MNA, if MNA is found to be ineffective, would return the contaminated water to its potential beneficial use, wherever practicable. Furthermore, long-term monitoring (LTM) would assure that human health and the environment are being protected by verifying that contaminated groundwater does not migrate into nearby surface water bodies at levels that exceed MCLs. This alternative offered a high degree of long-term effectiveness that could be easily implemented at a lower cost than other alternatives.

The following language is taken from Section 2.12.2, Description of the Selected Remedy, of the ROD (Shaw, 2010):

- Excavation of the contaminated soil and disposal in a Resource Conservation and Recovery Act (RCRA)-permitted landfill will remove soil that is considered to be a contaminant source to groundwater, thereby, protecting groundwater. The estimated volume of soil to be removed is 150 cubic yards and is based on the conservative TCEQ soil medium-specific concentration (MSC) for industrial use based on groundwater protection (GWP-Ind) of 7,200 micrograms per kilogram (µg/kg) for perchlorate in soil. The removal of soil contamination will be verified by collecting confirmation samples from the walls and floors of the excavation area and submitting them for laboratory analysis for perchlorate.
- Semi-annual performance monitoring of Goose Prairie Creek adjacent to the LHAAP-50 will be conducted at two locations after excavation of the contaminated perchlorate pathway. Evaluation of this data will be included in the annual reports. The frequency and locations of sampling may be modified after evaluation of data. If perchlorate levels in the creek are consistently above the groundwater MSC for residential use (GW-Res) after two years of monitoring, then additional evaluation will be conducted, and any proposed actions will be included in the annual evaluation report to be submitted after Year 2. The need to continue creek sampling will be evaluated during the five-year reviews.
- *MNA to return groundwater to its potential beneficial use, wherever practicable.* Historic data suggest that natural attenuation of COCs is occurring at the site; however, additional data collection is necessary to fully evaluate natural attenuation. Monitoring wells will be sampled for eight consecutive quarters to evaluate and confirm the occurrence of natural attenuation in conjunction with historical data. Data from the eight quarterly events will be combined with historic data to evaluate the effectiveness of various natural physical, chemical, and biological processes in reducing contaminant concentrations.

- *Performance objectives to evaluate the MNA remedy performance after two years.* Each of the general performance objectives must be met as indicated below. If the criteria are not met to illustrate that MNA is an effective remedy, a contingency action would be initiated. If MNA is effective, a baseline will be established from the data to this point in time. Specific evaluation criteria will be developed in the Remedial Design (RD). The MNA evaluation will be based on the USEPA lines of evidence (USEPA, 1999) and the anaerobic screening (USEPA, 1998) as follows:
  - MNA potential based on evaluating biodegradation screening scores using USEPA guidance.
  - Plume stability (i.e., the plume concentrations are decreasing in the majority of performance wells, and the plume is not expanding in area as demonstrated with compliance wells).
  - MNA Process Evaluation demonstrated based on an attenuation rate calculated with empirical performance monitoring data, and MNA Process Demonstration based on the presence of daughter products and bacterial culture counts.
- *A contingency remedy to enhance MNA to reach the RAO if MNA is found to be ineffective*. The contingency remedy will use elements from other active remedial alternatives included in this ROD to address the ineffective aspects of MNA. The area and the elements of the contingency remedy would be selected based on the entire data set available. If a contingency remedy is implemented, it will be documented in an ESD.
- *Initiate LTM*. If MNA is determined to be effective, monitoring will be conducted to evaluate the remedy performance and determine if the plume conditions remain constant, improve or worsen after the baseline is established. Monitoring will continue after the initial eight quarters at a frequency of semiannual for three years, then annually until the next five-year review. The performance monitoring plan will be developed in the RD and will be based on USEPA guidance (USEPA, 2004).
- *Continue LTM* every five years to evaluate remedy performance and determine if plume conditions remain constant, improve, or worsen. The baseline of the plume for future five-year reviews will be established as part of the MNA evaluation program. The initial LTM plan will be developed during RD.
- LUC to restrict access to the contaminated groundwater to environmental monitoring and testing only until cleanup levels are reached. LUC implementation details will be included in the RD. The recordation notification for the site to be filed with Harrison County will include a description of the LUC. The boundary of the LUC will encompass the site boundaries and the plume boundaries.

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3 BASIS FOR THE DOCUMENT

The September 2010 ROD (Shaw, 2010), Section 2.12.2, contingency remedy component states that if a contingency remedy is implemented, it will be documented in an ESD. The 3rd Annual Remedial Action Operation Report for LHAAP-50 (APTIM, 2018) presented data that indicated geochemical conditions were not optimal for MNA. The 3rd Annual Remedial Action Operation Report for LHAAP-50 documented that MNA was found to be ineffective through several lines of evidence (APTIM, 2018). The TCE groundwater plume has expanded beyond its baseline footprint and now extends to 50WW12, the current downgradient monitoring well within the plume. At 50WW12, TCE concentrations increased from 0.5 µg/L in October 2013 to 79 µg/L in May 2018 while perchlorate concentrations increased from 23,600 µg/L in October 2013 to 91,000 µg/L in May 2018 suggesting continued migration within the current plume boundary. Though the perchlorate plume was relatively stable, a decreasing trend was observed only at one well (APTIM, 2018). The U.S. Army, USEPA, and TCEQ agree that MNA is currently not effective and that the contingency remedy should be implemented at this time (APTIM, 2018).

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4 DESCRIPTION OF SIGNIFICANT DIFFERENCES

As stated in Section 2.9.1 of the ROD, the groundwater remedy includes Excavation, MNA and LUC. The ROD states that a contingency remedy to enhance MNA will be implemented to reach the RAOs, if MNA is found to be ineffective, and will be documented in an ESD. The contingency remedy selected in this ESD to enhance MNA is ISB.

Change to Remedy Scope Presented in the ROD:

The only change to the remedy proposed in the ROD is the implementation of the contingency remedy (ISB) to enhance MNA. After three years of MNA performance monitoring, MNA was found to be ineffective (APTIM, 2018). The contingency remedy will consist of injection of emulsified vegetable oil, a microbial culture (SDC-9™), and nutrients to enhance the MNA remedy in an approximately 6,000 square foot area near monitoring wells 50WW12 and 50WW13. Upon implementation of the contingency remedy (ISB), two years of quarterly performance monitoring will be conducted. ISB will be the contingency remedy implemented for the impacted groundwater.

ROD Performance Objectives for the Groundwater Remedy, Section 2.12.2 Description of the Selected Remedy, paragraph 2:

> The MNA evaluation will be based on the USEPA lines of evidence (USEPA, 1999) and the anaerobic screening (USEPA, 1998) as follows:
>
> - MNA potential based on evaluating biodegradation screening scores using USEPA guidance.
> - Plume stability (i.e., the plume concentrations are decreasing in the majority of performance wells, and the plume is not expanding in area as demonstrated with compliance wells).
> - MNA Process Evaluation demonstrated based on an attenuation rate calculated with empirical performance monitoring data and MNA Process Demonstration based on the presence of daughter products and bacterial culture counts.

Change to Performance Objectives:

No change to the performance objectives in the ROD is proposed. MNA is not currently meeting the performance objectives. The 3rd Annual Remedial Action Operation Report for LHAAP-50 (APTIM, 2018) presented evidence of plume migration, increasing COC trends and geochemical conditions that are not optimal for MNA. The contingency remedy (ISB) will enhance MNA and performance objectives will be re-evaluated after two years of quarterly monitoring.

ROD Implementability Determination, Section 2.10.6, Implementability, paragraph 2:

> Alternative 2 (MNA) is easily implemented from a technical standpoint with minimal construction activities followed by long-term sampling, maintenance and enforcement of the LUC.

Change to Implementability:

The contingency remedy (ISB) would be somewhat more difficult to implement due to the specialized expertise required for design and construction. However, ISB is effective in creating conditions conducive to reductive dechlorination and reducing VOC and perchlorate concentrations.

ROD Protection of Human Health and the Environment, Section 2.13.1, Protection of Human Health and the Environment, paragraph 1:

> The selected remedy, Alternative 2, will protect human health and the environment, and achieve the RAOs for LHAAP-50. Although this alternative does not provide for human intervention to remediate groundwater, the alternative is a passive subsurface remedial action conducted by natural processes and mechanisms. The contaminated groundwater will be reduced to protective applicable or relevant and appropriate requirement (ARAR) levels, and the soil above protective ARAR levels will be removed. LUC would prevent human exposure to the contaminated groundwater by prohibiting the construction of potable wells within the LUC boundaries. Surface water monitoring of the creek will verify that the soil removal effectively mitigated the soil-to-groundwater pathway.

Change to Protection of Human Health and the Environment:

Currently, based on the 3rd Annual Remedial Action Operation Report for LHAAP-50 (APTIM, 2018), there is evidence of plume migration, increasing COC trends and geochemical conditions that are not optimal for MNA. The implementation of the contingency remedy (ISB) will enhance MNA and reduce groundwater contaminant concentrations which will prevent contaminated groundwater from migrating into nearby surface water at levels that may present an unacceptable risk to human health and the environment. Monitoring activities associated with the enhanced MNA would assure the protection of human health and the environment by documenting the return of the groundwater to its potential beneficial use as a drinking water supply, and by documenting reduction of the contaminant mass and protection of surface water through containment of the plume.

ROD Cost Estimate for the Selected Remedy, Section 2.12.3, paragraphs 1 and 2:

> Table 2-8 in the ROD (Shaw, 2010) presents the present worth analysis of the cost for the selected remedy, Alternative 2. The information in this table is based on the best available information regarding the anticipated scope of the remedial alternative. The quantities used in the estimate are for estimating purposes only. Changes in the cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record, an ESD, or a ROD amendment. This is an order of magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost.

The total project present worth cost of this alternative is approximately $639,000, using a discount rate of 2.8%. The capital cost is estimated at $215,000. The total operations and maintenance (O&M) present value cost is estimated at approximately $424,000. The O&M cost includes evaluation of MNA, maintenance of LUC, and LTM through Year 30. The LTM would support the required CERCLA five-year reviews.

Change to Cost Estimate for the Selected Remedy:

The implementation of the contingency remedy (ISB) for Alternative 2 will increase the overall costs associated with this remedial alternative. This increase in cost is due to the capital cost associated with the use of ISB technology to enhance MNA.

It is estimated that implementation of the contingency remedy (ISB) associated with Alternative 3 will increase the original estimate for this alternative by approximately $280,000.

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5 SUPPORT AGENCY COMMENTS

The USEPA and TCEQ have reviewed this ESD and support the changes to the selected remedy.

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6 STATUTORY DETERMINATION

The modification presented herein satisfies CERCLA §121, 42 U.S.C. §9621. The contingency remedy (ISB) will enhance MNA and reduce groundwater contaminant concentrations.

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7 PUBLIC PARTICIPATION

A notice summarizing the ESD shall be published in the Marshall News Messenger upon finalization of the ESD. This ESD and all supporting ESD documentation will be made a part of the Administrative Record file in accordance with the NCP at 40 C.F.R. §300.825(a)(2). The Administrative Record will be located at the repository identified in Section 1.0 of this document. All public participation requirements set out in NCP at 40 C.F.R. §300.435(c)(2)(i) have been met.

The Proposed Plan for Remedial Action at the site was released for public comments on 25 January 2010. The Proposed Plan identified the preferred alternative to be Alternative 2:

- Excavation and off-site disposal of perchlorate contaminated soil
- MNA of groundwater and LUCs
- A contingency remedy to enhance MNA, if MNA is found to be ineffective

The U.S. Army reviewed all written and oral comments submitted during the public comment period. There were no significant comments captured related to the groundwater remedy.

Authorizing Signature:

Thomas C Lederle

Date: 6 Aug 2019

Thomas E. Lederle
Chief, ACSIM BRAC Division
U.S. Department of the Army

Authorizing Signature:
I have reviewed this document, and any comments I had have been addressed and/or incorporated:

Wren Stenger

Date: 8/29/19

Wren Stenger
Director
Superfund Division
U.S. Environmental Protection Agency, Region 6

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8 REFERENCES

AECOM Technical Services, Inc. (AECOM), 2016, Final Remedial Action Report, LHAAP-50, Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas. June.

Aptim Federal Services, LLC (APTIM), 2018, *Draft Final 3rd Annual Remedial Action Operation Report, LHAAP-50 Shops Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas.* July.

Jacobs Engineering Group, Inc. (Jacobs), 2002, Final Remedial Investigation Report for the Group 4 Sites, Sites 35A, 35B, 35C, 46, 47, 48, 50, 60, 67, and Goose Prairie Creek, Longhorn Army Ammunition Plant, Karnack, Texas, Oak Ridge, TN, January (RI).

Shaw Environmental, Inc. (Shaw), 2010, *Final Record of Decision LHAAP-50, Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas.* July.

U.S. Environmental Protection Agency (USEPA), 1998, *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, EPA/600/R-98/128,* September.

USEPA, 1999, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, Directive 9200.4-17P, April.

USEPA, 2004, *Performance Monitoring of MNA Remedies for VOCs in Ground Water*, EPA/600/R-04/027, April.

USEPA, 2014, Transmittal of Final Dispute Decision, Letter dated October 31, 2014, from Gina McCarthy, USEPA Administrator, to John McHugh, Secretary of the Army, and Bryan Shaw, Chairman of TCEQ. Longhorn Army Ammunition Plant, Karnack, Texas, Administrative Record, Volume 4, 2014, 00192717-00192750.

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DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

September 26, 2019

DAIM-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality
Remediation Division
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: LHAAP-29 Record of Decision, August 2019
Longhorn Army Ammunition Plant, Karnack, Texas

Dear Ms. Palmie,

Enclosed please find the replacement pages for the August 2019 LHAAP-29 Record of Decision (ROD) for your records. This is the final ROD and includes the completed signature page with Army and EPA signatures, and the TCEQ concurrence.

The Final document transmitted for signature and concurrence on 16 August 2019 was revised in response to EPA's 4 September 2019 request to remove "Major" from the fourth sentence in Section 2.12.3 Cost Estimate of the Selected Remedy. The sentence "Major changes may be documented in the form of a memorandum in the Administrative Record, an Explanation of Significant Difference (ESD), or a ROD amendment" was revised to "Changes will be documented in accordance with 40 CFR 300.435(c)(2) in the form of a memorandum in the Administrative Record, an Explanation of Significant Difference (ESD), or a ROD amendment, as necessary." The revision also required changes to the notes for Tables 2-12 and 2-13. Other than these changes, the document remains the same as the 16 August 2019 Final ROD.

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

One Enclosure
Copies furnished:

R. Mayer, USEPA, Dallas, TX
R. Smith, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
A. Sherman, USAEC, San Antonio, TX
K.Nemmers, Bhate
P. Werner, HDR

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

September 26, 2019

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency
Federal Facilities Section R6
1201 Elm Street, Suite 500
Dallas, TX 75202-2102

Re: LHAAP-29 Record of Decision, August 2019
Longhorn Army Ammunition Plant, Karnack, Texas

Dear Mr. Mayer,

Enclosed please find the August 2019 LHAAP-29 Record of Decision (ROD) for your records. This is the final ROD and includes the completed signature page with Army and EPA signatures, and the TCEQ concurrence.

The Final document transmitted for signature and concurrence on 16 August 2019 was revised in response to EPA's 4 September 2019 request to remove "Major" from the fourth sentence in Section 2.12.3 Cost Estimate of the Selected Remedy. The sentence "Major changes may be documented in the form of a memorandum in the Administrative Record, an Explanation of Significant Difference (ESD), or a ROD amendment" was revised to "Changes will be documented in accordance with 40 CFR 300.435(c)(2) in the form of a memorandum in the Administrative Record, an Explanation of Significant Difference (ESD), or a ROD amendment, as necessary." The revision also required changes to the notes for Tables 2-12 and 2-13. Other than these changes, the document remains the same as the 16 August 2019 Final ROD.

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

One Enclosure
Copies furnished:

A. Palmie, TCEQ, Austin, TX
R. Smith, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
A. Sherman, USAEC, San Antonio, TX
K.Nemmers, Bhate
P. Werner, HDR

Jon Niermann, *Chairman*
Emily Lindley, *Commissioner*
Toby Baker, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 13, 2019

Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
2530 Crystal Drive, Room 5000
Taylor Bldg / NC3
Arlington, VA 22202

Subject: Record of Decision for LHAAP-29, Former TNT Production Area,
Longhorn Army Ammunition Plant Federal Superfund Site TX6213820529
Karnack, Harrison County, Texas

Dear Mr. Lederle:

The Texas Commission on Environmental Quality (TCEQ) received the final Record of Decision (ROD) for LHAAP-29, Former TNT Production Area, Longhorn Army Ammunition Plant Federal Superfund Site in Karnack, Texas on August 16, 2019. The TCEQ has completed the review of the above referenced document and concurs that the described action is appropriate.

Sincerely,

Toby Baker
Executive Director

Cc: Ms. Wren Stenger, Director, Superfund Division, US Environmental Protection Agency, Region 6

00937079

Final

Record of Decision

for LHAAP-29,
Former TNT Production Area, Group 2
Longhorn Army Ammunition Plant
Karnack, Texas

August 2019

Prepared For:

U.S. Army Corps of Engineers – Tulsa District

Prepared By:

HDR
9871 S. Meridian Blvd, Suite 400
Englewood, CO 80112

Contract No. W912BV-15-D-0014
Task Order No. W912BV18F0023

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Final

RECORD OF DECISION

FOR

LHAAP-29, FORMER TNT PRODUCTION AREA, GROUP 2

LONGHORN ARMY AMMUNITION PLANT

KARNACK, TEXAS

Prepared For:

U.S. Army Corp of Engineers Tulsa District

Prepared By:

HDR, Inc.
9871 S. Meridian Blvd, Suite 400
Englewood, CO 80112

Contract No. W912BV-15-D-0014
Task Order No. W912BV18F0023

August 2019

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Appendix A: Public Notice Affidavits

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Acronyms and Abbreviations

ARAR	applicable or relevant and appropriate requirement
BERA	baseline ecological risk assessment
bgs	below ground surface
BHHRA	baseline human health risk assessment
°C	degrees Celsius
CDI	chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C. F. R.	Code of Federal Regulations
COC	chemical of concern
COPEC	chemical of potential ecological concern
COPC	chemical of potential concern
CSM	conceptual site model
CWA	Clean Water Act of 1972
DCA	dichloroethane
DCE	dichloroethene
DNAPL	dense non-aqueous phase liquid
DNT	dinitrotoluene
ECP	environmental condition of property
EcoPRG	ecological preliminary remediation goal
EEQ	ecological effects quotient
EISB	Enhanced in-situ bioremediation
EPC	exposure point concentration
ERH	Electrical resistance heating
ESD	Explanation of Significant Differences
FFA	Federal Facility Agreement
FR	Federal Register
FS	feasibility study
g/L	grams per liter
GWP-Ind	medium-specific concentration for industrial use based on groundwater protection
GWTP	Groundwater treatment plant
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System
ISTD	In-situ thermal desorption
Jacobs	Jacobs Engineering Group
LHAAP	Longhorn Army Ammunition Plant
LTM	long-term monitoring
LUC	land use control
MC	methylene chloride
MCL	maximum contaminant level
µg/L	Micrograms per liter
mg/kg	milligrams per kilogram
mg/L	Milligrams per liter
mg/kg-day	milligrams per kilogram per day
MNA	monitored natural attenuation
MOA	memorandum of agreement
MSC	medium-specific concentration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan

NOAEL	no-observed adverse effect level
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NT	nitrotoluene
O&M	operation and maintenance
PCB	polychlorinated biphenyl
PCL	Protective concentration level
PP	Proposed Plan
RA	remedial action
RAB	Restoration Advisory Board
RAO	remedial action objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RFA	RCRA Facility Assessment
RfD	reference dose
RI	remedial investigation
ROD	record of decision
SAI-Ind	soil MSC for industrial use based on inhalation, ingestion, and dermal contact
SARA	Superfund Amendments and Reauthorization Act
scfm	standard cubic feet per minute
SDWA	Safe Drinking Water Act
SF	slope factor
Shaw	Shaw Environmental, Inc.
STEP	Solutions to Environmental Problems, Inc.
SVE	Soil vapor extraction
SVOC	semivolatile organic compound
TAC	Texas Administrative Code
TCDD	tetrachlorodibenzo-p-dioxin
TCE	trichloroethene
TCEQ	Texas Commission on Environmental Quality
TCH	Thermal conductance heating
TDS	Total dissolved solids
TEC	toxicity equivalence concentration
TNT	trinitrotoluene
TRRP	Texas Risk Reduction Program
TRRP Residential Groundwater PCL	Texas Risk Reduction Program Tier 1 Residential Groundwater Protective Concentration Level
TRV	toxicity reference level
UCL	upper confidence limit
U.S. Army	U.S. Department of the Army
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VC	vinyl chloride
VOC	volatile organic compound

1. The Declaration

1.1 Site Name and Location

Longhorn Army Ammunition Plant (LHAAP)-29, Former TNT Production Area, Group 2
Longhorn Army Ammunition Plant
Karnack, Texas

Comprehensive Environmental Response, Compensation, and Liability Information System, U.S. Environmental Protection Agency (USEPA) Identification Number: TX6213820529.

1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the selected remedy for LHAAP-29, Former Trinitrotoluene (TNT) Production Area, Group 2 located at the Longhorn Army Ammunition Plant (LHAAP) in Karnack, Texas. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Code of Federal Regulations (C. F. R.) Title 40 §300.

The remedy selection was based on documentation available in the Administrative Record for the site, including the remedial investigation (RI) (Jacobs Engineering Group, Inc. [Jacobs], 2001), baseline human health risk assessment (BHHRA) report (Jacobs, 2002), installation-wide baseline ecological risk assessment (BERA) report (Shaw Environmental, Inc. [Shaw], 2007a), feasibility study (FS) (Shaw, 2010), RI Addendum (AECOM Technical Services [AECOM], 2016), Final Baseline Ecological Risk Assessment Addendum (AGEISS, 2014), FS Addendum (AECOM, 2017) and Revised Proposed Plan (PP) (U.S. Department of the Army [U.S. Army], 2018).

This document is issued by the U.S. Army, the lead agency for this installation. The U.S. Army, USEPA, and the Texas Water Commission (currently known as the TCEQ) entered into the FFA for remedial activities at LHAAP which became effective on December 30, 1991. The USEPA (Region 6) and the Texas Commission on Environmental Quality (TCEQ) are the regulatory agencies providing technical support, project review and comment, and oversight of the LHAAP cleanup program. The USEPA and the U.S Army jointly select the remedy and TCEQ concurs with the selected remedy in this Record of Decision (ROD).

1.3 Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment.

1.4 Description of the Selected Remedy

The final selected remedy for LHAAP-29 includes excavation and off-site disposal of contaminated soil, flushing, inspection, and plugging of the trinitrotoluene (TNT) cooling water and wastewater lines, in situ thermal desorption (ISTD) treatment of the intermediate groundwater zone dense non-

aqueous phase liquid (DNAPL) plume, monitored natural attenuation (MNA) for the shallow zone groundwater plumes and for the intermediate groundwater plume following ISTD, and land use controls (LUCs) for soil and groundwater.

The final selected remedy for LHAAP-29 protects human health and the environment by preventing human and ecological receptor exposure to contaminated soil and contaminated groundwater. The human health risk assessment scenarios evaluated were based on the hypothetical future maintenance worker. In the soil, chemicals of concern (COCs) and chemicals of potential ecological concern (COPECs) are explosives (2,4,6-TNT, 2,4-dinitrotoluene [DNT], and 2,6-DNT). Perchlorate is considered a potential soil COC based on groundwater concentrations. In the shallow groundwater zone, the COCs are Volatile Organic Compounds (VOCs) trichloroethene [TCE], 1,2-dichloroethane (DCA), TCE's daughter products cis-1,2-dichloroethene [DCE]), trans 1,2 DCE, and vinyl chloride [VC]), metals (arsenic, mercury, nickel, selenium), explosives (2,4-DNT, 2,6-DNT, 2-nitrotoluene [NT], 3-NT, 4-NT), and perchlorate. In the intermediate groundwater zone, the COCs are VOCs (methylene chloride (MC), TCE, 1,2-DCA, TCE's daughter products 1,1-DCE, cis-1,2-DCE, trans-1,2 DCE, and VC) and arsenic. COCs in the transite TNT wastewater and vitrified clay cooling water lines include explosives (2,4,6-TNT, 2,4-DNT, 2,6-DNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT, 1,3-dinitrobenzene). Residual MC DNAPL acting as a source material in the intermediate zone may be considered a principal threat waste at LHAAP-29. There are no COCs associated with the deep groundwater zone.

The components of the selected remedy are summarized below:

- Contaminated soil removal with off-site disposal to protect the hypothetical future maintenance worker and ecological receptors and eliminate the soil-to-groundwater pathway. Additional confirmation soil sampling during the remedial design (RD) will be needed to define the final excavation extent and volume of soil contaminated with explosives near former Building 812-F and in the cooling water outfall/ditch and may identify additional areas for soil removal adjacent to the North and South Cooling water lines as well as the wooden and transite TNT wastewater lines, see **Section 2.12.2**.
- Flushing, inspection, and plugging of the transite TNT wastewater line and the vitrified clay cooling water lines to eliminate potential exposure from residual contamination. Confirmation sampling of the wooden TNT wastewater line during the RD may result in excavation, see **Section 2.12.2**.
- MNA in the shallow groundwater zone to confirm protection of human health and the environment by documenting that contaminated groundwater remains localized with minimal migration and that COCs are being reduced to cleanup levels.
    - Performance objectives will be evaluated after two years of MNA. During those two years, monitoring will be quarterly. If MNA is found to be effective, it will be continued, and long-term monitoring (LTM) will be semiannual for three years. In subsequent years, LTM will be annual until the next five-year review and annually thereafter until recommended otherwise by the five-year review. The monitoring and reporting associated with this remedy will be used to track the effectiveness of MNA and will continue until recommended otherwise at the five-year review.
    - If MNA is found to be ineffective, a contingency remedy to enhance MNA would be developed. The contingency remedy would consist of injection of bioremediation

amendments to enhance degradation of the groundwater contaminants at selected locations based on data available at the time it is determined MNA is not successful. Development and specific description of the contingency remedy would be presented in a Remedial Design/Remedial Action Work Plan (RD/RAWP).

- ISTD treatment will be performed for the DNAPL MC plume in the intermediate groundwater zone to reduce concentrations to levels amenable to MNA. One of two ISTD treatment process options, Electrical Resistance Heating (ERH) or Thermal Conduction Heating (TCH), will be selected during the RD.
- MNA will be implemented in the intermediate groundwater zone following successful implementation of ISTD to confirm protection of human health and the environment by documenting that the contaminated groundwater remains localized with minimal migration and that contaminant concentrations are being reduced to cleanup levels. Trigger level or target value for successful ISTD treatment of MC in the intermediate zone is 8,000 micrograms per liter (µg/L). Performance monitoring will be conducted at a frequency necessary to evaluate the effectiveness of the in-situ treatment, with sampling and LTM conducted as described for the shallow groundwater MNA.
- Groundwater monitoring will be conducted to evaluate inorganic COCs. The need to continue groundwater monitoring for this purpose will be evaluated at five year reviews.
- The LUC objectives include maintaining the integrity of any current or future remedial or monitoring systems, and preventing the use of groundwater contaminated above cleanup levels as a potable water source. The groundwater treatment and MNA remedial components include a groundwater monitoring system that will be used to characterize the condition of the groundwater during the period the groundwater remedy is in place until the groundwater remediation goals are achieved, and to demonstrate achievement of the groundwater remediation goals when the groundwater remedy is complete. As a part of this groundwater remedy, the Army will maintain the remedial and monitoring systems associated with the groundwater remedies until these components of the remedy are no longer needed to achieve cleanup levels, and cleanup levels have been achieved. During the period of operation of the groundwater remedy, if any of the elements of the remedial and groundwater monitoring systems are damaged, destroyed, or become ineffective, they will be repaired or replaced with suitable components to assure that the remedial and groundwater monitoring systems are able to provide data of the quality necessary to determine the progress of and eventual completion of this component of the remedy. The actions to be taken to implement these LUC objectives and requirements will be provided through modifying the "Comprehensive Land Use Control (LUC) Management Plan, Former Longhorn Army Ammunition Plant, Karnack, Texas" and detailed in the LUC RD.[1]
- The LUC for prohibition of groundwater use (except for monitoring and testing) shall be implemented and shall remain in place at the Site until the COCs (i.e. including all hazardous substances, pollutants and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) in soil and groundwater remaining at the site, are reduced below levels that would support unlimited use and unrestricted exposure. A LUC RD will be finalized as the land use component of the RD. Within 21 days of the issuance of the ROD, the Army will

[1] This paragraph is October 31, 2014 Dispute Decision language that is included despite the ROD not being subject to the dispute.

propose deadlines for completion of the RD Work Plan, RD and Remedial Action Work Plan. The documents will be prepared and submitted to the EPA and the TCEQ pursuant to the FFA. The LUC RD will contain implementation and maintenance actions, including periodic inspections. The long-term groundwater and surface water monitoring and MNA performance monitoring plan will also be presented in the RD. The recordation notification for the Site, which will be filed with Harrison County, will include a description of the LUCs.[1] The preliminary boundary for the groundwater LUC is shown on **Figure 2-16**.

- The LUC restricting land use to nonresidential shall be implemented until it is demonstrated that surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that allow for unlimited use and unrestricted exposure.[1]
- The LUC to maintain the integrity of any current or future remedial or monitoring systems 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 2-10**) in groundwater are met. The LUC to prohibit 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 2-10**) in soil and groundwater allow for unlimited use and unrestricted exposure.[1]

CERCLA five-year reviews are required 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 2-10**) in soil and groundwater allow for unlimited use and unrestricted exposure.

Based on a preliminary natural attenuation evaluation and groundwater modeling, cleanup levels are expected to be met through natural attenuation in the shallow zone groundwater in approximately 70 years (Shaw, 2010), and 5-10 years following ISTD treatment in the intermediate zone groundwater (AECOM, 2017). Specifically, based on the attenuation of 1,2-DCA, MNA is estimated to take approximately 70 years in the shallow groundwater zone. The ISTD treatment in the intermediate zone is estimated to take 65-87 days if ERH is used, and 180 days if TCH is used. MNA will follow the in-situ treatment, and is estimated to take 5-10 years based on the attenuation of TCE. Other COCs are expected to require less time to attenuate, based on the natural attenuation study presented in the Final FS (Shaw, 2010). Considering the lithologic variability, particularly the lateral and vertical change from sand to clay, the time to achieve cleanup levels may vary. In the course of the remedy, the additional monitoring results will allow more accurate time estimates.

No adverse impact is expected to the surface water during the time it would take natural attenuation to reduce contaminant concentrations to cleanup levels.

A LUC RD will be finalized as the land use component of the Remedial Design. Within 21 days of the issuance of the ROD, the Army will propose deadlines for completion of the RD Work Plan, RD, and Remedial Action Work Plan. The documents will be prepared and submitted to EPA and TCEQ pursuant to the FFA. The LUC RD will contain implementation and maintenance actions, including periodic inspections. The long-term groundwater and surface water monitoring and MNA performance monitoring plan will also be presented in the RD.[1]

The Army will implement, maintain, monitor, report on and enforce land use controls at Army-owned property. The Army shall perform those actions related to land use control activities described in this ROD and in the Remedial Design for the ROD. 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 will provide notice of the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD. The Army will send these notices to the 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. The Army shall provide the initial notice within 90 days of ROD signature. The frequency of subsequent notifications will be described in the Remedial Design for the ROD. The Army remains responsible for ensuring that the remedy remains protective of human health and the environment. The Army will fulfill its responsibility and obligations under CERCLA and the NCP as it implements, maintains, and reviews the selected remedy.[1]

Upon transfer of Army-owned property, the Army will provide written notice of the land use controls to the transferee of the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD. Within 15 days of transfer, the Army shall provide EPA and the TCEQ with written notice of the division of implementation, maintenance, and enforcement responsibilities unless such information has already been provided in the LUC RD. The LUC RD will address the procedures to be used by the Army and the transferee to document compliance with the LUCs described in this ROD. 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.[1]

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of a LUC objective at the site after they have been transferred.

The management strategy at LHAAP is to approach each site separately to address human health issues and to approach the sites by sub-area to address ecological risk (Shaw, 2007a). Thus, the implementation of this remedy at LHAAP-29 is independent of any other remedial action at LHAAP to address human health issues. To address ecological risk, LHAAP-29 was grouped with several other sites as part of the Industrial Sub-Area. The final COPECs in soil that require remedial action in the Industrial Sub-Area are 2,4-DNT, 2,6-DNT and 2,4,6-TNT (Shaw, 2010). The remedial actions at LHAAP-29 will be sufficient to remove ecological risks for the sub-area. This management strategy is considered to be endorsed by regulators as evidenced by the regulatory approval of the BERA (Shaw, 2007a) and BERA Addendum (AGEISS, 2014).

1.5 Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are established as applicable or relevant and appropriate requirements (ARARS) for the remedial action, and is cost-effective.

The remedy offers long-term effectiveness through excavation of contaminated soil, thermal treatment of MC DNAPL, flushing, plugging, and abandoning the TNT wastewater and cooling water lines, and the implementation of a LUC, which will minimize the potential risk to the hypothetical future maintenance worker posed by the contaminated soil and groundwater. Evaluation of MNA, including routine monitoring of the attenuation until cleanup levels are met, will document the effectiveness of the selected remedy. In the event that MNA is determined to be ineffective, a contingency remedy consisting of injection of bioremediation amendments to enhance degradation of the groundwater contaminants at selected locations will be developed and implemented.

Development and specific description of the contingency remedy will be presented in a RD/RAWP. The selected remedy is easily and immediately implementable and while it was not the lowest cost alternative, is considered most likely to be effective and successful compared to the other alternatives considered for LHAAP-29.

The thermal treatment (ISTD) component of the selected remedy satisfies the statutory preference for treatment as a principal treatment element of the remedy. The MNA component does not address the statutory preference for treatment to the maximum extent practicable; MNA is a passive remedial action using natural processes.

The selected remedy will reduce the toxicity, mobility, or volume of contaminants in the groundwater through active and passive remedial actions. The high concentrations of MC in the intermediate groundwater at LHAAP-29 have indicated that DNAPL residual source material may be residing in the subsurface and acting as a principal threat in the groundwater.

Because hazardous substances, pollutants, or contaminants will remain at the site above levels that allow for unlimited use and unrestricted exposure, a five-year review will be conducted every 5 years to ensure protection of human health and the environment under CERCLA §121(c), U.S. Code (USC) Title 42 §9621(c). In accordance with Texas Administrative Code (TAC) Title 30 §335.566, a notification will be recorded in Harrison County records restricting land use to nonresidential until it is demonstrated that surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that allow for unlimited use and unrestricted exposure; that a prohibition of groundwater use (except for environmental monitoring and testing) as a potable source 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 2-10**) in soil and groundwater allow for unlimited use and unrestricted exposure; and, that the integrity of any current or future remedial or monitoring systems 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 2-10**) in groundwater are met. Although the U.S. Army may later pass these procedural responsibilities to the transferee by property transfer agreement, the U.S. Army shall retain ultimate responsibility for remedy integrity per the FFA and CERCLA §121.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for this site.

- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater as identified in the baseline risk assessment and ROD (**Section 2.6**).
- Potential groundwater use that will be available at the site as a result of the selected remedy (**Section 2.6**).
- COCs and their concentrations (**Section 2.7**).
- Baseline risk represented by the COCs (**Section 2.7**).
- Cleanup levels established for COCs and the basis for these levels (**Sections 2.7.3** and **2.8**).

- Principal threat wastes that will be addressed at this site (**Section 2.11**).
- Key factor(s) that led to selecting the remedy (**Section 2.12**).
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (**Section 2.12**).

1.7 Authorizing Signatures

As the lead agency, the U.S. Army issues this ROD for LHAAP-29 which documents the final selected remedy. The undersigned is the appropriate approval authority for this decision.

Thomas E Lederle — 16 Aug 2019
(Date)

Thomas E. Lederle
Division Chief
Base Realignment and Closure Division
Assistant Chief of Staff for Installation Management
U.S. Army

The United States Environmental Protection Agency approves the selected remedy as provided in the ROD for LHAAP-29.

Lisa Price for — September 19, 2019
(Date)

Wren Stenger
Director
Superfund Division
U.S. Environmental Protection Agency
Region 6

2. Decision Summary

2.1 Site Name, Location, and Description

LHAAP-29, Former TNT Production Area, Group 2
Longhorn Army Ammunition Plant
Karnack, Texas

Comprehensive Environmental Response, Compensation, and Liability Information System
USEPA Identification Number: TX6213820529

Lead Agency: U.S. Army, Department of Defense
Support Agencies: USEPA Region 6, TCEQ

Source of Cleanup Money: U.S. Army, Department of Defense
Site Type: Industrial Facility

The former LHAAP is an inactive, government-owned, formerly contractor operated and maintained, Department of Defense facility located in central east Texas (see **Figure 2-1**) in the northeast corner of Harrison County. LHAAP is approximately 14 miles northeast of Marshall, Texas, and approximately 40 miles west of Shreveport, Louisiana. The former U.S. Army installation occupied 8,416 acres between State Highway 43 at Karnack, Texas, and the southwestern shore of Caddo Lake. The facility can be accessed via State Highways 43 and 134.

LHAAP was placed on the Superfund 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 §120 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 majority of LHAAP, not including LHAAP-29, has been transferred by the U.S. Army to the U.S. Fish and Wildlife Service (USFWS) for management as the Caddo Lake National Wildlife Refuge.

LHAAP-29, Former TNT Production Area is an 85-acre site located within a heavily wooded section in the western-central portion of LHAAP (**Figure 2-2**). The surface features at LHAAP-29 include the foundations for the former production facilities and the underground pipelines that were originally built for cooling water drainage and TNT wastewater conveyance.

2.2 Site History and Enforcement Activities

2.2.1 History of Site Activities

LHAAP was established in December 1941 with the primary mission of manufacturing TNT. Production of TNT began at Plant 1 in October 1942 and continued through World War II until August 1945, when the facility was placed on standby status until February 1952. In 1952, the LHAAP facility was reactivated with the opening of Plant 2, where pyrotechnic ammunition, such as photoflash bombs, simulators, hand signals, and tracers for 40 millimeter ammunition, were produced until 1956.

In December 1954, a third facility, Plant 3, began production of solid-fuel rocket motors for tactical missiles. Rocket motor production at Plant 3 continued to be the primary operation at LHAAP until 1965 when Plant 2 was reactivated for the production of pyrotechnic and illuminating ammunition. In the years following the Vietnam conflict, LHAAP continued to produce flares and other basic pyrotechnic or illuminating items for the U.S. Department of Defense inventory. From September 1988 to May 1991, LHAAP was also used for the static firing and elimination of Pershing I and II rocket motors in compliance with the Intermediate-Range Nuclear Force Treaty in effect between the United States and the former Union of Soviet Socialist Republics. 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.

LHAAP-29 was used as a TNT manufacturing facility from October 1942 to August 1945. The facility produced approximately 400 million pounds of flake TNT during its operation using six TNT production lines (five active and one standby). The TNT production facility was inactive from August 1945 to 1959. In 1959, most of the buildings and aboveground storage tanks were removed. The debris was burned or flashed at Burning Ground No. 2/Flashing Area (LHAAP-17). Concrete foundations open-top concrete-lined pits, most of the underground utilities, and a network of underground pipelines still remain at the site. Since the end of World War II, the only activity that has been documented to have occurred at LHAAP-29 is the “soak out” or solvent bath of out-of-specification rocket motors. This took place from 1959 to the mid-1970s and involved the use of MC-based industrial solvent at tank 801-F. Waste from this operation was sent to LHAAP-18/24 (Jacobs, 2001).

2.2.2 History of Investigative Activities

As part of the Installation Restoration Program, the U.S. Army began an environmental investigation in 1976 at LHAAP followed by installation wide assessments/investigations that included the following:

- In 1980, U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) conducted a record search to assess the impact of the LHAAP installation activities including usage, storage, treatment, and disposal of toxic and hazardous materials on the environment, and defined conditions that may have adversely affected human health and the environment (USATHAMA, 1980).
- Contamination Survey – In 1982, as part of the LHAAP contamination survey, Environmental Protection Systems collected six groundwater samples for laboratory analyses. Subsequently in 1987, as part of the Resource Conservation and Recovery Act (RCRA) permit application process, and as a continuation of the contamination survey, U.S. Army Environmental Hygiene Agency (USAEHA) identified, described, and evaluated all solid waste management units at LHAAP (USAEHA, 1987). Units requiring further sampling, investigation, and corrective action were delineated.
- RCRA Facility Assessment (RFA) – In 1988, a preliminary RFA was conducted by the U.S. Army (Maley, 988). Waste at the various sites was characterized, but no samples were collected.
- Several investigations to determine the nature and extent of contamination in the soil, groundwater, surface water, and sediments at LHAAP-29 were conducted and are listed below. Samples were analyzed for (VOCs, semivolatile organic compounds (SVOCs),

metals, explosive compounds, perchlorate, pesticides, polychlorinated biphenyls (PCBs), and/or dioxins/furans, depending on the focus of the investigation.

Figure 2-3 and **Figure 2-4** show the sample locations for all investigations. **Figure 2-5** and **Figure 2-6** show well locations and groundwater elevations for the shallow and intermediate groundwater zones, respectively. For some of the earlier investigations, LHAAP sites were organized into groups, and LHAAP-29 was included in Group 2. The group designation was de-emphasized as the complexities of the individual sites increased.

The following summarizes the investigations at LHAAP-29:

- **Multi-phase investigation of Group 2 sites**: Between 1982 and 1998 numerous investigations were conducted in a phased approach by Jacobs, U.S. Army Corps of Engineers (USACE), and Environmental Protection System. Activities included installation of monitoring wells and analysis of groundwater, surface water, soil, and sediment samples. The results are documented in the RI for Group 2 sites (Jacobs, 2001).
- **Plant-wide perchlorate investigation**: The groundwater investigation was conducted from 2000 through 2002 (Solutions to Environmental Problems, Inc. (STEP), 2005) to delineate perchlorate contamination.
- **Baseline Human Health Risk Assessment**: The BHHRA (Jacobs, 2002) used data from the investigations conducted through 2001, including the plant-wide perchlorate investigation results up to that time. The report concluded that the soil at LHAAP-29 posed a non-carcinogenic hazard and the groundwater posed unacceptable carcinogenic risk and non-carcinogenic hazard to the hypothetical future maintenance worker.
- **Environmental Site Assessment**: Media investigated in 2003 included soil and groundwater (Plexus Scientific Corporation, 2005), although no sampling was conducted at LHAAP-29 for this assessment.
- **Baseline Ecological Risk Assessment**: The BERA (Shaw, 2007a) identified COPECs for the Industrial Sub-Area, which includes LHAAP-29. COPECs for the sub-area are addressed in the remedial actions for LHAAP-29. The evaluation was based on environmental investigations from 1993 to 2004.
- **Data Gaps**: Additional investigations were conducted in 2004 after the BHHRA was finalized to further delineate the extent of groundwater contamination identified during previous sampling events. A new monitoring well was installed and a total of 20 wells sampled in August 2004. The results of the 2004 investigation were presented in the *Data Gaps Investigation* (Shaw, 2007b).

Additional investigations were conducted after the 2004 investigation to further delineate contamination as follows:

- Additional investigations were conducted in December 2004 and February 2005 which included sampling soil near the TNT wastewater line, sediments from cooling water lines, the pump house pond, the outfall ditch, and manholes along the cooling water lines. Water was also sampled at the twelve manholes along the cooling water lines. Additional groundwater monitoring well sampling was conducted in May 2005 (Shaw, 2010).
- Sampling of soil at the foundation of former Wash House 806-D was conducted in February 2005 (USACE, 2005). Additional investigations were conducted between August 2006,

February 2007, and February 2008 to further delineate the extent of contamination, and included the activated persulfate oxidation study report (Shaw, 2010).

- Additional groundwater sampling events occurred in October 2008, January 2009, and June 2009 (Shaw, 2010).
- **Feasibility Study**: The FS (Shaw, 2010) was based on all available results from previous investigations through 2009, and the data collected since the risk assessment was evaluated in the FS. Data not formally submitted was incorporated into the FS. The potential soil-to-groundwater pathway was evaluated for the emerging contaminant perchlorate (found in groundwater) and the explosives posing risks or hazards in soil. The concentrations of these chemicals were compared to their TCEQ soil medium-specific concentrations (MSCs) for industrial use based on groundwater protection (GWP-Ind), which is more stringent than the soil MSC for industrial use based on inhalation, ingestion, and dermal contact (SAI-Ind) (TCEQ, 2006). The data collected from the shallow groundwater sampling indicated that MC concentrations were below Safe Drinking Water Act (SDWA) maximum contaminant level (MCLs), and 1,1-DCE concentrations are above the MCL. Additionally, all VOC groundwater data within the plumes were used to evaluate natural attenuation. The FS identified and evaluated 3 remedial alternatives to address the soil and groundwater contamination in the shallow and intermediate zones.
- **Supplemental Investigation**: A Final PP (U.S. Army, 2011) and Draft ROD were prepared in 2011 based on the RI and other investigation results, and the FS. During further evaluation of the RD requirements for the selected alternative, the U.S. Army determined that additional data were needed to refine the extent of the intermediate zone MC plume and also to collect data to evaluate additional treatment technologies, so a supplemental investigation was conducted in 2014. Additional wells were installed in the intermediate zone to define the extent of the MC plume inferred to be DNAPL, measure aquifer parameters, and evaluate thermal treatment of the MC plume, and in-situ bioremediation potential (AECOM, 2016).
- **Baseline Ecological Risk Assessment Addendum:** After the BERA was completed in 2007, a BERA Addendum was completed (AGEISS, 2014). The results of the re-evaluation indicated that that the replacement data collected during the data gaps investigation confirmed the conclusions of the BERA that no explosives compounds in soil should be identified as COPECs in the industrial sub-area.
- **Supplemental FS**: A supplemental FS was prepared in 2017 using the data collected in during the supplemental investigation. A fourth alternative, ISTD, was identified and evaluated to address the MC DNAPL plume in the intermediate groundwater zone (AECOM, 2017). The shallow zone groundwater and soil remediation components of the alternatives did not change from the initial FS.

2.2.3 Site History of CERCLA Enforcement Activities

LHAAP-29 was included in the National Priorities Listing for Longhorn in 1990 and identified as Unit No. 29 in the 1991 FFA. The FS for LHAAP-29 (Shaw, 2010) was issued in April 2010, and the PP (U.S. Army, 2011) was issued in March 2011. A Revised PP was completed in 2018 (U.S. Army, 2018). This ROD follows the Revised PP and precedes the more detailed RD.

2.3 Community Participation

The U.S. Army, USEPA, TCEQ and the LHAAP Restoration Advisory Board (RAB) have provided public outreach to the surrounding community concerning LHAAP-29 and other environmental sites at LHAAP. The outreach program has included fact sheets, media interviews, site visits, invitations to attend quarterly RAB meetings, and public meetings consistent with its public participation responsibilities under Sections 113(k)(2)(B), 117(a), and 121(f)(1)(G) of CERCLA.

The Final Revised PP (U.S. Army, 2018) for the selection of the remedy for LHAAP-29 was released to the Administrative Record and made available to the public for review and comment beginning November 21, 2018. The notice of availability of the Final Revised PP and other related documents in the Administrative Record file was published in *The Shreveport Times* and the *Marshall News Messenger* on November 7, 2018. The newspaper and media notices for the meeting are provided in **Appendix A**. The public comment period for the Revised PP began on November 21, 2018 and ended December 21, 2018. A public meeting was held on December 6, 2018 in a formal format and the meeting recorded by a court reporter. The transcript for the meeting is part of the Administrative Record. The significant comments (oral or written) are addressed in the Responsiveness Summary, which is included in this ROD as **Section 3**.

The previously completed PP (U.S. Army, 2011) was also released to the Administrative Record, and similar public notices and a public meeting were held. Comments received for the 2011 Proposed Plan are also presented in **Section 3**.

The Administrative Record may be found at http://www.longhornaap.com/ and locally at the information repository maintained at the following location:

Location: Marshall Public Library
300 S. Alamo
Marshall, Texas 75670

Business Hours: Monday, Tuesday, Thursday (9:30 AM – 7:30 PM)
Wednesday and Friday (9:00 AM – 5:30 PM)
Saturday (9:30 AM – 3:30 PM)

2.4 Scope and Role of Response Action

The response action will prevent potential unacceptable risks associated with exposure to contaminated soil and groundwater in both the shallow and intermediate zones. The removal of source soils will positively impact groundwater by eliminating the potential for the leaching of contaminants from the soil into the groundwater and will remove the contamination that poses a risk to ecological receptors.

Plugging the inlets and outlets of the underground lines with a bentonite slurry mix, including the manholes of the process cooling water lines, will minimize hypothetical future maintenance workers contact with contaminants and prevent water from infiltrating the lines.

The selected action at LHAAP-29 will prevent potential risks associated with exposure to contaminated groundwater. The groundwater at LHAAP is not currently being used as a drinking water source, nor may it be used in the future based on its reasonably anticipated use as a national wildlife refuge. However, when establishing the remedial action objectives (RAOs) for this response action, the U.S. Army has considered the NCP's expectation to return usable groundwater to its potential beneficial uses wherever practicable and has also considered the State of Texas designation of all groundwater as potential drinking water, unless otherwise classified, and consistent with 30 TAC 335.563(h)(1) [background total dissolved solids (TDS) content less than or equal to 10,000 milligrams per liter (mg/L)] and that occurs within a geologic zone that is sufficiently permeable to transmit water to a pumping well in usable quantities.

The U.S. Army intends to return the contaminated shallow and intermediate groundwater zones at LHAAP-29 to their potential beneficial uses, which for the purposes of this ROD is considered to be attainment of the SDWA MCLs to the extent practicable, and consistent with 40 C.F.R. § 300.430(e)(2)(i)(B & C). In the absence of federal drinking water standards, clean-up levels will be based on the Texas Risk Reduction Program (TRRP) Tier 1 Residential Groundwater Protective Concentration Level (PCL) (TRRP Residential Groundwater PCL). The TCEQ soil medium specific concentration (MSC) for industrial use based on groundwater protection (GWP-Ind) is used in accordance with 30 TAC 335.559(g)(2). If a return to potential beneficial uses is not practicable, the NCP expectation is to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction (40 C.F.R. § 300.430(a)(1)(iii)(F)).

The selected remedial action will also ensure containment of the plume to prevent potential impact to surface water. The selected action will also include groundwater monitoring to demonstrate that the plume is not migrating at levels that present a potential impact to surface water bodies and to verify that contaminant levels are being reduced to cleanup levels when the LUC for groundwater use prohibition may be terminated.

In addition, the selected action includes an active remedial component that will mitigate the principal threat waste. By instituting an ISTD treatment of the intermediate groundwater, this active treatment will be applied to the highest concentration area in the MC groundwater plume and will comply with NCP expectations regarding treatment of affected media where principal threat waste may be considered.

2.5 Site Characteristics

This section of the ROD presents a brief comprehensive overview of the LHAAP-29 site characteristics with respect to the conceptual site model (CSM), physical site features, known or suspected sources of contamination, types of contamination, and affected media. Known or potential routes of contaminant migration are also discussed. Detailed information about the site characteristics can be found in the RI (Jacobs, 2001).

2.5.1 Conceptual Site Model

Figure 2-7 illustrates the human health conceptual site model for LHAAP-29. The model presents the human health pathways that are complete and being considered for remediation. Those

pathways that are likely to be incomplete or have negligible impact are not being considered for remediation. The ecological conceptual model for LHAAP-29 (**Figure 2-8**) is similar to the one presented for human health in terms of the origin and fate and transport mechanisms of the contaminants present at the site. However, only exposure pathways and routes associated with soil are relevant for ecological risk assessment.

Explosive compound releases resulting from the manufacturing process of TNT as well as releases from process tanks and process waste pipelines are the suspected contamination sources at LHAAP-29. Releases from the rocket motor soak-out process that used methylene chloride-based solvents are also contamination sources. The pipelines include the TNT process wastewater gravity line (“red and/or yellow liquor”) that transported the TNT process wastewater to LHAAP-32 for treatment and two cooling water lines (blue water) that transported the cooling water to an outfall ditch. The remaining potential sources of contamination at the site are explosives compounds in stained soils around the foundation of former Buildings 806A and 806-D, isolated perchlorate-containing soils in the northeastern portion of LHAAP-29 at a depth of 8 feet below ground surface (bgs), and TNT-contaminated sediment in the cooling water outfall ditch at a depth of 7 feet bgs.

The red liquor TNT wastewater line was originally installed as a wooden pipeline at a depth of three to five feet bgs and was taken out of service, clear-flushed and abandoned in 1946 (Bate Stamp 001446, RFA, April, 1988). Several trenches were excavated across the wooden line in 1993, and the wood was found to be soft and severely degraded at most locations (Sverdrup Environmental, Inc. [Sverdrup], 1993). Samples collected at that time resulted in high concentrations of TNT in the liquid and sludge (3,500 µg/L and 3,700 mg/kg, respectively), but that data was later deemed unusable for environmental decision making (Jacobs, 2001). The transite TNT wastewater pipeline was added parallel to and north of the wooden line to carry the TNT wastewater. The transite TNT wastewater line has solid residues contaminated with explosives at concentrations above the GWP-Ind.

Two blue cooling water lines, called cooling water line north and cooling water line south, exist at LHAAP-29 and range from 8 to 18 inches in diameter. These are gravity fed lines and are constructed of vitrified clay pipe with manholes. These lines have solid residues contaminated with explosives at concentrations that are above the GWP-Ind MSC (solid residue).

Contamination in the form of explosive compounds, VOCs, perchlorate, and metals from rocket motor washout and TNT production is present in the shallow groundwater zone at LHAAP-29 and poses potential risk to the hypothetical future maintenance worker. In the intermediate groundwater zone, concentrations of VOCs and arsenic are present, with MC posing the highest risk. At monitoring well 29WW16 the MC concentrations in the intermediate zone are approximately half the solubility limit, which indicates a potential for the presence of DNAPL. The horizontal extent of contamination in the shallow and intermediate groundwater zones is presented in **Figures Figure 2-9,** and **Figure 2-11**.

The soil and groundwater at LHAAP-29 may pose an unacceptable risk for the hypothetical future maintenance workers. Even though no impact to surface water from groundwater has been established (Shaw, 2007c); the migration pathway of groundwater contaminants to surface water is being considered for remediation along with soil, soil to groundwater, and future industrial groundwater use.

2.5.2 Overview of the Site

The site boundary of LHAAP-29 comprises approximately 85 acres in the western-central portion of LHAAP. The surface features include the foundations for the former production facilities and the underground pipelines that were originally built for cooling water drainage and TNT wastewater conveyance. The site is currently heavily wooded. Surface runoff is collected by ditches constructed in 1942 when the production facility was built. Surface runoff from the northern part of the site (about 40 percent of the site) enters Goose Prairie Creek located approximately 1,500 feet to the north and east of the site. Surface water runoff in the southern portion of the site (about 60 percent of the site) flows into a tributary of Central Creek located near the southeast portion of the site. Eventually, runoff from the two creeks enters Caddo Lake.

2.5.3 Geology and Hydrogeology

The local geology at LHAAP-29 consists of a silty to clayey sand at the surface that extends from 3 to 10 feet bgs. A clayey silt grading to a silty clay was encountered extending to a depth of 40 feet bgs with an underlying silty to clayey sand. With the exception of boreholes 29WW02, 29WW10, and 29WW11, a sandy silt to silty clay layer was encountered below the sand deposit at depths ranging 15 to 26 feet bgs. Additional silt, clay and sand layers were encountered with depth in boreholes 29SB52 and 29SB53 that terminated at the top of the Midway formation at depths of 157 and 140 feet bgs, respectively.

There are three groundwater zones at LHAAP-29: shallow, intermediate, and deep. Semi-confining clay or silty clay layers separate the three groundwater zones. The shallow groundwater zone has wells that are screened at two depths (shallow and lower shallow); however, the wells have similar water level elevations and are all considered to be shallow zone wells. The bottom of each of the zones is defined by a continuous or semi-continuous clay layer of varying thickness. The depth of the shallow groundwater zone generally ranges from 17 to 45 feet bgs because of variable ground surface elevations across the site. The intermediate zone is less defined, but its depth has been measured to approximately 88 feet bgs. The deep groundwater zone extends to a depth of approximately 155 feet bgs. Based on the 2007 water levels and historic potentiometric maps, the predominant groundwater flow in the shallow zone is east/southeast and is east/northeast in the intermediate zone. **Figures 2-5** and **2-6** illustrate the groundwater elevations in the shallow zone and intermediate zone, respectively.

2.5.4 Sampling Strategy

Nineteen investigations/sampling events were conducted at LHAAP-29 from 1982 to 2014, as described in **Section 2.2.2**. In the early investigations, soil samples were collected from throughout the site to determine the areas of contamination. Subsequent investigations focused on the areas where contamination was found, performing additional soil, groundwater, and sediment sampling, and installing monitoring wells to delineate the groundwater contamination. Samples from all media were analyzed for various analytes including VOCs, SVOCs, metals, explosives, perchlorate, pesticides, and dioxins/furans. In the intermediate groundwater contaminant plume, groundwater samples were also analyzed for indicators of conditions that promote natural attenuation (biodegradation), such as dissolved oxygen, conductance, pH, oxidation-reduction potential, sulfide, methane, and chloride. During the 2014 investigation, soil resistivity and total organic carbon data were measured to provide additional data to evaluate ISTD technologies, and microcosm testing was performed to evaluate the potential for in enhanced in-situ bioremediation (EISB). Aquifer

pumping tests were also conducted to gather site-specific hydraulic conductivity data to support the evaluation of additional treatment technologies.

2.5.5 Nature and Extent of Contamination

Contamination was found in the soil, groundwater (shallow and intermediate zones), and liquid and solid residue remaining in the cooling water and TNT process wastewater underground lines. The COCs are toxic and carcinogenic. Since there is a high cancer risk associated with exposure to groundwater from this region of the intermediate zone, such residual source material may be considered a principal threat waste at LHAAP-29.

Groundwater

Shallow zone groundwater COCs are VOCs (TCE, 1,2-DCA, and daughter products), perchlorate, explosives (2,4-DNT, 2,6-DNT, 2-NT, 3-NT, 4-NT), and metals (arsenic, mercury, nickel, selenium).

The shallow zone plumes for VOCs and perchlorate are shown on **Figure 2-9**. The most recent maximum concentrations of COCs in shallow groundwater were all detected in samples collected from monitoring well 29WW15, and included TCE at 344 µg/L, 1,2-DCA at 5,520 µg/L and perchlorate at 16,800 µg/L. The calculated volume of the perchlorate plume is 4 million gallons. There are 3 shallow zone plumes for explosives as shown on

Figure 2-10. The highest concentration of 2,4-DNT detected was 50.9 µg/L at monitoring well 29WW05. The highest concentration of 2,6-DNT was 239 µg/L at monitoring well 116. The highest concentrations of 2-NT, 3-NT, and 4-NT are 8,140 µg/L, 451 µg/L, and 1,400 µg/L, respectively, also reported at monitoring well 116. The volume of the VOC, perchlorate, and NT plumes are estimated to be approximately 9 million gallons, assuming a total porosity of 0.25 (or 25 percent) with a thickness ranging from 5 to 10 feet.

Intermediate zone groundwater COCs are MC, TCE and daughter products, 1,2-DCA, and arsenic. The intermediate zone plume for VOCs is shown on **Figure 2-11**. The highest concentration of MC detected was 10,300,000 µg/L at monitoring well 29WW16. The most recently reported MC concentration in a 2014 sample collected from this well was 8,260,000 µg/L. Other COCs identified for the intermediate groundwater zone are degradation (daughter) products of TCE that have been non-detect or have not been detected above their SDWA MCLs; however, due to historic results and the high detection limits at 29WW16, it has been assumed that concentrations of 1,2-DCA and TCE still exceed their SDWA MCLs. The calculated volume of contaminated groundwater that exceeds MCLs is 650,000 gallons, assuming a total porosity of 0.40 (or 40 percent) with an average thickness of 15 feet based on drilling observations.

As demonstrated by previous sampling results, the deep groundwater zone at LHAAP-29 is not affected.

Soil

Soil COCs and COPECs are explosives (2,4,6-TNT, 2,4-DNT, 2,6-DNT) and perchlorate. **Figure 2-12** shows the approximate areas of contaminated soil. The maximum 2,4,6-TNT concentration in the soil is 26,000 milligrams per kilogram (mg/kg). Other explosives, 2,4-DNT and 2,6-DNT, have maximum concentrations of 8,000 mg/kg and an estimated concentration of 15 mg/kg, respectively. Additionally, perchlorate has been detected in the soil at a maximum concentration of 8.6 mg/kg. The estimated volume of impacted soil is 3,900 cubic yards in place.

TNT Wastewater Lines

Line solid residue COCs from the transite TNT wastewater line are explosives (2,4,6-TNT, 2,4-DNT, 1,3 dinitrobenzene, 2-amino-4,6-DNT, 4-amino-2,6-DNT). Contaminated explosive solid residue remains within the transite TNT wastewater line at concentrations above the SAI-Ind and GWP-Ind MSCs, but access to the pipe is limited to the inlets and outlets unless the pipe is penetrated. Additionally, the line is buried 3 feet bgs or deeper. The gravity flow portion of the line is approximately 3,000 linear feet. The pressurized portion of the line is approximately 1,000 linear feet. The line is in good condition. **Figure 2-13** shows the TNT wastewater lines at LHAAP-29, soil, sediment, and solid residue sampling results and MSC values.

The wooden TNT wastewater line was previously flushed and abandoned. The results from limited soil samples collected near the line indicate there has not been a release to the surrounding soil above the cleanup levels. The line is buried 3 feet bgs or deeper, but the deteriorated condition of the line and the potential for residual explosives may present a continuing source of groundwater contamination.

Cooling Water Lines

Line solid residue COCs from the vitrified clay cooling water lines are explosives (2,4,6-TNT, 2,4-DNT, 2,6-DNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT). The solid residues from the manholes are

contaminated with explosives at concentrations that are above the GWP-Ind (solid residue). The north and south vitrified clay cooling water lines are accessible through manholes, and the liquid and solid residue contents from the manholes were sampled. There are approximately 5,000 feet of pipe in the main lines, approximately 1,680 linear feet of pipe from each production area to the main line, and 12 manholes. **Figure 2-13** shows the cooling water lines and sampling results of the line contents at LHAAP-29.

2.6 Current and Future Land and Resource Uses

2.6.1 Current and Future Land Uses

LHAAP is located near the unincorporated community of Karnack, Texas. Karnack is a rural community with a population of 775 people. The incorporated community of Uncertain, Texas, population 205, is located to the northeast of LHAAP on the edge of Caddo Lake and is a resort area and an access point to Caddo Lake. The industries in the surrounding area consist of agriculture, timber, oil and natural gas production, and recreation.

LHAAP has been an industrial facility since 1942. Production activities and associated waste management activities continued until the facility was determined to be in excess of the U.S. Army's needs in 1997. The plant area has been relatively dormant since that time. LHAAP is surrounded by a fence (except on the border with Caddo Lake), and current security measures at the LHAAP preclude unlimited public access to areas within the fence. The fence now represents the National Wildlife Refuge boundary. Approved access for hunters is limited.

The reasonably anticipated future use of LHAAP-29 is as part of a national wildlife refuge. This anticipated future use is based on a Memorandum of Agreement (MOA) (U.S. Army, 2004) between the USFWS and the U.S. Army. That MOA documents the transfer process of the LHAAP acreage to USFWS to become the Caddo Lake National Wildlife Refuge and will be used to facilitate a future transfer of LHAAP-29. Presently the Caddo Lake National Wildlife Refuge occupies a little more than 7,100 acres of the 8,416-acre former installation. In accordance with the National Wildlife Refuge System Administration Act of 1966 and its amendments (16 USC 668dd), the land will remain as a national wildlife refuge unless there is a change brought about by an act of Congress, or the land is part of an exchange authorized by the Secretary of the Interior.

2.6.2 Current and Future Surface Water Uses

Streams on LHAAP currently support wildlife and aquatic life. While humans may have limited access to some streams during annual hunts, there is no routine human use of streams on LHAAP. The streams do not carry adequate numbers and size of fish to support either sport or subsistence fishing. During the summer months, the streams cease flowing and/or dry up. The streams flow into Caddo Lake. Caddo Lake is a large recreational area that covers 51 square miles and has a mean depth of 6 feet. The watershed of the lake encompasses approximately 2,700 square miles. It is used extensively for fishing and boating. Caddo Lake is a drinking water supply for multiple cities in Louisiana including Vivian, Oil City, Mooringsport, South Shore, Blanchard, Shreveport, and Bossier City.

The anticipated future uses of the streams and lake are the same as the current uses.

2.6.3 Current and Future Groundwater Uses

Groundwater in the aquifer (250 to 430 feet bgs) near LHAAP is currently used as a drinking water source. The drinking water aquifer should not be confused with the deep zone groundwater, which extends only to a depth of approximately 151 feet bgs. The deep zone groundwater and the drinking water aquifer are distinct from each other and there is no connectivity between the contaminated zone and the drinking water aquifer. There are five active water supply wells near LHAAP that are completed in the drinking water aquifer (**Figure 2-2**). One well is located in and owned by Caddo Lake State Park. The well is completed to a depth of 315 feet bgs and has been in use since 1935. A second well owned by the Karnack Water Supply Corporation services the town of Karnack and is located approximately 0.3 miles northwest of town. This well is completed to approximately 430 feet bgs and has been in use since 1942. The Caddo Lake Water Supply Corporation has three wells located both north and northwest of LHAAP. These wells are identified as Caddo Lake Water Supply Corporation Wells 1, 2, and 3, and all are hydraulically upgradient of LHAAP (Jacobs, 2002). These wells are completed deeper than the deepest zone of contamination at LHAAP. Because of this and the large distance between these wells and LHAAP, water removal from these wells is not expected to affect groundwater flow at the site. In addition, there are several livestock and domestic wells located in the vicinity of LHAAP with depths averaging approximately 250 feet bgs.

Three water supply wells are located within the boundary of LHAAP itself. One well is located at the Fire Station; the second well is located approximately 0.35 miles southwest of the Fire Station. The third well is located north of the USFWS administration building for the Caddo Lake National Wildlife Refuge, near the main entrance to LHAAP. The distances from these water supply wells to LHAAP-29 are approximately 0.4 miles, 0.2 miles, and 0.5 miles, respectively (**Figure 2-2**). The three water supply wells were completed at a depth much greater than the zone of contamination described at LHAAP-29. None of these three wells are currently used for drinking water at LHAAP, although they may supply water for non-potable uses. Two additional wells previously supplied water to the installation, but these have been plugged and abandoned.

Although the anticipated future use of the facility as a wildlife refuge does not include the use of the groundwater at LHAAP-29 as a drinking water source, the State of Texas designates all groundwater as potential drinking water, unless otherwise classified, and consistent with 30 TAC 335.563(h)(1). To be conservative, a hypothetical industrial use scenario was evaluated for risk. The future industrial scenario for LHAAP assumes limited use of groundwater as a drinking water source.

2.7 Summary of Site Risks

The BHHRA and BERA estimate the risks posed by contaminants at the site if no action were taken. These assessments provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the remedial action.

2.7.1 Summary of Human Health Risk Assessment

This section is based on the conclusions presented in the *Final Baseline Human Health and Screening Ecological Risk Assessment for the Group 2 Sites* (Jacobs, 2002), in the *Data Gaps Investigations* (Shaw, 2007b), and in additional data collected in preparation of the *Final Feasibility Study, LHAAP-29* (Shaw, 2010). The risk assessment used data from the investigations conducted through 1998 and the plant-wide perchlorate investigation conducted in 2000. Results from the later investigations conducted through 2014 did not change the overall outcome of the risk assessment

and the discussion of results and risks presented here are as presented in the Baseline HHRA and FS. During the risk assessment, soil and groundwater data were used to calculate the aggregate risk, which was then compared to the USEPA target risk range of 1×10^{-4} to 1×10^{-6} for the excess lifetime carcinogenic risk and to a hazard index (HI) of 1 for non-carcinogenic hazards. If there is no unacceptable risk associated with a medium, and a cleanup level is not exceeded, then the medium is not identified in this ROD for remediation. The CSM that is associated with the risk assessment was introduced in **Section 2.5.1**, and is presented as **Figure 2-7**.

2.7.1.1 Identification of Chemicals of Potential Concern

The BHHRA identified chemicals of potential concern (COPCs) for LHAAP-29 and evaluated the carcinogenic risk and non-carcinogenic hazard for each. **Table 2-1** summarizes the risk assessment data for the COPCs, including minimum and maximum detected concentrations, frequency of detection, and exposure point concentrations (EPCs). Analytical results for various congeners of dioxins and furans are expressed as 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalence concentration (TEC).

2.7.1.2 Exposure Assessment

The Jacobs risk assessment (Jacobs, 2002) presented the human health risks and hazards to a hypothetical future maintenance worker under an industrial scenario for soil and groundwater.

For soil, reasonable exposure pathways according to the CSM are: incidental ingestion of the surface soil (0 to 2 feet bgs), dermal contact with the surface soil, inhalation of particulates, and inhalation of VOCs from the soil (0 to 7 feet bgs).

For groundwater, reasonable exposure pathways are ingestion of groundwater, dermal contact while showering with contaminated groundwater, and inhalation of VOCs while showering with contaminated groundwater.

2.7.1.3 Toxicity Assessment

The carcinogenic and non-carcinogenic toxicity assessments from the BHHRA are summarized in **Table 2-2** and **Table 2-3**, respectively. The toxicity data assumes that exposure would be chronic to be conservative. Sources for the data include the Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tables (HEAST).

2.7.1.4 Risk Characterization

Characterization of the carcinogenic risk and non-carcinogenic hazard are summarized in **Table 2-4** and **Table 2-5**, respectively. For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime carcinogenic risk is calculated from the following equation:

$$Risk = CDI \times SF$$

where:
- risk = unitless probability of an individual developing cancer
- CDI = chronic daily intake averaged over 70 years, expressed as milligrams per kilogram per day (mg/kg-day)
- SF = slope factor, expressed as $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that usually are expressed in scientific notation. An excess lifetime carcinogenic risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime carcinogenic risk" because it would be in addition to the risks of cancer that individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three. USEPA's generally acceptable risk range for site-related exposures is 1×10^{-4} to 1×10^{-6}.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ < 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic non-carcinogenic effects from that chemical are unlikely. The HI is generated by adding the HQs for all COCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI < 1 indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI > 1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-carcinogenic HQ = CDI/RfD

Where: CDI = chronic daily intake
RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (e.g., chronic, subchronic, or short-term).

The carcinogenic risks for soil and groundwater are 7.3×10^{-6} and 3.9×10^{-1}, respectively (Jacobs, 2002). The carcinogenic risk for soil is within the USEPA target risk range of 1×10^{-4} to 1×10^{-6}. The HIs for soil and groundwater are 1 and 3,000, respectively, and are above the acceptable HI of < 1. The carcinogenic risks for groundwater are unacceptable; the non-carcinogenic risk for both soil and groundwater are unacceptable; therefore, the remedial action acts on both the soil and groundwater. Chemicals with a risk greater than 1×10^{-4} in groundwater include TCE, 1,2-DCA, arsenic, 2,4-DNT, 2,6-DNT, MC, chloroform, and 2,3,7,8-TCDD. Chemicals with a HQ greater than one in groundwater include 2-NT, 3-NT, arsenic, nickel, 2,4-DNT, 2,6-DNT, chloroform, perchlorate, TCE, and 1,2-DCA.

The BHHRA included an uncertainty analysis which identified factors that would cause values used in the risk assessment to be over or underestimated. The analysis concluded that the risks and HIs are overestimated, making the BHHRA a conservative evaluation. Additionally, the uncertainty analysis indicated a portion of the noncarcinogenic effects associated with antimony in groundwater at LHAAP-29 may be due to background.

2.7.1.5 Evaluation of COPCs

To further evaluate the occurrence of COPCs, a data gap investigation was conducted (Shaw, 2007b) and additional investigations were conducted when preparing the FS (Shaw, 2010). While

these investigations did not change the overall outcome of the earlier BHHRA, they determined the COPCs to be targeted by the remedial action.

Table 2-6 and **Table 2-7** list the chemicals in groundwater that exceed those values for the carcinogenic risk and HQ greater than 0.1, respectively. There is no carcinogenic risk in soil to the hypothetical maintenance worker. **Table 2-8** lists chemicals in the soil that have an HQ greater than 0.1 for the hypothetical maintenance worker. These tables also summarize the justifications for which of the COPCs should be classified as COCs. COPCs in soil were identified as COCs when they posed a carcinogenic risk above the acceptable range (risk greater than 1×10^{-4}) or when their HQ was greater than 1. COPCs in groundwater were identified as COCs when they posed a carcinogenic risk above the acceptable range (risk greater than 1×10^{-4}), when their HQ was greater than 1, or when the EPC was above the MCL or in the absence of federal drinking water standards, the TRRP Residential Groundwater PCL. Recent data obtained after the BHRRA investigation was used when possible. Based on the comparison of the maximum groundwater concentration since the BHHRA to their associated SDWA MCL or PCL, these COCs have been identified on **Table 2-10** to be of concern in the shallow and intermediate groundwater. **Table 2-10** presents the final list of COCs and all media, along with cleanup levels.

The human health risk assessment, which was based on the reasonably anticipated future use as a national wildlife refuge, does not address unrestricted use. In accordance with 30 TAC 335.566, a notification will be recorded in the Harrison County records stating that the site is suitable for nonresidential use.

2.7.2 Summary of Ecological Risk Assessment

The *Final Installation-Wide Baseline Ecological Risk Assessment* (Shaw, 2007a) and Baseline Ecological Risk Assessment Addendum (AGEISS, 2014) evaluated potential hazards to ecological resources at LHAAP by conducting a screening evaluation to identify initial COPECs in the individual sub-areas and watersheds. The potential of these COPECs to adversely affect communities was evaluated for: (1) organisms that have direct contact with the COPECs (e.g., plants and earthworms growing and living in contaminated soil); and (2) organisms that may be exposed to the chemicals via food chain pathways (e.g., ingestion of an earthworm living in the contaminated soil by a shrew). Potential impacts to invertebrate and plant communities were evaluated by comparing COPEC concentrations to benchmark values available from multiple literature sources. For the food chain exposure assessment, a number of measurement receptors were selected as representative species for the various trophic levels in the food web that could be at risk from contaminants in site media. The measurement receptors that were selected and used in the food chain evaluation included the following:

- Deer Mouse
- Raccoon
- Modified Raccoon (as a surrogate for the Louisiana Black Bear)
- Short-Tailed Shrew
- Red Fox
- Muskrat
- River Otter

- Townsend's Big-Eared Bat
- Common Snapping Turtle
- Bank Swallow
- American Woodcock
- Belted Kingfisher
- Red-Tailed Hawk

A food chain model was developed and used to estimate the total dose for each measurement receptor based on species-specific considerations such as diet, body weight, ingestion rates, etc., using conservative exposure estimates. Ecological hazard estimates were developed based on exposure to all media including soil in a particular sub-area and surface water and sediment from any watersheds present in the sub-areas. Two different soil depths were used for modeling exposure to ecological receptors: surface soil (0 to 0.5 foot) and total soil (0 to 3 feet). Each receptor was assumed to be exposed to one of the two depths based on its life history characteristics (e.g., burrowing animals were assumed to be exposed to total soil). Bioaccumulation of chemicals up the food chain was initially estimated using uptake factors obtained from available literature, and then refined using site-specific data obtained during the BERA. **Figure 2-8** presents the ecological conceptual model, which lays out the exposure pathways for selected species.

Ecological effects quotients (EEQ) were developed for each of the measurement receptors. EEQs are similar to HQs for human health, and are calculated by dividing the total dose that the receptor is exposed to by the toxicity reference value (TRV), which is based on a no-observed adverse effect level (NOAEL) or the lowest-observed adverse effect level concentration. If the EEQ exceeds 1 for a receptor (based on the NOAEL TRV), then that chemical is considered to have a realistic potential to cause adverse ecological impacts, and is identified as a final COPEC that should be addressed either through remediation or further investigation. As discussed in the BERA, there are several important uncertainties associated with the assumptions used in the EEQ process, and it should be noted that EEQs greater than 1 do not necessarily mean that ecological impacts have occurred, or are occurring.

Several sub-areas were established within LHAAP for the BERA. LHAAP-29 falls within the Industrial Sub-Area. For the industrial Sub-Area, four chemicals were selected as final COPECs: cadmium, chromium, zinc, and perchlorate. After that selection, additional sampling data became available and further analysis was performed, leading to the calculation of ecological preliminary cleanup levels (EcoPRGs) for several chemicals in soil. The final COPECs that were initially selected were found to not be of concern and EcoPRGs were calculated for six other chemicals: barium, lead, 2,4-DNT, 2,6-DNT, TNT, and 2,3,7,8-TCDD. Ecological hazards were found to be acceptable for the Industrial Sub-Area that includes LHAAP-29; however, elevated concentrations of NTs (TNT, 2,4-DNT and 2,6-DNT) were identified at one location at the site (Shaw, 2007a). Although NTs were not selected in the Industrial Sub-Area as final COPECs due to low frequency of detection and other considerations, the BERA evaluated measurement receptors and included a spatial analysis at this sample location at LHAAP-29. The results of this analysis identified that the NTs at this location and the adjacent areas may represent a small area of highly elevated concentrations (i.e., a hot spot) that could pose a threat to small-range ecological receptors either through acute toxicity, or as a source area for downgradient surface water transport of contamination (Shaw, 2007b). The EcoPRGs are shown on **Table 2-9**. An Excel spreadsheet analysis was performed by

ranking the detected concentrations of each final COPEC in the Industrial Sub-Area and iteratively re-calculating the 95% upper confidence limit (UCL) on the mean after removing concentrations until the 95% UCL for the Industrial Sub-Area was lower than the EcoPRG. (Note: as discussed in the BERA, the EcoPRG is not a “not to exceed” value for all concentrations; rather, it is a conservative estimate of the average concentration that results in no adverse effects, and as such is equivalent to the 95% UCL of chemical concentrations, rather than to individual sample concentrations.) The order of chemical concentrations was altered to preferentially remove LHAAP-29 samples in order to reduce the ecological risk in the Industrial-Sub Area. It is assumed that the locations associated with these concentrations will be remediated. The outcome of the analysis is included in **Table 2-10** and indicated on **Figure 2-12**.

After the BERA was completed in 2007, additional data review determined that some explosives results used in the BERA were invalid. Additional samples were collected during a data gaps investigation to replace the invalid results and the results were combined with the previously reported useable data and data from samples collected following completion of the BERA to re-evaluate the ecological risks. The results were reported in the BERA Addendum (AGEISS, 2014). The results of the re-evaluation indicated that that the replacement data collected during the data gaps investigation confirmed the conclusions of the BERA that no explosives compounds in soil should be identified as COPECs in the industrial sub-area. These results do not change the determination that the areas of elevated NTs at LHAAP-29 might pose a risk to small-range ecological receptors and should be addressed as part of the remedial action.

2.7.3 Basis of Action

The remedial action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment. Actions for the groundwater are necessary to address the potential for human health risks in the unlikely event there is an attempt to use groundwater as a potable water source.

Actions for soil are necessary to address human health risk including the pathway from soil to groundwater and ecological risks. **Table 2-10** presents the COCs and the final cleanup levels for both soil and groundwater with groundwater COCs for the shallow zone and the intermediate zone listed separately, which takes into account both ecological and human receptors.

The SDWA MCL is the cleanup level for the groundwater COCs. In the absence of federal drinking water standards, clean-up levels will be based on TRRP Residential Groundwater PCLs.

2.8 Remedial Action Objectives

The RAOs for LHAAP-29 presented in this ROD for the selected remedy and contingency remedy address contamination associated with the media at the site and take into account the future uses of LHAAP surface waters, land, and groundwater, are:

- Protection of human health by preventing human exposure to the contaminants in the soil, sediment, transite TNT wastewater line, vitrified clay cooling water lines, and groundwater
- Protection of human health and the environment by preventing the migration of contaminants to groundwater and surface water from potential sources in the soil, sediment, and process lines (TNT wastewater and cooling water)

- Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water
- Protection of ecological receptors by preventing exposure to the contaminated soil and sediment
- Return of groundwater to its potential beneficial uses, wherever practicable within a timeframe that is reasonable given the particular circumstances of the site (40 C. F. R. § 300.430(a)(1)(iii)(F)).

The above RAO recognizes USEPA's policy to return all groundwater to beneficial uses, based on non-binding programmatic expectation in the NCP, and is consistent with the NCP regulations requiring the lead agency to establish RAOs specifying contaminants and media of concern, potential exposure pathways, and remediation goals.

Per these RAOs, and consistent with the NCP, groundwater will be returned to its beneficial use. In the absence of federal drinking water standards, the groundwater clean-up level at the Site is the TRRP Residential Groundwater PCL and is protective of human health and the environment.

2.9 Description of Alternatives

Four alternatives (including No Action) were evaluated. This section introduces the remedy components, identifies the common elements and distinguishing features of each alternative, and describes the expected outcomes of each.

2.9.1 Description of Remedy Components

Alternative 1 – No Action
As required by the NCP, the no action alternative provides a comparative baseline against which the action alternatives can be evaluated. Under this alternative, groundwater would be left "as is" without implementing any additional monitoring, containment, removal, treatment, or other mitigating actions. No actions would be implemented to reduce existing or potential future exposure to human and ecological receptors, although natural attenuation would be ongoing.

Estimated Capital Present Worth Cost: $0
Estimated O&M Present Worth Cost: $0
Cost Estimate Duration: NA
Estimated Present Worth Cost: $0

Alternative 2 – Excavation and Off-site Disposal for Soil; Plug Lines; In-situ Chemical Oxidation, MNA and LUCs for Intermediate Zone and Shallow Zone Groundwater
The major components of this alternative include the following:

- Excavation and off-site disposal of impacted soil from LHAAP-29 to protect human and ecological receptors, and to eliminate the potential soil-to-groundwater pathway
- Cooling water and transite TNT process wastewater lines will be flushed with water, inspected, and plugged using a bentonite slurry. Confirmation sampling of the wooden TNT wastewater line during the RD may result in excavation and disposal.

- Injection of chemical oxidant in targeted locations in the intermediate groundwater zone to oxidize organic constituents in the saturated zone and extraction of groundwater to help distribute oxidant with MNA following treatment
- MNA with LTM in the intermediate zone (after chemical oxidation is complete) to reduce groundwater contamination to cleanup levels
- MNA with LTM in the shallow zone to reduce groundwater contamination to cleanup levels
- A contingency remedy to enhance MNA if MNA is found to be ineffective. The contingency remedy would consist of injection of bioremediation amendments to enhance degradation of the groundwater contaminants at selected locations based on data available at the time it is determined MNA is not successful. Details for the contingency remedy would be presented in a RD/RAWP.
- Groundwater monitoring will be conducted to evaluate inorganic COCs. The need to continue groundwater monitoring for this purpose will be evaluated at five year reviews.
- LTM semiannually for 3 years, annually until the next five-year review, then annually until recommended otherwise at the five-year review to evaluate remedy performance and determine if plume conditions remain constant, improve, or worsen. Monitoring will continue until the five-year review demonstrates that cleanup levels are reached
- The LUCs' performance objectives are to prohibit groundwater use (except for environmental testing and monitoring) as a potable source 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 2-10**) in groundwater are met; to restrict land use to nonresidential until it is demonstrated that the surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that allow for unlimited use and unrestricted exposure; and to maintain the integrity of any current or future remedial or monitoring systems 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 2-10** in groundwater are met.

Estimated Capital Present Worth Cost: $8,070,000
Estimated O&M Present Worth Cost: $1,070,000
Cost Estimate Duration: 30 years
Estimated Present Worth Cost: $9,140,000

Alternative 3 – Excavation and Off-site Disposal of Soil; Plug Lines; Intermediate Zone Groundwater Extraction and Treatment, MNA and LUCs for Intermediate and Shallow Groundwater

The major components of this alternative include the following:

- Excavation and off-site disposal of impacted soil from LHAAP-29 to protect human and ecological receptors, and to eliminate the potential soil-to-groundwater pathway
- Cooling water and transite TNT process wastewater lines will be flushed with water, inspected, and plugged using a bentonite slurry. Confirmation sampling of the wooden TNT wastewater line during the RD may result in excavation and disposal.

- Groundwater extraction to reduce VOC levels throughout the intermediate zone groundwater contaminant plume to favorable conditions for MNA
- MNA with LTM in the intermediate zone (after groundwater extraction) to reduce groundwater contamination to cleanup levels
- MNA with LTM in the shallow zone to reduce groundwater contamination to cleanup levels
- A contingency remedy to enhance MNA if MNA is found to be ineffective. The contingency remedy would consist of injection of bioremediation amendments to enhance degradation of the groundwater contaminants at selected locations based on data available at the time it is determined MNA is not successful. Details for the contingency remedy would be presented in a RD/RAWP.
- Groundwater monitoring will be conducted to evaluate inorganic COCs. The need to continue groundwater monitoring for this purpose will be evaluated at five year reviews.
- LTM semiannually for 3 years, annually until the next five-year review, then annually until recommended otherwise at the five-year review to evaluate remedy performance and determine if plume conditions remain constant, improve, or worsen. Monitoring will continue until the five-year review demonstrates that cleanup levels are reached
- The LUCs' performance objectives are to prohibit groundwater use (except for environmental testing and monitoring) as a potable source 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 2-10**) in groundwater are met; to restrict land use to nonresidential until it is demonstrated that the surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that allow for unlimited use and unrestricted exposure; and to maintain the integrity of any current or future remedial or monitoring systems 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 2-10**) in groundwater are met.

Estimated Capital Present Worth Cost: $1,550,000
Estimated O&M Present Worth Cost: $1,780,000
Cost Estimate Duration: 30 years
Estimated Present Worth Cost: $3,300,000

Alternative 4 - Excavation and Off-site Disposal for Soil; Plug Lines; ISTD, MNA and LUCs for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater
The major components of this alternative include the following:

- Excavation and off-site disposal of impacted soil from LHAAP-29 to protect human and ecological receptors, and to eliminate the potential soil-to-groundwater pathway
- Cooling water and transite TNT process wastewater lines will be flushed with water, inspected, and plugged using a bentonite slurry. Confirmation sampling of the wooden TNT wastewater line during the RD may result in excavation and disposal.
- One of two ISTD process options, ERH (Alternative 4a) or TCH (Alternative 4b) will be selected during the remedial design phase and implemented to remediate the MC DNAPL plume in the intermediate zone to levels amenable to MNA

- MNA with LTM in the intermediate groundwater zone (after ISTD activities are complete) to reduce groundwater contamination to cleanup levels
- MNA with LTM in the shallow zone to reduce groundwater contamination to cleanup levels
- A contingency remedy to enhance MNA if MNA is found to be ineffective. The contingency remedy would consist of injection of bioremediation amendments to enhance degradation of the groundwater contaminants at selected locations based on data available at the time it is determined MNA is not successful. Details for the contingency remedy would be presented in a RD/RAWP.
- Groundwater monitoring will be conducted to evaluate inorganic COCs. The need to continue groundwater monitoring for this purpose will be evaluated at five year reviews.
- LTM semiannually for 3 years, annually until the next five-year review, then annually until recommended otherwise at the five-year review to evaluate remedy performance and determine if plume conditions remain constant, improve, or worsen. Monitoring will continue until the five-year review demonstrates that cleanup levels are reached
- The LUCs' performance objectives are to prohibit groundwater use (except for environmental testing and monitoring) as a potable source 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 2-10**) in groundwater are met; to restrict land use to nonresidential until it is demonstrated that the surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that allow for unlimited use and unrestricted exposure; and to maintain the integrity of any current or future remedial or monitoring systems 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 2-10**) in groundwater are met.

Alternative 4a:

Estimated Capital Present Worth Cost: $3,710,000
Estimated O&M Present Worth Cost: $1,030,000
Cost Estimate Duration: 30 years
Estimated Total Present Worth Cost: $4,740,000

Alternative 4b:

Estimated Capital Present Worth Cost: $4,530,000
Estimated O&M Present Worth Cost: $1,190,000
Cost Estimate Duration: 30 years
Estimated Total Present Worth Cost: $5,720,000

2.9.2 Common Elements and Distinguishing Features

Common Elements of Alternative 2, 3, and 4

Common elements of Alternatives 2, 3, and 4 are described below.

Soil Excavation –Contaminated soil would be excavated at LHAAP-29 under Alternatives 2, 3, and 4 to prevent human and ecological receptor exposure to contaminants in the soil and to eliminate the soil-to-groundwater pathway. As part of the RD, confirmation soil samples will be collected along

the north and south cooling water lines as well as the TNT wastewater lines to confirm that leaching has not occurred, which may identify additional soil excavation areas. Disposal will be at a RCRA Subtitle D-permitted landfill.

Process Lines – Transite TNT wastewater line would be flushed, then the inlets and outlets will be inspected and plugged with a bentonite slurry mix or equivalent. The cooling water lines will be evaluated further during the RD in order to base the remedial action on up-to-date data. The lines will be flushed with water, inspected and plugged using a bentonite slurry mix or equivalent. Rinsate water will be containerized and characterized for waste handling. During the RD, samples will be collected from the soil along the deteriorated wooden TNT wastewater line and analyzed for explosives to determine if there are concentrations that represent a potential source for groundwater contamination. If present, above the GWP-Ind, the affected soils may be included in the excavation and disposal activity.

MNA – MNA is a passive remedial action that relies on natural biological, chemical, and physical processes to reduce the mass and concentrations of groundwater COCs under favorable conditions. The natural attenuation evaluation indicates that MNA is a feasible technology for the groundwater at LHAAP-29 (Shaw, 2010). Monitoring activities associated with MNA would confirm the protection of human health and the environment by documenting the return of the groundwater to its potential beneficial use as a drinking water supply, and by documenting reduction of the contaminant mass and protection of surface water through containment of the plume. In all three alternatives, contaminant reduction would occur by MNA alone in the shallow zone. For the intermediate zone, to achieve conditions favorable to MNA, MC would be reduced by chemical oxidation in Alternative 2, groundwater extraction in Alternative 3, and thermal destruction in Alternative 4.

MNA performance monitoring would be conducted quarterly for the first two years. After eight quarterly sampling events, MNA effectiveness will be evaluated. The analytical program would consist of VOCs, including chlorinated compounds and degradation products, nitrotoluenes, methane, ethene, and ethane, among others. The full list of MNA parameters would be developed during the RD phase.

Inspection/Long-Term Groundwater Monitoring – Alternatives 2, 3, and 4 include inspection and long-term groundwater monitoring activities. Monitoring would be continued as required to evaluate the effectiveness of the remedy, to demonstrate compliance with applicable or relevant and appropriate requirements (ARARs) and RAOs, and to support five-year reviews.

LUCs – LUCs would be implemented to support the RAOs. The LUC for groundwater would 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. The LUC to prohibit groundwater use (except for environmental testing and monitoring) as a potable source would remain 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 2-10**) in groundwater are met; to restrict land use to nonresidential until it is demonstrated that the surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that allow for unlimited use and unrestricted exposure; and to maintain the integrity of any current or future remedial or monitoring systems 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 2-10**) in groundwater are met.

In addition, within 90 days of signature of this ROD, the Army shall request the Texas Department of Licensing and Regulation to notify well drillers of groundwater use prohibitions based on a preliminary LUC boundary. A LUC Remedial Design (RD) will be finalized as the land use component of the Remedial Design. Within 21 days of the issuance of the ROD, the Army will propose deadlines for completion of the RD Work Plan, RD, and Remedial Action Work Plan. The documents will be prepared and submitted to EPA and TCEQ pursuant to the FFA. The LUC RD will contain implementation and maintenance actions, including periodic inspections. The long-term groundwater and surface water monitoring and MNA performance monitoring will also be presented in the RD. Consistent with the dates presented for these documents, the U.S. Army shall: 1) request the Texas Department of Licensing and Regulation to notify well drillers of the final boundary of groundwater use prohibitions; and 2) notify the Harrison County Courthouse of the LUCs to include a map showing the areas of groundwater and nonresidential use restrictions, and the monitoring system at the site, in accordance with 30 TAC 335.565.

The Army will implement, maintain, monitor, report on and enforce land use controls at Army-owned property. The Army shall perform those actions related to land use control activities described in this ROD and in the Remedial Design for the ROD. 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 will provide notice of the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD. The Army will send these notices to the 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. The Army shall provide the initial notice within 90 days of ROD signature. The frequency of subsequent notifications will be described in the Remedial Design for the ROD. The Army remains responsible for ensuring that the remedy remains protective of human health and the environment. The Army will fulfill its responsibility and obligations under CERCLA and the NCP as it implements, maintains, and reviews the selected remedy.

Upon transfer of Army-owned property, the Army will provide written notice of the land use controls to the transferee of the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD. Within 15 days of transfer, the Army shall provide EPA and TCEQ with written notice of the division of implementation, maintenance, and enforcement responsibilities unless such information has already been provided in the LUC RD. The LUC RD will address the procedures to be used by the Army and the transferee to document compliance with the LUCs described in this ROD. 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.

To transfer this property (LHAAP-29), an Environmental Condition of Property (ECP) document would be prepared and the Environmental Protection Provisions from the ECP would be attached to the letter of transfer. The ECP would include the LUCs as part of the Environmental Protection Provisions. The property would be transferred subject to the LUCs identified in the ECP. These restrictions would prohibit or restrict property uses that might result in exposure to the contaminated groundwater (e.g., drilling restrictions) or soil (e.g., residential land use prohibition).

The U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of a LUC objective at these sites after they have been transferred.

Distinguishing Feature of Alternative 2

The distinguishing feature of Alternative 2 compared to Alternatives 3 and 4 is the inclusion of ISCO to treat the MC DNAPL in the intermediate groundwater zone. These actions are described below. Note that the design specifications presented below are used for cost estimating purposes and the final design for the selected remedy will be presented in the Remedial Design document.

In situ chemical oxidation – The components of this action include:

Installation of injection wells. Four intermediate zone injection wells (88 feet bgs) would be installed around existing intermediate monitoring well 29WW16, where MC was detected at the highest concentration. The four wells would be arranged in a square with well 29WW16 in the center of the square. The spacing may be adjusted based on actual field conditions.

Injection of oxidation solution. One pore volume of heat activated (40 degrees Celsius [ºC]) combined persulfate and sodium hydroxide solution at 60 grams per liter (g/L) and 15 g/L, respectively, would be injected into four wells while simultaneously extracting groundwater from well 29WW216. Temporary piping would be used for the injection array. The estimated volume is approximately 187,000 gallons of activated persulfate and sodium hydroxide solution to be injected into the subsurface. The solution is estimated to be 94,000 pounds of persulfate reagent and 23,500 pounds of sodium hydroxide. A second round of injection may be required if monitoring indicates COCs are not being effectively reduced from the initial round. For the cost estimate, a second round is assumed. If contaminant concentrations do not decrease as anticipated, the method would be modified.

Simultaneous extraction of groundwater. Well 29WW16, or an equivalent, would be converted to an extraction well. Prior to conversion, a pumping test would be conducted and hydrogeologic parameters would be measured to assess aquifer conditions. Groundwater flow in the vicinity of 29WW16 and the injection wells would be modeled to determine the scope of the modifications needed at 29WW16 and to assess the time required to extract one pore volume.

For estimating purposes, it is assumed the on-site groundwater treatment plant is operating and can handle 187,000 gallons extracted for one pore volume. A temporary piping system would be used to convey the extracted water to three 5,000-gallon on-site storage tanks. The on-site tanks would be interconnected and would be equipped with a high level shut off to the extraction pump. Once every two days, water would be pumped into a tank truck and transported to the LHAAP groundwater treatment plant for treatment and discharge (**Figure 2-14**). A 20-foot by 50-foot gravel pad would be prepared for the tanks, and a 6-inch-layer of gravel would be placed to upgrade the road to the tanks at LHAAP-29. Based on the pumping test results, the quantities of extracted water and best approach to handle the water would be evaluated.

Monitor effectiveness. To monitor the effectiveness of the in situ chemical oxidation, six wells would be monitored biweekly for three sampling events. The six wells would include one new monitoring well, four injection wells, and 29WW16. The effect of the first chemical injection should be evident within a few weeks. It is anticipated that a second injection may be needed after approximately 2 months.

Distinguishing Feature of Alternative 3

The distinguishing feature of Alternative 3 compared to Alternatives 2 and 4 is the inclusion of groundwater extraction to address contamination in the intermediate groundwater zone.

Groundwater extraction is estimated to require 3 years to reduce concentrations to levels amenable to MNA. These actions are described below. Note that the design specifications presented below are used for cost estimating purposes and the final design for the selected remedy will be presented in the Remedial Design document.

Pre-Design Study: This action would begin with a pre-design study. A pump test would be conducted and hydrogeologic parameters would be measured to better design the system. Groundwater flow would be modeled to set performance evaluation parameters and to assess the likely time required for remediation.

Construction: Groundwater contamination in the intermediate zone at LHAAP-29 primarily consists of a MC plume. A minimum of five additional wells (four extraction and one monitoring) are proposed to be installed in the intermediate zone within the region of greatest MC contamination in order to provide a more effective extraction process. Several groundwater monitoring wells are located throughout the site and some of these could also be converted to extract contaminated groundwater if needed. The final number and locations for extraction wells would be determined as part of the pre-design study.

Storage and transport of extracted groundwater: A piping system would be constructed to transport the extracted water from the extraction wells 5,000-gallon storage tanks to be located on-site at LHAAP-29. The tanks would be interconnected and equipped with a high level shut off to the pump. Once every two days or at a determined frequency, the water would be pumped into a tank truck and transported to the existing groundwater treatment plant for treatment and discharge.

Performance Monitoring: During extraction, samples would be collected from the extraction wells and monitoring wells to monitor the effectiveness of the action. During startup of the extraction system (until the system is operating properly), bimonthly sampling would be conducted. Startup is estimated to be approximately six months. After startup, monitoring would be reduced to quarterly for the remaining 2.5 years.

Water Treatment and Discharge: The extracted groundwater from LHAAP-29 would be treated at the LHAAP groundwater treatment plant, which was originally built to treat groundwater containing VOCs and metals extracted from other LHAAP sites. The plant uses air stripping, carbon adsorption, and thermal oxidation. Perchlorate treatment using a fluidized bed reactor was added in April 2001 to the treatment plant. The extracted water from LHAAP-29 would be discharged from the tank truck into the existing 300,000-gallon equalization tank. This tank receives water from other LHAAP sites and is stored in this tank until treatment. After the water is treated, the effluent would be discharged in accordance with plant procedures. The plant presently operates at a fraction of its maximum capacity of 1 to 1.5 million gallons of water per month. The original groundwater treatment plant components have adequate capacity to accommodate the increase in volume that would be introduced to the system when the contaminated groundwater is transported from LHAAP-29 to the plant. The system capacity is limited by effluent storage and discharge rate, and this concern was addressed. Recent mitigating measures include the replacement of the reinjection pipeline to increase the pipe diameter to 4-inches, and the installation of a sprinkler system. The capacity issue would be revaluated as necessary during the remedial action.

Extraction System: Operation and maintenance would include groundwater extraction system maintenance, groundwater treatment plant operations, and environmental media monitoring. In three years, the extraction wells are anticipated to remove the highest concentrations of VOCs from the groundwater intermediate zone at LHAAP-29, thus reducing the contaminant mass to make

conditions favorable for MNA (estimate assumes 3 years). For MNA, four wells would be selected for use as monitoring wells, and monitoring would be implemented to demonstrate that any remaining VOCs are attenuated by natural processes. During the groundwater extraction operations, the extraction wells would require regular maintenance to prevent fouling of well screens, and the extraction pumps would require routine maintenance and may also require replacement. Cleaning of the pipelines, refurbishing pumps and other maintenance activities would be needed on the groundwater collection and transport system during full-scale operation. O&M costs would include the addition of chemicals, power, and labor; equipment cleaning, tank cleaning, general system maintenance, and replacement; and regulatory monitoring and reporting. O&M activities would also be conducted at the LHAAP plant location as part of the routine plant O&M activities.

Distinguishing Feature of Alternative 4

The distinguishing feature of Alternative 4 compared to Alternatives 2 and 3 is the inclusion of ISTD to remediate the MC DNAPL in the intermediate groundwater zone. Alternative 4a, using ERH as the ISTD process, or 4b using TCH as the ISTD process would be selected during the remedial design phase. Thermal desorption operates by heating the subsurface to effectively and quickly volatilize large quantities of VOCs, including those in the form of non-aqueous phase liquid. Available technologies include ERH, TCH, and steam injection, which are typically coupled with a soil vapor extraction (SVE) system and above ground emission controls to capture and/or destroy volatilized VOCs. Pumping of groundwater or multi-phase extraction (MPE) may also be required to contain the mobilized VOCs in groundwater.

These actions are described below. Note that the design specifications presented below are used for cost estimating purposes and the final design for the selected remedy will be presented in the Remedial Design document. The proposed ERH concept developed for this site and used to develop costs presented in the FS does not include a groundwater extraction component, while the proposed TCH concept incorporated groundwater extraction as part of the MPE component. The TCH conceptual design is significantly more robust than the one proposed for ERH, which may in part explain the difference in total cost between Alternatives 4a and 4b. The actual number of heater wells and the need for groundwater extraction would require further evaluation during the remedial design phase. ISTD for either process option would include extraction of vapors and potentially concurrent groundwater extraction. The need for MPE would be determined during the RD phase. Condensate would be removed from the extracted vapors, which would subsequently be treated in a thermal oxidizer for the destruction of the chlorinated VOCs. Hydrogen chloride generated by combustion of chlorinated compounds would be treated in an acid gas scrubber before discharge to ambient air. If groundwater extraction is required, the extracted water would be combined with the condensate removed from the extracted vapors and transported via truck to the existing groundwater treatment plant (GWTP).

Alternative 4a, In-situ thermal desorption using ERH – ERH delivers electricity through subsurface media via an array of electrodes. The heat generated by electrical resistance typically can raise subsurface temperatures to around the boiling point of water. The steam produced from pore-water serves as a medium to carry out volatilized VOCs for capture via SVE and subsequent ex-situ treatment of extracted vapors. Contaminants are also directly volatilized from unsaturated soil and the applied heat can increase hydrolysis of chlorinated solvents, such as MC, and promote in-situ biological activity. Treatment duration is estimated at 65 – 87 days. The components of the ERH technology for Alternative 4a include:

Installation of electrode borings: An array of electrode borings with co-located vapor extraction wells. The specific depths and layout of the array would be determined during the RD. Temperature monitoring probes would also be installed.

Vapors: The extracted vapor would require treatment to remove VOCs. Although activated carbon is proposed in the vendor's conceptual design, it is assumed that the mass loading would require a thermal oxidizer for treatment of the vapors. The airflow rate is estimated at 320 standard cubic feet per minute (scfm).

Storage, transfer, and treatment of extracted water: Condensate from the co-located vapor extraction wells would be collected and stored in an above-ground tank prior to transfer to the GWTP for treatment and disposal.

Alternative 4b, In-situ thermal desorption using TCH - Thermal conduction is the process of heat flow from a high temperature area to a lower temperature area. TCH involves applying heat and vacuum simultaneously to subsurface media with an array of vertical heater/vacuum wells, thus heating up solids (soil and rock) and liquids (water, air and non-aqueous phase liquids). The heat moves out radially from each thermal well until the heat fronts overlap. Thermal conductivities of subsurface materials, such as sands, silt, and clay show little variability, which leads to highly predictable in-situ heating even in challenging heterogeneous settings. Heating of the wells can either be accomplished by electrically-powered heater coils or using combustion of fuels (e.g. natural gas or propane).

Transport of the vaporized contaminants is improved by the creation of permeability, which results from drying and, if clay is present, shrinking of the soil close to the heaters causing the formation of preferential flow paths that allow capture of the vaporized contaminants. The target temperature for TCH is typically the boiling temperature of the groundwater (e.g. 100 degrees Celsius [ºC] at a pressure of 1 atmosphere). The steam produced from the groundwater serves as a medium to carry out volatilized VOCs. In addition, the applied heat can increase hydrolysis and promote in-situ biological activity. Treatment duration estimated at 180 days.

The components of the TCH technology for Alternative 4b include:

Installation of heater wells: An array of heater wells with co-located vapor extraction wells. The specific depths and layout of the array would be determined during the RD. Temperature monitoring probes would also be installed.

Vapor treatment: The extracted vapor would require treatment to remove VOCs. Although activated carbon is proposed in the vendor's conceptual design, it is assumed that the mass loading would require a thermal oxidizer for treatment of the vapors. Assumed airflow rate is 320 scfm

Storage, transfer, and treatment of extracted water: Condensate from the co-located vapor extraction wells would be collected and stored in an above-ground tank prior to transfer to the GWTP for treatment and disposal

2.9.3 Expected Outcomes of Each Alternative

Alternative 1 would allow the site to remain a hazard to human and ecological receptors, since it simply leaves the site as is. Alternatives 2, 3, and 4 provide the same outcome to mitigate exposure to human and ecological receptors by excavation and off-site disposal of the contaminated soil. Soil excavation would also eliminate the potential soil-to-groundwater pathway, preventing further

degradation of groundwater from contaminated soil. Alternatives 2, 3, and 4 would significantly and permanently reduce groundwater contaminant concentrations to the applicable cleanup levels and, therefore, provide long-term effectiveness and permanence. This would be achieved by implementing MNA after the implementation of the initial active treatments from Alternatives 2, 3, and 4 to reduce the VOC contaminant concentrations in the intermediate groundwater zone. These include ISCO for Alternative 2, groundwater extraction (pump and treat) for Alternative 3, and ISTD for Alternative 4. Cleanup levels for the shallow zone should be achieved through MNA in approximately 70 years, and in the intermediate zone the cleanup levels should be achieved through MNA following extraction or active treatment in approximately 90 years for Alternatives 2 and 3, and 5-10 years for Alternatives 4a and 4b. However, considering the lithologic variability, particularly the lateral and vertical change from sand to clay, the times to achieve the cleanup levels may vary by an order of magnitude. The similar outcomes are considered to be attainment of the SDWA MCLs to the extent practicable, and consistent with 40 C.F.R. § 300.430(e)(2)(i)(B & C). If no SDWA MCL has been promulgated for a contaminant, the TRRP Residential Groundwater PCL is used in place of the SDWA MCL. In addition, the monitoring activities associated with MNA would confirm the protection of human health and the environment by documenting the return of the groundwater to its potential beneficial use as a drinking water supply to the extent practicable, given the particular circumstances of the site, by documenting reduction of the contaminant mass and protection of surface water through containment of the plume.

The LUC will remain in place to prohibit groundwater use (except for environmental testing and monitoring) as a potable source 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 2-10**) in groundwater are met; to restrict land use to nonresidential until it is demonstrated that the surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that allow for unlimited use and unrestricted exposure; and to maintain the integrity of any current or future remedial or monitoring systems 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 2-10**) in groundwater are met.

2.10 Summary of Comparative Analysis

Nine criteria identified in the NCP 40 C.F.R. § 300.430(a)(1)(iii)(F) are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. This section profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. **Table 2-11** summarizes the comparative analysis of the alternatives.

2.10.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or land use controls.

The four alternatives provide varying levels of human health protection. Alternative 1, no action, does not confirm achievement of the RAO for the return of groundwater to its potential beneficial use because there is no monitoring involved. Alternative 1 also provides the least protection of all the

alternatives; it provides no reduction in risks to human health or the environment because no measures would be implemented to eliminate the pathway for human exposure to soil or to the groundwater contamination and potential groundwater impacts to Central Creek and Goose Prairie Creek would not be addressed. Additionally, the soil pathway for ecological receptors would not be addressed.

Alternatives 2, 3, and 4 satisfy the RAOs for LHAAP-29. Alternatives 2, 3, and 4 would remove the contaminated soil and solid residue in lines that pose a hazard, and provide confirmation that human health and the environment would be protected because the monitoring would be conducted to show that MNA is returning the groundwater in the contaminated shallow and intermediate groundwater zones at LHAAP-29 to its potential beneficial use as a drinking water supply to the extent practicable, given the particular circumstances of the site, and to document that the plumes are contained and prevented from impacting surface water at levels that could present a risk to human health and the environment. Furthermore, the LUC for groundwater would protect human health by preventing access to the contaminated groundwater 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 2-10**) in soils and groundwater allow for unlimited use and unrestricted exposure. Alternatives 2, 3 and 4 provide treatment of the primary COC, MC, for human health in the intermediate zone.

2.10.2 Compliance with ARARs

Section 121(d) of CERCLA and 40 C.F.R. § 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites attain legally applicable or relevant and appropriate Federal and state requirements, standards, criteria, and limitations, which are collectively referred to as “ARARs”, unless such ARARs are waived under CERCLA Section 121(d)(4). The ARARs that pertain to this ROD are discussed in **Section 2.13.2**.

Because contaminated groundwater has the potential to flow into Goose Prairie Creek which flows to Caddo Lake, a drinking water supply, chemical-specific ARARs for surface water consumption are appropriate and relevant. Specifically, Texas surface water quality standards are set forth in 30 TAC 307.6(d)(1), Table 2, for MC, TCE, 1,2-DCA, 1,1-DCE, and VC. For those COCs not listed in Table 2, including perchlorate, cis-1,2-DCE, trans-1,2-DCE, and explosives, the TRRP Residential Groundwater PCLs for those COCs would apply.

Alternative 1 does not comply with chemical-specific ARARs because no remedial action or measures would be implemented. Alternatives 2, 3, and 4 do comply with all chemical-specific ARARs for soil because the contaminated soil above the chemical-specific ARAR would be removed. Alternatives 2, 3, and 4 comply with all chemical-specific ARARs for groundwater because they would return the contaminated shallow and intermediate groundwater zones at LHAAP-29 to their potential beneficial use as drinking water, wherever practicable, which for the purposes of this ROD is considered to be attainment of the relevant and appropriate cleanup levels (SDWA MCLs or TRRP Residential Groundwater PCLs if no SDWA MCL is available) to the extent practicable, and consistent with 40 C.F.R. § 300.430(e)(2)(i)(B & C) and 30 TAC 335.559(d)(2). If a return to potential beneficial uses is not practicable, these alternatives would still meet the NCP expectation to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction. While Alternative 3 provides a level of overall protection similar to Alternatives 2 and 4, Alternatives 2 and 4 would accelerate the MC cleanup in the intermediate zone. Alternative 4 would achieve the cleanup in the shortest period of time, 5-10 years of MNA after active treatment is completed, compared with 90 years of MNA for Alternatives 2 and 3.

Location-specific and action-specific ARARs would not apply to Alternative 1 since no remedial activities would be conducted. Alternatives 2, 3, and 4 would comply with all action-specific ARARs. There are no location-specific ARARs for Alternatives 2, 3, or 4.

2.10.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Alternative 1 would be the least effective and permanent in the long term because no contaminant source removal or treatment would take place and no measures would be implemented to control exposure risks posed by contaminated site soil, sediment, surface water and groundwater. Alternative 1 would also have no effectiveness and permanence with regards to the contaminated soil, since no soil removal would be conducted.

Removing the source soils and either removing the contaminated groundwater through extraction, or using active treatment to destroy VOCs in the DNAPL plume would provide a permanent solution for the contaminants in affected media.

Alternatives 2, 3, and 4 would provide a moderate degree of long-term effectiveness by removing the source soils and providing restoration of the groundwater by treatment and/or MNA. Alternatives 2 and 4 provide a higher level of effectiveness than Alternative 3because the intermediate groundwater zone would reach concentrations amenable to natural attenuation in a shorter time frame. Alternative 4 would provide the highest level of effectiveness since the intermediate zone groundwater would reach cleanup levels in the shortest timeframe. Alternative 2 allows the opportunity to evaluate the impact of the in-situ treatment and re-inject if necessary. The impact of the ISTD performed under either of the process options for Alternative 4 would also be evaluated to determine whether additional treatment may be necessary. Alternative 3 is as effective and permanent as Alternatives 2 and 4, but would require more time to reduce concentrations amenable to MNA than Alternatives 2 or 4 and would require a longer period of active operations and maintenance. Alternatives 2 and 4 would significantly reduce initial groundwater contaminant concentrations and thereafter rely on natural attenuation and LUCs 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 2-10**) in soils and groundwater allow for unlimited use and unrestricted exposure. Monitoring activities associated with MNA would confirm the protection of human health and the environment by documenting the return of the groundwater to its potential beneficial use as a drinking water supply to the extent practicable, by documenting reduction of the contaminant mass and protection of surface water through containment of the plume.

LUCs would provide a moderate to high degree of effectiveness by limiting land use and preventing exposure to contaminated media. As a federally owned property that will remain so as a refuge after transfer, the ability to achieve permanence and effectiveness is greatly enhanced.

The removal of contaminated solid residue from the transite wastewater line and from the cooling water lines would provide a high degree of long-term effectiveness and permanence by removing the contaminated solid residue from the site.

2.10.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternative 1 does not employ treatment and would not result in a reduction of toxicity, mobility, or volume of contaminants. Alternative 2 would use excavation, ISCO, and natural attenuation to permanently reduce the mass and concentration of contaminants and, therefore, the toxicity, mobility, and volume of the contaminants. In-situ chemical oxidation is an active treatment process.

Alternative 3 would use excavation, groundwater extraction, and natural attenuation to achieve the same reductions in contamination that are expected from Alternative 2. Groundwater extraction is an active treatment process and would reduce toxicity and volume of the contaminants.

Alternative 4 would use excavation, ISTD, and natural attenuation to permanently reduce the mass and concentration of contaminants and, therefore, the toxicity, mobility, and volume of the contaminants. ISTD is an active treatment process.

Biological activity would generate daughter products that may temporarily increase toxicity or mobility of the contaminant plume. Alternatives 2, 3, and 4 include monitoring so that daughter products would be quantified, documented, and evaluated. The same biological activities would also consume the daughter products, and it is anticipated that these concentrations would be reduced to levels below their associated cleanup levels to return groundwater to its potential beneficial use, wherever practicable.

There is an NCP expectation to use treatment to address principal threat wastes, wherever practicable. Alternatives 2, 3, and 4 satisfy the NCP expectation by including treatment components that address the potential for principal threat wastes associated with the high concentrations of MC in the intermediate groundwater zone.

The soil excavation in Alternatives 2, 3, and 4 would reduce mobility because perchlorate and explosive contaminated soils would be removed from the site and placed in a permitted disposal facility. Toxicity and volume would not be reduced by the excavation portion of the alternatives as the form and quantity of contaminants would not be altered.

The removal of contaminated solid residue from the transite wastewater line and cooling water lines by flushing with water in Alternatives 2, 3, and 4 would reduce mobility because the solid residue would be removed from the site and the rinsate collected, analyzed by the toxicity characteristic leaching procedure (TCLP), and properly disposed. Toxicity and volume would not be reduced since quantity of the contaminants would not be altered.

2.10.5 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternative 1 would not involve any remedial measures; therefore, no short-term risk to workers, the community, or the environment would exist. The activities associated with Alternatives 2, 3, and 4 would be protective to the surrounding community from short-term risks except for minimal potential

short-term risks during transport (possible accident when soil is transported off site) of perchlorate and explosive contaminated soil.

Alternatives 2, 3, and 4 would involve potential short-term risks to remediation workers associated with exposure to contaminated groundwater from monitoring and/or operation of drilling/construction equipment, and with exposure to contaminated soil during excavation work.

Alternative 2 has additional short-term risks due to remediation workers handling chemical oxidants and also requires heating of the target zone to 40 degrees C, which would pose similar risks as those posed by the thermal treatment included under Alternative 4, such as potential exposure to high voltage power sources. The thermal treatment component of Alternative 4 has additional potential short-term risks due to potential exposure to high voltage power sources and exposure to hot fluids extracted during ISTD treatment. In addition, workers could be exposed to toxic air emissions during ISTD operations.

Alternative 3 would have short-term risks to the remediation workers associated with exposure during increased operations at the LHAAP groundwater treatment system, which include chemical handling and operation of a high-temperature catalytic oxidizer and in handling contaminated groundwater during extraction, temporary storage on site, and conveyance to the GWTP 1.5 miles away. The implementation of Alternative 3 would require more time than either Alternative 2 or Alternative 4.

Alternatives 2, 3, and 4 include the LUCs as elements of their remedies and would provide almost immediate protection from the contaminated groundwater by prohibiting groundwater use except for environmental monitoring and testing through LUC implementation through a relatively quick implementation period. The time period to achieve groundwater cleanup levels is the most significant difference between Alternative 1 versus Alternatives 2, 3, or 4. Alternatives 2 and 3 are expected to take less time to achieve RAOs than Alternative 1, and either Alternative 4a or 4b would require the shortest time for the intermediate zone groundwater to achieve cleanup levels.

2.10.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Under Alternative 1, no remedial action would be taken. Therefore, no difficulties or uncertainties would be associated with its implementation. For Alternatives 2, 3, and 4, soil excavation would require extensive coordination between excavation, sampling, transportation and disposal. Plugging of the TNT transite wastewater line and cooling water lines can be conducted without extensive intrusive activities with equipment, services, and materials readily available to conduct the activities for Alternatives 2, 3, and 4. Alternatives 2, 3, and 4 could all be implemented. There are qualified vendors available to implement the ISTD technology. There are also qualified contractors with the capabilities to design and implement ISCO. Installation of utilities, availability of equipment and supplies, and compliance with any local ordinances or other requirements would need to be identified and addressed during the design and construction process.

Alternative 3 would involve the use of a groundwater treatment system which currently exists at LHAAP and is accessible to the site; however, from a technical standpoint the increased duration for extraction would require three years for Alternative 3 compared to six months for Alternative 2 and

Alternative 4b, or approximately 3 months for Alternative 4a. The U.S. Army will be responsible for LTM and enforcement of the LUCs, long-term evaluation of MNA, long-term sampling, and LTM and operation of sampling equipment. Technically, Alternatives 2, 3, and 4 are readily implementable.

Administratively, all of the alternatives are implementable.

2.10.7 Cost

Cost estimates are used in the CERCLA process to eliminate those remedial alternatives that are significantly more expensive than competing alternatives without offering commensurate increases in performance or overall protection of human health or the environment. The cost estimates developed are preliminary estimates with an intended accuracy range of –30 to +50 percent. Final costs would depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final scope, final schedule, final engineering design, and other variables.

The cost estimates include capital costs (including fixed-price remedial construction) and long-term O&M costs (post-remediation). Overall present worth costs are developed for each alternative assuming a discount rate of 2.8 percent. The duration used for the estimates is a 30-year period.

The progression of present worth costs from the least expensive alternative to the most expensive alternative is as follows: Alternative 1, Alternative 3, Alternative 4a, Alternative 4b, and Alternative 2. No costs are associated with Alternative 1 because no remedial activities would be conducted.

Alternative 3 has the lowest present worth and capital costs of the active remedial alternatives. The presence of the existing groundwater treatment system at LHAAP greatly reduces the capital costs associated with groundwater extraction in Alternative 3. Alternative 2 has the highest present worth and capital costs primarily due to the activities associated with the injection phase of ISCO. Alternative 4a has a lower present worth than Alternative 4b, however the difference in costs between the ISTD process options may reflect differences between the components included in the proposed designs for ERH and TCH developed for the FS. The proposed ERH concept developed for this site and used to develop costs presented in the FS does not include a groundwater extraction component, while the proposed TCH concept incorporated groundwater extraction as part of the MPE component. The TCH conceptual design is significantly more robust than the one proposed for ECH, which may in part explain the difference in total cost between Alternatives 4a and 4b.

2.10.8 State/Support Agency Acceptance

The USEPA and TCEQ have reviewed the Revised Proposed Plan, which presented Alternative 4 as the preferred alternative. Comments received from the USEPA and TCEQ during the Revised Proposed Plan development have been incorporated. Both agencies concur with the selected remedial action.

2.10.9 Community Acceptance

Community acceptance is an important consideration in the final evaluation of the selected remedy. Verbal comments were received during the public meeting held on December 6, 2018 at the Karnack Community Center. No other comments were received during the 30-day public comment period. The topics of the comments included: excavation and disposal of contaminated soils; requirements for vegetation removal and above ground ecological impacts of the remedial actions; the status of

the wooden wastewater line; prior treatability studies; groundwater plume stability and migration; ISTD effectiveness; and regulatory drivers for remediation. Comment responses were provided and incorporated into the ROD, including describing soil sampling and evaluating the wooden wastewater lines for removal.

Several sets of written public comments were received during the 30-day public comment period and public meeting held for the 2011 PP, and there were several verbal comments from the March 22, 2011 public meeting. Although the selected remedy has changed, most of the comments remain relevant. The relevant topics of the 2011 comments included: excavation of contaminated soils, groundwater treatment plant operation, additional groundwater sampling for DNT isomers, remediation for flushing and plugging the subsurface TNT wastewater line, and plugging the cooling water lines. Comment responses were provided and are summarized in the Responsiveness Summary (**Section 3**).

2.11 Principal Threat Waste

Laboratory results from the groundwater at LHAAP-29 have indicated that residual DNAPL may be residing as a source material in the subsurface. In a phase separate from groundwater, the hazardous contaminant MC is characterized as a highly toxic source material and, thus, a principal threat waste. In accordance with the NCP, treatment alternatives have been evaluated through the remedy selection process. The preferred remedial alternative includes an active remedial component that would mitigate the potential principal threat. By instituting an ISTD treatment of the groundwater, this active treatment would be applied to the highest concentration area in the MC groundwater plume and would comply with the NCP expectations regarding treatment of affected media where principal threat may be considered.

2.12 The Selected Remedy

2.12.1 Summary of Rationale for the Selected Remedy

Alternative 4 (Excavation and Off-site Disposal for Soil; Plug Lines; ISTD, MNA and LUCs for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater) is the selected alternative for LHAAP-29 and is consistent with the intended future use of the site as a national wildlife refuge. Either Alternative 4a, using ERH, or Alternative 4b, using TCH as the ISTD process option would be selected during the RD. The ISTD would rapidly reduce MC concentrations in the intermediate zone to make conditions more amenable for MNA. The selected alternative offers a high degree of long-term effectiveness and can be easily and immediately implemented. This alternative would satisfy the RAOs for the site through the following:

- Contaminated soil and sediment removal with off-site disposal to protect the hypothetical future maintenance worker and ecological receptors from exposure and eliminate the soil-to-groundwater pathway. Additional confirmation soil sampling during the RD may identify additional soil excavation areas, see **Section 2.12.2**.
- Flushing, inspecting, and plugging of the transite TNT wastewater line and the vitrified clay cooling water lines to eliminate potential exposure from residual contamination. The wooden wastewater lines would be evaluated during the RD for excavation and disposal.
- For intermediate groundwater zone: ISTD treatment of the MC DNAPL plume to reduce to levels amenable to MNA.

- MNA was selected as one component of the remedy based on available groundwater evidence as presented in the FS (Shaw, 2010). A tiered approach using three lines of evidence was used to examine the occurrence of natural attenuation. The first line of evidence evaluated reductions in COC concentrations over time and with distance, the second line of evidence evaluated geochemical indicators, while the third line of evidence entailed estimation of natural attenuation rates. Historical decreases in concentrations of chlorinated solvents in individual wells were observed in intermediate groundwater, including the detection of daughter products that suggest the occurrence of complete reductive dechlorination. Concentrations of TCE decreased from 8,800 µg/L to 4,340 µg/L at monitoring well 29WW16 and were completely attenuated at monitoring well 29WW35. Concentrations of MC decreased from 8,770 µg/L to undetectable at 29WW35. These results indicated the intermediate contaminant plume is stable. Thus, natural attenuation was considered feasible for intermediate groundwater, but not as a sole remedy due to the high MC concentrations in groundwater at 29WW16 and vicinity. Additional evaluation would be implemented as part of the MNA component. MNA, together with ISTD, would ultimately restore the intermediate groundwater to attain groundwater cleanup levels. This is anticipated to be completed in approximately 5-10 years. Considering the lithologic variability, particularly the lateral and vertical change from sand to clay, the times to achieve the cleanup levels may vary by an order of magnitude. This approximate timeframe to achieve cleanup levels is considered reasonable based on the anticipated future land use of the site as a national wildlife refuge and the fact that there is no current or anticipated future use of groundwater as a drinking water supply. Thus, MNA is an appropriate component of the remedy for the intermediate groundwater because it would protect human health and the environment, and would document that further reductive dechlorination is occurring within the groundwater plume and that contaminant concentrations are being reduced to attain groundwater cleanup levels.
- For shallow groundwater zone: MNA to reduce contaminant levels to cleanup levels and return groundwater to its potential beneficial uses, and confirm the contaminated groundwater remains localized with minimal migration to protect surface water. MNA was selected as the remedy based on available groundwater evidence as presented in the FS (Shaw, 2010). A tiered approach using three lines of evidence was used to examine the occurrence of natural attenuation. The first line of evidence evaluated reductions in COC concentrations over time and with distance, the second line of evidence evaluated geochemical indicators, while the third line of evidence entailed estimation of natural attenuation rates. Historical decreases in concentrations of perchlorate, explosives, and chlorinated solvents in individual wells were observed in shallow groundwater, including the detection of daughter products that suggest the occurrence of complete reductive dechlorination. These results indicated the shallow contaminant plumes are stable, and monitoring wells formerly with COC concentrations above cleanup levels have attained the cleanup levels in the historical sampling record. Noting some of the highest remaining concentrations; perchlorate decreased from 88,000 µg/L to 16,800 µg/L at monitoring well 29WW15, the explosive o-NT decreased from 18,000 µg/L to 1,230 µg/L at monitoring well 29WW05, and the chlorinated solvent 1,2-DCA decreased from 14,000 µg/L to 5,520 µg/L at 29WW15. Thus, natural attenuation was considered feasible for perchlorate, explosives and chlorinated solvents in shallow groundwater. Additional evaluation would be implemented as part of the MNA component. MNA would ultimately restore the shallow groundwater to attain groundwater cleanup levels. This is anticipated to be completed in approximately 70 years

based on attenuation of 1,2-DCA in 29WW15. Considering the lithologic variability, particularly the lateral and vertical change from sand to clay, the times to MCL may vary by an order of magnitude. This approximate timeframe to achieve cleanup levels is considered reasonable based on the anticipated future land use of the site as a national wildlife refuge and the fact that there is no current or anticipated future use of groundwater as a drinking water supply. Thus, MNA is an appropriate component of the remedy for the shallow groundwater because it would protect human health and the environment and would document that further natural attenuation is occurring within the groundwater plume, and that perchlorate, explosives, and chlorinated solvent concentrations are being reduced to attain groundwater cleanup levels.

- The LUC to prohibit groundwater use (except for environmental testing and monitoring) as a potable source would be implemented to ensure protection of human health by preventing exposure to groundwater 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 2-10**) in groundwater are met. The LUC restricting land use to nonresidential would be implemented until it is demonstrated that the surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that allow for unlimited use and unrestricted exposure. The LUC to maintain the integrity of any current or future remedial or monitoring systems would be implemented 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 2-10**) in groundwater are met.
- Long-term monitoring and reporting would continue until the cleanup levels are achieved in groundwater to confirm protection of human health by preventing exposure to groundwater until cleanup levels are met.

Five-year reviews will be performed to document that the remedy remains protective of human health and the environment.

Based on information currently available, the U.S. Army believes the selected alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the CERCLA §121(b) criteria used to evaluate remedial alternatives. The selected alternative: 1) is protective of human health and the environment; 2) complies with ARARs; 3) is cost-effective; 4) utilizes a permanent solution; and 5) utilizes an active treatment as a principal element. The selected remedy addresses the statutory preference for treatment to the maximum extent possible. As a component of the intermediate groundwater zone, MC is characterized as a highly toxic source material and, thus, a principal threat waste. In accordance with the NCP, treatment alternatives have been evaluated through the remedy selection process. The preferred remedial alternative includes an active remedial component that would mitigate the potential principal threat. By instituting ISTD treatment of the groundwater, this active treatment would be applied to the highest concentration area in the MC groundwater plume and would comply with NCP expectations regarding treatment of affected media where principal threat may be considered.

In the remedial design, the U.S. Army would present details of the soil excavation, selected ISTD process (ERH or TCH), ISTD design, LUC operations and maintenance, groundwater monitoring, flushing TNT transite wastewater line and cooling water lines, evaluating the deteriorated wooden wastewater line for excavation and disposal, plugging and abandoning TNT wastewater and cooling water lines, and MNA remedy implementation for LHAAP-29.

2.12.2 Description of the Selected Remedy

The selected remedy, Alternative 4, was outlined in **Section 2.9**; that description is expanded in the following discussion. The major components of the remedy include:

***Soil Excavation*.** The excavation would remove explosives and perchlorate contaminated soils for off-site disposal at a RCRA Subtitle D-permitted landfill. This action would achieve the following: 1) removal of soil that is a direct risk to the hypothetical future maintenance worker, thereby protecting human health by preventing inhalation, ingestion, and dermal contact with the COCs; 2) removal of contaminated soil that is a potential source of contaminant migration to groundwater; and 3) removal of soil posing a risk to ecological receptors. The cleanup levels are presented in **Table 2-10**. The approximate excavation locations are highlighted on **Figure 2-12**. The removal of soil contamination would be verified by collecting confirmation samples from the walls and floors of the excavation area and submitting them for laboratory analysis for the COCs of interest. Clean borrow soil would be used as needed to backfill the excavations so they can be graded for proper drainage. Additional sampling would be required during the remedial design phase to further define explosives impacts near former Building 812-F and in the cooling water outfall/ditch as part of the remedial design, and confirmation soil samples would be collected adjacent to the North and South Cooling Water lines as well as the wooden and transite TNT wastewater lines to confirm that leaching from the lines has not occurred. Results from the confirmation soil sampling may identify additional areas exceeding the cleanup levels presented in **Table 2-10**, which would require soil excavation.

Plug and Abandon Lines. The transite TNT wastewater line and the cooling water lines would be flushed with water to remove solid residue. After flushing, the lines would be visually inspected to evaluate if there is any remaining residue and/or liquid in the lines. The inspection and closure details would be included in the RD and may include techniques such as sampling of flush water and video camera inspection if there is any uncertainty about the effectiveness of the flushing. The rinsate water would be containerized. During typical flushing operations, the flush water would be sampled, analyzed and screened to TCLP (or the equivalent TCEQ test) to determine disposal. The inlets and outlets of the transite TNT wastewater line would be plugged with a bentonite slurry mix or equivalent. The manholes and outlets of the cooling water lines would then be plugged with a bentonite slurry mix or equivalent. The deteriorated wooden wastewater line would be sampled to determine whether contaminants in the line exceed soil cleanup levels and require excavation and disposal.

***In-situ Thermal Desorption for Intermediate Zone VOC Groundwater Plume*.** Under Alternative 4 the highest concentration area in the MC plume in the Intermediate Zone groundwater would be treated using ISTD with either the process option ERH (Alternative 4a) or TCH (Alternative 4b) to be determined during the remedial design phase. Groundwater extraction may be implemented as part of the in-situ treatment to physically remove mass and to control the hydraulic gradient.

ERH delivers electricity through subsurface media via an array of electrodes. The heat generated by electrical resistance typically can raise subsurface temperatures to around the boiling point of water. The steam produced from pore-water serves as a medium to carry out volatilized VOCs for capture via SVE and subsequent ex-situ treatment of extracted vapors. In addition, the applied heat can increase hydrolysis of chlorinated solvents, such as MC, and promote in-situ biological activity in two ways. First, biological activity is boosted by moderately high temperatures (30 ºC) found at the periphery of the heated area during active thermal treatment, and throughout the heated area as it

cools. Second, high temperatures increase the solubility of DNAPL, resulting in an increase in contaminant concentrations in the dissolved form that the microbes are able to use, provided the concentrations of the dissolved COCs are not toxic to the microorganisms.

TCH involves applying heat and vacuum simultaneously to subsurface media with an array of vertical heater/vacuum wells. The wells are typically heated by electrical coils, but can also be heated by fuel (e.g. natural gas or propane) combustion. Heat generated from heating elements/wells is transferred to the subsurface largely through thermal conduction and radiant heating. Similar to ERH, the heat generated by TCH typically raises subsurface temperatures to around the boiling point of groundwater and the steam produced from the groundwater serves as a medium to carry out volatilized VOCs. In addition, the applied heat can increase hydrolysis and promote in-situ biological activity.

Preliminary conceptual designs including the number and spacing of heater wells (TCH) or electrode borings (ERH), associated vapor and/or dual phase extraction systems, and treatment train for extracted vapors and condensate were developed and used for FS costing. The final ISTD process option would be determined during the remedial design phase, and the specific design parameters, including the number and locations of heater wells (TCH) or electrodes (ERH) and associated treatment train components may change as the system design is refined.

The ERH preliminary conceptual design components include:

- ***Electrode borings.*** Fifteen 12-inch diameter electrode borings would be installed to a depth of 91 feet bgs with co-located vapor extraction wells screened above 48 feet bgs; average electrode spacing would be 18 ft. The electrodes would be used to heat the subsurface to near boiling temperatures to volatilize VOCs from the subsurface, and the vapor extraction wells would extract the steam generated.
- ***Temperature monitoring probes.*** Four probes, with 10 sensors per probe to monitor subsurface temperatures.
- ***Vapor treatment.*** Activated carbon or a thermal oxidizer would be used to treat the vapors. The vendor's conceptual design included activated carbon, but the expected mass loading would require a thermal oxidizer to treat the extracted vapor. Airflow rate is estimated at 320 scfm.
- ***Condensate collection.*** Condensate production is estimated at 0.9 gpm and would be captured and stored in aboveground tanks for transfer to the on-site GWTP.
- ***Power control unit.*** A 480 volt, 3-phase 700 kilowatt power control unit would be required to supply the required power to the electrodes, extraction and treatment components associated with the system operations.

Figure 2-14 shows the conceptual layout for the network of ERH electrodes. The final layout and number of electrodes would be determined as part of the RD if ERH is the selected ISTD process option.

The TCH preliminary conceptual design components include:

- ***Heater borings.*** 25 heater borings would be installed to a depth of 91 feet bgs with co-located vapor extraction wells screened at close to the target zone depth. Average electrode spacing would be 18 feet.

- ***Multi-phase extraction wells.*** 7 multi-phase extraction wells would be installed in 10-inch boreholes to extract vapor and water for treatment.
- ***Temperature monitoring probes.*** 5 temperature monitoring probes with 3 sensors in each probe would be instated in 6-inch boreholes to monitor subsurface temperatures.
- ***Vapor treatment.*** Activated carbon or a thermal oxidizer would be used to treat the vapors. The vendor's conceptual design included activated carbon, but the expected mass loading would require a thermal oxidizer to treat the extracted vapor. Airflow rate is estimated at 320 scfm.
- ***Water collection and treatment.*** The water production rate is estimated at 1-3 gpm and would be captured and stored in aboveground tanks for transfer to the GWTP.
- ***Power control unit.*** A 480-volt, 3-phase 700 kilowatt power control unit would be required to supply the required power to the heater borings, extraction and treatment components associated with the system operations.

Figure 2-15 shows the conceptual layout for the network of TCH heater borings. The final layout and number of electrodes would be determined as part of the RD if TCH is the selected ISTD process option.

Major components of the MNA remedy include:

- ***MNA to return groundwater to its potential beneficial use, wherever practicable given the particular circumstances of the site.*** MNA begins following ISTD activities. Historic data suggest that natural attenuation of COCs is occurring at the site; however, additional data collection is necessary to fully evaluate natural attenuation. Monitoring wells would be sampled for eight consecutive quarters to evaluate and confirm the occurrence of natural attenuation in conjunction with historical data. Data from the eight quarterly events would be combined with historic data to evaluate the effectiveness of various natural physical, chemical, and biological processes in reducing contaminant concentrations.
- ***Performance objectives to evaluate the MNA remedy performance after two years.*** Each of the general performance objectives must be met as indicated below. If MNA is effective, a baseline would be established from the data to that point in time. Specific evaluation criteria would be developed in the RD. A contingency remedy would be developed and implemented to enhance MNA if it is found to be ineffective. If the criteria are not met to illustrate that MNA is an effective remedy, the contingency action would be initiated.

  The MNA evaluation would be based on the USEPA lines of evidence (USEPA, 1999) as follows:

  - Plume stability (i.e., the plume concentrations are decreasing in the majority of performance wells, and the plume is not expanding in area as demonstrated with compliance wells)
  - MNA Process Evaluation demonstrated based on an attenuation rate calculated with empirical performance monitoring data, and MNA Process Demonstration based on the presence of daughter products and bacterial culture counts
- ***A contingency remedy to enhance MNA to reach the RAOs if MNA is found to be ineffective.*** The area and the elements of the contingency remedy would be selected based on the entire data set available. The contingency remedy would consist of injection of bioremediation amendments to enhance degradation of the groundwater contaminants at

selected locations based on data available at the time it is determined MNA is not successful. Development and specific description of the contingency remedy would be presented in a RD/RAWP.

- ***Initiate LTM.*** Monitoring would be conducted to evaluate the remedy performance and determine if the plume conditions remain constant, improve or worsen after the baseline is established. LTM would be implemented at a frequency of semiannual for three years, then annually until the next five-year review. The performance monitoring plan would be developed in the RD and would be based on USEPA guidance (USEPA, 2004).
    - Continue LTM annually thereafter until recommended otherwise by the five-year review to evaluate remedy performance and determine if plume conditions remain constant, improve, or worsen. The baseline of the plume for future five-year reviews would be established as part of the MNA evaluation program. The initial LTM plan would be developed in the RD.
    - Groundwater monitoring would be conducted to evaluate inorganic COCs. The need to continue groundwater monitoring for this purpose would be evaluated at five year reviews.
- ***Land Use Control.*** The LUC objectives include maintaining the integrity of any current or future remedial or monitoring systems, and preventing the use of groundwater contaminated above cleanup levels as a potable water source. The groundwater treatment and MNA remedial components include a groundwater monitoring system that will be used to characterize the condition of the groundwater during the period the groundwater remedy is in place until the groundwater remediation goals are achieved, and to demonstrate achievement of the groundwater remediation goals when the groundwater remedy is complete. As a part of this groundwater remedy, the Army will maintain the remedial and monitoring systems associated with the groundwater remedies until these components of the remedy are no longer needed to achieve cleanup levels, and cleanup levels have been achieved. During the period of operation of the groundwater remedy, if any of the elements of the remedial and groundwater monitoring systems are damaged, destroyed, or become ineffective, they will be repaired or replaced with suitable components to assure that the remedial and groundwater monitoring systems are able to provide data of the quality necessary to determine the progress of and eventual completion of this component of the remedy. The actions to be taken to implement these LUC objectives and requirements will be provided through modifying the “Comprehensive Land Use Control (LUC) Management Plan, Former Longhorn Army Ammunition Plant, Karnack, Texas” and detailed in the LUC RD.
    - The LUC for prohibition of groundwater use (except for monitoring and testing) shall be implemented and shall remain in place at the Site until the COCs (i.e. including all hazardous substances, pollutants and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) in soil and groundwater remaining at the site are reduced below levels that would support unlimited use and unrestricted exposure. A LUC RD will be finalized as the land use component of the Remedial Design. Within 21 days of the issuance of the ROD, the Army will propose deadlines for completion of the RD Work Plan, RD and Remedial Action Work Plan. The documents will be prepared and submitted to the EPA and the TCEQ pursuant to the FFA. The LUC RD will contain implementation and maintenance actions, including periodic inspections. The long-term groundwater and surface water monitoring and MNA performance monitoring plan will also be presented in the RD. The recordation notification for the

Site which will be filed with Harrison County, will include a description of the LUCs. The preliminary boundary for the groundwater LUC is shown on **Figure 2-16**.

- The LUC restricting land use to nonresidential shall be implemented until it is demonstrated that surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) are at levels that 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 the levels of COCs (i.e., including all hazardous substances, pollutants and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) in groundwater are met. The LUC to prohibit 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, **Table 2-10**) in soil and groundwater allow for unlimited use and unrestricted exposure.

The Army will implement, maintain, monitor, report on and enforce land use controls at Army-owned property. The Army shall perform those actions related to land use control activities described in this ROD and in the Remedial Design for the ROD. 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 will provide notice of the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD. The Army will send these notices to the 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. The Army shall provide the initial notice within 90 days of ROD signature. The frequency of subsequent notifications will be described in the Remedial Design for the ROD. The Army remains responsible for ensuring that the remedy remains protective of human health and the environment. The Army will fulfill its responsibility and obligations under CERCLA and the NCP as it implements, maintains, and reviews the selected remedy.

Upon transfer of Army-owned property, the Army will provide written notice of the land use controls to the transferee of the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD. Within 15 days of transfer, the Army shall provide USEPA and TCEQ with written notice of the division of implementation, maintenance, and enforcement responsibilities unless such information has already been provided in the LUC RD. The LUC RD will address the procedures to be used by the Army and the transferee to document compliance with the LUCs described in this ROD. 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.

LUC implementation and maintenance actions will be described in the RD for LHAAP 29. The LUCs would be included in the property transfer documents and a recordation of them filed in the Harrison County Courthouse. The LUC for groundwater will prevent human exposure to groundwater contaminated with chlorinated solvents, explosives, metals, and perchlorate through the prohibition of groundwater use (except for environmental monitoring and testing), restrict land use to nonresidential, require maintenance of the integrity of any current or future remedial or monitoring systems and prevent the use of groundwater contaminated above cleanup levels as a potable water source. In addition, within 90 days of signature of this ROD, the Army shall request the Texas

Department of Licensing and Regulation to notify well drillers of groundwater use prohibitions based on a preliminary LUC boundary. Within 21 days of the issuance of the ROD, the Army will propose deadlines for completion of the RD Work Plan, RD, and Remedial Action Work Plan. The documents will be prepared and submitted to USEPA and TCEQ pursuant to the FFA. The LUC RD will contain implementation and maintenance actions, including periodic inspections. Consistent with the dates presented for these documents, the Army shall: 1) request the Texas Department of Licensing and Regulation to notify well drillers of the final boundary of groundwater use prohibitions; and 2) notify the Harrison County Courthouse of the LUCs to include a map showing the area of groundwater use prohibition at the site, in accordance with 30 TAC 335.565.

Monitoring activities associated with the LUCs will confirm that groundwater is not being used. Long-term operational requirements under this alternative will include maintenance of the LUCs. Groundwater monitoring will demonstrate no migration of the plume and the eventual reduction of contaminates to levels below cleanup levels. The need for continued groundwater monitoring will be evaluated every 5 years during the reviews. Sampling frequency and analytical requirements will be presented as an appendix to the RD for LHAAP-29.

2.12.3 Cost Estimate of the Selected Remedy

Table 2-12 and **Table 2-13**present the present worth analysis of the cost for the selected remedy, Alternative 4a or 4b. The information in the tables is based on the best available information regarding the anticipated scope of the remedial alternative. The quantities used in the estimates are for estimating purposes only. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Changes will be documented in accordance with 40 CFR 300.435(c)(2) in the form of a memorandum in the Administrative Record, an Explanation of Significant Difference (ESD), or a ROD amendment, as necessary. This is an order-of-magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost.

The total project present worth, capital, and O&M costs for Alternatives 4a and 4b are shown in **Table 2-12** and **Table 2-13**. For Alternative 4a, the capital costs are $3.71M, O&M costs are $1.03M, and total present worth costs are $4,740M. For Alternative 4b, the capital costs are $4.53M, O&M costs are $1.19M, and total present worth costs are $5.72M. The costs were developed using a discount rate of 2.8%. The O&M costs include evaluation of MNA, maintenance of the LUC, and LTM through Year 30. The LTM would support the required CERCLA five-year reviews.

2.12.4 Expected Outcomes of Selected Remedy

The purpose of this response action is to attain the RAOs stated in **Section 2.8** of this document. **Table 2-10** presents the cleanup levels. The cleanup levels for the COCs in the groundwater are the Federal SDWA MCLs, or in the absence of federal drinking water standards, the cleanup level is the TRRP Residential Groundwater PCL. The cleanup level for the soil is the GWP-Ind MSC. The cleanup levels for the COPECs in soil are the EcoPRGs.

The expected outcome of the selected remedy is that contaminants in soil and groundwater will be reduced to the cleanup levels. Achievement of the cleanup levels (**Table 2-10**) is anticipated to be completed in approximately 70 years based on the MNA for 1,2-DCA in the shallow zone. MNA in the intermediate zone is estimated to take 5-10 years following active treatment of the DNAPL plume. Considering the lithologic variability, particularly the lateral and vertical change from sand to clay, the times to achieve the cleanup levels may vary by an order of magnitude. This approximate

timeframe to achieve cleanup levels is considered reasonable for the anticipated future land use as a national wildlife refuge.

The LUC for the maintenance of the monitoring system will be maintained until the groundwater cleanup levels are achieved. The LUCs for soil and groundwater will be maintained 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 2-10**) allow for unlimited use and unrestricted exposure. In the short-term (prior to the groundwater achieving cleanup levels), the site will be made part of a national wildlife refuge operated by USFWS, and will continue as such in the long-term (after the groundwater achieves cleanup levels).

In addition, the monitoring activities associated with MNA will confirm the protection of human health and the environment by documenting the return of the groundwater to its potential beneficial use as a drinking water supply, by documenting reduction of the contaminant mass, and protection of surface water through containment of the plume. The LUC for groundwater will prohibit the use of the site's groundwater except for environmental monitoring and testing.

As part of the evaluation of MNA, attenuation rates are computed and evaluated in accordance with the USEPA guidance material (USEPA, 1998). Time-dependent attenuation rate constants and estimated in-well cleanup times are determined based on COC concentration data over time from individual wells assuming first order degradation kinetics. Attenuation rates are calculated for the monitoring wells with the highest concentrations for which the available data allow such a calculation. Attenuation rates are based on the following formula from the USEPA guidance (USEPA, 1998):

$C = C_o e^{-kt}$

where: C = concentration at time t
C_o = initial concentration
k = attenuation rate constant (first order reaction)

2.13 Statutory Determinations

Under CERCLA §121 and the NCP, the U.S. Army must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedy meets the statutory requirements.

2.13.1 Protection of Human Health and the Environment

The selected remedy, Alternative 4, will achieve the RAOs for LHAAP-29. For the protection of human health, the remedial action would remove soil that exceeds the cleanup levels; flush and remove residues from the process lines and properly dispose the rinsate; reduce groundwater COCs with ISTD in the intermediate zone followed by MNA; reduce shallow groundwater COCs with MNA, which would eventually achieve the destruction of the COCs present in the groundwater plumes at

LHAAP-29. Continued maintenance of the LUC for groundwater will prevent human access and exposure to groundwater that poses an unacceptable risk to human health, until COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) in soils and groundwater, have sufficiently degraded to levels that allow for unlimited use and unrestricted exposure. At LHAAP-29 the evaluation of historical groundwater contaminant trends indicates that natural attenuation processes are occurring at the site. This remedy provides adequate confirmation that human health and the environment are protected because monitoring would be conducted to document the effectiveness of MNA. The monitoring activities associated with MNA will ensure that COCs and by-product (daughter) contaminants in groundwater do not flow to surface water bodies at such levels that ARARs are exceeded. There are currently no surface water impacts identified. The LUCs for soil and groundwater will be maintained 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 2-10**) in soil and groundwater allow for unlimited use and unrestricted exposure.

For the protection of ecological receptors, the remedial action would remove soil at select areas (in addition to those areas excavated for the protection of human health) to address ecological risks. The outcome of the removal is that the soil in the Industrial Sub-Area, which includes LHAAP-29, will satisfy the EcoPRGs.

There are no short-term threats associated with the selected remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the selected remedy.

2.13.2 Compliance with ARARS

The selected remedy complies with all ARARs. The ARARs are presented below and in **Table 2-14**.

Chemical-Specific ARARs

- **Soil**: There are no federally promulgated chemical-specific ARARs for soil. The State of Texas promulgated cleanup standards under 30 TAC 335, Subchapter S, specifically 30 TAC 335.559 (g)(2) which specifies contaminant concentration limits for nonresidential soil and are used as the chemical-specific ARARs for the site soils. The concentrations represent the non-residential soil-to-groundwater cross-media protection concentrations that must be met to demonstrate that a contaminant in soil does not pose the potential for a future release of leachate in excess of the groundwater concentration considered to be protective for nonresidential worker exposure. It is anticipated that removal of contaminated soils above the Texas standards will prevent further contamination of the groundwater from soil at the site.
- **TNT Wastewater Line and Cooling Water Lines**: The removal of explosive-contaminated solid or liquid residue remaining in the line by flushing and disposing of the rinsate based on TCLP criteria or equivalent TCEQ criteria will prevent any further contamination of the groundwater from any explosive-contaminated residue remaining in the lines, in accordance with 40 C.F.R. § 261.2 and 30 TAC 335.559(g)(2).
- **Surface water**: Section 121(d)(2) of CERCLA states that every remedial action shall require a level of control which at least attains surface water quality criteria established under Sections 304 or 303 of the Clean Water Act of 1972 (CWA) where such goals and criteria are relevant and appropriate under the circumstances of the release or threatened release. Therefore, surface water quality criteria may be ARARs if there is a remedial action that

affects surface water, and measures will be implemented during construction to prevent off-site migration of contaminants to surface waters. In the event of remedy failure resulting in or potentially resulting in a release to surface water, 40 C.F.R. §§ 122, 125, 129, and 130-131, 40 C.F.R. §§ 141.61 and 141.62, and 30 TAC 307.4, 307.6, 307.7, 307.8 and 307.9 are considered potential future ARARs.

- **Groundwater**: Cleanup levels are presented in **Table 2-10**. The cleanup goal for groundwater will be the SDWA MCLs as specified in 40 C.F.R. §§ 141.61 and 141.62, which meet health-based standards and criteria. In the absence of federal drinking water standards, clean-up levels will be based on TRRP Residential Groundwater PCLs.

  This alternative will return the contaminated shallow and intermediate groundwater zones at LHAAP-29 to their potential beneficial use as drinking water, wherever practicable, which for the purposes of this ROD is considered to be attainment of the relevant and appropriate SDWA MCLs, and consistent with 40 C. F. R. § 300.430(e)(2)(i)(B&C). If a return to potential beneficial uses is not practicable, this alternative would still meet the NCP expectation to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction.

Location-Specific ARARs

There are no location-specific ARARs**.**

Action-Specific ARARs

The selected remedy has potential action-specific ARARs related to the following activities: site preparation, construction, and excavation activities; waste generation, characterization, management, storage, and disposal activities; well construction and abandonment; and water treatment.

- **Site Preparation, Construction, and Excavation Activities:** Certain on-site preparation, construction, and/or excavation activities will be necessary under all remediation actions to prepare the site for remediation, including the soil-moving or site-grading activities. Control of fugitive emissions and storm water runoff during implementation of these activities will be required. Airborne particulate matter resulting from construction or excavation activities is subject to the fugitive dust and opacity limits listed in 30 TAC 111, Subchapter A. No person may cause, suffer, allow, or permit visible emissions from any source to exceed an opacity of 30 percent for any 6-minute period (30 TAC 111.111[a]). Reasonable precautions must also be taken to achieve maximum control of dust to the extent practicable, including the application of water or suitable chemicals or the complete covering of materials (30 TAC 111.143 and 30 TAC 111.145). Texas has also promulgated general nuisance rules for air contaminants mandating that no person shall discharge from any source whatsoever one or more air contaminants, or combinations thereof, in such concentration and of such duration as are or may tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation, or property, or as to interfere with the normal use and enjoyment of animal life, vegetation, or property (30 TAC 101.4). Storm water discharges from construction activities that disturb equal to or greater than one acre of land must comply with the substantive requirements of a USEPA National Pollutant Discharge Elimination System (NPDES) general permit (40 C.F.R. § 122. 26), depending on the amount of acreage disturbed. Substantive requirements include implementation of good construction

management techniques; phasing of large construction projects; minimal clearing; and sediment, erosion, structural, and vegetative controls to mitigate runoff and ensure that discharges meet required parameters.

- **Waste and Disposal Activities:** The processes of monitoring, intercepting, or treating contaminated groundwater may generate a variety of primary and secondary waste streams (e.g., soil, personal protective equipment, and dewatering and decontamination fluids). These waste streams are expected to be non-hazardous waste. All solid waste (defined as any solid, liquid, semisolid, or contained gaseous material intended for discard [40 C.F.R. § 261.2]) generated during remedial activities must be appropriately characterized to determine whether it contains RCRA hazardous waste (40 C.F.R. § 262.11; 30 TAC 335.62; 30 TAC 335.503[a][4]; 30 TAC 335.504). All wastes must be managed, stored, treated (if necessary), and disposed in accordance with the ARARs for waste management listed in **Table 2-14** for the particular type of waste stream or contaminants in the waste.
- **Well Construction:** The remedial action may involve the placement, use, or eventual plugging and abandonment of some type of groundwater monitoring, injection, and/or extraction wells, either for in-situ treatment or extraction of the contaminated groundwater or for LTM of the groundwater. Available standards for well construction and plugging/abandonment would provide ARARs for such actions and include 30 TAC 331, Subchapters A and H. Specific provisions 30 TAC §331.9(a); 30 TAC §331.10(a); 30 TAC §331.10(d); 30 TAC §331.21; 30 TAC §331.132(a); 30 TAC §331.132(c); 30 TAC §331.132(d)(1); 30 TAC §331.132(d)(4); 30 TAC §331.133(e) apply. Texas has promulgated technical requirements in Chapter 76 of Title 16 of the TAC applicable to construction, operation, and plugging/abandonment of water wells. In particular, 16 TAC 76.1000 (*Locations and Standards of Completion for Wells*), 16 TAC 76.1002 (*Standards for Wells Producing Undesirable Water or Constituents*) (LHAAP-29 contaminated groundwater could be considered “undesirable water” defined pursuant to Section 76.10[36] as “water that is injurious to human health and the environment or water that can cause pollution to land or other waters”), 16 TAC 76.1004 (*Standards for Capping and Plugging of Wells and Plugging Wells that Penetrate Undesirable Water or Constituent Zones*), and 16 TAC 76.1008 (*Pump Installation*) may provide ARARs for the placement, construction, and eventual plugging/abandonment of groundwater injection or extraction wells or the placement and long-term operation of groundwater monitoring wells for proposed groundwater remedial strategies.
- **Water treatment:** Contaminated groundwater and wastewaters collected during well drilling or decontamination activities could be transported to the groundwater treatment plant at LHAAP-18/24 for processing, and would subsequently be discharged in compliance with the effluent limits for that plant. Such waters would be characterized, as required, before transport and managed accordingly in compliance with requirements for the type of waste contaminating the water. To assure compliance with the groundwater treatment plant’s discharge limits, the incoming water must meet the waste acceptance criteria for the facility. On-site wastewater treatment units (as defined in 40 C.F.R. § 260.10) that are part of a wastewater treatment facility that is subject to regulation under Section 402 or Section 307(b) of the Clean Water Act of 1972 are not subject to RCRA Subtitle C hazardous waste management standards (40 C.F.R. § 270.1(c)(2)(v) and 40 C.F.R. § 264.1(g)(6).; 30 TAC 335.42[d][1]). The USEPA has clarified that this exemption applies to all tanks, conveyance

systems, and ancillary equipment, including piping and transfer trucks, associated with the wastewater treatment unit (Federal Register Title 53, 34079, September 2, 1988).

2.13.3 Cost-Effectiveness

Table 2-12 and **Table 2-13** present the present worth analysis of the cost estimates for the selected remedy. The information in the tables is based on the best available information regarding the anticipated scope of the remedial alternative. The quantities used in the estimates are for estimating purposes only. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. The least expensive alternative to the most expensive alternative (provided no contingencies are implemented) is as

follows: Alternative 1, Alternative 3, Alternative 4a, Alternative 4b, and Alternative 2. No costs are associated with Alternative 1 because no remedial activities would be conducted. Alternative 3 has the lowest present worth and capital costs of the remediation alternatives (Alternatives 2, 3, 4a, and 4b). The present worth cost for Alternative 3 is lower than that of Alternative 2, as it does not involve chemical treatment or construction costs for a groundwater extraction system. However, costs for operation and maintenance are higher for Alternative 3 than that of Alternative 2. Alternative 3 also estimates assume a 3-year duration for extraction; however, the presence of inferred DNAPL and sorbed MC is expected to require extraction for a longer period of time.

Additionally, although Alternative 3 appears to have lower costs than Alternatives 4a or 4b, this ignores that Alternative 3 will take longer to meet the RAOs in the intermediate zone due to the presence of DNAPL and would instead rely on the MNA component and LUCs to protect human health and the environment. Similarly, Alternative 2 is estimated to have the highest cost and has higher uncertainty of ISCO performance in full-scale application compared to bench-scale testing. Since the DNAPL in the intermediate zone may persist longer, MNA and LUCs may need to remain in place longer as well under Alternatives 2 and 3 than under Alternative 4. A comparison between the sub-alternatives 4a (ERH) and 4b (TCH) for treatment of the MC plume in intermediate zone indicates that sub-alternative 4a may have a lower cost; however, the TCH conceptual design under Alternative 4b appears to be more robust.

2.13.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The U.S. Army has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Soil excavation would remove impacted soils and groundwater extraction and in-situ treatment would irreversibly reduce groundwater contaminant concentrations in the treated portions of the groundwater plume. Removal of contaminated pipeline solid residue would protect the groundwater from contaminant leaching, and MNA will reduce groundwater contaminants to cleanup levels.

The selected remedy would provide reduction in toxicity, mobility, and volume of the groundwater contaminants via active treatment of the most contaminated areas. The selected remedy would document effectiveness through the confirmation of MNA and the routine monitoring of the attenuation and migration of the contaminants in groundwater.

The selected remedy would provide immediate protection because the LUCs would be implemented quickly. Maintenance of this control would be required until COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 2-10**) and by-product (daughter) contaminant concentrations in soil and groundwater that allow for unlimited use and unrestricted exposure.

2.13.5 Preference for Treatment as a Principal Element

The selected remedy would reduce the toxicity, mobility, or volume of contaminants in the groundwater through an active remedial process. By utilizing ISTD as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied. In addition, there is a potential principal source threat at LHAAP-29 residing as residual source material in the subsurface. As a component of this groundwater, the hazardous contaminant MC is characterized as a highly toxic source material and, thus, potentially a principal threat waste.

2.13.6 Five-Year Review Requirements

Section 121(c) of CERCLA and NCP 40 C.F.R. § 300.430(f)(5)(iii)(C) provide the statutory and legal bases for conducting five-year reviews. Because this remedy will result in contaminants that remain on site above levels that allow unlimited use and unrestricted exposure, a review will be conducted at least every five years to confirm that the remedy continues to provide adequate protection of human health and the environment.

2.14 Significant Changes from the Proposed Plan

The Revised Proposed Plan was issued for public comments on November 21, 2018 and identified Alternative 4 as the Preferred Alternative, with either Alternative 4a or 4b to be selected during the RD. The U.S. Army reviewed all verbal comments that were discussed during the public meeting (there were no written comments). After careful consideration of the comments, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

Table 2-1. Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical	Concentration Detected[1] (mg/L)		Frequency of Detection	Exposure Point Concentration (mg/L)	Statistical Measure
		Minimum	Maximum			
Ingestion, inhalation, dermal contact	***Dioxin/Furan***					
	2,3,7,8-TCDD TEC	2.82E-09	1.25E-08	---	1.25E-08	maximum
	Explosives					
	2,4-Dinitrotoluene	0.0087	0.530	6/50	5.30E-01	maximum
	2,6-Dinitrotoluene	0.0087	0.530	7/50	5.30E-01	maximum
	2-Amino-4,6-dinitrotoluene	0.0059	0.0059	1/50	5.90E-03	maximum
	2-Nitrotoluene	0.002	4.40	9/50	4.40E+00	maximum
	3-Nitrotoluene	0.0021	0.240	7/50	2.40E-01	maximum
	4-Amino-2,6-dinitrotoluene	0.0059	0.0059	1/50	5.90E-03	maximum
	4-Nitrotoluene	0.0054	2.100	8/50	2.10E+00	maximum
	Metals					
	Aluminum	0.21	130	30/43	1.30E+02	maximum
	Antimony	0.005	0.052	40/68	5.20E-02	maximum
	Arsenic	0.008	0.059	7/68	5.90E-02	maximum
	Barium	0.024	6.5	37/68	6.50E+00	maximum
	Beryllium	0.0005	0.0099	6/43	9.90E-03	maximum
	Cadmium	0.0012	0.00623	2/68	6.23E-03	maximum
	Chromium	0.01	7.6	45/68	7.60E+00	maximum
	Lead	0.00241	0.35	26/68	3.50E-01	maximum
	Manganese	0.022	2.41	42/43	2.41E+00	maximum
	Mercury	0.002	0.003	2/68	3.00E-03	maximum
	Nickel	0.04	8.4	29/68	8.40E+00	maximum
	Selenium	0.006	0.35	6/68	3.50E-01	maximum
	Silver	0.01	0.08	5/68	8.00E-02	maximum
	Strontium	0.2	19	43/43	1.90E+01	maximum
	Thallium	0.0011	0.003	14/68	3.00E-03	maximum
	Vanadium	0.12	0.36	2/43	3.60E-01	maximum
	Non-Metallic Anion					
	Perchlorate	8.00E-03	8.80E+01	13/30	8.80E+01	maximum
	Volatile Organics					
	1,2-Dichloroethane	14	14	1/68	1.40E+01	maximum
	Acetone	0.0058	0.0058	1/68	5.80E-03	maximum
	Bromodichloromethane	0.001	0.0022	3/68	2.20E-03	maximum
	Chloroform	0.0012	0.014	7/68	1.40E-02	maximum
	cis-1,2-Dichloroethene	0.0013	0.0013	1/50	1.30E-03	maximum
	Methylene chloride	0.001	6,600	12/68	6.60E+03	maximum
	p-Cymene	0.0029	0.0029	1/43	2.90E-03	maximum
	Trichloroethene	0.0011	1.200	3/68	1.20E+00	maximum

Table 2-1. Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations (continued)

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil (0 to 2 feet below ground surface)

Exposure Point	Chemical	Concentration Detected[1] (mg/kg)		Frequency of Detection	Exposure Point Concentration (mg/kg)	Statistical Measure
		Minimum	Maximum			
Ingestion, inhalation, dermal contact	***Dioxin/Furan***					
	2,3,7,8-TCDD TEC	2.63E-07	7.71E-06	---	4.20E-06	95% UCL
	Explosives					
	2,4,6-Trinitrotoluene	3.8	190	5/49	1.90E+02	maximum
	2,4-Dinitrotoluene	0.760	6.2	2/49	6.20E+00	maximum
	2-Amino-4,6-dinitrotoluene	2.6	25	4/49	2.5E+01	maximum
	4-Amino-2,6-dinitrotoluene	1.1	16	3/18	1.60E+01	maximum
	Metals					
	Antimony	1.2	2.5	15/65	1.92E+00	95% UCL
	Mercury	0.12	0.22	3/75	2.20E-01	maximum
	Non-Metallic Anion					
	Perchlorate	2.45E-02	7.03E-02	5/6	7.03E-02	maximum

Notes:
[1] Minimum/maximum detected concentration above the reporting limit

For groundwater, the maximum detected concentrations were used to estimate the exposure point concentration.
For soil, the 95% UCL values were used to estimate the exposure point concentration if the concentration exceeded the average and was below the maximum detected; otherwise, the maximum detected concentration was used to estimate the exposure point concentration.

---: No information available
95% UCL: 95% upper confidence level of the mean
mg/kg: milligrams per kilogram
mg/L: milligrams per liter
TCDD: tetrachlorodibenzo-p-dioxin
TEC: toxicity equivalence concentration

References:
Jacobs Engineering Group, Inc. (Jacobs), 2002, *Baseline Human Health and Screening Ecological Risk Assessment for the Group 2 Sites (Sites 12, 17, 18/24, 29, 32, 49, Harrison Bayou, and Caddo Lake), Longhorn Army Ammunition Plant, Karnack, Texas*, Final, Oak Ridge, TN, August.

Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations:
The table presents the chemicals of potential concern (COPCs) and exposure point concentration (EPC) for each (i.e. the concentration used to estimate the exposure and risk from each COPC). The table includes the range of concentrations detected for each COPC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and the statistical measure upon which the EPC was based. The COPCs listed are the ones that were quantitatively evaluated for carcinogenic risk and non-carcinogenic hazard in the Baseline Human Health Risk Assessment (Jacobs, 2002).

Table 2-2. Carcinogenic Toxicity Data Summary

Pathway: Ingestion, Dermal Contact

Chemical of Concern	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Dermal Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Weight of Evidence/ Carcinogen Guideline Description	Source/ Date
Dioxin/Furans				
2,3,7,8-TCDD TEC	1.50E+05	3.00E+05	Not Classified	---
Explosives				
2,4,6-Trinitrotoluene	3.00E-02	5.00E-02	C	TCEQ, 2001
2,4-Dinitrotoluene	6.80E-01	8.00E-01	B2	TCEQ, 2001
2,6-Dinitrotoluene	6.80E-01	8.00E-01	B2	TCEQ, 2001
2-Amino-4,6-dinitrotoluene	1.00E-02	2.00E-02	Not Classified	---
2-Nitrotoluene	NTV	NTV	Not Classified	---
3-Nitrotoluene	NTV	NTV	Not Classified	---
4-Amino-2,6-dinitrotoluene	1.00E-02	2.00E-02	Not Classified	---
4-Nitrotoluene	NTV	NTV	Not Classified	---
Metals				
Aluminum	NTV	NTV	Not Classified	---
Antimony	NTV	NTV	Not Classified	---
Arsenic	1.50E+00	1.58E+00	A	TCEQ, 2001
Barium	NC	NC	D	TCEQ, 2001
Beryllium	NTV	NTV	B1	TCEQ, 2001
Cadmium (water)	NTV	NTV	B1	TCEQ, 2001
Chromium (total)	NC	NC	Not Classified	---
Lead	NTV	NTV	Not Classified	---
Manganese (non-diet)	NC	NC	D	TCEQ, 2001
Mercury	NC	NC	D	TCEQ, 2001
Nickel	NTV	NTV	A	TCEQ, 2001
Selenium	NC	NC	D	TCEQ, 2001
Silver	NC	NC	D	TCEQ, 2001
Strontium	NTV	NTV	Not Classified	---
Thallium	NC	NC	Not Classified	---
Vanadium	NTV	NTV	Not Classified	---
Non-Metallic Anions				
Perchlorate	NTV	NTV	Not Classified	---
Volatile Organics				
1,2-Dichloroethane	9.10E-02	9.10E-02	B2	TCEQ, 2001
Acetone	NC	NC	D	TCEQ, 2001
Bromodichloromethane	6.20E-02	6.33E-02	B2	TCEQ, 2001
Chloroform	6.10E-03	3.05E-02	B2	TCEQ, 2001
cis-1,2-Dichloroethene	NC	NC	D	TCEQ, 2001
Methylene chloride	7.50E-03	7.89E-03	B2	TCEQ, 2001
p-Cymene	NTV	NTV	Not Classified	---
Trichloroethene	1.10E-02	1.10E-02	B2	TCEQ, 2001

Table 2-2. Carcinogenic Toxicity Data Summary (continued)

Pathway: Inhalation

Chemical of Concern	Unit Risk Factor $(mg/m^3)^{-1}$	Weight of Evidence/ Carcinogen Guideline Description	Source/Date
Dioxin/Furans			
2,3,7,8-TCDD TEC	3.30E+04	Not Classified	---
Explosives			
2,4,6-Trinitrotoluene	NTV	C	TCEQ, 2001
2,4-Dinitrotoluene	NTV	B2	TCEQ, 2001
2,6-Dinitrotoluene	NTV	B2	TCEQ, 2001
2-Amino-4,6-dinitrotoluene	NTV	Not Classified	---
2-Nitrotoluene	NTV	Not Classified	---
3-Nitrotoluene	NTV	Not Classified	---
4-Amino-2,6-dinitrotoluene	NTV	Not Classified	---
4-Nitrotoluene	NTV	Not Classified	---
Metals			
Aluminum	NTV	Not Classified	---
Antimony	NTV	Not Classified	---
Arsenic	4.30E+00	A	TCEQ, 2001
Barium	NC	D	TCEQ, 2001
Beryllium	2.40E+00	B1	TCEQ, 2001
Cadmium (water)	1.80E+00	B1	TCEQ, 2001
Chromium (total)	NC	Not Classified	---
Lead	NTV	Not Classified	---
Manganese (Non-diet)	NC	D	TCEQ, 2001
Mercury	NC	D	TCEQ, 2001
Nickel	4.80E-01	A	TCEQ, 2001
Selenium	NC	D	TCEQ, 2001
Silver	NC	D	TCEQ, 2001
Strontium	NTV	Not Classified	---
Thallium	NC	Not Classified	---
Vanadium	NTV	Not Classified	---
Non-Metallic Anions			
Perchlorate	NTV	Not Classified	---
Volatile Organics			
1,2-Dichloroethane	2.60E-02	B2	TCEQ, 2001
Acetone	NC	D	TCEQ, 2001
Bromodichloromethane	NTV	B2	TCEQ, 2001
Chloroform	2.30E-02	B2	TCEQ, 2001
cis-1,2-Dichloroethene	NC	D	TCEQ, 2001
Methylene chloride	4.70E-04	B2	TCEQ, 2001
p-Cymene	NTV	Not Classified	---

Table 2-2. Carcinogenic Toxicity Data Summary (continued)

Pathway: Inhalation

Chemical of Concern	Unit Risk Factor $(mg/m^3)^{-1}$	Weight of Evidence/ Carcinogen Guideline Description	Source/Date
Volatile Organics (continued)			
Trichloroethene	1.70E-03	B2	TCEQ, 2001

Notes:
--- : No information available
mg/kg-day: milligrams per kilogram per day
mg/m^3: milligrams per cubic meter
NC: Chemical not classified as a carcinogen
NTV: no toxicity value available
TCDD: tetrachlorodibenzo-p-dioxin
TEC: toxicity equivalence concentration

Weight of Evidence/Carcinogen Guideline Description:
A - Human carcinogen
B1 - Probable human carcinogen – Indicates that limited human data are available
B2 - Probable human carcinogen – Indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen

References:
Jacobs Engineering Group, Inc. (Jacobs), 2002, *Baseline Human Health and Screening Ecological Risk Assessment for the Group 2 Sites (Sites 12, 17, 18/24, 29, 32, 49, Harrison Bayou, and Caddo Lake)*, Longhorn Army Ammunition Plant, Karnack, Texas, Final, Oak Ridge, TN, August.

Texas Commission on Environmental Quality (TCEQ), 2001, Update to 1998 Consistency Memorandum. Toxicity Factors Table, 15 March 2001. Medium specific concentrations have been recalculated using updated toxicity values through March 2010.

Summary of Toxicity Assessment:
The table provides carcinogenic risk information which is relevant to the contaminants of potential concern in soil and ground water. The list of chemicals of concern presented here are the ones that were quantitatively evaluated for carcinogenic risk and non-carcinogenic hazard in the Baseline Human Health Risk Assessment (Jacobs, 2002).

Table 2-3. Non-Carcinogenic Toxicity Data Summary

Pathway: Ingestion, Dermal Contact

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value (mg/kg-day)	Dermal RfD (mg/kg-day)	Target Endpoint	Combined Uncertainty/ Modifying Factors	Source/Date
Dioxin/Furans						
2,3,7,8-TCDD TEC	chronic	NTV	NTV	NA	NA	---
Explosives						
2,4,6-Trinitrotoluene	chronic	5.00E-04	3.00E-04	Liver effects	1000/1	USEPA-IRIS, 2001
2,4-Dinitrotoluene	chronic	2.00E-03	1.70E-03	Central nervous system effects	100/1	USEPA-IRIS, 2001
2,6-Dinitrotoluene	chronic	1.00E-03	8.50E-04	Central nervous system effects	3000/1	USEPA-HEAST, 1997
2-Amino-4,6-dinitrotoluene	chronic	1.67E-04	8.33E-05	NA	NA	---
2-Nitrotoluene	chronic	1.00E-02	5.00E-03	Spleen lesions	10000/1	USEPA-HEAST, 1997
3-Nitrotoluene	chronic	1.00E-02	5.00E-03	Spleen lesions	10000/1	USEPA-HEAST, 1997
4-Amino-2,6-dinitrotoluene	chronic	1.67E-04	8.33E-05	NA	NA	---
4-Nitrotoluene	chronic	1.00E-02	5.00E-03	Spleen lesions	10000/1	USEPA-HEAST, 1997
Metals						
Aluminum	chronic	1.00E+00	1.00E-01	NA	NA	---
Antimony	chronic	4.00E-04	6.00E-05	Longevity, blood glucose, and cholesterol	1000/1	USEPA-IRIS, 2001
Arsenic	chronic	3.00E-04	2.85E-04	Skin effects	3/1	USEPA-IRIS, 2001
Barium	chronic	7.00E-02	4.90E-03	Increased kidney weight	3/1	USEPA-IRIS, 2001
Beryllium	chronic	2.00E-03	1.40E-05	Small Intestine	300/1	USEPA-IRIS, 2001
Cadmium (water)	chronic	5.00E-04	1.25E-05	Proteinuria	10/1	USEPA-IRIS, 2001
Chromium (total)	chronic	1.50E+00	1.95E-02	No effects observed	100/10	USEPA-IRIS, 2001
Lead	chronic	NTV	NTV	NA	NA	---
Manganese (non-diet)	chronic	4.70E-02	2.82E-03	Central nervous system effects	1/1	USEPA-IRIS, 2001
Mercury	chronic	3.00E-04	2.10E-05	Autoimmune effects	1000/1	USEPA-IRIS, 2001
Nickel	chronic	2.00E-02	8.00E-04	Decreased Body Weight	300/1	USEPA-IRIS, 2001
Selenium	chronic	5.00E-03	2.50E-03	Skin	3/1	USEPA-IRIS, 2001
Silver	chronic	5.00E-03	2.00E-04	Argyria	3/1	USEPA-IRIS, 2001
Strontium	chronic	6.00E-01	1.20E-01	Rachitic bone	300/1	USEPA-IRIS, 2001
Thallium	chronic	8.00E-05	8.00E-05	Blood	3000/1	USEPA-IRIS, 2001
Vanadium	chronic	7.00E-03	1.82E-04	NA	NA	---

Table 2-3. Non-Carcinogenic Toxicity Data Summary (continued)

Pathway: Ingestion, Dermal Contact

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value (mg/kg-day)	Dermal RfD (mg/kg-day)	Target Endpoint	Combined Uncertainty/ Modifying Factors	Source/Date
Non-Metallic Anions						
Perchlorate	chronic	9.00E-04	9.00E-04	NA	NA	---
Volatile Organics						
1,2-Dichloroethane	chronic	3.00E-02	3.00E-02	NA	NA	---
Acetone	chronic	1.00E-01	8.30E-02	Liver and kidney effects	1000/1	USEPA-IRIS, 2001
Bromodichloromethane	chronic	2.00E-02	1.96E-02	Renal cytomegaly	1000/1	USEPA-IRIS, 2001
Chloroform	chronic	1.00E-02	2.00E-03	Cyst formation in the liver	1000/1	USEPA-IRIS, 2001
cis-1,2-Dichloroethene	chronic	1.00E-02	1.00E-02	Decreased hematocrit and hemoglobin in the blood	3000/1	USEPA-IRIS, 2001
Methylene chloride	chronic	6.00E-02	5.70E-02	Liver toxicity	100/1	USEPA-IRIS, 2001
p-Cymene	chronic	1.00E-01	8.00E-02	NA	NA	---
Trichloroethene	chronic	6.00E-03	6.00E-03	NA	NA	---

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC (mg/m^3)	Target Endpoint	Combined Uncertainty/ Modifying Factors	Source/ Date
Dioxin/Furans					
2,3,7,8-TCDD TEC	chronic	NTV	---	---	---
Explosives					
2,4,6-Trinitrotoluene	chronic	0.0001	NA	NA	---
2,4-Dinitrotoluene	chronic	0.00015	NA	NA	---
2,6-Dinitrotoluene	chronic	0.00015	NA	NA	---
2-Amino-4,6-dinitrotoluene	chronic	0.0001	NA	NA	---
2-Nitrotoluene	chronic	0.011	NA	NA	---
3-Nitrotoluene	chronic	0.011	NA	NA	---
4-Amino-2,6-dinitrotoluene	chronic	0.0001	NA	NA	---
4-Nitrotoluene	chronic	0.011	NA	NA	---
Metals					
Aluminum	chronic	0.0035	NA	NA	---
Antimony	chronic	0.0005	Pulmonary toxicity, chronic interstitial inflammation	300/1	USEPA-IRIS, 2001
Arsenic	chronic	NTV	---	---	---
Barium	chronic	0.00049	Fetus, developmental effects	1000/1	USEPA-HEAST, 1997

Table 2-3. Non-Carcinogenic Toxicity Data Summary (continued)

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC (mg/m^3)	Target Endpoint	Combined Uncertainty/ Modifying Factors	Source/ Date
Metals (continued)					
Beryllium	chronic	0.00002	Beryllium sensitization and progression to Chronic Beryllium Disease	10/1	USEPA-IRIS, 2001
Cadmium (water)	chronic	0.0002	NA	NA	---
Chromium (total)	chronic	0.0001	NA	NA	---
Lead	chronic	NTV	---	---	---
Manganese (non-diet)	chronic	0.00005	Impairment of neurobehavioral function	1000/1	USEPA-IRIS, 2001
Mercury	chronic	0.0003	Hand tremor, memory loss	30/1	USEPA-IRIS, 2001
Nickel	chronic	0.0002	Respiratory effects	NA	ATSDR, 1997
Selenium	chronic	0.0002	NA	NA	---
Silver	chronic	0.00001	NA	NA	---
Strontium	chronic	NTV	---	---	---
Thallium	chronic	0.0001	NA	NA	---
Vanadium	chronic	0.00005	NA	NA	---
Non-Metallic Anions					
Perchlorate	chronic	NTV	---	---	---
Volatile Organics					
1,2-Dichloroethane	chronic	0.005	NA	NA	---
Acetone	chronic	0.59	NA	NA	---
Bromodichloromethane	chronic	NTV	---	---	---
Chloroform	chronic	0.000301	NA	NA	---
cis-1,2-Dichloroethene	chronic	0.793	NA	NA	---
Methylene chloride	chronic	3	Liver toxicity	100/1	USEPA-HEAST, 1997
p-Cymene	chronic	0.3	NA	NA	---
Trichloroethene	chronic	NTV	---	---	---

Notes:
---: No information for a compound with no toxicity value (NTV)
IRIS: Integrated Risk Information System, USEPA
mg/kg-day: milligrams per kilogram per day
mg/m^3: milligrams per cubic meter
NA: Information not available
NTV: No toxicity value available
RfC: Reference concentration
RfD: Reference dose
TCDD: tetrachlorodibenzo-p-dioxin
TEC: toxicity equivalence concentration

References:
Agency for Toxic Substances and Disease Registry (ATSDR), 1997, Minimal Risk Levels (MRLs) for Hazardous Substances.

Jacobs Engineering Group, Inc. (Jacobs), 2002, *Baseline Human Health and Screening Ecological Risk Assessment for the Group 2 Sites (Sites 12, 17, 18/24, 29, 32, 49, Harrison Bayou, and Caddo Lake)*, Longhorn Army Ammunition Plant, Karnack, Texas, Final, Oak Ridge, TN, August.

USEPA-HEAST, 1997. Health Effects Summary Table (HEAST). FY 1995, Annual Office of Emergency and Remedial Response. Washington, D.C. EPA/340/R-95-036.

USEPA-IRIS, 2001. Integrated Risk Information System (IRIS). United States Environmental Protection Agency Online Database for Toxicity Information on Hazardous Chemicals, 2001.

Summary of Toxicity Assessment:
This table provides non-carcinogenic risk information relevant to the contaminants of concern in both soil and ground water. The list of chemicals of potential concern presented here are the ones that were quantitatively evaluated for carcinogenic risk and non-carcinogenic hazard in the Baseline Human Health Risk Assessment (Jacobs, 2002). The uncertainty factor and modifying factor are used in the development of a references dose. The uncertainty factor adjusts results from dose-response studies in animals to make them applicable to humans. The modifying factor is used to account for uncertainties in the available toxicity data from which the reference dose is derived. In the risk assessment, the reference doses and concentrations were for the chronic case, to be conservative.

Table 2-4. Risk Characterization Summary – Carcinogens

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground-water	Ground-water	Ingestion or exposure through showering	***Dioxin/Furan***				
			2,3,7,8-TCDD TEC	6.5E-06	NE	5.4E-05	6.1E-05
			Explosive				
			2,4,6-Trinitrotoluene	ND	ND	ND	NA
			2,4-Dinitrotoluene	1.3E-03	NE	NE (Kp<=0.01)	1.3E-03
			2,6-Dinitrotoluene	1.3E-03	NE	NE (Kp<=0.01)	1.3E-03
			2-Amino-4,6-dinitrotoluene	2.1E-07	NE	NE (Kp<=0.01)	2.1E-07
			2-Nitrotoluene	NTV	NTV	NTV	NA
			3-Nitrotoluene	NTV	NTV	NTV	NA
			4-Amino-2,6-dinitrotoluene	2.1E-07	NE	NE (Kp<=0.01)	2.1E-07
			4-Nitrotoluene	NTV	NTV	NTV	NA
			Metals				
			Aluminum	NTV	NE	NE (Kp<=0.01)	NA
			Antimony	NTV	NE	NE (Kp<=0.01)	NA
			Arsenic	3.1E-04	NE	NE (Kp<=0.01)	3.1E-04
			Barium	NC	NE	NE (Kp<=0.01)	NA
			Beryllium	NTV	NE	NE (Kp<=0.01)	NA
			Cadmium (water)	NTV	NE	NE (Kp<=0.01)	NA
			Chromium (total)	NC	NE	NE (Kp<=0.01)	NA
			Lead	NTV	NE	NE (Kp<=0.01)	NA
			Manganese	NC	NE	NE (Kp<=0.01)	NA
			Mercury	NC	NE	NE (Kp<=0.01)	NA
			Nickel	NTV	NE	NE (Kp<=0.01)	NA
			Selenium	NC	NE	NE (Kp<=0.01)	NA
			Silver	NC	NE	NE (Kp<=0.01)	NA
			Strontium	NTV	NE	NE (Kp<=0.01)	NA
			Thallium	NC	NE	NE (Kp<=0.01)	NA
			Vanadium	NTV	NE	NE (Kp<=0.01)	NA
			Non-Metallic Anion				
			Perchlorate	NTV	NE	NE (Kp<=0.01)	NA
			Volatile Organics				
			1,2-Dichloroethane	4.5E-03	2.2E-02	2.0E-03	2.9E-02
			Acetone	NC	NC	NE (Kp<=0.01)	NA
			Bromodichloro-methane	4.8E-07	NTV	2.5E-07	7.2E-07
			Chloroform	3.0E-07	2.0E-05	1.2E-06	2.1E-05
			Cis-1,2-Dichloroethene	NC	NC	NE (Kp<=0.01)	NA
			Methylene chloride	1.7E-01	1.9E-01	NE (Kp<=0.01)	3.6E-01
			p-Cymene	NTV	NTV	NTV	NA
			Trichloroethene	4.6E-05	1.2E-04	6.2E-05	2.3E-04
						Groundwater risk total =	3.9E-01

Table 2-4. Risk Characterization Summary – Carcinogens (continued)

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil (0 to 2 feet)	Soil and particulates	Incidental Ingestion, inhalation of particulates, and dermal contact	***Dioxin/Furan***				
			2,3,7,8-TCDD TEC	2.2E-07	7.3E-12	8.4E-08	3.0E-07
			Explosive				
			2,4,6-Trinitrotoluene	2.0E-06	NTV	2.1E-06	4.1E-06
			2,4-Dinitrotoluene	1.5E-06	NTV	1.1E-06	2.6E-06
			2,6-Dinitrotoluene	ND	ND	ND	NA
			2-Amino-4,6-dinitrotoluene	8.7E-08	NTV	1.1E-07	2.0E-07
			2-Nitrotoluene	ND	ND	ND	NA
			3-Nitrotoluene	ND	ND	ND	NA
			4-Amino-2,6-dinitrotoluene	5.6E-08	NTV	7.2E-08	1.3E-07
			4-Nitrotoluene	ND	ND	ND	NA
			Metals				
			Aluminum	ND	ND	ND	NA
			Antimony	NTV	NTV	NTV	NA
			Arsenic	ND	ND	ND	NA
			Barium	ND	ND	ND	NA
			Beryllium	ND	ND	ND	NA
			Cadmium (water)	ND	ND	ND	NA
			Chromium (total)	ND	ND	ND	NA
			Lead	ND	ND	ND	NA
			Manganese (non-diet)	ND	ND	ND	NA
			Mercury	NC	NC	NC	NA
			Nickel	ND	ND	ND	NA
			Selenium	ND	ND	ND	NA
			Silver	ND	ND	ND	NA
			Strontium	ND	ND	ND	NA
			Thallium	ND	ND	ND	NA
			Vanadium	ND	ND	ND	NA
			Non-Metallic Anion				
			Perchlorate	NTV	NTV	NTV	NA
			Volatile Organics				
			1,2-Dichloroethane	ND	ND	ND	NA
			Acetone	ND	ND	ND	NA
			Bromodichloro-methane	ND	ND	ND	NA
			Chloroform	ND	ND	ND	NA

Table 2-4. Risk Characterization Summary – Carcinogens (continued)

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
			Cis-1,2-Dichloroethene	ND	ND	ND	NA
			Volatile Organics (continued)				
			Methylene chloride	ND	ND	ND	NA
			p-Cymene	ND	ND	ND	NA
			Trichloroethene	ND	ND	ND	NA
						Soil risk total =	7.3E-06
						Total risk (soil and groundwater) =	3.9E-01

Notes:

Kp	Dermal permeability coefficient
NA	Not applicable
NC	Not classified as a carcinogen
ND	Not detected in associated media or not selected as a chemical of potential concern
NE	Not evaluated through this exposure pathway. Chemical is not identified as volatile.
NE(Kp<=0.01)	Based on USEPA Region 6 guidance, chemicals of potential concern with a Kp<=0.01 were not evaluated for dermal contact while showering (USEPA, 1995)
NTV	No toxicity value available
TCDD	Tetrachlorodibenzo-p-dioxin
TEC	Toxicity equivalence concentration

References:

U.S. Environmental Protection Agency (USEPA), 1989, *Risk Assessment Guidance for Superfund, Vol. I: Human Health Evaluation Manual, (Part A)*, EPA/540/1-89/002, December.

USEPA, *Supplemental Region VI Risk Assessment Guidance, May 5, 1995.*

Summary of Risk Characterization:

The table provides risk estimates for the significant routes of exposure at LHAAP-29. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a hypothetical future maintenance worker's exposure to soil and groundwater, as well as the toxicity of the chemicals of concern. The total risk from exposure to contaminated soil and groundwater at this site is estimated to be 3.9×10^{-01}. A risk below 1×10^{-4} is generally considered to be acceptable (USEPA, 1989). The total groundwater risk is unacceptable.

Table 2-5. Risk Characterization Summary – Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Target End-point	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground-water	Ground-water	Ingestion or exposure through showering	***Dioxin/Furan***					
			2,3,7,8-TCDD TEC	NA	NTV	NE	NTV	NA
			Explosive					
			2,4,6-Trinitrotoluene	Liver effects	ND	ND	ND	NA
			2,4-Dinitrotoluene	NA	2.6E+00	NE	NE (Kp<=0.01)	2.6E+00
			2,6-Dinitrotoluene	NA	5.2E+00	NE	NE (Kp<=0.01)	5.2E+00
			2-Amino-4,6-dinitrotoluene	NA	3.5E-01	NE	NE (Kp<=0.01)	3.5E-01
			2-Nitrotoluene	Spleen lesions	4.3E+00	6.8E+01	4.1E-01	7.3E+01
			3-Nitrotoluene	Spleen lesions	2.3E-01	3.7E+00	2.2E-02	4.0E+00
			4-Amino-2,6-dinitrotoluene	NA	3.5E-01	NE	NE (Kp<=0.01)	3.5E-01
			4-Nitrotoluene	Spleen lesions	2.1E+00	3.3E+01	1.9E-01	3.5E+01
			Metals					
			Aluminum	NA	1.3E+00	NE	NE (Kp<=0.01)	1.3E+00
			Antimony	Longevity, blood glucose, and cholesterol	1.3E+00	NE	NE (Kp<=0.01)	1.3E+00
			Arsenic	Skin effects	1.9E+00	NE	NE (Kp<=0.01)	1.9E+00
			Barium	Fetus, developmental effects, increased kidney weight	9.1E-01	NE	NE (Kp<=0.01)	9.1E-01
			Beryllium	Beryllium sensitization and progression to Chronic Beryllium Disease	4.8E-02	NE	NE (Kp<=0.01)	4.8E-02
			Cadmium(water)	Proteinuria	1.2E-01	NE	NE (Kp<=0.01)	1.2E-01
			Chromium (total)	Proteinuria	5.0E-02	NE	NE (Kp<=0.01)	5.0E-02
			Lead	Gastrointestinal	NTV	NE	NE (Kp<=0.01)	NA

Table 2-5. Risk Characterization Summary – Non-Carcinogens (continued)

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Target End-point	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Tota
			Metals (continued)					
			Manganese (non-diet)	CNS	5.0E-01	NE	NE (Kp<=0.01)	5.0E-01
			Mercury	CNS	9.8E-02	NE	NE (Kp<=0.01)	9.8E-02
			Nickel	Respiratory effects, decreased body weight	4.1E+00	NE	NE (Kp<=0.01)	4.1E+00
			Selenium	NA	6.8E-01	NE	NE (Kp<=0.01)	6.8E-01
			Silver	Argyria	1.6E-01	NE	NE (Kp<=0.01)	1.6E-01
			Strontium	Rachitic bone	3.1E-01	NE	NE (Kp<=0.01)	3.1E-01
			Thallium	Blood	3.7E-01	NE	NE (Kp<=0.01)	3.7E-01
			Vanadium	NA	5.0E-01	NE	NE (Kp<=0.01)	5.0E-01
			Non-Metallic Anion					
			Perchlorate	---	9.6E+02	NE	NE (Kp<=0.01)	9.6E+02
			Volatile Organics					
			1,2-Dichloroethane	NA	4.6E+00	4.8E+02	2.1E+00	4.9E+02
			Acetone	NA	5.7E-04	1.7E-03	NE (Kp<=0.01)	2.3E-03
			Bromodichloro-methane	---	1.1E-03	NTV	5.6E-04	1.6E-03
			Chloroform	NA	1.4E-02	8.0E+00	5.4E-02	8.0E+00
			cis-1,2-Dichloroethene	NA	1.3E-03	2.8E-04	NE (Kp<=0.01)	1.6E-03
			Methylene chloride	Decreased hematocrit and hemoglobin in the blood	1.1E+03	3.8E+02	NE (Kp<=0.01)	1.5E+03
			p-Cymene	NA	2.8E-04	1.7E-03	2.7E-04	2.2E-03
			Trichloroethene	Liver and kidney effects	2.0E+00	NTV	2.6E+00	4.6E+00
							Groundwater Hazard Index Total =	3.0E+03

Table 2-5. Risk Characterization Summary – Non-Carcinogens (continued)

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Target Endpoint	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil (0 to 2 feet)	Soil and particulates	Incidental ingestion, inhalation of particulates, dermal contact	***Dioxin/Furan***					
			2,3,7,8-TCDD TEC	NA	NTV	NTV	NTV	NA
			Explosive					
			2,4,6-Trinitrotoluene	Liver effects	3.7E-01	2.8E-04	4.0E-01	7.7E-01
			2,4-Dinitrotoluene	IA	3.0E-03	6.1E-06	2.3E-03	5.3E-03
			2,6-Dinitrotoluene	IA	ND	ND	ND	NA
			2-Amino-4,6-dinitrotoluene	NA	1.5E-01	3.7E-05	1.9E-01	3.3E-01
			2-Nitrotoluene	Spleen lesions	ND	ND	ND	NA
			3-Nitrotoluene	Spleen lesions	ND	ND	ND	NA
			4-Amino-2,6-dinitrotoluene	NA	9.4E-02	2.4E-05	1.2E-01	2.1E-01
			4-Nitrotoluene	Spleen lesions	ND	ND	ND	NA
			Metals					
			Aluminum	NA	ND	ND	ND	NA
			Antimony	ongevity, blooc lucose, and holesterol	4.7E-03	5.7E-07	2.0E-03	6.7E-03
			Arsenic	kin effects	ND	ND	ND	NA
			Barium	etus, evelopmental ffects, ıcreased kidne eight	ND	ND	ND	NA
			Beryllium	eryllium ensitization an rogression to hronic eryllium isease	ND	ND	ND	NA
			Cadmium (water)	roteinuria	ND	ND	ND	NA
			Chromium (total)	roteinuria	ND	ND	ND	NA
			Lead	astrointestinal	ND	ND	ND	NA
			Manganese (non-diet)	CNS	ND	ND	ND	NA
			Mercury	CNS	7.2E-04	1.1E-07	6.6E-04	1.4E-03
			Nickel	Respiratory effects, decreased body weight	ND	ND	ND	NA
			Selenium	NA	ND	ND	ND	NA

Table 2-5. Risk Characterization Summary – Non-Carcinogens (continued)

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Target Endpoint	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
			Metals (continued					
			Silver	Argyria	ND	ND	ND	NA
			Strontium	Rachitic bone	ND	ND	ND	NA
			Thallium	Blood	ND	ND	ND	NA
			Vanadium	NA	ND	ND	ND	NA
			Non-Metallic Anion					
			Perchlorate	---	7.6E-05	NTV	4.9E-06	8.1E-05
			Volatile Organics					
			1,2-Dichloroethane	NA	ND	ND	ND	NA
			Acetone	NA	ND	ND	ND	NA
			Bromodichloromethane	---	ND	ND	ND	NA
			Chloroform	NA	ND	ND	ND	NA
			cis-1,2-Dichloroethene	NA	ND	ND	ND	NA
			Methylene chloride	Decreased hematocrit and hemoglobin in the blood	ND	ND	ND	NA
			p-Cymene	NA	ND	ND	ND	NA
			Trichloroethene	Liver and kidney effects	ND	ND	ND	NA
							Soil Hazard Index Total =	1.3E+00
							Hazard Index Total (soil and groundwater) =	3.0E+03

Notes:

CNS	central nervous system
Kp	Dermal permeability coefficient
NA	Not applicable
ND	Not detected in associated media or not selected as a chemical of potential concern
NE	Not evaluated through this exposure pathway. Chemical is not identified as a volatile.
NE (Kp<=0.01)	Based on USEPA Region 6 guidance, chemicals of potential concern with a Kp<=0.01 were not evaluated for dermal contact while showering (USEPA, 1995)
NTV	No toxicity value
TCDD	Tetrachlorodibenzo-p-dioxin
TEC	Toxicity equivalence concentration

References:

U.S. Environmental Protection Agency (USEPA), 1989, *Risk Assessment Guidance for Superfund, Vol. I: Human Health Evaluation Manual, (Part A)*, EPA/540/1-89/002, December.

Summary of Risk Characterization:

The table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of hazard quotients) for all routes of exposure for LHAAP-29. The Risk Assessment Guidance for Superfund (USEPA, 1989) states that, generally, a hazard index (HI) greater than 1 indicates the potential for adverse non-carcinogenic effects. The estimated HI for groundwater is 3.0E+03 and for soil is 1. Both values are unacceptable and indicate that the potential for adverse non-carcinogenic effects could occur from exposure to contaminants in those mediums.

Table 2-6. Chemicals Contributing to Carcinogenic Risk in Groundwater

Chemical	Baseline Risk Assessment			Data Since Risk Assessment			Comparison Levels		Retained as COC ?
	Cancer Risk Groundwater [a]	EPC (µg/L)	Well	Maximum (µg/L)	Well	Adjusted Risk	MCL (µg/L)	TRRP Tier 1 Residential Groundwater PCLs (µg/L)	
Methylene chloride	3.6×10^{-1}	6,600,000	29WW16	10,300,000	29WW16	5.6×10^{-1}	5	5	Yes, 1
1,2-Dichloroethane	2.9×10^{-2}	14,000	29WW15	<12,500	29WW16	--	5	5	Yes, 1
2,4-Dinitrotoluene	1.3×10^{-3}	530	29WW20	50.9 32.4	29WW05 29WW20	1.2×10^{-4}	--	1.3	Yes, 2
2,6-Dinitrotoluene	1.3×10^{-3}	530	29WW20	239 112	116 29WW20	5.9×10^{-4}	--	1.3	Yes, 2
Arsenic	3.1×10^{-4}	59	29WW25	141	29WW25	7.4×10^{-4}	10	10	Yes, 5
Trichloroethene	2.3×10^{-4}	1,200	29WW15	<12,500	29WW16	--	5	5	Yes, 1
2,3,7,8-TCDD	6.1×10^{-5}	1.25×10^{-5}	29WW03	NR	--	--	3.0×10^{-5}	--	No, 4
Chloroform	2.1×10^{-5}	14	29WW21	9.75 ND	29WW15 29WW21	1.5×10^{-5}	80 [b]	1,000	No, 4

Notes and Abbreviations:

1. Identified as COC because most recent maximum concentration is above the Safe Drinking Water Act (SDWA) MCL.
2. Identified as COC because carcinogenic risk is $>10^{-4}$.
3. Excluded because detections are isolated.
4. Excluded because EPC is below the SDWA MCL.
5. Identified as a COC subject to further verification.

[a] From Baseline Risk Assessment Table C-71 (Jacobs, 2002)

[b] SDWA MCL for total trihalomethanes was used for chloroform.

µg/L micrograms per liter
COC contaminant of concern
EPC exposure point concentration
MCL Safe Drinking Water Act maximum contaminant level
NR not resampled for this constituent since Baseline Risk Assessment

Table 2-7. Chemicals with Hazard Quotient Greater than 0.1 in Groundwater

Chemical	Baseline Risk Assessment			Data Since Risk Assessment			Comparison Levels		Retained as COC ?
	Hazard Quotient Groundwater [a]	EPC [a] (µg/L)	Well	Maximum (µg/L)	Well	Adjusted Hazard Quotient	MCL (µg/L)	TRRP Tier 1 Residential Groundwater PCLs (µg/L)	
Methylene chloride	1,500	6,600,000	29WW16	7,110,000	29WW16	1600	5		Yes, 1
Perchlorate	960	88,000	29WW15	16,800	29WW15	180		17	Yes, 2
1,2-Dichloroethane	490	14,000	29WW15	5,520	29WW15	190	5		Yes, 1
4-Nitrotoluene (p-)	35	2,100	29WW20	1,400 374	116 29WW20	23		57	Yes, 2
Chloroform	8.0	14	29WW21	9.75 ND	29WW15 29WW21	5.6	80 [b]		No, 3
2-Nitrotoluene (o-)	7.3	4,400	116	8,140	116	14		4.1	Yes, 2
2,6-Dinitrotoluene	5.2	530	29WW20	239 112	116 29WW20	2.3		1.3	Yes, 2
Trichloroethene	4.6	1,200	29WW15	344	29WW15	1.3	5		Yes, 1
Nickel	4.1	8,400	29WW11	3,190 40	29WW07 29WW11	1.6 <0.1		490	Yes, 9
3-Nitrotoluene (m-)	4.0	240	29WW05	451 123	116 29WW05	7.5		240	Yes, 2
2,4-Dinitrotoluene	2.6	530	29WW20	50.9 32.4	29WW05 29WW20	0.33		1.3	Yes, 5
Arsenic	1.9	59	29WW25	141	29WW25	4.5	10		Yes, 9
Aluminum	1.3	130,000	115	713	29WW08 [c]	<0.1		24,000	No, 6
Antimony	1.3	52	29WW09	1.45	29WW08	<0.1	6		No, 7
Barium	0.91	6,500	116	1,100 48.5 J	115 116	0.15 <0.1	2,000		No, 6
Selenium	0.68	350	118	75.3	118	0.15	50		Yes, 9
Manganese	0.50	2,410	115	1,310	114 [c]	0.27		1,100	No, 4
Vanadium	0.50	360	115	7.5 J	29WW04 [c]	<0.1		44	No, 8
Thallium	0.37	3.0	29WW03	0.339 J	29WW25 [c]	<0.1	2		No, 7

Table 2-7. Chemicals with Hazard Quotient Greater than 0.1 in Groundwater

Chemical	Baseline Risk Assessment			Data Since Risk Assessment			Comparison Levels		Retained as COC ?
	Hazard Quotient Groundwater [a]	EPC [a] (µg/L)	Well	Maximum (µg/L)	Well	Adjusted Hazard Quotient	MCL (µg/L)	TRRP Tier 1 Residential Groundwater PCLs (µg/L)	
2-Amino-4,6-dinitrotoluene	0.35	5.9	29WW05	ND	29WW05	-		4.1	No, 8
4-Amino-2,6-dinitrotoluene	0.35	5.9	29WW05	16.3	29WW05	0.97		4.1	Yes, 1
Strontium	0.31	19,000	119	NR	-	-		15,000	Yes, 1
Silver	0.16	80	29WW09	ND	All wells resampled [c]	-		120	No, 8
Cadmium	0.12	6.23	119	1.2 1.12	115 116	< 0.1 < 0.1	5		No.6

Notes and Abbreviations:

1. Identified as COC because EPC is above the Safe Drinking Water Act (SDWA) MCL or TRRP Tier 1 Residential Groundwater PCL
2. Identified as COC because HQ is > 1.0
3. Excluded because EPC is below the SDWA MCL
4. Excluded because EPC is below the 95% UTL value for Manganese of 7,820 *µg/L from Final Evaluation of Perimeter Well Data for Use as Groundwater Background (Shaw, 2007)* and HQ is <1.0.
5. Already identified as a COC due to carcinogenic risk (**Table 2-2**)
6. More recent sample results indicate lower concentrations of chemical, reducing HQ to <1.0
7. More recent sample results indicate lower concentrations of chemical below the MCL
8. Excluded because EPC and/or most recent maximum is below the TRRP Tier 1 Residential Groundwater PCL and HQ is <1.0
9. Identified as a COC subject to further verification.

[a] From Baseline Risk Assessment Table C-68 (Jacobs, 2002)
[b] SDWA MCL for total trihalomethanes was used for chloroform
[c] Well with maximum in Baseline Risk Assessment was dry in most recent sampling event and the identified well has the most recent maximum

µg/L	micrograms per liter
COC	contaminant of concern
EPC	exposure point concentration
HQ	hazard quotient
J	estimated; the analyte was positively identified; the concentration is estimated
MCL	Safe Drinking Water Act maximum contaminant level
ND	not detected in associated media or not selected as a chemical of potential concern
NR	chemical not resampled in most recent sampling event

Table 2-8. Chemicals with Hazard Quotient Greater than 0.1 in Soil

Chemical	Baseline Risk Assessment			Data Through 2008			Retained as COC ?
	Soil Hazard Quotient [a]	EPC (mg/kg)	Soil Sample Location	Adjusted Hazard Quotient [b]	Maximum (mg/kg)	Soil Sample Location	
2,4,6-Trinitrotoluene	0.77	190	29SD13	105	26,000	29SD46	Yes, 2
2-Amino-4,6-dinitrotoluene	0.33	25	29SD13	0.63	48	29SD46	No, 1
4-Amino-2,6-dinitrotoluene	0.21	16	29SD13	0.21	16	29SD13	No, 1
2,4-Dinitrotoluene	0.0053	6.2	29SB15	6.8	8,000	29SD46	Yes, 3
Perchlorate [c]	8.1×10^{-5}	0.0703	Max from BHHRA Table 3-66	0.0099	8.6	29SB86	Yes, 4

Notes and Abbreviations:

1. Not identified as contaminant of concern (COC) because HQ is less than 1.0.
2. Identified as COC because risk assessment HQ is almost 1 and most recent sample concentration is greater than the SAI-Ind GWP-Ind.
3. Identified as COC because EPC is above the SAI-Ind and GWP-Ind values and Hazard Quotient is greater than 1.0.
4. Identified as COC because contaminant is COC in groundwater and exceeds the GWP-Ind.

[a] HQ from Baseline Risk Assessment Table C-68 (Jacobs, 2002)
[b] calculated HQ based on the most recent maximum concentration.
[c] Even though HI <0.1, listed because recent maximum concentration is greater than EPC

BHHRA	Baseline Human Health Risk Assessment
EPC	Exposure Point Concentration from Baseline Risk Assessment (Jacobs, 2002)
GWP-Ind	Soil medium-specific concentration for industrial use based on groundwater protection
HQ	hazard quotient
mg/kg	milligrams per kilogram.
SAI-Ind	Soil medium-specific concentration for industrial use based on inhalation, ingestion, and dermal contact

Table 2-9. Chemicals in Soil Compared to EcoPRGs

Chemical	SS EcoPRG[a] (mg/kg)	TS EcoPRG[a] (mg/kg)	Maximum[b] (mg/kg)	Retained as Contaminant of Potential Ecological Concern?
2,4,6-Trinitrotoluene	6.1	4.7	26,000	Yes
2,4-Dinitrotoluene	—	12	8,000	Yes
2,6-Dinitrotoluene	2.7	6.8	15	Yes

Notes and Abbreviations:

[a] From Baseline Ecological Risk Assessment Table 16-1 (Shaw, 2007b).
[b] Maximum soil concentrations from samples collected in the upper 3 feet of soil at 29SD46 collected (Shaw, 2007a)

EcoPRG Ecological Preliminary Cleanup Level
mg/kg milligrams per kilogram.
SS surface soil from 0-0.5 feet (applicable to deer mouse)
TS total soil from 0-3 feet (applicable to short-tailed shrew)

Table 2-10. Cleanup Levels at LHAAP-29

Medium	Chemical of Concern	Cleanup Level
Shallow Zone Groundwater		**MCL (µg/L)**
	Trichloroethene	5
	1,2-Dichloroethane	5
	1,1-Dichloroethene*	7
	cis-1,2-Dichloroethene*	70
	trans-1,2-Dichloroethene*	100
	Vinyl chloride*	2
	Arsenic	10
	Mercury	2
	Selenium	50
		TRRP Tier 1 Residential Groundwater PCL - (µg/L)
	2,4-Dinitrotoluene	1.3
	2,6-Dinitrotoluene	1.3
	2-Nitrotoluene	4.1
	3-Nitrotoluene	240
	4-Nitrotoluene	57
	Perchlorate	17
	Nickel	490
Intermediate Zone Groundwater		**MCL (µg/L)**
	Methylene chloride	5
	Trichloroethene	5
	1,2-Dichloroethane	5
	1,1-Dichloroethene*	7
	cis-1,2-Dichloroethene*	70
	trans-1,2-Dichloroethene*	100
	Vinyl chloride*	2
	Arsenic	10
Soil		**GWP-Ind (mg/kg)**
	2,4,6-Trinitrotoluene	4.7[a] 5.1[b]
	2,4-Dinitrotoluene	0.042
	2,6-Dinitrotoluene	0.042
	Perchlorate**	7.2

Table 2-10. Cleanup Levels at LHAAP-29 (continued)

Medium	Chemical of Concern	Cleanup Level
Transite TNT Wastewater Line		**GWP-Ind (mg/kg)**
Solid Residue	1,3-Dinitrobenzene	1
	2,4,6-Trinitrotoluene	5.1
	2,4-Dinitrotoluene	0.042
	2-amino-4,6-Dinitrotoluene	1.7
	4-amino-2,6-Dinitrotoluene	1.7
Cooling Water Drain Line		**GWP-Ind (mg/kg)**
Solid Residue	2,4,6-Trinitrotoluene	5.1
	2,4-Dinitrotoluene	0.042
	2,6-Dinitrotoluene	0.042
	2-amino-4,6-Dinitrotoluene	1.7
	4-amino-2,6-Dinitrotoluene	1.7

Notes:

* Trichloroethene daughter products

** Potential COC in soil due to high perchlorate concentration in groundwater

[a] applies to 0-3 feet below ground surface
[b] applies from 3 feet below ground surface to groundwater interface

GWP-Ind Texas Commission on Environmental Quality soil medium specific concentration for industrial use based on groundwater protection
µg/L micrograms per liter
MCL Safe Drinking Water Act (SDWA) maximum contaminant level
mg/kg milligrams per kilogram
MSC medium-specific concentration

Table 2-11. Comparative Analysis of Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Excavation and off-site disposal for soil; plug lines; in situ chemical oxidation, MNA and LUCs for intermediate zone groundwater; and MNA and LUCs for shallow zone groundwater	Alternative 3 Excavation and off-site disposal for soil; plug lines; groundwater extraction, MNA and LUCs for groundwater	Alternative 4a Excavation and Offsite Disposal for Soil; Plug Lines; Electrical Resistance Heating (ERH) , MNA and LUCs for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater	Alternative 4b Excavation and Offsite Disposal for Soil; Plug Lines; Thermal Conduction Heating (TCH) and MNA for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater
Overall protection of human health and the environment	No protection. Does not achieve RAOs.	Achieves RAOs. Protection of human health and environment provided by soil removal and remediation of groundwater COCs to cleanup levels	Achieves RAOs. Protection of human health and environment provided by soil removal and remediation of groundwater COCs to cleanup levels.	Achieves RAOs in shallow soil/sediment, shallow zone groundwater and intermediate zone groundwater. LUCs can be removed upon completion of active treatment and post-treatment MNA.	Achieves RAOs in shallow soil/sediment, shallow zone groundwater and intermediate zone groundwater. LUCs can be removed upon completion of active treatment and post-treatment MNA.
Compliance with ARARs	No compliance with chemical-specific ARARs.	Complies with all ARARs.	Complies with all ARARs.	Complies with all ARARs.	Complies with all ARARs.

Criteria	Alternative 1 No Action	Alternative 2 Excavation and off-site disposal for soil; plug lines; in situ chemical oxidation, MNA and LUCs for intermediate zone groundwater; and MNA and LUCs for shallow zone groundwater	Alternative 3 Excavation and off-site disposal for soil; plug lines; groundwater extraction, MNA and LUCs for groundwater	Alternative 4a Excavation and Offsite Disposal for Soil; Plug Lines; Electrical Resistance Heating (ERH) , MNA and LUCs for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater	Alternative 4b Excavation and Offsite Disposal for Soil; Plug Lines; Thermal Conduction Heating (TCH) and MNA for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater
Long-term effectiveness and permanence	Is not effective at protection of human health and the environment and does not provide permanence.	Soil removal is a permanent remedy for shallow soil. Excavation of soil is effective long-term and permanent as contamination would be removed from the site and placed in a permitted landfill. In situ chem-ox for intermediate zone should be effective and permanent; however, uncertainty exists concerning the effectiveness of in situ treatment for reducing groundwater contaminant concentrations to cleanup levels. Treatability and pilot studies would be required to further assess the effectiveness of this treatment method and a pre-design would be required to determine the optimum extraction technique configuration. Evaluation of natural attenuation suggests that contaminants are degrading naturally. MNA sampling would be conducted to confirm its effectiveness. Flushing and plugging the process lines would effectively remove any remaining contaminants and there would be no remaining potential for release to surrounding soils. Land use controls would be effective and reliable so long as they are maintained.	Soil removal is a permanent remedy for shallow soil. Excavation of soil is effective long-term and permanent as contamination would be removed from the site and placed in a permitted landfill. Groundwater extraction should be effective and permanent for intermediate zone, based on the efficiency exhibited by the current groundwater treatment system. A pre-design study would be required to determine the optimum extraction technique/configuration. Evaluation of natural attenuation suggests that contaminants are degrading naturally. MNA sampling would be conducted to confirm its effectiveness. Flushing and plugging the process lines would effectively remove any remaining contaminants and there would be no remaining potential for release to surrounding soils. Land use controls would be effective and reliable so long as they are maintained.	Soil removal is a permanent remedy for shallow soil. Excavation of soil is effective long-term and permanent as contamination would be removed from the site and placed in a permitted landfill. MNA has been demonstrated to be effective in managing residual contamination in shallow zone groundwater. ERH is expected to be effective on DNAPL in intermediate zone, MNA demonstrated to be effective in reducing concentrations in intermediate zone groundwater outside of DNAPL zone. Flushing and plugging the process lines would effectively remove any remaining contaminants and there would be no remaining potential for release to surrounding soils. LUCs would remain in place until MNA is completed.	Soil removal is a permanent remedy for shallow soil. Excavation of soil is effective long-term and permanent as contamination would be removed from the site and placed in a permitted landfill. MNA has been demonstrated to be effective in managing residual contamination in shallow zone groundwater. ERH is expected to be effective on DNAPL in intermediate zone, MNA demonstrated to be effective in reducing concentrations in intermediate zone groundwater outside of DNAPL zone. Flushing and plugging the process lines would effectively remove any remaining contaminants and there would be no remaining potential for release to surrounding soils. LUCs would remain in place until MNA is completed.

Table 2-11. Comparative Analysis of Alternatives (continued)

Criteria	Alternative 1 No Action	Alternative 2 Excavation and off-site disposal for soil; plug lines; in situ chemical oxidation, MNA and LUCs for intermediate zone groundwater; and MNA and LUCs for shallow zone groundwater	Alternative 3 Excavation and off-site disposal for soil; plug lines; groundwater extraction, MNA and LUCs for groundwater	Alternative 4a Excavation and Offsite Disposal for Soil; Plug Lines; Electrical Resistance Heating (ERH) , MNA and LUCs for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater	Alternative 4b Excavation and Offsite Disposal for Soil; Plug Lines; Thermal Conduction Heating (TCH) and MNA for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater
Reduction of toxicity, mobility, or volume through treatment	No reduction.	Provides permanent and irreversible reduction of intermediate zone. Provides active reduction of toxicity and volume of groundwater contaminants through biological degradation component of MNA.	Extraction and treatment of contaminated groundwater intermediate zone reduces toxicity, mobility, and volume of groundwater contaminants in this area outside of natural processes. Provides active reduction of toxicity and volume of groundwater contaminants through biological degradation component of MNA.	Reduced toxicity, mobility, and volume through excavation, in situ hydrolysis of DNAPL and DNAPL removal followed by ex-situ destruction, and MNA.	Reduced toxicity, mobility, and volume through excavation, in situ hydrolysis of DNAPL and DNAPL removal followed by ex-situ destruction, and MNA.
Short-term effectiveness	No short-term impacts.	Greater potential for impacts to the community or hypothetical future maintenance worker through off-site transportation of contaminated soil. Release to environment can be controlled during construction.	Greater potential for impacts to the community or hypothetical future maintenance worker through off-site transportation of contaminated soil. Release to environment can be controlled during construction.	Greater potential for impacts to the community or LHAAP workers through off-site transportation of excavated soil. Release to environment can be controlled during construction. Potential for impacts to workers from exposure to hot fluids and high voltage power during ERH application. Duration of MNA and LUCs expected to be 5-10 years following active remediation.	Greater potential for impacts to the community or LHAAP workers through off-site transportation of excavated soil. Release to environment can be controlled during construction. Potential for impacts to workers from exposure to hot fluids during TCH application. Duration of MNA and LUCs expected to be 5-10 years following active remediation.
Implementability	Inherently implementable.	Implementable, but uncertainty exists whether in situ chemical oxidation would lower contaminant concentrations to cleanup levels. Specialized knowledge required for implementation. Use of on-site storage tanks may limit storage capacity. A groundwater treatment system is already operating at LHAAP.	Implementable. Use of on-site storage tanks may limit storage capacity. A groundwater treatment system is already operating at LHAAP. Potential exists for limited groundwater recovery which may affect ability of system to remove contaminants to cleanup levels. A pre-design study would be required.	Soil excavation readily implemented with standard Earthmoving equipment. ERH has been proven to be effective on DNAPL and within low hydraulic conductivity zones.	Soil excavation readily implemented with standard Earthmoving equipment. TCH has been proven to be effective on DNAPL and within low hydraulic conductivity zones.
Cost* (present worth)					

Table 2-11. Comparative Analysis of Alternatives (continued)

Criteria	Alternative 1 No Action	Alternative 2 Excavation and off-site disposal for soil; plug lines; in situ chemical oxidation, MNA and LUCs for intermediate zone groundwater; and MNA and LUCs for shallow zone groundwater	Alternative 3 Excavation and off-site disposal for soil; plug lines; groundwater extraction, MNA and LUCs for groundwater	Alternative 4a Excavation and Offsite Disposal for Soil; Plug Lines; Electrical Resistance Heating (ERH) , MNA and LUCs for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater	Alternative 4b Excavation and Offsite Disposal for Soil; Plug Lines; Thermal Conduction Heating (TCH) and MNA for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater
Capital	$0	$2,109,000	$1,360,000	$3,710,000	$4,530,000
O&M	$0	$919,000	$1,558,000	1,030,000	1,190,000
Total	$0	$3,028,000	$2,918,000	$4,740,000	$5,720,000
State Acceptance	This criterion will be evaluated in the Proposed Plan after state agency comments are provided.				
Community Acceptance	This criterion will be evaluated in the Proposed Plan after community comments are provided.				

Notes and Abbreviations:

* Costs have been rounded to nearest $1,000

ARAR applicable or relevant and appropriate requirement
COC contaminant of concern
LHAAP Longhorn Army Ammunition Plant
LUC land use controls
MNA monitored natural attenuation
O&M operation and maintenance
RAO remedial action objective

Table 2-12. Remediation Cost Table Selected Remedy (Alternative 4a) Present Worth Analysis

Year	Capital Costs		Excavation & Pipeline Flushing		Operation and Maintenance Costs			Present Value (NPV)		
	Design, Permitting, Construction Management, Sub G&A	Electrical Resistance Heating (ERH)			MNA/LUC	O&M GWTP (condensate treatment)	Total O&M	Discount Rate 2.8%	Capital	O&M
Estimate Base Year	2010 (FS)	2014	2010 (FS)		2010 (FS)	2010 (FS				
Escalation Factor *	1.14	1.02	1.14		1.14	1.14				
1	814,530	1,443,282	670,076		252,638	23,005	275,643	**NPV**	**3,710,000**	**1,030,000**
2		799,659			127,777		127,777			
3		0			66,717		66,717		**Total NPV**	**$4,740,000**
4		0			58,711		58,711			
5		0			115,041		115,041			
6		0			40,147		40,147			
7		0			40,147		40,147			
8		0			40,147		40,147			
9		0			40,147		40,147			
10		0			88,471		88,471			
11		0					0			
12		0					0			
13		0					0			
14		0					0			
15		0			89,078					
16		0					0			
17		0					0			
18		0					0			
19		0					0			
20		0			89,078					
21		0					0			
22		0					0			
23		0					0			

Table 2-12. Remediation Cost Table Selected Remedy (Alternative 4a) Present Worth Analysis (continued)

Year	Capital Costs		Excavation & Pipeline Flushing	Operation and Maintenance Costs			Present Value (NPV)		
	Design, Permitting, Construction Management, Sub G&A	Electrical Resistance Heating (ERH)		MNA/LUC	O&M GWTP (condensate treatment)	Total O&M	Discount Rate 2.8%	Capital	O&M
24		0				0			
25		0		89,078					
26		0				0			
27		0				0			
28		0				0			
29		0				0			
30		0		89,078					
	814,530	2,242,941	670,076	1,225,755	23,005	1,248,761			

*Escalation based on construction cost index published by RS Means (https://www.rsmeansonline.com/references/unit/refpdf/hci.pdf)

Notes:

LUC	land use control
MNA	monitored natural attenuation
NPV	net present value
O&M	operation & maintenance
VOC	volatile organic compound

Major assumptions are as described below. Quantities and assumptions are for cost estimating purposes only.

Capital costs include: excavation evaluation, excavation and disposal activities, flow tests, engineering support, and construction management. The soil is assumed to be classified as nonhazardous for disposal purposes.

Monitoring costs are based on the assumption that sampling is conducted at five shallow zone wells and three intermediate zone wells, with one quality control sample in each zone. In the shallow zone, monitoring begins 6 months into Year 2 when groundwater extraction ends and MNA begins. The sampling frequency is quarterly for 2 years, then semiannually for 3 years, then annually for Years 7 through 10, and finally every 5 years (Years 15, 20, 25, and 30). Analysis of the shallow zone groundwater is for VOCs and perchlorate. In the intermediate zone, monitoring begins at the start of Year 1 when MNA begins. The sampling frequency is quarterly for 2 years (Years 1 and 2), then semiannually for 3 years (Years 3 through 5), then annually for Years 6 through 10, and finally every 5 years (Years 15, 20, 25, and 30). Analysis of the intermediate zone groundwater is for VOCs.

The discount rate of 2.8% is based on the Office of Management and Budget Circular No. A-94, January 2008.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Changes will be documented in accordance with 40 CFR 300.435(c)(2) in the form of a memorandum in the Administrative Record, an Explanation of Significant Difference (ESD), or a ROD amendment, as necessary. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Table 2-13. Remediation Cost Table Selected Remedy (Alternative 4b) Present Worth Analysis

Year	Capital Costs		Excavation & Pipeline Flushing	Operation and Maintenance Costs			Present Value (NPV)		
	Design, Permitting, Construction Management, Sub G&A	Thermal Conduction Heating (TCH)		MNA/LUC	O&M GWTP (condensate treatment)	Total O&M	Discount Rate 2.8%	Capital	O&M
Estimate Base Year	2010 (FS)	2014	2010 (FS)	2010 (FS)	2010 (FS				
Escalation Factor *	1.14	1.02	1.14	1.14	1.14				
1	997,004	1,889,115	670,076	250927	175,509	470,436	**NPV**	**4,530,000**	**1,190,000**
2		1,003,601		126,415		126,415			
3		0		66,266		66,266		**Total NPV**	**$5,720,000**
4		0		66,266		66,266			
5		0		114,262		114,262			
6		0		39,875		39,875			
7		0		39,875		39,875			
8		0		39,875		39,875			
9		0		39,875		39,875			
10		0		87,871		88,871			
11		0				0			
12		0				0			
13		0				0			
14		0				0			
15		0		88,475		88,475			
16		0				0			
17		0				0			
18		0				0			
19		0				0			
20		0		88,475		88,475			
21		0				0			
22		0				0			
23		0				0			
24		0				0			

Table 2-13. Remediation Cost Table Selected Remedy (Alternative 4b) Present Worth Analysis (continued)

Year	Capital Costs		Excavation & Pipeline Flushing	Operation and Maintenance Costs			Present Value (NPV)		
	Design, Permitting, Construction Management, Sub G&A	Thermal Conduction Heating (TCH)		MNA/LUC	O&M GWTP (condensate treatment)	Total O&M	Discount Rate 2.8%	Capital	O&M
25		0		88,475		88,475			
26		0				0			
27		0				0			
28		0				0			
29		0				0			
30		0		88,475		88,475			
	997,004	2,892,716	670,076	1,225,406	175,509	1,404,915			

*Escalation based on construction cost index published by RS Means (https://www.rsmeansonline.com/references/unit/refpdf/hci.pdf)

Notes:

LUC	land use control
MNA	monitored natural attenuation
NPV	net present value
O&M	operation & maintenance
VOC	volatile organic compound

Major assumptions are as described below. Quantities and assumptions are for cost estimating purposes only.

Capital costs include: excavation evaluation, excavation and disposal activities, flow tests, engineering support, and construction management. The soil is assumed to be classified as nonhazardous for disposal purposes.

Monitoring costs are based on the assumption that sampling is conducted at five shallow zone wells and three intermediate zone wells, with one quality control sample in each zone. In the shallow zone, monitoring begins 6 months into Year 2 when groundwater extraction ends and MNA begins. The sampling frequency is quarterly for 2 years, then semiannually for 3 years, then annually for Years 7 through 10, and finally every 5 years (Years 15, 20, 25, and 30). Analysis of the shallow zone groundwater is for VOCs and perchlorate. In the intermediate zone, monitoring begins at the start of Year 1 when MNA begins. The sampling frequency is quarterly for 2 years (Years 1 and 2), then semiannually for 3 years (Years 3 through 5), then annually for Years 6 through 10, and finally every 5 years (Years 15, 20, 25, and 30). Analysis of the intermediate zone groundwater is for VOCs.

The discount rate of 2.8% is based on the Office of Management and Budget Circular No. A-94, January 2008.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Changes will be documented in accordance with 40 CFR 300.435(c)(2) in the form of a memorandum in the Administrative Record, an Explanation of Significant Difference (ESD), or a ROD amendment, as necessary. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Table 2-14. Description of ARARs for Selected Remedy

Citation	Activity or Prerequisite/Status	Requirement
Soil		
TCEQ Texas Risk Reduction Rules 30 TAC 335.558 and 30 TAC 335.559(g)(2)	Ensures adequate protection of human health and the environment from potential exposure to contaminants associated with releases – **relevant and appropriate** for remediation of contaminated soil and contaminated pipeline solid residue for cross-media contamination pathways such as soil to groundwater and for hypothetical future maintenance workers.	Non-residential (industrial) soils shall conform to the non-residential soil-to-groundwater cross media protection concentration. Non-residential (industrial) soils shall conform to the non-residential soil-to-groundwater cross media protection concentration MSC (GWP-Ind) values for 2,4,6-TNT for soils less than 3 ft bgs and for soils deeper than 3 ft bgs; 2,4-DNT and 2,6-DNT and Perchlorate in accordance with 30 TAC 335.559(g)(2) and as listed in **Table 2-10** of this report. The concentration of contamination in soil and pipeline solid residue shall not exceed the non-residential soil-to-groundwater protection MSC (GWP-Ind) for the COCs listed in **Table 2-10.** COCs in soil and pipeline solid residue COCs include 2,4,6-TNT, 2,4-DNT, 2,6-DNT, 1,3-DNB, 2-amino-4.6-DNT and 4-amino-2,6-DNT.
Groundwater		
Federal Safe Drinking Water Act (SDWA) MCLs 40 C. F. R. §§ 141.61 and 141.62	Applicable to drinking water for a public water system**—relevant and appropriate** for water that could potentially be used for human consumption.	Must not exceed SDWA MCLs for water designated as a current or potential source of drinking water. The MCLs for organic contaminants TCE, MC, 1,2-DCE, 1,2-DCA; 1,1-DCE; cis-1,2-DCE; trans-1,2-DCE; and VC are provided in 40 C. F. R. § 141.61(a) and the MCLs for inorganic contaminants arsenic; mercury; and, selenium are provided in 40 C. F. R. § 141.62 (b) and **Table 2-10** of this report.
General Site Preparation, Construction, and Excavation Activities		
Opacity Standard 30 TAC 111.111(a)(8)(A)	Fugitive emissions from land-disturbing activities (e.g., excavation, construction)**—applicable**.	Visible emissions shall not be permitted to exceed opacity of 30% for any 6-minute period from any source.
Air Contaminants – General Nuisance Rules **30 TAC 101.4**	Emissions of air contaminants**—applicable**.	No person shall discharge from any source whatsoever one or more air contaminants or combinations thereof, to exceed an opacity of 30 percent for any 6-minute period as are or may tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation, or property, or as to interfere with the normal use and enjoyment of animal life, vegetation, or property.
Fugitive Particulate Matter Standard 30 TAC 111.145	Fugitive emissions from land-disturbing activities (e.g., excavation, construction)**—applicable**.	No person may cause, suffer, allow, or permit a structure, road, street, alley or parking area to be constructed, altered, repaired, or demolished, or land to be cleared without taking at least the following precautions to achieve control of dust emissions: • Use of water or of suitable oil or chemicals for control of dust in the demolition of structures, in construction operations, in work performed on a road, street, alley, or parking area, or in the clearing of land; and • Use of adequate methods to prevent airborne particulate matter during sandblasting of structures or similar operations
Storm Water Runoff Controls 40 C.F.R. § 122.26	Storm water discharges associated with construction activities**—applicable** to disturbances of equal to or greater than 1 acre of land.	Specific to areas of excavation of contaminated soil. Good construction management techniques, phasing of construction projects, minimal clearing, and sediment, erosion, structural, and vegetative controls shall be implemented to mitigate storm water run-on/runoff.

Table 2-14. Description of ARARs for Selected Remedy (continued)

Citation	Activity or Prerequisite/Status	Requirement
Waste Generation, Management, and Storage		
Characterization of Solid Waste 40 C.F.R. § 262.11 30 TAC 335.62 30 TAC 335.504 30 TAC 335.503(a)(4)	Generation of solid waste, as defined in 30 TAC 335.1—**applicable**.	Must determine whether the generated solid waste is RCRA hazardous waste by using prescribed testing methods or applying generator knowledge based on information regarding material or process used. If the waste is determined to be hazardous, it must be managed in accordance with 40 C. F. R. § 262–268. After making the hazardous waste determination as required, if the waste is determined to be nonhazardous, the generator shall then classify the waste as Class 1, Class 2, or Class 3 (as defined in Section 335.505 through Section 335.507) using one or more of the methods listed in Section 335.503(a)(4) and Section 335.508 and manage the waste in accordance with the requirements of Chapter 335 of the TAC for industrial solid waste.
Characterization of Hazardous Waste 40 C.F.R. §.264.13(a)(1); 40 C.F.R. § 268.7 30 TAC 335.504(3) 30 TAC 335.509 30 TAC 335.511	Generation of a RCRA hazardous waste for treatment, storage, or disposal—**applicable** if hazardous waste is generated (e.g., PPE).	Must obtain a detailed chemical and physical analysis of a representative sample of the waste(s) that at a minimum contains all the information that must be known to treat, store, or dispose of the waste in accordance with 40 C. F. R. §264 and 268. Must also determine whether the waste is restricted from land disposal under 40 C. F. R. § 268 et seq. by testing in accordance with prescribed methods or use of generator knowledge of waste.
Requirements for Temporary Storage of Hazardous Waste in Accumulation Areas 40 C. F. R. § 262.34(a) and (c)(1) 30 TAC 335.69(a) and (d)	On-site accumulation of 55 gallons or less of RCRA hazardous waste for 90 days or less at or near the point of generation—**applicable** if hazardous waste is generated (e.g., PPE) and stored in an accumulation area.	Remedial activities derived waste (from monitoring and treating contaminated groundwater) is expected for this facility. A generator may accumulate hazardous waste at the facility provided that • Waste is placed in containers that comply with 40 C. F. R. § 264.171 to 264.173 (Subpart I); and • Container is marked with the words “hazardous waste”; or • Container may be marked with other words that identify the contents.
Requirements for the Use and Management of Containers 40 C. F. R. § 264.171–264.173 30 TAC 335.69(e) 30 TAC 335.152(a)(7)	On-site storage/treatment of RCRA hazardous waste in containers for greater than 90 days—**applicable** if hazardous waste is generated (e.g., PPE) and is stored in containers.	Design and operating standards of 40 C. F. R. § 264.175(c) and 40 C. F. R. § 264.171, §.264.172, and §.264.173(a) and (b) must be met for the use and management of hazardous waste in containers.
Wells		
Well Construction Standards—Monitoring or Injection Wells 16 TAC 76.1000	Construction of water wells—**applicable** to construction of new monitoring or injection wells, if needed.	Injection wells shall be completed in accordance with the technical requirements of Section 76.1000, as appropriate. Substantive requirements applicable to the injection wells will be adhered to.

Table 2-14. Description of ARARs for Selected Remedy (continued)

Citation	Activity or Prerequisite/Status	Requirement
Wells (continued)		
Class V Injection Wells 30 TAC §331.9(a); 30 TAC §331.10(a); 30 TAC §331.10(d); 30 TAC §331.21; 30 TAC §331.132(a); 30 TAC §331.132(c); 30 TAC §331.132(d)(1); 30 TAC §331.132(d)(4); 30 TAC §331.133(e)	Installation, operation, and closure of injection wells for in situ chemical oxidation fall in the category of Class V Injection Wells— **relevant and appropriate**.	Injection wells shall be constructed to the required specifications for isolation casing, surface completion, prevention of commingling, and confinement of undesirable groundwater to its zone of origin. Closure shall be accomplished by removing all of the removable casing and the entire well shall be pressure filled via a tremie pipe with cement from bottom to the land surface, or closure shall be performed by the alternative method for Class V Wells completed in zones of undesirable groundwater. Groundwater concentrations at time of well closure will determine the appropriate method of abandonment. Substantive requirements applicable to the injection wells will be adhered to.
Well Construction Standards—Extraction Wells 16 TAC 76.1000(a) and (c) through (h) 16 TAC 76.1002(a) through (c) 16 TAC 76.1008(a) through (c)	Construction of water wells**—applicable** to construction of extraction (recovery) wells.	Substantive requirements applicable to extraction (recovery) wells will be adhered to. Wells shall be completed in accordance with the technical requirements of Section 76.1000, as appropriate. Water wells completed to produce undesirable water shall be cased to prevent the mixing of water or constituent zones. The annular space between the casing and the wall of the borehole shall be pressure grouted with cement or bentonite grout to the land surface. Bentonite grout may not be used if a water zone contains chloride water above 1500 parts per million (ppm) or if hydrocarbons are present. Wells producing undesirable water or constituents shall be completed in such a manner that will not allow undesirable fluids to flow onto the land surface. During installation of a water well pump, installer shall make a reasonable effort to maintain integrity of groundwater and to prevent contamination by elevating the pump column and fittings, or by other means suitable under the circumstances. Pump shall be constructed so that no unprotected openings into the interior of the pump or well casing exist.
Treatment/Disposal		
Disposal of Wastewater (e.g., contaminated groundwater, dewatering fluids, decontamination liquids) 40 C. F. R. § 268.1(c)(4)(i) 30 TAC 335.431(c)	RCRA-restricted characteristically hazardous waste intended for disposal**—applicable** if extracted groundwater is determined to be RCRA characteristically hazardous.	Appropriate and relevant in the event of a spill. Disposal is not prohibited if such wastes are managed in a treatment system subject to regulation under Section 402 of the CWA that subsequently discharges to waters of the United States.
Closure		

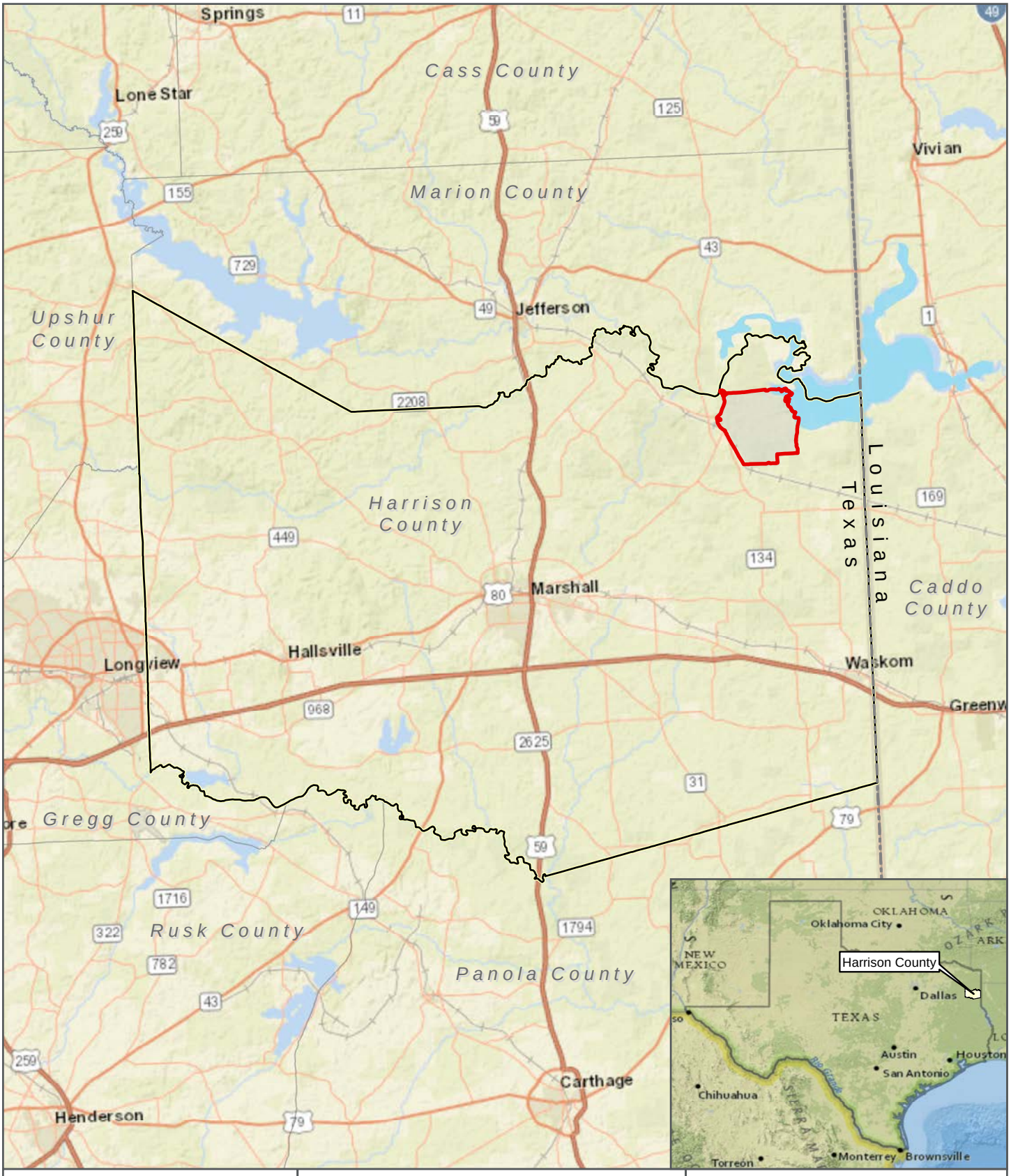
Table 2-14. Description of ARARs for Selected Remedy (continued)

Citation	Activity or Prerequisite/Status	Requirement
Standards for Plugging Wells that Penetrate Undesirable Water or Constituent Zones 16 TAC 76.1004(a) through (c)	Plugging and abandonment of wells**—applicable** to plugging and closure of monitoring and/or extraction wells.	If a well is abandoned, all removable casing shall be removed and the entire well pressure filled via a tremie pipe with cement from bottom up to the land surface. In lieu of this procedure, the well shall be pressure-filled via a tremie tube with bentonite grout of a minimum 9.1 lb/gal weight followed by a cement plug extending from land surface to a depth of not less than 2 feet. Undesirable water or constituents or the freshwater zone(s) shall be isolated with cement plugs.

Abbreviations:

ARAR	*applicable or relevant and appropriate requirement*
bgs	*below ground surface*
C. F. R.	*Code of Federal Regulations*
CWA	*Clean Water Act of 1972*
USEPA	*U.S. Environmental Protection Agency*
FR	*Federal Register*
lb/gal	*pound per gallon*
LHAAP	*Longhorn Army Ammunition Plant*
MCL	*maximum contaminant level*
MCLG	*maximum contaminant level goal*
MSC	*medium-specific concentration*
%	*percent*
PPE	*personal protective equipment*
ppm	*part per million*
RCRA	*Resource Conservation and Recovery Act of 1976*
SDWA	*Safe Drinking Water Act*
TAC	*Texas Administrative Code*
TCEQ	*Texas Commission on Environmental Quality*

Figure 2 -1. LHAAP Site Location



N

0 5 10
MILES

LEGEND

- LHAAP Installation Boundary
- Harrison County
- State Boundary

SITE LOCATION

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

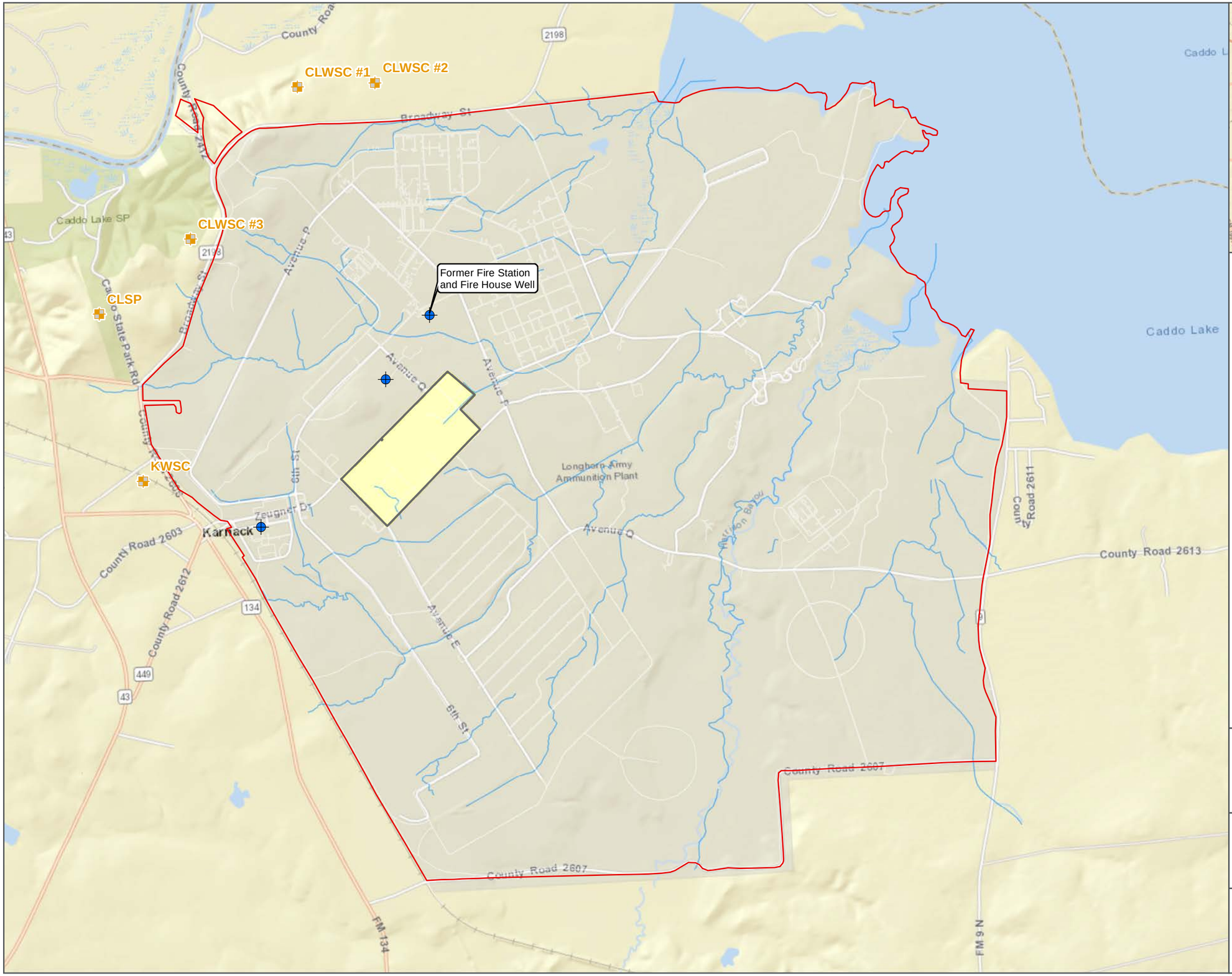
DATA SOURCES: AECOM, 2017, Draft Final Feasibility Study Addendum LHAAP-29, Former TNT Production Area, Group 2 Longhorn Army Ammunition Plant, Karnack, Texas. August

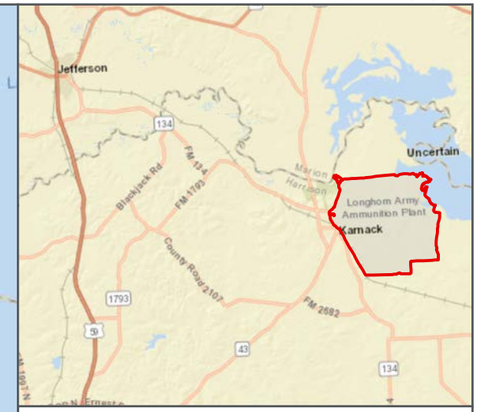
DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

FIGURE 2-1

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_LHAAP_SITE_LOCATION.MXD - USER: KLOFGREN - DATE: 5/17/2019

Figure 2-2. LHAAP-29 TNT Production Facility Site Location





LEGEND

- Public Water Supply Well Locations
- Potable Water Wells
- Roads
- Streams
- Site LHAAP-29
- LHAAP Installation Boundary

DATA SOURCES: AECOM, 2016, Draft Final Remedial Investigation Addendum LHAAP-29, Former TNT Production Area, Group 2 Longhorn Army Ammunition Plant, Karnack, Texas. July. ESRI

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

SITE VICINTY MAP

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N

0 0.5 1
MILES

FIGURE 2-2

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_SITE_VICINITY.MXD - USER: KLOFGREN - DATE: 7/12/2019

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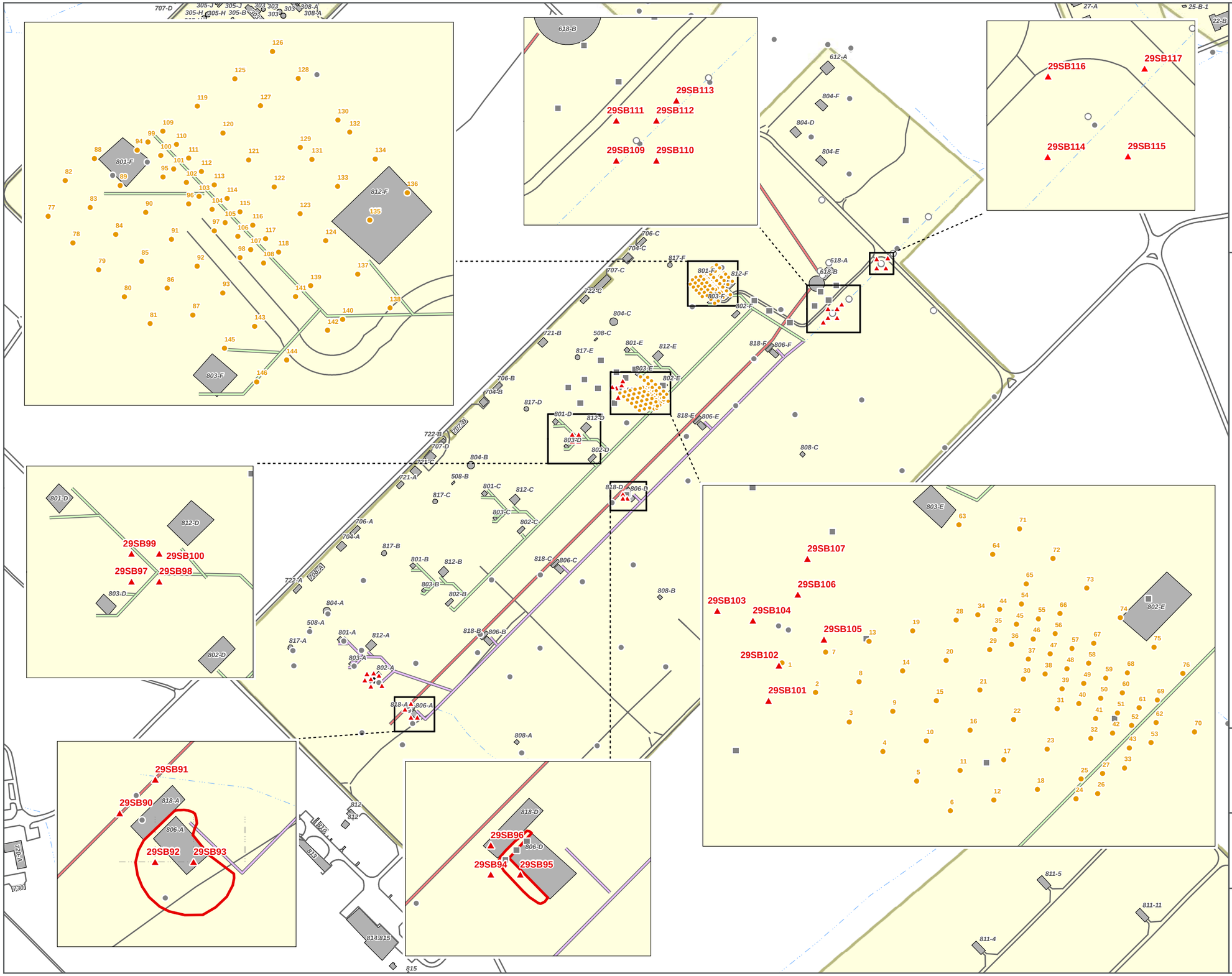

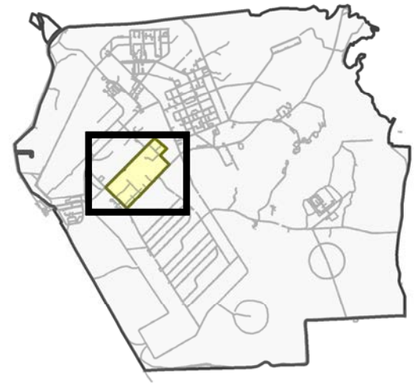

LEGEND

- 2014 Shallow Soil Sample Location
- 2014 Soil Sample Location
- <all other values>
- Former Building Locations
- Historical Sediment Sample Location
- Historical Soil Boring Location
- Historical Surface Soil Sample Location
- Stained Soil
- TNT Cooling Water Drain Line (North)
- TNT Cooling Water Drain Line (South)
- TNT Wastewater Line
- Road
- Stream
- Building
- Site LHAAP-29

DATA SOURCES: AECOM, 2016, Draft Final Remedial Investigation Addendum LHAAP-29, Former TNT Production Area, Group 2 Longhorn Army Ammunition Plant, Karnack, Texas. July.

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

SOIL SAMPLE LOCATIONS

LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N

0 250 500
FEET

FIGURE 2-3

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_SOIL_SAMPLE_LOCATIONS.MXD - USER: KLOFGREN - DATE: 5/17/2019

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LHAAP-49
LHAAP-32
LHAAP-35B (37)
LHAAP-47
LHAAP-23
LHAAP-64
LHAAP-29
LHAAP-45
29SW17
29SD17
29SW16
29SD16
29SW15
29SD15
29SW29
29SD29
GPS-12
GPW-12
29SD45
29SW45
29SD44
29SD13
29SW13
29SW44
29SD14
29SW14
29SD47
STEP-29SW01
STEP-29SW02
29WL43-MH12
29SD43-MH12
29SW30
29SD30
29SD46
29SW46
29SW12
29SD12
29SD32-MH01
29WL32-MH01
29WL42-MH11
29SD42-MH11
29SW11
29SD11
29WL33-MH02
29SD33-MH02
29SD41-MH10
29WL41-MH10
29SD10
29SW10
29SD34-MH03
29WL34-MH03
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29SW04
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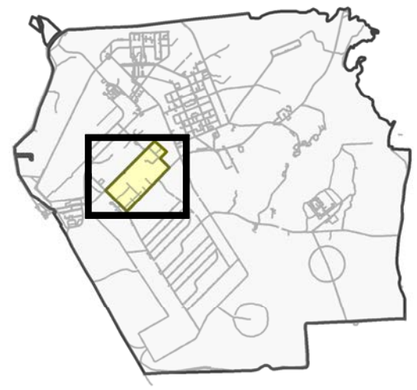
29SW18
29SD18



LEGEND

- Surface Water Sample Location
- Sediment Sample Location
- TNT Cooling Water Drain Line (North)
- TNT Cooling Water Drain Line (South)
- TNT Wastewater Line
- Stream
- Road
- Building
- Site LHAAP-29

DATA SOURCES: Shaw, 2010, Final Feasibility Study, LHAAP-29, Former TNT Production Area, Group 2, Longhorn Army Ammunition Plant, Karnack, Texas, December.

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N

0 250 500
FEET

FIGURE 2-4

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_SURFACEWATER_SEDIMENTSAMPLE_LOCATIONS.MXD - USER: KLOFGREN - DATE: 5/17/2019

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Figure 2-5. LHAAP-29 Shallow Zone Wells and Groundwater Elevations

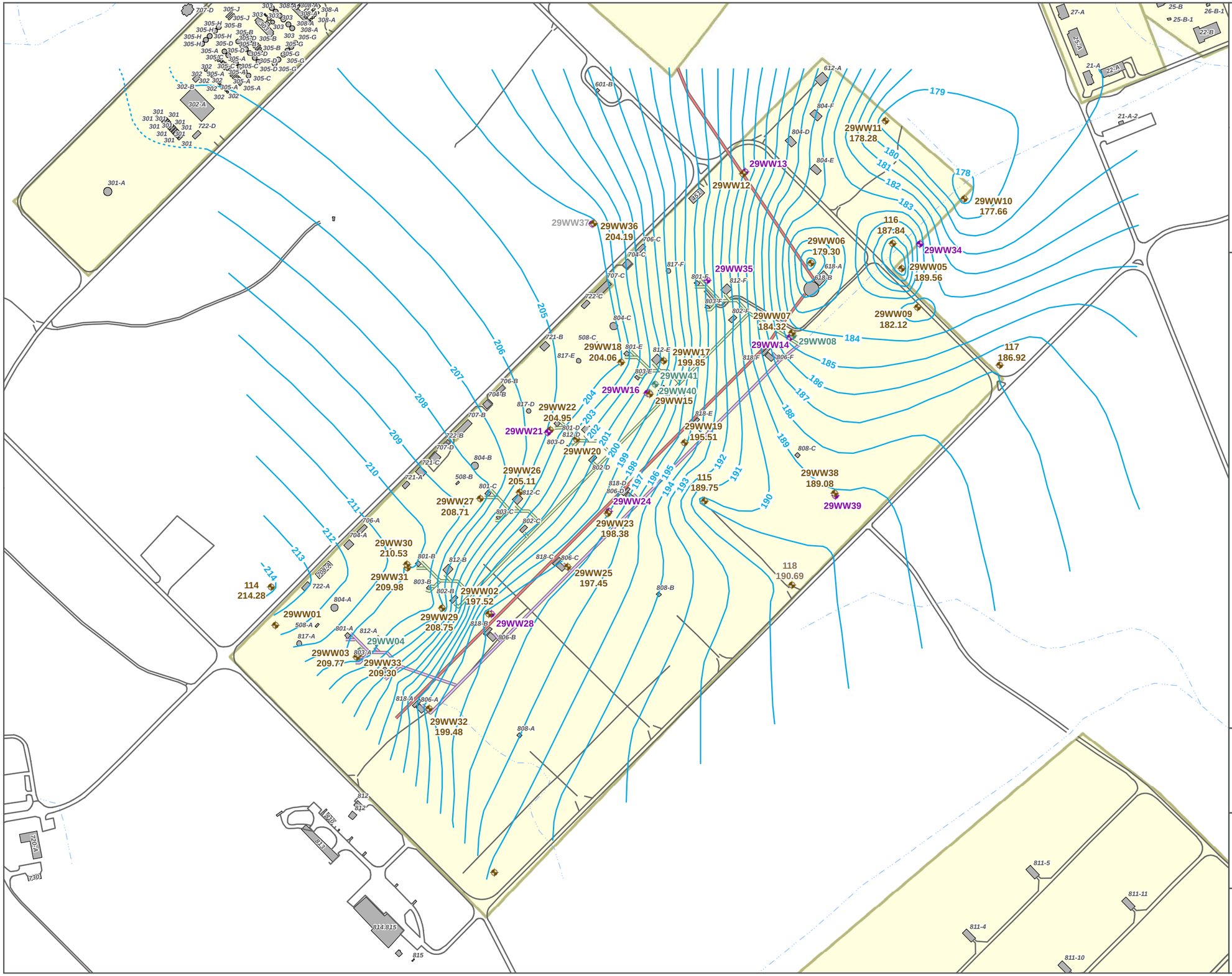

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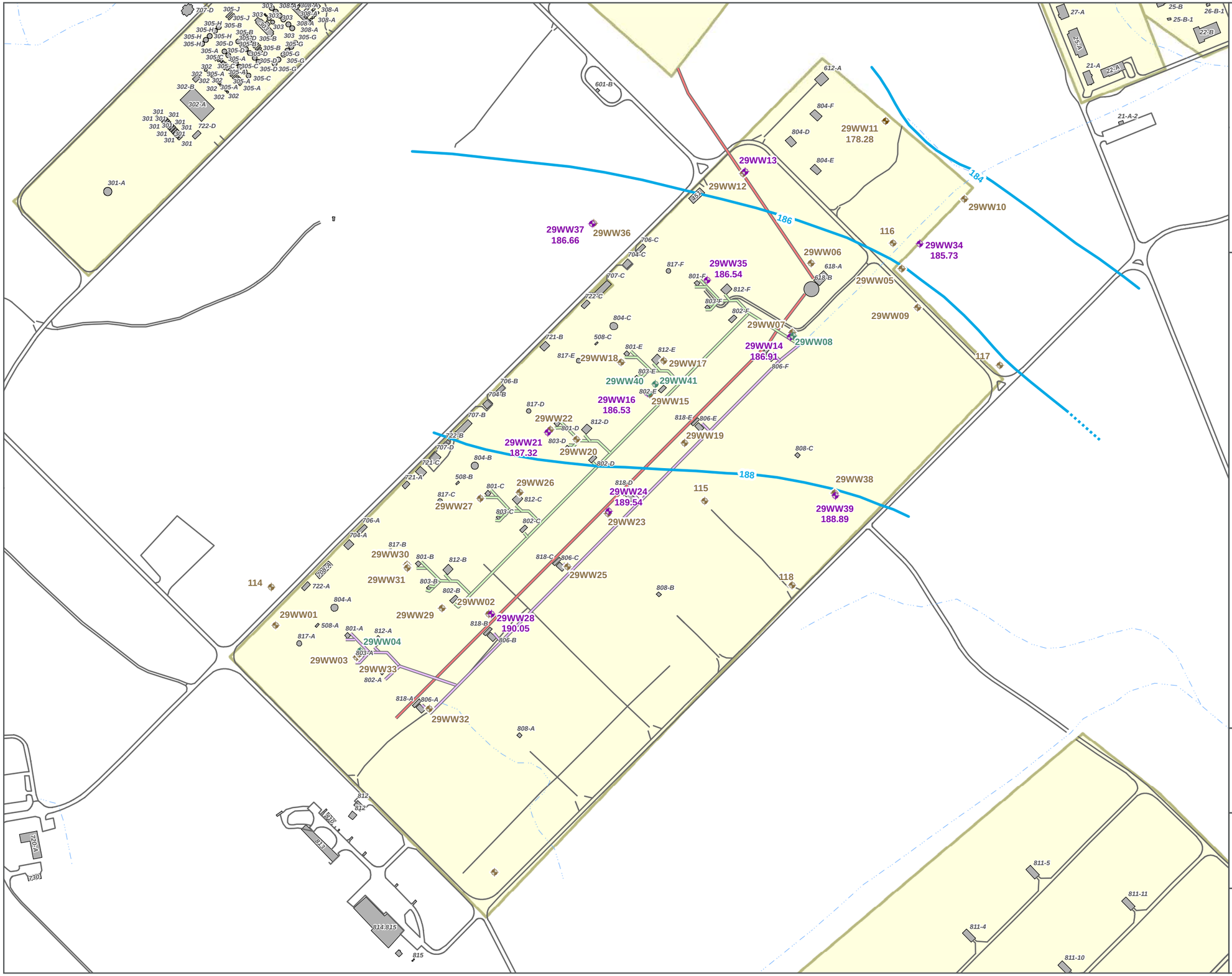
Figure 2-6. LHAAP-29 Intermediate Groundwater Zone Wells and Elevations



PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_GW_ELEVATION_INTERMEDIATE.MXD - USER: KLOFGREN - DATE: 5/17/2019

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Figure 2-7. LHAAP-29 Human Health Conceptual Site Model

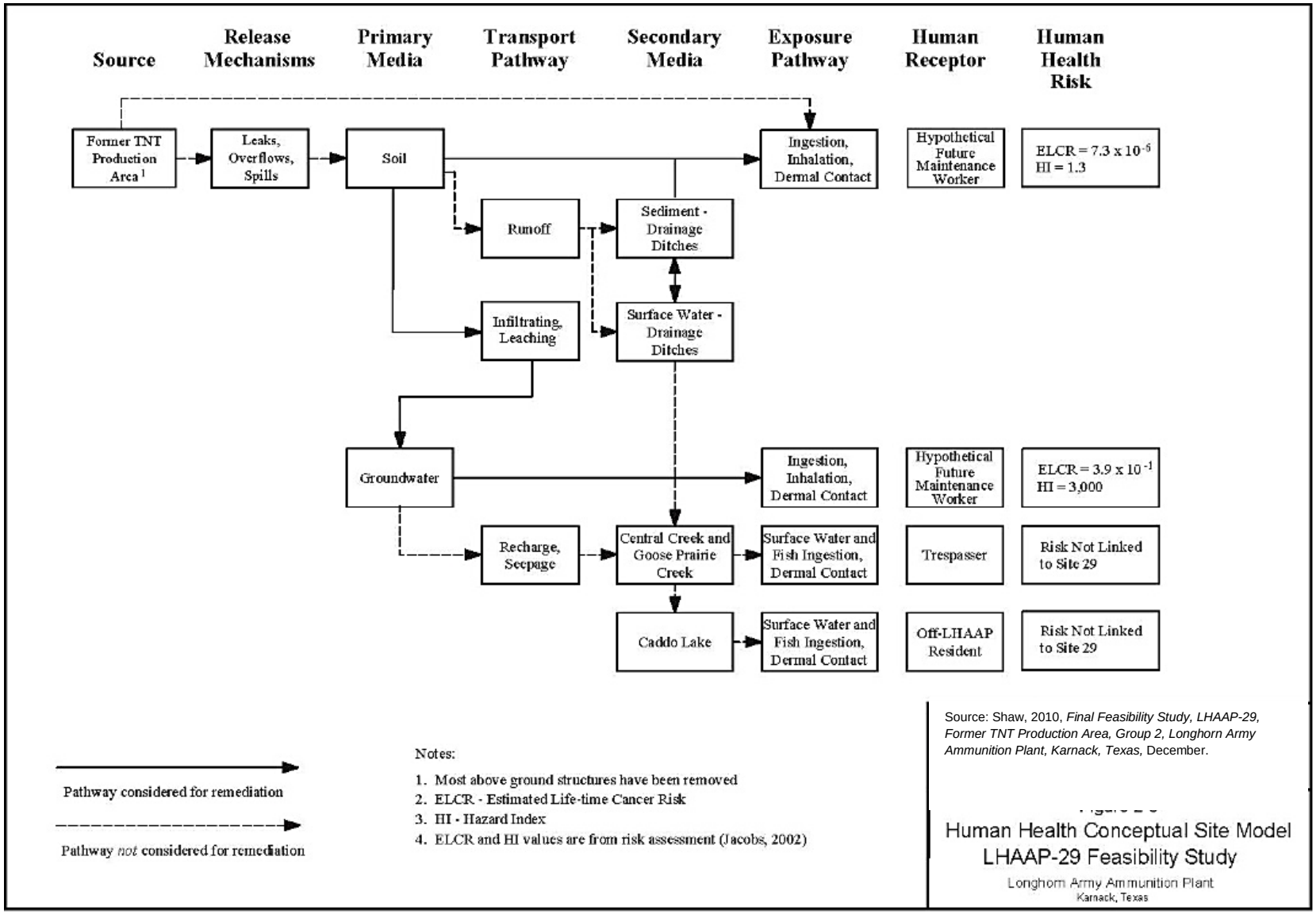
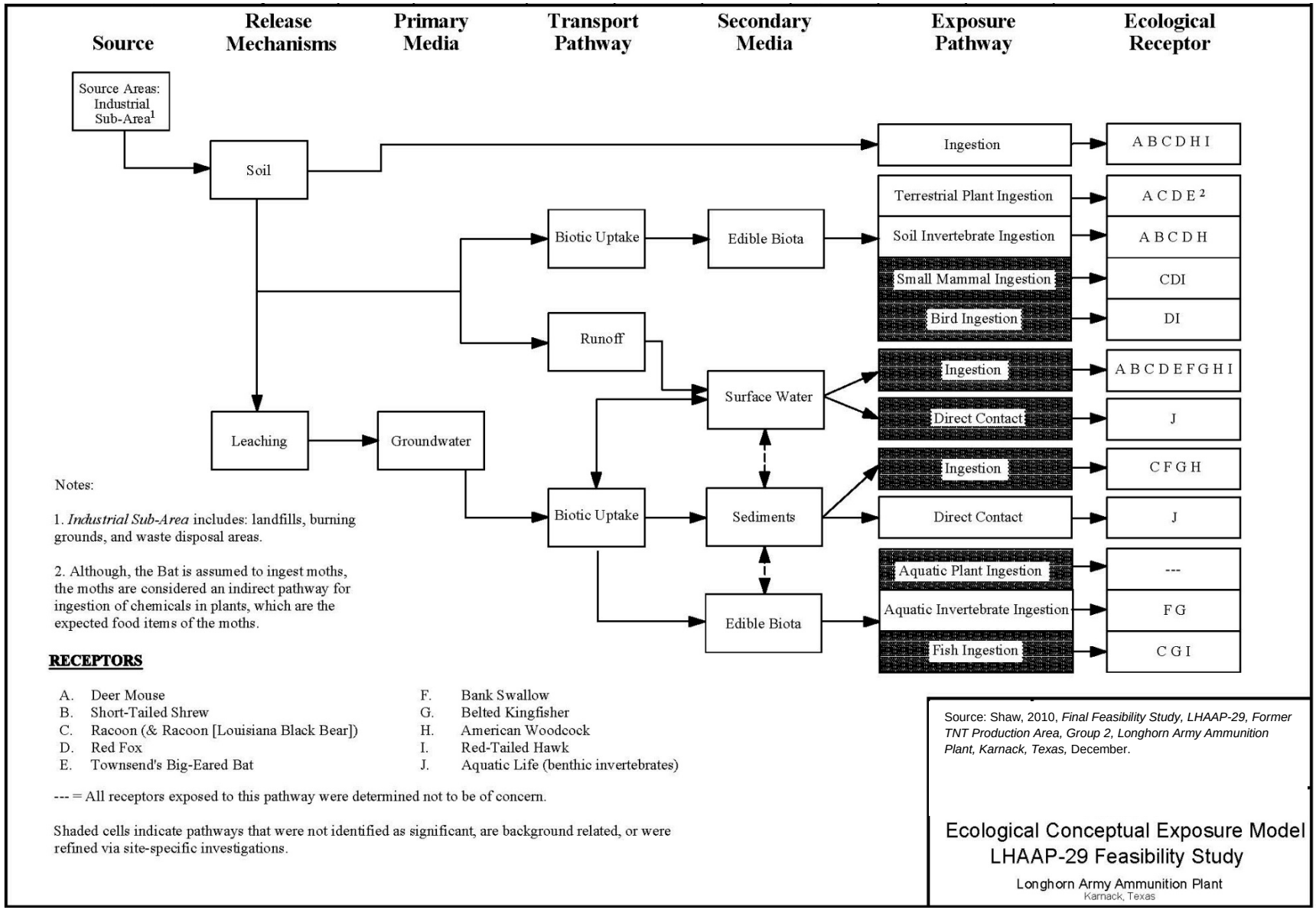
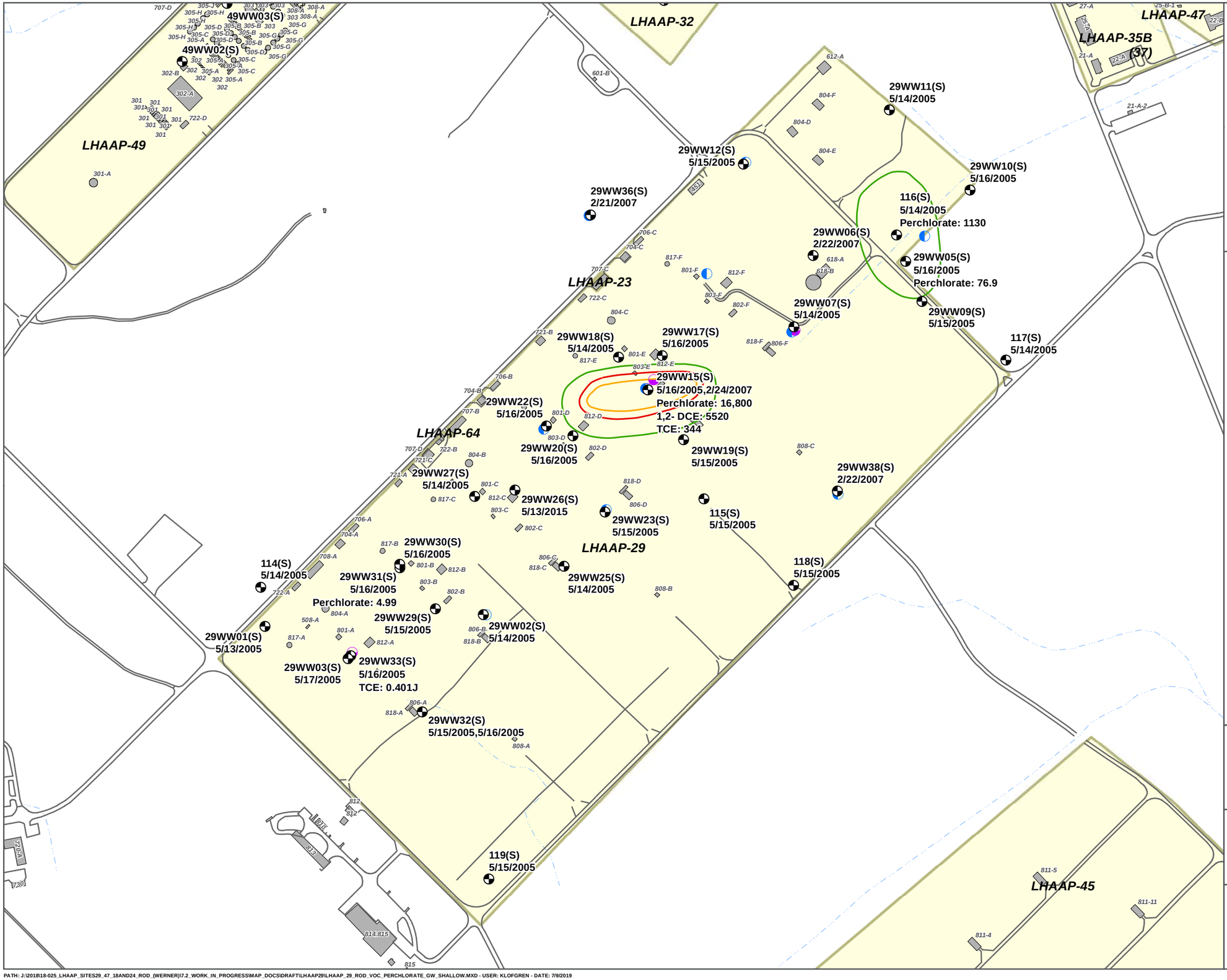


Figure 2-8. LHAAP-29 Ecological Conceptual Exposure Model





LEGEND

- Shallow Groundwater Monitoring Well (S)
- Intermediate Groundwater Monitoring Well (I)
- Deep Groundwater Monitoring Well (D)

Plume in Shallow Groundwater

- 1,2-Dichloroethane (MCL= 5 µg/L)
- Perchlorate (TRRP Tier 1 Residential Groundwater PCL = 17 ug/L)
- Trichloroethene (MCL= 5 µg/L)
- Stream
- Road
- Building
- Site LHAAP-29

NOTES:
-All perchlorate concentrations in the intermediate and deep zones are below the TRRP Tier 1 Residential Groundwater PCL of 17 ug/L
-All concentrations are reported in micrograms per liter (µg/L).
-Analytes are non detect unless labeled on map.
-MCL = Maximum Contaminant Level.

DATA SOURCES: HDR, 2018, Draft Revised Proposed Plan for LHAAP-29 Former TNT Production Area Group 2 Longhorn Army Ammunition Plant. August.

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

VOCS AND PERCHLORATE IN SHALLOW ZONE GROUNDWATER

LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N

0 250 500
FEET

FIGURE 2-9

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_VOC_PERCHLORATE_GW_SHALLOW.MXD - USER: KLOFGREN - DATE: 7/9/2019

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LHAAP-49
LHAAP-32
LHAAP-47
LHAAP-35B (37)
LHAAP-23
LHAAP-64
LHAAP-29
29WW11(S) 5/14/2005
29WW12(S) 5/15/2005
29WW13 (I) 5/15/2005
116(S) 5/14/2005
2,4-DNT: 1 U
2,6-DNT: 239
m-NT: 451
o-NT: 8140
p-NT: 1400
29WW10(S) 5/16/2005
29WW36(S) 2/21/2007
29WW37 (I) 2/1/2008
29WW06(S) 2/22/2007
29WW35 (I) 2/22/2007
29WW34 (I) 5/16/2005
29WW05(S) 5/16/2005
2,4-DNT: 50.9
2,6-DNT: 224
m-NT: 123
o-NT: 1230
p-NT: 42.7
29WW09(S) 5/15/2005
29WW07(S) 5/14/2005
29WW14 (I) 5/14/2005
29WW08 (D) 5/14/2005
117(S) 5/14/2005
29WW18(S) 5/14/2005
29WW17(S) 5/16/2005
29WW16 (I) 5/16/2005
29WW41 (D) 6/10/2009
29WW40 (D) 12/19/2006
29WW22(S) 5/16/2005
29WW15(S) 2/24/2007
29WW20(S) 5/16/2005
2,4-DNT: 32.4
2,6-DNT: 112
m-NT: 43.3
o-NT: 401
p-NT: 374
29WW21 (I) 5/15/2005
29WW19(S) 5/15/2005
29WW26(S) 5/13/2005
29WW27(S) 5/14/2005
29WW24 (I) 5/15/2005
29WW23(S) 5/15/2005
115(S) 5/15/2005
29WW38(S) 2/22/2007
29WW39 (I) 2/1/2008
29WW30(S) 5/16/2005
29WW31(S) 5/16/2005
114(S) 5/14/2005
29WW29(S) 5/15/2005
29WW28 (I) 5/15/2005
29WW01(S) 5/13/2005
29WW02(S) 5/14/2005
29WW25(S) 5/14/2005
118(S) 5/15/2005
29WW04 (D) 4/17/2005
29WW33(S) 5/16/2005
29WW03(S) 5/17/2005
2,4-DNT: 1 U
2,6-DNT: 9.32
J, m-NT: 5.5
o-NT: 71.3
p-NT: 37.2
29WW32(S) 5/16/2005
119(S) 4/15/2005
2,6-DNT
o-NT
p-NT
m-NT
2,4-DNT

LEGEND

- Shallow Groundwater Monitoring Well (S)
- Intermediate Groundwater Monitoring Well (I)
- Deep Groundwater Monitoring Well (D)
- 2,4-DNT and 2,6-DNT (TRRP Tier 1 Residential Groundwater PCL - all occurrences = 1.3 ug/L) *
- Inferred 2,4-DNT and 2,6-DNT (TRRP Tier 1 Residential Groundwater PCL - all occurrences = 1.3 ug/L) *
- 2(o)-NT (TRRP Tier 1 Residential Groundwater PCL - all occurrences = 4.1 µg/L)*
- Inferred 2(o)-NT (TRRP Tier 1 Residential Groundwater PCL - all occurrences = 4.1 µg/L)*
- 3(m)-NT and 4(p)-NT (TRRP Tier 1 Residential Groundwater PCL - all occurrences = 240 µg/L and 57 µg/L)*
- Stream
- Road
- Building
- Site

* Contours based on the TRRP Tier 1 Residential Groundwater PCLs

DATA SOURCES: HDR, 2018, Draft Revised Proposed Plan for LHAAP-29 Former TNT Production Area Group 2 Longhorn Army Ammunition Plant. August.

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

NOTES:
-All concentrations in the intermediate and deep zones are below the TRRP Tier 1 Residential Groundwater PCLs for 2(o)-, 3(m)- and 4 (p)-nitrotoluenes (4.1, 240 and 57 ug/L respectively), 2,4-DNT and 2,6-DNT (1.3 ug/L); therefore no plumes exist in these zones
-All concentrations are reported in micrograms per liter (µg/L).
-Analytes are non detect unless labeled on map.
-COC - Contaminant of concern, DNT - Dinitrotoluene, NT - Nitrotoluene

NITROTOLUENES IN SHALLOW ZONE GROUNDWATER

LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N
0 250 500
FEET

FIGURE 2-10

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_NITROTOLUENES_GW_SHALLOW.MXD - USER: KLOFGREN - DATE: 7/9/2019

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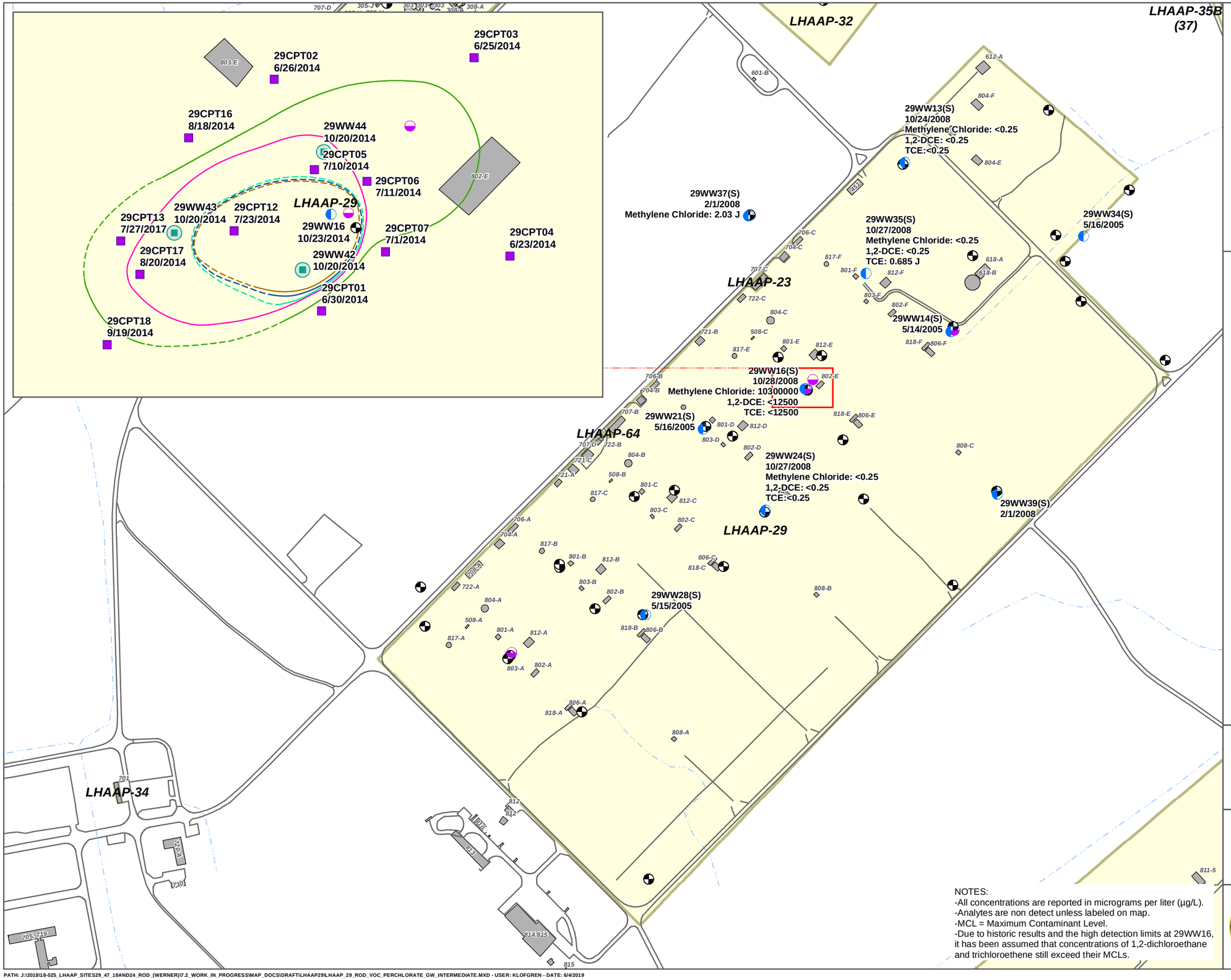
Figure 2-11. VOCs in Intermediate Zone Groundwater



LEGEND

- Shallow Groundwater Monitoring Well (S)
- Intermediate Groundwater Monitoring Well (I)
- Deep Groundwater Monitoring Well (D)
- Intermediate Zone Well (2014)
- Intermediate Zone Soil Boring (2014)

Intermediate Groundwater Contours (Dashed Where Inferred), Contour Concentration

- Trichloroethene (MCL = 5 µg/L)
- 1,1- DCE (MCL = 7 µg/L)
- cis - 1,2 - DCE (MCL = 70 µg/L)
- Vinyl Chloride (MCL = 2 µg/L)
- MC (MCL = 5 µg/L)
- Stream
- Road
- Building
- Site LHAAP-29

DATA SOURCES: HDR, 2018, Draft Revised Proposed Plan for LHAAP-29 Former TNT Production Area Group 2 Longhorn Army Ammunition Plant. August.

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

NOTES:
-All concentrations are reported in micrograms per liter (µg/L).
-Analytes are non detect unless labeled on map.
-MCL = Maximum Contaminant Level.
-Due to historic results and the high detection limits at 29WW16, it has been assumed that concentrations of 1,2-dichloroethane and trichloroethene still exceed their MCLs.

VOCS IN INTERMEDIATE ZONE GROUNDWATER

LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N
0 250 500
FEET

FIGURE 2-11

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_VOC_PERCHLORATE_GW_INTERMEDIATE.MXD - USER: KLOFGREN - DATE: 6/4/2019

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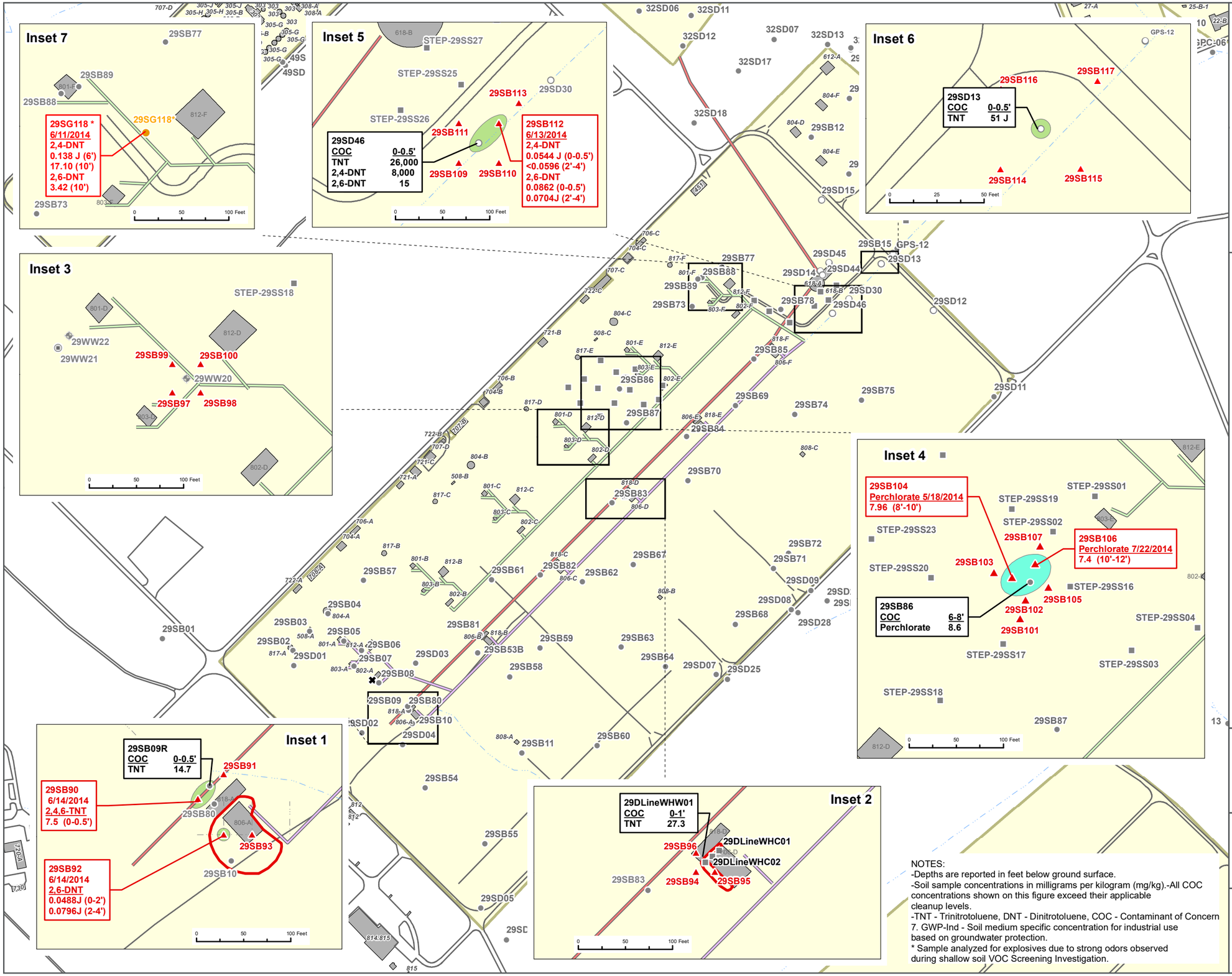

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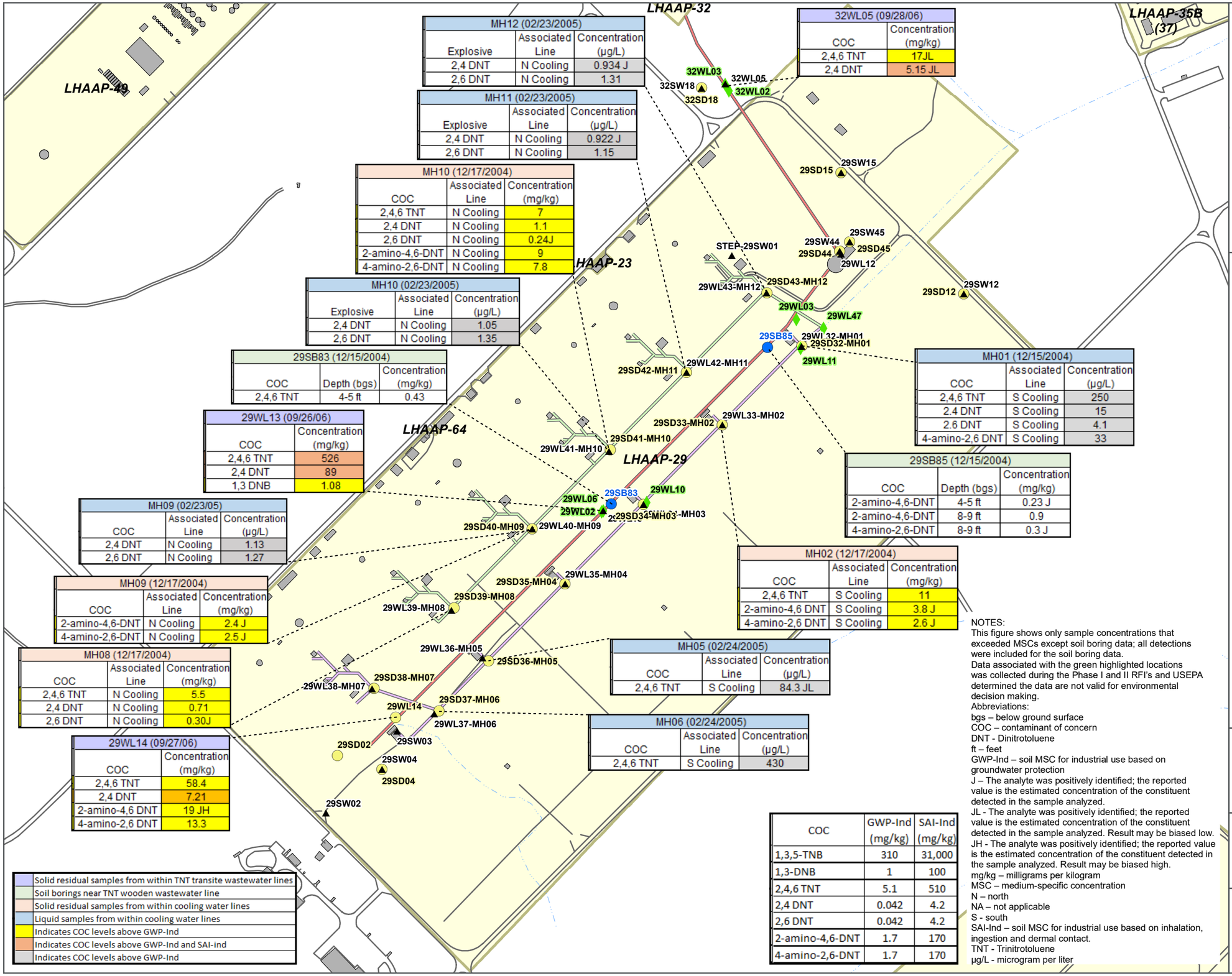

MH12 (02/23/2005)		
Explosive	Associated Line	Concentration (µg/L)
2,4 DNT	N Cooling	0.934 J
2,6 DNT	N Cooling	1.31

MH11 (02/23/2005)		
Explosive	Associated Line	Concentration (µg/L)
2,4 DNT	N Cooling	0.922 J
2,6 DNT	N Cooling	1.15

MH10 (12/17/2004)		
COC	Associated Line	Concentration (mg/kg)
2,4,6 TNT	N Cooling	7
2,4 DNT	N Cooling	1.1
2,6 DNT	N Cooling	0.24J
2-amino-4,6-DNT	N Cooling	9
4-amino-2,6-DNT	N Cooling	7.8

MH10 (02/23/2005)		
Explosive	Associated Line	Concentration (µg/L)
2,4 DNT	N Cooling	1.05
2,6 DNT	N Cooling	1.35

29SB83 (12/15/2004)		
COC	Depth (bgs)	Concentration (mg/kg)
2,4,6 TNT	4-5 ft	0.43

29WL13 (09/26/06)	
COC	Concentration (mg/kg)
2,4,6 TNT	526
2,4 DNT	89
1,3 DNB	1.08

MH09 (02/23/05)		
COC	Associated Line	Concentration (µg/L)
2,4 DNT	N Cooling	1.13
2,6 DNT	N Cooling	1.27

MH09 (12/17/2004)		
COC	Associated Line	Concentration (mg/kg)
2-amino-4,6-DNT	N Cooling	2.4 J
4-amino-2,6-DNT	N Cooling	2.5 J

MH08 (12/17/2004)		
COC	Associated Line	Concentration (mg/kg)
2,4,6 TNT	N Cooling	5.5
2,4 DNT	N Cooling	0.71
2,6 DNT	N Cooling	0.30J

29WL14 (09/27/06)	
COC	Concentration (mg/kg)
2,4,6 TNT	58.4
2,4 DNT	7.21
2-amino-4,6 DNT	19 JH
4-amino-2,6 DNT	13.3

32WL05 (09/28/06)	
COC	Concentration (mg/kg)
2,4,6 TNT	17JL
2,4 DNT	5.15 JL

MH01 (12/15/2004)		
COC	Associated Line	Concentration (µg/L)
2,4,6 TNT	S Cooling	250
2.4 DNT	S Cooling	15
2.6 DNT	S Cooling	4.1
4-amino-2,6 DNT	S Cooling	33

29SB85 (12/15/2004)		
COC	Depth (bgs)	Concentration (mg/kg)
2-amino-4,6-DNT	4-5 ft	0.23 J
2-amino-4,6-DNT	8-9 ft	0.9
4-amino-2,6-DNT	8-9 ft	0.3 J

MH02 (12/17/2004)		
COC	Associated Line	Concentration (mg/kg)
2,4,6 TNT	S Cooling	11
2-amino-4,6 DNT	S Cooling	3.8 J
4-amino-2,6 DNT	S Cooling	2.6 J

MH05 (02/24/2005)		
COC	Associated Line	Concentration (µg/L)
2,4,6 TNT	S Cooling	84.3 JL

MH06 (02/24/2005)		
COC	Associated Line	Concentration (µg/L)
2,4,6 TNT	S Cooling	430

	Solid residual samples from within TNT transite wastewater lines
	Soil borings near TNT wooden wastewater line
	Solid residual samples from within cooling water lines
	Liquid samples from within cooling water lines
	Indicates COC levels above GWP-Ind
	Indicates COC levels above GWP-Ind and SAI-ind
	Indicates COC levels above GWP-Ind

COC	GWP-Ind (mg/kg)	SAI-Ind (mg/kg)
1,3,5-TNB	310	31,000
1,3-DNB	1	100
2,4,6 TNT	5.1	510
2,4 DNT	0.042	4.2
2,6 DNT	0.042	4.2
2-amino-4,6-DNT	1.7	170
4-amino-2,6-DNT	1.7	170

NOTES:
This figure shows only sample concentrations that exceeded MSCs except soil boring data; all detections were included for the soil boring data.
Data associated with the green highlighted locations was collected during the Phase I and II RFI's and USEPA determined the data are not valid for environmental decision making.
Abbreviations:
bgs – below ground surface
COC – contaminant of concern
DNT - Dinitrotoluene
ft – feet
GWP-Ind – soil MSC for industrial use based on groundwater protection
J – The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.
JL - The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed. Result may be biased low.
JH - The analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed. Result may be biased high.
mg/kg – milligrams per kilogram
MSC – medium-specific concentration
N – north
NA – not applicable
S - south
SAI-Ind – soil MSC for industrial use based on inhalation, ingestion and dermal contact.
TNT - Trinitrotoluene
µg/L - microgram per liter



LEGEND

- Soil Boring
- Water Sample from Line or Man Hole
- Solid residual Sample from Line or Man Hole
- Water Line Sample
- TNT Cooling Water Drain Line (North)
- TNT Cooling Water Drain Line (South)
- TNT Wastewater Line
- Stream
- Road
- Building
- Site LHAAP-29

DATA SOURCES: Shaw, 2010, Final Feasibility Study, LHAAP-29, Former TNT Production Area, Group 2, Longhorn Army Ammunition Plant, Karnack, Texas, December.

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

WASTEWATER AND COOLING WATER LINES SAMPLE RESULTS

LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N

0 250 500
FEET

FIGURE 2-13

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_WASTEWATER_COOLINGWATERLINE_SAMPLERESULTS.MXD - USER: KLOFGREN - DATE: 7/12/2019

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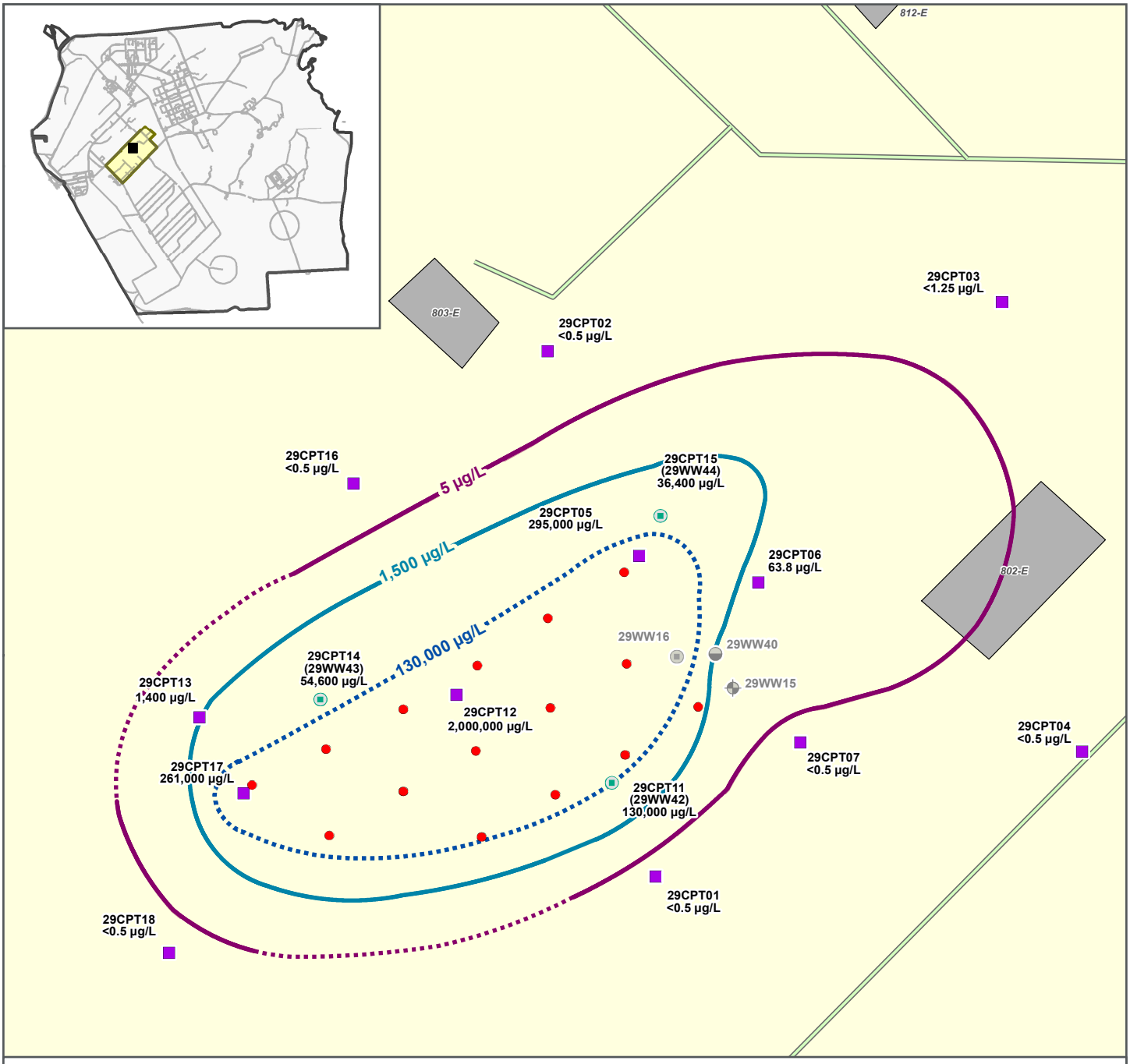


LEGEND

- Electrode Boring with Co-Located SVE Well
- Intermediate Zone Soil Boring (2014)
- Intermediate Zone Well (2014)
- Deep Zone Well (2006)
- Intermediate Zone Well (1998)
- Shallow Zone Well (1998)
- Inferred MC DNAPL Zone Contour (130,000 µg/L ~ 1% Solubility)
- MC Isoconcentration Contour (MCL = 5 µg/L) (Dashed Where Inferred)
- Approximate Outline of MC Exceeding 1,500 µg/L
- TNT Cooling Water Drain Line (North)
- Buildings
- Site LHAAP-29

N

0 15 30
FEET

Notes:
µg/L = Concentrations in micrograms per liter.
< = Concentration below laboratory reporting limit.
DNAPL = Dense Non-Aqueous Phase Liquid
MC = Methylene Chloride

CONCEPTUAL LAYOUT OF ELECTRICAL RESISTANCE HEATING (ERH) WELL NETWORK

LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

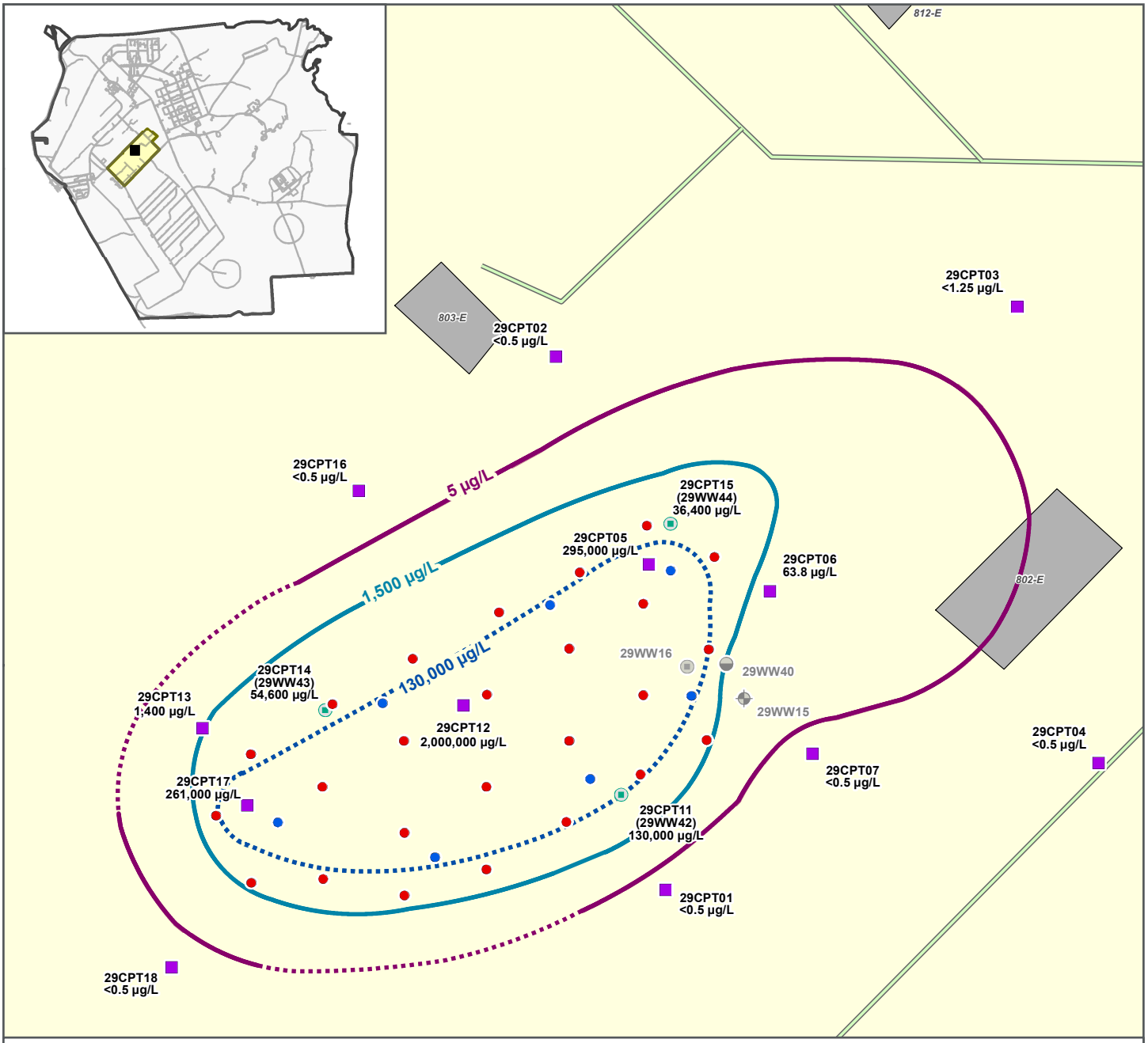
DATA SOURCES:

DISCLAIMER: Map information was compiled from the best available sources.
No warranty is made for its accuracy or completeness.

FIGURE 2-14

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_CONCEPTUAL_LAYOUT_OF_ERH_WELL_NETWORK.MXD - USER: KLOFGREN - DATE: 5/17/2019

Figure 2-15. Conceptual Layout for TCH Heater Wells



LEGEND

- Heater Boring with Co-Located SVE Well (Proposed)
- Multi-phase Extraction Well
- Intermediate Zone Soil Boring (2014)
- Intermediate Zone Well (2014)
- Deep Zone Well (2006)
- Intermediate Zone Well (1998)
- Shallow Zone Well (1998)
- Inferred MC DNAPL Zone Contour (130,000 µg/L ~ 1% Solubility)
- MC Isoconcentration Contour (MCL = 5 µg/L) (Dashed Where Inferred)
- Approximate Outline of MC Exceeding 1,500 µg/L
- TNT Cooling Water Drain Line (North)
- Buildings
- Site LHAAP-29

N

0 15 30
FEET

Notes:
µg/L = Concentrations in micrograms per liter.
< = Concentration below laboratory reporting limit.
DNAPL = Dense Non-Aqueous Phase Liquid
MC = Methylene Chloride

CONCEPTUAL LAYOUT OF THERMAL CONDUCTION HEATING (TCH) WELL NETWORK

LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

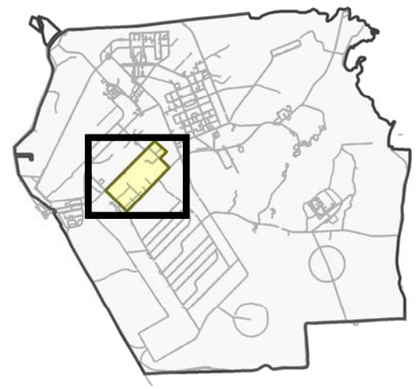
DATA SOURCES:

DISCLAIMER: Map information was compiled from the best available sources.
No warranty is made for its accuracy or completeness.

FIGURE 2-15

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_CONCEPTUAL_LAYOUT_OF_TCH_WELL_NETWORK.MXD - USER: KLOFGREN - DATE: 5/17/2019





LEGEND

- Preliminary Land Use Control Boundary
- TNT Cooling Water Drain Line
- TNT Cooling Water Drain Line
- TNT Wastewater Line
- Stream
- Road
- Building
- Site LHAAP-29

DISCLAIMER: Map information was compiled from the best available sources. No warranty is made for its accuracy or completeness.

PRELIMINARY
LAND USE CONTROL BOUNDARY
LHAAP 29
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N

0 250 500
FEET

FIGURE 2-16

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_LUC_BOUNDARY.MXD - USER: KLOFGREN - DATE: 5/17/2019

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3. Responsiveness Summary

The Responsiveness Summary serves three purposes. First, it provides the U.S. Army, USEPA, and TCEQ with information about community concerns with the preferred alternative at LHAAP-29 as presented in the Revised Proposed Plan. Second, it shows how the public's comments were considered in the decision-making process for selection of the remedy. Third, it provides a formal mechanism for the U.S. Army to respond to public comments. Two public comment periods and public meetings were held, one for the LHAAP-29 PP and one for the Revised PP. Responsiveness summaries for both meetings are provided.

The U.S. Army, USEPA, and TCEQ provide information regarding LHAAP-29 through public meetings, the Administrative Record for the facility, and announcements published in the Shreveport Times and Marshall News Messenger newspapers. **Section 2.3** discusses community participation on LHAAP-29, including the dates for the public comment period, the date, location, and time of the public meetings, and the location of the Administrative Record. The following documents related to community involvement were added to the Administrative Record for the two comment periods and public meetings:

- Transcript of the public meeting held on March 22, 2011
- Presentation slides from the March 22, 2011 public meeting
- Written questions and comments from the public during the public comment period pertinent to the revised PP, and the U.S. Army response to those comments are provided in **Section 3.1**.
- Transcript of the public meeting held for the Revised Proposed Plan on December 6, 2018
- Presentation slides from the December 6, 2018 public meeting
- Verbal questions and comments (no written questions provided) from the public during the public comment period, and the U.S. Army response to those comments are provided in **Section 3.1**.

3.1 Stakeholder Issues and Lead Agency Responses

This section responds to significant issues raised by stakeholders including the public and community groups that were received in written or verbal form.

2018 Revised Proposed Plan Comments

No written comments were received on the Revised Proposed Plan. Verbal comments and questions were discussed and addressed during the public meeting on December 6, 2018 and are summarized below.

Question/comment: Will the contaminated soil remain at the site?

Response: The estimated 3,900 cubic yards of contaminated soil will be excavated and disposed at a permitted landfill. The Landfill will be selected as part of the remedial design process.

Question/comment: Are they going to fill in the excavation areas?

Response: *What is typically done in these situations is to backfill with clean soil and re-vegetate the area. The specific details will be developed as part of the remedial design, which hasn't happened yet.*

Question/comment: The information presented states the wooden wastewater line has been flushed and abandoned. I would think the wood has rotted by now. Does it still exist, and is there anything more to be done there?

Response: *As part of the Remedial Design, the soil along the wooden TNT wastewater lines will be sampled to confirm that leaching from the lines has not occurred. Results from the confirmation soil sampling may identify additional areas exceeding the cleanup levels, which would require soil excavation and disposal. Additionally, as part of the Remedial Design, the deteriorated wooden wastewater line will be sampled to determine whether contaminants in the line exceed soil cleanup levels and require excavation and disposal.*

Question/comment: Does the cooling water line made of clay still exist? Has it been flushed?

Response: *Yes, the clay line will be flushed and the water sampled.*

Question/comment: I guess they're expecting that there could be some holes in that old clay pipe, so they're going to check it with a camera. And if they see a hole, then they'll check the soil around where that hole was. Because I'm wondering how aren't these falling apart and disintegrated over time.

Response: *The lines haven't disintegrated. They will be flushed and inspected, and if any breaks are found, soil in the vicinity will be sampled to determine if contaminants have leached into the soil.*

Question/comment: There was a process where they were trying microorganisims out in the area near the fire station about three or four years ago. Did that prove to be successful in any way?

Response: *We've performed a treatability study at the old Chemlab. It's different than what we are doing now. We do enhanced bioremediation at two areas, and will begin in a third area soon. We've had good success with this process in these areas. The treatability study at Site 37 was not successful. That bioremediation at LHAAP-37 was aerobic as opposed to anaerobic process, which has been used at the other three plumes. For Site 29, the contaminant is methylene chloride, which is almost at the DNAPL phase (that is a separate phase and not dissolved in groundwater). The concentrations are so high that it is toxic to the microorganisms and they can't degrade the methylene chloride. They can survive around the edges of the plume but not in the main portion. The data and posters provided show that concentrations decrease rapidly as you get further from the center of the plume where the DNAPL is present and indicates that degradation is probably occurring.*

One thing to note about the shallow and intermediate plumes at Site 29 is that they appear to be stable and not migrating due to the geology. The contaminant plumes appear to be contained by clay lenses. This is fairly unusual but in this case is helpful.

Question/comment: *In heating up the ground that deep is that going to harm the animals or vegetation?*

Response: *We don't expect the soil at or near the ground surface to be heated up to temperatures that could harm animals or vegetation. The heating will occur in the subsurface in the contaminated zone at 45 feet below ground surface. The heater wells or electrodes will be placed at that depth so that only the main part of the plume will be targeted to be heated to the highest temperatures (up to 140 degrees F). There will be a halo of warmed up soil and groundwater around the primary area though. That is considered possibly beneficial to help with destruction of VOCs in the shallower groundwater zone, but we're not sure just how much that might happen or the extent of the warming to shallower depths.*

Question/comment: Are we going to see clearing of that land and taking trees and dirt and everything out for these heating wells?

Response: *Much of the surface area was cleared of low-growing vegetation for the previous investigations and well installation. Some regrowth has occurred and there will have to be some vegetation or tree removal in specific areas that will be excavated, for well installation, and equipment access. That will need to be determined during the remedial design phase. We will try to minimize the amount of environmental damage. We were discussing how to do the work with minimal impact with the regulators and USFWS but we still have to balance that with the need to remove the contamination.*

Question/comment: Are you going to protect this area using fencing or other means?

Response: *During remedial activities, there will be an exclusion zone established to keep people out for safety reasons. One of the gates might need to be closed for a time while there is work going on.*

Question/comment: Is thermal desorption new, is it a proven practice?

Response: *This technology has been around for five to ten years. Because we have DNAPL at depth and there aren't many options to clean it up, we're anticipating that this approach will be able to vaporize the DNAPL so we can remove it.*

Question/comment: Earlier you mentioned that deep groundwater, beyond 88 feet is not contaminated, that this DNAPL is in the intermediate zone?

Response: *That is correct. There are monitoring wells in the deep zone that confirm the contamination does not extend to that zone.*

Question/comment: Once the decision has been made, will you go out with another contractor or will this company be the one to do the work?

Response: *We will have a separate remedial design and potentially a separate remedial action contract.*

Question/comment: This contamination has been here so long, hasn't the damage been done? Is the fear of migrating what is urging us to want to remove it completely? Not a lot has been damaged so why are we doing all this and planning to spend millions of dollars for this?

Response: *At other sites there is a visible risk to surface water. At this site the DNAPL in the intermediate groundwater is actually considered a principal threat waste because it will continue to*

contaminate groundwater. The EPA regulations require that a principal threat waste must be remediated. In addition, even though the plumes aren't moving, there are Federal and State of Texas regulatory requirement to return groundwater to beneficial uses whether we're using it or not, so remedial action is still required. Before 2009 if the groundwater wasn't being used you could let it go, but EPA's rules changed with regard to groundwater and now it is required to return all groundwater to its beneficial use. We have a small area of soil that is an ecological risk that must be remediated.

Question/comment: You've said you don't know what future uses [of groundwater] might be and that scares me. We went through a long process for this to become a refuge and now you're saying there is an opportunity for someone to come in and take the property and use it for another use?

Response: *That is not the intent at all. There are only two ways the property could come out of refuge property, a congressional act or some type of transfer to another federal agency. There is very limited potential for this to happen and is not anticipated. Everything that's being done has the anticipated use as a refuge and the regulatory requirement with regard to returning groundwater to beneficial uses is the driver for the remedial action planning. There are sites throughout the nation where this is required so Longhorn is not being required to do more than other sites.*

Question/comment: The Caddo Lake Institute has a third party contaminant expert who reviews these documents and he finds this to be a good plan. His largest question is the depth and extent of the DNAPL and that has been answered. I wanted to share with the community that he found this to be a good plan.

Response: *Thank You*

2011 Proposed Plan Comments

Question/comment: Remedial Alternatives 2 and 3 includes Excavation and Offsite Disposal of Soil, but no amount is given. How many acres within site 29 are we talking about? How deep would the excavation go? How many cubic yards are proposed to be removed from site 29?

Response: *Based on comparison of concentrations versus cleanup levels, several excavation locations are identified to various depths. Confirmation samples will be collected to verify the cleanup levels are met. Excavation will continue until the cleanup levels are attained in both the vertical (floor) and horizontal (walls) directions. Thus, the actual excavation size and depth may vary from the proposed excavations.*

The proposed excavation areas to mitigate human health risk are:

- *Area around 29SD46 – explosives contaminated soil with the approximate dimensions of 120 feet by 20 feet to a depth of 1 foot and an estimated total volume of 90 cubic yards (cy).*
- *Area around 29SB86 – perchlorate contaminated soil with approximate dimensions of 100-foot diameter circle to a depth of 10 feet and an estimated volume of approximately 2,900 cy.*

The proposed excavation areas to mitigate ecological risk by removal of explosives contaminated soil are:

- *Area around 29SB08 (former Building 802-A) – approximate dimensions of a 60-foot diameter circular area and an estimated volume of approximately 200 cy.*
- *Area around 29DLineWHW01 – stained soil around former Building 806-D and former Building 806-A, with an estimated volume of approximately 30 cy.*
- *Area around 29SD13, 29SB15, and GPS-12 (cooling water ditch north of Avenue D), 150 feet by 20 feet, approximately 440 cy.*

In total, the areas are less than a half-acre with a volume of approximately 3,900 cy.

Question/comment: It is a poor plan for the Army to waste money flushing and plugging the old TNT wastewater, and cooling water lines at site 29 in hope it removes the dangerous chemicals contaminating the groundwater. This is not a cure for the problem. Given the high concentration levels of dangerous chemicals listed, these lines should be dug up and disposed of. Any contaminated soil adjacent to the lines caused by leakage from the lines should be dug up as well and disposed of. By doing this, it for sure resolves the problem by preventing further contamination to groundwater.

Response: *The contamination in the lines has the potential to cause contamination in the groundwater only if there is no action and the contamination remains in the lines and the line deteriorates to allow water to infiltrate or the contamination to come into contact with the soil. Currently, there is no evidence that the explosive residue in the lines has caused the isolated shallow explosive groundwater plumes, as they are not located adjacent to the lines. Explosive soil contamination that poses a potential to leach into the groundwater was identified in the surface soil. (These areas are proposed for excavation as described in the previous response.) The samples collected from the subsurface soil adjacent to the TNT wastewater lines do not have explosive concentrations exceeding the groundwater protection standard, or do not indicate contamination that poses a potential to leach into the groundwater.*

Additionally, as part of the RD, confirmation soil samples will be collected adjacent to the North and South Cooling Water lines as well as the TNT wastewater lines to confirm that leaching from the lines has not occurred.

Over time, the lines may eventually deteriorate or break down. After line flushing, no contamination (no solid or liquid residue) will remain in the lines; therefore, there will be no groundwater infiltration and transport of contaminants as the lines deteriorate. The lines will remain buried below ground and since the lines do not contain any liquid or soil residue, they cannot leak and cannot be a conduit for contaminating the surrounding soil or groundwater from past operations at the site.

Question/comment: Several comments have been received regarding the mitigation of the TNT transite process wastewater line and the two cooling water lines (North and South) as follows:

- All Lines –
    - What is the procedure to plug the lines? Plugging the inlets and outlets to prevent water from infiltrating and transporting may not be correct because the lines may develop leaks, as the seals will eventually fail.

  - What is the length of the lines, diameter, how deep they are buried, and about how much it would cost to remove or excavate and dispose of the lines off site?

- TNT process wastewater line – How will it be determined whether high concentrations of contaminants remain in the TNT wastewater line after it is flushed? How will lines be sampled if not accessible by a manhole?
- Cooling water lines –
  - For the RD evaluation only two locations along the northern cooling water line will be sampled. This is not sufficient to characterize contamination along the entire northern line. High concentrations of contaminants have been found at other locations along the northern line. Most of the line has not been sampled because it is not accessible through manholes.
  - The southern cooling water line will not be sampled for the RD evaluation even though high concentrations of contaminants have been found in the line. As with the northern line, most of the southern line has not been sampled because it is not accessible through manholes.
  - If the cooling water lines are flushed, the Army has not explained how it will determine whether high concentrations of contaminants remain in the lines after flushing.

Response: *To clearly describe the lines and the approach to the selected remedy, it must be understood that there are two distinctly different processes that generated the liquid flowing through these lines and remaining residue. Thus, a discussion of each line to address the above comments is presented below:*

TNT Process Wastewater Line – The TNT wastewater line carried away process wastewater from the washing process during TNT production (also known as "red water, yellow water, red liquor and yellow liquor"). The TNT wastewater line carried wash water from the process and is expected to have some solids in it (5 to 15%). The wastewater was pumped and treated at the wastewater treatment plant (LHAAP-32). This line was originally installed as a wooden line before the transite line was installed. Historical documentation (Bate Stamp 001446, RCRA FA, April 1988) indicated a wooden TNT line (a.k.a. red water line) was used for a short time before the transite line was put into service. The wooden line was "clear-flushed" in 1946 and abandoned. It was determined that no further action was necessary for this line (Bate Stamp 001446). During investigation activities, the wooden TNT wastewater line was found 5 feet south of the transite TNT process wastewater line. The wooden line was cut to allow sampling of the contents. Although the sample results indicated the presence of explosives, the data was later determined by EPA to be unsuitable for environmental decision-making. Because the line is deteriorated and has been cut in multiple locations, the line cannot be flushed. Instead, the line contents and surrounding soil will be sampled and then excavated and disposed offsite if required.

The TNT transite process wastewater line is approximately 3 feet bgs. The gravity flow portion of the line is approximately 3,000 linear feet. The pressurized portion of the line is approximately 500 linear feet, and the lines are in good condition. The diameter of the TNT transite process wastewater line along the entire line is not known but should range from 8 inches to 18 inches based on the original

design of the wooden stave line. There are no manholes in the transite line, and the line will be cut at select locations for any additional sampling and the implementation of the remedy.

For the investigation, the gravity fed portion of the line was cut at two locations and a thick viscous residue was observed. Samples were collected at these two locations. Samples were also collected at two points along the pressurized portion of the line that extends from the former pump house location to LHAAP-32, located north of LHAAP-29. Since explosives were identified in the viscous residue in the gravity fed portion of the line, it is assumed that this residue remains throughout the line and the samples were representative.

Thus, the selected remedy is to flush the line with potable water. The exact procedure will be developed in the RD, but generally the flushing will be conducted in segments since the line was broken during the investigation phase and the line is no longer a single continual run of pipe. Visual verification that the residue is not sticking to the sides of the pipe will also be conducted. The flush water will be containerized, sampled for waste characterization, and properly treated or disposed. Flushing will ensure that no residual material is left in the lines. Thus, even if the pipes break in the future, there is no contamination remaining to leach. After flushing, the inlets and outlets of the TNT wastewater line will be plugged with a bentonite slurry mix or cementitous grout to stop future infiltration. The procedures for the plugging activities will be included in the RD.

The transite TNT wastewater line is a combination of cement and asbestos that, when disturbed, can become friable and pose additional risk. Exposure to friable asbestos requires special handling and disposal requirements, increasing risks to workers through exposure by the process of digging the lines out of the ground (causing the material to become friable), handling the pieces onsite and during the subsequent transportation and disposal. The location of the line remaining in place will be surveyed and filed with the County. Since the TNT wastewater line is asbestos, the county notification will provide information on the existence and location of the transite line in order to avoid disturbing the line in the event future excavation or other activities are being planned in the area. Additionally, the depth of the line is deeper than the 2 feet bgs, the depth used for industrial use. Since no residue would remain in the lines after flushing, no contamination would remain in the line or have the potential to contaminate the surrounding soil or groundwater even if the line would deteriorate. Additionally, the removal of the line will impact a large area of the site that is currently covered with mature trees and native vegetation.

<u>Cooling Water Lines</u> – The TNT manufacturing process generated a lot of heat; cold water was used to cool the reaction equipment. It flowed over the equipment and down a drain into the cooling water drain lines. Thus, the cooling water lines carried water and would not have carried solids. There were two lines, the North and South Cooling Water (a.k.a. blue cooling water lines) lines, that were gravity fed lines constructed of vitrified clay pipe with manholes. The cooling water from six production plants flowed into the two main collection lines (North and South). The main cooling water lines are approximately 5,000 feet, with approximately 280 feet of smaller line at each of the six production plants. The lines are approximately 8 feet bgs and range from 8 to 18 inches in diameter. The lines drain into a ditch along 16th Street which eventually flows into Goose Prairie Creek.

Small amounts of solid sediment residue and water were found during the investigations of the pipeline. Samples collected from some of the manholes detected explosives in both the solid residue and water at concentrations above the cleanup levels. These lines only carried water, and the solids found in the manholes during investigations are expected to be from open inlets after demolition of

the facility and through the open manholes. The manholes are low spots in the lines where several lines intersect and solid residue would collect at these locations. It stands to reason that minimal solid residue is expected to be found in the actual lines between the manholes. An attempt will be made to collect additional solid residue samples from the manholes during the remedial action.

For the selected remedy, each manhole and outlet will be inspected prior to flushing. The exact procedure will be developed in the RD, but generally the flushing will be conducted between two manholes. The rinsate water will be containerized, transported, sampled, analyzed, and treated at the onsite groundwater treatment plant or appropriately disposed off-site based on the explosives concentrations. After flushing of the lines, there would be no solid residue remaining in the pipe to conduct additional sampling of the solids; however, the flush water will be tested. Thus, even if the pipes break in the future, there is no contamination remaining to leach. The manholes will then be plugged with a bentonite slurry mix or cement grout. The procedures for the plugging activities will be included in the RD.

Question/comment: The Army claims that "…soil samples collected near the line indicate there has not been a release to the surrounding soil." This is incorrect. Sample collected from soil borings along the line were found to contain TNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT.

Response: *The commenter is referencing the samples collected near the wooden TNT process wastewater line, which is 3 feet bgs. Soil samples were collected in 2004 near the line 4 to 5 feet bgs to evaluate the potential of contaminants leaching from the line and contaminating the surrounding soil. Table 2-6 from the FS summarizes the detected results. Even though samples were found to contain TNT, 2-amino-4,6-DNT, and 4-amino-1,6-DNT, the concentrations are less than both the SAI-Ind and GWP-Ind. Sampling of the wooden TNT process wastewater line and associated soil will take place during the remedial design phase, and if the results indicate unacceptable levels of explosives are present, excavation and disposal off-site of the material will take place during the remedial action phase.*

Question/comment: *The Army estimates that it will take 90 years for natural attenuation to reduce contaminant concentrations acceptable levels. It is not reasonable to propose a plan that could require the maintenance of LUCs for almost a century.*

Response: *All alternatives evaluated have a long time for restoration. Given the nature of the residual contaminants that are present at LHAAP-29, the length of time that will be required to achieve cleanup levels would be long for any of the remedial alternatives, whether treatment, migration control, or source control by removal. The reasonably anticipated future use of the site is as a national wildlife refuge (i.e. Caddo Lake National Wildlife Refuge). Once the property is transferred into the refuge system, the property must be kept as a National Wildlife Refuge unless there is an act of Congress which removes the parcel or the land is exchanged in accordance with the National Wildlife Refuge System Administration Act of 1966 and the National Wildlife Refuge System Act Amendments of 1974. This proposed transfer as a national wildlife refuge, which by its very nature includes physical access and use restrictions, is subject to control and continual inspection by Refuge personnel. Also, the property is intended to remain under ownership and management of a federal government agency. The LUC will restrict access to the groundwater for purposes other than environmental testing until cleanup levels are met. Additionally, access of groundwater through well installations requires a permit from the Texas Department of Licensing and Regulation or Texas Water District authority. The department will be provided a copy of the county*

recordation that indicates the location of contaminated groundwater at the site and associated restriction.

Question/comment: The extremely high concentration of methylene chloride in the intermediate groundwater zone indicates that DNAPL may by present. If so, it may be very difficult to clean up the groundwater. The Army does not appear to have developed any plans to deal with DNAPL. The Army should explain how it will deal with any DNAPL that may be present.

Response: *The current active remedy to conduct in-situ thermal desorption will reduce contaminant concentrations even if DNAPL is present.*

Question/comment: High concentrations of arsenic, mercury, and selenium exist in the shallow groundwater zone. High concentrations of arsenic exist in the deep groundwater zone. The metals are not subject to natural attenuation by biodegradation and the Army has not explained how they will be cleaned up. The Army should explain how it will cleanup these metals.

Response: *The elevated concentrations of metals were suspected to be a result of sampling methodology and/or turbid samples which could falsely elevate the metals concentration result due to excess solids in the sample. Subsequent sampling and redevelopment of some of the wells resulted in lowered concentrations of some metals.*

The arsenic sample collected from the deep well had high aluminum concentrations; the geochemical relationship between the high aluminum in the same sample as the arsenic indicates arsenic may be naturally occurring. Mercury detections are intermittent and appear to be isolated and the calculated Hazard Index for mercury is less than 1, based on the Final Baseline Human Health and Screening Ecological Risk Assessment for Group 2 Sites, from Jacobs Engineering Corp., 2002.

The extent of arsenic and mercury in groundwater will be assessed site-wide during the remedial design. Selenium was only detected above the MCL in one shallow well and the concentrations have fluctuated over the years. The most recent concentration has an associated adjusted hazard quotient value of 0.15. Selenium will be added as a contaminant of concern.

Question/comment: The current distribution of groundwater contaminants at site 29 is not well known. This is because the Army has not sampled many of the monitor wells (18 of 47) since 2005, and has not sampled any monitor well since 2009. In addition, many of the most recent sample analyses are incomplete. No wells have been analyzed for explosives or perchlorate since February 2007.

The only way to ensure that the current distribution of contaminants is known is to sample all the monitor wells at the site. They should be sample for solvents (e.g., methylene chloride, TCE), explosives (e.g., TNT, 2,4-DNT), metals (e.g., arsenic, mercury), and perchlorate. The Army should do this before it completes the design of the groundwater cleanup plan.

Response: *The analytical suites selected for investigations were based on the past operations that could cause potential contamination at LHAAP-29. Initial investigations had several analytical suites which were reduced to refine the nature and extent of those chemicals that were detected above screening levels. During the remedial design phase, additional data will be gathered to verify plume boundaries, develop monitoring networks, and determine concentrations for the treatment.*

Question/comment: The Army's proposed cleanup plan does not address high concentrations of dangerous chemicals in surface water. The Army should either 1) explain why it is unnecessary to cleanup surface water, or 2) prepare a plan to clean it up.

Response: *The surface water sample collected at 29SW46 has the highest contamination and is located at the cooling water ditch outfall. Both surface water and sediments at this location were sampled and concentrations in the surface water and sediments were above the groundwater MSC for residential use and GWP-Ind levels for explosives, respectively. This location is the outfall of the cooling water lines and is collocated with the high sediment levels which will be removed as part of the selected remedy. The next sample location downgradient of 29SW46 did not show high concentrations of contaminants in the surface water. Thus, the action to remove residual contamination from the cooling water lines (so water cannot infiltrate them and carry contamination into the ditch) and to remove the contaminated sediment where the surface water sample was collected will mitigate impacts to surface water along the cooling water ditch. Also, as part of this action, surface water monitoring will be conducted downgradient of this mitigated area.*

Question/comment: Major components of the cleanup are yet to be determined. These include the evaluation of the cooling water lines, and details of: the plan to monitor metals near the in-situ oxidation area, the soil excavation plan, the groundwater monitoring plan, and MNA implementation. These components will be presented in the RD, which will be completed after the Record of Decision is published. Given the importance these components, the Army should make the RD available for public review and comment as soon as possible.

Response: *The public will be provided with updates on remedial design and remedial action status through the RAB meetings and any concerns can be addressed through this forum. The RAB meetings provide the forum for dissemination of information and discussion. The RD will include performance objectives, schedule and other design criteria and will follow established regulatory guidance for the components of the remedy. The RD will also become part of the Administrative Record and will be available to the public at the Marshall Public Library, the public repository for the LHAAP Administrative Record.*

Question/comment: Recommend expanding environmental testing to include all six isomer of DNT (2,4-DNT, 2,6-DNT, 3,4-DNT, 2,3-DNT, 2,5-DNT and 3,5-DNT), site characterization and evaluation of human health risk should incorporate and consider all six isomers of DNT in all media, and corresponding enforceable remedial goals should be established for the four minor isomers of DNT for soils, sediments, groundwater, and surface water. In the event the presence of minor isomers of DNT is confirmed, there may be potential impacts to aquatic ecosystems that should be addressed.

Response: *The selected remedy will address and monitor the explosive contaminated shallow groundwater and surface water. At this time, there are no Federal or State of Texas promulgated screening levels for DNT isomers, other than for 2,4-DNT and 2,6-DNT. However, as part of the CERCLA process, the statutory five-year reviews will evaluate the effectiveness of the remedy, including any changes in applicable or relevant and appropriate requirements (ARARs) concerning DNT isomers, and would recommend implementation of other measures if needed.*

3.2 Technical and Legal Issues

This section is used to expand on technical and legal issues. However, there are no issues of that nature beyond the technical issues already discussed in **Section 3.1**.

References

AECOM Technical Services (AECOM), 2016, Draft Final Remedial Investigation Addendum LHAAP-29, Former TNT Production Area, Group 2 Longhorn Army Ammunition Plant, Karnack, Texas. July.

AECOM, 2017, Draft Final Feasibility Study Addendum LHAAP-29, Former TNT Production Area, Group 2 Longhorn Army Ammunition Plant, Karnack, Texas. August.

AGEISS, Inc., 2014. *Final Baseline Ecological Risk Assessment Addendum, Longhorn Army Ammunition Plant, Karnack, Texas. Longhorn Ammunition Plant, Karnack, Texas,* July

Jacobs Engineering Group, Inc. (Jacobs), 2001, Remedial Investigation Report for the Group 2 Sites Remedial Investigation (Sites 12, 17, 18/24, 29, and 32) at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, Final, St. Louis, Missouri, April.

Jacobs, 2002, Baseline Human Health and Screening Ecological Risk Assessment for the Group 2 Sites (Sites 12, 17, 18/24, 29, 32, 49, Harrison Bayou, and Caddo Lake), Longhorn Army Ammunition Plant, Karnack, Texas, Final, Oak Ridge, Tennessee, August.

Maley, Don, 1988, Potential Hazardous Waste Site Preliminary Assessment, EPA Form 2070-12, April.

Plexus Scientific Corporation, 2005, Final Environmental Site Assessment, Phase I and II Report, Production Areas, Longhorn Ammunition Plant, Karnack, Texas, Columbia, Maryland, February.

Shaw Environmental, Inc. (Shaw), 2007a, Final Installation-Wide Baseline Ecological Risk Assessment, Longhorn Army Ammunition Plant, Karnack, Texas, Houston, Texas, Volume I: Step 3 Report, January, and Volume II: Steps 4 through 8, November.

Shaw, 2007b, Data Gaps Investigation Report, Longhorn Army Ammunition Plant, Karnack, Texas, Final, Houston, Texas, April.

Shaw, 2007c, Final Modeling Report, Derivation of Soil and Groundwater Concentrations Protective of Surface Water and Sediment, Longhorn Army Ammunition Plant, Karnack, Texas, Houston, Texas, April.

Shaw, 2010, Final Feasibility Study, LHAAP-29, Former TNT Production Area, Group 2, Longhorn Army Ammunition Plant, Karnack, Texas, December.

Solutions to Environmental Problems, Inc. (STEP), 2005, Plant-Wide Perchlorate Investigation, Longhorn Army Ammunition Plant, Karnack, Texas, Final, Oak Ridge, Tennessee, April.

Sverdrup Environmental, Inc., 1993, Sampling and Data Results Report for the Phase I Remedial Investigation at Longhorn Amy Ammunition Plan, Karnack, Texas. Prepared for the U.S. Army Corps of Engineers, Tulsa District. December.

Texas Commission on Environmental Quality (TCEQ), 2006, Updated Examples of Standard No. 2, Appendix II, Medium-Specific Concentrations, March 21.

U.S. Department of the Army (U.S. Army), 2004, Memorandum of Agreement Between the Department of the Army and the Department of the Interior for the Interagency Transfer of Lands at the Longhorn Army Ammunition Plant for the Caddo Lake National Wildlife Refuge, Harrison County, Texas, Signed by the Department of the Interior on April 27, 2004 and the U.S. Army on April 29, 2004.

U.S. Army, 2011, Proposed Plan for LHAAP-29, Former TNT Production Area, Group 2, Longhorn Army Ammunition Plant, Karnack, Texas, Final, March.

U.S. Army, 2018, Revised Proposed Plan for LHAAP-29, Former TNT Production Area, Group 2, Longhorn Army Ammunition Plant, Karnack, Texas, Final, November.

USACE, 2005, Personal Communication (e-mail from C. Murray to R. Zeiler), Subject: Washhouse Soil Sampling, March 28.

U.S. Army Environmental Hygiene Agency (USAEHA), 1987, Final Groundwater Contamination Survey No. 38-26-0851-89, Evaluation of Solid Waste Management Units, Longhorn Army Ammunition Plant, Karnack, Texas, May.

U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), 1980, Installation Assessment of Longhorn Army Ammunition Plant, Report No. 150, February.

USEPA, 1998, Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater, EPA/600/R-98/128, September.

USEPA, 1999, Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, OSWER Directive 9200.4.-17P, April.

USEPA, 2004, Performance Monitoring of MNA Remedies for VOCs in Ground Water, EPA/600/R-04/027, April.



Appendix A

Public Notice Affidavits



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State of Texas)

County of Harrison)

This Affidavit of Publication for the Marshall News Messenger, a daily newspaper of general circulation, printed and published at Marshall, hereby certifies that the attached legal notice, ad # 623368, was published in said newspaper on November 7,2018, and that copies of each paper in which said Public Notice was published were delivered by carriers to the subscribers of said paper, according to their accustomed mode of business in this office.

Dianne Gray
for the Marshall News Messenger

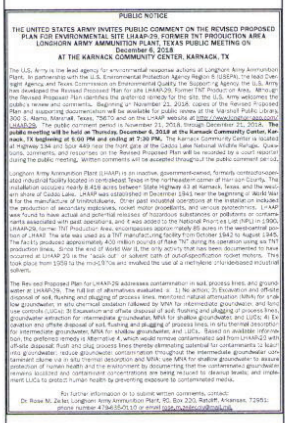
The above Affidavit and Certificate of Publication was subscribed and sworn to before me by the above-named Dianne Gray, who is personally known to me to be the identical person in the above certificate on this 13th day of November, 2018.

Dana Morton
Notary Public in and for
State of Texas)
County of Harrison)

My commission expires 3-21-21

DANA MORTON
Notary Public, State of Texas
Comm. Expires 03-21-2021
Notary ID 2485572

ad id: 623368



PUBLIC NOTICE

THE UNITED STATES ARMY INVITES PUBLIC COMMENT ON THE REVISED PROPOSED PLAN FOR ENVIRONMENTAL SITE LHAAP-29, FORMER TNT PRODUCTION AREA LONGHORN ARMY AMMUNITION PLANT, TEXAS PUBLIC MEETING ON December 6, 2018 AT THE KARNACK COMMUNITY CENTER, KARNACK, TX

45 days. Call Ken @ (855)847-6806 First payment

LEGAL NOTICES BUY LOCAL I got it in the classifieds. NEWS MESSENGER

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The U.S. Army is the lead agency for environmental response actions at Longhorn Army Ammunition Plant. In partnership with the U.S. Environmental Protection Agency Region 6 (USEPA), the lead Oversight Agency, and Texas Commission on Environmental Quality, the Supporting Agency, the U.S. Army has developed the Revised Proposed Plan for site LHAAP-29, Former TNT Production Area. Although the Revised Proposed Plan identifies the preferred remedy for the site, the U.S. Army welcomes the public's review and comments. Beginning on November 21, 2018, copies of the Revised Proposed Plan and supporting documentation will be available for public review at the Marshall Public Library, 300 S. Alamo, Marshall, Texas, 75670 and on the LHAAP website at http://www.longhornaap.com/LHAAP-29. The public comment period is November 21, 2018, through December 21, 2018. **The public meeting will be held on Thursday, December 6, 2018 at the Karnack Community Center, Karnack, TX beginning at 6:00 PM and ending at 7:30 PM.** The Karnack Community Center is located at Highway 134 and Spur 449 near the front gate of the Caddo Lake National Wildlife Refuge. Questions, comments, and responses on the Revised Proposed Plan will be recorded by a court reporter during the public meeting. Written comments will be accepted throughout the public comment period.

Longhorn Army Ammunition Plant (LHAAP) is an inactive, government-owned, formerly contractor-operated industrial facility located in central-east Texas in the northeastern corner of Harrison County. The installation occupies nearly 8,416 acres between State Highway 43 at Karnack, Texas, and the western shore of Caddo Lake. LHAAP was established in December 1941 near the beginning of World War II for the manufacture of trinitrotoluene. Other past industrial operations at the installation included the production of secondary explosives, rocket motor propellants, and various pyrotechnics. LHAAP was found to have actual and potential releases of hazardous substances or pollutants or contaminants associated with past operations, and it was added to the National Priorities List (NPL) in 1990. LHAAP-29, former TNT Production Area, encompasses approximately 85 acres in the west-central portion of LHAAP. The site was used as a TNT manufacturing facility from October 1942 to August 1945. The facility produced approximately 400 million pounds of flake TNT during its operation using six TNT production lines. Since the end of World War II, the only activity that has been documented to have occurred at LHAAP 29 is the "soak out" or solvent bath of out-of-specification rocket motors. This took place from 1959 to the mid-1970s and involved the use of a methylene chloride-based industrial solvent.

The Revised Proposed Plan for LHAAP-29 addresses contamination in soil, process lines, and groundwater at LHAAP-29. The full list of alternatives evaluated is: 1) No action; 2) Excavation and off-site disposal of soil, flushing and plugging of process lines, monitored natural attenuation (MNA) for shallow groundwater, in situ chemical oxidation followed by MNA for intermediate groundwater, and land use controls (LUCs); 3) Excavation and offsite disposal of soil; flushing and plugging of process lines, groundwater extraction for intermediate groundwater, MNA for shallow groundwater, and LUCs; 4) Excavation and offsite disposal of soil, flushing and plugging of process lines, in situ thermal desorption for intermediate groundwater, MNA for shallow groundwater, and LUCs. Based on available information, the preferred remedy is Alternative 4, which would remove contaminated soil from LHAAP-29 with off-site disposal; flush and plug process lines thereby eliminating potential for contaminants to leach into groundwater; reduce groundwater contamination throughout the intermediate groundwater contaminant plume via in situ thermal desorption and MNA; use MNA for shallow groundwater to assure protection of human health and the environment by documenting that the contaminated groundwater remains localized and contaminant concentrations are being reduced to cleanup levels; and implement LUCs to protect human health by preventing exposure to contaminated media.

For further information or to submit written comments, contact:
Dr. Rose M. Zeiler, Longhorn Army Ammunition Plant, P.O. Box 220, Ratcliff, Arkansas, 72951;
phone number 479-635-0110 or email rose.m.zeiler.civ@mail.mil.

The Times

State of Louisiana
Parish of Caddo

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, personally known to me who being duly sworn, deposes and says that she is the LEGAL CLERK, for The Times, and that the attached advertisement published entitled:

PUBLIC NOTICE THE UNITED STATES ARMY
INVITES PUBLIC COMMENT ON THE REVISED
PROPOSED PLAN FOR ENVIRONMENTAL SITE
LHAAP-29, FORMER TNT PRODUCTION AREA
LONGHORN A

Notice published in the Times on 11/07/18

(Signed)

11/7/2018

(Notary)

MELANIE C ALTZ
NOTARY PUBLIC, STATE OF NEW JERSEY
MY COMMISSION EXPIRES
NOV. 19 2019

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The Times
November 7, 2018