

**LONGHORN ARMY
AMMUNITION PLANT**

KARNACK, TEXAS

**ADMINISTRATIVE
RECORD**

VOLUME 1 of 1

Jan. - Dec. 2003

**Bate Stamp Numbers
031116 - 031407**

Prepared for:

**Department of the Army
Longhorn Army Ammunition Plant**

**LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
ADMINISTRATIVE RECORD - CHRONOLOGICAL INDEX**

VOLUME 1 of 1

Year - 2003

- A: Title: Letter - Subject: Compliance points and values at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas
Author: James S.H. Sher, P.E., Project Manager, Superfund Cleanup Section, Texas Commission on Environmental Quality (TCEQ), Austin, Texas
Recipient: David Tolbert, Commander's Representative, LHAAP
Date: 05 March 2003
Bate Stamp: 031116
- B: Title: Meeting Agenda – Technical Review Committee (TRC) Meeting, Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas
Recipient: All Parties
Date: 11 March 2003
Bate Stamp: 031117 – 031142
- C: Title: Report - Installation Action Plan, for the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas
Author: U.S. Army Corps of Engineers (USACE), Tulsa District
Recipient:
Date: March 2003
Bate Stamp: 031143 – 031202
- D: Title: Letter - Subject: Background soil sampling locations for the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas
Author: Acting Regional Director, U.S. Department of the Interior, Fish and Wildlife Service, Albuquerque, New Mexico
Recipient: Jonna Polk, U.S. Army Corps of Engineers (USACE), Tulsa District,
copied to: Chris Villarreal, US Environmental Protection Agency (EPA),
James Sher, Texas Commission on Environmental Quality (TCEQ),
Rod Krey, Refuge Supervisor, National Wildlife Refuge System
& Renne Lohofener, Texas State Administrator, Ecological Services Field Office,
Austin, Texas
Date: 22 May 2003
Bate Stamp: 031203 – 031204
- E: Title: Meeting Agenda – Technical Review Committee (TRC) Meeting, Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas
Recipient: All Parties
Date: 19 June 2003
Bate Stamp: 031205 – 031226

**LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
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Year - 2003

Note: *A report Titled: Final Baseline Human Health and Screening Ecological Risk Assessment for Group 4 Sites, should have been inserted here for June 2003. However, due to receiving this document after the July 2004 update to the Admin. Record, it is out of sequence. For this report go to Volume 4 of 7, Year 2004, Letter A through Volume 7 of 7, Year 2004, Letter A.*

- F: Title: Meeting – Technical Review Committee (TRC) Meeting, Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas – Meeting held at Texas Commission on Environmental Quality (TCEQ), Austin, Texas
Recipient: All Parties
Date: 21 August 2003
Bate Stamp: 031227
- G: Title: Letter & Report - Closure Report for filling in Basement Structures at Site 32 at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas
Author: William R. Corrigan, Project Manager, Complete Environmental Service, Karnack, TX
Recipient: David Tolbert, Commander's Representative, LHAAP
copied to: Robert J. Matthys, AMSOS-CCM-R
Date: 04 September 2003
Bate Stamp: 031228 – 031249
- H: Title: Meeting – Technical Review Committee (TRC) Meeting, Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas – Meeting held at the Groundwater Treatment Plant (GWTP) Army Office Trailer, Karnack, Texas
Recipient: All Parties
Date: 17 September 2003
Bate Stamp: 031250 – 031306
- I: Title: Meeting – Technical Review Committee (TRC) Meeting on the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas – Meeting held at Texas Commission on Environmental Quality (TCEQ), Austin, Texas
Recipient: All Parties
Date: 14 October 2003
Bate Stamp: 031307 – 031331
- J: Title: Meeting – Comment Resolution Meeting on the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas – Meeting held at Texas Commission on Environmental Quality (TCEQ), Austin, Texas
Recipient: All Parties
Date: 03-04 November 2003
Bate Stamp: 031332 – 031349

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- K: Title: Meeting Agenda with Attachments – Monthly Managers Meeting & Partnering / Transition Meeting on the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas – Meeting held at Courtyard Marriott, Dallas, Texas
Recipient: All Parties
Date: 19 November 2003
Bate Stamp: 031350 – 031382
- L: Title: Meeting Agenda with Attachments – Technical Review Committee (TRC) Meeting on the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas – Meeting held at the Groundwater Treatment Plant (GWTP) Army Office Trailer, Karnack, Texas
Recipient: All Parties
Date: 03 December 2003
Bate Stamp: 031383 – 031406
- M: Title: Letter - Subject: Appointed Site Manager for the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas
Author: Thomas E. Lederle, Director, Base Realignment and Closure, Hampton Field Office, Department of the Army, Fort Monroe, Virginia
Recipient: Chris Villarreal, US Environmental Protection Agency (EPA), Dallas, Texas
copied to: James Sher, Texas Commission on Environmental Quality (TCEQ), Austin, Texas
Date: 08 December 2003
Bate Stamp: 031407

Robert J. Huston, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
Kathleen Hartnett White, *Commissioner*
Margaret Hoffman, *Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

March 5, 2003

Mr. David Tolbert, Commander's Representative
Longhorn/Louisiana Army Ammunition Plants
Attn: SIOLH-CR
P.O. Box 658
Doyline, LA 71023

Re: Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas
Compliance points and values

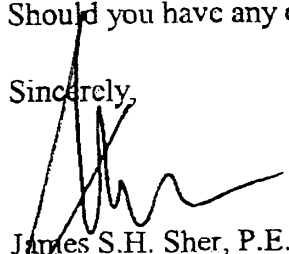
Dear Mr. Tolbert:

During the January 22, 2003, meeting held at the Texas Commission on Environmental Quality (TCEQ) office in Austin, the Army was informed of the TCEQ's position on compliance points and values for LHAAP into Caddo Lake and Harrison Bayou. TCEQ guidance and supplementary tables were provided and explained to the Army in order to assist in developing compliance points and values. Compliance points were determined to be the wells immediately upgradient of the creek/bayou in the zone of impacted groundwater and before entering Caddo Lake. Compliance values were given for trichloroethene, cis- 1,2 dichloroethene, 1,2 dichloroethene, 1,1-dichloroethene, and vinyl chloride. For the most part, these values were based on the maximum value assuming a default dilution factor of 0.15.

Because there is not currently a default value for perchlorate, the Army has one year to develop a site-specific perchlorate value based on perchlorate toxicology research. TCEQ has agreed to help in the endeavor to develop a value for perchlorate. A monthly update, provided to the TCEQ, of the development progress is required from the Army.

Should you have any questions, please do not hesitate to contact me at 512-239-2444.

Sincerely,


James S.H. Sher, P.E.
Superfund Cleanup Section

JS/KM/mmw

**Longhorn Army Ammunition Plant
Technical Review Committee Meeting**

11 March 2003

9:00 a.m.

Agenda

Executive Summary

Jonna Polk

Groundwater Treatment Plant Report

Bill Corrigan, CES

Site 16 Perchlorate Treatment Study

Evan Cox, Geosyntech

Meeting Schedule

David Tolbert

Adjourn

**LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY**

As of 11 March 2003

PROJECT NAME	PROJECT PHASE	PROJECT STATUS	NEXT MAJOR MILESTONE(S)
Group # 2 (Sites 12, 16, 17, 18, 24, 29, and 32)	Remedial Investigation/ Feasibility Study	- Quarterly sampling completed 7 March 03.	- Plant-wide ecological risk assessment workplan to team June 03.
Group # 4 (Wastewater Sumps And Sites 50 & 60)	Remedial Investigation/ Feasibility Study	- Quarterly sampling completed 7 March 03.	- Background study workplan to team early May 03. - Data Quality Objectives meeting scheduled for 1-2 April 03.
Burn Ground #3 (Sites 18 and 24)	Interim Remedial Action	- Five Year Review completed.	
Perchlorate		- Additional seasonal sampling completed in September 02.	
Transition Management Group		- Transition Management Group met January 03.	- Meeting scheduled for 19 March 03.

0311118

**LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY**

As of 11 March 2003

PROJECT NAME	PROJECT PHASE	PROJECT STATUS	NEXT MAJOR MILESTONE(S)
Caddo Lake Sampling	RI/FS	- Lake sampling results presented in September 02.	

031119

LONGHORN ARMY AMMUNITION PLANT IRP STATUS SUMMARY

As of 11 March 2003

SCHEDULED MEETINGS AND VISITS TO LHAAP				
Date / Time		Purpose of Meeting / Visit	Location	
1-2 April 03		DQO Group 4 Meeting	Austin, Texas	
01	Inert Burning Grounds	24	Washout & Unlined Evaporation Pond	60
11	Suspected TNT Burial Grounds at Ave P&Q	27	South Test Area	XX(54)
12	Landfill 12	29	Former TNT Production Area	52
16	Landfill 16	32	Former TNT Disposal Area	63
17	Burning Ground 2/Flashing Area	35	Process Wastewater Sumps	
18	Burning Ground 3	50	Former Waste Disposal Facility	
			Ground Signal Test Area	
			Magazine Area	
			Burial Pits	
			Former Storage Bldg. 411 & 714	

031120

Technical Review Committee Meeting

Groundwater Treatment Plant Information

Longhorn Army Ammunition Plant

Site 18/24 & Site 16

March 11, 2003

Prepared By:
Complete Environmental Service
March 2003



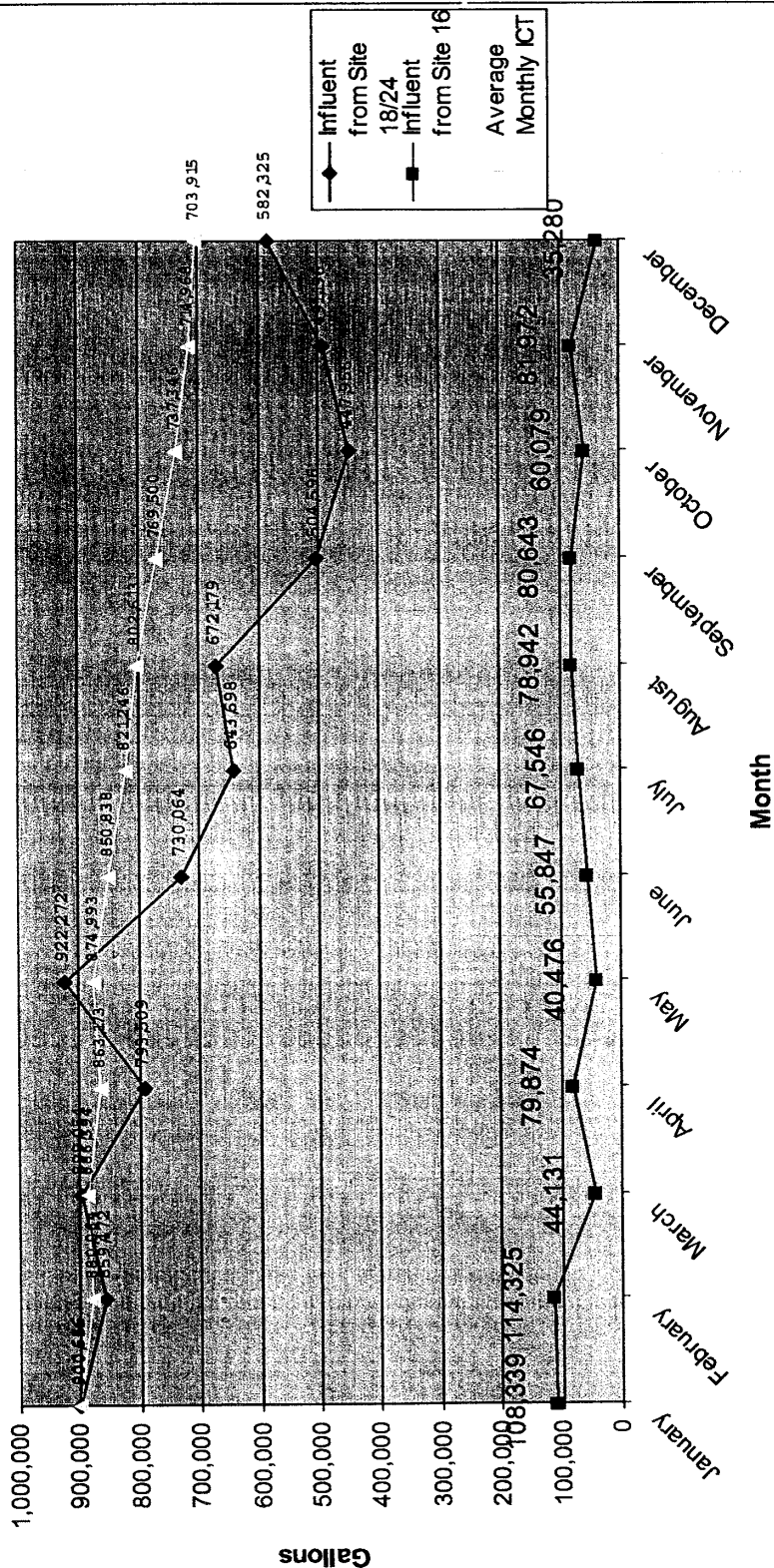
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- Groundwater Production Quantities Jan.2002 through Dec.2002
- GWTP Monthly Total Water Treatment Jan.2002 through Dec.2002
- Total Volatiles Removed from Site 18/24 for Year 2002
- Perchlorate Removed from Site 18/24 in Year 2002
- Contaminants Removed for Site 18/24 Apr.1998 to Dec.2002
- Contaminants Removed from Individual ICT's During Year 2002
- Site 18/24 Monitoring Well Sample Data November 2002
- Site 16 Extraction Well Analytical Data Summary
- Groundwater Elevation Charts
- Contaminant Plume Maps



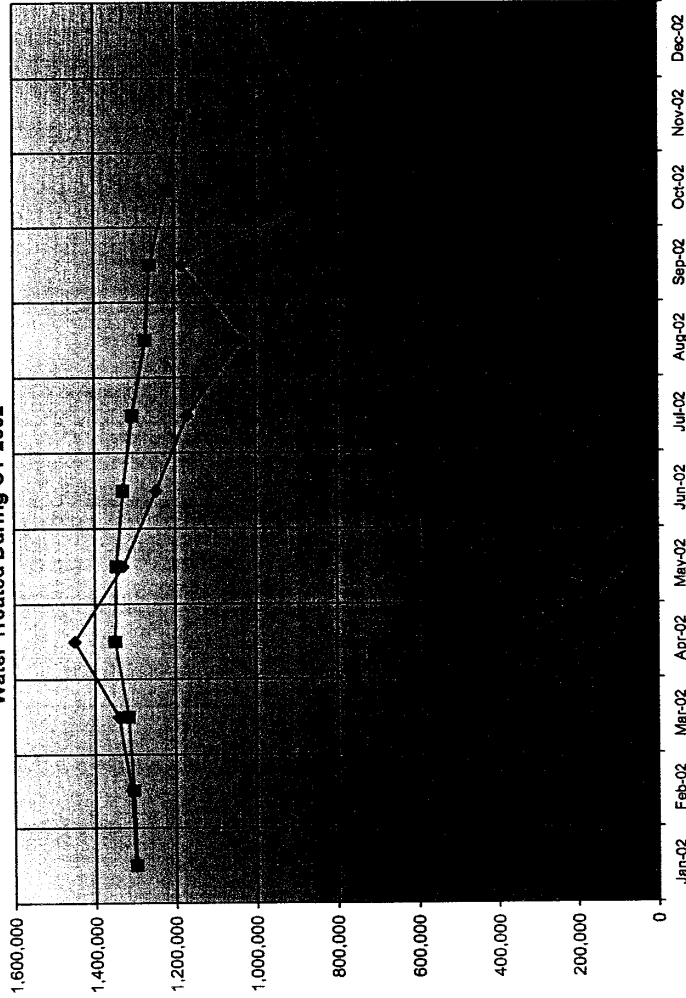
Groundwater Production Quantities Jan.2002 through Dec.2002

Groundwater Production
(January through December)
Year 2002



GWTP Monthly Total Water Treatment Jan.2002 through Dec.2002

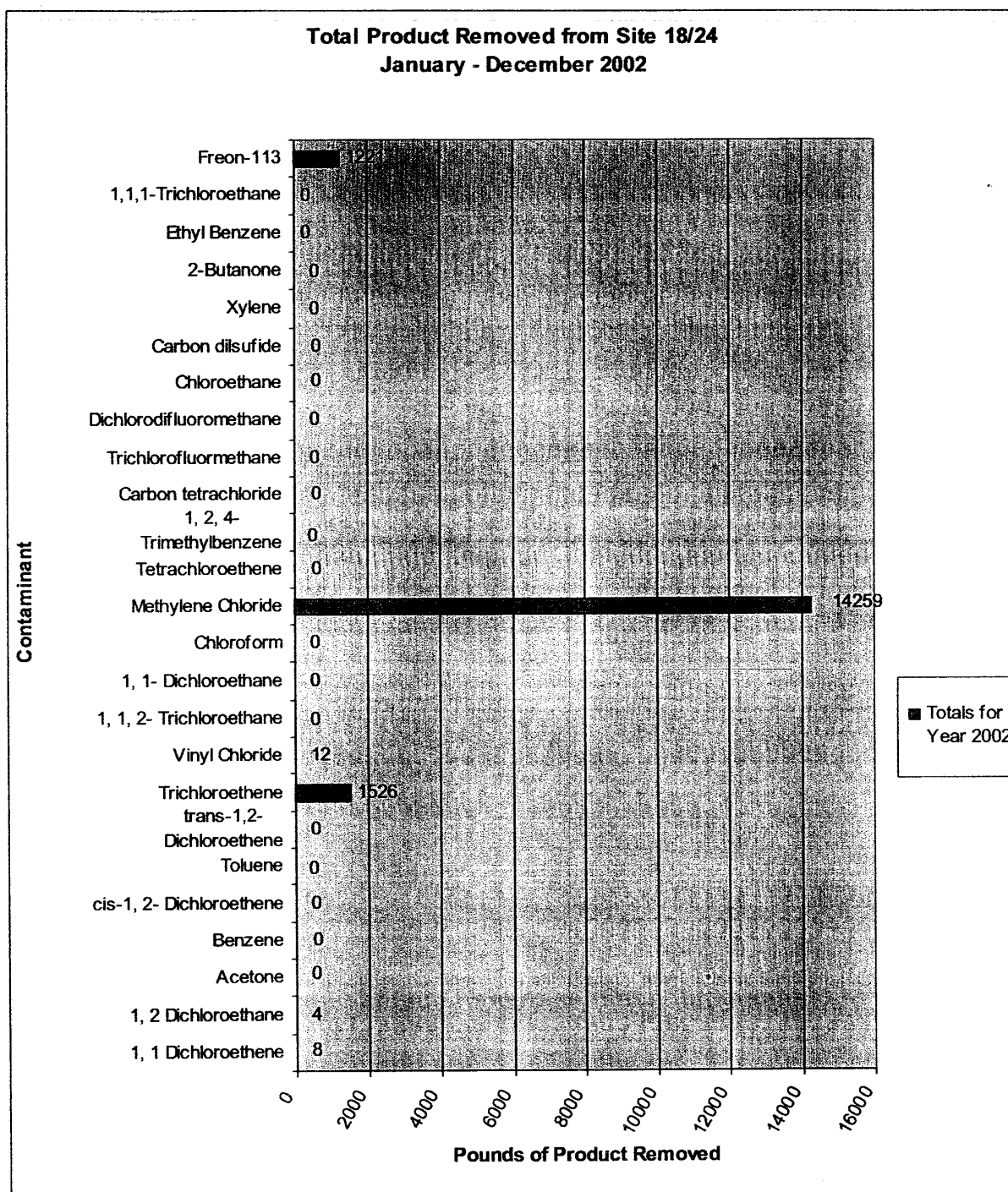
Longhorn AAP Groundwater Treatment Plant
Water Treated During CY 2002



	Jan-02	Feb-02	Mar-02	Apr-02	May-02	Jun-02	Jul-02	Aug-02	Sep-02	Oct-02	Nov-02	Dec-02
—◆— TOTAL INFLUENT PROCESSED	1,298,580	1,310,933	1,341,550	1,450,081	1,330,219	1,246,743	1,169,529	1,036,484	1,183,526	821,896	837,564	991,313
—■— AVERAGED MONTHLY INFLUENT PROCESSED (Jan. 02-Dec. 02)	1,298,580	1,304,757	1,317,021	1,350,286	1,346,273	1,329,684	1,306,805	1,273,015	1,263,072	1,218,954	1,184,284	1,188,203



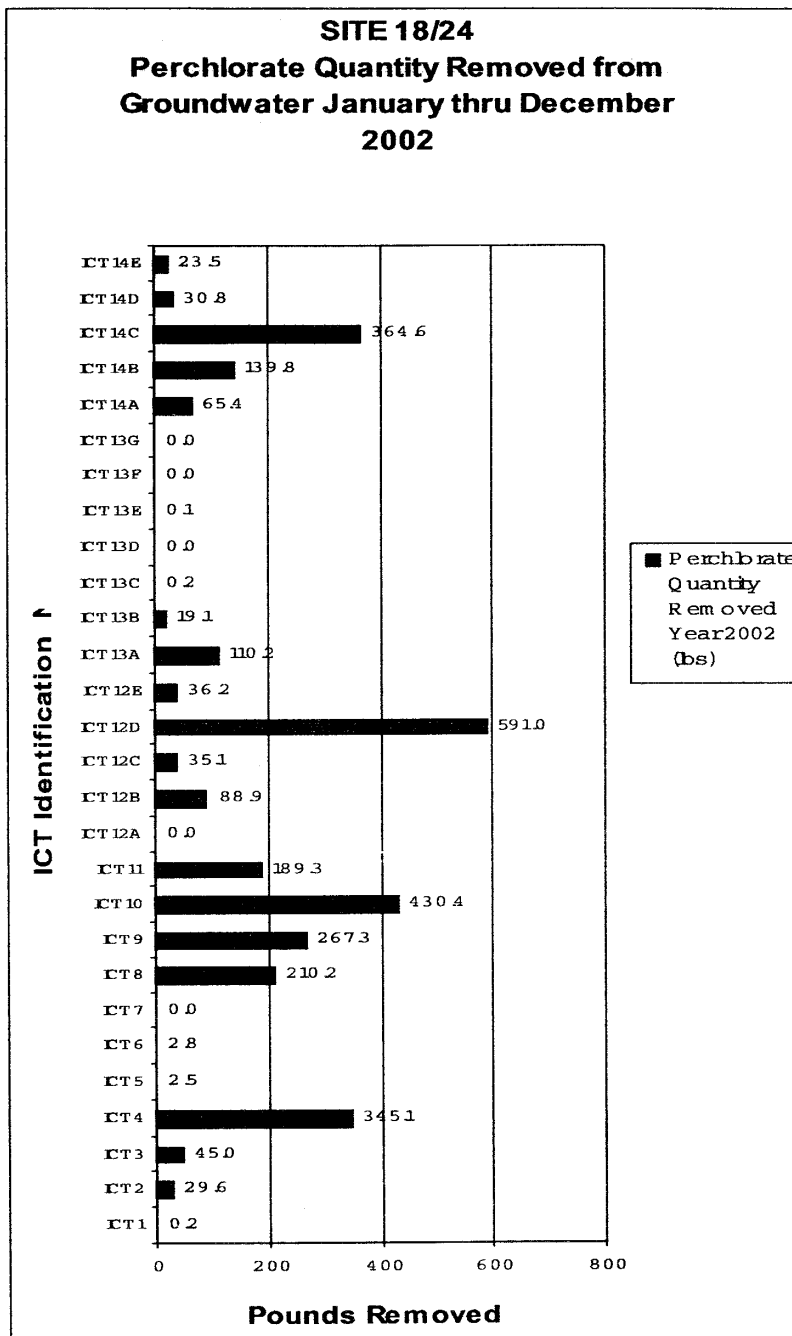
Total Volatiles Removed from Site 18/24 for Year 2002





Perchlorate Removed from Site 18/24 in Year 2002

Interceptor Collection Trench ID Number	Perchlorate Quantity Removed Year 2002 (lbs)
ICT 1	0.162
ICT 2	29.595
ICT 3	44.979
ICT 4	345.080
ICT 5	2.547
ICT 6	2.776
ICT 7	0.016
ICT 8	210.216
ICT 9	267.307
ICT 10	430.350
ICT 11	189.347
ICT 12A	0.019
ICT 12B	88.864
ICT 12C	35.095
ICT 12D	591.049
ICT 12E	36.167
ICT 13A	110.214
ICT 13B	19.103
ICT 13C	0.165
ICT 13D	0.025
ICT 13E	0.053
ICT 13F	0.000
ICT 13G	0.000
ICT 14A	65.402
ICT 14B	139.764
ICT 14C	364.626
ICT 14D	30.795
ICT 14E	23.501
Total Removed	3027.22





Contaminants Removed for Site 18/24 Apr.1998 to Dec.2002

Contaminants	Pounds Removed 1998	Pounds Removed 1999	Pounds Removed 2000	Pounds Removed 2001	Pounds Removed 2002	Total Removed to Date
1, 1 Dichloroethene	0.00	0.00	0.17	14.24	7.87	22.28
1, 2 Dichloroethane	0.00	0.00	0.73	5.89	4.16	10.77
Acetone	0.00	192.54	227.93	0.92	0.09	421.47
Benzene	0.00	0.00	0.00	0.44	0.05	0.50
cis-1, 2- Dichloroethene	0.00	14.04	16.94	0.00	0.00	30.98
Toluene	0.00	0.00	0.00	0.44	0.06	0.50
trans-1,2- Dichloroethene	0.00	0.00	0.00	0.00	0.00	0.00
Trichloroethene	134.03	213.19	1168.32	1788.98	1525.59	4830.10
Vinyl Chloride	0.00	0.00	5.34	8.57	11.61	25.52
1, 1, 2- Trichloroethane	0.00	0.00	0.01	0.53	0.03	0.57
1, 1- Dichloroethane	0.00	0.00	0.04	0.16	0.18	0.38
Chloroform	0.00	0.00	0.03	2.64	0.35	3.02
Methylene Chloride	2061.97	2042.18	14620.72	20584.32	14259.12	53568.31
Tetrachloroethene	0.00	0.00	0.32	1.48	0.02	1.82
1, 2, 4-Trimethylbenzene	0.00	0.00	0.00	0.00	0.00	0.00
Carbon tetrachloride	0.00	0.00	0.00	0.20	0.26	0.47
Trichlorofluoromethane	0.00	0.00	0.00	0.00	0.00	0.00
Dichlorodifluoromethane	0.00	0.00	0.00	0.00	0.00	0.00
Chloroethane	0.00	0.00	0.00	0.00	0.00	0.00
Carbon disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Xylene	0.00	0.00	0.00	0.13	0.00	0.13
2-Butanone	0.00	0.00	0.00	0.00	0.00	0.00
Ethyl Benzene	0.00	0.00	0.00	0.80	0.01	0.81
1,1,1-Trichloroethane	0.00	0.00	0.00	0.33	0.00	0.33
Freon-113	0.00	0.00	0.00	679.70	1221.26	1900.96
Total Volatiles Removed Per Year	2195.99	2461.96	16040.55	23089.76	17030.66	
Total Volatiles Removed to Date						60818.92
Total Perchlorate Removed to Date	0.00	0.00	102.59	2577.00	3027.00	5706.59

	Gallons Removed 1998	Gallons Removed 1999	Gallons Removed 2000	Gallons Removed 2001	Gallons Removed 2002	Total Gallons Removed to Date
Total Groundwater Removed from Site 18/24	6,014,165	6,595,570	6,341,793	8,785,628	8,446,977	36,184,133
Total Groundwater Removed from Site 16	Not Recorded	Not Recorded	Not Recorded	964,914	847,454	1,812,368



Contaminants Removed from Individual ICT's During Year 2002

Chemical	Totals for Year 2002	ICT 1	ICT 2	ICT 3	ICT 4	ICT 5	ICT 6	ICT 7	ICT 8	ICT 9	ICT 10	ICT 11	ICT 12A	ICT 12B
1, 1 Dichloroethene	14.237	0.015	0.020	0.052	0.050	0.000	0.000	0.000	10.481	3.172	0.000	0.000	0.000	0.014
1, 2 Dichloroethane	5.886	0.031	0.207	1.331	1.482	0.176	0.023	0.000	0.962	0.471	0.043	0.000	0.000	0.141
Acetone	0.917	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.917	0.000	0.000	0.000	0.000
Benzene	0.445	0.000	0.000	0.000	0.053	0.000	0.000	0.000	0.100	0.281	0.000	0.000	0.000	0.008
Cis-1, 2- Dichloroethene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Toluene	0.440	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.212	0.226	0.000	0.000	0.000	0.000
Trans-1, 2- Dichloroethene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Trichloroethene	1788.976	0.259	3.727	17.166	59.817	3.432	1.476	0.017	967.123	323.504	5.450	1.173	4.064	13.159
Vinyl Chloride	8.568	0.170	0.059	1.118	0.000	0.000	0.000	0.000	1.202	0.489	0.028	0.000	0.002	0.035
1, 1, 2- Trichloroethane	0.534	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.477	0.049	0.000	0.000	0.000	0.000
1, 1- Dichloroethane	0.159	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.104	0.000	0.000	0.000	0.000
Chloroform	2.635	0.000	0.000	0.010	0.141	0.000	0.000	0.000	1.683	0.687	0.022	0.000	0.000	0.022
Methylene Chloride	20584.324	0.002	0.010	0.000	1.131	0.204	0.000	0.001	17429.460	2327.896	0.000	0.000	0.561	0.000
Tetrachloroethene	1.478	0.000	0.000	0.000	0.027	0.000	0.000	0.000	1.202	0.196	0.000	0.000	0.000	0.000
1, 2, 4-Trimethylbenzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Carbon tetrachloride	0.201	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.000	0.000	0.000
Trichlorofluoromethane	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dichlorodifluoromethane	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Chloroethane	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Carbon disulfide	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Xylene	0.131	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.129	0.000	0.000	0.000	0.000	0.000
2-Butanone	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethyl Benzene	0.797	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,1,1-Trichloroethane	0.329	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.797	0.000	0.000	0.000	0.000	0.000
Freon-113	679.699	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.329	0.000	0.000	0.000	0.000	0.000
									685.392	0.000	0.000	0.000	0.000	0.000

Contaminants Removed from Individual ICT's During Year 2002

Chemical	ICT 12C	ICT 12D	ICT 12E	ICT 13A	ICT 13B	ICT 13C	ICT 13D	ICT 13E	ICT 13F	ICT 13G	ICT 14A	ICT 14B	ICT 14C	ICT 14D	ICT 14E
1, 1 Dichloroethene	0.000	0.000	0.100	0.165	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.142	0.001	0.000
1, 2 Dichloroethane	0.043	0.000	0.020	0.165	0.686	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.001	0.000
Acetone	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
Cis-1, 2- Dichloroethene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Toluene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Trans-1, 2- Dichloroethene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Trichloroethene	1.485	128.460	79.534	106.107	12.173	3.562	0.006	0.000	0.000	0.000	0.407	1.605	21.160	0.360	33.753
Vinyl Chloride	0.019	4.088	0.462	0.000	0.479	0.055	0.000	0.000	0.000	0.000	0.017	0.000	0.270	0.030	0.044
1, 1, 2- Trichloroethane	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
1, 1- Dichloroethane	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035	0.000	0.000
Chloroform	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.001	0.012
Methylene Chloride	0.006	267.788	550.116	2.842	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.508	0.000	3.801
Tetrachloroethene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.000	0.001
1, 2, 4-Trimethylbenzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Carbon tetrachloride	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Trichlorofluoromethane	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dichlorodifluoromethane	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Chloroethane	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Carbon disulfide	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Xylene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2-Butanone	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Ethyl Benzene	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1,1,1-Trichloroethane	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Freon-113	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.307

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	<u>101</u>	<u>102</u>	<u>109</u>	<u>120</u>	<u>123</u>	<u>125</u>	<u>126</u>	<u>129</u>	<u>130</u>	<u>AWD1</u>	<u>AWD2</u>	<u>AWD3</u>	<u>AWD4</u>
<u>VOLATILES In UG/L</u>													
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	47.3	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	17.0	ND	ND	ND	ND	ND	14.2	5.44	ND	ND
1,1 - Dichloroethane	ND	ND	ND	59.8	ND	ND	ND	ND	ND	71.4	ND	ND	ND
1,1 - Dichloroethene	ND	ND	ND	298	ND	ND	ND	ND	ND	635	ND	16.8	ND
1,2 - Dichloroethane	ND	ND	ND	62.4	ND	ND	ND	99.2	ND	33.5	1,250	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	7.93	ND	ND	ND	ND	ND	16.7	5.46	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	99.2	ND
Chloroform	ND	ND	ND	96.9	ND	ND	ND	13.6	ND	23.6	19.3	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	18.8	ND	ND	ND
Methylene chloride	ND	ND	ND	57,400	ND	ND	ND	ND	ND	ND	59.8	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.4	ND	ND	ND
Tetrachloroethene	ND	ND	ND	7.86	ND	ND	ND	ND	ND	37.9	ND	ND	ND
Toluene	ND	ND	ND	15.2	ND	ND	ND	ND	ND	9.39	ND	ND	ND
Trichloroethene	9.88	ND	249	31,900	9.56	ND	ND	4,150	63.7	54,600	18,000	639	ND
Vinyl chloride	ND	ND	ND	55.7	ND	ND	ND	ND	ND	886	25.9	ND	ND
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	91.0	ND	ND	ND
Freon 113	ND	ND	126	ND	13.2	325	ND	226	ND	18,800	ND	24,100	ND
<u>METALS In MG/L</u>													
Arsenic	0.0189	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	1.06	0.0435	0.462	0.194	0.209	1.5400	3.890	0.266	0.200	1.76	0.142	0.0783	0.266
Cadmium	ND	ND	ND	ND	0.00131	0.00167	ND	ND	ND	ND	ND	ND	ND
Chromium	0.0823	ND	ND	ND	ND	ND	ND	0.00625	ND	0.0707	0.295	0.175	0.0784
Lead	0.0407	ND	ND	ND	ND	0.0497	ND	ND	ND	0.00591	ND	ND	ND
Nickel	0.0859	ND	ND	0.0527	ND	0.0271	0.0111	ND	ND	0.153	0.0274	1.24	0.790
Selenium	ND	ND	ND	0.00665	ND	ND	ND	ND	ND	0.00923	0.00658	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	0.289	0.00535	ND	0.0622	0.00957	0.0594	0.0359	0.0107	0.00523	0.0156	0.00721	0.0114	0.0118
<u>CHLORIDE In MG/L</u>													
<u>101</u>	6.85	<u>102</u>	<u>109</u>	<u>120</u>	<u>123</u>	<u>125</u>	<u>126</u>	<u>129</u>	<u>130</u>	<u>AWD1</u>	<u>AWD2</u>	<u>AWD3</u>	<u>AWD4</u>
		18	553	702	27.9	6.95	993	188	1,270	162	103	38.3	52.6
<u>PERCHLORATE In UG/L</u>													
<u>101</u>	10.3	<u>102</u>	<u>109</u>	<u>120</u>	<u>123</u>	<u>125</u>	<u>126</u>	<u>129</u>	<u>130</u>	<u>AWD1</u>	<u>AWD2</u>	<u>AWD3</u>	<u>AWD4</u>
		54.9	65,800	156,000	172	ND	ND	48,000	34,200	3,000	ND	11,200	2,260



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	C8	18WW17	C10	MW1	MW1 QC	MW1 QA	MW1 EB	MW2	MW2 QC	MW2 QA	MW3	MW4	MW5
<u>VOLATILES in UG/L</u>													
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	58.3	51.1	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	42.3	47.5	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	227	191	ND	ND	5.91	ND
1,1 - Dichloroethene	ND	ND	ND	28.8	23.1	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethane	ND	ND	ND	137	127	ND	ND	10.6	10.8	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	6.22	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	20.4	ND	ND	ND	208	189	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	ND	222	196	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	1,770,000	1,840,000	1,400,000	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	179	163	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	207	195	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	66.5	58.3	ND	ND	ND	ND
Trichloroethene	ND	72.3	ND	4,970	4,800	6400	ND	175,000	180,000	150,000	436	318	28.6
Vinyl chloride	ND	ND	ND	34.3	32.9	ND	ND	328	239	ND	10.4	22.9	ND
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	120	109	ND	ND	ND	ND
Freon 113	ND	370	ND	2,180	2,060	1900	ND	ND	ND	7200 J	46.1	40.3	162
<u>METALS in MG/L</u>													
Arsenic	ND	ND	ND	ND	MW1 QC	MW1 QA	MW1 EB	MW2	MW2 QC	MW2 QA	MW3	MW4	MW5
Barium	6.47	3.68	0.921	3.32	3.64	3.23	ND	3.69	3.54	3.350	1.87	0.221	0.530
Cadmium	ND	ND	ND	0.00163	0.0019	ND	ND	ND	ND	ND	0.00106	ND	ND
Chromium	ND	0.159	ND	0.423	0.428	0.385	ND	ND	ND	ND	0.00965	0.0162	0.0121
Lead	ND	ND	ND	ND	0.00573	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	ND	0.915	ND	1.38	1.42	1.12	ND	0.0259	0.0237	0.0293	0.0176	0.0668	0.029
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	ND	0.00611	0.0079	0.0263	0.0278	0.0531	ND	0.00956	0.00985	ND	0.0318	0.00822	0.00779
<u>CHLORIDE in MG/L</u>													
C8	2,570	18WW17	C10	MW1	MW1 QC	MW1 QA	MW1 EB	MW2	MW2 QC	MW2 QA	MW3	MW4	MW5
		2,900	595	714	729	879	ND	544	532	550.0	443	525	146
<u>PERCHLORATE in UG/L</u>													
C8	ND	18WW17	C10	MW1	MW1 QC	MW1 QA	MW1 EB	MW2	MW2 QC	MW2 QA	MW3	MW4	MW5
		117,000	40.9	108,000	108,000	110,000	ND	13,500	14,300	14,200	198,000	51,600	22,800



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	<u>MW6</u> <u>QC</u>	<u>MW6</u> <u>QA</u>	<u>MW7</u>	<u>MW8</u>	<u>MW9</u>	<u>MW10</u>	<u>MW11</u>	<u>MW12</u>	<u>MW13</u>	<u>MW14</u>	<u>MW16</u>	<u>MW17</u>
<u>VOLATILES In UG/L</u>												
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	ND	ND	189	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethane	ND	3.8	189	52.4	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	45.5	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	180	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	109	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	6.11	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	16.8	22	6,070	2,470	3,870	ND	ND	316	ND	411	ND	66.8
Vinyl chloride	ND	2.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	278	160	999	24.7	104	ND	ND	ND	ND	ND	ND	ND
<u>METALS In MG/L</u>												
Arsenic	ND	<u>MW6</u> <u>QC</u>	<u>MW7</u>	<u>MW8</u>	<u>MW9</u>	<u>MW10</u>	<u>MW11</u>	<u>MW12</u>	<u>MW13</u>	<u>MW14</u>	<u>MW16</u>	<u>MW17</u>
Barium	1.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	1.05	0.114	0.676	0.132	0.519	0.264	0.416	0.443	0.530	0.440	0.501
Chromium	0.108	ND	ND	ND	ND	ND	ND	0.00157	ND	ND	ND	ND
Lead	ND	0.108	0.180	0.135	0.0496	ND	0.0119	ND	ND	0.0233	ND	0.0341
Nickel	0.274	ND	ND	ND	ND	0.0152	ND	ND	ND	ND	ND	ND
Selenium	ND	0.280	0.198	0.211	0.0179	0.0152	0.0703	0.0159	ND	0.101	ND	0.465
Silver	ND	ND	ND	ND	0.00507	ND	ND	ND	ND	ND	ND	ND
Zinc	0.0212	0.0222	ND	0.051	0.00593	0.0218	0.0339	0.0537	ND	0.0197	ND	0.0123
<u>CHLORIDE In MG/L</u>												
	<u>MW6</u>	<u>MW6</u> <u>QC</u>	<u>MW7</u>	<u>MW8</u>	<u>MW9</u>	<u>MW10</u>	<u>MW11</u>	<u>MW12</u>	<u>MW13</u>	<u>MW14</u>	<u>MW16</u>	<u>MW17</u>
	330	331	297.0	480	45.2	234	26.2	237	302	348	186	236
<u>PERCHLORATE In UG/L</u>												
	<u>MW6</u>	<u>MW6</u> <u>QC</u>	<u>MW7</u>	<u>MW8</u>	<u>MW9</u>	<u>MW10</u>	<u>MW11</u>	<u>MW12</u>	<u>MW13</u>	<u>MW14</u>	<u>MW16</u>	<u>MW17</u>
	10,900	10,600	118,000	22,900	1200	ND	ND	ND	ND	4,740	ND	223



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VOLATILES In UG/L	18WW09				MW23			
	MW19	MW20	MW21	MW22	MW23	MW22	MW23	MW23
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	12.8	ND	ND	ND	ND	ND
1,1 - Dichloroethene	ND	ND	29.4	ND	ND	ND	ND	ND
1,2 - Dichloroethane	ND	ND	ND	7	46.8	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	6.79	5.02	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	32.7	14	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	54,000	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	6,260	1,030	1,090	ND	ND	ND
Vinyl chloride	ND	ND	19.9	ND	ND	ND	ND	ND
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	28,800	6,350	2,830	ND	ND	ND
METALS In MG/L	18WW09				MW23			
	MW19	MW20	MW21	MW22	MW23	MW22	MW23	MW23
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND
Barium	0.137	0.0719	12.2	3,790	1.77	ND	ND	ND
Cadmium	ND	0.00336	0.00123	ND	ND	ND	ND	ND
Chromium	ND	ND	0.108	0.866	0.220	ND	ND	ND
Lead	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	0.353	ND	0.213	0.666	0.321	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	0.00938	0.0116	0.0401	0.00647	ND	ND	ND	ND
CHLORIDE In MG/L	18WW09				MW23			
	MW19	MW20	MW21	MW22	MW23	MW22	MW23	MW23
PERCHLORATE In UG/L	75.7	10.6	2,120	1,270	516	1,270	516	516



Site 16 Extraction Well Sample Data Summary

Perchlorate	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sep-01	Oct-01	Jan-02	Apr-02	Jul-02	Sep-02
<u>Well 1</u>	N/A	256	202	581	42.4	610	564	481	472	65.3	430	668
<u>Well 2</u>	N/A	226	224	56.6	27.6	467	91.3	102	39.4	62.1	100	30.5
<u>Well 3</u>	N/A	252	290	47.6	ND	512	56	235	71.4	83.7	130	ND
<u>Well 4</u>	N/A	ND	44.7	ND	ND	446	18.8	37.3	17.4	21.4	80	ND
<u>Well 5</u>	N/A	864	53.1	ND	ND	486	1240	1450	1590	1340	1430	1,290
<u>Well 6</u>	N/A	208	269	173	ND	323	ND	201	137	96.2	ND	15.4
<u>Well 7</u>	N/A	20.7	94.5	120	ND	387	237	114	ND	51.6	ND	ND
<u>Well 8</u>	N/A	ND	241	44.8	ND	486	ND	77.3	ND	50.1	ND	ND
Trichloroethene												
<u>Well 1</u>	26,000	30,000		4,200		24,000		19,000		4,280		14,100
<u>Well 2</u>	8,500	21,000		640		18,000		45,000		62,900		109,000
<u>Well 3</u>	7,400	4,800		100		21,000		5,700		6,060		5,620
<u>Well 4</u>	2,100	2,100		50		20,000		1,000		2,400		2,790
<u>Well 5</u>	6,600	3,400		220		24,000		4,300		5,740		4,160
<u>Well 6</u>	7,600	24,000		190		21,000		1,600		1,280		875
<u>Well 7</u>	1,200	6,200		16		13,000		16		32		51
<u>Well 8</u>	5,200	4,600		140		20,000		ND		105		ND
Methylene Chloride												
<u>Well 1</u>	170	ND		ND		ND		ND		ND		ND
<u>Well 2</u>	ND	ND		ND		ND		ND		ND		ND
<u>Well 3</u>	ND	ND		ND		ND		ND		ND		ND
<u>Well 4</u>	ND	ND		ND		ND		ND		ND		ND
<u>Well 5</u>	ND	ND		ND		ND		ND		ND		ND
<u>Well 6</u>	ND	ND		ND		ND		ND		ND		ND
<u>Well 7</u>	ND	ND		ND		ND		ND		ND		ND
<u>Well 8</u>	ND	ND		ND		ND		ND		ND		ND
1,1-Dichloroethane												
<u>Well 1</u>				ND		ND		ND		ND		ND
<u>Well 2</u>				ND		ND		ND		ND		ND
<u>Well 3</u>				ND		ND		ND		ND		ND
<u>Well 4</u>				ND		ND		ND		ND		ND
<u>Well 5</u>				ND		ND		5		ND		ND
<u>Well 6</u>				ND		ND		ND		ND		ND
<u>Well 7</u>				ND		ND		ND		ND		ND
<u>Well 8</u>				ND		ND		ND		ND		ND



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	<u>C1</u>	<u>C2</u>	<u>C3</u>	<u>C3 QC</u>	<u>C3 QA</u>	<u>C3 EB</u>	<u>C4</u>	<u>C4A</u>	<u>18WW07</u>	<u>C6</u>	<u>18WW08</u>	<u>18WW08 QC</u>	<u>18WW08 QA</u>
<u>VOLATILES In UG/L</u>													
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	2.0	ND	ND	ND	ND	ND	ND	ND	3.0
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.53
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	8.99	8.76	12.0	ND	ND	ND	ND	ND	ND	ND	ND
<u>METALS In MG/L</u>													
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	0.568	0.411	1.12	1.09	1.090	ND	0.203	0.105	0.173	0.971	0.419	0.438	0.433
Cadmium	ND	ND	0.00209	0.00211	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	ND	ND	ND	ND	ND	ND	ND	ND	0.00517	ND	0.0382	0.0389	0
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	ND	ND	ND	ND	0.007	ND	ND	ND	0.0126	ND	0.0305	0.0340	0.0358
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	ND	ND	0.0478	0.0456	0.051	ND	0.0099	ND	ND	ND	ND	ND	ND
<u>CHLORIDE In MG/L</u>													
C1	686	206	401	398	385	ND	44.7	60.6	62	435	300	297	315.0
<u>PERCHLORATE In UG/L</u>													
C1	ND	ND	1,940	1,770	709	ND	ND	ND	ND	ND	18,400	18,800	18,000



Site 16 Extraction Well Sample Data Summary

1,2-Dichloroethane

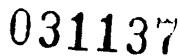
<u>Well 1</u>	ND	ND	ND	86	ND	104
<u>Well 2</u>	ND	ND	ND	16	ND	ND
<u>Well 3</u>	ND	ND	ND	ND	ND	ND
<u>Well 4</u>	ND	ND	ND	ND	ND	ND
<u>Well 5</u>	ND	ND	ND	16	ND	ND
<u>Well 6</u>	ND	ND	ND	ND	ND	ND
<u>Well 7</u>	ND	ND	ND	ND	ND	ND
<u>Well 8</u>	ND	ND	ND	ND	ND	ND

1,1-Dichloroethene

<u>Well 1</u>	51	ND	ND	33	ND	ND
<u>Well 2</u>	ND	ND	ND	72	ND	109
<u>Well 3</u>	ND	ND	ND	8	78.4	ND
<u>Well 4</u>	ND	ND	ND	ND	ND	ND
<u>Well 5</u>	ND	ND	ND	7	ND	ND
<u>Well 6</u>	ND	ND	ND	ND	ND	ND
<u>Well 7</u>	ND	ND	ND	ND	ND	ND
<u>Well 8</u>	ND	ND	ND	ND	ND	ND

Vinyl Chloride

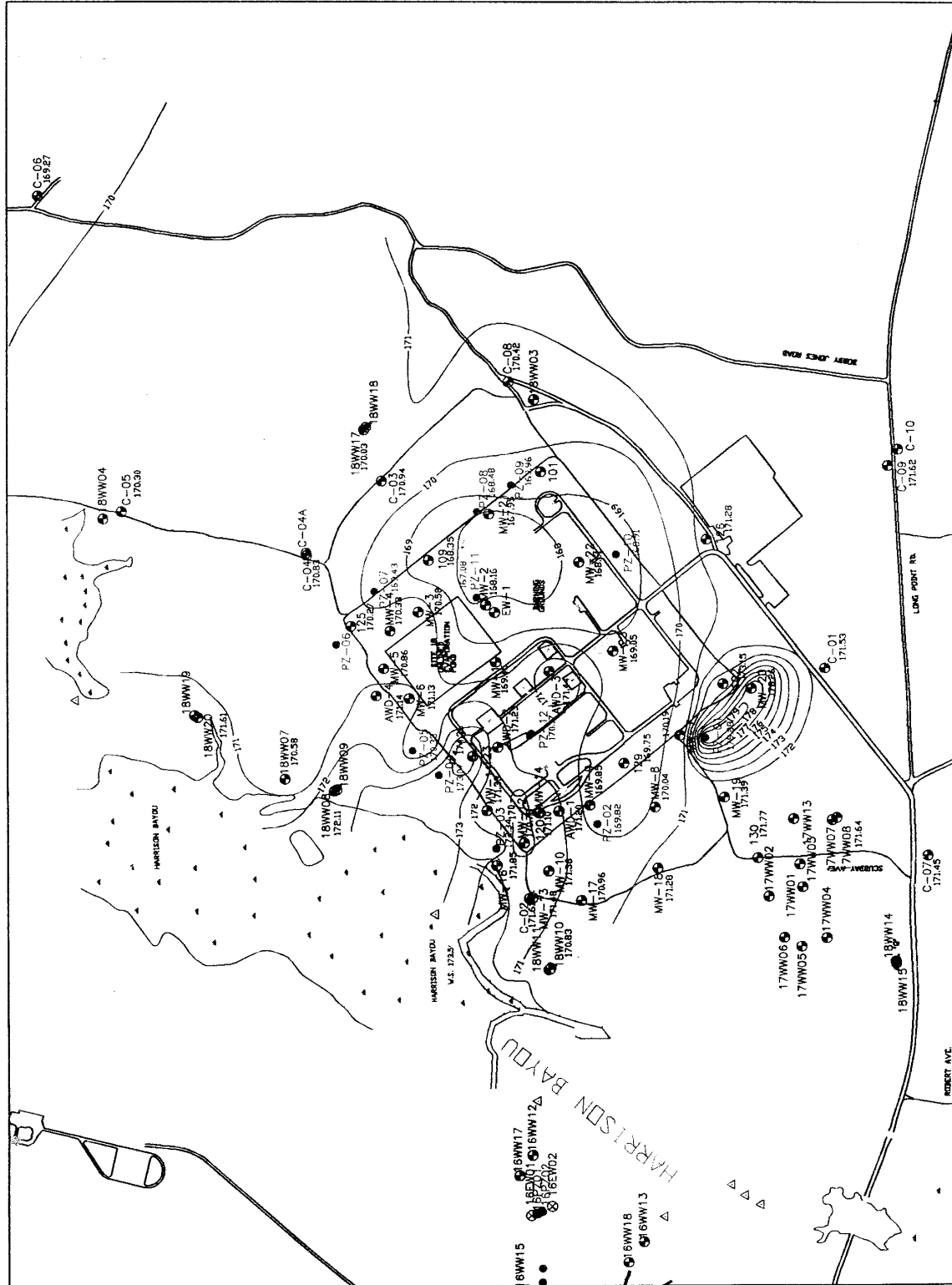
<u>Well 1</u>	ND	ND	ND	160	ND	144
<u>Well 2</u>	75	ND	ND	10	ND	ND
<u>Well 3</u>	ND	ND	ND	ND	ND	ND
<u>Well 4</u>	ND	ND	ND	ND	ND	ND
<u>Well 5</u>	50	ND	ND	70	ND	ND
<u>Well 6</u>	50	ND	ND	ND	ND	ND
<u>Well 7</u>	ND	ND	ND	ND	ND	ND
<u>Well 8</u>	38	ND	ND	ND	ND	ND



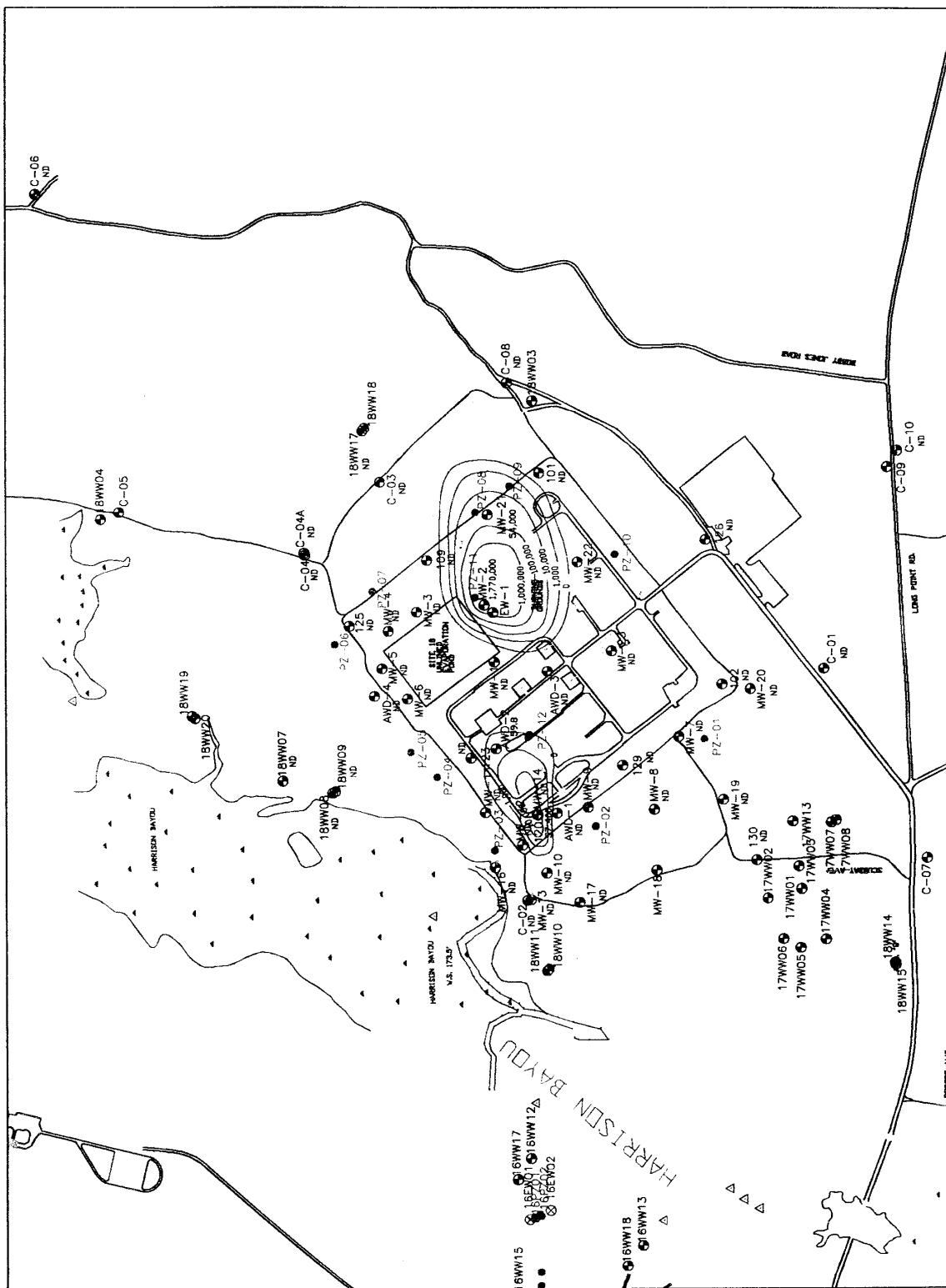
17

Complete Environmental Service
LHAAP Groundwater Treatment Plant
Annual Evaluation Report
Calendar Year 2002

Complete Environmental Service
LHAAP Sites 18 & 24
DATE: January 2, 2003
Groundwater Levels

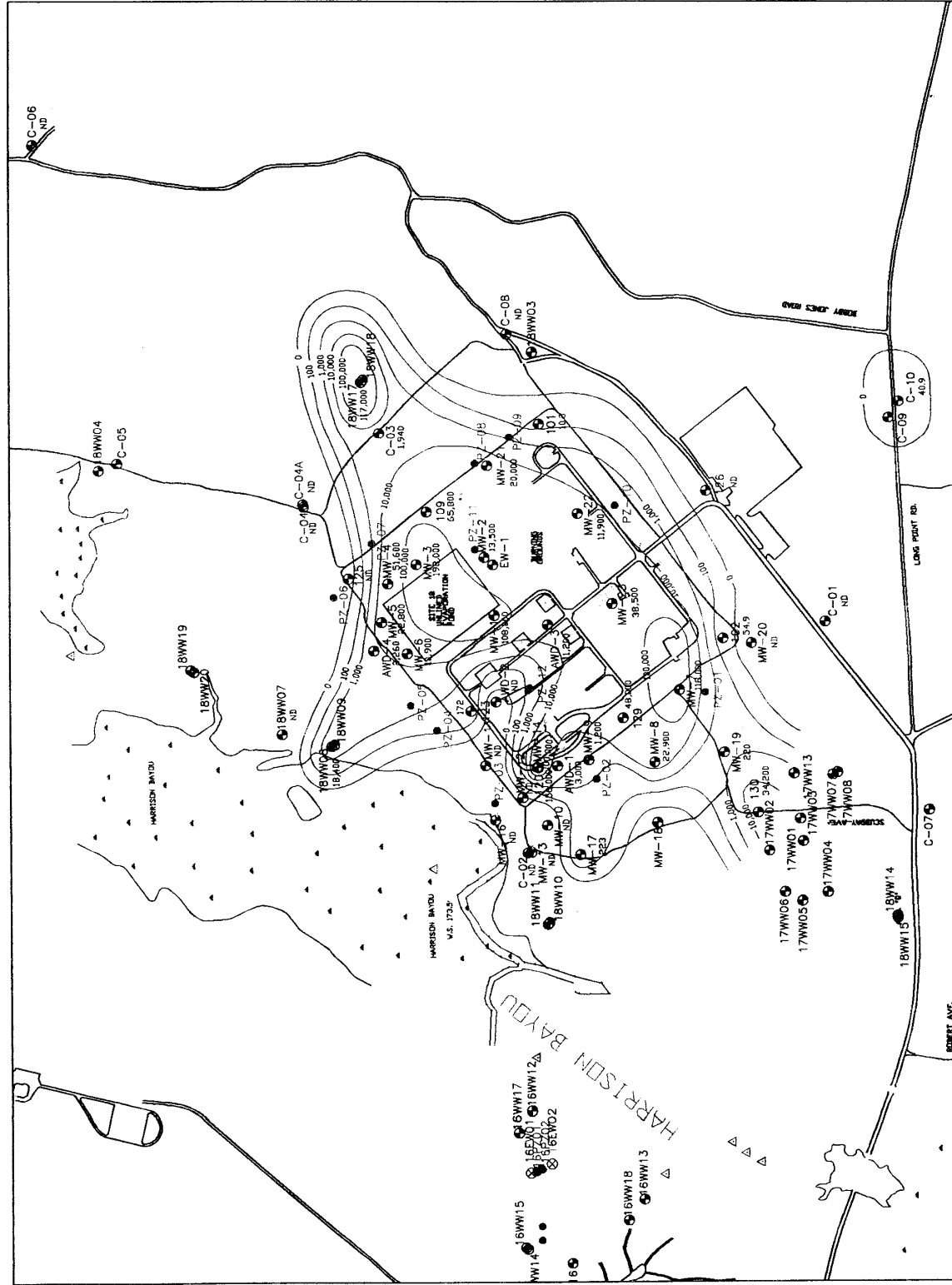


Complete Environmental Service
LHAAP Sites 18 & 24
DATE: November 2002
Methylene Chloride



031140

Complete Environmental Service
LHAAP Sites 18 & 24
DATE: November 2002
Perchlorate



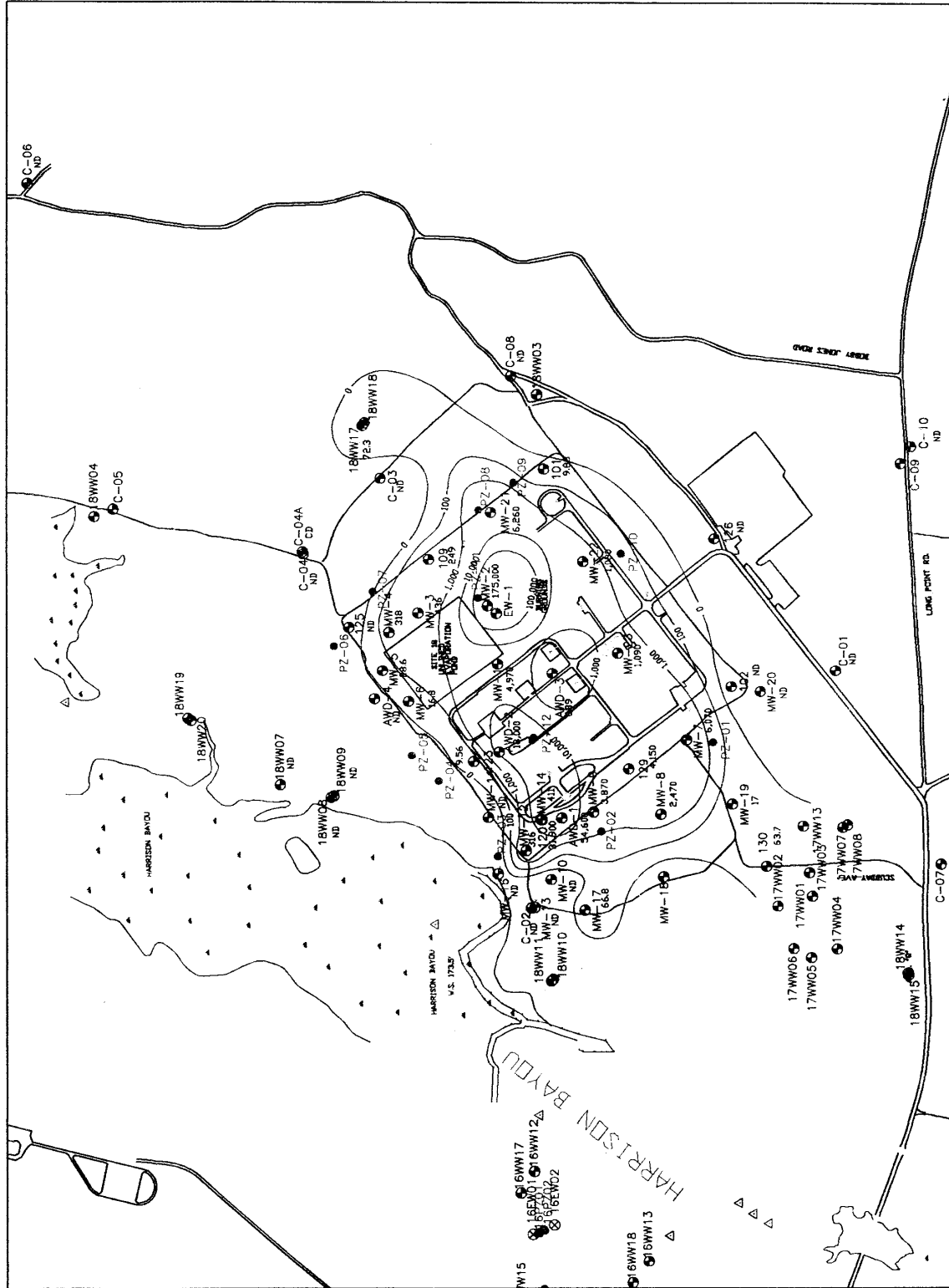
031141

Complete Environmental Service

LHAAP Sites 18 & 24

DATE: November 2002

Trichloroethene



LONGHORN AAP TRC

11 MARCH 2003

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March 2003

Installation Action Plan

for

Longhorn Army Ammunition Plant

printed on 30% post-consumer material paper



**INSTALLATION ACTION PLAN
For
LONGHORN ARMY
AMMUNITION PLANT**

March 2003

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Statement of Purpose

The purpose of the Installation Action Plan (IAP) is to outline the total multi-year restoration program for an installation. The plan will define Installation Restoration Program (IRP) requirements and propose a comprehensive approach and associated costs to conduct future investigations and remedial actions at the installation.

In an effort to coordinate planning, information between the IRP manager, major army commands (MACOMs), installations, executing agencies, regulatory agencies, and the public, an IAP has been completed for the Longhorn Army Ammunition Plant (LHAAP). The IAP is used to track requirements, schedules and tentative budgets for all major Army installation restoration programs.

All site specific funding and schedule information has been prepared according to projected overall Army funding levels and is therefore subject to change during the document's annual review. Under current project funding, all remedies (construction) will be in place or response complete at the LHAAP by the end of 2007. Long Term Monitoring and Operations will be required after this date.

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Acronyms & Abbreviations

~	approximate
AEC	(United States) Army Environmental Center
BRAC	Base Realignment and Closure
BRACO	BRAC Office
CERCLA	Comprehensive Environmental, Response, Compensation and Liability Act
CTC	Cost to Complete
cy	cubic yards
DOT	Department of Transportation
DSERTS	Defense Site Environmental Restoration Tracking System
EPA	Environmental Protection Agency
ER,A	Environmental Restoration, Army (formally DERA)
FFA	Federal Facility Agreement
FS	Feasibility Study
ft	foot
FY	Fiscal Year
GW	Groundwater
GWTP	Groundwater Treatment Plant
HMX	used on LHAAP-53
HRS	Hazard Ranking Score
IAP	Installation Action Plan
INF	Intermediate-Range Nuclear Force
IRA	Interim Remedial Action
IRP	Installation Restoration Program
K	thousand
LAP	Load, Assemble, and Pack
LHAAP	Longhorn Army Ammunition Plant
LTM	Long Term Monitoring
LTO	Long Term Operation
M	million
MACOM	Major Army Command
MEC	Methylene Chloride
NE	Not Evaluated
NFA	No Further Action
NPDES	National Pollution Disposal and Elimination System
NPL	National Priorities List
OB/OD	Open Burn/Open Detonation
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyls
POL	Petroleum, Oil & Lubricants
PP	Proposed Plan
PVC	Polyvinylchloride
RA	Remedial Action
RAB	Restoration Advisory Board
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
REM	Removal
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RIP	Remedy in Place

Acronyms & Abbreviations

ROD	Record of Decision
RRSE	Relative Risk Site Evaluation
SI	Site Investigation
SVOC	Semi-Volatile Organic Compounds
SWMU	Solid Waste Management Unit
TAPP	Technical Assistance for Public Participation
TCE	Trichloroethylene
TCEQ	Texas Commission on Environmental Quality
TMG	Transition Management Group
TNRCC	Texas Natural Resource Conservation Commission (changed to TCEQ)
TNT	Trinitrotoluene
TPH	Total Petroleum Hydrocarbons
TRC	Technical Review Committee
TWC	Texas Water Commission
UEP	Unlined Evaporation Pond
USACE	United States Army Corps of Engineers
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine (changed to AEC)
USAEHA	United States Army Environmental Hygiene Agency (changed to USACHPPM)
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compounds

Summary

STATUS:	NPL Installation, HRS - 39.83, listed August 1990. Confirmed Soil and Ground Water Contamination on Installation, Surface Water Contaminated Off-Post.		
NUMBER OF DSERTS SITES:	47 DSERTS sites 12 Active ER,A Eligible Sites 35 Response Complete/No Further Action ER,A Eligible		
DIFFERENT DSERTS SITE TYPES:	3 Burn Areas 7 Landfills 2 Surface Impoundments/ Lagoons 1 Above Ground Storage Tank 2 Waste Lines 1 Other (LHAAP-053)	2 Disposal Pits/ Dry Wells 14 Storage Areas 9 Spill Site Areas 2 Underground Storage Tanks 4 Waste Treatment Plants	
CONTAMINANTS OF CONCERN:	Trichloroethene, Methylene Chloride, Explosives, Metals, Perchlorate		
MEDIA OF CONCERN :	Groundwater, Soil, Surface Water, Sediment (Air is funded separately)		
COMPLETED REM/IRA/RA:	UEP Sludge removed and pond capped, 1986, Closed under RCRA Removal Action for waste sumps, 1997, Total Cost: \$1.83 M Landfills 12 & 16 capped, 1997 & 1998, Total Cost: \$5.3 M Removal 30K cy soil at Site 18, 1998, Total Cost: \$6.5 M		
CURRENT IRP PHASES:	RI/FS at 11 sites	IRA at 3 sites	LTM at 3 site
PROJECTED IRP PHASES:	RI/FS at 6 sites RA at 7 sites	IRA at 3 sites LTO at 3 sites	RD at 7 sites LTM at 9 sites
IDENTIFIED POSSIBLE REM/IRA/RA:	IRA at LHAAP-16, 18, 24, 32 RA at LHAAP-16, 17, 18, 24, 32, 35, 50		
FUNDING:	PRIOR YEAR: \$ 73,382,700 FY2003: \$ 6,045,000 FUTURE REQUIREMENTS: \$ 27,937,000 TOTAL: \$ 107,364,700		
DURATION:	YEAR OF IRP INCEPTION: 1988 YEAR OF REMOVAL FROM NPL: 2007 YEAR OF RA COMPLETION 2033		

Installation Information

SITE DESCRIPTION:	Longhorn Army Ammunition Plant (LHAAP) is located in central east Texas in the northeast corner of Harrison County, approximately 14 miles northeast of Marshall, Texas, and approximately 40 miles west of Shreveport, Louisiana. The installation occupies 8,493 acres between State Highway 43 and the western shore of Caddo Lake. The area surrounding LHAAP is primarily rural and consists of forest lands; the small towns of Karnack and Uncertain, Texas; Caddo Lake; and Caddo Lake State Park.
COMMAND ORGANIZATION:	Base Realignment and Closure Office INSTALLATION: Longhorn Army Ammunition Plant
IRP EXECUTING AGENCIES:	INVESTIGATION PHASE: U.S Army Corps of Engineers, Region VI ACTION PHASE: U.S. Army Corps of Engineers, Tulsa District and Fort Worth District, Nashville District
REGULATORY PARTICIPATION:	FEDERAL: U.S. Environmental Protection Agency, Region VI STATE: Texas Commission on Environmental Quality
REGULATORY STATUS:	- NPL listing August 1990 - Federal Facility Agreement, 1991
MAJOR CHANGES TO IAP FROM PREVIOUS YEAR (2002):	- Full scale treatment for perchlorate was started (FY01). Perchlorate investigation completed. - Conducted sediment sampling in Caddo Lake. - RI reports for Group 2 and 4 were completed. - Updated the Community Relations Plan and held a public meeting. - Completed a 5-year review for LHAAP-12, 16, 18, 24.

Installation Description

HISTORIC/CURRENT ACTIVITIES

LHAAP was established in October 1942 with the primary mission of producing 2,4,6-trinitrotoluene (2,4,6-TNT) flake. Monsanto Chemical Company was the first contract operator of the plant. Production of 2,4,6-TNT continued through World War II until August 1945, when the plant went on standby status until February 1952. From 1952 until 1956, Universal Match Corporation was the contracting operator, producing such pyrotechnic ammunition as photoflash bombs, simulators, hand signals, and tracers for 40mm ammunition. Thiokol assumed this responsibility, along with rocket motor production, with the departure of Universal Match Corporation in 1956. Production of rocket motors continued to be the primary mission of LHAAP until 1965, when the production of pyrotechnic and illuminating ammunition was re-established.

Prior to 1994, operations consisted of compounding pyrotechnic and propellant mixtures, LAP activities, accommodating receipt and shipment of containerized cargo, and maintenance and/or layaway of standby facilities and equipment as they apply to mobilization planning. The installation was also responsible for static firing and elimination of Pershing I and II rocket motors in compliance with the Intermediate-Range Nuclear Force (INF) Treaty in effect between the United States and the former USSR. In October 1996, approximately 1,435 of the 8,493 acres were leased to the Caddo Lake Institute for biological and ecological studies by local schools and universities.

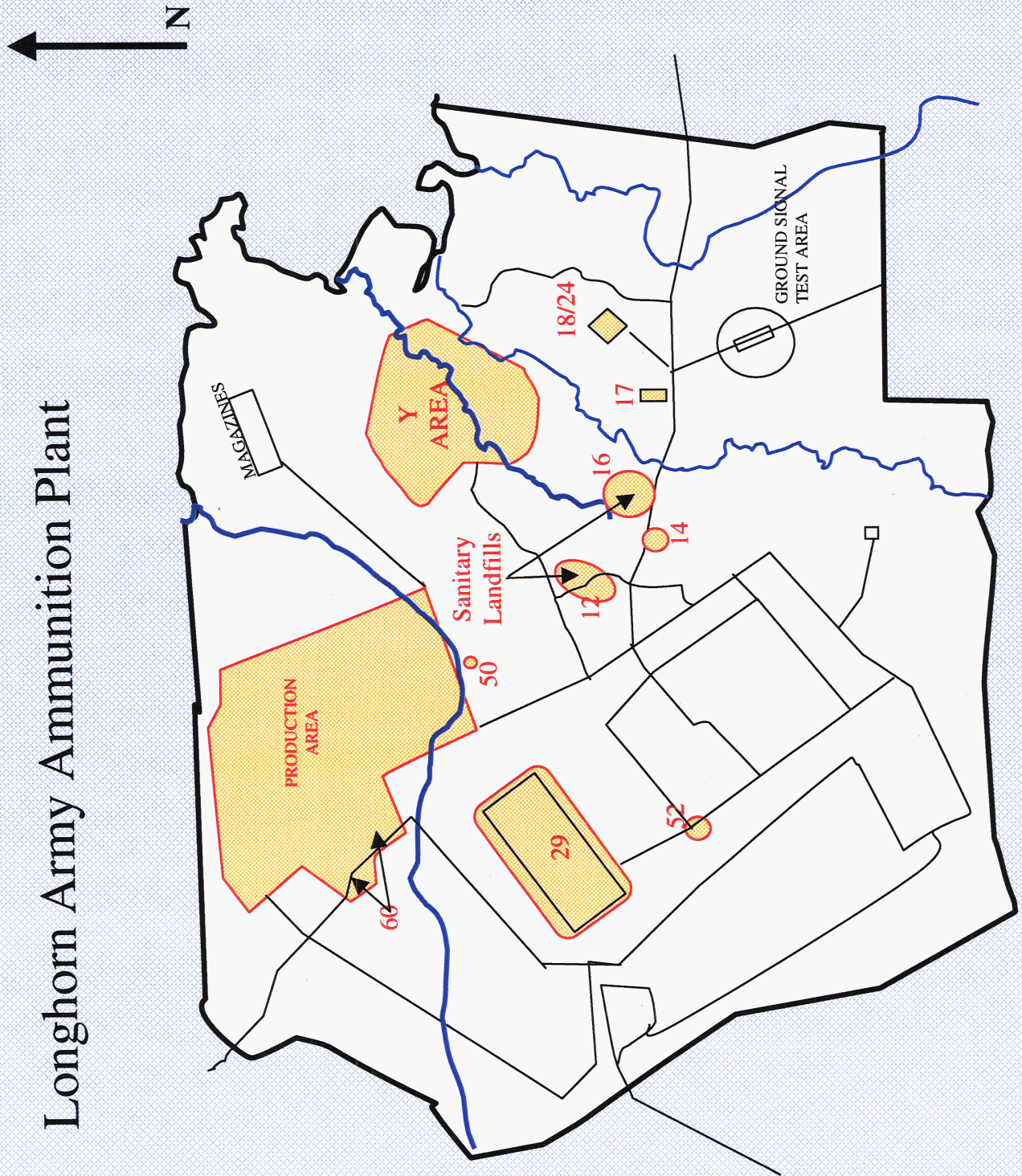
The plant became inactive and excess to the Army's needs in July 1997. In July 1998 the Army contracted Earth Tech, Inc. to liquidate all personal property and specific installed property. That contract was completed in FY00. In 1999, the Army contracted with Project Development Corp. to demolish specific structurally unsafe buildings. A Memorandum of Agreement between the Army and USFWS was signed on 21 October 2000 designating an area consisting of approximately 7,200 acres for establishment of a wildlife refuge at LHAAP. LHAAP was transferred to the Base Realignment and Closure Office (BRACO) in Oct 2002.

REGULATORY STATUS

LHAAP was placed on the National Priorities List (NPL) on August 9, 1990. After being listed on the NPL, LHAAP, the U.S. Environmental Protection Agency (EPA), and the Texas Water Commission (TWC) (now called the Texas Commission on Environmental Quality [TCEQ]) entered into a Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA) Section 120 Agreement for remedial activities at LHAAP. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective December 30, 1991. The Installation applied for a RCRA Part A Permit. A RCRA Part B Permit was signed February 1992. As a result, a RCRA Facility Assessment (RFA) identified 57 potential sites of concern. Since that time, scrubbing of the list (removal of non-ER, A eligible sites, redundancies, etc.) has resulted in the current Defense Site Environmental Restoration Tracking System (DSERTS) list of 47 sites.

While the Army leads the IRP at LHAAP, a close working relationship with the regulatory community has been developed. Remedial Project Managers from TCEQ and EPA Region VI work closely with Army personnel in planning and implementing IRP goals and activities. A cooperative teamwork environment has proven helpful in accelerating IRP activities and focusing energies of all the stakeholders on achieving restoration goals.

Longhorn Army Ammunition Plant



Contamination Assessment

Various environmental investigations, studies, and reports have been conducted since 1980 to address possible contamination at LHAAP. A summary of the current project milestones, based on funding availability, for the remedial activities is given below. Approved regulatory schedules are included on the following pages to summarize submittal dates for primary and secondary documents. LHAAP was placed on the National Priorities List (NPL) on August 9, 1990.

Studies conducted at the installation identified volatile organic compounds (e.g. TCE, MEC), heavy metals, perchlorate, and explosives in on-site groundwater, surface water, sediment and soil.

Longhorn AAP currently has a total of 47 Defense Sites Environmental Restoration Tracking System (DSERTS) (see DSERTS chart in Schedule section) including inert and production landfills, burning areas, storage tanks, and production areas.

- = 10 Sites are still active
- = 37 Sites are Response Complete
 - 6 closed by NFA ROD
 - 2 closed after SI
 - 10 closed under RCRA
 - 19 closed after PA

Perchlorate Investigations addressed by the IRP have been funded under LHAAP-35 and the number of open sites may change.

Interim remedial actions (IRAs) have been performed at four sites (LHAAP-12, 16, 18 and 24). Landfill caps were placed at LHAAP-12 and 16. LHAAP-18 and 24 have a groundwater treatment facility (to treat chlorinated solvents and perchlorate) and interception collection trenches in place and in operation. At Burning Ground 3 (LHAAP-18, 24), approximately 30,000 cy of VOCs-contaminated source material were removed. The production lines sumps were grouped together with investigation, characterization, removal and disposal action completed in FY97.

Investigations currently under way address contamination at Site 16, the Group 2 Sites (LHAAP-12, 17, 18, 24, 29 and 32) and Group 4 Sites (production area or LHAAP-35). VOCs (primarily methylene chloride, trichloroethene and their daughter compounds) are the dominant contaminants in the soil and groundwater at LHAAP-12, 16, 18, 24 and 35. At LHAAP-17, 29, and 32, explosives in soil and the previously mentioned VOCs in soil and groundwater are the dominant contaminants of concern.

Measures have been implemented at LHAAP-16, 18 and 24 to intercept groundwater contaminated with VOCs and perchlorate that has the potential to flow to Harrison Bayou. At LHAAP-18 and 24, interception collection trenches, installed as a part of the IRA, were designed to collect groundwater flowing from the contaminated areas of those sites. That collected water is then pumped to the groundwater treatment plant, where the contaminants are removed and the treated water is discharged to Harrison Bayou. At LHAAP-16, extraction wells were placed between the landfill and Harrison bayou to intercept the contaminated groundwater. The water taken from these wells is also treated at the LHAAP-18/24 Treatment Plant. A fluidized bed reactor has been added to the treatment system for perchlorate removal.

In 2002, sediment samples were taken from Caddo Lake in the area of Goose Prairie Creek (off site), that detected elevated levels of metals.

PREVIOUS STUDIES

031155

Title	Author	Date
Assessment of Contaminant Migration, Longhorn Army Ammunition Plant	The Robert H. Balter Co.	1-Apr-79
Installation Assessment of Longhorn Army Ammunition Plant, Report No. 150.	U.S. Army Toxic and Hazardous Materials Agency	1-Feb-80
Land Disposal Study No. 38-26-0104-81, LHAAP, 23 January - 8 February 1980.	USAEHA	26-May-80
Wastewater Engineering Special Study No. 32-62-0182-82.	USAEHA, Regional Div., South	1-Sep-81
Phase II, Hazardous Waste Management Special Study No. 39-26-0147-83, DARCOM Open-Burning/Open-Detonation Grounds Evaluation, LHAAP, 31 July - 3 August 1981	USAEHA	1-Sep-83
Closure of Unlined Evaporation Pond	Kindle, Stone and Associates	15-Jun-84
Longhorn Army Ammunition Plant Contamination Survey, Contract # DAAA09-78-C-3004	Environmental Protection Systems, Inc.	1-Jun-84
Closure Report, Unlined Evaporation Pond, Longhorn Army Ammunition Plant	Army Corps of Engineers, Tulsa	1-Jun-86
Interim Risk Assessment for Burning Ground 3 & Unlined Evaporation Pond Sites (18 & 24)	Army Corps of Engineers, Tulsa	18-Jan-94
Soil and Groundwater Background Concentration Study	Army Corps of Engineers, Tulsa	12-May-94
Remedial Investigation /Feasibility Study Report for Areas 13 & 14	Army Corps of Engineers, Tulsa	1-Jun-94
Draft Final Workplan Addendum Soil and Groundwater Background Concentration Study	Army Corps of Engineers, Tulsa	29-Jun-94
Final Soil Background Concentration Report (Revised)	Army Corps of Engineers, Tulsa	30-Mar-95
Groundwater Background Concentration Report	Army Corps of Engineers, Tulsa	9-May-95
Final Hydrogeologic Assessment Report	Army Corps of Engineers, Tulsa	11-May-95
Final Prop Plan of Action for Sites 13 & 14	Army Corps of Engineers, Tulsa	21-Jun-95
Groundwater Sampling Results-May 95, Interim Remedial Action-Phase III, Burning Ground 3 and UEP, LHAAP 18 & 24	Army Corps of Engineers, Tulsa	26-Jun-95
Final Remedial Investigation/Feasibility Study Report for Sites 13 & 14	Army Corps of Engineers, Tulsa	28-Jun-95
Final Record of Decision for Early Interim Remedial Action at Landfill Sites 12 & 16	Army Corps of Engineers, Tulsa	10-Jul-95
Final Work Plan for Phase III Interim Remedial Action at Burning Ground 3	Army Corps of Engineers, Tulsa	3-Jan-96
Group 4 Baseline Risk Assessment Work Plan	Army Corps of Engineers, Tulsa	5-Feb-96
Final Project Work Plans, Interim Remedial Action Landfills 12 & 16 Caps	Army Corps of Engineers, Tulsa	10-Jun-96
Group 4 Sumps Groundwater Monitoring Quarterly Report	Army Corps of Engineers, Tulsa	13-Jun-96
Draft Final Design Analysis Report for the Site 16 Time Critical Removal Action	Army Corps of Engineers, Tulsa	28-Jun-96
Draft Final Comprehensive Chemical Data Acquisition Plan for the RI/FS	Army Corps of Engineers, Tulsa	3-Jul-96
Draft Final Field Summary Report for the Phase II, Group 2 Sites Remedial Investigation	Army Corps of Engineers, Tulsa	17-Jul-96
Treatment Simulation and Toxicity Testing Results of Site 16 Groundwater	Army Corps of Engineers, Tulsa	8-Aug-96
Final Project Construction Drawings, Interim Remedial Action, Landfill 12 & 16 Caps	Army Corps of Engineers, Tulsa	21-Aug-96
Final Remedial Investigation Report Group 1 Sites (Sites 1, 11, 27, and XX) and Vol. 2 Baseline Risk Assessment	Army Corps of Engineers, Tulsa	30-Apr-97

PREVIOUS STUDIES

031156

Title	Author	Date
Final Record of Decision for Early Interim Remedial Action at Group 1 Sites	Army Corps of Engineers, Tulsa	Feb. 1998
Environmental Baseline Study	Army Corps of Engineers, Tulsa	Apr-98
Group 2 Final WorkPlan	Army Corps of Engineers, Tulsa	Mar-98
Group 4 Final WorkPlan	Army Corps of Engineers, Tulsa	Jul-98
Site 16 Risk Assessment	Army Corps of Engineers, Tulsa	Mar-00
Final Site 16 Remedial Investigation Report	Army Corps of Engineers, Tulsa	Oct-00

OPEN DSERTS SITES

It is assumed that ecological concerns, once completely evaluated, will not result in significant further action at any site.

The RI that was completed in 2002 did not include any perchlorate sampling data. This data is going to be included in the FS work that is expected to be completed in FY03.

Extensive additional sampling by the U.S. Fish and Wildlife Service, if recent patterns are followed, is likely to result in a large number of areas identified as having "elevated" contaminant levels, and could require considerable additional cleanup work, if property transfer on USFWS terms is to occur.

LHAAP-12, SWMU 12 LANDFILL 12

SITE DESCRIPTION

Landfill 12 (previously called the Active Landfill) was used for disposal of non-hazardous industrial waste. The landfill was used intermittently since 1963. Continuous use of the landfill began in approximately 1978. The front section of the landfill closed in March 1994; the back section was closed previously.

Groundwater analyses showed that some metals, chlorides, VOCs and explosive compounds were present. Surface water and sediment sample analyses showed similar contamination.

Site investigations conducted in 1993 concluded that an Early Interim Remedial Action (Landfill Cap) was necessary to reduce further contamination to the groundwater. The cap was completed in 1997. Cap maintenance started in 1998.

Perchlorate was detected, in soil and groundwater at low levels, in 2001.

The RI was completed in 2002 and the FS is in draft form. A 5-year review was completed for the cap in 2002.

Note: It is assumed that ecological concerns, once completely evaluated, will not result in further action at this site.

Note: Treated soil from LHAAP-18 was disposed of at this site.

PROPOSED PLAN

Complete the PP/ROD in order to resolve land use control issues. Complete an Operation and Maintenance Plan for the cap. Cap maintenance, institutional controls and long term (groundwater) monitoring will continue.

Cap maintenance will be funded under LHAAP-016.

Five year review will be funded under LHAAP-18.

STATUS

RRSE RATING:

High Risk (1A)

CONTAMINANTS OF CONCERN:

VOCs

MEDIA OF CONCERN:

Groundwater

COMPLETED IRP PHASE:

PA/SI, IRA

CURRENT IRP PHASE:

RI/FS, LTM

FUTURE IRP PHASE:

LTM

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	150			
IRA				
RD				
RA				
LTO				
LTM	50	50	50	321
Total	621,000			



LHAAP-16 LANDFILL 16

SITE DESCRIPTION

Landfill 16 (formally called the Old Landfill, ~22 acres) was originally used for disposal of products generated from the TNT Wastewater Treatment Plant. However, a variety of waste was disposed of in the landfill until the 1980s. Waste may have included burned rocket motor casings, substandard TNT, barrels of chemicals, oil, paint, scrap iron, and wood. VOCs and metals above action levels have been found in the soil, surface water, and groundwater around the site. Low levels of explosive compounds were detected in groundwater.

Site investigations conducted in 1993 concluded that an Early Interim Remedial Action (Landfill Cap) was necessary to reduce further contamination to the groundwater. The cap was completed in 1998. Eight extraction wells were installed in late 1997 to contain contamination that was seeping from groundwater into Harrison Bayou. Groundwater extracted from the Landfill 16 containment system is piped to the LHAAP-18 GWTP.

Perchlorate was detected in groundwater at this site in 2001. VOCs were detected in the surface water.

The RI was completed in 2002 and the FS is in draft form. A 5-year review was completed in 2002. Quarterly surface water sampling of the Harrison Bayou area has not shown significant contamination.

Note: It is assumed that ecological concerns, once completely evaluated, will not result in further action at this site.

Note: Treated soil from LHAAP-18 was disposed of at this site.

PROPOSED PLAN

The FS will be completed. It will include a groundwater to surface water interface model. FS completion hinges on resolution of issues related to surface water compliance point and standards. An Operation and Maintenance Plan will be completed.

A groundwater containment action is expected.

Cap maintenance, long term monitoring (groundwater and Harrison Bayou) and institutional controls will continue.

STATUS

RRSE RATING:

High Risk (1A)

CONTAMINANTS OF CONCERN:

VOCs, Perchlorates

MEDIA OF CONCERN:

Groundwater, Surface Water

COMPLETED IRP PHASE:

PA/SI, IRA

CURRENT IRP PHASE:

RIFS

FUTURE IRP PHASE:

RI/FS, IRA, RD, RA, LTO, LTM

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	115	110		
IRA		15		
RD			150	
RA			1380	
LTO			175	1270
LTM				450
Total	3,665,000			



LHAAP-17

NO. 2 FLASHING AREA/BURNING GROUND

SITE DESCRIPTION

This site (~500 x 600ft) was used for burning bulk TNT, photoflash powder, and reject material from Universal Match Corporation's production processes. The site was operated as a burning ground from 1959 until 1980. TNT has been detected in surface soils. This site is situated ~400-500 feet southwest of Burning Ground No. 3.

Waste residues were removed in 1984 and the area grassed over. VOCs and explosive compounds were found in the groundwater. Explosive compounds were found in the soil. Perchlorate was detected at this site in 2001 (groundwater 300ppm, less in soil).

The RI was completed in 2002 and the FS is in draft form.

A Research and Development project for enhanced in situ bioremediation (VOCs, perchlorate and explosives in soil and groundwater) was started in 2002.

Groundwater at this site flows extremely slowly.

PROPOSED PLAN

The FS will be completed.

Explosively-contaminated soil excavation may be needed.

An installation wide ecological study and background study will be funded under this site and LHAAP-35.

Long term monitoring will continue.

STATUS**RRSE RATING:**

High Risk (1A)

CONTAMINANTS OF CONCERN:

Explosives, VOCs, Perchlorates

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RI/FS

FUTURE IRP PHASE:

RI/FS, RD, RA, LTM

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	1774	860	60	
IRA				
RD			200	
RA				1100
LTO				
LTM				570
Total	4,564,000			



LHAAP-18

BURNING GROUND NO. 3

SITE DESCRIPTION

Burning Ground No. 3 started operation in 1955. It was used for the treatment, storage, and disposal of solid and liquid explosives, pyrotechnics, and combustible solvent wastes by open burning, open detonation and burial. The Unlined Evaporation Pond (UEP) (LHAAP-24) was constructed in 1963 within Burning Ground No. 3. Explosive compounds, VOCs, and metals were detected in soils and groundwater. In addition, perchlorate was detected in groundwater. In 1986, sludge from the UEP was removed and the area was capped. Quarterly monitoring has been conducted at the site since closure of the UEP.

In May 1995, an IRA ROD was signed. This IRA addressed soil and shallow groundwater contamination. In 1997, 30,000 cy of soil was excavated and treated; some of this soil was placed in LHAAP12 & 18. A Groundwater Treatment Plant (GWTP) with approximately 5,000 feet of interception collection trench has been installed to control migration of contaminated groundwater. The extracted groundwater is discharged into Harrison Bayou after treatment. Perchlorate was detected at this site in 2001 and a fluidized bed reactor treatment system was installed.

The RI was completed in 2002 and the FS is in draft form.

PROPOSED PLAN

Complete the FS. The PP/ROD will be funded under LHAAP-17. Additional investigation to determine the vertical extent and impact of the contamination, and a fate and transport model for perchlorate will be completed. There is a possibility that a responsible case may be eventually made for significantly limiting the both the duration of treatment plant operations and the extent of any other active remedial systems.

Operation of the GWTP and cap maintenance will continue.

The current treatment systems will be evaluated for effectiveness and replaced if needed.

STATUS

RRSE RATING:

High Risk (1A)

CONTAMINANTS OF CONCERN:

VOCs, Heavy Metals, Perchlorates

MEDIA OF CONCERN:

Soil, Groundwater, Surface Water

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RI/FS, IRA

FUTURE IRP PHASE:

RI/FS, IRA, RD, RA, LTO, LTM

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	1	500		
IRA	400	400	400	400
RD			250	
RA				2575
LTO				2197
LTM				390
Total	7,513,000			



LHAAP-24

UNLINED EVAPORATION POND

SITE DESCRIPTION

Burning Ground No. 3 (LHAAP-18) started operation in 1955. It was used for the treatment, storage, and disposal of solid and liquid explosives, pyrotechnics, and combustible solvent wastes by open burning, open detonation and burial. The Unlined Evaporation Pond (UEP) was constructed in 1963 within Burning Ground No. 3. Explosive compounds, VOCs, and metals were detected in soils and groundwater. In addition, perchlorate was detected in groundwater. In 1986, sludge from the UEP was removed and the area was capped. Quarterly monitoring has been conducted at the site since closure of the UEP.

In May 1995, an IRA ROD was signed. This IRA addressed soil and shallow groundwater contamination. In 1997, 30,000 cy of soil was excavated and treated; some of this soil was placed in LHAAP 12 & 18. A Groundwater Treatment Plant (GWTP) with approximately 5,000 feet of interception collection trench has been installed to control migration of contaminated groundwater. The extracted groundwater is discharged into Harrison Bayou after treatment. Perchlorate was detected at this site in 2001 and a fluidized bed reactor treatment system was installed.

The RI was completed in 2002 and the FS is in draft form.

PROPOSED PLAN

Complete the FS. The PP/ROD will be funded under LHAAP-17. Additional investigation to determine the vertical extent and impact of the contamination, and a fate and transport model for perchlorate will be completed. There is a possibility that a responsible case may be eventually made for significantly limiting both the duration of treatment plant operations and the extent of any other active remedial systems.

Operations for the GWTP and cap maintenance will continue.

The current treatment systems will be evaluated for effectiveness and replaced if needed.

STATUS

RRSE RATING:

High Risk (1A)

CONTAMINANTS OF CONCERN:

VOCs, Heavy Metals, Perchlorate

MEDIA OF CONCERN:

Soil, Surface Water, Groundwater

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RI/FS, IRA

FUTURE IRP PHASE:

RI/FS, IRA, RD, RA, LTO, LTM

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	1	500		
IRA	400	400	400	400
RD			250	
RA			294	1632
LTO				2089
LTM				250
Total	6,616,000			



LHAAP-29

FORMER TNT PRODUCTION AREA

SITE DESCRIPTION

The Former TNT Production Area (approximately 85 acres) was in operation from April 1943 to August 1945 as a six-line plant with a supporting acid plant. The plant produced 180 million kilograms of TNT throughout the period of operation. A bulk toluene storage area servicing the TNT Production Area was located adjacent to the production area. TNT wastewater (red water) from the production of the TNT was sent through wooden pipelines to a storage tank and pumphouse, and then to the TNT Wastewater Treatment Plant (LHAAP-32). Cooling water (blue water) from the production area ran through main lines and into an open ditch. The structures, except for the foundations, were demolished and removed in 1959.

In support of the Intermediate Nuclear Forces Treaty, a portion of the site (approximately 2 acres) was used for the washout of Pershing 1 and 2 rocket motor casings. One structure associated with this activity is still standing.

Explosive compounds have been detected in soil and surface water, sediment and groundwater samples. VOCs have also been detected in groundwater. Perchlorate was detected in soil and groundwater at this site in 2001.

The RI was completed in 2002 and the FS is in draft form.

PROPOSED PLAN

The FS will be completed. Institutional controls and groundwater monitoring are expected.

STATUS

RRSE RATING:

High Risk (1A)

CONTAMINANTS OF CONCERN:

VOCs, Perchlorates

MEDIA OF CONCERN:

Groundwater

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

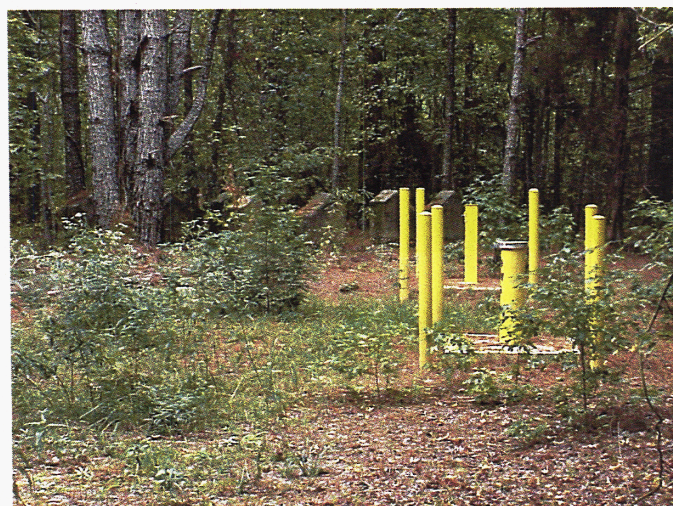
RI/FS, LTM

FUTURE IRP PHASE:

LTM

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	1			
IRA				
RD				
RA				
LTO				
LTM	50	50	25	381
Total	507,000			



FORMER TNT WASTEWATER TREATMENT PLANT

SITE DESCRIPTION

The TNT Wastewater Treatment Plant was constructed in 1942 to treat and dispose of wastewater generated at the TNT Production Area (LHAAP-29). The plant was in operation from April 1943 until August 1945. In 1959, most of the facilities at the Wastewater Treatment Plant were removed. The suspected contaminants are explosive compounds and metals contained in explosive manufacturing residues.

Surface water, groundwater, soil and sediment samples were collected in the area. Explosive compounds were detected in soils and sediments along with some elevated levels of metals. A surface water sample was collected in 1991, and the analyses detected low levels of explosive compounds. Groundwater has had no detections.

The RI was completed in 2002 and the FS is in draft form. Mercury was detected (fall 2002) in the sediment that was in the building basement.

STATUS

RRSE RATING:

Medium Risk (2A)

CONTAMINANTS OF CONCERN:

Explosives

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RI/FS, IRA

FUTURE IRP PHASE:

RD, RA

PROPOSED PLAN

Complete the FS. Soil removal, for explosives, and sediment removal, for mercury, and industrial controls are planned.

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	1			
IRA	25			
RD		75		
RA		625		
LTO				
LTM				
Total	726,000			



LHAAP-35

PROCESS WASTEWATER SUMPS-VARIOUS

SITE DESCRIPTION

This area of approximately 1,500 acres encompasses two major production areas, a maintenance area, two satellite production areas, chemical laboratory, and aboveground solvent tank farm. This site also contained 125 industrial wastewater sumps. The sumps were located in different production areas within LHAAP. All of the sumps were removed in 1996.

VOCs have been detected in groundwater at each area with 9 separate groundwater plumes (~2,500 x 2,000ft) having been identified. Metals contamination in groundwater has also been identified in several of these areas. Surface water and sediments in Goose Prairie Creek have also been impacted by VOCs as a result of inflows of contaminated groundwater. Metals were detected in the sediments in Caddo Lake near the mouth of Goose Prairie Creek.

Several buildings in this site have a history of perchlorate use. Perchlorate contamination has been identified in soil, surface water and groundwater. Interim measures are being implemented to minimize the runoff of perchlorate to Goose Prairie Creek.

The RI was completed in 2002 and the FS is in draft form. The perchlorate assessment was started in FY00 and was completed in late FY03.

PROPOSED PLAN

The FS will be completed. It will include a groundwater to surface water interface model. FS completion hinges on resolution of issues related to surface water compliance point and standards. Goose Prairie Creek sediment and surface water sampling will be funded under this site.

An installation wide ecological study and background study will be funded under this site and LHAAP-17.

RD and RA (soil removal) will be conducted for soil contaminated with perchlorate, to control migration to surface water in the Plant 3 Area and maintenance areas. LTM will be conducted at all areas to confirm that the groundwater does not pose a risk to surface water.

STATUS

RRSE RATING:

High Risk (1A)

CONTAMINANTS OF CONCERN:

Heavy Metals, VOCs, Perchlorates, TNT

MEDIA OF CONCERN:

Soil, Sediment, Surface Water, Groundwater

COMPLETED IRP PHASE:

PA/SI, Removal

CURRENT IRP PHASE: RI/FS

FUTURE IRP PHASE:

RI/FS, RD, RA, LTM

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	3031	60	60	
IRA				
RD		350		
RA		1254	2246	
LTO				
LTM				2050
Total	9,051,000			



LHAAP-45 MAGAZINE AREA

SITE DESCRIPTION

This site was used for the storage of munitions. The total enclosed area is over 800 acres; within this area are 58 bunkers 3 magazine buildings in the northeast corner, and 2 buildings. Each bunker consists of three concrete walls and a concrete-floored structure 26 x 60 x 10 feet, with a wooden roof and doors. Operations began in 1942 and ceased in 1995.

In 2000, PA sampling by USACHPPM found pentachlorophenol, metals, and perchlorate. This site was rated and now requires remedial investigations.

STATUS

RRSE RATING:

Medium Risk (2A)

CONTAMINANTS OF CONCERN:

Pentachlorophenol, Metals, Perchlorate

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

SI (non-ER,A)

FUTURE IRP PHASE:

RI/FS

PROPOSED PLAN

SI sampling of this site will be done by US Fish and Wildlife Service (non-IRP, Army funds).

For future industrial use, no further action is expected. However, to transfer this land to USFWS, soil removal may be needed. Assuming 1,000 cy of soil removal, the cost will be 100K. These estimates are based on extremely limited data, and will be refined once further sampling is completed.

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS		3		
IRA				
RD				
RA				
LTO				
LTM				
Total	3,000			

LHAAP-50

FORMER WASTE DISPOSAL FACILITY

SITE DESCRIPTION

This site received wastewater from several sumps at Plants 2 and 3 from 1955 to the early 1970s. Washout of ammonium perchlorate containers was performed on site.

VOCs were detected in the soil samples. VOCs, metals and perchlorate were detected in groundwater.

The RI was completed in 2002 and the FS is in draft form. The VOCs in groundwater pose an unacceptable risk.

STATUS

RRSE RATING:

High Risk (1A)

CONTAMINANTS OF CONCERN:

Heavy Metals, Perchlorates, Chlorinated Solvents

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RI/FS

FUTURE IRP PHASE:

RD, RA, LTM

PROPOSED PLAN

Complete the FS. With current information, soil removal, institutional controls and LTM is expected.

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	2			
IRA				
RD			50	
RA			300	
LTO				
LTM				50
Total	402,000			



LSAAP-60

FORMER STORAGE BUILDING 411 & 714

SITE DESCRIPTION

This site is comprised of Buildings 411, 411A and 714, formerly used for storage of pesticides and herbicides. Pesticides were originally stored in Building 714, but were moved to Buildings 411 and 411A in 1970. Buildings 411 and 714 have concrete floors. Building 411A has a dirt floor. None of the buildings have a curb at the doorways.

Pesticides were detected in soils at all three buildings.

The RI was completed in 2002 and the FS is in draft form. No human health risk was detected.

Groundwater will be addressed under LHAAP-35.

STATUS

RRSE RATING:

Medium Risk (2A)

CONTAMINANTS OF CONCERN:

Pesticides

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RI/FS

FUTURE IRP PHASE:

RC

PROPOSED PLAN

The FS will be completed. Institutional controls are planned.

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	2			
IRA				
RD				
RA				
LTO				
LTM				
Total	2,000			



ABOVE GROUND STORAGE TANK

SITE DESCRIPTION

This site consists of seven above ground storage tanks (ASTs) containing Number 2 fuel oil, kerosene or solvents. The ASTs have earthen dikes sufficient to contain potential spill. Motor fuel tanks were registered with the state and have been removed. Central Creek runs just to the south of this site.

In 2001, TCE was detected in groundwater. Impact is limited

The RI was completed in 2002 and the FS is in draft form.

STATUS

RRSE RATING:

Medium Risk (2A)

CONTAMINANTS OF CONCERN:

POL, Solvents

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RI/FS, LTM

FUTURE IRP PHASE:

LTM

PROPOSED PLAN

Completed FS. Institutional controls and LTM are expected.

Constrained Cost to Complete

	2003	2004	2005	2006+
RI/FS	2			
IRA				
RD				
RA				
LTO				
LTM	40	40	20	60
Total	162,000			

LHAAP SITES INCLUDED WITH LHAAP-35

LHAAP-2**VACUUM TRUCK OVERNIGHT PARKING LOT****SITE DESCRIPTION**

This site was used as overnight parking for a vacuum truck. Tanker trucks containing industrial wastewater were sometimes left at this location overnight. This parking lot is located next to Building 704D (inside the LHAAP-35 area) and use was discontinued in 1995. Record searches indicated no spills occurred at this site. This site was identified as a Solid Waste Management Unit (SWMU) in the RFA.

PROPOSED PLAN

This area is being monitored under LHAAP-35.

RRSE RATING:

Medium Risk (2A)

CONTAMINANTS OF CONCERN:

Metals

MEDIA OF CONCERN:

Groundwater, Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RIFS

FUTURE IRP PHASE:

RD, RA

LHAAP-3**WASTE COLLECTION AT PAINT SHOP****SITE DESCRIPTION**

This site was used for collection of waste (may have included paint thinner, paints, and kerosene) produced from the paint shop. The Paint Shop was located in Building 722, within the LHAAP-35 area. The site consisted of one 55-gallon drum set on a gravel pad in an open-sided shed, with a galvanized metal roof. Waste was put into the 55-gallon drum until the drum was full. The drum was then taken to Building 31-W (Hazardous Waste Storage). This site is no longer active. This site was identified as a SWMU in the RFA.

PROPOSED PLAN

This area is being monitored under LHAAP-35.

RRSE RATING:

NE- included in LHAAP-35

CONTAMINANTS OF CONCERN:

Metals, Solvents

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-4**PILOT WASTEWATER TREATMENT PLANT****SITE DESCRIPTION**

This plant received all the wastewater from all sumps on the installation. After settlement, the wastewater was transferred to one of two storage tanks, and then pumped through a heat exchanger to an evaporation tower. Solids were shipped off-site, and sludges from the settling tank were blown down and drummed on a weekly basis, and burned at Burning Ground No. 3. The Pilot Wastewater Treatment Plant was removed and closed in 1998 under an Agreed Order with TNRCC.

Soil and groundwater contamination are being addressed under LHAAP-35

PROPOSED PLAN

No further action is needed.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Metals, VOCs

MEDIA OF CONCERN:

Water

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

SITE DESCRIPTION

This site consisted of a rack outside of Building 54F (within the LHAAP-35 area). The site consisted of a single 55-gallon drum stored in a three-sided shed, approximately 8 by 10 feet in size, with fiberglass siding and a roof of galvanized metal and fiberglass. The shed was set on a curbless concrete pad. Full drums were taken to Building 31-W. This site was in operation until mid-1985.

PROPOSED PLAN

This area is being monitored under LHAAP-35. No future actions are necessary at LHAAP-6.

LHAAP-6**BUILDING 54F****RRSE RATING:**

NE- included in LHAAP-35

CONTAMINANTS OF CONCERN:

Solvents, Acid

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-7**BUILDING 50G - DRUM PROCESSING****SITE DESCRIPTION**

This site was a washdown area for empty drums used in production (within the LHAAP-35 area). The site consisted of a wooden frame building 30 by 100 feet in size, set on concrete and having transite walls. Main washdown took place in a separate bay, 20 by 30 feet in size. All washdown water drained to a 3,000-gallon sump outside, Sump No. 70. This sump has been removed. Empty drums were either reused or flashed at the Air Curtain Destructor and sent to Building 49-W for disposal as scrap. This site ceased operation in 1995.

PROPOSED PLAN

This area is being monitored under LHAAP-35. This area is being incorporated as part of the LHAAP-35 remediation.

RRSE RATING:

NE- included in LHAAP-35

CONTAMINANTS OF CONCERN:

VOCs

MEDIA OF CONCERN:

Groundwater, Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-8**SEWAGE TREATMENT PLANT****SITE DESCRIPTION**

This site is not eligible for ER,A funding.

This site is a sewage treatment plant consisting of an Imhoff tank, a sand filter, and three inactive sludge beds. Sludge was dried on sand beds then shipped to Landfill 16. This site has been active from 1942. Although this site was identified as a SWMU in the RFA, the TNRCC determined that there were no additional investigations required at this site.

The site was closed in 1999 under the requirements of the closure plan approved by TNRCC.

Soil and groundwater contamination are being addressed under LHAAP-35

PROPOSED PLAN

No further action is needed.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Residues from production material

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-36**EXPLOSIVE WASTE PADS (20)****SITE DESCRIPTION**

This site is a compilation of 20 waste pads within the LHAAP-35 area. These waste pads consist of a galvanized metal roof set over a concrete 4- by 8-foot pad with a 6-inch curb. The waste pads were drained by concrete troughs into sumps. Explosive waste was desensitized with diesel fuel and placed in 5-gallon, galvanized, lidded, metal garbage pails with plastic bag liners. Full garbage pails were stored in a metal rack ~1.5 feet above the ground. The site was in operation from 1985 until the early 1990's.

PROPOSED PLAN

This area is being monitored under LHAAP-35. This area is being incorporated as part of the LHAAP-35 remediation.

RRSE RATING:

NE- included in LHAAP-35

CONTAMINANTS OF CONCERN:

Heavy Metals

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-37**CHEMICAL LABORATORY WASTE PAD****SITE DESCRIPTION**

This site served as a collection point for spent solvents from the Chemical Laboratory from 1985 to 1997. This site is within the LHAAP-35. The site held one 55-gallon, plastic, DOT approved drum set on a concrete pad. Each full drum was sent to Building 31-W (Hazardous Waste Storage) for disposal.

PROPOSED PLAN

This area is being monitored under LHAAP-35. This area is being incorporated as part of the LHAAP-35 remediation.

RRSE RATING:

NE- included in LHAAP-35

CONTAMINANTS OF CONCERN:

VOCs

MEDIA OF CONCERN:

Soil, Groundwater, Surface Water

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-58 MAINTENANCE COMPLEX

SITE DESCRIPTION

This site is a maintenance complex with concrete floors and no curbs at the doorways. Floor drains are connected to the sanitary sewer. Lubricants are stored on drum racks outside over a gravel surface. No curbing or other containment is present. Waste oil and solvents are transferred to Building 31-W. The area is still being used by the company that is excessing the plant. This site is totally included in the Group 4 RI/FS study (LHAAP-35). Future action will be addressed under LHAAP-35.

Soil and groundwater are being addressed under Site 35.

PROPOSED PLAN

This site requires NFA under the IRP.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

POL, Solvents

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-68 MOBILE STORAGE TANK PARKING AREA

SITE DESCRIPTION

This site contains two mobile storage tank (600 gallon) compartments on tank trucks used prior to 1985. These vehicles are used throughout the facility and are parked on the asphalt surface at the maintenance complex. No curb or other containment is present at the parking facility. Mobile storage tanks contain Number 2 diesel and gasoline.

Findings from the Army's preliminary assessment conducted in 1988 concluded that no further action is necessary at this site. Regulators did not agree to NFA, so this site has been included in the Group 4 RI/FS, LHAAP-35.

PROPOSED PLAN

This site requires NFA under the IRP.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

POL

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

RESPONSE COMPLETE DSERTS SITES

LHAAP-1, SWMU 1 INERT BURNING GROUNDS

SITE DESCRIPTION

This site was used for the burning of trash, ashes, scrap lumber, and waste from burned TNT. Universal Match Corporation used this site during the 1950s for burning photoflash powder and other discarded materials. In 1982, investigations at this site included completion and sampling of one groundwater well and three surface soil samples. Contamination by metals, chloride, sulfate, and two explosive compounds was detected. Trace explosive concentrations were detected in a down gradient well in 1988. This site is included in the FFA.

A No Action ROD was signed in January 1998.

RRSE RATING:

Low Risk (3A)

CONTAMINANTS OF CONCERN:

Explosive chemicals/inert materials

MEDIA OF CONCERN:

Groundwater, Soil

COMPLETED IRP PHASE:

PA/SI, RI/FS, ROD

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-5 POWER HOUSE BOILER POND

SITE DESCRIPTION

This site is not eligible for ER,A funding.

This site was in operation from 1978 to 1999. It consisted of a 4-foot-deep earthen lagoon lined with a polyvinylchloride (PVC) liner. The lagoon received approximately 3,000 gallons per day of backwash water from zeolite treatment units at the Building 401 Powerhouse. Water was either evaporated from the lagoon or discharged to the sewage treatment plant.

The site was closed in 1999, by removing the liner, filling with soil and seeding under the NPDES permit closure plan requirements.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

None

MEDIA OF CONCERN:

None

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

PILOT WASTEWATER TREATMENT PLANT

SITE DESCRIPTION

This site is not eligible for ER,A funding.

Building 31-W was a storage area for containers of liquid hazardous waste, PCBs and various chemicals from the early 1950s to 1995. This site was closed in 1999.

Although this site was identified as a SWMU in the RFA, the TNRCC determined that there were no additional investigations required at this site.

This site is being closed under the current RCRA permit.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

None

MEDIA OF CONCERN:

None

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

SITE DESCRIPTION

Burial of contaminated wastes occurred in the general area just north of Avenue Q, bounded by Avenue P on the west and the explosive burning ground on the east. An area near the intersection of Avenues Q and P was identified as a possible TNT disposal site in use during the 1940s.

A concrete block was discovered in this area during an assessment conducted in 1980, but its purpose was unknown. There is an area a few hectares in size located just west of the intersection of track 3-A and Avenue Q. This area was used during the late 1940s and early 1950s for the disposal of acids, building rubble, and other trash.

Surface and subsurface soil samples were collected in 1984 and 1988. Low levels of explosive contamination were detected in both soil sampling events. This site is included in the FFA.

A No Action ROD was signed in January 1998.

LHAAP-11
BUILDING 54F**RRSE RATING:**

3A Low Risk

CONTAMINANTS OF CONCERN:

TNT

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA/SI, RI/FS, ROD

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-13, SWMU 13**SUSP. TNT BURIAL BETWEEN ACTIVE LANDFILL & OLD LANDFILL****SITE DESCRIPTION**

The Suspected TNT Burial Site/Acid Dump is an undocumented location, where it is suspected that TNT or waste acids may have been disposed, sometime during the history of the installation. Other than this suspected one-time disposal, no other activities have taken place at this site. Evidence of possible TNT burial or acid waste disposal at the site consisted of several areas of little or no vegetation, that is consistent with the suspicion that some form of waste disposal has occurred at this location.

Examination of aerial photographs dated 1963 show these same locations stripped of vegetation with some type of activity being performed at the site. These locations were not evident in 1954 photos, and most of the area appears to be re-vegetated and inactive in 1970 photos. This site is included in the FFA. Completion of the remedial investigation fieldwork conducted in 1993 concluded that no further investigation was needed at this site.

The final RI/FS report was submitted June 1995, and the No Action ROD was signed by EPA in February 1996.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Waste Acid

MEDIA OF CONCERN:

Groundwater, Soil

COMPLETED IRP PHASE:

ROD

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-14**AREA 54 BURIAL GROUND****SITE DESCRIPTION**

The Area 54 Burial Ground is an undocumented location where it was suspected that demolition debris, building rubble, explosives, and acidic wastes were disposed during the 1940s and early 1950s. The disposal site is reportedly beneath the asphalt parking area adjacent to Building 49-W. Other than this period of operation, no other waste disposal activities have taken place at the site. This site is included in the FFA. Completion of remedial investigation fieldwork conducted in 1993 concluded that no further investigation was needed at this site.

The final RI/FS report was submitted June 1995 and the No Action ROD was signed by EPA in February 1996.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Oil

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-15 AREA 49W DRUM STORAGE

SITE DESCRIPTION

This site is not eligible for ER,A funding.

This site is a drummed waste storage shed containing solid and hazardous waste. It consists of a metal building 50 feet by 100 feet by 10/16 feet (sloped), with a concrete floor. This site was in operation from 1984 to 1999. Although this site was identified as a SWMU in the RFA, LHAAP, with TNRCC concurrence, determined that there were no additional investigations required at this site.

This site is being closed under the current RCRA permit.

RRSE RATING:

NE- Not eligible for ER,A funds

CONTAMINANTS OF CONCERN:

None

MEDIA OF CONCERN:

None

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-19 CONSTRUCTION MATERIALS LANDFILL

SITE DESCRIPTION

This is an active site, and therefore not eligible for ER,A funding.

This site is a fenced 400 x 800 feet landfill. The site began operations in 1985 for the disposal of construction debris.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

None

MEDIA OF CONCERN:

None

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-23**BUILDING 707-STORAGE AREA FOR PCBs****SITE DESCRIPTION**

This site is not eligible for ER,A funds.

This site consisted of a 30 by 150 feet, wooden, storage building, with shingle siding and a concrete floor. Drums or transformers containing PCB-contaminated oil were stored in galvanized steel cattle watering troughs inside the building. The building is empty except for the used cattle troughs. This site was in operation from 1980 until March 1986.

The building is being closed under Minor Project Funding.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

PCBs

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-27, SWMU 27**SOUTH TEST AREA/BOMB TEST AREA****SITE DESCRIPTION**

The South Test Area was constructed in 1954 for testing of photoflash bombs. During the late 1950s, illuminating signal devices were also demilitarized within pits at the site. Until the early 1980s, photoflash cartridges were demilitarized in the area. This site is no longer in operation.

In 1982, investigations included installation and sampling of two wells and three shallow soil samples. Metals, explosives, chloride and sulfate were detected above background levels in the soil samples. Metals, chloride and sulfate were detected above background, but below action levels in the groundwater.

This site is included in the FFA. A No Action ROD was signed in January 1998.

RRSE RATING:

Low Risk (3A)

CONTAMINANTS OF CONCERN:

Ordinance Components

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA/SI, RI/FS, ROD

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-34**BUILDING 701-PCB STORAGE****SITE DESCRIPTION**

This site is not eligible for ER,A funds.

This site consists of Building 701 that was used for storage of PCB-contaminated material from 1980 to 1984. The contaminated material from the cleanup of transformer spills was stored in 30- and 55-gallon drums in the north end of the building. The storage area was a wooden framed building with shingles and a concrete floor, approximately 25 x 110 feet in dimension. The building is currently not used.

Soil samples found no contamination.

This site is being closed under Minor Project Funding.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

PCBs

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-39**25X WASHOUT PAD****SITE DESCRIPTION**

This site is located within Burning Ground No. 3 which is under IRA and RI/FS phases.

This site was combined with sites LHAAP-18 & 24, therefore it requires NFA under the IRP.

RRSE RATING:

NE - combined with LHAAP-18, 24

CONTAMINANTS OF CONCERN:

POL, Solvents, Heavy Metals

MEDIA OF CONCERN:

Soil, Groundwater, Surface Water

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RI/FS, IRA (EP,R#94-021)

FUTURE IRP PHASE:

RD/RA (EP,R#92-011)

PHOTOGRAPHIC LAB - BUILDING 60B**SITE DESCRIPTION**

Building 60B was the location for processing of x-ray film. The building has a concrete floor without a floor drain. Spent developing waste was drummed and transferred to Building 31-W for disposal. Findings from the Army's preliminary assessment conducted in 1988 concluded that no further action is necessary.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Acid, Base

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

MAGAZINE WASHOUT AREA**SITE DESCRIPTION**

The Plant 1 Magazine Area contains 58 Richmond-type magazines and two aboveground magazines, all of which had been used for the storage of TNT. A standpipe near the intersection of Avenue E and 19th Street was used to wash out trucks used for the transport of TNT. Wastewater from this operation may have flowed onto the ground.

Findings from the Army's preliminary assessment and recent re-evaluation concluded that a site investigation should be performed. The site investigation was conducted in FY96. Findings from the Army's site investigation concluded that no further action is necessary. EPA and TNRCC concurred with this conclusion.

RRSE RATING:

Low Risk (3A)

CONTAMINANTS OF CONCERN:

Explosive Chemicals

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-53 STATIC TEST AREA

SITE DESCRIPTION

The site was formerly used for rocket motor, red phosphorus smoke wedge, and illuminating candle testing. This static test area also has a candle test area. This site is located next to the HMX Area and approximately one mile behind LHAAP-16. The last activity of this site was demilitarization by ignition of Pershing rocket motors performed on test stands in 1991.

Findings from the Army's preliminary assessment concluded that no further action is necessary.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Propellant, Explosives

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-54 GROUND SIGNAL TEST AREA

SITE DESCRIPTION

The Ground Signal Test Area is currently used for aerial and on-ground testing of pyrotechnic, illuminators, and signal devices manufactured at the facility. Since 1988, burnout of Pershing missiles has been conducted at this site in accordance with the Intermediate-Range Nuclear Forces (INF) Treaty. The site has been used intermittently since 1963 for various types of testing and destruction of many explosive devices.

In 1982, investigations included installation and sampling of two groundwater wells and three surface samples. Elevated levels of some metals were detected in the soil and groundwater. Elevated levels (above background, but below action levels) of chloride and sulfate were detected in the groundwater. This site is included in the FFA.

A No Action ROD was signed in January 1998.

RRSE RATING:

Low Risk (3A)

CONTAMINANTS OF CONCERN:

Propellant, Explosives

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

ROD (NFA)

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

**LHAAP-55
SEPTIC TANK****SITE DESCRIPTION**

This site contains ten septic tanks with outfalls to ditches, which serve outlying areas of the installation. Contents of septic tanks are pumped out and transferred to the sewage treatment plant as needed. The effluent is chlorinated prior to discharge. There is no history of industrial waste being put into these septic tanks.

Findings from the Army's preliminary assessment conducted in 1988 concluded that no further action is necessary. Regulators agreed.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Refuse without Hazardous Waste

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

SITE DESCRIPTION

This site is used for burial of inert materials that were cleared from property after acquisition.

Findings from the Army's preliminary assessment conducted in 1988 concluded that no further action is necessary. Regulators agreed.

**LHAAP-57
RUBBLE BURIAL SITE****RRSE RATING:**

NE

CONTAMINANTS OF CONCERN:

Unknown

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-61**WATER TREATMENT PLANT EFFLUENT SETTLING POND****SITE DESCRIPTION**

This facility consists of two adjacent ponds each 0.1 hectare by 1.5 meters deep. The ponds are located just north of the shops area. Synthetic waterproof sheeting with soil cover constitutes the pond liner. The purpose of the facility is to settle out solids from the backwashing water treatment sand filters. Drainage is to Goose Prairie Bayou.

Findings from the Army's preliminary assessment concluded that no further action is necessary at this site.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Industrial Sludge

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

**LHAAP-63
BURIAL PITS****SITE DESCRIPTION**

Pits are located along Bobby Jones Road, approximately 30 meters north of Long Point Road, and east of the explosive burning ground. These pits were used in the late 1950s for the detonation of Plant 3 reject materials of unknown composition. The site investigation was conducted in FY96. Based on analytical results, no further action is required at this site.

RRSE RATING:

Low Risk (3A)

CONTAMINANTS OF CONCERN:

Explosives

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA/SI

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-64**TRANSFORMER STORAGE****SITE DESCRIPTION**

This site is used for storage of transformer oil. Approximately 20 out-of-service non-PCB transformers were stored on pallets outside, with no curb or other containment.

Findings from the Army's preliminary assessment conducted in 1988 concluded that no further action is necessary at this site.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

POL, PCBs

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-66**TRANSFORMER AT BUILDING 401****SITE DESCRIPTION**

A transformer at Building 401 dripped oil continuously for approximately 1 year. The transformer did not contain any polychlorinated biphenyls.

Findings from the Army's preliminary assessment conducted in 1988 concluded that no action is necessary at this site.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

Oil

MEDIA OF CONCERN:

Soil

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-69

SERVICE STATION USTs

SITE DESCRIPTION

This site consisted of six leaking gasoline underground storage tanks (USTs) that were leak tested in 1989. The tanks were replaced in 1993, and the site has been remediated.

Since this site was still active at the time of the PA, it was not eligible for ER,A funds. All action was addressed under RCRA guidelines.

The building is being closed under Minor Project Funding.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

POL

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA/SI, RI/FS, RD/RA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

LHAAP-70

LOADING DOCK/MAGAZINE AREA

SITE DESCRIPTION

On December 18, 1952, improperly stacked 23-kilogram fiberboard boxes of TNT fell in magazine area 811-50, resulting in the spill of a large quantity of TNT and the injury of a workman. Findings from the Army's preliminary assessment conducted in 1988 concluded that no action is necessary at this site.

RRSE RATING:

NE

CONTAMINANTS OF CONCERN:

TNT, Explosives

MEDIA OF CONCERN:

Soil, Groundwater

COMPLETED IRP PHASE:

PA

CURRENT IRP PHASE:

RC

FUTURE IRP PHASE:

RC

Schedule

PAST MILESTONES

Various environmental investigations, studies, and reports have been conducted since 1980 to address possible contamination at LHAAP. LHAAP was progressing towards a RCRA permit when the installation was listed on the National Priority List (NPL). A FFA was signed in December 1991, and the RCRA permit was signed in February 1992. A summary of the current project milestones, based on funding availability, for the remedial activities is given below. Approved regulatory schedules, which are part of the FFA, are included on the following pages to summarize submittal dates for primary and secondary documents.

1986	IRA - Capping LHAAP-18 IRA - Soil Removal and Capping LHAAP-24	
1988	RFA Installation	APR
1989	LTM - Groundwater Monitoring System installed at LHAAP 18 & 24	
1992	PA - Initiation at all sites	MAY
1993	RI/FS - Initiated - Group 1 (LHAAP-1, 11, 27, 54)	
1994	IRA - 18 & 24 Design Initiated	OCT
1995	SI - Initiated - Group 5 (LHAAP-50, 52, 60, 63) ROD - Early Interim Action, LHAAP 18 & 24 ROD - Interim Action LHAAP 12 & 16 RI/FS - completed - Group 3 (LHAAP-13, 14)	JAN MAR JUL JUL
1996	ROD - Group 3, NFA	FEB
1997	SI - Completed - Group 5 (LHAAP-50, 52, 60, 63) RI/FS - Completed - Group 1 ROD - Group 1	JAN JUL OCT
1998	IRA 12 & 16 Completed	DEC
1999	RI Completed - Site 16	OCT
2000	RA Completed - Site 16	MAR
2001	RI Completed - Group 2	MAY
2002	RI Completed - Group 4	

Schedule

PROJECTED MILESTONES

2007

RIP for all sites

Schedule

NO FURTHER ACTION SITES

The following sites currently require no further action under the ER,A program:

LHAAP-01	INERT BURNING GROUNDS - SWMU 1
LHAAP-02	VACUUM TRUCK OVERNIGHT PARKING LOT
LHAAP-03	BUILDING 722- PAINT SHOP
LHAAP-04	LHAAP PILOT WASTEWATER TREATMENT PLANT
LHAAP-05	POWER HOUSE BOILER POND
LHAAP-06	BUILDING 54F SOLVENT
LHAAP-07	BUILDING 50G DRUM PROCESSING
LHAAP-08	SEWAGE TREATMENT PLANT
LHAAP-09	BUILDING 31-W DRUM STORAGE
LHAAP-11	SIS TNT BURIAL SITE AT AVE P & Q - SWMU 11
LHAAP-13	SUS TNT BET ACTIVE & OLD LANDFILL SWMU 13
LHAAP-14	AREA-54 BURIAL GROUND - SWMU 14
LHAAP-15	AREA 49W DRUM STORAGE
LHAAP-19	CONSTRUCTION MATERIALS LANDFILL
LHAAP-23	BUILDING 707-STORAGE AREA PCBS
LHAAP-27	SOUTH TEST AREA/BOMB TEST AREA - SWMU 27
LHAAP-34	BUILDING 701 PCB STORAGE
LHAAP-36	EXPLOSIVE WASTE PADS (27)
LHAAP-37	QUALITY ASSURANCE LABORATORY BLDG 29-A
LHAAP-39	25X WASHOUT PAD
LHAAP-51	PHOTOGRAPHIC LABORATORY/BLDG #60B
LHAAP-52	MAGAZINE AREA WASHOUT
LHAAP-53	STATIC TEST AREA
LHAAP-54	GRD SIGNAL TEST AREA
LHAAP-55	SEPTIC TANK (10)
LHAAP-57	RUBBLE BURIAL SITE
LHAAP-58	MAINTENANCE COMPLEX
LHAAP-61	POTABLE WTP SEDIMENT POND
LHAAP-63	BURIAL PITS
LHAAP-64	TRANSFORMER STORAGE
LHAAP-66	TRANSFORMER AT BLDG 401
LHAAP-68	MOBILE STORAGE TANK PARKING AREA
LHAAP-69	SERVICE STATION UST'S
LHAAP-70	LOADING DOCK-MAGAZINE AREA
LHAAP-71	OIL SPILL, BUILDING 813

Longhorn AAP IRP Schedule

(Based on current funding constraints)

DSERTS #	PHASE	FY03	FY04	FY05	FY06	FY07	FY08	FY09+
LHAAP-12	RI/FS							
	LTM							
LHAAP-16	RI/FS							
	IRA							
	RD							
	RA							
	LTO							
	LTM							
LHAAP-17	RI/FS							
	RD							
	RA							
	LTM							
LHAAP-18	RI/FS							
	IRA							
	RD							
	RA							
	LTO							
	LTM							
LHAAP-24	RI/FS							
	IRA							
	RD							
	RA							
	LTO							
	LTM							
LHAAP-29	RI/FS							
	LTM							
LHAAP-32	RI/FS							
	IRA							
	RD							
	RA							
LHAAP-35	RI/FS							
	RD							
	RA							
	LTM							
LHAAP-45	RI/FS							
LHAAP-50	RI/FS							
	RD							
	RA							
	LTM							
LHAAP-60	RI/FS							
LHAAP-67	RI/FS							
	LTM							

DEFENSE SITE ENVIRONMENTAL RESTORATION TRACKING SYSTEM

		Site, 4.		Installation Phase Summary Report				12/4/2002	
Installation:		LONGHORN AAP							
Programs:				BRAC I, BRAC II, BRAC III, BRAC IV, IRP					
Subprograms:				Compliance, Restoration, UXO					
Installation count for Programs:				1					
NPL Options:				Delisted, No, Proposed, Yes					
Installations count for Programs and NPL:				1					
Site count for Programs and NPL:				47					
Phase / Status / Sites									
PA				SI					
C	U	F	RC	C	U	F	RC		
47	0	0	17	29	0	0	11		
RI / FS				RD					
C	U	F	RC	C	U	F			
6	12	0	6	0	0	9			
RA(C)				RA(O)					
C	U	F	RC	C	U	F	RC		
1	0	9	1	0	0	2	0		
				LTM					
				C	U	F	N		
				0	0	8	39		
Remedy / Status / Sites (Actions)									
				IRA					
				C	U	F			
				0 (0)	4 (4)	0 (0)			
				FRA					
				C	U	F			
				0 (0)	0 (0)	9 (10)			
RIP Total:		0							
RC Total:		35							
Reporting Period End Date: 09/30/2002									

DEFENSE SITE ENVIRONMENTAL RESTORATION TRACKING SYSTEM

Site, 7. SITE SUMMARY										12/04/2002					
Installation:	LONGHORN AAP			Major Command AMC											
FFID:	TX213820529			Subcommand: OSC											
Program Options:	IRP, BRAC I, BRAC II, BRAC III, BRAC IV														
Subprogram Options:	Compliance, Restoration, UXO														
Site	Description	Site Type	RRSE	PA	SI	RI	RD	RA(C)	RA(O)	LTM	IRA	IRA	RIP	RC	
Phase Status															
Compleat Underway															
LHAAP-001	INERT BURNING GROUNDS (SWMU 1)	Burn Area	3A	C	C	C			N	N	0	0	0	199801	
LHAAP-002	VACCUM TRUCK OVERNITE PARKING LOT	Storage Area	NE	C					N	N	0	0	0	198705	
LHAAP-003	BUILDING 722-PAINT SHOP	Storage Area	NE	C					N	N	0	0	0	198705	
LHAAP-004	LHAAP PILOT WASTEWATER TREATMENT	Waste Treatment Plant	NE	C					N	N	0	0	0	198705	
LHAAP-005	POWER HOUSE BOILER POND	Surface Impoundment/Lagc	NE	C					N	N	0	0	0	198705	
LHAAP-006	BUILDING 54F SOLVENT	Storage Area	NE	C					N	N	0	0	0	198705	
LHAAP-007	BUILDING 50G DRUM PROCESSING	Storage Area	NE	C					N	N	0	0	0	198705	
LHAAP-008	SEWAGE TREATMENT PLANT	Waste Treatment Plant	NE	C					N	N	0	0	0	198705	
LHAAP-009	BUILDING 31-W DRUM STORAGE	Storage Area	NE	C					N	N	0	0	0	198705	
LHAAP-011	SUS TNT BURIAL SITE AT AVE P&Q(SWMU	Landfill	3A	C	C	C			N	N	0	0	0	199801	
LHAAP-012	ACTIVE LANDFILL (SWMU 12)	Landfill	1A	C	C	U	N	N	N	F	0	1	0	200307	
LHAAP-013	SUS TNT BET ACTIVE&OLD LANDFILL(SWM	Landfill	3A	C	C	C			N	N	0	0	0	199512	
LHAAP-014	AREA 54 BURIAL GRND (SWMU 14)	Landfill	3A	C	C	C			N	N	0	0	0	199512	
LHAAP-015	AREA 49W DRUM STORAGE	Storage Area	NE	C					N	N	0	0	0	198705	
LHAAP-016	OLD LANDFILL (SWMU 16)	Landfill	1A	C	C	U	F	F	N	F	0	1	0	200508	
LHAAP-017	NO 2 FLASHING AREA BRN GROUND(SWMU	Burn Area	1A	C	C	U	F	F	N	F	0	0	0	200509	
LHAAP-018	BURNING GROUND/WASHOUT POND(SWMU	Burn Area	2A	C	C	U	F	F	F	F	0	1	200709	201409	
LHAAP-019	CONSTRUCTION MATERIALS LANDFILL	Landfill	NE	C	C				N	N	0	0	0	198705	
LHAAP-023	BUILDING 707-STORAGE AREA PCBS	Storage Area	NE	C	C				N	N	0	0	0	198705	
LHAAP-024	FORMER UNLINED EVAP POND (SWMU 24)	Surface Impoundment/Lagc	2A	C	C	U	F	F	F	F	0	1	200709	201409	
LHAAP-027	SOUTH TEST AREA/BOMB TEST AREA(SWM	Spill Site Area	3A	C	C	C			N	N	0	0	0	199801	
LHAAP-029	FORMER TNT PRODUCTION AREA(SWMU 2	Waste Lines	1A	C	C	U	F	F	N	F	0	0	0	200709	
LHAAP-032	FORMER TNT WASTE DISPOSAL PLT(SWMU	Disposal Pit/Dry Well	2A	C	C	U	F	F	N	N	0	0	0	201009	
LHAAP-034	BUILDING 701 PCB STORAGE	Storage Area	NE	C	C				N	N	0	0	0	198705	
LHAAP-035	SUMPS (145) VARIOUS	Underground Storage Tank	1A	C	C	U	F	F	N	F	0	0	0	200609	
LHAAP-036	EXPLOSIVE WASTE PADS (27)	Storage Area	NE	C	C				N	N	0	0	0	198705	
LHAAP-037	QUALITY ASSURANCE LABORATORY-BLDG	Storage Area	NE	C					N	N	0	0	0	199008	
LHAAP-039	25X WASHOUT PAD	Storage Area	NE	C					N	N	0	0	0	199008	
LHAAP-045	MAGAZINE AREA	Storage Area	2A	C	C	U	N	N	N	N	0	0	0	200309	
LHAAP-050	FORMER WASTE DISPOSAL FACILITY	Waste Lines	1A	C	C	U	F	F	N	F	0	0	0	200709	
LHAAP-051	PHOTOGRAPHIC LABORATORY/BLDG #60B	Spill Site Area	NE	C					N	N	0	0	0	199008	

Site	Description	Site Type	RRSE	PA	SI	RI	RD	RA(C)	RA(O)	LTM	IRA	IRA	RIP	RC
										Complete	Underway			
LHAAP-052	MAGAZINE AREA WASHOUT	Spill Site Area	3A	C	C				N	N	0	0	0	199805
LHAAP-053	STATIC TEST AREA	Other	NE	C					N	N	0	0	0	199008
LHAAP-054	GRD SIGNAL TEST AREA (LHAAP-XX)	Spill Site Area	3A	C	C	C			N	N	0	0	0	199801
LHAAP-055	SEPTIC TANK (10)	Waste Treatment Plant	NE	C					N	N	0	0	0	199008
LHAAP-057	RUBBLE BURIAL SITE	Landfill	NE	C					N	N	0	0	0	199008
LHAAP-058	MAINTENANCE COMPLEX	Spill Site Area	NE	C	C				N	N	0	0	0	199506
LHAAP-060	FORMER STORAGE BUILDING #411 & #714	Storage Area	2A	C	C	U	F	F	N	N	0	0	0	200908
LHAAP-061	POTABLE WTP SEDIMENT POND	Waste Treatment Plant	NE	C					N	N	0	0	0	199008
LHAAP-063	BURIAL PITS	Disposal Pit/Dry Well	3A	C	C				N	N	0	0	0	199805
LHAAP-064	TRANSFORMER STORAGE	Storage Area	NE	C	C				N	N	0	0	0	199506
LHAAP-066	TRANSFORMER AT BLDG 401	Spill Site Area	NE	C	C				N	N	0	0	0	199506
LHAAP-067	ABOVE GROUND STORAGE TANK	Above Ground Storage Tank	2A	C	C	U	N	N	N	N	0	0	0	200309
LHAAP-068	MOBILE STORAGE TANK PARKING AREA	Storage Area	NE	C		N	N		N	N	0	0	0	199008
LHAAP-069	SERVICE STATION UST'S	Underground Storage Tank	NE	C				C		N	0	0	0	199306
LHAAP-070	LOADING DOCK-MAGAZINE AREA	Spill Site Area	NE	C	C				N	N	0	0	0	199506
LHAAP-071	OIL SPILL, BLDG 813	Spill Site Area	NE	C	C				N	N	0	0	0	199506
									Report Period End Date: 09/30/2002					

031195

REM/IRA/RAASSESSMENT

Past REM/IRA/RA

- LHAAP 18 & 24 - Burning Ground/Washout Ponds & Former Unlined Evaporation Pond Long Term Monitoring (LTM) System installed in 1989.
- LHAAP 18 & 24 - Burning Ground/Washout Ponds & Former Unlined Evaporation Pond Interim Remedial Action, Waste Removal and Capping accomplished in 1986.
- LHAAP 18 & 24 - Burning Ground/Washout Ponds & Former Unlined Evaporation Pond LTM System installed in 1989. Cost \$90.0K.
- LHAAP 18 & 24 - Burning Ground/ Washout Ponds & Former Unlined Evaporation Pond Installed Groundwater Treatment System for organic contamination and excavated soil. Construction began March 1995. Cost FY 93 through FY00 \$ 27M.
- LHAAP 12 & 16 - Active and Old Landfill Landfills were capped, treated soil from Inert Burning Ground (LHAAP-001) was placed on landfills prior to cap construction. Caps are to mitigate groundwater contamination from landfill leachate. Cost FY95 through FY98 is \$5.5M.
- LHAAP 035 - Sumps (145) Various Waste sumps and their contents were sampled, removed as necessary, and disposed of in accordance with regulatory standards. Cost FY95 through FY97 is \$2.4M.

Current REM/IRA/RA

- LHAAP 12- IRA Landfill Cap
- LHAAP 16- RD/RA for groundwater for this site will begin in FY02. Perchlorate sampling for this site is funded under LHAAP-35. Cap maintenance will continue.
- LHAAP 18 & 24- IRA Groundwater Treatment Plant (GWTP) with approximately 5,000 feet of interception collection trench has been installed to control migration of contaminated groundwater.
- Treatment system in place for the removal of VOCs and perchlorate.

Future REM/IRA/RA

- IRA at LHAAP-16, 18, 24, 32
- RA at LHAAP-16, 17, 18, 24, 32, 35, 50

PRIOR YEAR FUNDING

FY76-90	RI/FS	\$ 687K	
FY91	RI	\$ 1,266K	
FY92	RI	\$ 5,855K	
FY93	RI/FS	\$ 2,332K	
FY94	RI/FS	\$ 5,392K	
	RD- LANDFILL CAPS	\$ 100K	
	RD - BURNING GROUNDS	\$ 196K	
	IRA - BURNING GROUNDS	\$ 16,866K	\$ 22,5540K
FY95	RI/FS	\$ 2,797K	
	RD	\$ 143K	
	IRA	\$ 7,733K	\$ 10,673K
FY96	PA/SI	\$ 40K	
	RI/FS	\$ 3,965K	
	IRA	\$ 1,705K	\$ 5,710K
FY97	RI/FS	\$ 2,397K	
	RA/IRA	\$ 3,995K	\$ 6,392K
FY98	RI/FS	\$ 4,434K	
	RA/IRA	\$ 2,107K	\$ 6,541K
FY99	RI/FS	\$ 985.7K	
	RA/IRA	\$ 1,330K	\$ 2,315.7K
FY00	RI/FS	\$ 2637K	
	LTM/LTO	\$ 921K	\$ 3,558 K
FY01	RI/FS	\$ 1752K	
	IRA	\$ 921 K	\$ 2,673 K
FY02	DETAILS		\$ 2,826 K

Total Prior Year ER,A Funds
 Expected Future Year Requirements
 Total Funding from Inception to Completion

\$ 73,382,700
 \$ 33,982,000
 \$ 107,364,700

Longhorn Unconstrained (Required) Cost to Complete

DSERTS #	SITE TITLE	PHASE	FY03	FY04	FY05	FY06	FY07	FY08	FY09+	PHASE TOTALS	SITE TOTAL	DESCRIPTION OF WORK
LHAAP-12	Landfill 12	RI/FS	150							150		PP/ROD
		LTM	50	50	50	25	25	25	396	621	771	~12 wells, starting with semi-annual then reduce
LHAAP-16	Landfill 16	RI/FS	115	110						225		Part of Group 2 FS, GW monitoring 50K, SW monitoring 60K
		IRA		15						15		cap maintenance 15K
		RD			150					150		Possible Groundwater Treatment, such as reactive wall
		RA			1,380					1,380		Possible Groundwater Treatment, such as reactive wall
		LTO			50	50	50	40	260	450		reactive wall maintenance 50K,
		LTO			110	110	70	70	470	830		monitoring (12 wells, semi-annual) 50K, Harrison Bayou surface water (10 points, quarterly 60K/yr)
		LTO			15	15	15	15	105	165		cap maintenance for LHAAP-12, 16
		LTM							180	180		monitoring (4 wells, annual) start in FY16
		LTM							270	270	3,665	cap maintenance for LHAAP-12, 16 start in FY16
LHAAP-17	No. 2 Flash Area/ Burning Ground	RI/FS	1,774	860	60					2,694		additional RI/FS (1774K), PP, ROD (200K), S&R (100K), ecological (500K) for Group 2 sites (12,17,18,24,29,32), quarterly sampling for perimeter wells 60K/yr for 2 yrs design
		RD			200					200		excavation of 2,600cy of explosive-contaminated soil
		RA			1,100					1,100		start with quarterly sampling for perimeter wells 60K/yr
		LTM				60	60	60	390	570	4,564	additional RI/FS for Group 2 (see LHAAP-17), Fate & transport for perchlorate
LHAAP-18	Burning Ground No 3	RI/FS	1	500						501		operation of P&T (w/ LHAAP-24) (handles water from 16, 18, 24 and is expected to take water from 35), cap maint
		IRA	400	400	400	400				1,600		Soil/ Groundwater treatment at the UEP
		RD			250					250		Soil/ Groundwater treatment at the UEP such as slurry wall
		RA			2,575					2,575		GWTP Operation cost including long term monitoring, cap maintenance, if this plant is treating water from other sites then the out year cost may increase (expected to shut off in FY11)
		LTO					562	400	1,200	2,162		Installation wide 5 year review
		LTO					35			35		Installation wide 5 year reviews
		LTM							140	140		GW monitoring
		LTM							250	250	7,513	additional RI/FS for Group 2 (see LHAAP-17), Fate & transport for perchlorate
LHAAP-24	Unlined Evaporation Pond	RI/FS	1	500						501		operation of Pump & Treat (with LHAAP-18) (handles water from 16, 18, 24 and is expected to take water from 35)
		IRA	400	400	400	400				1,600		

0311198

Longhorn Unconstrained (Required) Cost to Complete

DSERTS #	SITE TITLE	PHASE	FY03	FY04	FY05	FY06	FY07	FY08	FY09+	PHASE TOTALS	SITE TOTAL	DESCRIPTION OF WORK
		RD			250					250		Removal of pipelines, sediment and Hot Spots
		RA				1,926				1,926		Removal of pipelines, sediment and Hot Spots
		LTO					489	400	1,200	2,089		~39 wells, starting with quarterly, reduce frequency, 5 year reviews (10K), possible extra maintenance
		LTM							250	250	6,616	monitoring
LHAAP-29	Former TNT Production Area	RI/FS	1							1		quarterly sampling for perimeter wells (see LHAAP-17)
		LTM	50	50	25	25	25	25	306	506	507	~12 wells, starting with quarterly, reduce frequency, 5 year reviews
LHAAP-32	Former TNT Wastewater Treatment Plant	RI/FS	1							1		Group 2 FS (see LHAAP-17)
		IRA	25							25		sediment removal for mercury 2,500cy
		RD		75						75		design
		RA		625						625	726	Soil removal for explosives 1,200cy
LHAAP-35	Process Wastewater Sumps - Various	RI/FS	60	60	60					180		Sampling of Goose Prairie 60K/yr
		RI/FS	150							150		PP/ROD 150K
		RI/FS	2,571							2,571		Installation wide Eco with LHAAP-17
		RI/FS	250							250		Background study 250K
		RD			350					350		design
		RA			3,500					3,500		soil removal (for perchlorates) of source material 6,300cy
		LTM				100	100	50		250		abandon ~250 wells (installation wide)
		LTM				260	260	260	1,020	1,800	9,051	LTM start with 25 wells, quarterly 200K/yr, Goose Prairie 60K/yr
LHAAP-45	Magazine Area	RI/FS		3						3	3	sampling (USFWS doing sampling)
LHAAP-50	Former Waste Disposal Facility	RI/FS	2							2		Group 4 (see LHAAP-35)
		RD			50					50		design
		RA			300					300		Soil removal 440cy
		LTM				10	10	10	20	50	402	2 wells, quarterly
LHAAP-60	Former Storage Building 411, 411A & 714	RI/FS	2							2		Group 4 (see LHAAP-35)
LHAAP-67	Above Ground Storage Tank	RI/FS	2							2		design
		LTM	40	40	20	20	20	10	10	160	162	LTM 6 wells, start with quarterly
FY TOTALS IN THOUSANDS OF \$			6,045	3,688	7,620	7,076	1,721	1,365	6,467	33,982	33,982	
POM			6,045	5,292	6,310	6,146	5,434	2,725				
Difference			0	1,604	-1,310	-930	3,713	1,360			33,982	

031199

Longhorn AAP Constrained (Programmed) Cost to Complete

DSERTS #	SITE TITLE	PHASE	FY03	FY04	FY05	FY06	FY07	FY08	FY09+	PHASE TOTALS	SITE TOTAL	DESCRIPTION OF WORK
LHAAP-12	Landfill 12	RI/FS	150							150		PP/ROD
		LTM	50	50	50	25	25	25	396	621	771	~12 wells, starting with semi-annual for 3 years, reduce frequency
LHAAP-16	Landfill 16	RI/FS	115	110						225		Part of Group 2 FS, GW monitoring 50K, SW monitoring 60K
		IRA		15						15		cap maintenance 15K
		RD			150					150		Possible Groundwater Treatment, such as reactive wall
		RA			1,380					1,380		Possible Groundwater Treatment, such as reactive wall
		LTO			50	50	50	40	260	450		reactive wall maintenance 50K,
		LTO			110	110	70	70	470	830		monitoring (12 wells, semi-annual) 50K, Harrison Bayou surface water (10 points, quarterly 60K/yr)
		LTO			15	15	15	15	105	165		cap maintenance for LHAAP-12, 16
		LTM							180	180		monitoring (4 wells, annual) start in FY16
		LTM							270	270	3,665	cap maintenance for LHAAP-12, 16 start in FY16
		LTM	1,774	860	60					2,694		additional RI/FS (1774K), PP, ROD (200K), S&R (100K), ecological (500K) for Group 2 sites (12, 17, 18, 24, 29, 32), quarterly sampling for perimeter wells 60K/yr for 2 years
LHAAP-17	No. 2 Flash Area/ Burning Ground	RD			200					200		design
		RA				1,100				1,100		excavation of 2,600cy of explosive-contaminated soil
		LTM				60	60	60	390	570	4,564	start with quarterly sampling for perimeter wells 60K/yr
		RI/FS	1	500						501		additional RI/FS for Group 2 (see LHAAP-17), Fate & transport for perchlorate
		IRA	400	400	400	400				1,600		operation of Pump & Treat (with LHAAP-24) (handles water from 16, 18, 24 and is expected to take water from 35), cap maintenance
LHAAP-18	Burning Ground No 3	RD			250					250		Soil/ Groundwater treatment at the UEP
		RA				2,575				2,575		Soil/ Groundwater treatment at the UEP such as slurry wall
		LTO					562	400	1,200	2,162		GWTP Operation cost including long term monitoring, cap maintenance, if this plant is treating water from other sites then the out year cost may increase (expected to shut off in FY11)
		LTO										
		LTM					35			35		Installation wide 5 year review
LHAAP-24	Unlined Evaporation	LTM							140	140		Installation wide 5 year reviews
		LTM							250	250	7,513	GW monitoring
		RI/FS	1	500						501		additional RI/FS for Group 2 (see LHAAP-17), Fate & transport for perchlorate

031200

Longhorn AAP Constrained (Programmed) Cost to Complete

DSERTS #	SITE TITLE	PHASE	FY03	FY04	FY05	FY06	FY07	FY08	FY09+	PHASE TOTALS	SITE TOTAL	DESCRIPTION OF WORK
	Pond	IRA	400	400	400	400				1,600		operation of Pump & Treat (with LHAAP-18) (handles water from 16, 18, 24 and is expected to take water from 35)
		RD			250					250		Removal of pipelines, sediment and Hot Spots
		RA			294	996	636			1,926		Removal of pipelines, sediment and Hot Spots
		LTO					489	400	1,200	2,089		~39 wells, starting with quarterly, reduce frequency, 5 year reviews (10K), possible extra maintenance
		LTM							250	250	6,616	monitoring
LHAAP-29	Former TNT Production Area	RI/FS	1							1		quarterly sampling for perimeter wells (see LHAAP-17)
		LTM	50	50	25	25	25	25	306	506	507	~12 wells, starting with quarterly, reduce frequency, 5 year reviews
LHAAP-32	Former TNT Wastewater Treatment Plant	RI/FS	1							1		Group 2 FS (see LHAAP-17)
		IRA	25							25		sediment removal for mercury 2,500cy
		RD		75						75		design
		RA		625						625	726	Soil removal for explosives 1,200cy
LHAAP-35	Process Wastewater Sumps - Various	RI/FS	60	60	60					180		Sampling of Goose Prairie 60K/yr
		RI/FS	150							150		PP/ROD 150K
		RI/FS	2,571							2,571		Installation wide Eco with LHAAP-17
		RI/FS	250							250		Background study 250K
		RD		350						350		design
		RA		1,254	2,246					3,500		soil removal (for perchlorates) of source material 6,300cy
		LTM				100	100	50		250		abandon ~250 wells (installation wide)
		LTM				260	260	260	1,020	1,800	9,051	LTM start with 25 wells, quarterly 200K/yr, Goose Pairie 60K/yr
LHAAP-45	Magazine Area	RI/FS		3						3	3	sampling (USFWS doing sampling)
LHAAP-50	Former Waste Disposal Facility	RI/FS	2							2		Group 4 (see LHAAP-35)
		RD			50					50		design
		RA			300					300		Soil removal 440cy
		LTM				10	10	10	20	50	402	2 wells, quarterly
LHAAP-60	Former Storage Building 411, 411A & 714	RI/FS	2							2	2	Group 4 (see LHAAP-35)
LHAAP-67	Above Ground Storage Tank	RI/FS	2							2		design
		LTM	40	40	20	20	20	10	10	160	162	LTM 6 wells, start with quarterly
FY TOTALS IN THOUSANDS OF \$			6,045	5,292	6,310	6,146	2,357	1,365	6,467	33,982	33,982	
POM			6,045	5,292	6,310	6,146	5,434	2,725				
Difference			0	0	0	0	3,077	1,360			33,982	

031201

COMMUNITY INVOLVEMENT

While the Army leads the IRP at LHAAP, a close working relationship with the regulatory community has been developed. The local community has been involved through the Technical Review Committee (TRC) process. The TRC has quarterly meetings at LHAAP that are regularly attended by the public. Executive Summaries are provided monthly to the LHAAP environmental team members and at each TRC meeting in an effort to keep the public informed.

A Technical Assistance Grant has been awarded to the Caddo Lake Institute, a local group, and they have sought the assistance of Subra and Associates, Inc. under the grant. Wilma Subra has become a regular attendee of the Monthly Managers' Meetings in which the Army, EPA, and TNRCC discuss issues and make decisions regarding the environmental activities at LHAAP. Training and consensus process conducted by the Army (IAP Workshop, Independent Technical Review, Exit Strategy Planning, Data Quality Objectives on Per-chlorate) have been attended by Ms. Subra. Ms. Subra also receives copies of all documents sent to EPA and TNRCC.

Public meetings were held periodically to advise the community on various issues on the facility. These will continue as needed.

Formation of a Restoration Advisory Board (RAB) was attempted in April 1996 and 1998. The community involvement in the Technical Review Committee process was determined sufficient for community needs.

Technical Assistance for Public Participation application was originally submitted to higher headquarters May 1998. Contracts have been awarded to B. Jones Environmental, Inc. for FY00, 01, 02.

A Memorandum of Agreement between the Army and USFWS was signed on 21 October 2000, designating an overlay consisting of approximately 7,100 acres for establishment of a wildlife refuge at LHAAP. A Transition Management Group (TMG) is formed to facilitate transition of LHAAP to USFWS. The TMG consists of the Army, USFWS, and Caddo Lake Institute.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

P.O. Box 1306
Albuquerque, New Mexico 87103
<http://ifw2es.fws.gov>

In Reply Refer To:
R2/ES-HC/EC
CL 03-034

MAY 22 2003

Ms. Jonna Polk
U. S. Army Corps of Engineers
Tulsa District
1645 S. 101 E. Avenue
Tulsa, Oklahoma 74128-4629

Dear Ms. Polk:

This letter is in reference to appropriate background soil sampling locations related to the former Longhorn Army Ammunition Plant/Caddo Lake National Wildlife Refuge overlay in Harrison County, Texas. It is the U. S. Fish and Wildlife Service's (Service) position that background soil sampling sites should be located totally outside of the influence of any of the facility's operations so that the possibilities of contamination from any of the facility's current or past activities are greatly reduced. These background sites should be located up-gradient and up-wind of the facility so as not to be affected by any contaminants associated with surface run-off or airborne dispersal. Initial wind rose data indicate that southeasterly winds predominate. This would result in only the southernmost portion of the facility being outside of possible aerial deposition from facility activities. In addition, any sites selected off of the facility should not be affected by anthropogenic sources unrelated to the facility's operations such as roadways, oil and gas operations, mining activities, etc. Furthermore, the background sites selected should have similar soil regimes to those within the facility (i.e., hydric soils, loamy soils, etc.).

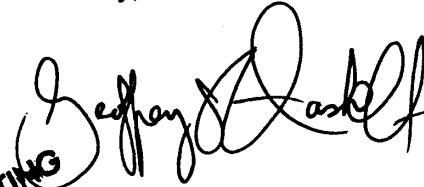
The U. S. Army had proposed to conduct background sampling within the confines of the facility (on-post, western, and southwestern portions of the facility). In an assessment conducted by the Service in 2002, metals, organochlorine pesticides, polychlorinated biphenyls, and perchlorate were detected in soils collected from portions of the facility that would coincide with those proposed to represent background. The sources of these contaminants within these areas are not evident, nor are operations records (i.e., pesticide application records) available to explain why these areas contained these contaminants. Considering the amount of time the facility was in operation (1942-1996), coupled with an incomplete operations record, the Service is concerned that former on-post operations may have released contaminants throughout the facility. Therefore, the Service does not consider on-post background sites suitable for background sampling.

Ms. Jonna Polk

2

For the reasons mentioned above, the Service recommends that background soil sampling be conducted off-site, up-gradient, and up-wind of the facility. Should you have any questions regarding this matter, please do not hesitate to contact Mr. Paul Bruckwicki at 903-679-4536, or Mr. Craig Giggelman at 817-277-1100.

Sincerely,


ACTING Regional Director

cc: Mr. Chris Villarreal, U. S. Environmental Protection Agency
Mr. James Sher, Texas Commission on Environmental Quality
Rod Krey, Refuge Supervisor, Oklahoma/Texas, National Wildlife Refuge System, Region 2
Renne Lohofener, Texas State Administrator, Ecological Services Field Office, Austin, TX

**Longhorn Army Ammunition Plant
Technical Review Committee Meeting**

19 June 2003

9:00 a.m.

Agenda

Executive Summary

Jonna Polk

Groundwater Treatment Plant Report

Bill Corrigan, CES

Meeting Schedule

David Tolbert

Adjourn

**LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY**

As of 19 June 2003

PROJECT NAME	PROJECT PHASE	PROJECT STATUS	NEXT MAJOR MILESTONE(S)
Group # 2 (Sites 12, 16, 17, 18, 24, 29, and 32)	Remedial Investigation/ Feasibility Study	- Quarterly sampling completed week of 2 June 03.	- Plant-wide ecological risk assessment workplan to team July 03.
Group # 4 (Wastewater Sumps And Sites 50 & 60)	Remedial Investigation/ Feasibility Study	- Quarterly sampling completed week of 2 June 03.	- Background study delayed pending resolution of request for off-site sampling.
Burn Ground #3 (Sites 18 and 24)	Interim Remedial Action	- Five Year Review completed. - Contract award completed.	
Perchlorate		- Additional seasonal sampling completed in September 02.	
Transition Management Group		- Transition Management Group meeting held May 03.	- Next meeting will be held after signature of MOU.

031206

**LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY**

As of 19 June 2003

PROJECT NAME	PROJECT PHASE	PROJECT STATUS	NEXT MAJOR MILESTONE(S)
Caddo Lake Sampling	RJ/FS	- Lake sampling results presented in September 02.	

031207

LONGHORN ARMY AMMUNITION PLANT IRP STATUS SUMMARY

As of 19 June 2003

SCHEDULED MEETINGS AND VISITS TO LHAAP		
Date / Time	Purpose of Meeting / Visit	Location
28-29 July 03	IAP Meeting	Austin, Texas

01	Inert Burning Grounds	24	Washout & Unlined Evaporation Pond	60	Former Storage Bldg. 411 & 714
11	Suspected TNT Burial Grounds at Ave P&Q	27	South Test Area	XX(54)	Ground Signal Test Area
12	Landfill 12	29	Former TNT Production Area	52	Magazine Area
16	Landfill 16	32	Former TNT Disposal Area	63	Burial Pits
17	Burning Ground 2/Flashing Area	35	Process Wastewater Sumps		
18	Burning Ground 3	50	Former Waste Disposal Facility		

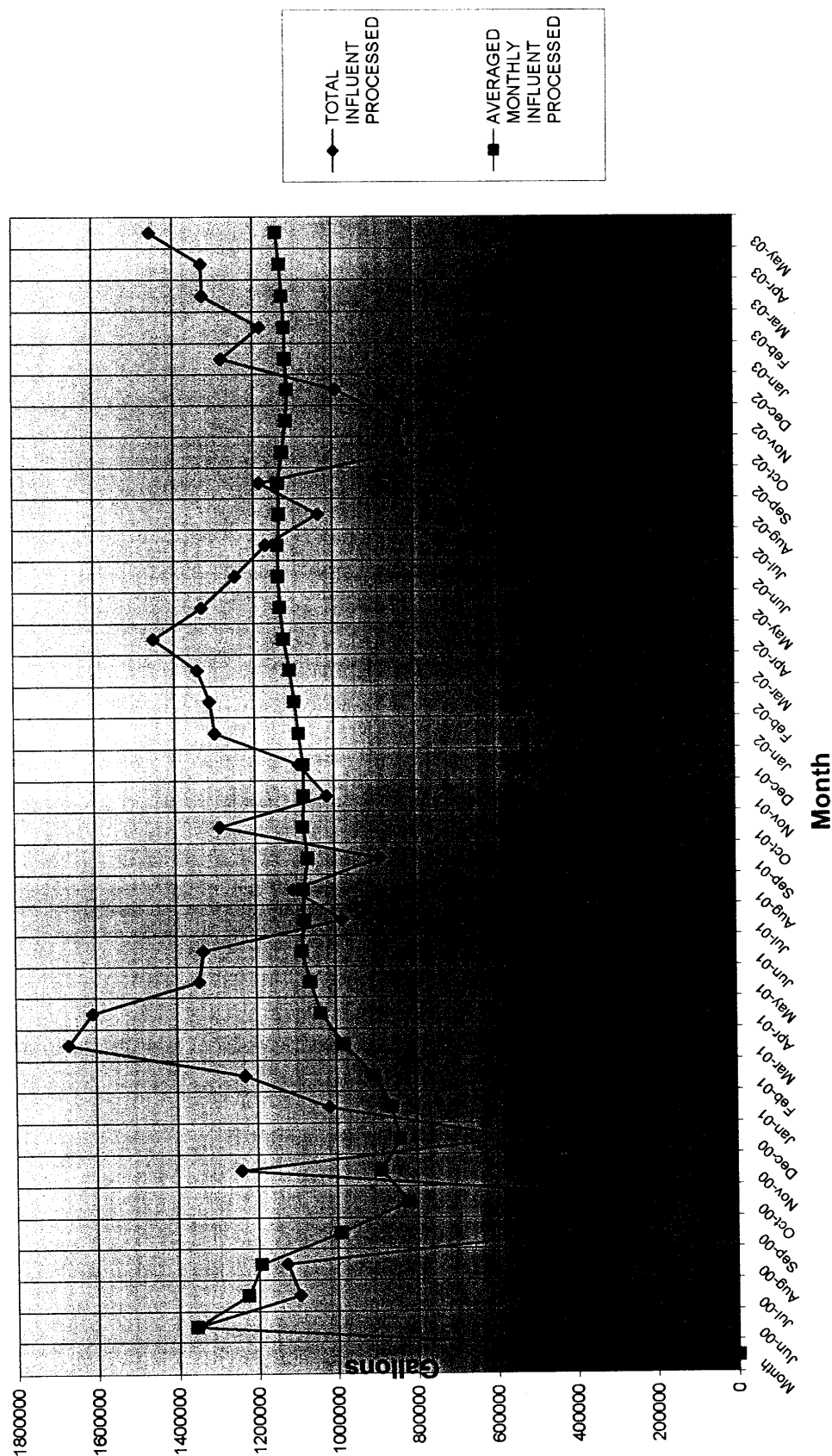
031208

Information for Quarterly TRC Meeting

Longhorn Army Ammunition Plant

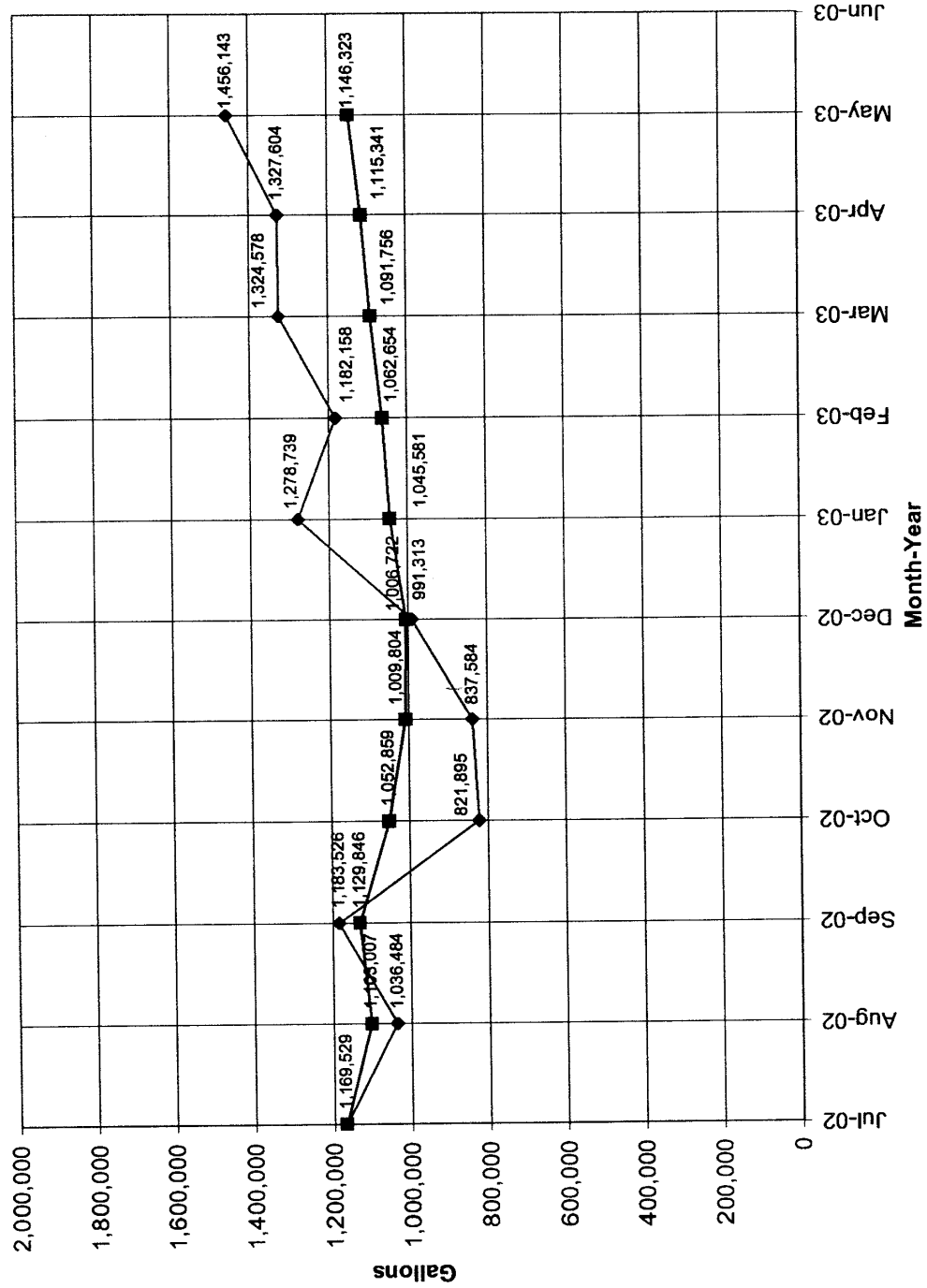
June 19, 2003

Longhorn AAP Groundwater Treatment Plant Water Treated June 2003 thru March 2003





LONGHORN ARMY AMMUNITION PLANT
GROUNDWATER TREATMENT PLANT
TOTAL WATER TREATMENT CHART
(July 1, 2002 through June 30, 2003)



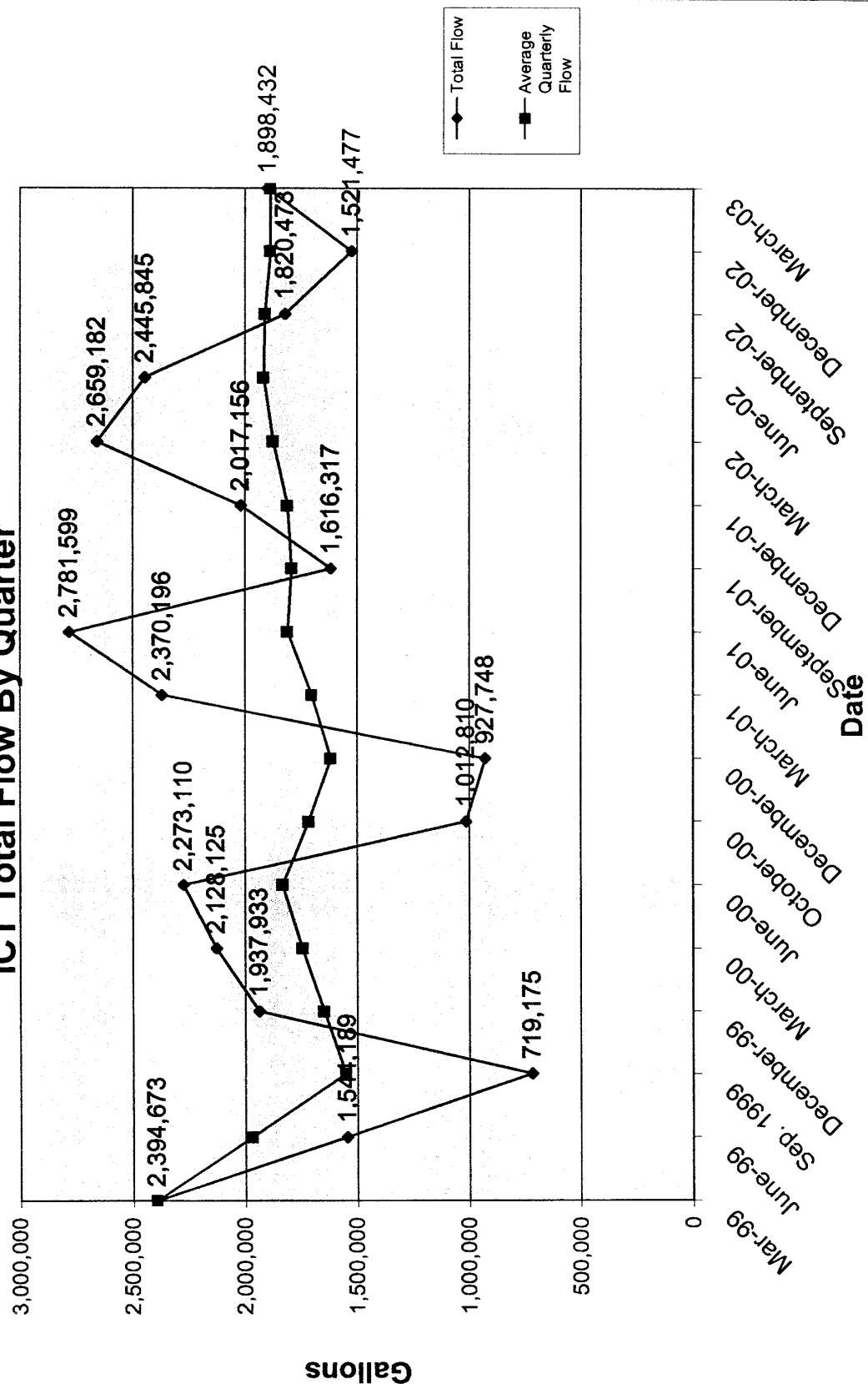


ICT SUMPS AND EXTRACTION WELL VOLUMES SPREADSHEET

Month of May 2003

Well #	Beginning Meter Reading	Ending Meter reading	Amount Pumped
1	329,963	331,294	1,331
2	1,164,020	1,186,683	22,663
3	507,716	528,743	21,027
4	749,956	784,810	34,854
5	634,619	639,873	5,254
6	101,993	103,210	1,217
7	154,160	156,137	1,977
8	3,123,341	3,201,811	78,470
9	4,916,458	5,042,495	126,037
10	903,168	947,421	44,253
11	1,406,733	1,485,350	78,617
12A	29,209	35,546	6,337
12B	306,777	311,773	4,996
12C	679,820	681,671	1,851
12D	1,545,033	1,580,137	35,104
12E	15,935	17,353	1,418
13A	969,076	999,921	30,845
13B	1,893,059	1,939,763	46,704
13C	1,058,559	1,058,559	0
13D	250,481	254,042	3,561
13E	256,830	259,687	2,857
13F	58,132	58,133	1
13G	44,180	44,181	1
14A	1,127,359	1,179,640	52,281
14B	3,157,998	3,211,169	53,171
14C	1,587,830	1,610,808	22,978
14D	2,881,758	2,936,622	54,864
14E	960,657	960,657	0
		Site 18/24 Total	732,669
Site 16	4,748,454	4,828,570	80,116
		Site 16 Total	80,116
		Sites 18/24 & Site 16 Total	812,785

Site 18/24 ICT Total Flow By Quarter



Analytical Data for Semi-Annual Well Samples for September 2002

Volatiles In ug/L	ICT 1	ICT 2	ICT 3	ICT 3 QC	ICT 3 QA	ICT 4	ICT 5	ICT 6	ICT 7	ICT 8	ICT 9	ICT 10	ICT 11	ICT 12A
Benzene	ND	ND	ND	ND	ND	15.9	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	48.1	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	10.9	41.5	41.6	ND	48.9	ND	ND	ND	304	ND	ND	ND	ND
1,1-Dichloroethane	ND	12.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	84.1	118	1,080	1,230	1,000	ND	16.2	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	21.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	32.7	7,080	16,600	11,000	743	ND	ND	ND	209,000	235,000	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	6.22	8.53	8.99	ND	11.9	ND	ND	ND	362	ND	ND	ND	ND
Toluene	ND	ND	32.6	33.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	7.37	7.23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	1,960	9,900	28,900	28,400	24,000	17,100	625	68.3	ND	34,000	38,000	8,380	3,960	1,780
Vinyl Chloride	160	123	811	836	700	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	ND	1,130	2,290	2,080	2,100	1,240	261	839	ND	68,600	78,900	3,050	51	37.3
Chloride In mg/L	ICT 1	ICT 2	ICT 3	ICT 3 QC	ICT 3 QA	ICT 4	ICT 5	ICT 6	ICT 7	ICT 8	ICT 9	ICT 10	ICT 11	ICT 12A
	40.7	255	316	339	342	219	92.4	97.7	16	412	1,130	280	130	92.6
Perchlorate In ug/L	ICT 1	ICT 2	ICT 3	ICT 3 QC	ICT 3 QA	ICT 4	ICT 5	ICT 6	ICT 7	ICT 8	ICT 9	ICT 10	ICT 11	ICT 12A
	1,080	9,480	27,100	25,900	26,100	168,000	1,070	1,180	33.7	16,200	28,800	86,600	30,600	5,670

6/18/2003

031214

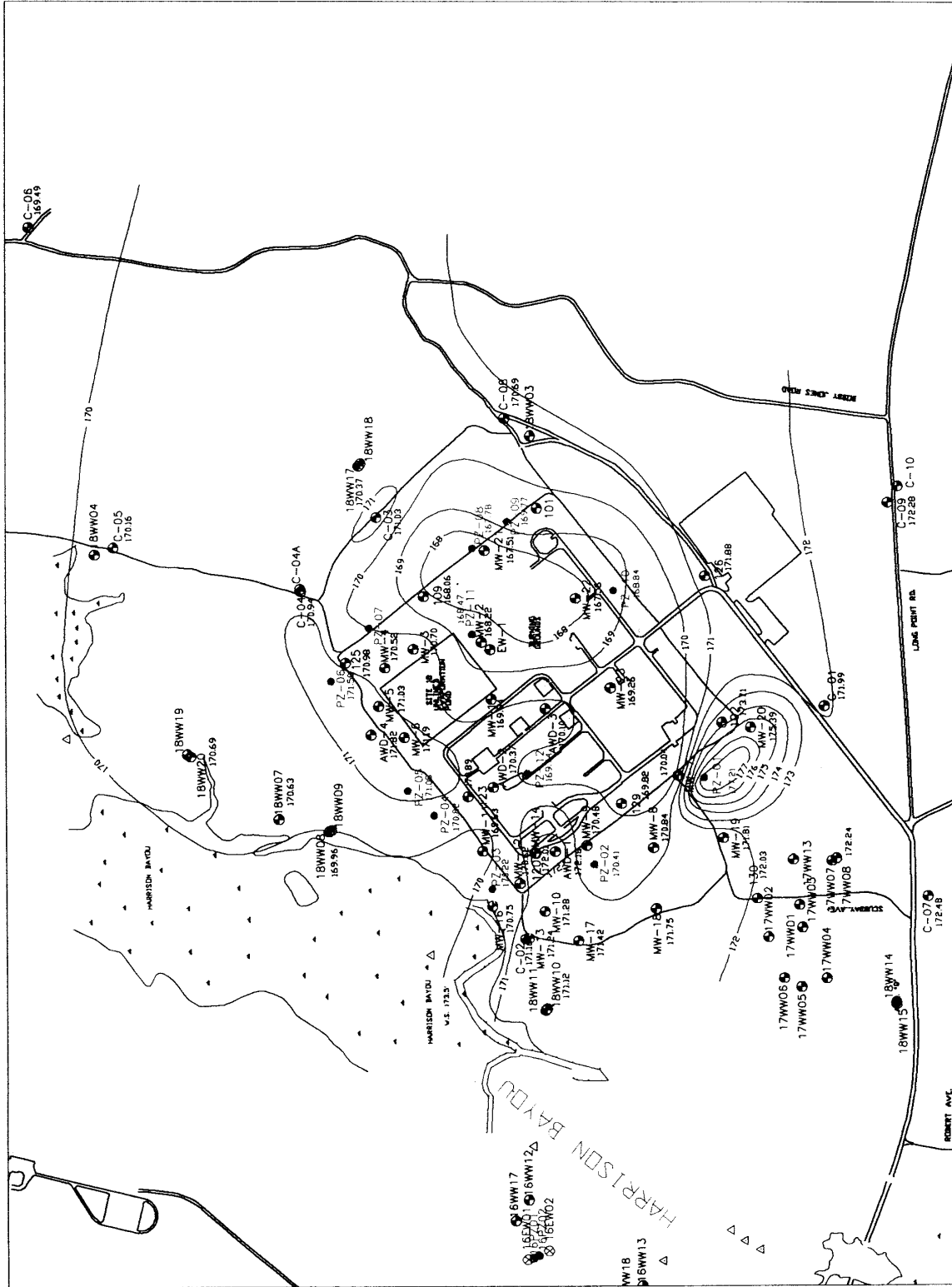
<u>Volatiles in ug/L</u>	<u>ICT 12B</u>	<u>ICT 12C</u>	<u>ICT 12D</u>	<u>ICT 12D QC</u>	<u>ICT 12D QA</u>	<u>ICT 12E</u>	<u>ICT 13A</u>	<u>ICT 13B</u>	<u>ICT 13C</u>	<u>ICT 13D</u>	<u>ICT 13E</u>	<u>ICT 13F</u>	<u>ICT 13G</u>
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	98.6	ND	ND	ND	ND	ND	158	50.5	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	411	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	370,000	358,000	150,000	38,500	3,350	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	9,820	4,210	109,000	104,000	58,000	43,300	43,000	3,060	2,260	ND	ND	ND	ND
Vinyl Chloride	ND	ND	1,180	891	ND	1,570	ND	170	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	345	58.5	5,120	5,380	4,000	1,100	807	ND	ND	ND	ND	ND	56.9
<u>Chloride in mg/L</u>	<u>ICT 12B</u>	<u>ICT 12C</u>	<u>ICT 12D</u>	<u>ICT 12D QC</u>	<u>ICT 12D QA</u>	<u>ICT 12E</u>	<u>ICT 13A</u>	<u>ICT 13B</u>	<u>ICT 13C</u>	<u>ICT 13D</u>	<u>ICT 13E</u>	<u>ICT 13F</u>	<u>ICT 13G</u>
	475	210	284	301	386	336	551	81.1	41.1	146	120	5.09	5.24
<u>Perchlorate in ug/L</u>	<u>ICT 12B</u>	<u>ICT 12C</u>	<u>ICT 12D</u>	<u>ICT 12D QC</u>	<u>ICT 12D QA</u>	<u>ICT 12E</u>	<u>ICT 13A</u>	<u>ICT 13B</u>	<u>ICT 13C</u>	<u>ICT 13D</u>	<u>ICT 13E</u>	<u>ICT 13F</u>	<u>ICT 13G</u>
	82,700	26,000	183,000	193,000	260,000	12,800	45,900	3,200	19.9	55.2	144.0	ND	ND

031216

<u>Volatiles in ug/L</u>	<u>ICT 14A</u>	<u>ICT 14A QC</u>	<u>ICT 14A QA</u>	<u>ICT 14B</u>	<u>ICT 14C</u>	<u>ICT 14D</u>	<u>ICT 14E</u>
Benzene	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	10	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	5,570	284
Styrene	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	117	86.9	100	141	1,980	13,900	18,800
Vinyl Chloride	ND	ND	9.3	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND
Freon 113	3,510	3,170	3,100	56.1	3,150	24,200	17,400
<u>Chloride in mg/L</u>	<u>ICT 14A</u>	<u>ICT 14A QC</u>	<u>ICT 14A QA</u>	<u>ICT 14B</u>	<u>ICT 14C</u>	<u>ICT 14D</u>	<u>ICT 14E</u>
	272	258	234	440	769	1,690	2,940
<u>Perchlorate in ug/L</u>	<u>ICT 14A</u>	<u>ICT 14A QC</u>	<u>ICT 14A QA</u>	<u>ICT 14B</u>	<u>ICT 14C</u>	<u>ICT 14D</u>	<u>ICT 14E</u>
	24,300	21,400	20,400	35,700	79,700	12,300	39,100

031217

Complete Environmental Service
LHAAP Sites 18 & 24
DATE: May 1, 2003
Groundwater Levels



<u>VOLATILES In UG/L</u>	<u>101</u>	<u>102</u>	<u>109</u>	<u>120</u>	<u>123</u>	<u>125</u>	<u>126</u>	<u>129</u>	<u>130</u>	<u>AWD1</u>	<u>AWD2</u>	<u>AWD3</u>	<u>AWD4</u>	<u>C1</u>
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	48.6	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	7	ND	ND	ND	ND	ND	14.6	5.45	ND	ND	ND
1,1,1 - Dichloroethane	ND	ND	ND	36.9	ND	ND	ND	ND	ND	74.2	ND	ND	ND	ND
1,1,1 - Dichloroethane	ND	ND	ND	201	ND	ND	ND	ND	ND	780	7.63	ND	ND	ND
1,2 - Dichloroethane	ND	ND	ND	15.9	ND	ND	ND	101	ND	42.4	1,390	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	12.9	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	5.15	ND	ND	ND	ND	ND	17.3	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	33	ND	ND
Chloroform	ND	ND	ND	47.9	ND	ND	ND	9.63	ND	33.3	22.9	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	30.3	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	13,600	ND	ND	ND	ND	ND	1,280	1,420	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	50.2	ND	ND	ND	ND
Toluene	ND	ND	ND	6.33	ND	ND	ND	ND	ND	12.7	7.11	ND	ND	ND
Trichloroethene	6.41	ND	181	18,700	ND	ND	ND	6,710	63.9	59,200	25,800	303	16	5.47
Vinyl chloride	ND	ND	ND	25.1	ND	ND	ND	ND	ND	1,240	28.9	ND	ND	ND
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	130	ND	ND	ND	ND
Freon 113	ND	ND	107	195	ND	174	ND	67.5	ND	17,500	ND	16,000	ND	ND
<u>METALS In MG/L</u>	<u>101</u>	<u>102</u>	<u>109</u>	<u>120</u>	<u>123</u>	<u>125</u>	<u>126</u>	<u>129</u>	<u>130</u>	<u>AWD1</u>	<u>AWD2</u>	<u>AWD3</u>	<u>AWD4</u>	<u>C1</u>
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	0.59	0.0396	0.320	0.0927	0.146	0.0457	4.13	0.202	0.161	1.28	0.172	0.0761	0.190	0.661
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	0.0327	ND	ND	ND	0.00852	ND	ND	ND	ND	0.0720	0.192	0.0726	0.172	ND
Lead	0.0131	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	0.0342	ND	ND	0.0296	0.0106	ND	0.0113	ND	ND	0.203	0.23	0.277	0.923	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00597	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	0.110	0.00628	0.0231	0.0335	0.0286	ND	0.0347	ND	0.0062	0.00814	0.00889	ND	0.0148	0.00959
<u>CHLORIDE In MG/L</u>	<u>101</u>	<u>102</u>	<u>109</u>	<u>120</u>	<u>123</u>	<u>125</u>	<u>126</u>	<u>129</u>	<u>130</u>	<u>AWD1</u>	<u>AWD2</u>	<u>AWD3</u>	<u>AWD4</u>	<u>C1</u>
	3.96	15.2	285	575	11.2	8.01	1,020	196	1,220	181	134	19.5	44.7	685
<u>PERCHLORATE In UG/L</u>	<u>101</u>	<u>102</u>	<u>109</u>	<u>120</u>	<u>123</u>	<u>125</u>	<u>126</u>	<u>129</u>	<u>130</u>	<u>AWD1</u>	<u>AWD2</u>	<u>AWD3</u>	<u>AWD4</u>	<u>C1</u>
	ND	39	29,200	131,000	59.5	12.2	ND	17,100	23,600	2,480	ND	176	2,340	ND

031219

VOLATILES in UG/L	C2	C3	C4	C4A	18WW07	C6	18WW08	C8	18WW17	18WW17 QC	18WW17 QA	18WW17 EB	C10
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.4
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	31.5	25.4	ND	15.3	ND	35	5.27	7.4	106	87.9	ND	ND	73.2
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	ND	7.29	ND	ND	ND	ND	ND	ND	468	480	ND	ND	ND
METALS in MG/L	C2	C3	C4	C4A	18WW07	C6	18WW08	C8	18WW17	18WW17 QC	18WW17 QA	18WW17 EB	C10
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	0.480	1.07	0.213	0.0937	0.179	0.969	0.970	6.71	3.65	3.73	ND	ND	0.841
Cadmium	ND	0.00222	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00103
Chromium	ND	ND	ND	ND	0.0146	ND	0.011	ND	0.0715	0.0816	ND	ND	ND
Lead	0.00613	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	ND	ND	ND	ND	0.0177	ND	0.0387	ND	0.308	0.322	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	ND	0.0454	0.0189	ND	ND	0.0159	0.0181	0.0307	ND	ND	ND	ND	0.0109
CHLORIDE in MG/L	C2	C3	C4	C4A	18WW07	C6	18WW08	C8	18WW17	18WW17 QC	18WW17 QA	18WW17 EB	C10
	201	385	48.7	58.7	61.6	392	592	2,490	2,750	2820	2630	ND	550
PERCHLORATE in UG/L	C2	C3	C4	C4A	18WW07	C6	18WW08	C8	18WW17	18WW17 QC	18WW17 QA	18WW17 EB	C10
	ND	2,160	ND	ND	ND	ND	16400	ND	121,000	123000	121,000	ND	23.9

Analytical Data for Semi-Annual Monitoring Well Samples, Sampled in May 2003

031220

<u>VOLATILES in UG/L</u>	<u>MW1</u>	<u>MW2</u>	<u>MW2 QC</u>	<u>MW2 QA</u>	<u>MW3</u>	<u>MW4</u>	<u>MW5</u>	<u>MW6</u>	<u>MW7</u>	<u>MW8</u>	<u>MW9</u>	<u>MW10</u>
1,1,1 - Trichloroethane	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	5.98	ND	ND		5.58	8.85	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	51.5	1,780	ND		6.24	7.11	ND	ND	161	ND	ND	ND
1,2 - Dichloroethane	145	ND	ND		ND	6.51	ND	ND	192	47.3	ND	ND
Acetone	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND		ND	ND	ND	ND	50.9	ND	ND	ND
Carbon tetrachloride	ND	ND	ND		ND	ND	ND	ND	170	ND	ND	ND
Chloroform	27.4	ND	ND		ND	ND	ND	ND	109	ND	5.32	ND
Ethyl benzene	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	41,900	1,080,000	856,000		ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND		ND	ND	ND	ND	5.24	ND	ND	ND
Toluene	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	11,500	160,000	134,000		543	572	49.4	17.7	15,000	2,620	6,100	25.3
Vinyl chloride	40.2	ND	ND		27.7	49.2	ND	ND	ND	ND	ND	ND
Xylene (total)	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	4,210	ND	ND		144	158	148	438	783	55.7	288	ND
<u>METALS in MG/L</u>	<u>MW1</u>	<u>MW2</u>	<u>MW2 QC</u>	<u>MW2 QA</u>	<u>MW3</u>	<u>MW4</u>	<u>MW5</u>	<u>MW6</u>	<u>MW7</u>	<u>MW8</u>	<u>MW9</u>	<u>MW10</u>
Arsenic	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Barium	2,940	3,660	3.68		1.91	0.227	0.645	1.07	0.107	0.488	0.181	0.667
Cadmium	0.00192	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Chromium	1.32	ND	ND		0.0204	ND	0.00894	0.0115	0.0425	0.0798	0.0775	0.00952
Lead	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Nickel	1.2	0.0361	0.0344		0.0217	0.0622	0.0388	0.0664	0.218	0.213	0.256	0.131
Selenium	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND
Zinc	0.0228	0.0166	0.0121		0.0362	0.0148	0.0143	0.0445	ND	0.034	0.00925	0.0219
<u>CHLORIDE in MG/L</u>	<u>MW1</u>	<u>MW2</u>	<u>MW2 QC</u>	<u>MW2 QA</u>	<u>MW3</u>	<u>MW4</u>	<u>MW5</u>	<u>MW6</u>	<u>MW7</u>	<u>MW8</u>	<u>MW9</u>	<u>MW10</u>
	661	561	603	586	397	466	179	297	288	430	66.1	239
<u>PERCHLORATE in UG/L</u>	<u>MW1</u>	<u>MW2</u>	<u>MW2 QC</u>	<u>MW2 QA</u>	<u>MW3</u>	<u>MW4</u>	<u>MW5</u>	<u>MW6</u>	<u>MW7</u>	<u>MW8</u>	<u>MW9</u>	<u>MW10</u>
	88,900	15,500	14,500	15,400	182,000	44,200	32,200	8,430	119,000	20,500	1830	ND

<u>VOLATILES In UG/L</u>	<u>MW11</u>	<u>MW12</u>	<u>MW12 QC</u>	<u>MW12 QA</u>	<u>MW12 EB</u>	<u>MW13</u>	<u>MW14</u>	<u>MW16</u>	<u>MW16 QC</u>	<u>MW16 QA</u>	<u>MW17</u>	<u>18WW09</u>	<u>MW19</u>
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethane	ND	ND	ND	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 - Dichloroethene	ND	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2 - Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	0.66	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	257	285	260	ND	5.51	380	ND	ND	1.7	113	6.59	25.8
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
<u>METALS In MG/L</u>	<u>MW11</u>	<u>MW12</u>	<u>MW12 QC</u>	<u>MW12 QA</u>	<u>MW12 EB</u>	<u>MW13</u>	<u>MW14</u>	<u>MW16</u>	<u>MW16 QC</u>	<u>MW16 QA</u>	<u>MW17</u>	<u>18WW09</u>	<u>MW19</u>
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	0.181	0.464	0.464	0.497	ND	0.528	0.522	0.471	0.468	0.443	0.454	0.139	0.0690
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	ND	ND	ND	0.0053	ND	ND	ND	ND	ND	0.006	0.0550	0.0178	ND
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	0.0176	ND	ND	0.0097	ND	ND	0.0597	ND	ND	ND	0.356	0.510	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	0.0264	0.0431	0.0444	0.0631	ND	0.00826	0.0184	0.00511	0.0057	ND	0.00734	0.0108	ND
<u>CHLORIDE In MG/L</u>	<u>MW11</u>	<u>MW12</u>	<u>MW12 QC</u>	<u>MW12 QA</u>	<u>MW12 EB</u>	<u>MW13</u>	<u>MW14</u>	<u>MW16</u>	<u>MW16 QC</u>	<u>MW16 QA</u>	<u>MW17</u>	<u>18WW09</u>	<u>MW19</u>
	15.4	230	232	218	ND	302	332	196	196	184	230	77.1	2,370
<u>PERCHLORATE In UG/L</u>	<u>MW11</u>	<u>MW12</u>	<u>MW12 QC</u>	<u>MW12 QA</u>	<u>MW12 EB</u>	<u>MW13</u>	<u>MW14</u>	<u>MW16</u>	<u>MW16 QC</u>	<u>MW16 QA</u>	<u>MW17</u>	<u>18WW09</u>	<u>MW19</u>
	ND	ND	ND	ND	ND	ND	3,750	ND	ND	ND	280	ND	197

<u>VOLATILES In UG/L</u>	<u>MW20</u>	<u>MW21</u>	<u>MW22</u>	<u>MW23</u>	<u>MW23 QC</u>	<u>MW23 QA</u>
1,1,1 - Trichloroethane	ND	ND	ND	ND	ND	
1,1,2 - Trichloroethane	ND	ND	ND	ND	ND	
1,1 - Dichloroethane	ND	9.67	ND	ND	ND	
1,1 - Dichloroethene	ND	29.9	ND	ND	ND	
1,2 - Dichloroethane	ND	ND	7.12	55.4	55.7	
Acetone	ND	ND	ND	ND	ND	
Benzene	ND	7.26	5.53	ND	ND	
Carbon tetrachloride	ND	ND	ND	ND	ND	
Chloroform	ND	28.8	12	ND	ND	
Ethyl benzene	ND	ND	ND	ND	ND	
Methylene chloride	15.7	9.770	ND	ND	ND	
Styrene	ND	ND	ND	ND	ND	
Tetrachloroethene	ND	ND	ND	ND	ND	
Toluene	ND	ND	ND	ND	ND	
Trichloroethene	29.9	3,200	1,520	1,180	1160	
Vinyl chloride	ND	14.6	ND	ND	ND	
Xylene (total)	ND	ND	ND	ND	ND	
Freon 113	ND	9,670	5,870	2,080	2860	
<u>METALS In MG/L</u>	<u>MW20</u>	<u>MW21</u>	<u>MW22</u>	<u>MW23</u>	<u>MW23 QC</u>	<u>MW23 QA</u>
Arsenic	ND	ND	ND	ND	ND	
Barium	0.132	11.5	3.32	1.58	1.57	
Cadmium	ND	0.0015	ND	ND	ND	
Chromium	ND	0.051	0.304	0.131	0.108	
Lead	ND	ND	ND	ND	ND	
Nickel	0.0122	0.154	0.621	0.293	0.284	
Selenium	ND	ND	ND	ND	ND	
Silver	ND	ND	ND	ND	ND	
Zinc	0.00556	0.0300	ND	0.00543	0.0184	
<u>CHLORIDE In MG/L</u>	<u>MW20</u>	<u>MW21</u>	<u>MW22</u>	<u>MW23</u>	<u>MW23 QC</u>	<u>MW23 QA</u>
	8.66	2,110	1,330	486	481	490
<u>PERCHLORATE In UG/L</u>	<u>MW20</u>	<u>MW21</u>	<u>MW22</u>	<u>MW23</u>	<u>MW23 QC</u>	<u>MW23 QA</u>
	ND	27,800	9,140	37,800	36800	36700

.6
Extraction Well Analytical Data

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sept 01	Oct. 01	Jan-02	Apr-02	Jul-02	Sep-02	Jan-03	Apr-03
<u>Perchlorate</u>														
Well 1	N/A	256	202	581	42.4	610	564	481	472	65.3	430	668	74.1	531
Well 2	N/A	226	224	56.6	27.6	487	91.3	102	39.4	62.1	100	30.5	86.1	20.9
Well 3	N/A	252	290	47.6	ND	512	56	235	71.4	83.7	130	ND	148	ND
Well 4	N/A	ND	44.7	ND	ND	446	18.8	37.3	17.4	21.4	80	ND	53.9	14.6
Well 5	N/A	864	53.1	ND	ND	486	1240	1450	1590	1340	1430	1,290	1,240	1,140
Well 6	N/A	208	269	173	ND	323	ND	201	137	96.2	ND	15.4	ND	67.7
Well 7	N/A	20.7	94.5	120	ND	387	237	114	ND	51.6	ND	ND	10.2	65.6
Well 8	N/A	ND	241	44.8	ND	486	ND	77.3	ND	50.1	ND	ND	ND	58.7
<u>Trichloroethene</u>														
Well 1	26,000	30,000		4,200		24,000		19,000		4,280		14,100		13,800
Well 2	8,500	21,000		640		18,000		45,000		62,900		109,000		108,000
Well 3	7,400	4,800		100		21,000		5,700		6,060		5,620		9,250
Well 4	2,100	2,100		60		20,000		1,000		2,400		2,790		3,760
Well 5	6,800	3,400		220		24,000		4,300		5,740		4,160		5,200
Well 6	7,600	24,000		190		21,000		1,600		1,280		875		3,150
Well 7	1,200	6,200		16		13,000		16		32		51		69.5
Well 8	5,200	4,600		140		20,000		ND		105		ND		30.3
<u>Methylene Chloride</u>														
Well 1	170	ND		ND		ND		ND		ND		ND		ND
Well 2	ND	ND		ND		ND		ND		ND		ND		ND
Well 3	ND	ND		ND		ND		ND		ND		ND		ND
Well 4	ND	ND		ND		ND		ND		ND		ND		ND
Well 5	ND	ND		ND		ND		ND		ND		ND		ND
Well 6	ND	ND		ND		ND		ND		ND		ND		ND
Well 7	ND	ND		ND		ND		ND		ND		ND		ND
Well 8	ND	ND		ND		ND		ND		ND		ND		ND
<u>1,1-Dichloroethane</u>														
Well 1				ND		ND		ND		ND		ND		28.5
Well 2				ND		ND		ND		ND		ND		ND
Well 3				ND		ND		ND		ND		ND		ND
Well 4				ND		ND		ND		ND		ND		ND
Well 5				ND		ND		5		ND		ND		ND
Well 6				ND		ND		ND		ND		ND		ND
Well 7				ND		ND		ND		ND		ND		ND
Well 8				ND		ND		ND		ND		ND		ND

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sept-01	Oct-01	Jan-02	Apr-02	Jul-02	Sep-02	Jan-03	Apr-03
1,2-Dichloroethane														
Well 1	130	ND		ND		ND		86		ND		104		96.4
Well 2	ND	ND		ND		ND		16		ND		ND		65.6
Well 3	ND	ND		ND		ND		ND		ND		ND		ND
Well 4	ND	ND		ND		ND		ND		ND		ND		ND
Well 5	ND	ND		ND		ND		16		ND		ND		19.2
Well 6	ND	ND		ND		ND		ND		ND		ND		ND
Well 7	ND	ND		ND		ND		ND		ND		ND		ND
Well 8	ND	ND		ND		ND		ND		ND		ND		ND
1,1-Dichloroethane														
Well 1	51	ND		ND		ND		33		ND		ND		ND
Well 2	ND	ND		ND		ND		72		78.4		109		164
Well 3	ND	ND		ND		ND		8		ND		ND		26.7
Well 4	ND	ND		ND		ND		ND		ND		ND		5.5
Well 5	ND	ND		ND		ND		7		ND		ND		9.9
Well 6	ND	ND		ND		ND		ND		ND		ND		6.6
Well 7	ND	ND		ND		ND		ND		ND		ND		ND
Well 8	ND	ND		ND		ND		ND		ND		ND		ND
Vinyl Chloride														
Well 1	ND	ND		ND		ND		160		ND		144		180
Well 2	75	ND		ND		ND		10		ND		ND		189
Well 3	ND	ND		ND		ND		ND		ND		ND		ND
Well 4	ND	ND		ND		ND		ND		ND		ND		ND
Well 5	50	ND		ND		ND		70		ND		ND		102
Well 6	50	ND		ND		ND		ND		ND		ND		ND
Well 7	ND	ND		ND		ND		ND		ND		ND		ND
Well 8	38	ND		ND		ND		ND		ND		ND		ND
Freon 113														
Well 1								ND		ND		ND		ND
Well 2								ND		ND		291		667
Well 3								ND		ND		ND		144
Well 4								ND		ND		ND		34
Well 5								ND		ND		ND		35.5
Well 6								ND		ND		ND		69
Well 7								ND		ND		ND		ND
Well 8								ND		ND		ND		ND
Chloroform														
Well 1				ND		ND		ND		ND		ND		ND
Well 2				ND		ND		ND	13	ND		ND		26.9
Well 3				ND		ND		ND		ND		ND		ND
Well 4				ND		ND		ND		ND		ND		ND
Well 5				ND		ND		ND		ND		ND		ND
Well 6				ND		ND		ND		ND		ND		ND
Well 7				ND		ND		ND		ND		ND		ND
Well 8				ND		ND		ND		ND		ND		ND

Extraction Well Analytical Data

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01	Sept. 01	Oct. 01	Jan-02	Apr-02	Jul-02	Sep-02	Jan-03	Apr-03
1,1,2-Trichloroethane (ug/L)														
Well 1														ND
Well 2														13.9
Well 3														ND
Well 4														ND
Well 5														ND
Well 6														ND
Well 7														ND
Well 8														ND
Chloride (mg/L)														
Well 1	860	1,270		886		834		NA		416		774		863
Well 2	448	905		555		738		NA		507		596		629
Well 3	553	904		459		764		NA		513		520		556
Well 4	560	637		464		737		NA		296		335		347
Well 5	640	1,230		535		830		NA		649		680		697
Well 6	436	1,170		679		731		NA		812		806		865
Well 7	635	897		528		748		NA		378		378		460
Well 8	461	755		532		751		NA		264		255		272

031225

031226

**Longhorn Army Ammunition Plant
Technical Review Committee
19 June 2003**

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[illegible]



September 4, 2003

Attn: SMALL-CR
David Tolbert
Commander's Representative
Department of the Army
Longhorn/Louisiana Army Ammunition Plants
PO Box 658
Doyline, LA 71023

Dear Mr. Tolbert:

Subject: Site 32 Closure Report

Provided is a hard copy and an electronic copy of a project completion report entitled "Closure Report for Filling in Basement Structures at Site 32 at the Longhorn Army Ammunition Plant, September 2003." The report describes the work done as required by Contract Number DAAA09-02-P-0072.

The hard copy of the report provided does not include copies of the analytical reports generated by each laboratory, due to these adding several hundred pages to the report. Tables summarizing the data are included in the report. The electronic copy of the report includes all analytical data that was provided by each laboratory.

As documented in the report, each of the two structures have been closed in accordance with the approved Site 32 Closure Plan. All water and sediment in each basement was sampled for environmental contaminants. Sediment from "Building 2" did not qualify to leave in place and was removed from the building and shipped offsite for disposal. The floor in each basement was breached for water to drain, and the ceiling in each basement was demolished in place. Each structure was then filled with soil.

Complete Environmental Service is pleased to have been able to assist you with this project.

You may want to discuss the different elements of the project. If you have any questions I can be reached at 903/679-3448 or by email at ces@shreve.net.

Sincerely,

William R. Corrigan, CHMM
Project Manager

WRC-2003-0904

Enclosure

cc: AMSOS-CCM-R (Mr. Robert J. Matthys)

Closure Report
For
Filling in Basement Structures at Site 32
At the
Longhorn Army Ammunition Plant
(LHAAP)

September 2003

Submitted to:
US Army
SMALL-CR, Louisiana AAP
Contract No. DAAA09-02-P-0072

Prepared by:

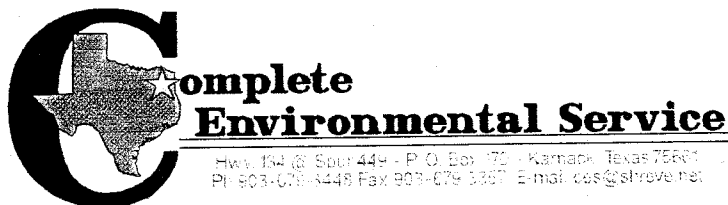


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1.0 INTRODUCTION

The US Army Operations Command has contracted with *Complete Environmental Service* to fill in two abandoned pits located at Site 32 on Longhorn AAP. *Complete Environmental Service* has prepared this closure plan to document the closure of the pits in accordance with the provisions of Contract No. DAAA09-02-P-0072.

1.1 Description of Site 32

Site 32 is located off Avenue C about .2 miles northwest of the intersection with 1st Street. The site covers approximately nine acres and is covered extensively with trees and brush. The site has not been in use since the late 1940's. Two large concrete slabs where the buildings were located are on the site, along with other small structures such as manway access holes to underground utilities, etc.

1.2 Purpose

Two large concrete slabs at Site 32 are from former buildings that each contained a subsurface room. The upper ceiling of each room or basement served as the concrete floor or slab that is located at ground level. Each building slab, or rather the ceiling of each basement, is deteriorating and collapsing in places. The purpose of filling in the basements, or pits, at Site 32 is to eliminate the safety hazard of a person falling into the basement. The basements are approximately 12 feet deep and at times are full of water.

The site where the basements, or pits, are located is designated as Site 32 under the Federal Facility Agreement and is under investigation as an area of possible contamination.

Due to the possibility of contamination at the site, sampling was conducted of the surface water and sediment in the pits prior to filling in the pits with fill material. Water and sediment was disposed of as necessary to comply with Federal and State regulations.

This closure report presents the actions that were conducted to accomplish the tasks of removing sediment and filling in the structures.

2.0 FIELD INVESTIGATION ACTIVITIES

The purpose of sampling the water and sediment in the building basement areas at Site 32 was to verify whether contaminants from VOC's, RCRA metals, explosives, and perchlorate were present in the media or not. The decision on the correct disposal method for the water and sediment in the buildings was based on the environmental sampling.

For tracking purposes, the structures at the site were named Building 1 and Building 2. Building 1 is a square structure at the north end of the site that measures 31 feet long by 23 feet wide. Building 2 is a rectangular structure at the south end of the site that measures approximately 117 feet long by 19 feet wide.

In order to meet the specific objectives of the closure plan, the following samples were collected:

- ❖ Collection of a surface water sample from each building (2-each samples, one split in triplicate for a QA/QC sample).
- ❖ Collection of a sediment sample from Building 2. Building 1 did not contain any sediment for sampling. (2-each samples, one split in triplicate for a QA/QC sample).

Tables 2.0-1 and 2.0-2 provide a description of the samples collected from each building.

Samples were collected in accordance with the closure plan with the following changes.

1. An additional sample of water was collected from Building 1 and analyzed for explosives. The initial sample was not analyzed within the correct holding time. The additional sample collected was sample number LH32-Bldg1-4003.
2. No sediment was in the bottom of the pit in Building 1. No sediment sample was collected.
3. Samples of sediment from Building 2 that contained metals above the LHAAP plant background concentrations were analyzed with EPA Method 1312 (Synthetic Precipitation Leachate Procedure).
4. Samples of sediment analyzed in accordance with the SPLP from Building 2 that contained metals exceeding the EPA maximum contaminant limit (MCL) were subject to the Toxicity Characteristic Leaching Procedure (TCLP).

Table 2.0-1: Samples Collected from Building 1

Sample Identification	Date Collected	Media	Parameter	EPA Method	Laboratory	Laboratory Project Number
LH32-Bldg1-4001	10/22/02	Water	VOC's, Perchlorate RCRA Metals Explosives	8260B 314.0 6010B 8330	STL, Houston	243088
LH32-Bldg1-4003	10/27/02	Water	Explosives	8330	Analab	198435

*No sediment was in the bottom of Building 1. No sediment samples were collected.

Table 2.0-2: Samples Collected from Building 2

Sample Identification	Date Collected	Media	Parameter	EPA Method	Laboratory	Laboratory Project Number
LH32-Bldg2-4002	10/22/02	Water	VOC's, Perchlorate RCRA Metals	8260B 314.0 6010B	STL, Houston	243088
LH32-Bldg2-4002	10/22/02	Water	Explosives	8330	STL, Chicago	212985
LH32-Bldg2-4002-QC	10/22/02	Water	VOC's, Perchlorate RCRA Metals	8260B 314.0 6010B	STL, Houston	243088
LH32-Bldg2-4002-QC	10/22/02	Water	Explosives	8330	STL, Chicago	212985
LH32-Bldg2-4002-QA	10/22/02	Water	VOC's, Perchlorate RCRA Metals	8260B 314.0 6010B	APPL, Inc.	39741
LH32-Bldg2-4004-QA	10/27/02	Water	Explosives	8330	STL, Chicago	213157
LH32-Bldg2-4004	11/18/02	Sediment	VOC's, Perchlorate RCRA Metals/ SPLP	8260B 314.0 6010B/1312	STL, Houston	244608
LH32-Bldg2-4004	11/18/02	Sediment	Explosives	8330	STL, Chicago	213760
LH32-Bldg2-4004-QC	11/18/02	Sediment	VOC's, Perchlorate RCRA Metals/ SPLP	8260B 314.0 6010B/1312	STL, Houston	244608
LH32-Bldg2-4004-QC	11/18/02	Sediment	Explosives	8330	STL, Chicago	213760
LH32-Bldg2-4004-QA	11/18/02	Sediment	VOC's, Perchlorate RCRA Metals	8260B 314.0 6010B	APPL, Inc.	39996
LH32-Bldg2-4004-QA	11/18/02	Sediment	Explosives	8330	Analab	200008
LH32-BLDG2-4005	01/14/03	Sediment	Reactive Sulfide, Reactive Cyanide, pH, Paint Filter Test, TCLP Lead, TCLP Mercury	7.3 7.3 7.23 9095A 6010B 7470A	STL Houston	247622
LH32-2-1 LH32-2-2	05/16/03	Sediment	Reactive Sulfide	7.3	STL Houston	254480

Table 2.0-3: Building 1 Water Sample Analysis Results

Sample Media: Water		
	LH32-Bldg1-4001 (Collected 10/22/02)	LH32-Bldg1-4003 (Collected 10/27/02)
Volatiles, ug/L	ND	NA
Perchlorate, ug/L	ND	NA
Arsenic, mg/L	ND	NA
Barium, mg/L	ND	NA
Cadmium, mg/L	ND	NA
Chromium, mg/L	ND	NA
Lead, mg/L	ND	NA
Selenium, mg/L	ND	NA
Silver, mg/L	ND	NA
Mercury, ug/L	ND	NA
Explosives	NA (Container Damaged)	ND

Table 2.0-4: Building 2 Water Sample Analysis Results

Sample Media: Water				
	LH32-Bldg2-4002 (Collected 10/22/02)	LH32-Bldg2- 4002-QC (Collected 10/22/02)	LH32-Bldg2- 4002-QA (Collected 10/22/02)	LH32-Bldg2- 4004-QA (Collected 10/27/02)
Volatiles, ug/L	ND	ND	ND	NA
Perchlorate, ug/L	ND	ND	ND	NA
Arsenic, mg/L	ND	ND	ND	NA
Barium, mg/L	0.0753	0.0806	0.0823	NA
Cadmium, mg/L	ND	ND	ND	NA
Chromium, mg/L	ND	ND	ND	NA
Lead, mg/L	0.0266	0.0282	0.028109	NA
Selenium, mg/L	ND	ND	ND	NA
Silver, mg/L	ND	ND	ND	NA
Mercury, ug/L	ND	ND	ND	NA
Explosives (ug/L)			NA	ND
2,4,6-Trinitrotoluene	5.5	5.6		
2-Amino-4,6-Dinitrotoluene	2.3	2.4		
4-amino-2,6-Dinitrotoluene	2.4	2.5		

Table 2.0-5: Building 2 Sediment Analysis Results

	LH32-Bldg2-4004 (Collected 11/18/02)	LH32-Bldg2-4004 (Collected 11/18/02)	LH32-Bldg2- 4004-QC (Collected 11/18/02)	LH32-Bldg2- 4004-QC (Collected 11/18/02)	LH32-Bldg2- 4004-QA (Collected 11/18/02)	LH32-Bldg2- 4004-QA (Collected 11/18/02)
Volatiles, ug/Kg	ND	NA	ND	NA	ND	NA
Perchlorate, ug/Kg	ND	NA	ND	NA	ND	NA
Arsenic, mg/Kg	4.02	NA	4.10	NA	10.7	NA
Barium, mg/Kg	32.2	NA	34.7	NA	95.7	NA
Cadmium, mg/Kg	1.37	NA	1.11	NA	ND	NA
Chromium, mg/Kg	12.2	NA	9.76	NA	37.2	NA
Lead, mg/Kg	117	NA	100	NA	288	NA
Selenium, mg/Kg	ND	NA	ND *	NA	3.0	NA
Silver, mg/Kg	ND	NA	ND	NA	ND	NA
Mercury, ug/Kg	3250	NA	477	NA	7.3 (mg/Kg)	NA
Explosives (ug/Kg) 2,4,6-Trinitrotoluene 2-Amino-4,6- Dinitrotoluene 4-amino-2,6- Dinitrotoluene	NA	ND	NA	61 ug/Kg (I); 140	NA	ND

**Table 2.0-6: Building 2 Sediment Synthetic Precipitation Leachate Procedure
Analysis Results**

Sample Media: Sediment		
	LH32-Bldg2-4004 (Collected 11/18/02)	LH32-Bldg2-4004-QC (Collected 11/18/02)
Arsenic, mg/L	ND	ND
Cadmium, mg/L	ND	ND
Chromium, mg/L	ND	0.0112
Lead, mg/L	0.690	0.0785
Mercury, ug/L	0.490	0.346

**Table 2.0-7: Building 2 Toxicity Characteristic Leaching Procedure
Analysis Results**

	LH32-Bldg2-4005 (Collected 01/14/03)	LH32-2-1 (Collected 05/16/03)	LH32-2-2 (Collected 05/16/03)
Reactive Cyanide, mg/Kg	<10	NA	NA
Reactive Sulfide, mg/Kg	680	60	<50
Soil pH, pH units	7.23	NA	NA
Paint Filter Test, Sludge	negative	NA	NA
TCLP Lead, mg/L	0.196	NA	NA
TCLP Mercury, ug/Kg	ND	NA	NA
Lead, mg/Kg	117	NA	NA
Selenium, mg/Kg	ND	NA	NA
Silver, mg/Kg	ND	NA	NA
Mercury, ug/Kg	3250	NA	NA

3.0 FIELD OPERATIONS

3.1 Environmental Sampling

Water and sediment sampling at Site 32 was conducted in accordance with the *Sampling and Analysis Plan for Groundwater Treatment Plant and Wellfields*.

3.1.1 Surface Water Sampling

Surface water samples were collected by a weighted jar. Sample location was near the bottom and center of each basement. Volatile samples were collected first. Explosives were collected next, followed by metals and perchlorate.

3.1.2 Sediment Sampling

Sediment samples were collected by using a stainless steel spoon. The sample location was near the center of each basement. Volatile samples were collected first and placed directly into a glass jar with a Teflon-lined lid. Explosives were collected next, followed by metals and perchlorate.

3.2 Physical Work at Site

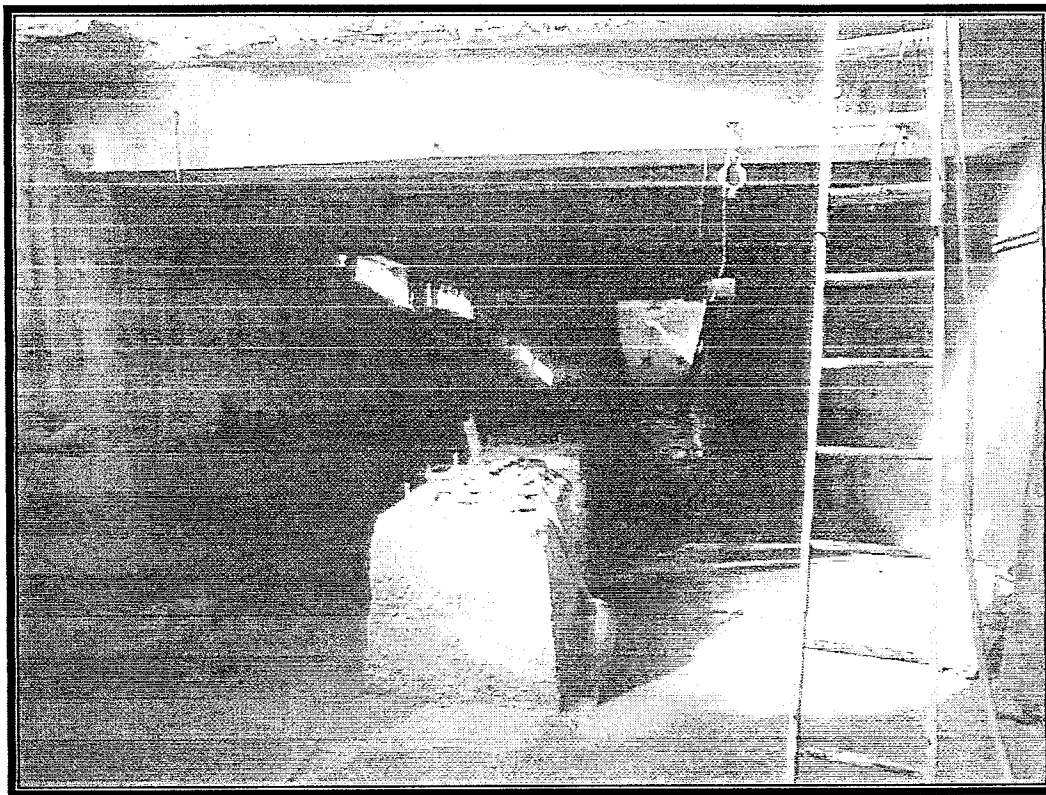
3.2.1 Site Access Improvements

Deadfalls and tree growth were removed as required to access the buildings. Some fill dirt was placed near each building in order to access the site. Fill dirt from berms around Magazine 811-1 in the LHAAP Magazine Area was utilized.

3.2.2 Water and Sludge Testing-

A sample of water was collected from each building basement. The samples were analyzed for volatiles, RCRA metals, explosives, and perchlorate. The samples were split in triplicate in accordance with standard QA/QC procedures. Upon acceptable QA/QC, the analytical results were evaluated for proper disposition of the water.

Once the water was removed from Building 2, sediment samples were collected from the building. The sediment sample was analyzed for volatiles, RCRA metals, explosives, and perchlorate. The samples were split in triplicate in accordance with standard QA/QC procedures. Upon acceptable QA/QC, the analytical results were evaluated for proper disposition of the sediment.



Interior of Building 2 after Sediment Was Removed

3.2.3 Evaluation of Surface Water and Sediment in each Building

Surface water and sediment analytical results were compared to the LHAAP background values and to TCEQ Protective Concentration Levels to determine disposition of water and sediment.

Contaminant concentrations in the water from Building 1 were non-detect for any contaminants. Water from Building 2 contained detectable concentrations of 2,4,6-Trinitrotoluene, 2-Amino-4,6-Dinitrotoluene, and 4-amino-2,6-Dinitrotoluene. The QA sample did not exhibit any detectable amount of the same contaminants.

There was no sediment in Building 1. The sediment in Building 2 contained detectable concentrations of 2,4,6-Trinitrotoluene, lead, mercury, cadmium, chromium, and arsenic. The Synthetic Precipitation Leachate Procedure (SPLP) was utilized to determine if the metals would leach. As provided in Table 3.0-5, the metals mercury, lead, and chromium did leach detectable amounts of these metals. Mercury and lead leached above current groundwater protections standards. Because the sediment did not meet standards to leave in place onsite, the material was sampled again and characterized for disposal to a

permitted offsite landfill. Provided in Table 3-0-7 are sample results from the TCLP analysis of sediment from Building 2.

3.2.4 Removal Surface Water and Sediment in each Building

Water was removed from each building by pumping the water with a trash pump. The water was discharged onsite.

Because sediment in Building 2 indicated contamination above LHAAP background values and State groundwater protection standards, the material was removed for disposal offsite. The material was stockpiled into a HDPE lined basin next to the building. After collecting all of the material, it was covered with plastic sheeting to keep rainwater off. When the necessary approvals were obtained from the landfill, the material was loaded into a 25 cubic-yard rolloff container and shipped for disposal.



Installing Liner for Sediment Waste

3.2.5 Clear Trees to Access Site

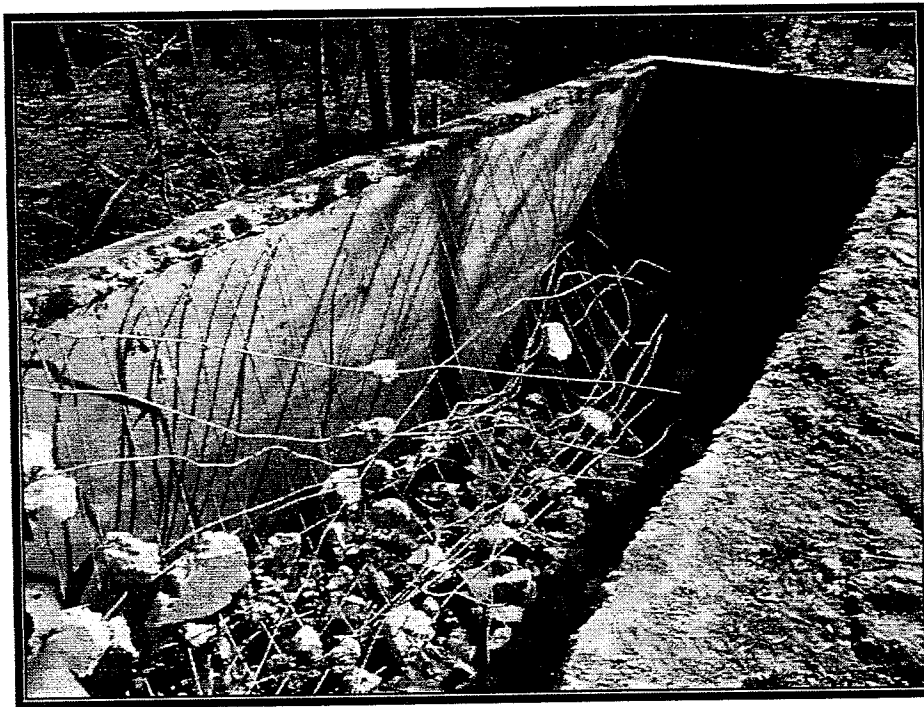
Some trees were cleared from the site to access each building. Only enough trees and debris were cleared for the dump truck to maneuver. The brush and trees were piled at the north side of the buildings.

3.2.6 Breakout Floor in each Basement

After the water was removed from each building, the concrete floor of the basement was breached prior to filling in the basement with fill material. The floor in each building basement was broken out enough to allow for water to drain preventing the water from collecting and pooling within the structure.

3.2.7 Demolish Ceiling Structure

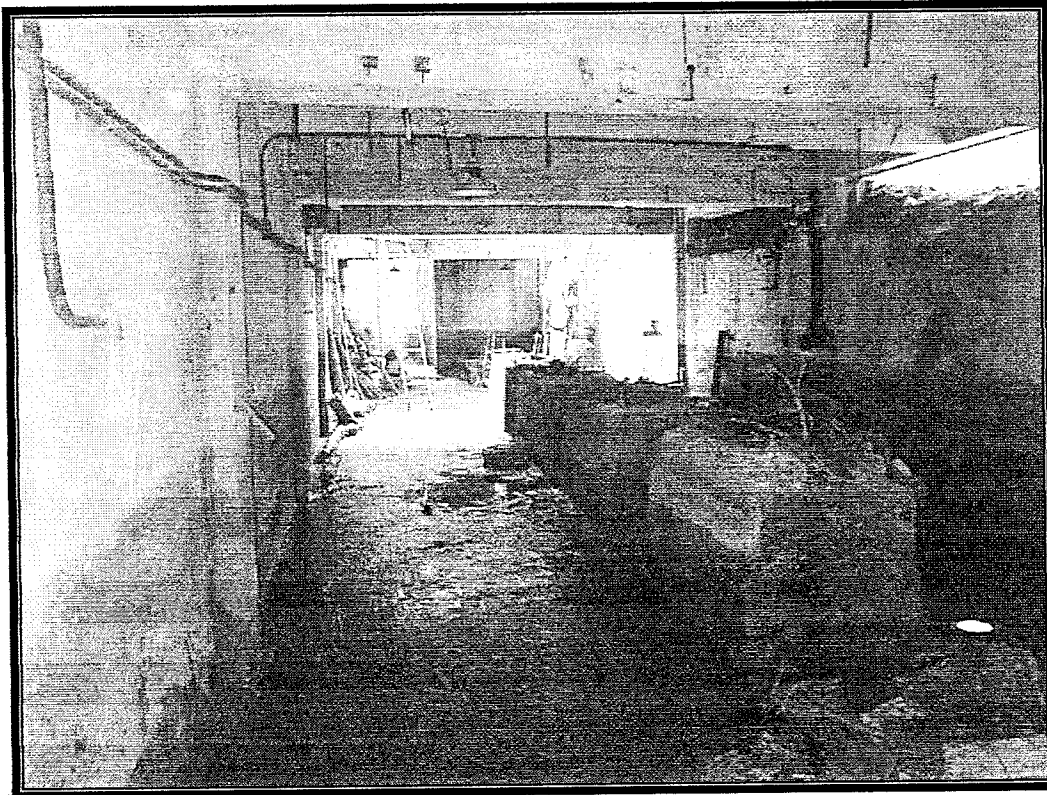
The ceiling structure in each building, currently a safety hazard, was demolished in place to allow access for fill material placement. All concrete was allowed to fall and was left in place. Rebar was cut free from the existing structure with a cutting torch, allowed to fall, and was left in place.



Building 1 After Ceiling Structure Demolished

3.2.8 Disposal of Sediment from Building 2

Sediment from Building 2 was loaded in a twenty-five cubic yard rolloff and shipped offsite on August 19, 2003. The sediment was classified as a Class 2 Non-hazardous Special waste. The material was shipped to Pinehill Landfill in Kilgore, Texas. A copy of the manifest, special waste approval, and profile are provided in Appendix A.



Interior of Building 2 after Removing Sediment

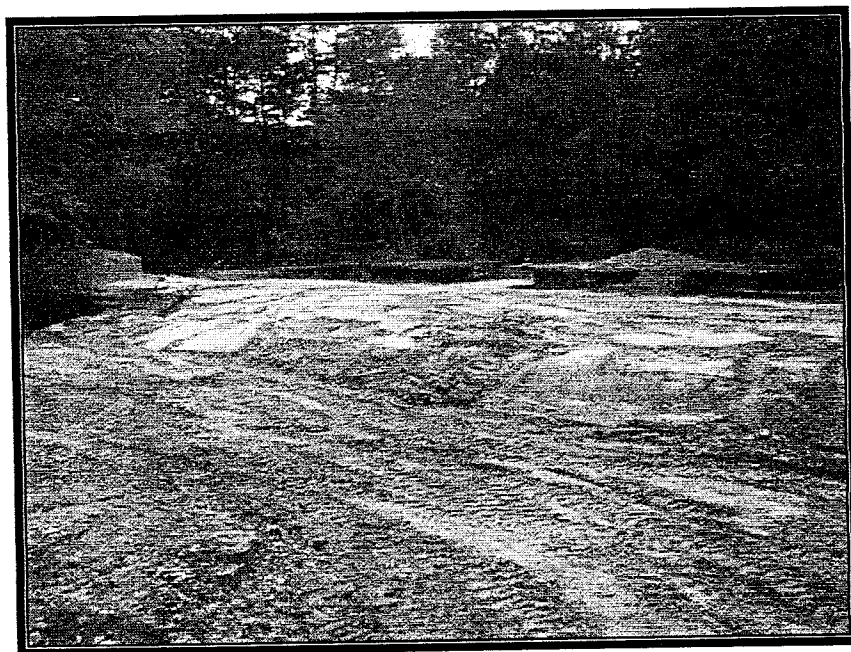
3.2.9 Import and Place Fill Material

Fill material provided from earthen berms at magazines located in the magazine area at LHAAP was excavated and transported to the site. The fill was provided from Magazines 811-1 and 811-2. Fill material was pushed into each basement and compacted into place. Approximately 300 cubic yards of fill material was required for Building 1 and 924 cubic yards for Building 2.

The fill material was compacted into place approximately one foot deep above the top elevation of the foundation walls. Grass seed was planted for cover on the fill to control erosion.



Structures after placement of fill: Building 1 on Left and Building 2 on Right



Building 2 after placement of fill. Area graded for drainage.

4.0 SAFETY AND ENVIRONMENTAL CONSIDERATIONS

Complete Environmental Service is committed to the safety of our employees, visitors and contractors in all activities, as well as protecting physical assets, the customer's personnel and physical assets, the environment, and the ultimate mission of success for our operations. In general, all employees, visitors, and contractors are required to abide by the rules, regulations, and standards in the *Complete Environmental Service Corporate Health & Safety Manual*. All employees are authorized and obligated to stop work at any time due to a safety issue. The safety manual is available at the CES office located at LHAAP. CES will operate and remain in compliance with all appropriate Federal and State regulations, and contractual obligations.

In addition to the *Complete Environmental Service Corporate Health & Safety Manual*, CES maintains the site specific "*Operation and Maintenance Health and Safety Plan*" for Site 18/24 located at LHAAP. All sections in the plan that are not unique for Site 18/24 were applied to Site 32.

All work conducted at Site 32 was completed with any recordable lost time injuries to CES employees or subcontractors. *

Appendix A

Waste Profile Information and Shipping Documents



031247

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form approved. OMB No. 2050-0039, expires 09/30/94

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. TX 6 2 1 3 8 2 0 5 2 9	Manifest Document No. 0 0 0 1 9	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.	
3. Generator's Name and Mailing Address Longhorn Army Ammunition Plant Hwy 134 @ Spur 449 Karnack, TX 75661 4. Generator's Phone (903) 679-3448				Mainling Address: PO Box 658 Doyline, LA 71023		
5. Transporter 1 Company Name Triad Transport Inc.				6. US EPA ID Number OKD 9 8 1 5 8 8 7 9 1		
7. Transporter 2 Company Name				8. US EPA ID Number		
9. Designated Facility Name and Site Address Pinehill Landfill Hwy 31 @ I-20 Kilgore, TX 75663				10. US EPA ID Number NA		
11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)		12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
	a. Non-Regulated Sediment from Site 32 Basement		0 0 1	CM	5.0 0 0	P
	b.					
	c.					
	d.					
J. Additional Descriptions for Materials Listed Above a) Waste Profile No. 072Y316640				K. Handling Codes for Wastes Listed Above		
15. Special Handling Instructions and Additional Information						
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.						
Printed/Typed Name William R Corrigan			Signature William R Corrigan		Month Day Year 08/19/03	
TRANSPORTER	17. Transporter 1 Acknowledgement of Receipt of Materials			Date		
	Printed/Typed Name Don R. Hall			Signature Don R. Hall		Month Day Year 08/19/03
	18. Transporter 2 Acknowledgement of Receipt of Materials			Date		
Printed/Typed Name			Signature		Month Day Year	
19. Discrepancy Indication Space						
FACILITY	20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.					
	Printed/Typed Name			Signature		Date Month Day Year



Serving You First

Original — Not Negotiable
TRIAD TRANSPORT, INC.
 P. O. Box 818 — McAlester, OK 74502

P.O.# _____ MANIF# 00019 LOAD# _____ PRO# 1104046 TRUCK# 2229 TRAILER# 239

ORIGIN:		DESTINATION:	
SHIPPER	<u>Longhorn Army Ammun.</u>	CONSIGNEE	<u>Pine Hill Lead Sil</u>
STREET		STREET	
CV/ST	<u>Kennett TX</u>	CV/ST	<u>Kilgore TX</u>

NO SHIPPING UNITS	H M	KIND OF PACKAGES DESCRIPTION OF ARTICLES (IF HAZARDOUS MATERIALS - PROPER SHIPPING NAME)	HAZARD CLASS	I. D. NUMBER	PACKING GROUP	TYPE OF CONTAINER	WEIGHT SUBJECT TO CORRECTION

Subject to Section 7 of Conditions Applicable Bill of Lading, if this ment is to be delivered to the consignee without recourse on the consignee, the consignor shall sign the following:

The carrier shall not make deliver this shipment without payment freight and all other lawful charges:

(Signature of Consignor)

Where the applicable tariff provides specify a limitation of the carrier's liability (NMFC item 172), if there is no release value declaration by the shipper, any shipper does not declare a value release the carrier's liability that it shall be limited to the extent provided NMFC item 172. California intrastate movements must comply with NMFC item:

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight".
 NOTE—Where this rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
 The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____

EMERGENCY CONTACT: _____

COMMENTS: _____

	YES
PLACARDS REQUIRED	
PLACARDS SUPPLIED BY SHIPPER	
TRIAD PLACARDS	

The property received in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the we) nor being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each at any time increased in all or any of said property, that every carrier to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or lawfully filed tariff if this is a motor carrier shipment. Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or lawfully filed tariff which governs the portion of the shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

LINERS FURNISHED BY: ☐ TRIAD ☐ CUSTOMER / VEHICLE FURNISHED BUT NOT USED: ☐ YES ☐ NO

LOADING **ACTION** **UNLOADING**

7:00 AM 8/19/03 DATE & APPOINTMENT TIME _____

ACTUAL ARRIVAL DATE & TIME _____

DETENTION END TIME _____

REMINDER

Wear P.P.E. when needed, be sure Trailer is Clean; Observe Facility Rules;
 Observe Loading/Unloading & Make Accurate Count; Be sure Manifest is Accurate & Complete
 Check Compatibility of Hazardous Materials—DO NOT HAUL INCOMPATIBLE MATERIALS;
 Secure and Weigh Load—Check Axle Weights—DO NOT HAUL OVERWEIGHT.

LOADING OF TRIAD EQUIPMENT IS ACKNOWLEDGEMENT OF THE ACCEPTANCE BY THE CUSTOMER OF THE TERMS AND CONDITIONS PROVIDED ON THE SHIPMENT CONFIRMATION

Equipment Condition: _____

Shipper per [Signature] Date 8/19/03 Consignee per _____ Date _____

Carrier per [Signature] Date 8/19/03 Print Name: _____

Work requested outside scope of Standard Operating Procedure: _____

Person Requesting Work: (SIGNATURE) _____ Date _____

ORIGINAL (WHITE) - TRIAD

YELLOW - SHIPPER

PINK - CONSIGNEE

GOLDENROD - DRIVER

Appendix B

Laboratory Reports

**Longhorn Army Ammunition Plant
Technical Review Committee Meeting**

**17 September 2003
10:30 a.m.**

Agenda

Executive Summary	Jonna Polk
Schedule Review	Jonna Polk
Groundwater Treatment Plant Report	CES
ESTCP Update	Geosyntech (CES)
Perchlorate Pilot Project – Groundwater Remediation	Stratum Engineering
Perchlorate Pilot Remediation Project – Site 17	Valentine Nzengung
Meeting Schedule	David Tolbert
Adjourn	

031251

TRC

MEETING ATTENDANCE FORM

LONGHORN ARMY. AMMN. PL.
KARNACK, TX 75661

DATE: September 17, 2003 TIME: 10:30 am

ATTENDEES

Printed Name	Signature	Organization	E-Mail Address	Phone No.
Barry Forsythe		USFWS	forsythe.barry@epa.gov	214-665-5467
Todd Dickinson		TAWD	todd.dickinson@tawd.state.tx.us	903-679-3351
Tom Erny		T.C.E.Q.	terny@tceq.state.tx.us	903-535-5148
H.L. "Bud" Jones	H.L. Jones	TAPP	hbjones@nwtcc	541-412-7224
Kevin Temeier		BRAC Tech	Kevin.Temeier@us.army.mil	309-782-1122
Michelle Rhodes		Tulsa Corps	michelle.m.rhodes@usace.army.mil	918-694-4308
Jamie Sher		TCEQ	jsheer@TCEQ.state.tx.us	512-239-2444
Praveen Srivastava		Shaw	praveen.srivastava@shawgrp.com	281-368-4588
WALTER O'NEILL		PLANTECO	wonielle@plantecon.com	706-316-3525
Valentine Nzengung		PLANTECO	vnzengun@plantecon.com	706-202-4296
DAVID TESTER		Shaw	david.test@shaw.com	706-710-6633
JONNA POLK		USACE-TULSA	Jonna.Polk@USACE	918/669-7482
JOHN HEPOLA		EPA, R-G	HEPOLA.JOHN@EPA.GOV	214-665-7220
GUS CHAUVAZON		" "		01-39-3162
CHRIS VILLARREAL		" "	villarreal.chris@epa.gov	214-665-6753
Bill Nelson		USAEC	william.nelson@aec.apgea.army.mil	410-361-5116
Paul Bruckwiczki		USFWS	paul.bruckwiczki@fws.gov	903-679-4536
Fatemeh Shirazi		Stratum	Fatemeh.Shirazi@stratumengineering.com	913-897-4447
David Tolbert		LOHAR	charlie.riggs@stratumengineering.com	318-452-5000
Charles Riggs		Stratum Engi.	cliff.murray@USACE.Army.MIL	314-739-1487
Cliff MURRAY		USACE-Tulsa		918-669-7573

**LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY**

As of 16 September 2003

PROJECT NAME	PROJECT PHASE	PROJECT STATUS	NEXT MAJOR MILESTONE(S)
Group # 2 (Sites 12, 16, 17, 18, 24, 29, and 32)	Remedial Investigation/ Feasibility Study	- Quarterly sampling completed August 03.	- Quarterly sampling scheduled for November. - FS Workplan Addendum to team 18 October.
Group # 4 (Wastewater Sumps And Sites 50 & 60)	Remedial Investigation/ Feasibility Study	- Quarterly sampling completed August 03.	- Resolution of Background study team comments by 13 October. - Field work scheduled to begin 20 October. - Quarterly sampling scheduled for November. - FS Workplan Addendum to team 16 October.
Burn Ground #3 (Sites 18 and 24)	Interim Remedial Action	- Five Year Review completed. - Contract award completed.	
Perchlorate		- Additional seasonal sampling completed in September 02.	
Transition Mgmt. Group		- Transition Management Group meeting held May 03.	- Next meeting will be held after signature of MOU.

**LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY**

As of 16 September 2003

PROJECT NAME	PROJECT PHASE	PROJECT STATUS	NEXT MAJOR MILESTONE(S)
Caddo Lake Sampling	RI/FS	- Lake sampling results presented in September 02.	

031253

LONGHORN ARMY AMMUNITION PLANT IRP STATUS SUMMARY

As of 16 September 2003

SCHEDULED MEETINGS AND VISITS TO LHAAP			
Date / Time	Purpose of Meeting / Visit	Location	
3 November 03	Monthly Meeting	Austin, Texas	
01	Inert Burning Grounds	24	Washout & Unlined Evaporation Pond
11	Suspected TNT Burial Grounds at Ave P&Q	27	South Test Area
12	Landfill 12	29	Former TNT Production Area
16	Landfill 16	32	Former TNT Disposal Area
17	Burning Ground 2/Flashing Area	35	Process Wastewater Sumps
18	Burning Ground 3	50	Former Waste Disposal Facility
		60	Former Storage Bldg. 411 & 714
		XX(54)	Ground Signal Test Area
		52	Magazine Area
		63	Burial Pits

031254

Information for Quarterly TRC Meeting

Longhorn Army Ammunition Plant Groundwater Treatment Plant Report

Site 18/24/16

September 17, 2003



GWTP OPERATIONS

The plant has suffered no major maintenance to render it unable to treat all groundwater pumped from each site so far this year. Maintenance was performed to correct any treatment rate limiting equipment, during scheduled maintenance days. During the quarter, some pipes were opened between pre-treat tanks 200B and 200C to remove a buildup of scale that was inhibiting flowrates through the plant. Once this problem was corrected, flowrates resumed as normal.

FLUIDIZED BED REACTOR OPERATIONS

One-liter samples of granular activated carbon (GAC) were collected from three depths within the FBR on April 2, 2003. These samples were shipped to Shaw Environmental & Infrastructure, Inc. (formerly Envirogen), Princeton Research Center. The samples were collected from depths of 2.5 ft, 7 ft, and 11 ft above the bottom of the bed. Aqueous feed and effluent samples were collected for Total Organic Carbon (TOC), Total Suspended Solid (TSS), and turbidity analysis.

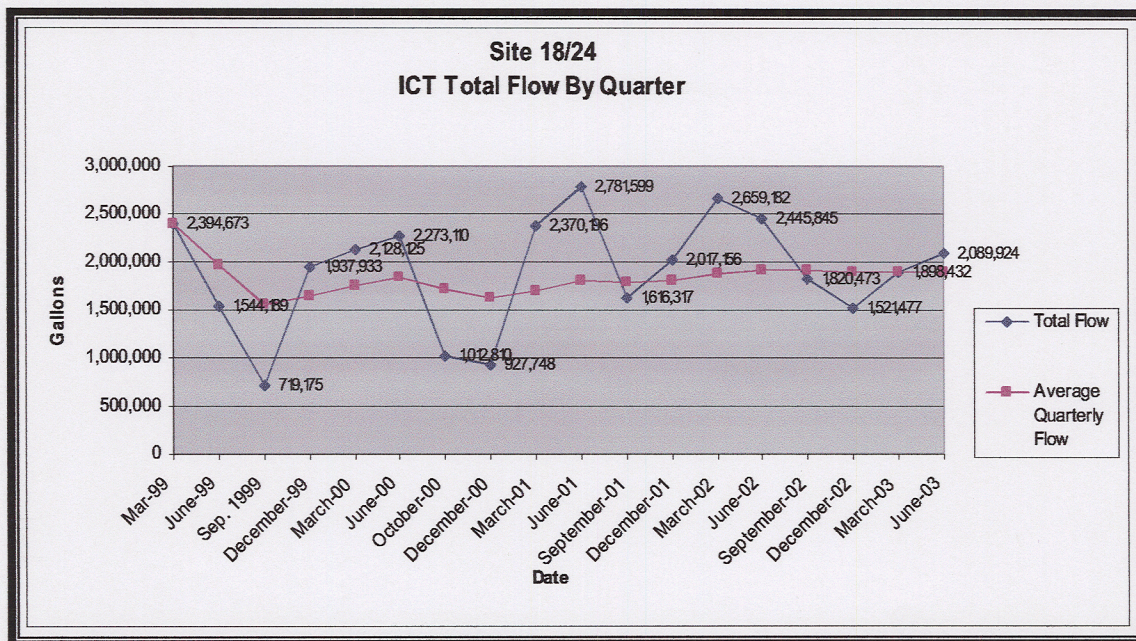
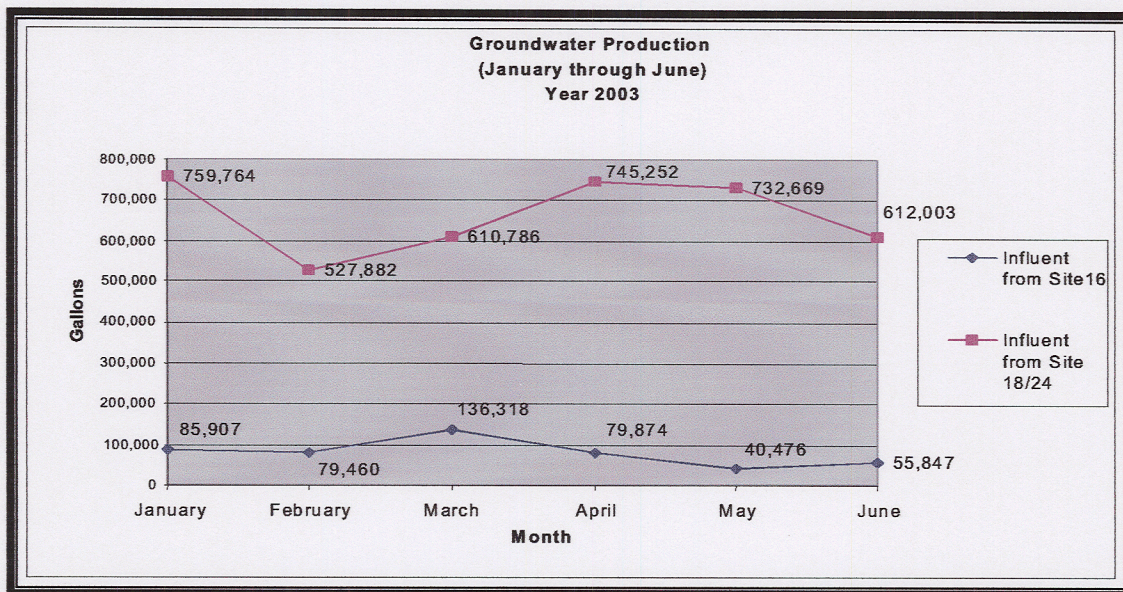
The biomass samples were analyzed by a gram staining procedure. The biomass removed from the carbon consisted of primarily Gram-negative floc. A few Gram-positive cocci and rods were also present. A minor portion of the biomass contained filamentous bacteria. There was not evidence of appreciable iron oxide precipitate within the reactor.

Conclusions reached from the analysis are that the FBR is operating normally. There have been no significant qualitative or quantitative changes in biomass within the reactor. The results from the biomass analyses and consistent performance of the reactor suggest the unit is operating well.

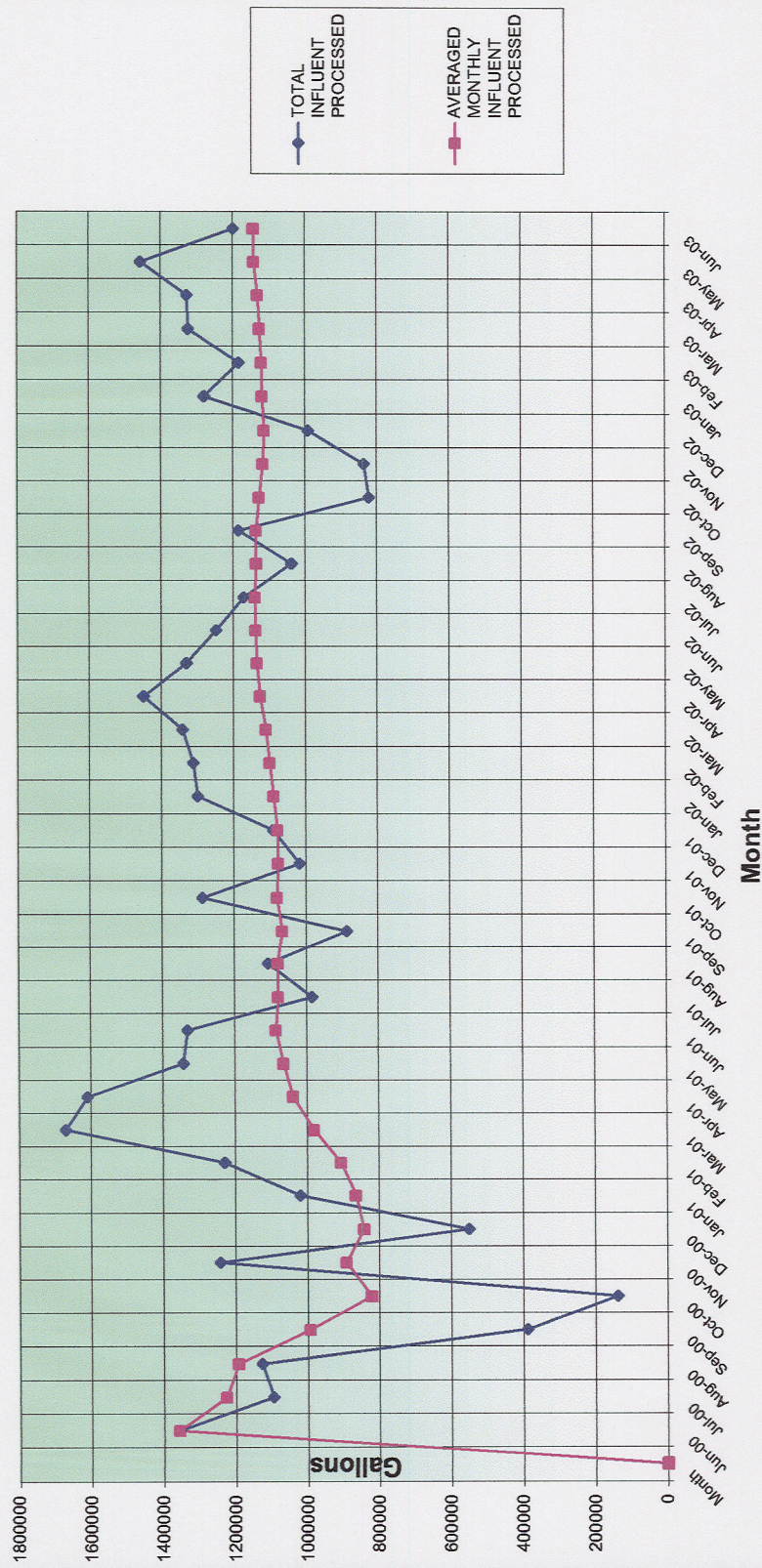
Average actual treatment rates through the FBR were near 30 GPM at the beginning of the quarter reduced to 15 GPM towards the middle of June. Perchlorate concentrations in the influent stream averaged from a high of 19,700 ppb to a low 18,600 ppb.

GROUNDWATER PRODUCTION FIGURES

Groundwater production from each site has slowed due to the seasonal decrease in rainfall. Provided are charts of the monthly and quarterly groundwater production from Site 18/24 and Site 16. The second quarter volume of groundwater removed from Site 18/24 was approximately 2,089,924 gallons.



Longhorn AAP Groundwater Treatment Plant Water Treated June 2000 thru June 2003



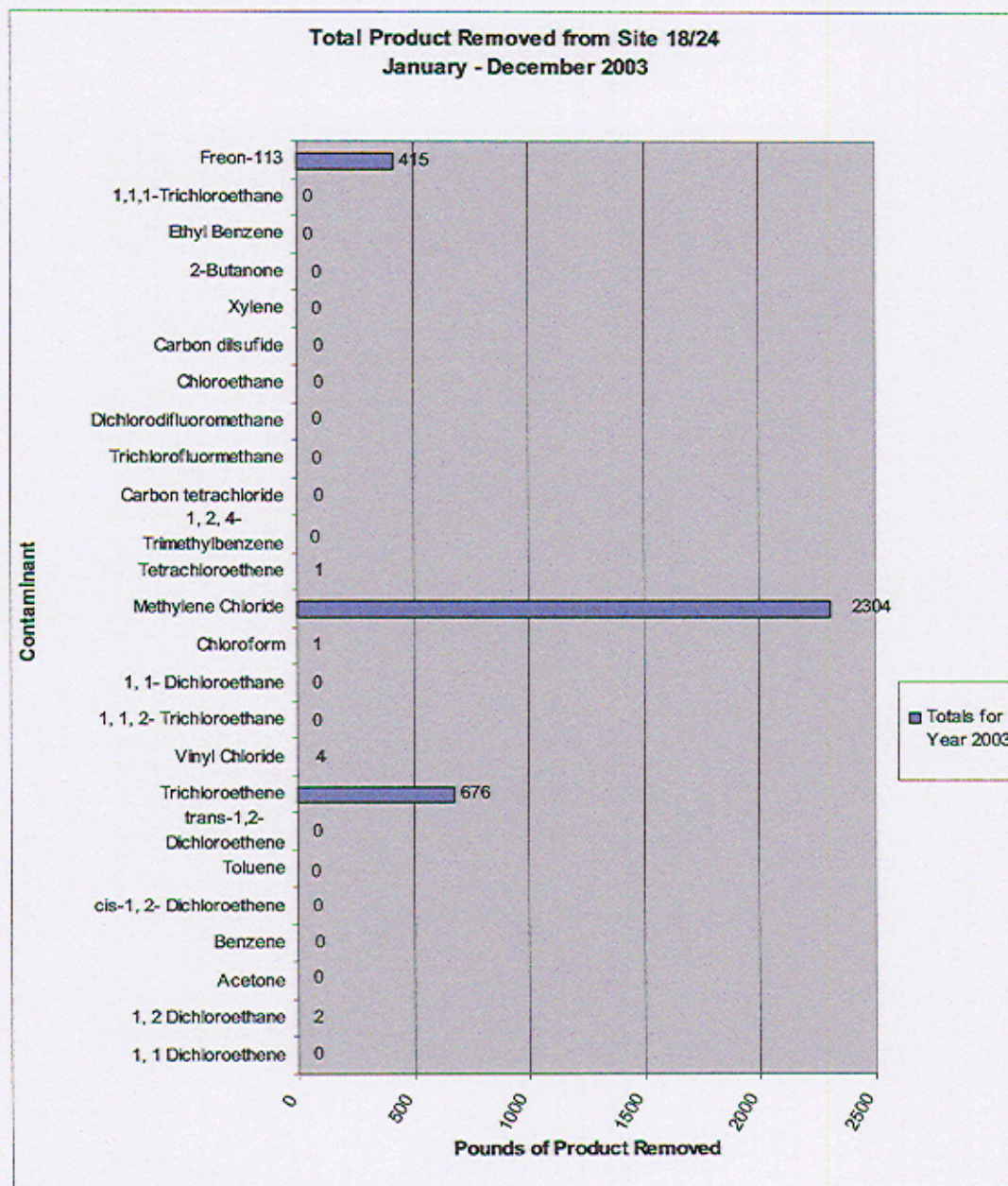
ICT MONTHLY GROUNDWATER PRODUCTION

ICT #	April	May	June	Total
1	7,308	1,331	1,679	10,318
2	3,516	22,663	0	26,179
3	29,657	21,027	12,762	63,446
4	37,222	34,854	31,901	103,977
5	7,561	5,254	3,048	15,863
6	4,223	1,217	11,504	16,944
7	2,836	1,977	1,818	6,631
8	71,783	78,470	68,867	219,120
9	83,897	126,037	113,831	323,765
10	44,941	44,253	38,444	127,638
11	79,721	78,617	63,151	221,489
12A	7,333	6,337	5,683	19,353
12B	8,738	4,996	1,493	15,227
12C	4,093	1,851	296	6,240
12D	38,231	35,104	32,891	106,226
12E	4,675	1,418	883	6,976
13A	35,310	30,845	0	66,155
13B	45,039	46,704	55,952	147,695
13C	19,896	0	3,062	22,958
13D	4,046	3,561	953	8,560
13E	3,574	2,857	2,260	8,691
13F	19	1	10	30
13G	1	1	0	2
14A	49,867	52,281	50,447	152,595
14B	48,049	53,171	49,374	150,594
14C	32,161	22,978	14,509	69,648
14D	40,956	54,864	47,185	143,005
14E	30,599	0	0	30,599
ICT Totals	745,252	732,669	612,003	2,089,924

During the quarter, pumps were replaced on ICT-9 and ICT 13-B. The pumps at ICT 2 and ICT 13-A were replaced during July. ICT's 13-F and 13-G did not produce much water due to low water levels.

During August, thirteen hundred feet of two-inch diameter pipeline had to be cleaned out between ICT-13A and 13-D. Sediment in the pipeline had reduced flow at ICT-13A from ten GPM to near zero. While the header system was opened, the 3-inch diameter line to the GWTP was backflushed. The pipeline between ICT-E and 13-G was also cleaned out. All water was collected in a tank and carried to the GWTP. The secondary containment on these pipelines was inspected and no leaks were evident.

Volatiles Removed From Groundwater at Site 18/24 Jan.-Dec. 2003

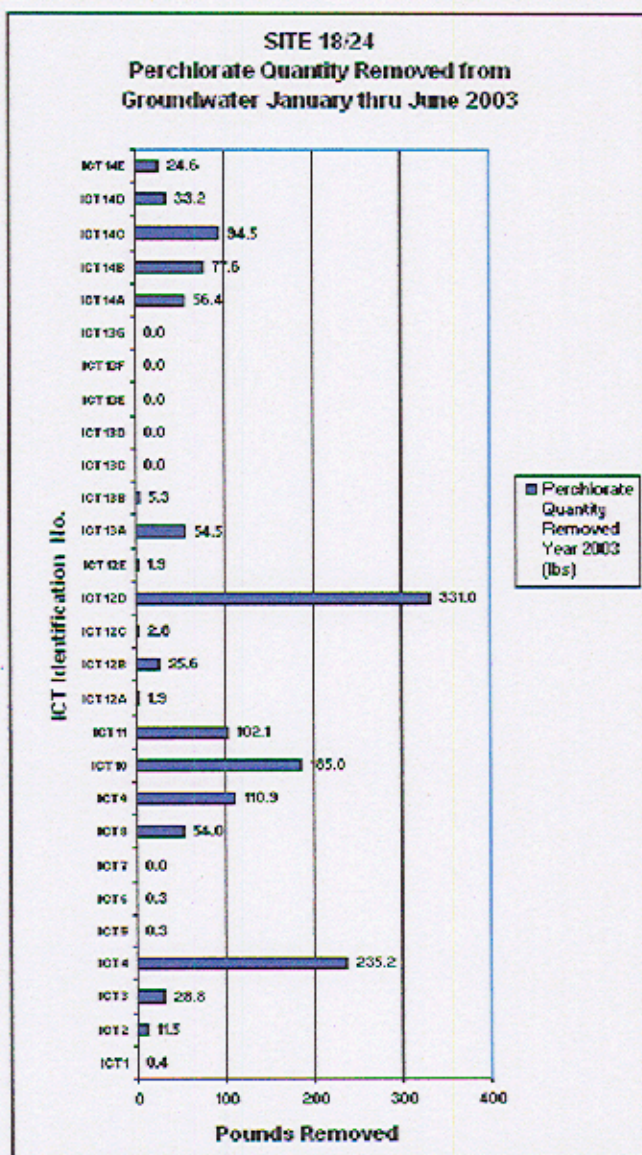


Duri

During the first six months of 2003, approximately 3,400 pounds of volatile organic compounds and 1,437 pounds of perchlorate were removed from the groundwater at Site 18/24.

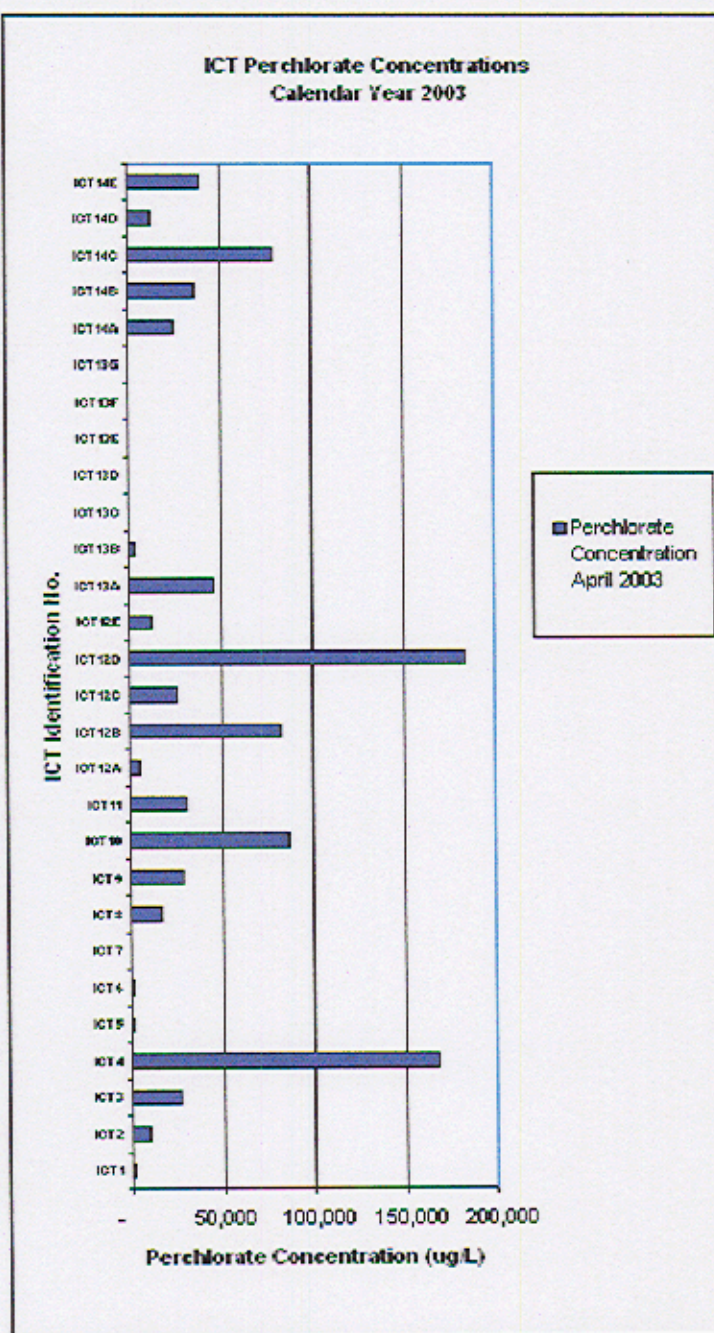
Perchlorate Removed From Groundwater at Site 18/24 January - June 2003

Interceptor Collection Trench ID Number	Perchlorate Quantity Removed Year 2003 (lbs)
ICT 1	0.390
ICT 2	11.532
ICT 3	28.829
ICT 4	235.213
ICT 5	0.306
ICT 6	0.303
ICT 7	0.005
ICT 8	53.956
ICT 9	110.857
ICT 10	185.002
ICT 11	102.061
ICT 12A	1.869
ICT 12B	25.598
ICT 12C	2.832
ICT 12D	331.031
ICT 12E	1.919
ICT 13A	54.496
ICT 13B	5.268
ICT 13C	0.017
ICT 13D	0.013
ICT 13E	0.030
ICT 13F	0.000
ICT 13G	0.000
ICT 14A	56.361
ICT 14B	77.624
ICT 14C	94.465
ICT 14D	33.182
ICT 14E	24.577
Total Removed	1437.74



Perchlorate Concentrations in ICT's at Site 18/24 April 2003

Interceptor Collection Trench ID Number	Perchlorate Concentration April 2003
ICT 1	1,080
ICT 2	9,480
ICT 3	27,100
ICT 4	168,000
ICT 5	1,070
ICT 6	1,180
ICT 7	34
ICT 8	16,200
ICT 9	28,800
ICT 10	86,600
ICT 11	30,600
ICT 12A	5,670
ICT 12B	82,700
ICT 12C	26,000
ICT 12D	183,000
ICT 12E	12,800
ICT 13A	45,900
ICT 13B	3,200
ICT 13C	20
ICT 13D	55
ICT 13E	144
ICT 13F	-
ICT 13G	-
ICT 14A	24,300
ICT 14B	35,700
ICT 14C	79,700
ICT 14D	12,300
ICT 14E	39,100



Analytical Data for Semi-Annual April 2003 ICT Well Samples

<u>Volatiles in ug/L</u>	<u>ICT 1</u>	<u>ICT 2</u>	<u>ICT 3</u>	<u>ICT 3 QC</u>	<u>ICT 3 QA</u>	<u>ICT 4</u>	<u>ICT 5</u>	<u>ICT 6</u>	<u>ICT 7</u>	<u>ICT 8</u>	<u>ICT 9</u>	<u>ICT 10</u>
Benzene	ND	ND	ND	ND	ND	15.9	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	48.1	ND	ND	ND	ND	ND	ND
Chloroform	ND	10.9	41.5	41.6	ND	48.9	ND	ND	ND	304	ND	ND
1,1-Dichloroethane	ND	12.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	84.1	118	1,080	1,230	1,000	ND	16.2	ND	ND	ND	ND	ND
1,1-Dichloroethene	21.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	32.7	7,080	16,600	11,000	743	ND	ND	ND	209,000	235,000	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	6.22	8.53	8.99	ND	11.9	ND	ND	ND	362	ND	ND
Toluene	ND	ND	32.6	33.8	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	7.37	7.23	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	1,960	9,900	28,900	28,400	24,000	17,100	625	68.3	ND	34,000	38,000	8,380
Vinyl Chloride	160	123	811	836	700	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	ND	1,130	2,290	2,080	2,100	1,240	261	839	ND	68,600	78,900	3,050
<u>Chloride in mg/L</u>	<u>ICT 1</u>	<u>ICT 2</u>	<u>ICT 3</u>	<u>ICT 3 QC</u>	<u>ICT 3 QA</u>	<u>ICT 4</u>	<u>ICT 5</u>	<u>ICT 6</u>	<u>ICT 7</u>	<u>ICT 8</u>	<u>ICT 9</u>	<u>ICT 10</u>
	40.7	255	316	339	342	219	92.4	97.7	16	412	1,130	280
<u>Perchlorate in ug/L</u>	<u>ICT 1</u>	<u>ICT 2</u>	<u>ICT 3</u>	<u>ICT 3 QC</u>	<u>ICT 3 QA</u>	<u>ICT 4</u>	<u>ICT 5</u>	<u>ICT 6</u>	<u>ICT 7</u>	<u>ICT 8</u>	<u>ICT 9</u>	<u>ICT 10</u>
	1,080	9,480	27,100	25,900	26,100	168,000	1,070	1,180	33.7	16,200	28,800	86,600

Analytical Data for Semi-Annual April 2003 ICT Well Samples

Volatiles in ug/L	ICT 11	ICT 12A	ICT 12B	ICT 12C	ICT 12D	ICT 12D QC	ICT 12D QA	ICT 12E	ICT 13A	ICT 13B	ICT 13C	ICT 13D
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	98.6	ND	ND	ND	ND	ND	158	50.5	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	411	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	370,000	358,000	150,000	38,500	3,350	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	3,960	1,780	9,820	4,210	109,000	104,000	58,000	43,300	43,000	3,060	2,260	ND
Vinyl Chloride	ND	ND	ND	ND	1,180	891	ND	1,570	ND	170	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	51	37.3	345	58.5	5,120	5,380	4,000	1,100	807	ND	ND	ND
Chloride in mg/L	ICT 11	ICT 12A	ICT 12B	ICT 12C	ICT 12D	ICT 12D QC	ICT 12D QA	ICT 12E	ICT 13A	ICT 13B	ICT 13C	ICT 13D
	130	92.6	475	210	284	301	386	336	551	81.1	41.1	146
Perchlorate in ug/L	ICT 11	ICT 12A	ICT 12B	ICT 12C	ICT 12D	ICT 12D QC	ICT 12D QA	ICT 12E	ICT 13A	ICT 13B	ICT 13C	ICT 13D
	30,600	5,670	82,700	26,000	183,000	193,000	260,000	12,800	45,900	3,200	19.9	55.2

Analytical Data for Semi-Annual April 2003 ICT Well Samples

Volatiles in ug/L	ICT 13E	ICT 13F	ICT 13G	ICT 14A	ICT 14A QC	ICT 14A QA	ICT 14B	ICT 14C	ICT 14D	ICT 14E
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	10	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	5,570	284
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	86.9	100	141	1,980	13,900	18,800
Trichloroethene	ND	ND	ND	ND	ND	9.3	ND	ND	ND	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	56.9	3,510	3,170	3,100	56.1	3,150	24,200	17,400
Chloride in mg/L	ICT 13E	ICT 13F	ICT 13G	ICT 14A	ICT 14A QC	ICT 14A QA	ICT 14B	ICT 14C	ICT 14D	ICT 14E
	120	5.09	5.24	272	258	234	440	769	1,690	2,940
Perchlorate in ug/L	ICT 13E	ICT 13F	ICT 13G	ICT 14A	ICT 14A QC	ICT 14A QA	ICT 14B	ICT 14C	ICT 14D	ICT 14E
	144.0	ND	ND	24,300	21,400	20,400	35,700	79,700	12,300	39,100

QUANTITY OF WATER PRODUCED AT SITE 16

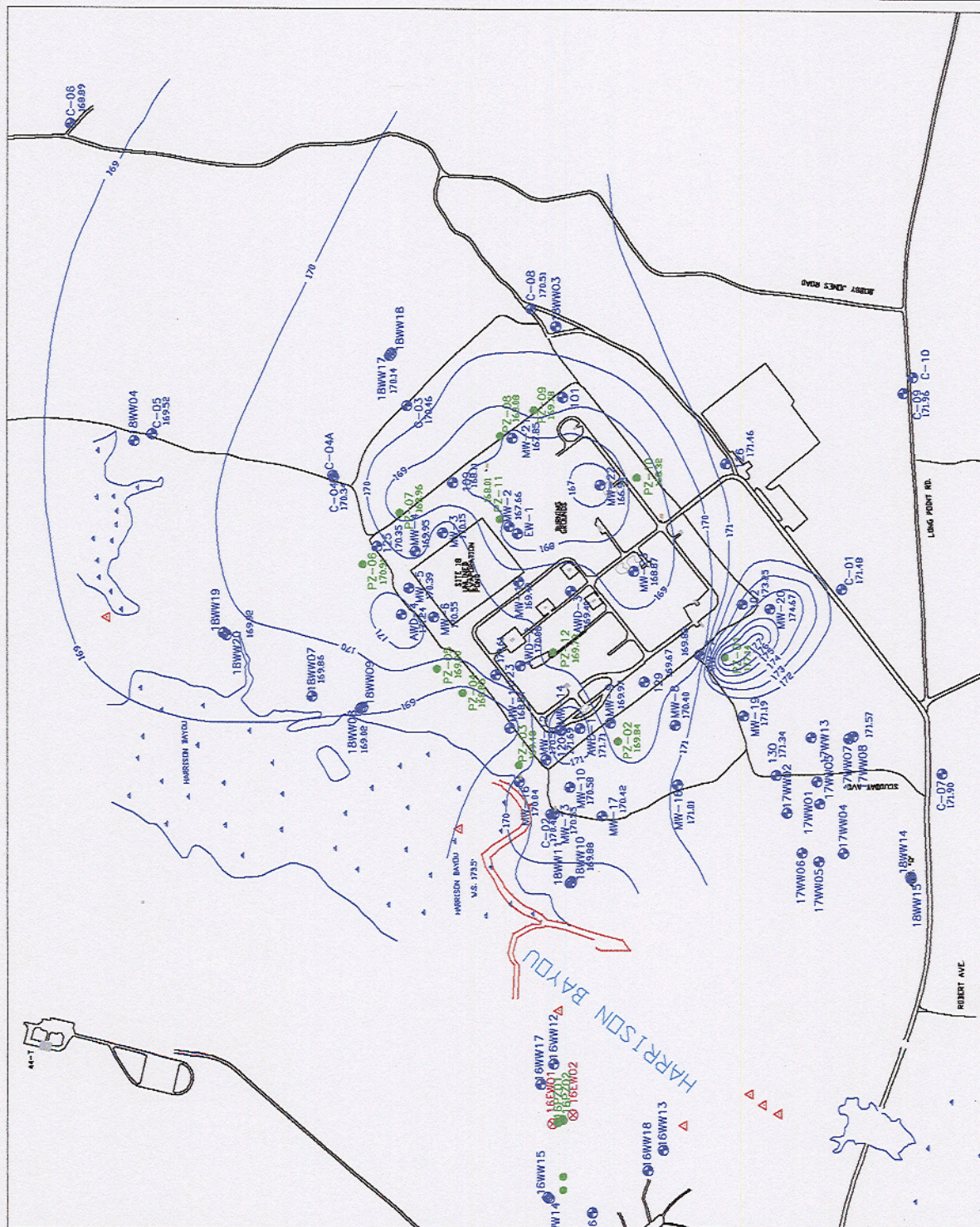
	April 2003	May 2003	June 2003	July 2003	August 2003
Gallons of groundwater from Site 16	99,712	80,116	64,411	42,948	55,877

The extraction system at Site 16 produced 244,239 gallons of water in the 2nd quarter of 2003.

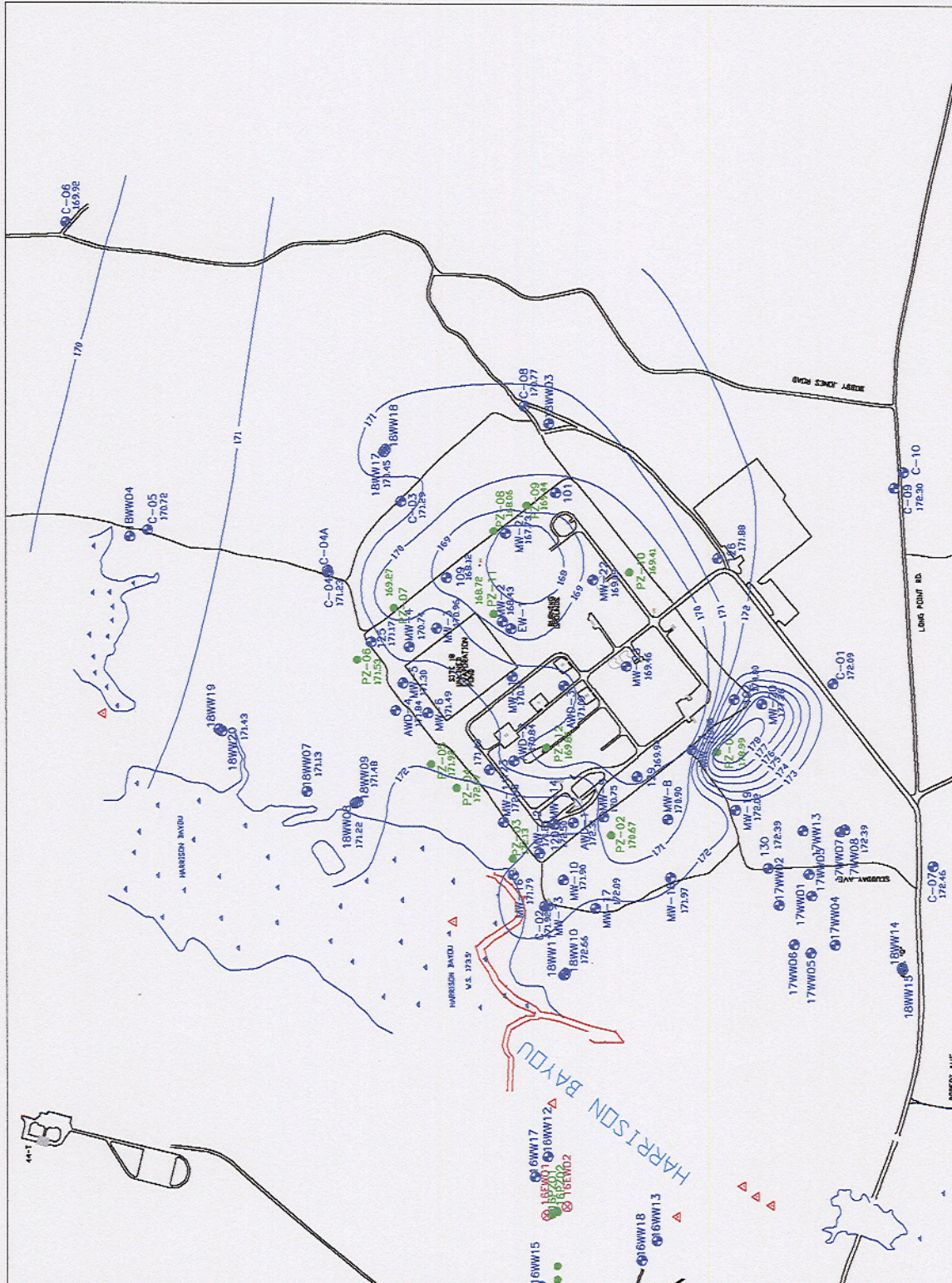
Site 16 April 2003 Quarterly Sample Analysis Results

SEMI-ANNUAL SITE 16 EXTRACTION WELL ANALYSIS SUMMARY Longhorn Army Ammunition Plant, Site 16										
Volatiles in ug/L, EPA8260B	LH16- EXT1- 1276	LH16- EXT2 - 1276	LH16- EXT2 - 1276 - QC	LH16- EXT2- 1276 - QA	LH16- EXT3- 1276	LH16- EXT4- 1276	LH16- EXT5- 1276	LH16- EXT6- 1276	LH16- EXT7- 1276	LH16- EXT8- 1276
Trichloroethene	13,800	108,000	121,000	110,000	9,250	3,760	5,200	3,150	69.5	30.3
Vinyl Chloride	180	189	184	ND	ND	ND	102	ND	ND	ND
1,1-Dichloroethane	ND	5.31	5.27	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	96.4	65.6	ND	ND	ND	ND	19.2	ND	ND	ND
1,1-Dichloroethene	28.5	164	162	ND	26.7	5.45	9.92	6.62	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	24,000	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	26.9	26.9	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	13.9	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	13.3	ND	ND	ND	ND	ND	ND	ND
Trichlorotrifluoroethane	ND	667	676	800	144	34.0	35.5	69.0	ND	ND
Chloride	863	629	638	614	556	347	697	865	460	272
Perchlorate in ug/L, EPA 314.0	531	20.9	ND	70.8	ND	14.6	1,140	67.7	65.6	58.7

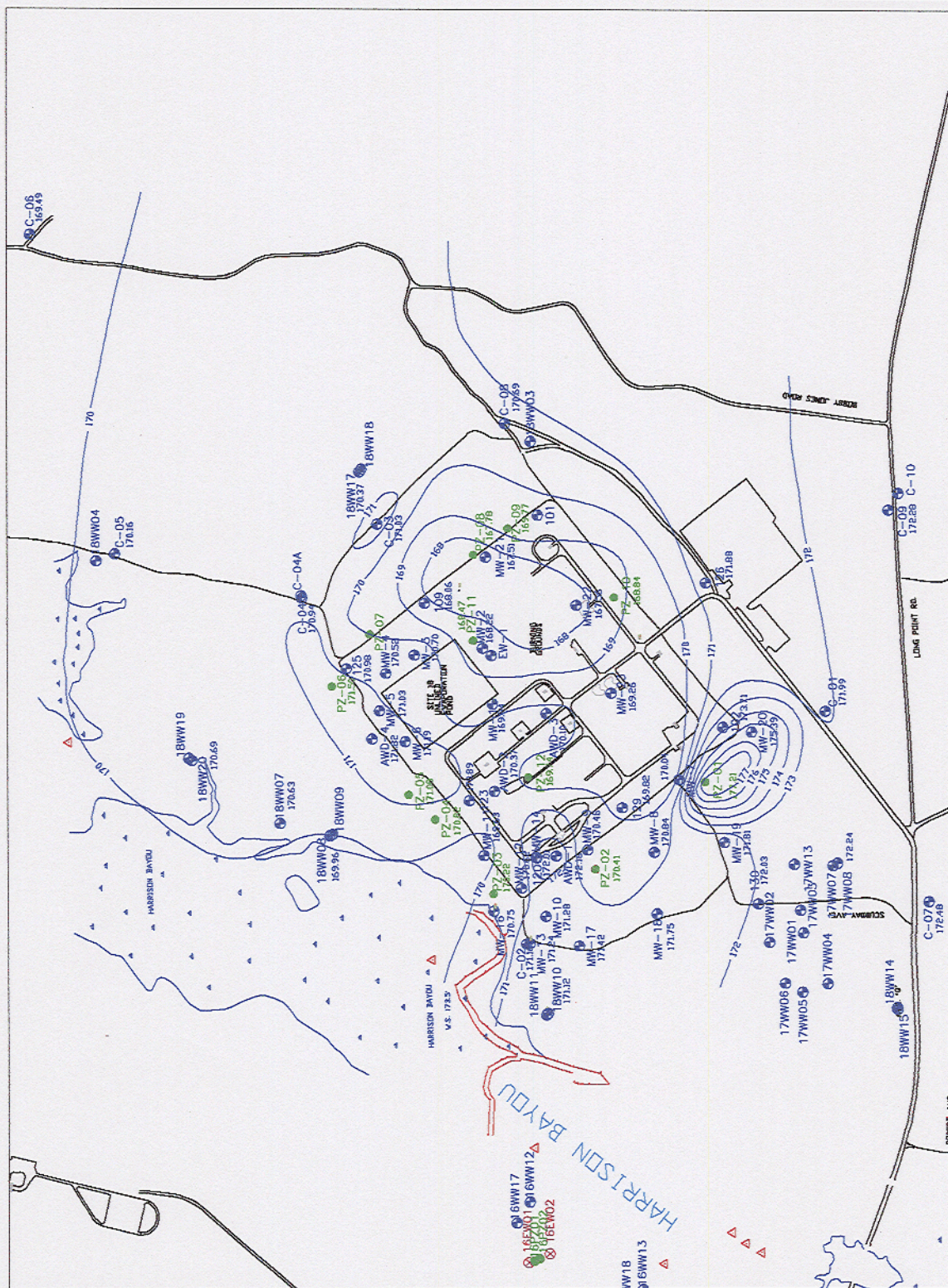
The laboratory reporting limits vary between 5 and 15 ug/L for volatiles with the exception of the analysis for trichloroethene, which had high concentrations and required a 100X dilution. The reporting limit for Perchlorate was 4 ug/L or 20 ug/L dependent upon the concentration of Perchlorate in the sample.



Complete Environmental Service
 LHAAP Sites 18 & 24
 DATE: April 1, 2003
 Groundwater Levels



Complete Environmental Service
LHAAP Sites 18 & 24
DATE: May 1, 2003
Groundwater Levels



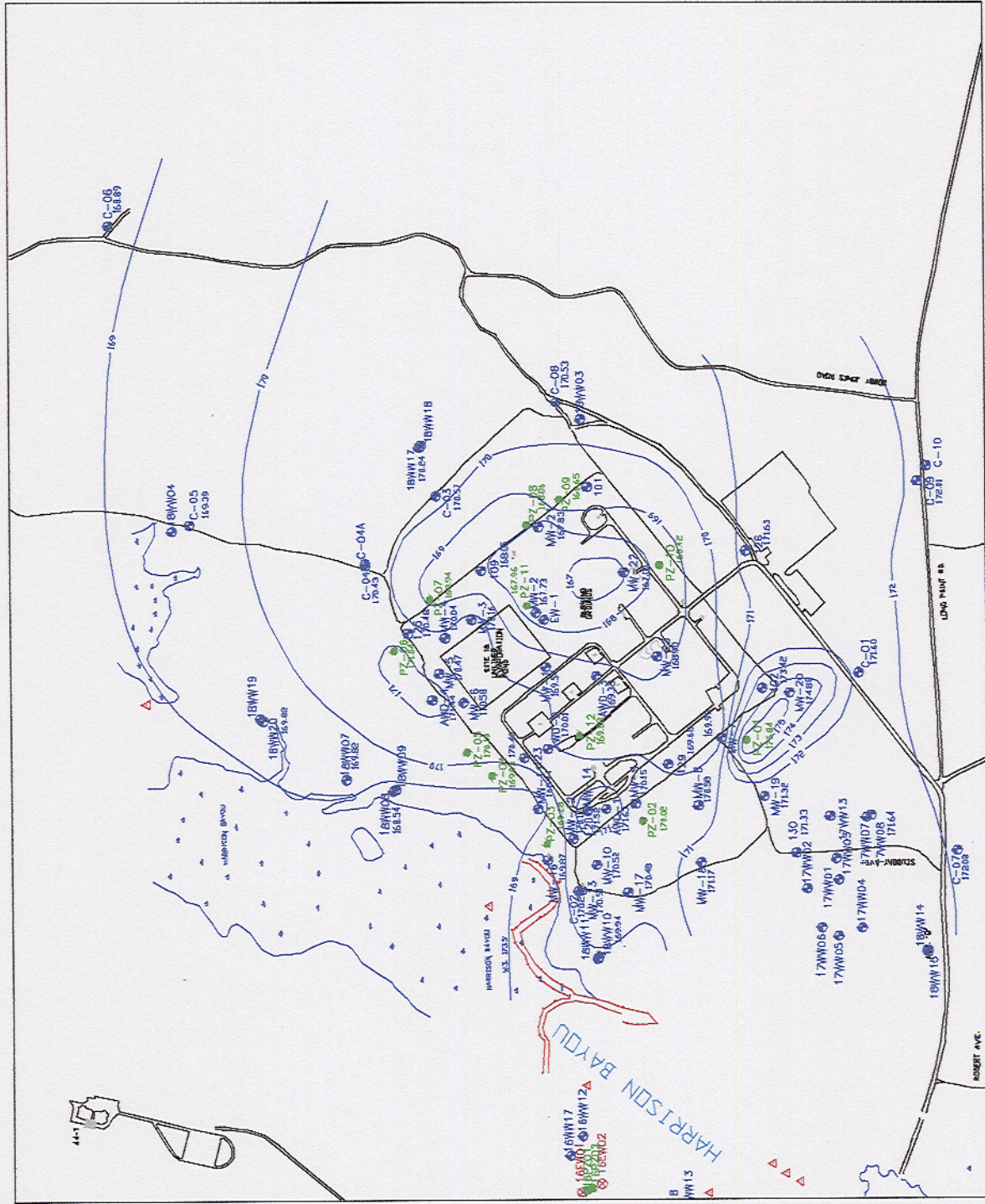
031270

Complete Environmental Service

LHAAP Sites 18 & 24

DATE: June 2003

Groundwater Levels



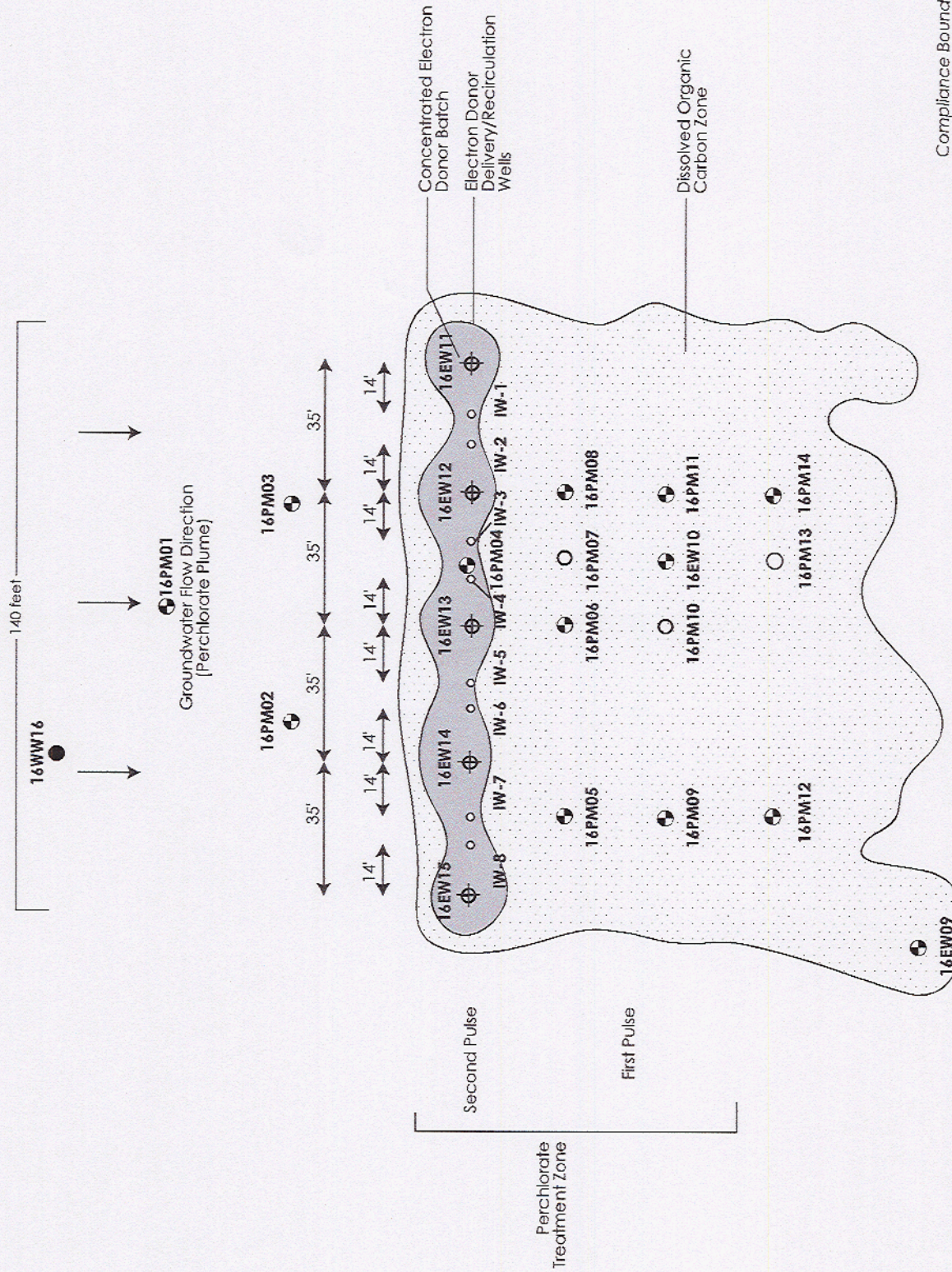
**Longhorn Army Ammunition Plant
Technical Review Committee Meeting
September 17, 2003
ESTCP Project Update as of September 16, 2003**

The following is a brief summary of the activities performed by GeoSyntec Consultants (with assistance from Complete Environmental Service) to date for the ESTCP demonstration project to remediate perchlorate and volatile organic compounds using a semi-passive bioremediation system at the Site 16 Landfill.

GeoSyntec completed the installation of five extraction and injection wells for recirculation of groundwater during the injection phase of the demonstration using electron donor (eg. methanol, ethanol, acetate or lactate). Sixteen monitoring wells in the vicinity of the demonstration test area were also installed. Hydraulic testing of the extraction and injection wells was conducted. In order to reduce the time required to distribute the electron donor, two additional intermediate electron donor injection wells between each set of injection and extraction wells were also installed. These wells are to be used for injection of electron donor only and will not be equipped with extraction pumps or used to reinject groundwater. Using the intermediate electron donor wells will reduce the time required to inject and distribute electron donor.

A groundwater recirculation system that allows for extraction of groundwater from two wells and reinjection into three other wells has recently been installed. The recirculation system is currently being tested and a tracer test is being planned for later in September. The results of the tracer test will be used to determine the time required to recirculate groundwater between the extraction and injection wells in order to mix the electron donor into the groundwater impacted with perchlorate and VOCs. The attached updated version of Figure 3-6 from Demonstration Plan showing the actual locations of the injection and extraction wells, the monitoring wells, and the intermediate injection wells.

In addition, GeoSyntec contracted SiREM Laboratory to conduct a treatability study to assess the feasibility of in situ bioremediation to remediate volatile organic compounds (VOCs) and perchlorate in the groundwater within the study area. Laboratory microcosms were constructed using aquifer material collected from a borehole drilled within the study area and groundwater collected from an existing Site 16 well. The microcosms were amended with several different electron donors to assess the ability of these nutrients to promote biodegradation of the VOCs. The results of this study are presented in the attached summary report.



- Existing up gradient monitoring well
- Multi-level performance monitoring well
- ⊕ Performance monitoring well
- ⊖ Extraction/injection well (4 inch)
- Injection well (2 inch)

EW - extraction well
IW - injection well
PM - performance monitoring well

Semi-Passive Biobarrier for Perchlorate in Groundwater
ESTCP Demonstration Plan,
LHAAP Bioremediation Pilot Test

Sept. 2003

Figure: 3-6



Prepared for:

GeoSyntec Consultants, Inc.
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Guelph, Ontario N1G 5G3

DRAFT

**LABORATORY BIOTREATABILITY STUDY TO
EVALUATE THE BIODEGRADATION OF
PERCHLORATE & CHLORINATED SOLVENTS IN
GROUNDWATER**

**Longhorn Army Ammunition Plant
Karnack, Texas**

Prepared by:



130 Research Lane, Suite 2
Guelph, Ontario N1G 5G3

SiREM Ref: TR0136.03
16 September 2003

DRAFT



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LIST OF APPENDICES

Appendix A:	Biotreatability Laboratory Analytical Methods
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LIST OF ABBREVIATIONS

°C	degrees Celsius
°C/min	degrees Celsius per minute
cis-DCE	cis-1,2-dichloroethene
gal	US gallons
GeoSyntec	GeoSyntec Consultants, Inc.
g/L	grams per liter
kg	kilograms
L	liters
MEAL	methanol, ethanol, acetate, lactate
MeOH	methanol
MDL	method detection limit
μMOL	micromoles
min	minutes
mg/L	milligrams per liter
mL	milliliters
mL/min	milliliters per minute
PQL	practical quantitation limit
SiREM	SiREM Laboratories
TCE	trichloroethene
μL	microlitres
VC	vinyl chloride
VOCs	volatile organic compounds

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1. BACKGROUND

GeoSyntec Consultants, Inc., (GeoSyntec) retained SiREM Laboratories (SiREM) to perform a biotreatability study to evaluate the potential for in situ bioremediation of perchlorate and chlorinated volatile organic compounds (VOCs), namely trichloroethylene (TCE) and its breakdown products in groundwater at the Site 16 Landfill, Longhorn Army Ammunition Plant in Karnack, Texas (the Site).

The specific objectives of the study were to:

- 1) Evaluate the nature, rate and extent of intrinsic anaerobic biodegradation of perchlorate and VOCs that may be occurring in the Site groundwater;
- 2) Evaluate the ability to improve the rate and extent of perchlorate and VOC dechlorination to environmentally acceptable end products through the addition of electron donors; and
- 3) Evaluate whether bioaugmentation of the Site soil and groundwater using a stable dehalorespiring microbial consortium referred to as KB-1™ improves the rate and extent of biodegradation of the chlorinated VOCs relative to electron donor addition alone.

The remainder of this report is divided into four sections. Section 2 presents the experimental approach and methods. Section 3 presents and discusses the results of the microcosm study. Section 4 presents conclusions drawn from the microcosm study.

2. APPROACH AND METHODS

The following sections summarize the approach and methods for soil and groundwater sample collection and handling (Section 2.1); microcosm construction and incubation (Section 2.2); and microcosm sampling and analysis (Section 2.3).

2.1 Sample Collection and Handling

Aquifer material and groundwater samples were express shipped under chain of custody to the SiREM laboratory.

Groundwater and aquifer material samples were received from the Site on 27 February 2003 and 27 March 2003, respectively and stored at 4 degrees celsius (°C). Two soil cores and one 4 Liter (L) jug of groundwater were received. Soil core sections were collected from a depth interval of 18 to 23 feet below ground surface. The first soil core (1 of 4) was reddish in color, dry and clay like. The second soil core (3 of 4) was medium brown, wet and sandy.

2.2 Microcosm Construction and Incubation

A total of twelve microcosms were constructed on 2 April 2003. Site groundwater and aquifer material were placed within a disposable anaerobic glove bag with the materials required to construct the various treatment and control microcosms. The glove bag was purged with a carbon dioxide/nitrogen (20:80) gas mixture to create an anaerobic environment. The aquifer material was combined and homogenized to improve reproducibility between replicates and to ensure that control and treatment microcosms contained similar starting aquifer materials. Microcosms were constructed by filling sterile 250 milliliter (mL) (nominal volume) glass bottles with 30 mL of homogenized aquifer

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material and 150 mL of groundwater from site well 16WW16. The bottles were capped with a Mininert™ closure to allow repetitive sampling of the bottle with minimal losses of VOCs and to allow nutrient amendment as needed, throughout the incubation period. All controls and treatments were constructed in triplicate.

Sterile control microcosms were constructed to quantify potential abiotic and experimental losses of VOCs from the microcosms. The sterile controls were constructed by autoclaving the Site soils at 121 °C and 15 pounds per square inch pressure for 60 minutes. After autoclaving, the control microcosms were returned to the disposable glove bag, where they were filled with Site groundwater and amended with 1.5 mL of 5% mercuric chloride (equal to a final liquid concentration of 0.05%) and 0.5 mL of 5% sodium azide (equal to a final liquid concentration of 0.017%) to inhibit microbial activity. The first replicate of the sterile controls was amended with acetate and lactate.

Intrinsic control microcosms were constructed to evaluate the ability of indigenous bacteria in the Site soil and groundwater to intrinsically degrade the perchlorate and target VOCs. No electron donor or KB-1™ was added to the intrinsic controls. Treatment microcosms were amended with soluble electron donors such as methanol, ethanol, acetate and lactate (MEAL).

Microcosms were amended with electron donor on 3 April 2003 (Day 0). The MEAL microcosms were amended with 20 microliters (μL) of neat methanol, 20 μL of neat ethanol and 280 μL of a sodium acetate stock solution (75 grams per Liter [g/L]) and 250 μL of a sodium lactate stock solution (75 g/L) corresponding to a target concentration of about 100 milligrams per liter (mg/L) each.

To assess the ability of bioaugmentation to improve the rate and extent of TCE dechlorination to ethene, an additional set of triplicate MEAL microcosms was constructed and bioaugmented with KB-1™, a natural (i.e., not genetically modified), non-pathogenic dehalorespiring microbial consortia. This set of

microcosms was bioaugmented with KB-1™ (1 mL of culture) on 8 May 2003 (Day 35), following development of appropriate reducing redox conditions in the microcosms.

Table 1 summarizes the details of microcosm construction and amendments for the various treatment and control microcosms.

2.3 Microcosm Sampling and Analysis

Groundwater samples were collected from the various control and treatment microcosms on a weekly to bi-weekly basis for analysis of VOCs, headspace gases (e.g., ethene and methane), selected electron donors (directly for methanol, ethanol, acetate, lactate) and inorganic anions (chloride, nitrate, nitrite, sulphate and perchlorate). Microcosms were sampled using gas-tight 1.0 mL glass Hamilton syringes. Separate sets of syringes were used for bioaugmented and non-bioaugmented treatments, to reduce the potential for transfer of KB-1™ organisms to non-bioaugmented treatments. Syringes were cleaned with acidified water (pH 2-3) and rinsed 10 times with deionized water between samples, to ensure that VOCs and microorganisms were not transferred between different samples or treatments. Descriptions of the analytical methods employed by the biotreatability laboratory are provided in Appendix A.

3. RESULTS AND DISCUSSION

The following sections present the results of the biotreatability study. Section 3.1 discusses results for the sterile and intrinsic control microcosms; Section 3.2 discusses the results for the electron donor amended microcosms and Section 3.3 discusses the results for the KB-1 bioaugmented microcosms.

Figures 1 through 4 show the fate of the TCE and associated degradation products in each of the treatment and control microcosms over the incubation period for the study. All VOC concentrations are graphed in units of micromoles per microcosm bottle ($\mu\text{mol}/\text{bottle}$) to demonstrate mass balances on a molar basis (i.e., 1 micromole [μmol] of TCE is dechlorinated to 1 μmol of ethene). Table 2A provides the all the VOC data for the controls and treatments.

Figures 5 through 8 show the fate of perchlorate and the major anions in each of the treatment and control microcosms over the incubation period for the study. All perchlorate and anion concentrations are graphed in units of mg/L . Table 2B provides all the perchlorate and anion data.

3.1 Sterile and Intrinsic Controls

As expected, TCE and cis-1,2-dichloroethene (cis-DCE) concentrations in the Sterile Control microcosms remained relatively stable over the incubation period, showing no decline in TCE and cis-DCE or increase in dechlorination intermediates or end products (e.g., vinyl chloride [VC] or ethene) (Figures 1a and 1b). As well, perchlorate concentrations remained stable through out the incubation period. Furthermore, analytical data provided in Table 2A shows no methane production that would indicate microbial activity in these microcosms. These results confirm that any perchlorate, TCE and/or cis-DCE mass losses in the treatment microcosms result from biodegradation promoted by electron donor addition and/or bioaugmentation, and are not due to abiotic or experimental losses (e.g., sorption or loss through microcosm closures).

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TCE and cis-1,2-DCE concentrations have also remained stable in the Anaerobic Intrinsic Control microcosms over 74 days of incubation, suggesting that the rate and extent of intrinsic biodegradation activity at the site may be low. As well chloride and sulphate concentrations remained stable over the 74 days. Perchlorate concentrations degraded by 20 days suggesting that there is sufficient electron donor and the proper indigenous bacteria population is present to degrade perchlorate at the site.

3.2 Electron Donor Treatments

Addition of soluble electron donor (MEAL) did not promote complete dechlorination of TCE to cis-1,2-DCE (Figure 3). The cis-DCE remained relatively constant through out the 74 day incubation period and there was no increase in dechlorination intermediates or end products. Perchlorate concentrations dropped rapidly with the addition of MEAL and dropped below 0.010 mg/L (method detection limit) on day 14.

3.3 Bioaugmented Treatments

Bioaugmentation of the KB1+MEAL microcosms took place on day 35 of the incubations. Following bioaugmentation with KB-1 on Day 35, cis-1,2-DCE concentrations declined from 35 mg/L to non-detect (<0.01 mg/L) by Day 64 (Figure 4). By day 74, the only product detected was ethene, thus showing the complete dechlorination of TCE to ethene in 74 days. Methane concentrations in these microcosms began to increase immediately after bioaugmentation and reached a maximum concentration of 5.13 mg/L on day 74. The presence of methane at this high of a concentration indicates strong microbial activity. Analytical data in the biotreatability report show that methanol and ethanol are being consumed in the MEAL+KB-1 treatments, indicating that the dechlorinating bacteria are using these electron donors in the dechlorinating

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process. Perchlorate concentrations dropped rapidly with the addition of MEAL and dropped below 0.010 mg/L (method detection limit) on day 14.

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4. CONCLUSIONS

Based on the results of this biotreatability study the following conclusions can be provided:

1. Complete degradation of perchlorate was observed in absence of added electron donor within 15 days of initiation of the test. Addition of soluble electron donor resulted in rapid degradation of perchlorate within 5 to 15 days.
2. The site groundwater and soil does not contain adequate naturally containing electron donors to promote rapid reductive dechlorination of TCE
3. The addition of soluble electron donor (MEAL) did not result in any cis-DCE dechlorination over the incubation period. This suggests that these electron donors alone may not be suitable to promote any indigenous *Dehalococcoides* that may be present at the site or a greater acclimation period is needed.
4. Complete and rapid dechlorination of TCE and cis-DCE via vinyl chloride to ethene was also observed in the bioaugmented microcosm amended with soluble electron donor (MEAL) and the natural, non-pathogenic microbial consortium KB-1.

TABLE 1: SUMMARY OF LABORATORY MICROCOSM CONTROLS & TREATMENTS,
Longhorn Army Ammunition Plant, Karnack, Texas

Controls	Number of Microcosms
Anaerobic Sterile Control (ANSC)	3
Anaerobic Intrinsic Control (ANAC)	3
<u>Electron Donor Amended</u>	
Methanol/ethanol/acetate/lactate (MEAL)	3
<u>Bioaugmented</u>	
MEAL + KB-1	3
<u>Number of Microcosms</u>	12

Detailed treatment table

Longhorn Army Ammunition Plant, Karnack, Texas

Treatment	Assigned bottle Number	Number of Microcosms	Sediment vol. in mL	Groundwater mL	Headspace mL	HgCl ₂ mL	Na Azide mL	MeOH μ L	EtOH μ L	Lactate μ L	Acetate μ L	KB-1 mL
ANSC	1 to 3	3	30	150	75	2.8	0.5					
ANAC	4 to 6	3	30	150	75							
MEAL	7 to 9	3	30	150	75			20	20	250	280	
MEAL + KB 1	10 to 12	3	30	150	75			20	20	250	280	1

Notes:

* rep. 1 of ANSC will be fed MEAL

Sterile controls: aquifer soils autoclaved, groundwater amended with mercuric chloride and sodium azide

Rezasurin added to rep. 1 of each treatment.

HgCl₂: Mercuric Acid stock: add 2.8 mL of 2.7% stock soln* (final target concentration of 0.05%)

Na Azide: Sodium azide: add 0.5 mL of 5% stock solution (final target concentration of approximately 0.02%)

KB-1: Do NOT add for 2-3 weeks after time zero. Add 1 mL from actively degrading KB-1 bottle (record bottle ID in lab book) that has been purged to remove any VOCs and methane/ethane

Table 2A: VOC RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

Date			Day	Replicate	Chlorinated Ethenes				Methane and Electron Donors						
					TCE	cis-1,2-DCE mg/L	trans-1,2-DCE mg/L	1,1-DCE mg/L	VC mg/L	Ethene mg/L	Total Ethenes μmol/L	Ethane mg/L	Methane mg/L	MeOH mg/L	EtOH mg/L
Anaerobic Sterile Control															
03-Apr-03	03	0	ANSC-1	2.23	32.9	0.025	0.030	0.73	<0.01			<0.010	0.017	<1	<1.0
03-Apr-03	03	0	ANSC-2	3.01	39.1	0.025	0.040	0.96	<0.01			<0.010	0.019	<1	<1.0
03-Apr-03	03	0	ANSC-3	2.57	33.9	0.028	0.035	0.83	<0.01			<0.010	0.020	<1	<1.0
03-Apr-03	03	0	Average Concentration (mg/L)	2.60	35.23	0.03	0.03	0.85	0.00			0.00	0.02	0.00	0.00
03-Apr-03	03	0	Standard Deviation (mg/L)	3.9E-01	3.3E+00	1.8E-03	5.2E-03	1.2E-01	0.0E+00			0.0E+00	1.9E-03	0.0E+00	0.0E+00
03-Apr-03	03	0	Average Concentration (μmol)	3.92	65.9	0.048	0.061	3.36	0.00	7.3E+01		0	3.27	0	0
09-Apr-03	09	6	ANSC-1	3.06	38.6	0.023	0.048	1.05	<0.01			<0.010	0.023	<1	<1
09-Apr-03	09	6	ANSC-2	2.90	37.8	0.022	0.044	0.98	<0.01			<0.010	0.019	<1	<1
09-Apr-03	09	6	ANSC-3	2.84	36.1	0.024	0.040	0.96	<0.01			<0.010	0.022	<1	<1
09-Apr-03	09	6	Average Concentration (mg/L)	2.93	37.50	0.02	0.04	1.00	0.00			0.00	0.02	0.00	0.00
09-Apr-03	09	6	Standard Deviation (mg/L)	1.1E-01	1.3E+00	1.0E-03	4.0E-03	4.0E-02	0.0E+00			0.0E+00	2.0E-03	0.0E+00	0.0E+00
09-Apr-03	09	6	Average Concentration (μmol)	4.42	70.0	0.042	0.077	3.93	0.00	7.8E+01		0	3.86	0	0
17-Apr-03	17	14	ANSC-1	2.52	34.8	0.024	0.041	0.88	<0.01			<0.010	0.017	<1	<1
17-Apr-03	17	14	ANSC-2	2.70	35.9	0.019	0.036	0.89	<0.01			<0.010	0.017	<1	<1
17-Apr-03	17	14	ANSC-3	2.62	34.3	0.021	0.037	0.89	<0.01			<0.010	0.018	<1	<1
17-Apr-03	17	14	Average Concentration (mg/L)	2.65	34.99	0.02	0.04	0.89	0.00			0.00	0.02	0.00	0.00
17-Apr-03	17	14	Standard Deviation (mg/L)	4.7E-02	8.2E-01	2.5E-03	2.9E-03	5.8E-03	0.0E+00			0.0E+00	6.7E-04	0.0E+00	0.0E+00
17-Apr-03	17	14	Average Concentration (μmol)	3.88	65.3	0.039	0.066	3.48	0.00	7.3E+01		0	3.07	0	0
25-Apr-03	25	22	ANSC-1	2.71	35.4	0.018	0.031	0.69	<0.01			<0.010	0.017	<1	<1
25-Apr-03	25	22	ANSC-2	2.50	32.9	0.020	0.034	0.82	<0.01			<0.010	0.013	<1	<1
25-Apr-03	25	22	ANSC-3	2.72	35.4	0.019	0.038	0.89	<0.01			<0.010	0.017	<1	<1
25-Apr-03	25	22	Average Concentration (mg/L)	2.64	34.57	0.02	0.03	0.87	0.00			0.00	0.02	0.00	0.00
25-Apr-03	25	22	Standard Deviation (mg/L)	1.2E-01	1.4E+00	9.4E-04	3.4E-03	4.0E-02	0.0E+00			0.0E+00	2.5E-03	0.0E+00	0.0E+00
25-Apr-03	25	22	Average Concentration (μmol)	3.98	64.5	0.035	0.060	3.40	0.00	7.2E+01		0	2.76	0	0
01-May-03	01	28	ANSC-1	2.77	38.2	0.028	0.040	0.91	<0.01			<0.010	0.021	<1	6
01-May-03	01	28	ANSC-2	2.64	38.2	0.023	0.030	0.78	<0.01			<0.010	0.013	<1	<1
01-May-03	01	28	ANSC-3	2.69	35.2	0.019	0.036	0.88	<0.01			<0.010	0.020	<1	<1
01-May-03	01	28	Average Concentration (mg/L)	2.70	35.89	0.02	0.04	0.86	0.00			0.00	0.02	0.00	1.90
01-May-03	01	28	Standard Deviation (mg/L)	6.2E-02	5.9E-01	3.2E-03	4.7E-03	6.8E-02	0.0E+00			0.0E+00	4.3E-03	0.0E+00	3.3E+00
01-May-03	01	28	Average Concentration (μmol)	4.07	67.0	0.041	0.062	3.36	0.00	7.5E+01		0	3.16	0	6
14-May-03	14	41	ANSC-1	2.69	36.6	0.022	0.028	0.85	<0.01			<0.010	0.015	<1	6
14-May-03	14	41	ANSC-2	2.64	36.5	0.022	0.038	0.82	<0.01			<0.010	0.015	<1	6
14-May-03	14	41	ANSC-3	2.56	34.9	0.028	0.037	0.79	<0.01			<0.010	0.014	<1	7
14-May-03	14	41	Average Concentration (mg/L)	2.63	36.00	0.02	0.03	0.82	0.00			0.00	0.01	0.00	6.02
14-May-03	14	41	Standard Deviation (mg/L)	8.9E-02	9.5E-01	3.8E-03	5.3E-03	3.0E-02	0.0E+00			0.0E+00	6.0E-04	0.0E+00	7.1E-01
14-May-03	14	41	Average Concentration (μmol)	3.96	67.2	0.044	0.060	3.21	0.00	7.4E+01		0	2.83	0	20
28-May-03	28	55	ANSC-1	2.46	33.4	<0.01	0.029	0.78	<0.01			<0.010	0.014	<1	<1
28-May-03	28	55	ANSC-2	2.10	28.5	<0.01	0.03	0.63	<0.01			<0.010	0.010	<1	<1
28-May-03	28	55	ANSC-3	2.54	34.1	<0.01	0.119	0.79	<0.01			<0.010	0.015	<1	<1
28-May-03	28	55	Average Concentration (mg/L)	2.37	32.33	0.00	0.05	0.73	0.00			0.00	0.01	0.00	0.00
28-May-03	28	55	Standard Deviation (mg/L)	2.3E-01	2.8E+00	0.0E+00	6.2E-02	9.0E-02	0.0E+00			0.0E+00	2.6E-03	0.0E+00	0.0E+00
28-May-03	28	55	Average Concentration (μmol)	3.57	60.4	0.000	0.086	2.87	0.00	6.7E+01		0	2.33	0	8

Table 2A: VOC RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

Chlorinated Ethenes			Methane and Electron Donors										
Date	Day	Replicate	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	VC	Ethene	Total Ethenes	Ethane	Methane	MeOH	EtOH
16-Jun-03	74	ANSC-1	2.57	34.9	0.027	0.037	0.78	<0.01		<0.010	0.016	<1	6
16-Jun-03	74	ANSC-2	2.43	34.3	0.026	0.034	0.71	<0.01		<0.010	0.012	<1	6
16-Jun-03	74	ANSC-3	2.55	34.6	0.025	0.032	0.77	<0.01		<0.010	0.014	<1	7
16-Jun-03	74	Average Concentration (mg/L)	2.52	34.96	0.03	0.03	0.75	0.00		0.00	0.01	0.00	6.30
16-Jun-03	74	Standard Deviation (mg/L)	7.6E-02	3.1E-01	9.7E-04	2.5E-03	3.8E-02	0.0E+00		0.0E+00	1.7E-03	0.0E+00	4.8E-01
16-Jun-03	74	Average Concentration (umol)	3.79	64.5	0.047	0.060	2.95	0.00	7.1E+01	0	2.48	0	21
Anaerobic Intrinsic Control													
03-Apr-03	01	ANAC-1	2.94	34.5	0.026	0.032	0.78	<0.01		<0.010	0.013	<1	<1
03-Apr-03	01	ANAC-2	2.96	34.7	0.027	0.036	0.87	<0.01		<0.010	0.015	<1	<1
03-Apr-03	01	ANAC-3	3.85	41.4	0.028	0.048	1.13	<0.01		<0.010	0.023	<1	<1
03-Apr-03	01	Average Concentration (mg/L)	3.25	36.87	0.03	0.04	0.93	0.00		0.00	0.02	0.00	0.00
03-Apr-03	01	Standard Deviation (mg/L)	5.2E-01	3.9E+00	5.3E-04	8.5E-03	1.8E-01	0.0E+00		0.0E+00	5.4E-03	0.0E+00	0.0E+00
03-Apr-03	01	Average Concentration (umol)	4.89	68.6	0.049	0.067	3.64	0.00	7.7E+01	0	3.09	0	0
09-Apr-03	06	ANAC-1	2.92	33.2	0.024	0.037	0.78	<0.01		<0.010	0.015	<1	<1
09-Apr-03	06	ANAC-2	3.13	36.0	0.026	0.047	0.93	<0.01		<0.010	0.017	<1	<1
09-Apr-03	06	ANAC-3	3.83	40.2	0.028	0.051	1.08	<0.01		<0.010	0.024	<1	<1
09-Apr-03	06	Average Concentration (mg/L)	3.29	36.47	0.03	0.05	0.93	0.00		0.00	0.02	0.00	0.00
09-Apr-03	06	Standard Deviation (mg/L)	4.8E-01	3.5E+00	2.3E-03	7.2E-03	1.6E-01	0.0E+00		0.0E+00	4.4E-03	0.0E+00	0.0E+00
09-Apr-03	06	Average Concentration (umol)	4.86	68.1	0.048	0.079	3.65	0.00	7.7E+01	0	3.36	0	0
17-Apr-03	14	ANAC-1	2.68	31.3	0.026	0.036	0.71	<0.01		<0.010	0.011	<1	<1
17-Apr-03	14	ANAC-2	2.55	31.7	0.025	0.034	0.68	<0.01		<0.010	0.010	<1	<1
17-Apr-03	14	ANAC-3	3.53	36.9	0.031	0.049	0.95	<0.01		<0.010	0.019	<1	<1
17-Apr-03	14	Average Concentration (mg/L)	2.92	33.29	0.03	0.04	0.78	0.00		0.00	0.01	0.00	0.00
17-Apr-03	14	Standard Deviation (mg/L)	5.3E-01	3.1E+00	3.4E-03	8.0E-03	1.4E-01	0.0E+00		0.0E+00	5.3E-03	0.0E+00	0.0E+00
17-Apr-03	14	Average Concentration (umol)	4.40	62.2	0.050	0.070	3.05	0.00	7.0E+01	0	2.40	0	0
25-Apr-03	22	ANAC-1	2.58	30.2	0.024	0.038	0.67	<0.01		<0.010	0.009	<1	<1
25-Apr-03	22	ANAC-2	2.80	33.2	0.028	0.039	0.77	<0.01		<0.010	0.011	<1	<1
25-Apr-03	22	ANAC-3	3.60	37.2	0.030	0.049	0.93	<0.01		<0.010	0.016	<1	<1
25-Apr-03	22	Average Concentration (mg/L)	2.99	33.54	0.03	0.04	0.79	0.00		0.00	0.01	0.00	0.00
25-Apr-03	22	Standard Deviation (mg/L)	5.4E-01	3.5E+00	2.8E-03	6.9E-03	1.3E-01	0.0E+00		0.0E+00	3.9E-03	0.0E+00	0.0E+00
25-Apr-03	22	Average Concentration (umol)	4.81	62.6	0.049	0.072	3.10	0.00	7.0E+01	0	2.11	0	0
01-May-03	28	ANAC-1	2.76	32.8	0.023	0.040	0.73	<0.01		<0.010	0.013	<1	<1
01-May-03	28	ANAC-2	2.83	34.1	0.022	0.042	0.79	<0.01		<0.010	0.014	<1	<1
01-May-03	28	ANAC-3	3.84	40.0	0.034	0.052	0.96	<0.01		<0.010	0.018	<1	<1
01-May-03	28	Average Concentration (mg/L)	3.15	35.62	0.03	0.04	0.83	0.00		0.00	0.01	0.00	0.00
01-May-03	28	Standard Deviation (mg/L)	6.0E-01	3.8E+00	5.5E-03	6.2E-03	1.2E-01	0.0E+00		0.0E+00	3.1E-03	0.0E+00	0.0E+00
01-May-03	28	Average Concentration (umol)	4.74	66.5	0.048	0.076	3.24	0.00	7.5E+01	0	2.86	0	0
14-May-03	41	ANAC-1	2.80	33.0	0.025	0.041	0.71	<0.01		<0.010	0.010	<1	<1
14-May-03	41	ANAC-2	2.86	34.7	0.025	0.044	0.81	<0.01		<0.010	0.013	<1	<1
14-May-03	41	ANAC-3	3.63	38.8	0.036	0.052	0.96	<0.01		<0.010	0.026	<1	<1
14-May-03	41	Average Concentration (mg/L)	3.10	35.62	0.03	0.05	0.83	0.00		0.00	0.02	0.00	0.00
14-May-03	41	Standard Deviation (mg/L)	6.4E-01	3.0E+00	6.0E-03	5.8E-03	1.3E-01	0.0E+00		0.0E+00	8.3E-03	0.0E+00	0.0E+00
14-May-03	41	Average Concentration (umol)	4.67	66.3	0.052	0.080	3.24	0.00	7.4E+01	0	2.88	0	0

Table 2A: VOC RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

Chlorinated Ethenes			Methane and Ethanol Donors										
Date	Day	Replicate	TCE mg/L	cis-1,2-DCE mg/L	trans-1,2-DCE mg/L	1,1-DCE mg/L	VC mg/L	Ethene mg/L	Total Ethenes µmol/L	Ethane mg/L	Methane mg/L	MeOH mg/L	EtOH mg/L
Methanol, Ethanol, Acetate, Lactate													
03-Apr-03	0	MEAL-1	2.80	33.0	0.023	0.032	0.78	<0.01		<0.010	0.014	<1	<1
03-Apr-03	0	MEAL-2	3.00	35.1	0.017	0.035	0.87	<0.01		<0.010	0.010	<1	<1
03-Apr-03	0	MEAL-3	3.16	35.9	0.023	0.038	0.94	<0.01		<0.010	0.020	<1	<1
03-Apr-03	0	Average Concentration (mg/L)	2.99	34.66	0.02	0.03	0.86	0.00		0.00	0.01	0.00	0.00
03-Apr-03	0	Standard Deviation (mg/L)	1.6E-01	1.5E+00	3.5E-03	2.9E-03	8.0E-02	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00
03-Apr-03	0	Average Concentration (µmol)	4.51	64.7	0.038	0.061	3.38	0.00	7.3E+01	0	2.62	0	0
09-Apr-03	6	MEAL-1	2.86	33.0	0.034	NA	0.79	<0.01		<0.010	0.016	107	112
09-Apr-03	6	MEAL-2	3.35	37.0	0.026	NA	0.97	<0.01		<0.010	0.020	110	86
09-Apr-03	6	MEAL-3	3.20	35.7	0.027	NA	0.95	<0.01		<0.010	0.020	110	90
09-Apr-03	6	Average Concentration (mg/L)	3.14	36.23	0.03	0.09	0.91	0.00		0.00	0.02	109.00	96.11
09-Apr-03	6	Standard Deviation (mg/L)	2.5E-01	2.0E+00	4.4E-03	0.0E+00	1.0E-01	0.0E+00		0.0E+00	2.7E-03	1.7E+00	1.4E+01
09-Apr-03	6	Average Concentration (µmol)	4.73	65.8	0.053	0.000	3.55	0.00	7.4E+01	0	3.37	510	313
17-Apr-03	14	MEAL-1	2.30	32.7	0.049	0.035	0.72	<0.01		<0.010	0.012	100	8
17-Apr-03	14	MEAL-2	3.15	35.4	0.056	0.037	0.90	<0.01		<0.010	0.018	105	14
17-Apr-03	14	MEAL-3	2.74	31.7	0.045	0.077	0.79	<0.01		<0.010	0.013	104	62
17-Apr-03	14	Average Concentration (mg/L)	2.73	33.28	0.05	0.05	0.80	0.00		0.00	0.01	102.96	27.56
17-Apr-03	14	Standard Deviation (mg/L)	4.3E-01	1.9E+00	5.4E-03	2.3E-02	6.9E-02	0.0E+00		0.0E+00	3.2E-03	2.9E+00	3.0E+01
17-Apr-03	14	Average Concentration (µmol)	4.12	62.1	0.091	0.087	3.13	0.00	7.6E+01	0	2.51	452	90
fed 20 µL EtOH to reps 1 and 2													
23-Apr-03	20	MEAL											
25-Apr-03	22	MEAL-1	0.01	35.5	0.051	0.037	0.71	<0.01		<0.010	0.009	<1	36
25-Apr-03	22	MEAL-2	2.93	34.1	0.052	0.040	0.84	<0.01		<0.010	0.014	<1	22
25-Apr-03	22	MEAL-3	2.95	33.9	0.064	0.041	0.84	<0.01		<0.010	0.014	<1	28
25-Apr-03	22	Average Concentration (mg/L)	1.96	34.47	0.06	0.04	0.80	0.00		0.00	0.01	0.00	28.72
25-Apr-03	22	Standard Deviation (mg/L)	1.7E+00	8.6E-01	7.0E-03	2.0E-03	7.6E-02	0.0E+00		0.0E+00	2.9E-03	0.0E+00	6.9E+00
25-Apr-03	22	Average Concentration (µmol)	2.96	64.4	0.101	0.089	3.12	0.00	7.1E+01	0	2.27	0	94

Table 2 raw data tables.xls

Table 2A: VOC RAW DATA
Loughorn Army Ammunition Plant, Kameck, Texas

Chlorinated Ethanes				Methane and Electron Donors									
Date	Day	Replicate	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	VC	Ethane	Total Ethanes	Ethane	Methane	MeOH	EtOH
fed 20 µL MeOH and 20 µL EtOH to all 3 reps													
28-Apr-03	25	MEAL											
01-May-03	28	MEAL-1	<0.01	35.3	0.049	0.038	0.69	<0.01		<0.010	0.012	102	99
01-May-03	28	MEAL-2	2.79	33.6	0.049	0.038	0.79	<0.01		<0.010	0.016	56	45
01-May-03	28	MEAL-3	2.85	31.5	0.029	0.041	0.74	<0.01		<0.010	0.013	94	99
01-May-03	28	Average Concentration (mg/L)	1.81	33.46	0.04	0.04	0.74	0.00		0.00	0.01	84.86	81.09
01-May-03	28	Standard Deviation (mg/L)	1.8E+00	1.8E+00	1.2E-02	3.0E-03	5.3E-02	0.0E+00		0.0E+00	1.8E-03	2.4E+01	3.1E+01
01-May-03	28	Average Concentration (µmol)	2.73	62.5	0.077	0.067	2.90	0.00	6.8E+01	0	2.42	396	264
fed 10 µL MeOH and 10 µL EtOH to rep 2 only													
03-May-03	25	MEAL											
14-May-03	41	MEAL-1	0.04	35.2	0.069	0.037	0.67	<0.01		<0.010	0.009	<1	112
14-May-03	41	MEAL-2	<0.01	36.7	0.036	0.045	0.79	<0.01		<0.010	0.013	57	67
14-May-03	41	MEAL-3	2.71	33.4	0.042	0.042	0.84	<0.01		<0.010	0.015	<1	262
14-May-03	41	Average Concentration (mg/L)	0.92	35.07	0.05	0.04	0.76	0.00		0.00	0.01	18.88	143.61
14-May-03	41	Standard Deviation (mg/L)	1.8E+00	1.7E+00	1.2E-02	4.0E-03	8.7E-02	0.0E+00		0.0E+00	3.2E-03	3.3E+01	1.1E+02
14-May-03	41	Average Concentration (µmol)	1.38	65.5	0.084	0.072	3.00	0.00	7.0E+01	0	2.18	88	468
fed 20 µL MeOH and 20 µL EtOH to rep 2													
15-May-03	42	MEAL											
28-May-03	55	MEAL-1	<0.01	34.1	0.035	1.041	0.87	<0.01		<0.010	0.015	<1	<1
28-May-03	55	MEAL-2	<0.01	36.8	0.040	0.635	0.80	<0.01		<0.010	0.014	<1	<1
28-May-03	55	MEAL-3	2.77	32.4	0.028	2.121	0.81	<0.01		<0.010	0.014	128	<1
28-May-03	55	Average Concentration (mg/L)	0.92	34.43	0.03	1.27	0.76	0.00		0.00	0.01	42.50	0.00
28-May-03	55	Standard Deviation (mg/L)	1.6E+00	2.2E+00	5.5E-03	7.7E-01	8.1E-02	0.0E+00		0.0E+00	5.8E-04	7.4E+01	0.0E+00
28-May-03	55	Average Concentration (µmol)	1.39	64.3	0.063	2.212	2.98	0.00	7.1E+01	0	2.58	199	0
fed 20 µL EtOH to rep 3, fed 20 µL MeOH and 20 µL EtOH to reps 1 and 2													
30-May-03	57	MEAL											
16-Jun-03	74	MEAL-1	0.04	33.3	0.036	0.031	0.55	<0.01		<0.010	0.013	<1	127
16-Jun-03	74	MEAL-2	<0.01	38.2	0.032	0.045	0.82	<0.01		<0.010	0.017	<1	76
16-Jun-03	74	MEAL-3	2.82	34.0	0.030	0.040	0.84	<0.01		<0.010	0.016	99	95
16-Jun-03	74	Average Concentration (mg/L)	0.95	35.17	0.03	0.04	0.74	0.00		0.00	0.02	33.17	98.21
16-Jun-03	74	Standard Deviation (mg/L)	1.6E+00	2.6E+00	2.8E-03	6.9E-03	1.6E-01	0.0E+00		0.0E+00	2.4E-03	5.7E+01	2.6E+01
16-Jun-03	74	Average Concentration (µmol)	1.44	65.7	0.059	0.067	2.89	0.00	7.0E+01	0	2.73	155	323
Methanol, Ethanol, Acetate, Lactate and KB 1													
03-Apr-03	0	MEA+KB 1-1	3.61	39.4	0.025	0.046	1.06	<0.01		<0.010	0.034	<1	<1
03-Apr-03	0	MEA+KB 1-2	8.28	37.3	0.023	0.040	0.94	<0.01		<0.010	0.019	<1	<1
03-Apr-03	0	MEA+KB 1-3	8.36	36.5	0.028	0.039	0.92	<0.01		<0.010	0.014	<1	<1
03-Apr-03	0	Average Concentration (mg/L)	3.42	37.72	0.02	0.04	0.97	0.00		0.00	0.02	0.00	0.00
03-Apr-03	0	Standard Deviation (mg/L)	1.7E-01	1.5E+00	1.6E-03	3.4E-03	7.5E-02	0.0E+00		0.0E+00	1.0E-02	0.0E+00	0.0E+00
03-Apr-03	0	Average Concentration (µmol)	5.15	70.4	0.045	0.073	3.82	0.00	8.0E+01	0	4.02	0	0
09-Apr-03	6	MEA+KB 1-1	3.68	39.4	0.027	NA	1.04	<0.01		<0.010	0.020	110	111
09-Apr-03	6	MEA+KB 1-2	3.20	36.7	0.027	NA	0.92	<0.01		<0.010	0.017	118	114
09-Apr-03	6	MEA+KB 1-3	3.81	40.7	0.032	NA	1.01	<0.01		<0.010	0.017	119	100
09-Apr-03	6	Average Concentration (mg/L)	3.56	38.93	0.03	0.00	0.99	0.00		0.00	0.02	115.67	103.32
09-Apr-03	6	Standard Deviation (mg/L)	3.2E-01	2.0E+00	3.1E-03	0.0E+00	6.2E-02	0.0E+00		0.0E+00	2.0E-03	4.9E+00	7.6E+00
09-Apr-03	6	Average Concentration (µmol)	5.37	72.7	0.052	0.000	3.86	0.00	8.2E+01	0	3.24	542	353

Table 2A: VOC RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

Methane and Electron Donors													
Chlorinated Ethenes													
Date	Day	Replicate	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	VC	Ethene	Total Ethenes	Ethane	Methane	MeOH	EtOH
17-Apr-03		14 MEA+KB 1-1	0.04	39.0	0.085	0.046	0.92	<0.01		<0.010	0.019	99	8
17-Apr-03		14 MEA+KB 1-2	<0.01	36.6	0.056	0.044	0.85	<0.01		<0.010	0.016	93	6
17-Apr-03		14 MEA+KB 1-3	<0.01	40.5	0.076	0.038	0.90	<0.01		<0.010	0.014	107	5
17-Apr-03		14 Average Concentration (mg/L)	0.01	38.75	0.07	0.04	0.89	0.00		0.00	0.02	100.04	6.30
17-Apr-03		14 Standard Deviation (mg/L)	2.4E-02	1.8E+00	1.5E-02	4.0E-03	3.4E-02	0.0E+00		0.0E+00	2.7E-03	6.9E+00	1.5E+00
17-Apr-03		14 Average Concentration (umol)	0.02	72.3	0.132	0.075	3.59	0.00	7.6E+01	0	2.90	468	21
23-Apr-03		20 MEAL	fed 20 µL EtOH to all 3 reps										
25-Apr-03		22 MEA+KB 1-1	0.01	35.0	0.046	0.041	0.76	<0.01		<0.010	0.012	<1	12
25-Apr-03		22 MEA+KB 1-2	<0.01	33.3	0.023	0.036	0.72	<0.01		<0.010	0.011	<1	34
25-Apr-03		22 MEA+KB 1-3	<0.01	37.3	0.055	0.040	0.81	<0.01		<0.010	0.011	<1	12
25-Apr-03		22 Average Concentration (mg/L)	0.00	35.22	0.04	0.04	0.77	0.00		0.00	0.01	0.00	19.29
25-Apr-03		22 Standard Deviation (mg/L)	8.3E-03	2.0E+00	1.7E-02	1.5E-03	4.5E-02	0.0E+00		0.0E+00	4.9E-04	0.0E+00	1.3E+01
25-Apr-03		22 Average Concentration (umol)	0.01	66.8	0.078	0.069	3.01	0.00	6.9E+01	0	2.61	0	63
28-Apr-03		26 MEAL	fed 20 µL MeOH and 20 µL EtOH to all 3 reps										
01-May-03		28 MEA+KB 1-1	<0.01	37.0	0.044	0.046	0.83	<0.01		<0.010	0.016	19	21
01-May-03		28 MEA+KB 1-2	<0.01	36.1	0.053	0.041	0.79	<0.01		<0.010	0.016	103	130
01-May-03		28 MEA+KB 1-3	<0.01	38.5	0.053	0.043	0.80	<0.01		<0.010	0.012	30	43
01-May-03		28 Average Concentration (mg/L)	0.00	37.24	0.05	0.04	0.81	0.00		0.00	0.01	50.39	64.93
01-May-03		28 Standard Deviation (mg/L)	0.0E+00	1.2E+00	7.2E-03	3.8E-03	2.4E-02	0.0E+00		0.0E+00	2.1E-03	4.6E+01	6.8E+01
01-May-03		28 Average Concentration (umol)	0.00	69.5	0.094	0.077	3.17	0.00	7.3E+01	0	2.59	236	211
08-May-03		35 MEAL	1ml of KB-1 used to inoculate all MEA + KB-1 bottles										
08-May-03		35 MEAL	fed 20 µL EtOH to all 3 reps, fed 20 µL EtOH to rep 1 and 10 µL EtOH to rep 3										
08-May-03		35 MEA+KB 1-1	<0.01	37.0	0.062	0.034	0.91	<0.01		<0.010	0.017	132	40
08-May-03		35 MEA+KB 1-2	0.03	35.2	0.026	0.044	0.83	<0.01		<0.010	0.017	134	152
08-May-03		35 MEA+KB 1-3	<0.01	39.6	0.029	0.042	0.83	<0.01		<0.010	0.015	129	58
08-May-03		35 Average Concentration (mg/L)	0.01	36.27	0.04	0.04	0.86	0.00		0.00	0.02	131.67	83.33
08-May-03		35 Standard Deviation (mg/L)	1.7E-02	9.5E-01	1.4E-02	5.3E-03	4.6E-02	0.0E+00		0.0E+00	1.1E-03	2.6E+00	6.0E+01
08-May-03		35 Average Concentration (umol)	0.02	67.7	0.085	0.070	3.36	0.00	7.1E+01	0	2.90	416	271
14-May-03		41 MEA+KB 1-1	<0.01	24.7	0.027	0.036	5.79	0.267		<0.010	0.059	88	34
14-May-03		41 MEA+KB 1-2	0.04	28.4	0.033	0.035	4.54	0.095		<0.010	0.064	69	139
14-May-03		41 MEA+KB 1-3	<0.01	22.7	0.028	0.028	6.96	0.414		<0.010	0.12	113	48
14-May-03		41 Average Concentration (mg/L)	0.01	25.27	0.03	0.03	6.76	0.26		0.00	0.08	90.00	73.57
14-May-03		41 Standard Deviation (mg/L)	2.1E-02	2.9E+00	3.3E-03	4.4E-03	1.2E+00	1.9E-01		0.0E+00	3.5E-02	2.2E+01	5.7E+01
14-May-03		41 Average Concentration (umol)	0.02	47.2	0.054	0.056	22.59	11.43	8.1E+01	0	14.61	421	240
15-May-03		42 MEAL	fed 10 µL EtOH to reps 1 and 3										
21-May-03		48 MEA+KB 1-1	<0.01	8.3	<0.01	0	7.57	0.647		<0.010	0.209	<1	<1
21-May-03		48 MEA+KB 1-2	<0.01	13.7	0.024	1.001	7.12	0.370		<0.010	0.323	<1	<1
21-May-03		48 MEA+KB 1-3	<0.01	0.4	<0.01	0	2.13	1.85		<0.010	1.00	<1	<1
21-May-03		48 Average Concentration (mg/L)	0.00	7.47	0.01	0.33	5.61	0.96		0.00	0.51	0.00	0.00
21-May-03		48 Standard Deviation (mg/L)	0.0E+00	6.7E+00	1.4E-02	5.8E-01	3.0E+00	7.9E-01		0.0E+00	4.9E-01	0.0E+00	0.0E+00

Table 2 raw data tables.xls

Table 2A: VOC RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

Date	Day	Replicate	Chlorinated Ethenes				Methane and Electron Donors						
			TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	VC	Ethene	Total Ethenes	Ethane	Methane	MeOH	EtOH
			fed 20 µL MeOH to all 3 reps	fed 20 µL MeOH to all 3 reps									
22-May-03	49	MEA+KB-1	<0.01	0.3	<0.01	0	2.63	1.83		<0.010	0.371	88	<1
26-May-03	54	MEA+KB-1	<0.01	4.9	<0.01	0	7.38	1.19		<0.010	0.642	94	<1
28-May-03	55	MEA+KB 1-1	<0.01	<0.01	<0.01	0	<0.01	1.69		<0.010	3.13	29	<1
28-May-03	55	MEA+KB 1-3	0.00	1.81	0.00	0.00	3.30	1.57		0.00	1.38	70.23	0.00
28-May-03	55	Average Concentration (mg/L)	0.0E+00	2.7E+00	0.0E+00	0.0E+00	3.8E+00	3.3E+01		0.0E+00	1.5E+00	3.6E+01	0.0E+00
28-May-03	55	Standard Deviation (mg/L)	0.00	3.4	0.000	0.000	12.95	69.31	8.6E+01	0	247.28	329	0
30-May-03	54	MEA+KB-1	fed 20 µL EtOH to all 3 reps										
05-Jun-03	64	MEA+KB 1-1	<0.01	<0.01	0.01	0.022	0.02	1.26		<0.010	1.82	<1	255
05-Jun-03	64	MEA+KB 1-2	<0.01	<0.01	0.013	0.016	0.04	1.52		<0.010	2.81	<1	112
05-Jun-03	64	MEA+KB 1-3	<0.01	<0.01	0.011	0.017	0.01	1.10		<0.010	4.765	<1	182
05-Jun-03	64	Average Concentration (mg/L)	0.00	0.00	0.01	0.02	0.02	1.29		0.00	3.07	0.00	175.45
05-Jun-03	64	Standard Deviation (mg/L)	0.0E+00	0.0E+00	1.5E-03	3.5E-03	1.7E-02	2.1E-01		0.0E+00	1.8E+00	0.0E+00	7.3E-01
06-Jun-03	64	Average Concentration (µmol)	0.00	0.0	0.021	0.032	0.09	57.12	5.7E+01	0	548.53	0	575
08-Jun-03	66	MEA+KB-1	fed 20 µL MECH to all 3 reps, fed 20 µL EtOH to rep 3										
18-Jun-03	74	MEA+KB 1-1	<0.01	<0.01	0.02	0.026	<0.01	1.56		<0.010	3.90	<1	284
18-Jun-03	74	MEA+KB 1-2	<0.01	<0.01	0.011	0.013	<0.01	1.63		<0.010	5.15	<1	163
18-Jun-03	74	MEA+KB 1-3	<0.01	<0.01	0.010	<0.01	<0.01	1.80		<0.010	8.34	<1	195
18-Jun-03	74	Average Concentration (mg/L)	0.00	0.00	0.01	0.01	0.00	1.60		0.00	5.13	0.00	214
18-Jun-03	74	Standard Deviation (mg/L)	0.0E+00	0.0E+00	2.6E-03	1.3E-02	0.0E+00	2.5E-02		0.0E+00	1.2E+00	0.0E+00	6.3E+01
18-Jun-03	74	Average Concentration (µmol)	0.00	0.0	0.022	0.022	0.00	70.82	7.1E+01	0	918.26	0	598

Table 2B: PERCHLORATE AND GEOCHEMICAL RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

Date	Day	Replicate	perchlorate mg/L	acetate & lactate* mg/L	chloride mg/L	nitrite mg/L	nitrate mg/L	phosphate mg/L	sulphate mg/L
Anaerobic Sterile Control									
03-Apr-03	0	ANSC-1	0.561	<2.4	815	<0.5	26.5	<1	979
03-Apr-03	0	ANSC-2	0.501	<2.4	911	<0.5	17.1	<1	990
03-Apr-03	0	ANSC-3	0.500	<2.4	1144	<0.5	20.2	<1	1013
03-Apr-03	0	Standard Deviation (mg/L)	3.3E-02	0.0E+00	1.7E+02	0.0E+00	4.8E+00	0.0E+00	1.7E+01
03-Apr-03	0	Average Concentration (mg/L)	0.52	0.00	966.67	0.00	21.28	0.00	994.00
09-Apr-03	6	ANSC-1	0.615	<2.4	979	<0.5	25.1	<1	1034
09-Apr-03	6	ANSC-2	0.638	<2.4	973	<0.5	20.5	<1	1024
09-Apr-03	6	ANSC-3	0.603	<2.4	1003	<0.5	28.0	<1	1057
09-Apr-03	6	Standard Deviation (mg/L)	1.5E-02	0.0E+00	1.8E+01	0.0E+00	3.8E+00	0.0E+00	1.7E+01
09-Apr-03	6	Average Concentration (mg/L)	0.62	<2.4	986.90	<0.5	24.55	<1	1039.33
17-Apr-03	14	ANSC-1	0.798	<2.4	973	<0.5	24.9	<1	1134.461
17-Apr-03	14	ANSC-2	0.758	<2.4	958	<0.5	18.0	<1	1111
17-Apr-03	14	ANSC-3	0.714	<2.4	985	<0.5	19.3	<1	1134
17-Apr-03	14	Standard Deviation (mg/L)	4.2E-02	0.0E+00	1.4E+01	0.0E+00	3.6E+00	0.0E+00	1.3E+01
17-Apr-03	14	Average Concentration (mg/L)	0.76	<2.4	972.04	<0.5	20.73	<1	1126.49
25-Apr-03	22	ANSC-1	ND	405	946	<0.5	23.3	<1	979
25-Apr-03	22	ANSC-2	ND	<2.4	961	<0.5	16.7	<1	949
25-Apr-03	22	ANSC-3	ND	<2.4	990	<0.5	20.3	<1	918
25-Apr-03	22	Standard Deviation (mg/L)	0.0E+00	0.0E+00	8.5E+00	0.0E+00	3.3E+00	0.0E+00	3.1E+01
25-Apr-03	22	Average Concentration (mg/L)	0.00	136.00	955.54	<0.5	20.11	<1	946.67
01-May-03	28	ANSC-1	ND	385	976	<0.5	10.5	<1	921
01-May-03	28	ANSC-2	ND	<2.4	983	<0.5	11.2	<1	892
01-May-03	28	ANSC-3	ND	<2.4	976	<0.5	9.7	<1	884
01-May-03	28	Standard Deviation (mg/L)	0.0E+00	2.1E+02	4.1E+00	0.0E+00	7.2E-01	0.0E+00	1.9E+01
01-May-03	28	Average Concentration (mg/L)	0.00	121.67	978.62	<0.5	10.48	<1	898.00
14-May-03	41	ANSC-1	0.852	376	980	<0.5	9.8	<1	1069
14-May-03	41	ANSC-2	0.894	<2.4	1015	<0.5	11.3	<1	1109
14-May-03	41	ANSC-3	0.935	<2.4	998	<0.5	9.0	<1	1046
14-May-03	41	Standard Deviation (mg/L)	4.2E-02	2.2E+02	1.8E+01	0.0E+00	1.2E+00	0.0E+00	3.2E+01
14-May-03	41	Average Concentration (mg/L)	0.89	123.33	997.67	<0.5	10.03	<1	1074.67
28-May-03	55	ANSC-1	ND	377	1003	<0.5	7.9	<1	1146
28-May-03	55	ANSC-2	ND	<2.4	996	<0.5	8.7	<1	1179
28-May-03	55	ANSC-3	ND	<2.4	1023	<0.5	9.9	<1	1175
28-May-03	55	Standard Deviation (mg/L)	0.0E+00	2.2E+02	1.4E+01	0.0E+00	1.0E+00	0.0E+00	1.6E+01
28-May-03	55	Average Concentration (mg/L)	0.00	123.67	1007.25	<0.5	8.83	<1	1166.67
16-Jun-03	74	ANSC-1	ND	383	988	<0.5	7.2	<1	1163
16-Jun-03	74	ANSC-2	ND	<2.4	1018	<0.5	7.9	<1	1184
16-Jun-03	74	ANSC-3	ND	<2.4	995	<0.5	9.2	<1	1167
16-Jun-03	74	Standard Deviation (mg/L)	0.0E+00	2.0E+02	1.8E+01	0.0E+00	1.0E+00	0.0E+00	1.1E+01
16-Jun-03	74	Average Concentration (mg/L)	0.00	117.67	1000.33	<0.5	8.10	<1	1171.33

Table 2B: PERCHLORATE AND GEOCHEMICAL RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

Date	Day	Replicate	perchlorate mg/L	acetate & lactate mg/L	chloride mg/L	nitrite mg/L	nitrate mg/L	phosphate mg/L	sulphate mg/L
Anaerobic Intrinsic Control									
03-Apr-03	0	ANAC-1	0.543	<2.4	810	<0.5	25.7	<1	963
03-Apr-03	0	ANAC-2	0.538	<2.4	812	<0.5	32.3	<1	962
03-Apr-03	0	ANAC-3	0.576	<2.4	754	<0.5	18.4	<1	989
03-Apr-03	0	Standard Deviation (mg/L)	2.3E-02	0.0E+00	3.3E+01	0.0E+00	8.0E+00	0.0E+00	8.0E+00
03-Apr-03	0	Average Concentration (mg/L)	0.55	<2.4	792.10	<0.5	24.80	<1	991.33
09-Apr-03	6	ANAC-1	<0.01	<2.4	652	<0.5	18.8	<1	934
09-Apr-03	6	ANAC-2	<0.01	<2.4	856	<0.5	30.6	<1	1069
09-Apr-03	6	ANAC-3	0.587	<2.4	793	<0.5	23.7	<1	1046
09-Apr-03	6	Standard Deviation (mg/L)	3.4E-01	0.0E+00	1.0E+02	0.0E+00	5.9E+00	0.0E+00	7.2E+01
09-Apr-03	6	Average Concentration (mg/L)	0.20	<2.4	787.02	<0.5	24.39	<1	1016.33
17-Apr-03	14	ANAC-1	<0.01	<2.4	753	<0.5	20.9	<1	979
17-Apr-03	14	ANAC-2	<0.01	<2.4	771	<0.5	5.0	<1	934
17-Apr-03	14	ANAC-3	<0.01	<2.4	753	<0.5	20.9	<1	979
17-Apr-03	14	Standard Deviation (mg/L)	0.0E+00	0.0E+00	1.0E+01	0.0E+00	9.2E+00	0.0E+00	2.8E+01
17-Apr-03	14	Average Concentration (mg/L)	<0.01	<2.4	758.20	<0.5	15.56	<1	964.00
25-Apr-03	22	ANAC-1	ND	<2.4	836	<0.5	<1.5	<1	1020
25-Apr-03	22	ANAC-2	ND	<2.4	818	<0.5	<1.5	<1	994
25-Apr-03	22	ANAC-3	ND	<2.4	825	<0.5	<1.5	<1	1016
25-Apr-03	22	Standard Deviation (mg/L)	0.0E+00	0.0E+00	9.1E+00	0.0E+00	0.0E+00	0.0E+00	1.4E+01
25-Apr-03	22	Average Concentration (mg/L)	ND	<2.4	826.44	<0.5	<1.5	<1	1010.00
01-May-03	28	ANAC-1	ND	<2.4	866	<0.5	<1.5	<1	917
01-May-03	28	ANAC-2	ND	<2.4	916	<0.5	<1.5	<1	1104
01-May-03	28	ANAC-3	ND	<2.4	884	<0.5	<1.5	<1	1078
01-May-03	28	Standard Deviation (mg/L)	0.0E+00	0.0E+00	2.5E+01	0.0E+00	0.0E+00	0.0E+00	1.0E+02
01-May-03	28	Average Concentration (mg/L)	ND	<2.4	888.68	<0.5	<1.5	<1	1033.00
14-May-03	41	ANAC-1	ND	<2.4	848	<0.5	<1.5	<1	1051
14-May-03	41	ANAC-2	ND	<2.4	817	<0.5	<1.5	<1	1016
14-May-03	41	ANAC-3	ND	<2.4	856	<0.5	<1.5	<1	1071
14-May-03	41	Standard Deviation (mg/L)	0.0E+00	0.0E+00	2.1E+01	0.0E+00	0.0E+00	0.0E+00	2.8E+01
14-May-03	41	Average Concentration (mg/L)	ND	<2.4	840.33	<0.5	<1.5	<1	1045.67
28-May-03	55	ANAC-1	ND	<2.4	878	<0.5	<1.5	<1	1219
28-May-03	55	ANAC-2	ND	<2.4	858	<0.5	<1.5	<1	1192
28-May-03	55	ANAC-3	ND	<2.4	881	<0.5	<1.5	<1	1199
28-May-03	55	Standard Deviation (mg/L)	0.0E+00	0.0E+00	1.0E+01	0.0E+00	0.0E+00	0.0E+00	1.9E+01
28-May-03	55	Average Concentration (mg/L)	ND	<2.4	865.60	<0.5	<1.5	<1	1200.00
16-Jun-03	74	ANAC-1	ND	<2.4	859	<0.5	<1.5	<1	1155
16-Jun-03	74	ANAC-2	ND	<2.4	838	<0.5	<1.5	<1	1148
16-Jun-03	74	ANAC-3	ND	<2.4	843	<0.5	<1.5	<1	1197
16-Jun-03	74	Standard Deviation (mg/L)	0.0E+00	0.0E+00	1.1E+01	0.0E+00	0.0E+00	0.0E+00	2.7E+01
16-Jun-03	74	Average Concentration (mg/L)	ND	<2.4	846.51	<0.5	<1.5	<1	1166.67

Table 2 raw data tables.xls

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Table 2B: PERCHLORATE AND GEOCHEMICAL RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

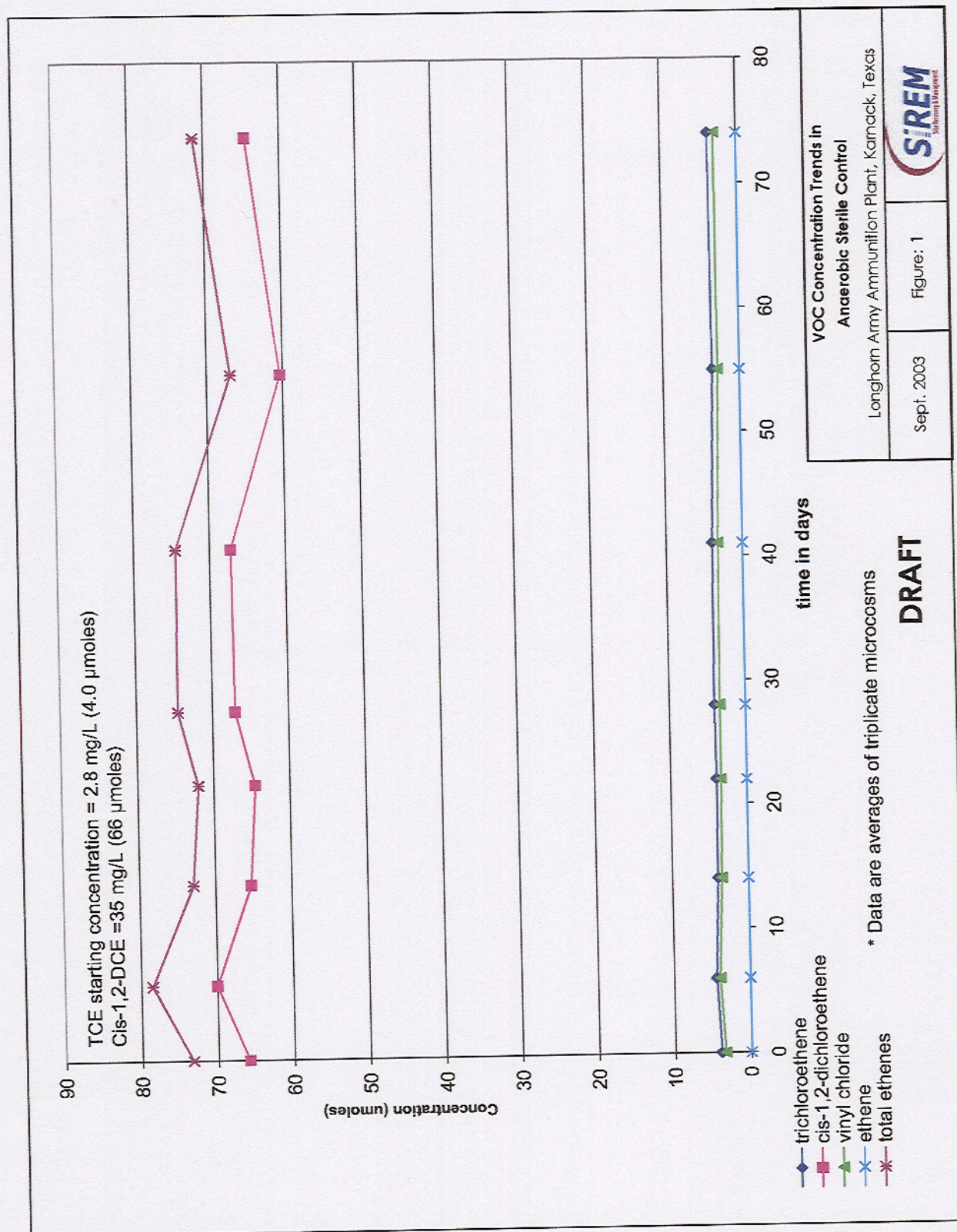
Date	Day	Replicate	perchlorate mg/L	acetate & lactate mg/L	chloride mg/L	nitrite mg/L	nitrate mg/L	phosphate mg/L	sulphate mg/L
Methanol, Ethanol, Acetate, Lactate									
03-Apr-03	0	MEAL-1	0.442	<2.4	702	<0.5	34.5	<1	968
03-Apr-03	0	MEAL-2	0.440	<2.4	797	<0.5	27.0	<1	968
03-Apr-03	0	MEAL-3	0.814	<2.4	828	<0.5	17.4	<1	1002
03-Apr-03	0	Standard Deviation (mg/L)	1.0E-01	0.0E+00	1.9E+01	0.0E+00	8.5E+00	0.0E+00	2.3E+01
03-Apr-03	0	Average Concentration (mg/L)	0.50	<2.4	805.55	<0.5	26.29	<1	976.00
09-Apr-03	6	MEAL-1	<0.01	258	812	<0.5	34.9	<1	1002
09-Apr-03	6	MEAL-2	0.346	241	834	<0.5	28.1	<1	1045
09-Apr-03	6	MEAL-3	<0.01	303	857	<0.5	25.6	<1	1052
09-Apr-03	6	Standard Deviation (mg/L)	2.0E-01	3.2E+01	2.2E+01	0.0E+00	4.8E+00	0.0E+00	2.7E+01
09-Apr-03	6	Average Concentration (mg/L)	0.12	267.33	834.45	<0.5	29.61	<1	1033.00
17-Apr-03	14	MEAL-1	<0.01	190	838	<0.5	9.7	<1	1100
17-Apr-03	14	MEAL-2	0.022	196	863	<0.5	17.0	<1	1135
17-Apr-03	14	MEAL-3	<0.01	272	846	<0.5	18.6	<1	1165
17-Apr-03	14	Standard Deviation (mg/L)	1.3E-02	4.6E+01	2.4E+01	0.0E+00	4.7E+00	0.0E+00	3.3E+01
17-Apr-03	14	Average Concentration (mg/L)	0.01	219.33	855.71	<0.5	15.10	<1	1133.33
25-Apr-03	22	MEAL-1	ND	180	823	<0.5	<1.5	<1	349
25-Apr-03	22	MEAL-2	<0.01	179	866	<0.5	<1.5	<1	554
25-Apr-03	22	MEAL-3	ND	290	821	<0.5	2.4	<1	713
25-Apr-03	22	Standard Deviation (mg/L)	0.0E+00	8.4E+01	1.9E+01	0.0E+00	1.4E+00	0.0E+00	1.8E+02
25-Apr-03	22	Average Concentration (mg/L)	ND	216.47	833.19	<0.5	0.81	<1	536.67
01-May-03	28	MEAL-1	ND	267	969	<0.5	<1.5	<1	15
01-May-03	28	MEAL-2	ND	208	802	<0.5	<1.5	<1	46
01-May-03	28	MEAL-3	ND	189	721	<0.5	<1.5	<1	308
01-May-03	28	Standard Deviation (mg/L)	0.0E+00	4.1E+01	1.3E+02	0.0E+00	0.0E+00	0.0E+00	1.6E+02
01-May-03	28	Average Concentration (mg/L)	ND	221.21	830.70	0.50	0.00	<1	122.33
14-May-03	41	MEAL-1	ND	214	1019	<0.5	<1.5	<1	14
14-May-03	41	MEAL-2	ND	182	853	<0.5	<1.5	<1	54
14-May-03	41	MEAL-3	ND	80	869	<0.5	<1.5	<1	16
14-May-03	41	Standard Deviation (mg/L)	0.0E+00	7.0E+01	9.4E+01	0.0E+00	0.0E+00	0.0E+00	2.3E+01
14-May-03	41	Average Concentration (mg/L)	ND	155.67	910.33	<0.5	0.00	<1	28.00
28-May-03	55	MEAL-1	ND	202	861	<0.5	<1.5	<1	<0.5
28-May-03	55	MEAL-2	ND	231	888	<0.5	<1.5	<1	<0.5
28-May-03	55	MEAL-3	ND	143	843	<0.5	<1.5	<1	<0.5
28-May-03	55	Standard Deviation (mg/L)	0.0E+00	4.4E+01	1.3E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
28-May-03	55	Average Concentration (mg/L)	ND	191.89	857.21	<0.5	<1.5	<1	<0.5
16-Jun-03	74	MEAL-1	ND	184	839	<0.5	<1.5	<1	<0.5
16-Jun-03	74	MEAL-2	ND	293	824	<0.5	<1.5	<1	<0.5
16-Jun-03	74	MEAL-3	ND	210	870	<0.5	<1.5	<1	<0.5
16-Jun-03	74	Standard Deviation (mg/L)	0.0E+00	5.7E+01	2.3E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
16-Jun-03	74	Average Concentration (mg/L)	ND	228.98	844.59	<0.5	<1.5	<1	<0.5

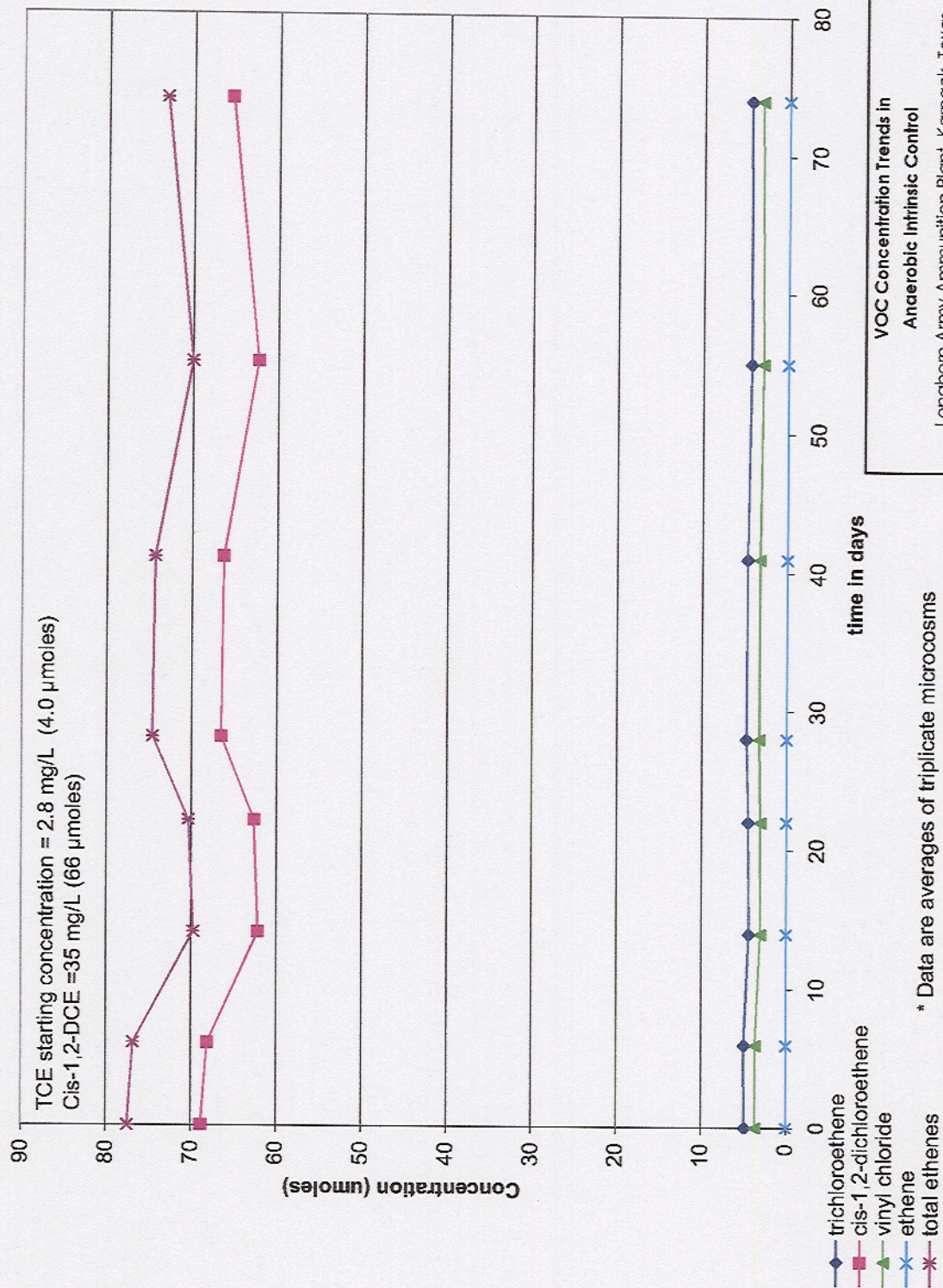
Table 2 raw data tables.xls

Table 2B: PERCHLORATE AND GEOCHEMICAL RAW DATA
Longhorn Army Ammunition Plant, Karnack, Texas

Date	Day	Replicate	perchlorate mg/L	acetate & lactate ^a mg/L	chloride mg/L	nitrate mg/L	phosphate mg/L	sulphate mg/L
Methanol, Ethanol, Acetate, Lactate and KB 1								
03-Apr-03	0	MEA+KB 1-1	0.573	<2.4	813	<0.5	<1	998
03-Apr-03	0	MEA+KB 1-2	0.452	<2.4	584	<0.5	<1	815
03-Apr-03	0	MEA+KB 1-3	0.503	<2.4	814	<0.5	<1	995
03-Apr-03	0	Standard Deviation (mg/L)	6.1E-02	0.0E+00	1.3E+02	0.0E+00	0.0E+00	1.0E+02
03-Apr-03	0	Average Concentration (mg/L)	0.51	<2.4	737.00	<0.5	<1	938.33
09-Apr-03	6	MEA+KB 1-1	<0.01	250	866	<0.5	<1	1060
09-Apr-03	6	MEA+KB 1-2	<0.01	347	882	<0.5	<1	1085
09-Apr-03	6	MEA+KB 1-3	<0.01	252	859	<0.5	<1	1078
09-Apr-03	6	Standard Deviation (mg/L)	0.0E+00	5.5E+01	1.3E+01	0.0E+00	0.0E+00	1.3E+01
09-Apr-03	6	Average Concentration (mg/L)	<0.01	283.00	886.35	<0.5	<1	1074.33
17-Apr-03	14	MEA+KB 1-1	<0.01	278	861	<0.5	<1	1086
17-Apr-03	14	MEA+KB 1-2	<0.01	216	795	<0.5	<1	1034
17-Apr-03	14	MEA+KB 1-3	<0.01	222	872	<0.5	<1	1141
17-Apr-03	14	Standard Deviation (mg/L)	0.0E+00	3.5E+01	4.1E+01	0.0E+00	0.0E+00	5.4E+01
17-Apr-03	14	Average Concentration (mg/L)	<0.01	238.33	842.79	<0.5	<1	1087.67
25-Apr-03	22	MEA+KB 1-1	ND	276	826	<0.5	<1	861
25-Apr-03	22	MEA+KB 1-2	ND	133	838	<0.5	<1	344
25-Apr-03	22	MEA+KB 1-3	ND	167	820	<0.5	<1	498
25-Apr-03	22	Standard Deviation (mg/L)	0.0E+00	7.5E+01	9.8E+00	0.0E+00	0.0E+00	1.6E+02
25-Apr-03	22	Average Concentration (mg/L)	ND	191.75	827.51	<0.5	<1	501.33
01-May-03	28	MEA+KB 1-1	ND	218	888	<0.5	<1	103
01-May-03	28	MEA+KB 1-2	ND	166	912	<0.5	<1	44
01-May-03	28	MEA+KB 1-3	ND	141	834	<0.5	<1	37
01-May-03	28	Standard Deviation (mg/L)	0.0E+00	3.9E+01	4.0E+01	0.0E+00	0.0E+00	3.6E+01
01-May-03	28	Average Concentration (mg/L)	ND	175.98	874.03	<0.5	<1	61.33
14-May-03	41	MEA+KB 1-1	ND	189	863	<0.5	<1	11
14-May-03	41	MEA+KB 1-2	ND	227	849	<0.5	<1	2
14-May-03	41	MEA+KB 1-3	ND	219	873	<0.5	<1	40
14-May-03	41	Standard Deviation (mg/L)	0.0E+00	2.0E+01	1.2E+01	0.0E+00	0.0E+00	2.0E+01
14-May-03	41	Average Concentration (mg/L)	ND	211.67	861.67	<0.5	<1	17.87
28-May-03	55	MEA+KB 1-1	ND	178	898	<0.5	<1	<0.5
28-May-03	55	MEA+KB 1-2	ND	277	878	<0.5	<1	<0.5
28-May-03	55	MEA+KB 1-3	ND	218	949	<0.5	<1	<0.5
28-May-03	55	Standard Deviation (mg/L)	0.0E+00	4.9E+01	3.9E+01	0.0E+00	0.0E+00	0.0E+00
28-May-03	55	Average Concentration (mg/L)	ND	224.55	904.42	<0.5	<1	0.00
16-Jun-03	74	MEA+KB 1-1	ND	210	901	<0.5	<1	<0.5
16-Jun-03	74	MEA+KB 1-2	ND	248	895	<0.5	<1	<0.5
16-Jun-03	74	MEA+KB 1-3	ND	200	903	<0.5	<1	<0.5
16-Jun-03	74	Standard Deviation (mg/L)	0.0E+00	2.5E+01	4.2E+00	0.0E+00	0.0E+00	0.0E+00
16-Jun-03	74	Average Concentration (mg/L)	ND	219.42	899.65	<0.5	<1	0.00

Notes: ND = not determined, analysis not conducted





VOC Concentration Trends in
Anaerobic Intrinsic Control

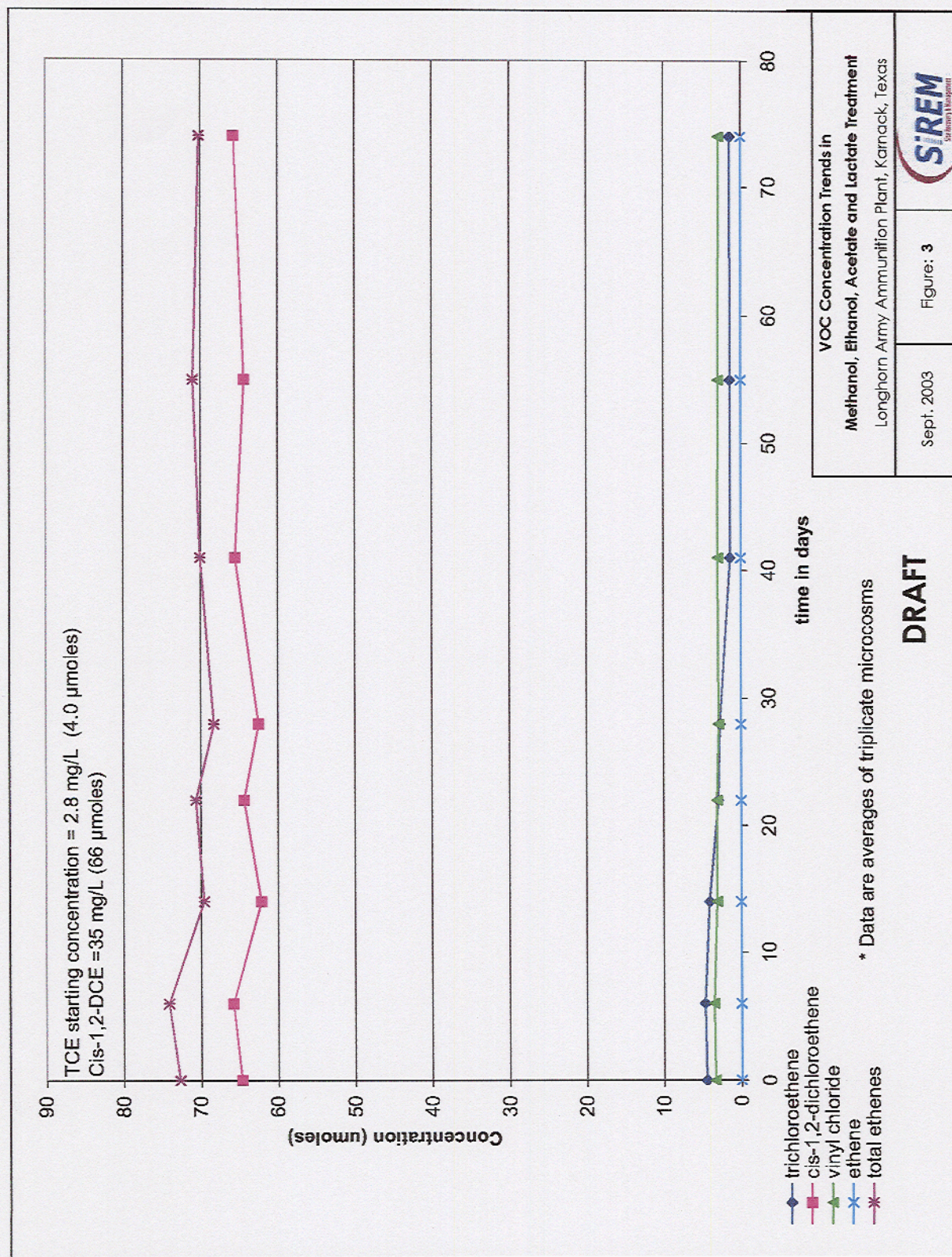
Longhorn Army Ammunition Plant, Karnack, Texas

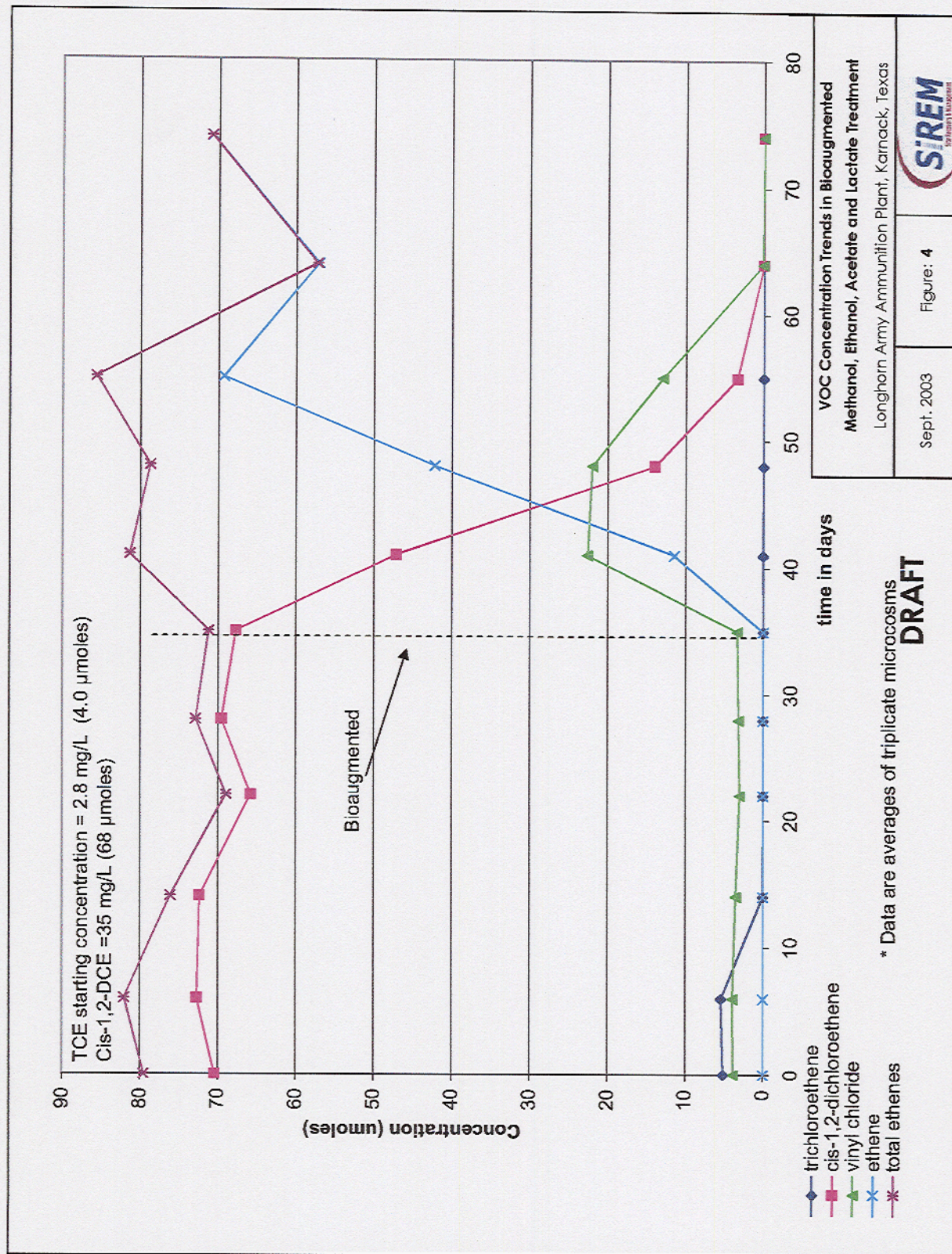


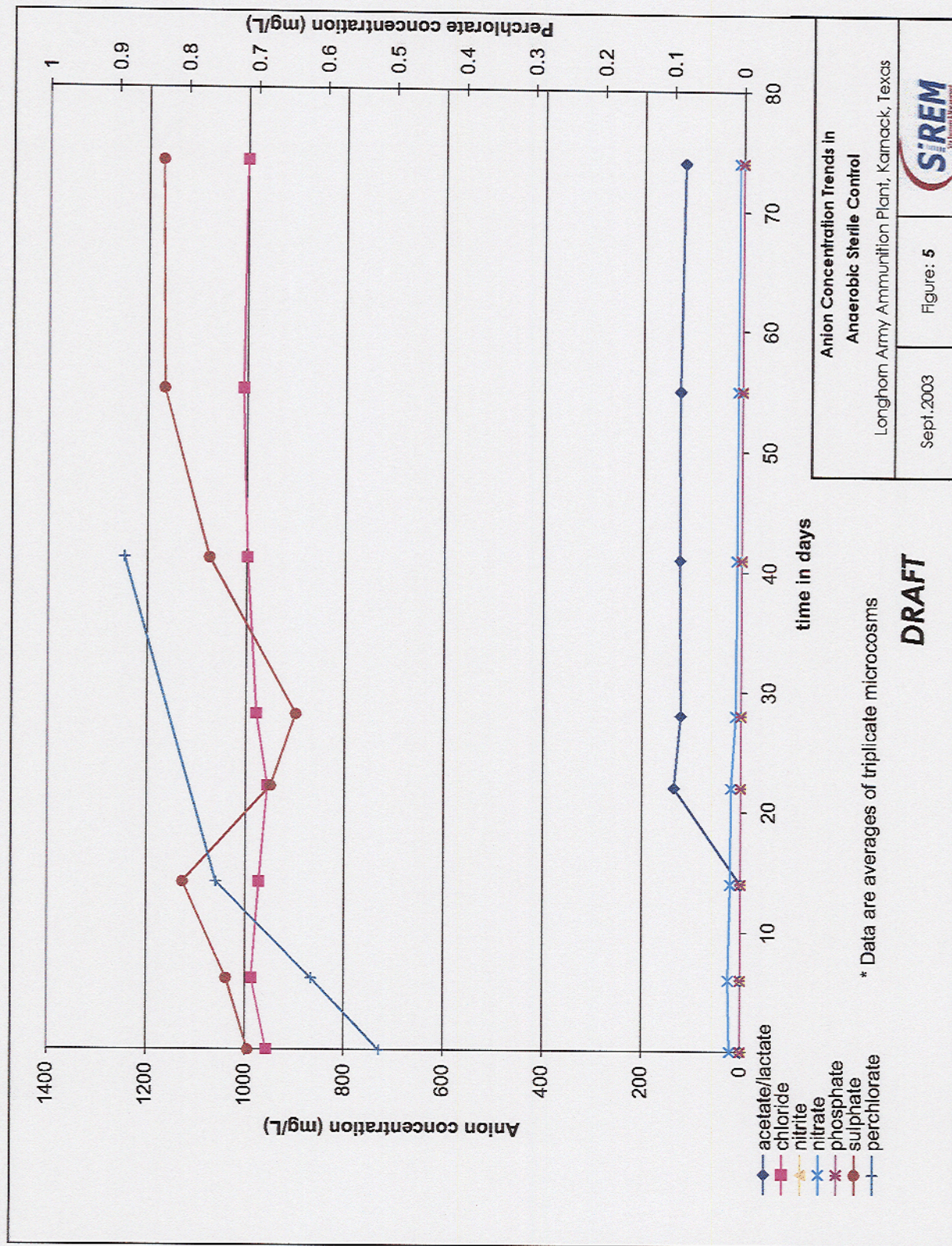
Sept. 2003

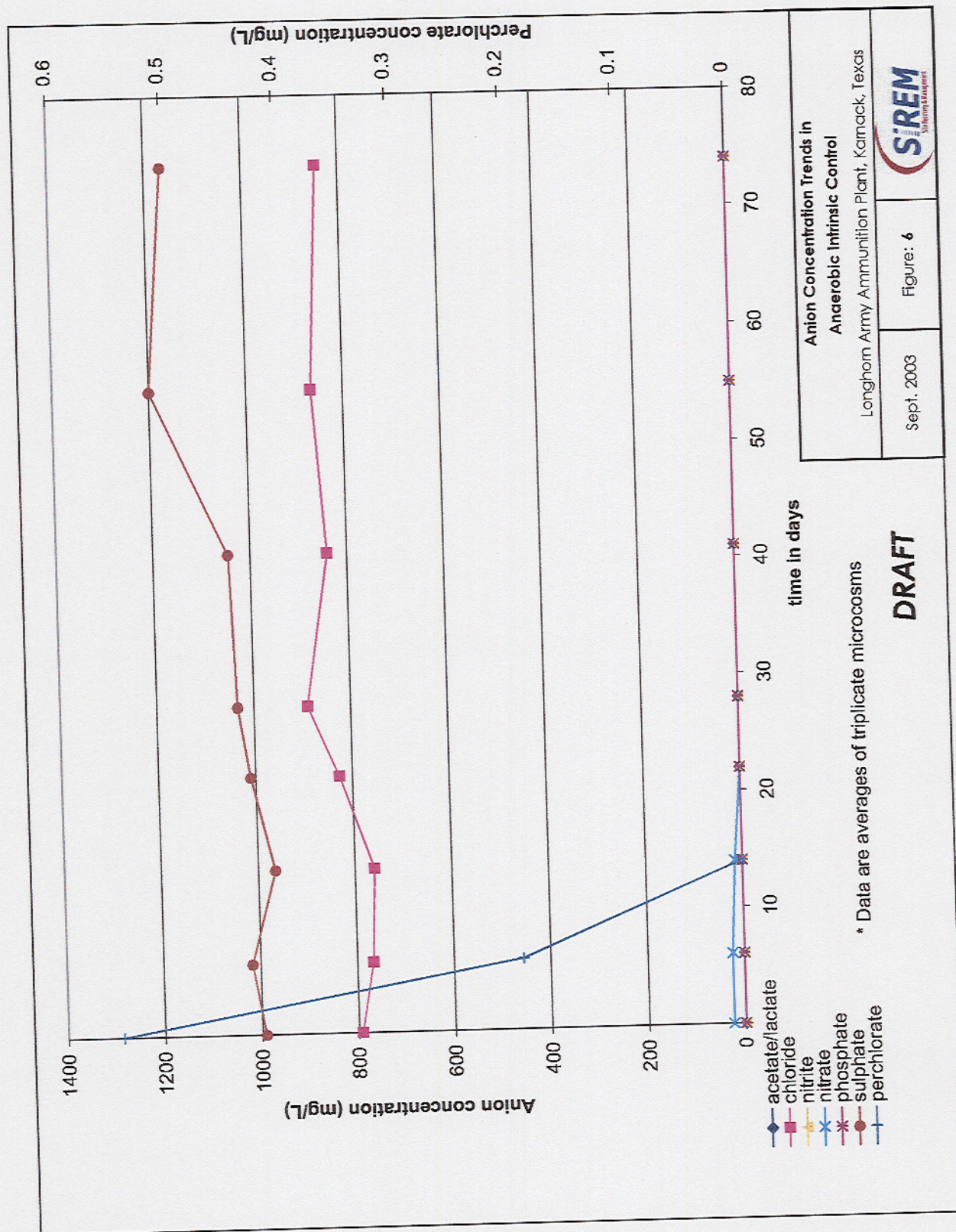
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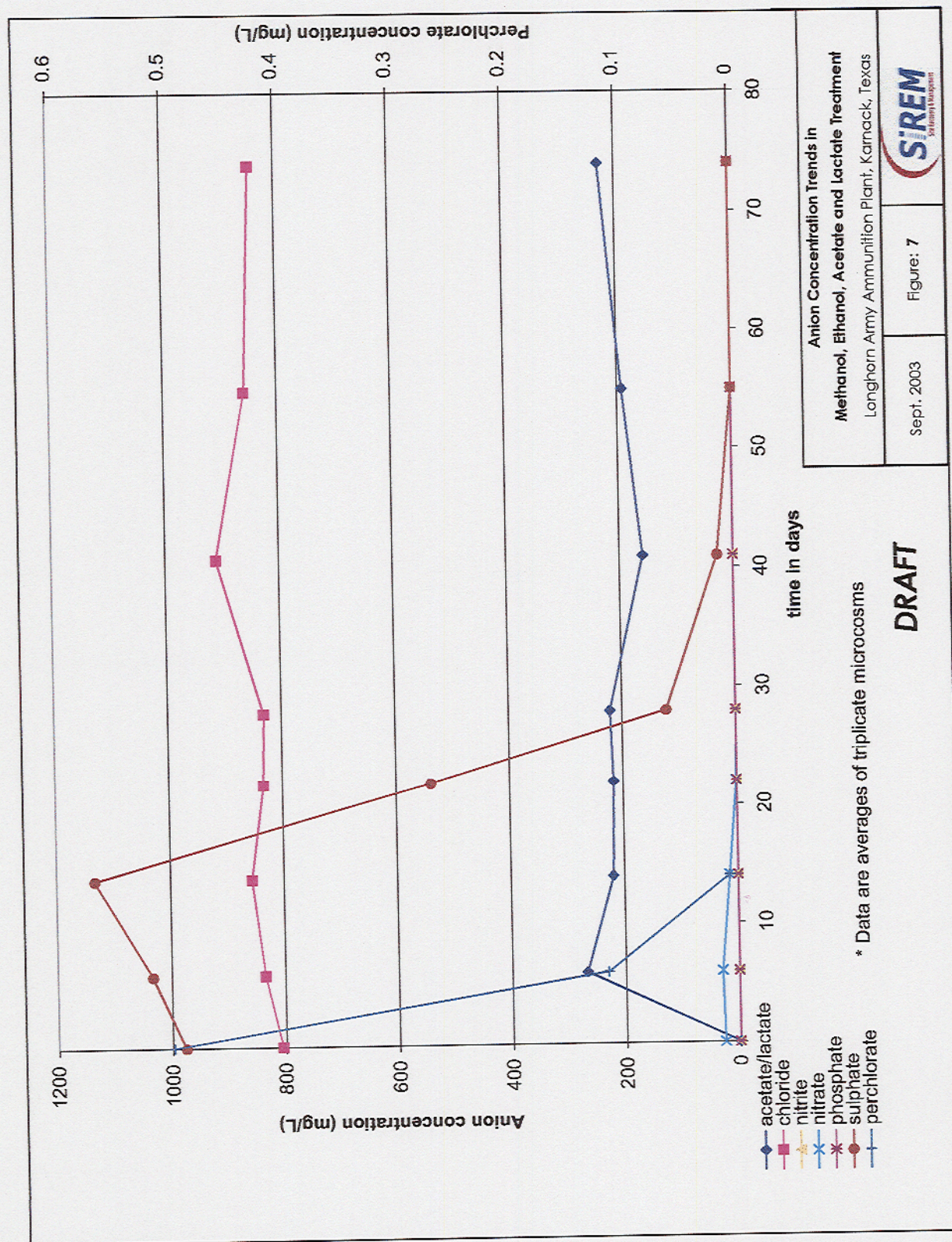
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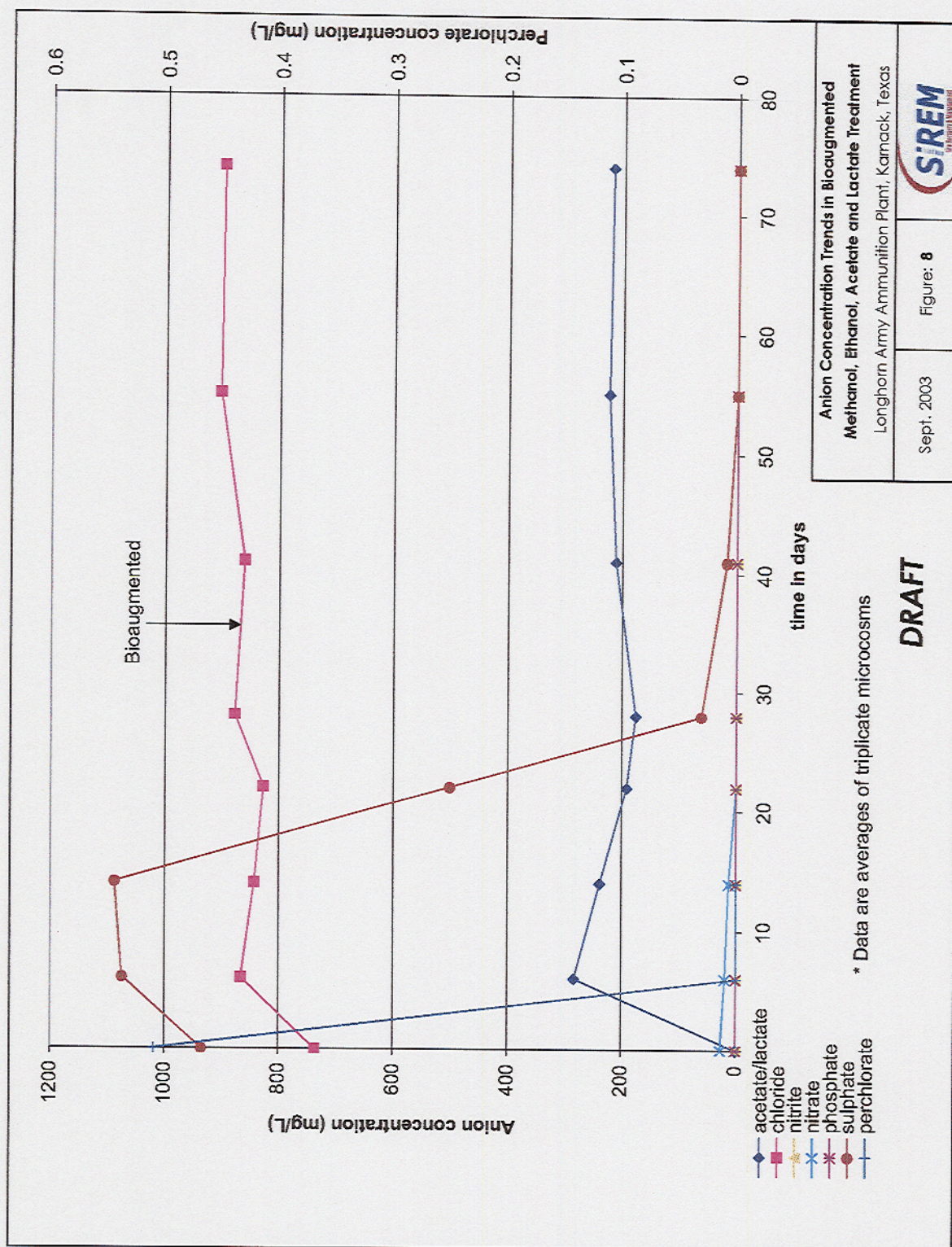












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APPENDIX A

BIOTREATABILITY LABORATORY ANALYTICAL METHODS

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VOCS, Dissolved Hydrocarbon Gases, Methanol and Ethanol Analysis

This section describes the methods to quantify the chlorinated ethenes as well as methane, ethene, methanol and ethanol. The practical quantitation limit (PQL) for the chlorinated ethenes (PCE, TCE, cis-DCE and vinyl chloride) and ethene was 10 µg/L. The PQL for methanol and ethanol was 1 mg/L.

VOC concentrations were measured using a Hewlett-Packard (HP5890 series II) gas chromatograph (GC) equipped with a head-space autosampler (Hewlett Packard 7684) programmed to heat each sample to 75 °C for 40 minutes prior to injection into a SUPEL-Q™ Plot column (0.53 mm x 30 m, Supelco) and a flame ionization detector (FID). The injector temperature was 200°C, and the detector temperature was 250°C. The oven temperature was programmed as follows: 35°C for 2 minutes, increase to 100°C at 10°C/min, then increase to 185°C at 6°C/min and hold at 185 °C for 1.34 minutes. The carrier gas was helium at a flow rate of 11 mL/min.

VOC concentrations in the liquid phase of the microcosms were measured by withdrawing 1 mL of liquid from each microcosm and injecting the sample into a 10-mL headspace vial containing 5 mL of acidified deionized water. The vial was sealed with an inert Teflon-coated septum and aluminum crimp cap for automated injection onto the GC. A three-point calibration was performed using methanolic stock solutions containing known concentrations of the target analytes. Calibration was performed using external standards that were prepared gravimetrically, or were purchased as standard solutions. The data from the GCs were integrated using HPChem software (Hewlett Packard). Data can be reviewed and re-integrated at a later date, but the raw data cannot be modified.

Anions, Lactate, Acetate and Perchlorate Analysis

This section describes the methods to quantify anions, lactate, acetate and perchlorate. The PQL for the standard anions was 0.71 mg/L chloride, 0.28

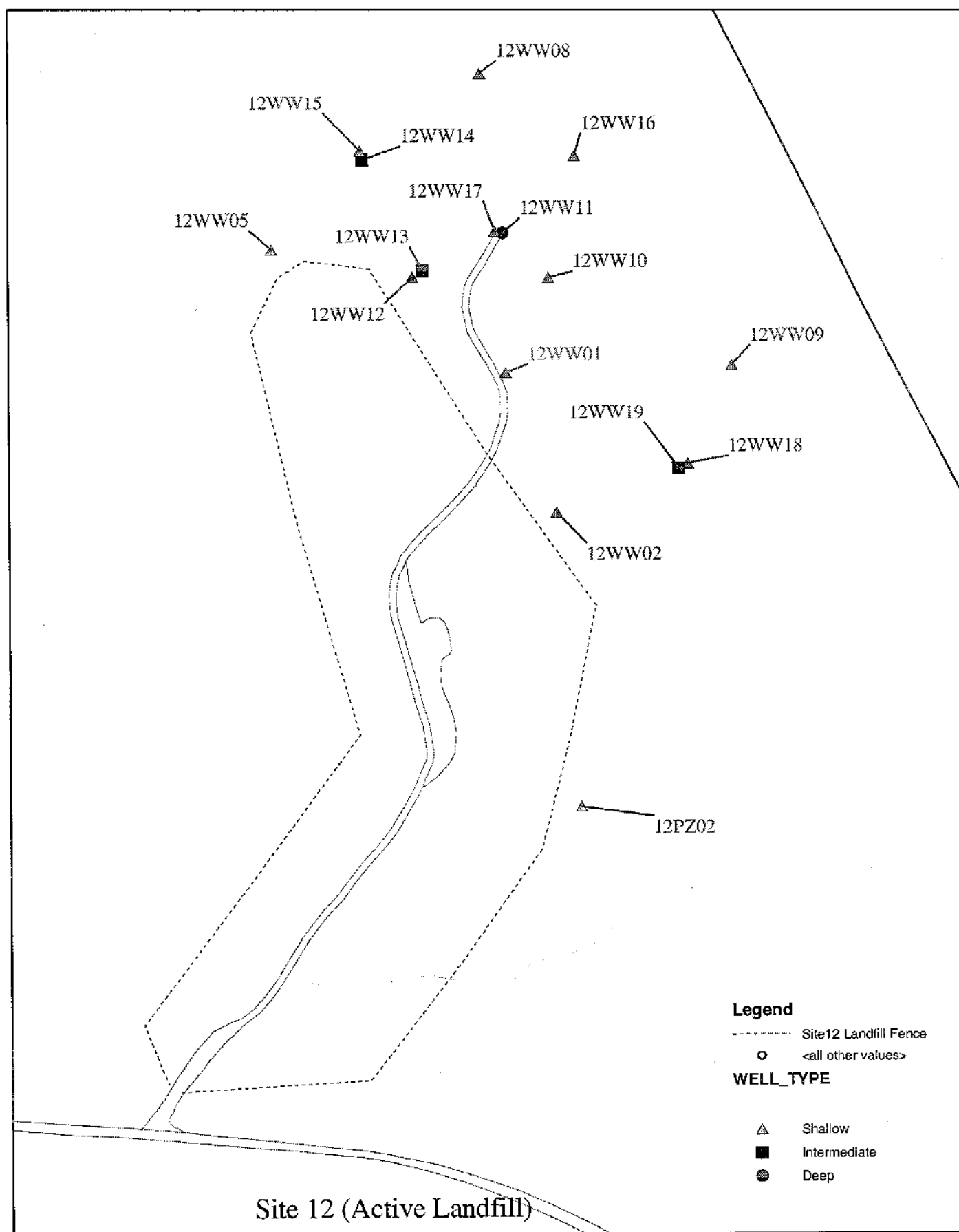
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mg/l nitrate, 0.28 mg/L nitrite, 0.19 mg/L sulphate, 0.96 mg/L phosphate and 2.4 mg/L for acetate and lactate. The PQL for perchlorate was 0.01 mg/L.

Sulphate, nitrate, nitrite, chloride, phosphate and acetate/lactate concentrations were measured by removing a 0.5 to 1 mL liquid sample from the microcosm and placing it in a 1.5 ml micro-centrifuge tube. Samples were centrifuged for 5 minutes. The supernatant was removed and placed in a Dionex auto-sampler vial with a filter cap. Analysis was performed on a Dionex AS-40 auto-sampler and quantified using a Dionex DX-300 ion chromatograph (IC) equipped with an AS14 column. The sample loop volume was 20 μ L. The IC was run isocratically with an eluent made up of 3.5 mM Na_2CO_3 and 1 mM NaHCO_3 at a flow rate of 1.2 mL/min. Calibration was performed using external standards of known concentrations.

Perchlorate concentrations were measured by removing a 5 mL liquid sample from the microcosm and centrifuging for 5 minutes. The supernatant was removed and placed in a Dionex auto-sampler vial with filter cap. Analysis was performed with the same auto-sampler and IC as mentioned above with an AS16 column. The sample loop volume was 1 mL. The IC was run isocratically with an eluent made up of 55 mM sodium hydroxide at a flowrate of 1.5 mL/min. Calibration was performed using external standards of known concentrations.



Longhorn Army Ammunition Plant
Site 12 Analytical Results (27-28 February 2003) (tentative, pending validation)

Parameter	Units	12WW01	12WW02	12WW05	12WW08	12WW10	12WW11	12WW12
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Anions

Chloride	mg/l	1000	159	695	2600	505	766	255
Nitrogen, Nitrate/Nitrite	mg/l	0.050 J	0.050 J	0.050 J	0.050 J	0.050 J	0.050 J	0.050 J
Perchlorate	ug/l	< 4.00	< 4.00	< 4.00	< 4.00	< 4.00	< 4.00	< 4.00
Sulfate	mg/l	353	65.3	209	435	210	325	122
Total Organic Carbon	mg/l	1.82	5.08	1.92	1.14	2.40	1.44	12.2

Metals

Aluminum	ug/l	737 J	473 J	< 500	510 J	261 J	< 1000	1160
Antimony	ug/l	< 10.0	< 10.0	< 20.0	5.15 J	< 10.0	< 10.0	< 10.0
Arsenic	ug/l	< 5.00	< 5.00	< 10.0	3.47 J	< 5.00	< 5.00	3.03 J
Barium	ug/l	34.1	70.7	43.0	37.4	28.0	43.0	36.0
Beryllium	ug/l	0.161 J	< 5.00	< 10.0	< 5.00	< 5.00	< 5.00	0.411 J
Cadmium	ug/l	< 2.00	3.64	< 10.0	< 2.00	< 2.00	0.691 J	0.702 J
Calcium	ug/l	94000	20600	88400	246000	55000	119000	16300
Chromium	ug/l	3.93 J	2.76 J	4.80 J	1490	94.9	179	144
Cobalt	ug/l	37.5	11.6	98.2	10.2	6.00	8.97	34.7
Copper	ug/l	3.17 J	3.69 J	3.13 J	9.38	5.46	7.89	13.0
Iron	ug/l	874	564	227	5060	1580	7960	1550
Lead	ug/l	< 4.00	< 4.00	< 10.0	< 4.00	< 4.00	8.89	< 4.00
Magnesium	ug/l	88400	15300	65900	233000	48300	87300	15700
Manganese	ug/l	1650	315	1720	586	376	894	736
Mercury	ug/l	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	0.149 J
Nickel	ug/l	40.0	11.1	55.3	797	193	56.3	53.0
Potassium	ug/l	3110	837	1990	4350	1650	5030	1310
Selenium	ug/l	< 5.00	< 5.00	< 10.0	4.52 J	< 5.00	< 5.00	< 5.00
Silver	ug/l	< 5.00	< 5.00	< 10.0	< 5.00	< 5.00	< 5.00	< 5.00
Strontium	ug/l	2130	426	2030	6250	1340	3570	397
Thallium	ug/l	< 20.0	< 20.0	< 40.0	< 20.0	< 20.0	< 20.0	< 20.0
Tin	ug/l	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0	< 10.0	< 10.0
Vanadium	ug/l	< 5.00	< 5.00	< 10.0	8.99	0.897 J	< 5.00	3.39 J
Zinc	ug/l	40.7	18.1	44.4	29.1	24.3	51.5	40.1

Volatile Organic Compounds

1,1-Dichloroethane	ug/l	< 1.00	5.99	< 1.00	< 1.00	< 1.00	< 1.00	1.08
1,1-Dichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.539 J
1,4-Dichlorobenzene	ug/l	< 1.00	1.69	< 1.00	< 1.00	< 1.00	< 1.00	11.0
Acetone	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Benzene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	1.25
Chlorobenzene	ug/l	< 1.00	0.439 J	< 1.00	< 1.00	< 1.00	< 1.00	24.8
Chloroform	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.380 J
cis-1,2-Dichloroethylene	ug/l	< 1.00	3.33	< 1.00	< 1.00	2.91	< 1.00	144
Tetrachloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	1.30
trans-1,2-Dichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0.439 J
Trichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	14.5	< 1.00	385
Vinyl chloride	ug/l	< 1.00	7.24	< 1.00	< 1.00	2.46	< 1.00	5.65

Explosives

1,3,5-Trinitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	0.0536	< 0.104	< 0.104	< 0.104
2,6-Dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	0.591	< 0.104
Nitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	1.03	< 0.104	< 0.104	1.24

Longhorn Army Ammunition Plant
Site 12 Analytical Results (27-28 February 2003) (tentative, pending validation)

Parameter	Units	12WW13	12WW14	12WW15	12WW16	12WW17	12WW18	12WW19
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Anions

Chloride	mg/l	591	372	9.51			103	677
Nitrogen, Nitrate/Nitrite	mg/l	0.050 J	0.050 J	0.050 J			< 0.250	< 0.250
Perchlorate	ug/l	< 4.00	< 4.00	< 4.00	< 4.00	< 4.00	< 4.00	< 4.00
Sulfate	mg/l	265	135	15.2			32.8	484
Total Organic Carbon	mg/l	0.993	0.898	1.95			0.975	2.00

Metals

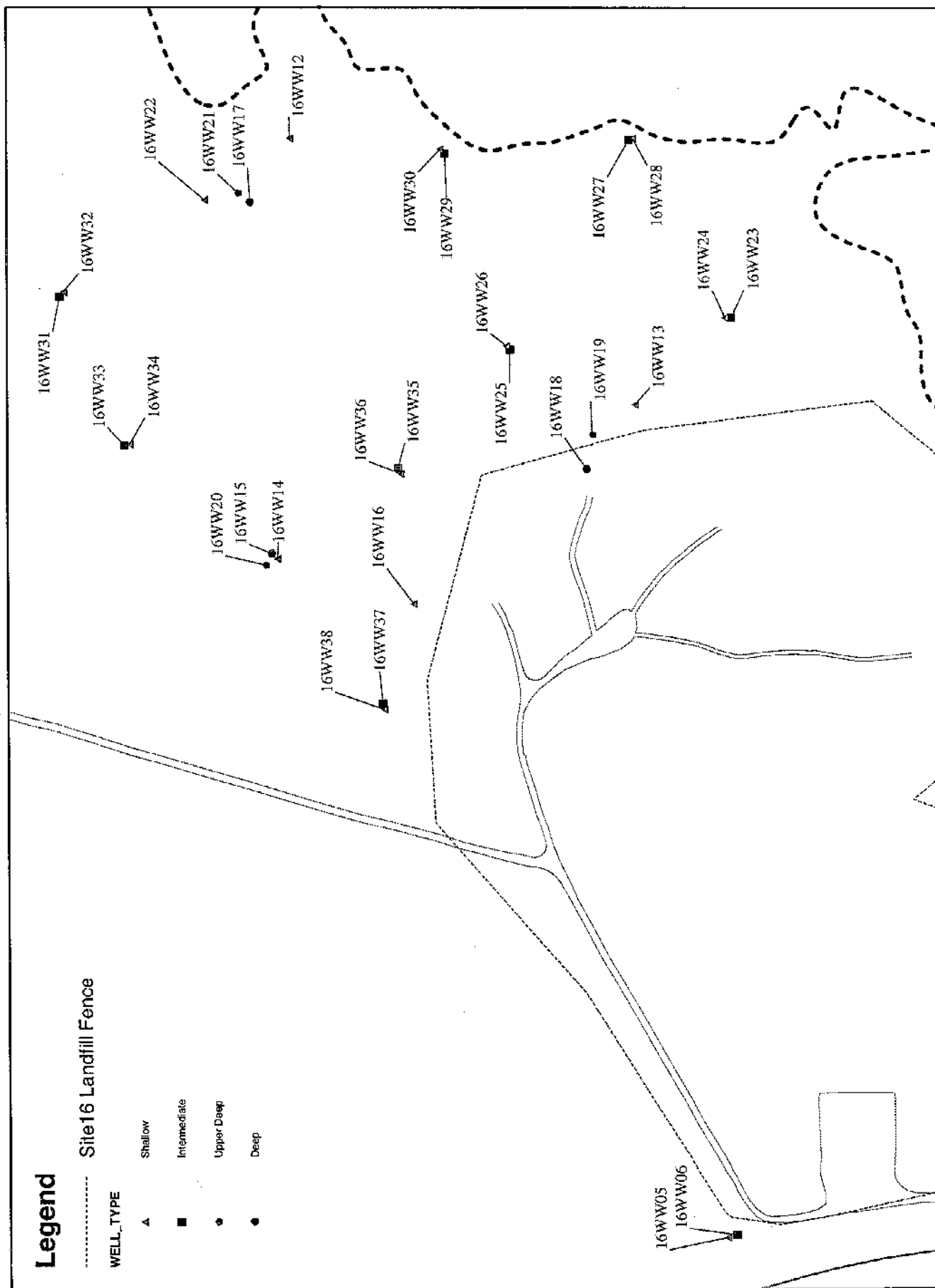
Aluminum	ug/l	< 500	< 500	2060			130	< 1000
Antimony	ug/l	< 10.0	< 10.0	< 10.0			< 10.0	< 10.0
Arsenic	ug/l	3.07 J	< 5.00	< 5.00			< 5.00	< 5.00
Barium	ug/l	42.8	35.8	150			223	23.9
Beryllium	ug/l	< 5.00	< 5.00	0.189 J			< 5.00	< 5.00
Cadmium	ug/l	< 2.00	< 2.00	< 2.00			< 2.00	0.636 J
Calcium	ug/l	108000	36000	1060			5370	163000
Chromium	ug/l	37.4	43.0	176			240	303
Cobalt	ug/l	8.60	4.12 J	5.53			3.50 J	7.38
Copper	ug/l	3.96 J	3.75 J	6.98			9.50	11.5
Iron	ug/l	9040	257	1930			1620	1960
Lead	ug/l	< 4.00	< 4.00	< 4.00			< 4.00	< 4.00
Magnesium	ug/l	68100	32100	1110			5010	115000
Manganese	ug/l	484	154	64.7			67.9	544
Mercury	ug/l	< 0.200	< 0.200	< 0.200			< 0.200	< 0.200
Nickel	ug/l	132	30.0	133			337	26.4
Potassium	ug/l	4720	1090	769			1140	3530
Selenium	ug/l	< 5.00	< 5.00	< 5.00			< 5.00	< 5.00
Silver	ug/l	< 5.00	< 5.00	< 5.00			< 5.00	< 5.00
Strontium	ug/l	3100	870	23.5			119	4320
Thallium	ug/l	< 20.0	< 20.0	< 20.0			< 20.0	< 20.0
Tin	ug/l	< 10.0	< 10.0	< 10.0			< 10.0	< 10.0
Vanadium	ug/l	< 5.00	< 5.00	3.25 J			1.24 J	1.20 J
Zinc	ug/l	19.8	21.2	12.9			13.4	26.2

Volatile Organic Compounds

1,1-Dichloroethane	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,1-Dichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,4-Dichlorobenzene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Acetone	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	2.99 J	< 5.00	< 5.00
Benzene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Chlorobenzene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Chloroform	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
cis-1,2-Dichloroethylene	ug/l	0.478 J	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Tetrachloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
trans-1,2-Dichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Trichloroethylene	ug/l	0.829 J	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Vinyl chloride	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00

Explosives

1,3,5-Trinitrobenzene	ug/l	< 0.104	< 0.104	< 0.104			< 0.104	< 0.104
2,6-Dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104			< 0.104	< 0.104
Nitrobenzene	ug/l	< 0.104	< 0.104	< 0.104			< 0.104	< 0.104



Longhorn Army Ammunition Plant
Site 16 Analytical Results (28 February - 5 March 2003) (tentative, pending validation)

Parameter	Units	16WW05	16WW06	16WW12	16WW13	16WW14	16WW15
Anions							
Chloride	mg/l	782	403	855	95.1	829	102
Nitrogen, Nitrate/Nitrite	mg/l	< 0.250	0.050 J	< 0.250	< 0.250	< 0.250	< 0.250
Perchlorate	ug/l	< 4.00	< 4.00	46.3	< 4.00	4.83	< 4.00
Sulfate	mg/l	17.7	9.13	506	821	114	< 0.400
Total Organic Carbon	mg/l	1.17	0.412	2.00	6.41	0.992	1.52
Metals							
Aluminum	ug/l	1160	< 500	1100	1590	668 J	7130
Antimony	ug/l	< 10.0	< 10.0	5.95 J	2.38 J	< 10.0	2.80 J
Arsenic	ug/l	< 5.00	2.39 J	5.61	2.05 J	< 5.00	2.05 J
Barium	ug/l	434	580	44.6	103	173	47.0
Beryllium	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	0.830 J
Cadmium	ug/l	< 2.00	< 2.00	0.477 J	1.61 J	1.51 J	< 2.00
Calcium	ug/l	86700	61600	166000	90400	142000	931
Chromium	ug/l	3.95 J	7.01	1640	5.69	172	16.6
Cobalt	ug/l	6.10	< 5.00	4.91 J	193	3.42 J	8.96
Copper	ug/l	4.45 J	1.62 J	35.0	4.50 J	5.07	8.36
Iron	ug/l	2700	314	9180	1310	1780	4980
Lead	ug/l	< 4.00	< 4.00	< 4.00	6.95	< 4.00	14.2
Magnesium	ug/l	78800	47000	139000	99600	109000	1280
Manganese	ug/l	617	18.8	398	8960	133	41.8
Mercury	ug/l	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
Nickel	ug/l	11.1	2.68 J	239	87.6	161	26.8
Potassium	ug/l	984	1380	1220	1610	1910	2260
Selenium	ug/l	< 5.00	< 5.00	< 5.00	27.2	< 5.00	< 5.00
Silver	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Strontium	ug/l	1850	1760	2950	2020	2390	73.9
Thallium	ug/l	< 20.0	< 20.0	< 20.0	11.1 J	< 20.0	14.8 J
Tin	ug/l	< 10.0	< 10.0	< 10.0	< 100	< 10.0	< 10.0
Vanadium	ug/l	1.19 J	< 5.00	7.44	< 5.00	1.42 J	19.9
Zinc	ug/l	14.7	9.79	21.5	52.6	17.2	82.4
Volatile Organic Compounds							
1,1,2-Trichloroethane	ug/l	< 1.00	< 1.00	< 10.0	< 1.00	< 1.00	< 1.00
1,1-Dichloroethane	ug/l	< 1.00	< 1.00	< 10.0	< 1.00	< 1.00	< 1.00
1,1-Dichloroethylene	ug/l	< 1.00	< 1.00	< 10.0	0.747 J	0.418 J	< 1.00
1,2-Dichloroethane	ug/l	< 1.00	< 1.00	10.4	< 1.00	< 1.00	< 1.00
Acetone	ug/l	< 5.00	< 5.00	< 50.0	< 5.00	< 5.00	< 5.00
Chloroform	ug/l	< 1.00	< 1.00	< 10.0	< 1.00	< 1.00	< 1.00
cis-1,2-Dichloroethylene	ug/l	< 1.00	< 1.00	42.8	389	1.70	< 1.00
Tetrachloroethylene	ug/l	< 1.00	< 1.00	< 10.0	< 1.00	< 1.00	< 1.00
trans-1,2-Dichloroethylene	ug/l	< 1.00	< 1.00	< 10.0	5.84	< 1.00	< 1.00
Trichloroethylene	ug/l	< 1.00	< 1.00	1940	893	57.8	< 1.00
Vinyl chloride	ug/l	< 1.00	< 1.00	< 10.0	3.63	< 1.00	< 1.00
Explosives							
1,3,5-Trinitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
2,4-Dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
4-Amino-2,6-dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
Nitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104

Longhorn Army Ammunition Plant
Site 16 Analytical Results (28 February - 5 March 2003) (tentative, pending validation)

Parameter	Units	16WW16	16WW17	16WW18	16WW19	16WW20	16WW21
Anions							
Chloride	mg/l	613	107	77.5	64.3	28.9	63.5
Nitrogen, Nitrate/Nitrite	mg/l	2.70	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Perchlorate	ug/l	1050	< 4.00	< 4.00	< 4.00	< 4.00	< 40.0
Sulfate	mg/l	690	9.73	0.514	44.5	3.12	3.63
Total Organic Carbon	mg/l	6.41	1.24	2.36	1.43	0.791	1.15
Metals							
Aluminum	ug/l	587	1010	179	30900	529	8340
Antimony	ug/l	6.43 J	< 10.0	< 10.0	3.31 J	< 10.0	< 10.0
Arsenic	ug/l	4.24 J	< 5.00	< 5.00	6.98	2.75 J	5.02
Barium	ug/l	37.7	14.9	8.20	169	137	181
Beryllium	ug/l	< 5.00	< 5.00	< 5.00	1.04 J	< 5.00	0.277 J
Cadmium	ug/l	1.22 J	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Calcium	ug/l	158000	535	591	11500	12800	14100
Chromium	ug/l	159	5.34	7.00	54.8	24.7	391
Cobalt	ug/l	14.3	3.93 J	0.450 J	6.04	0.901 J	4.64 J
Copper	ug/l	11.5	4.57 J	2.98 J	38.2	3.39 J	20.3
Iron	ug/l	1260	675	300	13800	877	4740
Lead	ug/l	< 4.00	6.24	2.65 J	22.0	3.41 J	5.68
Magnesium	ug/l	119000	253	178	5000	6020	7810
Manganese	ug/l	1980	13.9	11.0	86.8	150	104
Mercury	ug/l	0.0804 J	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
Nickel	ug/l	193	11.4	9.90	30.8	62.1	223
Potassium	ug/l	1680	1080	823	4500	4540	4190
Selenium	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Silver	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Strontium	ug/l	2320	33.9	38.0	572	727	724
Thallium	ug/l	< 20.0	6.62 J	6.11 J	24.2	< 20.0	< 20.0
Tin	ug/l	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Vanadium	ug/l	< 5.00	4.82 J	< 5.00	83.2	1.02 J	28.5
Zinc	ug/l	22.2	33.9	19.8	51.2	12.3	21.1
Volatile Organic Compounds							
1,1,2-Trichloroethane	ug/l	< 500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,1-Dichloroethane	ug/l	< 500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,1-Dichloroethylene	ug/l	< 500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,2-Dichloroethane	ug/l	< 500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Acetone	ug/l	< 2500	2.68 J	< 5.00	< 5.00	< 5.00	4.39 BJ
Chloroform	ug/l	< 500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
cis-1,2-Dichloroethylene	ug/l	90100	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Tetrachloroethylene	ug/l	< 500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
trans-1,2-Dichloroethylene	ug/l	< 500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Trichloroethylene	ug/l	19400	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Vinyl chloride	ug/l	5250	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Explosives							
1,3,5-Trinitrobenzene	ug/l	0.323	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
2,4-Dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
4-Amino-2,6-dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
Nitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104

Longhorn Army Ammunition Plant
Site 16 Analytical Results (28 February - 5 March 2003) (tentative, pending validation)

Parameter	Units	16WW22	16WW23	16WW24	16WW25	16WW26	16WW27
Anions							
Chloride	mg/l	926	572	407	359	68.1	300
Nitrogen, Nitrate/Nitrite	mg/l	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Perchlorate	ug/l	20.5	< 4.00	< 4.00	41.3	< 20.0	< 4.00
Sulfate	mg/l	497	111	599	1820	425	185
Total Organic Carbon	mg/l	1.91	0.831	1.62	9.79	3.45	1.68
Metals							
Aluminum	ug/l	650	45.9 J	2650	< 100	429	111
Antimony	ug/l	8.80 J	3.57 J	2.71 J	< 10.0	< 10.0	2.63 J
Arsenic	ug/l	3.15 J	< 5.00	< 5.00	< 5.00	2.83 J	< 5.00
Barium	ug/l	99.0	143	21.7	26.3	23.8	157
Beryllium	ug/l	< 5.00	< 5.00	6.57	< 5.00	1.58 J	< 5.00
Cadmium	ug/l	0.545 J	< 2.00	< 2.00	0.757 J	1.68 J	0.563 J
Calcium	ug/l	152000	80200	24000	318000	58400	61300
Chromium	ug/l	1290	132	175	5.22	9.67	113
Cobalt	ug/l	10.8	21.6	242	< 5.00	69.3	5.43
Copper	ug/l	7.67	11.0	8.67	5.73	5.35	12.3
Iron	ug/l	2730	15100	38100	116000	328	21500
Lead	ug/l	< 4.00	3.73 J	5.06	< 4.00	3.25 J	3.46 J
Magnesium	ug/l	117000	43900	37800	200000	67000	35400
Manganese	ug/l	212	7900	5630	5960	1210	3330
Mercury	ug/l	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
Nickel	ug/l	597	720	517	20.2	101	438
Potassium	ug/l	1910	6200	2760	6990	1630	3140
Selenium	ug/l	< 5.00	21.5	5.39	9.54	9.81	10.2
Silver	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Strontium	ug/l	2450	1590	593	7900	1450	1260
Thallium	ug/l	< 20.0	40.3	17.3 J	43.7	10.7 J	17.6 J
Tin	ug/l	< 10.0	< 100	< 100	< 500	< 100	< 100
Vanadium	ug/l	5.70	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Zinc	ug/l	23.1	38.2	303	26.4	111	31.8
Volatile Organic Compounds							
1,1,2-Trichloroethane	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,1-Dichloroethane	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,1-Dichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	1.60	< 1.00
1,2-Dichloroethane	ug/l	3.07	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Acetone	ug/l	2.67 BJ	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Chloroform	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	1.08	< 1.00
cis-1,2-Dichloroethylene	ug/l	11.4	< 1.00	< 1.00	< 1.00	137	< 1.00
Tetrachloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
trans-1,2-Dichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	0.705 J	< 1.00
Trichloroethylene	ug/l	240	< 1.00	< 1.00	< 1.00	3210	0.979 J
Vinyl chloride	ug/l	3.20	< 1.00	< 1.00	< 1.00	5.66	< 1.00
Explosives							
1,3,5-Trinitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
2,4-Dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
4-Amino-2,6-dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
Nitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	0.154	0.190	< 0.104

Longhorn Army Ammunition Plant
Site 16 Analytical Results (28 February - 5 March 2003) (tentative, pending validation)

Parameter	Units	16WW28	16WW29	16WW30	16WW31	16WW32	16WW33
Anions							
Chloride	mg/l	248	182	418	445	682	516
Nitrogen, Nitrate/Nitrite	mg/l	< 0.250	0.350	< 0.250	< 0.250	< 0.250	< 0.250
Perchlorate	ug/l	< 4.00	3.47 J	< 4.00	< 4.00	< 4.00	< 4.00
Sulfate	mg/l	75.3	256	14.3	25.2	19.5	70.8
Total Organic Carbon	mg/l	1.22	2.45	0.778	0.677	0.828	0.858
Metals							
Aluminum	ug/l	497	< 100	< 100	192 J	545	290 J
Antimony	ug/l	3.46 J	< 10.0	2.36 J	< 10.0	< 10.0	< 10.0
Arsenic	ug/l	< 5.00	3.57 J	3.26 J	< 5.00	2.79 J	< 5.00
Barium	ug/l	378	77.1	868	330	669	120
Beryllium	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Cadmium	ug/l	< 2.00	1.31 J	< 2.00	< 2.00	< 2.00	< 2.00
Calcium	ug/l	21900	76700	45700	63000	120000	76700
Chromium	ug/l	16.6	4.12 J	32.0	30.1	1260	287
Cobalt	ug/l	1.92 J	< 5.00	9.79	2.60 J	6.98	16.2
Copper	ug/l	4.95 J	4.13 J	5.12	3.79 J	8.82	2.25 J
Iron	ug/l	31600	2100	23800	243	9190	2450
Lead	ug/l	2.70 J	3.71 J	1.93 J	< 4.00	< 4.00	< 4.00
Magnesium	ug/l	18500	37900	34000	44800	73100	54000
Manganese	ug/l	1240	1460	1630	87.8	98.5	591
Mercury	ug/l	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
Nickel	ug/l	24.7	6.75	197	73.3	325	887
Potassium	ug/l	1990	3720	2990	1170	599	1750
Selenium	ug/l	5.14	12.2	10.8	< 5.00	< 5.00	< 5.00
Silver	ug/l	< 5.00	< 5.00	< 5.00	0.952 J	< 5.00	< 5.00
Strontium	ug/l	496	2290	1210	1180	2090	1230
Thallium	ug/l	9.53 J	24.5	19.1 J	< 20.0	< 20.0	< 20.0
Tin	ug/l	< 100	< 100	< 100	< 10.0	< 10.0	< 10.0
Vanadium	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	4.51 J	< 5.00
Zinc	ug/l	23.0	19.1	20.0	14.8	9.34	14.5
Volatile Organic Compounds							
1,1,2-Trichloroethane	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,1-Dichloroethane	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,1-Dichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
1,2-Dichloroethane	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Acetone	ug/l	3.43 J	< 5.00	2.71 J	3.30 BJ	4.55 BJ	4.31 BJ
Chloroform	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
cis-1,2-Dichloroethylene	ug/l	< 1.00	7.30	< 1.00	1.22	< 1.00	6.22
Tetrachloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
trans-1,2-Dichloroethylene	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Trichloroethylene	ug/l	0.760 J	35.9	4.76	1.09	< 1.00	6.20
Vinyl chloride	ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Explosives							
1,3,5-Trinitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
2,4-Dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
4-Amino-2,6-dinitrotoluene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
Nitrobenzene	ug/l	< 0.104	0.107	0.113	< 0.104	< 0.104	< 0.104

Longhorn Army Ammunition Plant
Site 16 Analytical Results (28 February - 5 March 2003) (tentative, pending validation)

Parameter	Units	16WW34	16WW35	16WW36	16WW37	16WW38
Anions						
Chloride	mg/l	205	646	221	628	1300
Nitrogen, Nitrate/Nitrite	mg/l	< 0.250	< 0.250	< 0.250	< 0.250	< 0.250
Perchlorate	ug/l	4.05	342	91.0	72.9	< 4.00
Sulfate	mg/l	38.7	11300	469	2810	179
Total Organic Carbon	mg/l	0.781	65.4	12.1	23.7	1.08
Metals						
Aluminum	ug/l	347	871	157	147 J	1140
Antimony	ug/l	< 10.0	3.99 J	< 10.0	< 10.0	< 10.0
Arsenic	ug/l	< 5.00	11.6	< 5.00	3.50 J	2.87 J
Barium	ug/l	243	22.9	47.0	24.6	122
Beryllium	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Cadmium	ug/l	< 2.00	3.00 J	2.37 J	0.317 J	< 2.00
Calcium	ug/l	25900	447000	87500	353000	158000
Chromium	ug/l	195	8.32	3.31 J	26.8	594
Cobalt	ug/l	12.7	64.8	16.4	25.9	5.30
Copper	ug/l	4.40 J	88.6	12.1	13.5	11.9
Iron	ug/l	2660	13900	147	631	2990
Lead	ug/l	< 4.00	3.48 J	5.40	< 4.00	< 4.00
Magnesium	ug/l	18600	484000	82700	283000	125000
Manganese	ug/l	170	8070	1390	4690	176
Mercury	ug/l	< 0.200	0.0749 J	< 0.200	< 0.200	< 0.200
Nickel	ug/l	774	59.0	17.1	152	265
Potassium	ug/l	759	14900	874	3860	1670
Selenium	ug/l	< 5.00	28.2	17.3	< 5.00	< 5.00
Silver	ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
Strontium	ug/l	470	9220	1570	6530	2570
Thallium	ug/l	< 20.0	90.5	6.19 J	< 20.0	< 20.0
Tin	ug/l	< 10.0	< 500	< 100	< 10.0	< 10.0
Vanadium	ug/l	0.722 J	< 5.00	< 5.00	< 5.00	3.29 J
Zinc	ug/l	17.3	34.4	24.8	10.2	12.8
Volatile Organic Compounds						
1,1,2-Trichloroethane	ug/l	< 1.00	< 1.00	1.32	< 1.00	< 1.00
1,1-Dichloroethane	ug/l	< 1.00	1.38	1.01	< 1.00	< 1.00
1,1-Dichloroethylene	ug/l	< 1.00	8.88	21.6	3.84	0.486 J
1,2-Dichloroethane	ug/l	< 1.00	< 1.00	0.482 J	0.874 J	< 1.00
Acetone	ug/l	3.91 BJ	< 5.00	< 5.00	< 5.00	< 5.00
Chloroform	ug/l	< 1.00	1.15	3.70	0.537 J	< 1.00
cis-1,2-Dichloroethylene	ug/l	51.9	84.9	288	59.2	0.746 J
Tetrachloroethylene	ug/l	< 1.00	< 1.00	0.786 J	< 1.00	< 1.00
trans-1,2-Dichloroethylene	ug/l	< 1.00	0.807 J	1.69	1.36	< 1.00
Trichloroethylene	ug/l	18.2	2940	3860	854	52.9
Vinyl chloride	ug/l	0.941 J	29.4	24.3	13.6	< 1.00
Explosives						
1,3,5-Trinitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104
2,4-Dinitrotoluene	ug/l	< 0.104	< 0.104	0.199	< 0.104	< 0.104
4-Amino-2,6-dinitrotoluene	ug/l	< 0.104	0.0926 J	< 0.104	< 0.104	< 0.104
Nitrobenzene	ug/l	< 0.104	< 0.104	< 0.104	< 0.104	< 0.104

Activity ID	Activity Description	Item ID	Qty	Unit	Early Start	Early Finish
010001	Task Order Initiation	1	1	LOT	06/03/23	08/03/23
GENERAL INFORMATION & WORKPLANS						
010101	Review GFI Information	2	1	LOT	11/03/23	12/03/23
010201	COE-H Transmittal Of Workplan for Regulatory Rev	1	1	LOT	11/03/23	11/03/23
010202	EPA Region 6 Review Draft Workplan	3	2	LOT	12/03/23	12/03/23
010203	TAG Review Draft Workplan	3	2	LOT	12/03/23	12/03/23
010204	COE Review Draft Workplan	3	2	LOT	12/03/23	12/03/23
010205	US Fish & Wildlife Review Draft Workplan	3	2	LOT	12/03/23	12/03/23
010206	Review Draft Workplan	2	1	LOT	12/03/23	12/03/23
010207	Voluntary Reg. Review Comments Draft Workplan	2	1	LOT	12/03/23	12/03/23
010208	Voluntary Regulation Meeting Workplan	2	1	LOT	12/03/23	12/03/23
010209	Submittal Final Workplan to COE	2	1	LOT	12/03/23	12/03/23
010210	COE-H Transmittal F. Workplan for Regulatory App	1	1	LOT	12/03/23	12/03/23
010211	COE-H Transmittal F. Workplan for Regulatory App	1	1	LOT	12/03/23	12/03/23
010212	Regulator Approves Final Workplan	1	1	LOT	12/03/23	12/03/23
BACKGROUND SOIL SAMPLING						
010301	Background Soil Sampling	3	1	LOT	12/03/23	12/03/23
010302	Soil Lab Analysis (Sub)	1	1	LOT	12/03/23	12/03/23
010303	Background Soil Sampling Data Validation	1	1	LOT	12/03/23	12/03/23
DATA SUMMARY SOILS REPORT						
010401	Data Summary Report Background Soils	1	1	LOT	12/03/23	12/03/23
010402	Data Summary Report Background Soils Peer Review	1	1	LOT	12/03/23	12/03/23
010403	Submit Data Summary Background Soils to COE	1	1	LOT	12/03/23	12/03/23
DRAFT SOILS REPORT						
010501	Draft Report Soils	2	1	LOT	12/03/23	12/03/23
010502	Draft Report Soils Peer Review	1	1	LOT	12/03/23	12/03/23
010503	Submit Draft Soils to COE	1	1	LOT	12/03/23	12/03/23
010504	COE Transmittal for Team Review Draft Soils	1	1	LOT	12/03/23	12/03/23

Ship Name	22AP03	LNQ2	TULSA TERC TASK ORDER #429 ENVIRONMENTAL INVESTIGATION & REMEDIATION @ LONGSHORN ARMY AMMUNITION PLANT KATYACK, TEXAS	 Shaw Environmental & Infrastructure, Inc.
Flight Code	1ACR06			
Order Code	080UG03			
Call Date	6/8/02	14:13		
Run Date				

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Activity ID	Activity Description	Orig ID	Item ID	Early Start	Early End
DRAFT SOILS REPORT					
01022578	COE H-Transmittal for Team Review Draft Soils	5	1	1/22	2/2/04
01022580	HTRVX Rev of Draft Soils rpt	3	2	2/2/04	2/24/04
01022582	COE Rev of Draft Soils rpt	3	2	2/2/04	2/24/04
01022584	COE Review of Draft Soils rpt	3	2	2/2/04	2/24/04
01022586	ACE Review of Draft Soils rpt	3	2	2/2/04	2/24/04
01022588	EPA Region 8 Review of Draft Soils rpt	3	2	2/2/04	2/24/04
01022590	TAG Review of Draft Soils rpt	3	2	2/2/04	2/24/04
01022592	TCED Review of Draft Soils rpt	3	2	2/2/04	2/24/04
01022594	U.S. Fish & Wildlife Review of Draft Soils rpt	3	2	2/2/04	2/24/04
01022596	Reserve Reg. Review of Draft Soils rpt	3	2	2/2/04	2/24/04
01022598	Onboard Rev Meeting Rev. Comments on Draft Soils rpt	20	1	2/24/04	2/24/04
01022599	Submit Resp to Comments on Draft Soils rpt to COE	1	1	2/24/04	2/24/04
FINAL REPORT SOILS					
01055807	Prepare Final Report Soils	15	1	2/24/04	2/24/04
01055812	Final Report Soils Peer Review	3	1	2/24/04	2/24/04
01055814	Submit Final Soils Rpt to COE	1	1	2/24/04	2/24/04
01055816	COE H-Transmittal for Approval Final Soils	1	1	2/24/04	2/24/04
01055818	COE H-Transmittal for Approval Final Soils	5	1	2/24/04	2/24/04
01055820	Regulators Approve Final Soils Report	5	1	2/24/04	2/24/04
SOILS MEETING					
01055822	Present on Meeting Soils	1	1	2/24/04	2/24/04
BACKGROUND, GROUNDWATER & SEDIMENT SAMPLING					
01055824	BACKGROUND, GROUNDWATER & SEDIMENT SAMPLING	75	1	2/24/04	2/24/04
01055826	Background Groundwater Sampling #1	10	1	2/24/04	2/24/04
01055828	SAMPLING LAB ANALYSIS SUBCONTRACT	75	1	2/24/04	2/24/04
01055830	Background Groundwater Sampling #1 Lab Analysis	10	1	2/24/04	2/24/04
01055832	Background Groundwater Sampling #1 Data Validation	5	1	2/24/04	2/24/04
01055834	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055836	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055838	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055840	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055842	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055844	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055846	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055848	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055850	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055852	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055854	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055856	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055858	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055860	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055862	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055864	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055866	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055868	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055870	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055872	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055874	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055876	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055878	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055880	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055882	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055884	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055886	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055888	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055890	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055892	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055894	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055896	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055898	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055900	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055902	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055904	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055906	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055908	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055910	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055912	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055914	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055916	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055918	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055920	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055922	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055924	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055926	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055928	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055930	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055932	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055934	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055936	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055938	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055940	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055942	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055944	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055946	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055948	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055950	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055952	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055954	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055956	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055958	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055960	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055962	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055964	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055966	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055968	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055970	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055972	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055974	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055976	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055978	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055980	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055982	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055984	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055986	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055988	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055990	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055992	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055994	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055996	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055998	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04
01055999	Background Groundwater Sampling #1 Data Validation	10	1	2/24/04	2/24/04

Agency ID	Activity	Description	Orig. Due	Item ID	Early Start	Early Finish
0755001	WATER & SEDIMENTS MEETING	Present on Project Status, Sediment	1	1550	03SEP04	03SEP04
0755001	MONTHLY MEETINGS, DALLAS		267	1	04JUL03	03SEP04
0755002	Home Office Admin & Support		269	1	04JUL03	03SEP04
0755003	HOUSTON		267	1	04JUL03	03SEP04
INVESTIGATE GROUP 2 SITES (WAD 2)						
0211501	Review CFI Information		11	1	2115	14JUL03
0211502	Draft Workplans Addendum		25	1	2115	14JUL03
0211503	Scheduling meeting Austin		1	1	2115	14JUL03
0211504	Draft Workplans Addendum Peer Review		1	1	2115	14JUL03
0211505	Small Draft Workplans Addendum to COE		1	1	2115	14JUL03
0211506	COE E-Transmittal for Team Review Draft Workplans Addendum		1	1	2115	14JUL03
0211507	COE E-Transmittal for Team Review Draft Workplans Addendum		5	1	2115	14JUL03
0211508	INTERVIEW with Draft Workplans Addendum		30	2	2115	14JUL03
0211509	CHP/PA Review of Draft Workplans Addendum		30	2	2115	14JUL03
0211510	COE Review of Draft Workplans Addendum		30	2	2115	14JUL03
0211511	RECEIVED Review of Draft Workplans Addendum		30	2	2115	14JUL03
0211512	EPRA Region 6 Review Draft Workplans Addendum		30	2	2115	14JUL03
0211513	EPAG Review Draft Workplans Addendum		30	2	2115	14JUL03
0211514	COE Review Draft Workplans Addendum		30	2	2115	14JUL03
0211515	US Fish & Wildlife Review Draft Workplans Addendum		30	2	2115	14JUL03
0211516	Revised Review Comments on Workplans Addendum		10	1	2115	14JUL03
0211517	Comment Resolution on Draft Workplans Addendum		1	1	2115	14JUL03
0211518	Submit Responses Draft Workplans to COE		5	1	2115	14JUL03
FINAL WORKPLANS (G2)						
0211519	Draft Workplans Addendum		10	1	2115	14JUL03
0211520	Final Workplans Addendum Peer Review		5	1	2115	14JUL03

0.15

Activity ID	Activity Description	Orig	Cal	Item	Early Start	Early Finish
DRAFT MODELING & CALCULATION MEMORANDUM (G2)						
020001	Control Resolution Meeting - Tech Memorandum	1	1	200	2/28/03	2/28/03
020002	Submit Responses to Comments to COE Tech Memorandum	5	1	200	2/28/03	3/5/04
FINAL MODELING & CALCULATION MEMORANDUM (G2)						
020003	Final Technical Memorandum	5	1	200	3/5/04	3/5/04
020004	Final Technical Memo and/or Peer Review	5	1	200	3/5/04	3/5/04
020005	Submit Final Technical Memorandum to COE	2	1	200	3/5/04	3/5/04
020006	COE E-Transmittal for Approval Final Tech Memorandum	1	1	200	3/5/04	3/5/04
020007	COE E-Transmittal for Approval Final Tech Memorandum	5	1	200	3/5/04	3/5/04
020008	Regulator Approval Final Technical Memorandum	5	1	200	3/5/04	3/5/04
DRAFT MODELING & CALCULATION RPT (G2)						
020009	Prepare Draft Modeling and Calculation Report	10	1	200	3/5/04	2/2/04
020010	Draft Modeling & Calculation Report Peer Review	4	1	200	2/2/04	3/5/04
020011	Submit Draft Modeling & Calculation Report to COE	1	1	200	3/5/04	3/5/04
020012	COE E-Transmittal for Team Review Draft Mod & Calc	1	1	200	3/5/04	3/5/04
020013	COE E-Transmittal for Team Review Draft Mod & Calc	5	1	200	3/5/04	3/5/04
020014	AT&T Review of Draft Modeling & Calculation Rpt	3	2	200	3/5/04	3/5/04
020015	AT&T Review of Draft Modeling & Calculation Rpt	3	2	200	3/5/04	3/5/04
020016	COE Review of Draft Modeling & Calculation Rpt	3	2	200	3/5/04	3/5/04
020017	AEC Review of Draft Modeling & Calculation Rpt	3	2	200	3/5/04	3/5/04
020018	EPA Region 6 Review of Draft Modeling & Calculation Rpt	3	2	200	3/5/04	3/5/04
020019	Team Review Draft Modeling & Calculation Rpt	3	2	200	3/5/04	3/5/04
020020	TCOE Review Draft Modeling & Calculation Rpt	3	2	200	3/5/04	3/5/04
020021	U.S. Fish & Wildlife Review, Draft Mod & Calc Rpt	3	2	200	3/5/04	3/5/04
020022	Resubmit Reg Res Comments Draft Mod & Calc Rpt	3	2	200	3/5/04	3/5/04
020023	Comment Resolution Meeting - Draft Mod & Calc Rpt	3	2	200	3/5/04	3/5/04
020024	Submit Response Draft Modeling & Calculation Rpt to COE	3	1	200	3/5/04	3/5/04
020025	Prepare Final Modeling and Calculation Report	2	1	200	3/5/04	3/5/04
FINAL MODELING & CALCULATION RPT (G2)						
020026	Final Modeling and Calculation Report	2	1	200	3/5/04	3/5/04

Sheet 5 of 15

TULSA TERC
TASK ORDER #109
ENVIRONMENTAL INVESTIGATION & REMEDIATION @ LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Start Date: 2/28/03
Finish Date: 3/5/04
Cost Code: 000000
Run List: 000000
@ Primavera Systems, Inc.



Shaw Environmental & Infrastructure, Inc.

Activity ID	Activity Description	Orig. ID	Item ID	Early Start	Early Finish
FINAL MODELING & CALCULATION RPT (G2)					
014602	Final Modeling and Calculation Rpt Peer Review	5	1	1/4/04	1/14/04
014604	Submit REPORT to Comments to COE-F. M&C Rpt	2	1	1/4/04	1/14/04
014606	COE E-Transmittal for Approval Final Model Calc Rpt	1	1	2/4/04	2/14/04
014608	COE E-Transmittal for Approval Final Model Calc Rpt	5	1	2/4/04	2/14/04
014610	Regulate Approval Final Modeling & Calculation Rpt	5	1	3/1/04	3/8/04
014612	Final Report Addendum and Risk Assessment Rpt	2	1	3/8/04	3/28/04
DRAFT RPT ADDENDUM (INCLUDING RISK ASSESSMENT) (G2)					
020001	Draft Rpt Addendum (Including Risk Assessment)	5	1	1/20/04	1/20/04
020002	Draft Rpt Addendum Peer Review	4	1	1/20/04	2/3/04
020003	Submit Draft Rpt Addendum to COE	1	1	2/3/04	2/14/04
020004	COE E-Transmittal for Team Rev. Draft Rpt Addm	1	1	2/14/04	2/14/04
020005	COE E-Transmittal for Team Rev. Draft Rpt Addm	5	1	2/14/04	2/14/04
020006	INTERVIEW Rev of Draft Rpt Addendum	3	2	2/14/04	2/14/04
020007	Logistics Rev of Draft Rpt Addendum	3	2	2/14/04	2/14/04
020008	COE Review of Draft Rpt Addendum	3	2	2/14/04	2/14/04
020009	COE Review of Draft Rpt Addendum	5	2	2/14/04	2/14/04
020010	AEC Review of Draft Rpt Addendum	5	2	2/14/04	2/14/04
020011	EPA Region 8 Review Draft Rpt Addendum	3	2	2/14/04	2/14/04
020012	TAG Review Draft Rpt Addendum	3	2	2/14/04	2/14/04
020013	TCED Review Draft Rpt Addendum	3	2	2/14/04	2/14/04
020014	U.S. Fish & Wildlife Rev. Draft Rpt Addendum	3	2	2/14/04	2/14/04
020015	Resubmit Rpt Rev. Comments Draft Rpt Addm	5	2	2/14/04	2/14/04
020016	Comments Re: Draft Rpt Addendum - Draft Rpt Addendum	5	2	2/14/04	2/14/04
020017	Submit Response to Comments to COE Draft Rpt Addm	5	2	2/14/04	2/14/04
FINAL RPT ADDENDUM (INCLUDING RISK ASSESSMENT) (G2)					
030001	Final Rpt Addendum (Including Risk Assessment)	5	1	2/14/04	2/14/04
030002	Final Rpt Addendum (Including Risk Assessment) Peer Review	4	1	2/14/04	2/14/04
030003	Submit Final Rpt Addendum (Including Risk Assessment) to COE	2	1	2/14/04	2/14/04
030004	COE E-Transmittal for Approval Final Rpt Addm	5	1	2/14/04	2/14/04

Shaw

Shaw Environmental & Infrastructure, Inc.

Task Order #109

ENVIRONMENTAL INVESTIGATION & REMEDIATION @ LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

Sheet 7 of 15

Task Order #109

ENVIRONMENTAL INVESTIGATION & REMEDIATION @ LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

Start Date: 1/4/04

Finish Date: 3/28/04

Log Date: 08/03/04

Run Date: 08/03/04

Activity ID	Activity Description	Orig. Dur.	Q#	REM	Early Start	Early Finish
FINAL RI RPT - ENDUM (Including RISK ASSESSMENT) (G2)						
020000	COE H-Transmittal for Approval FRI Rpt Adopt	5	1	260	01/11/04	03/11/04
020102	Regulate Approve FRI Rpt Adopt (incl R-Adopt)	5	1	260	01/11/04	03/11/04
020201	Meeting Presentation/Draft/Austin	2	1	260	01/11/04	03/11/04
REVISED DRAFT FINAL FEASIBILITY STUDY (G2)						
020201	Prepare Revised Draft Final Feasibility Study	40	1	230	08/05/04	09/07/04
020202	Revised Draft Final Feasibility Study Peer Rev.	4	1	230	09/06/04	09/06/04
020204	Submit Revised Draft Final Feasibility Study to COE	1	1	230	09/06/04	09/06/04
020206	COE E-Transmittal for Team Review R.D.F.F Study	1	1	230	09/06/04	09/06/04
020208	COE H-Transmittal for Team Review R.D.F.F Study	5	1	230	09/06/04	09/06/04
020210	IT/ROW/CK Rev of Revised Draft Final Feasibility Study	30	2	230	09/06/04	09/06/04
020212	CH/PA/TH Rev of Revised Draft Final Feasibility Study	30	2	230	09/06/04	09/06/04
020214	COE Review of Revised Draft Final Feasibility Study	30	2	230	09/06/04	09/06/04
020216	SEC Review of Revised Draft Final Feasibility Study	30	2	230	09/06/04	09/06/04
020218	BPA Regional Review of Revised Draft Final Feasibility Study	30	2	230	09/06/04	09/06/04
020220	TAG Review of Revised Draft Final Feasibility Study	30	2	230	09/06/04	09/06/04
020222	ICED Review of Revised Draft Final Feasibility Study	30	2	230	09/06/04	09/06/04
020224	US Fish & Wildlife Review of Revised Draft Final Feasibility Study	30	2	230	09/06/04	09/06/04
020226	Stakeholder Review/Comments on Draft Study	20	1	230	09/06/04	09/06/04
020228	Comment Resolution Meeting - R.D.F.F Study	1	1	230	09/06/04	09/06/04
020230	Submit Revised Draft Final Feasibility Study to COE	5	1	230	09/06/04	09/06/04
FINAL FEASIBILITY STUDY (G2)						
020231	Prepare Final Feasibility Study	25	1	230	09/06/04	09/06/04
020232	Final Feasibility Study Peer Review	5	1	230	09/06/04	09/06/04
020234	Submit Final Feasibility Study to COE for Regs	1	1	230	09/06/04	09/06/04
020236	COE E-Transmittal for Approval FRI Study	1	1	230	09/06/04	09/06/04
020238	COE H-Transmittal for Approval FRI Study	5	1	230	09/06/04	09/06/04
020240	Regulate Approve FRI Feasibility Study	5	1	230	09/06/04	09/06/04
020242	Meeting Presentation/Draft/Austin	5	1	230	09/06/04	09/06/04

Activity ID	Activity Description	Orig Dur	Cal ID	Item	Early Start	Early Finish
FINAL FEASIBILITY STUDY SITE 12						
0011000	Final Reg. Rev/Comments Dft. Study	2	1	2019	20070301	20070301
0011001	Comm. Res. for Meeting - Dft. Study	1	1	2019	20070301	20070301
0011002	Submit Reg. Rev. Final Feasibility Study to COE	3	1	2019	20070301	20070301
0011003	Prepare Final Feasibility Study SITE 12	20	1	2019	20070301	20070301
0011004	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011005	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011006	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011007	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011008	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011009	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011010	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011011	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011012	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011013	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011014	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011015	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011016	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011017	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011018	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011019	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011020	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011021	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011022	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011023	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011024	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011025	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011026	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011027	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011028	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011029	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011030	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011031	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011032	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011033	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011034	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011035	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011036	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011037	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011038	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011039	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011040	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011041	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011042	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011043	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011044	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011045	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011046	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011047	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011048	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011049	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011050	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011051	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011052	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011053	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011054	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011055	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011056	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011057	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011058	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011059	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011060	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011061	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011062	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011063	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011064	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011065	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011066	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011067	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011068	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011069	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011070	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011071	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011072	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011073	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011074	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011075	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011076	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011077	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011078	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011079	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011080	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011081	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011082	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011083	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011084	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011085	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011086	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011087	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011088	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011089	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011090	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011091	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011092	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011093	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011094	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011095	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011096	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011097	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011098	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011099	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011100	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011101	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011102	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011103	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011104	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011105	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011106	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011107	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011108	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011109	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011110	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011111	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011112	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011113	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011114	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011115	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011116	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011117	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011118	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011119	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011120	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011121	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011122	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011123	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011124	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011125	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011126	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011127	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011128	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011129	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011130	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011131	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011132	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011133	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011134	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011135	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011136	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011137	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011138	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011139	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011140	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011141	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011142	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011143	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011144	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011145	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2019	20070301	20070301
0011146	COE External Review of Final Feasibility Study SITE 12	1	1	2019	20070301	20070301
0011147	COE Internal Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011148	Regulatory Review of Final Feasibility Study SITE 12	5	1	2019	20070301	20070301
0011149	Final Feasibility Study SITE 12 Study Peer Rev	5	1	2019	20070301	20070301
0011150	Submit Final Feasibility Study SITE 12 to COE for Regs	1	1	2		

Activity ID	Activity Description	Orig. ID	CD ID	Item ID	Early Start	Early Finish
FINAL SITE 12 PROPOSED PLAN (G2)						
021001	Prepare Final Proposed Plan	15	1	2140	14F004	08M010
021012	Final Proposed Plan Peer Review	3	1	2140	02M004	11M004
021003	Submit Final Proposed Plan to COE	1	1	2140	02M003	12M003
021005	COE E-Transmittal for Approval Final Proposed Plan	1	1	2140	02M005	03M004
021008	COE H-Transmittal for Approval Final Proposed Plan	5	1	2140	04M004	10M004
021010	Regulator Approve Final Proposed Plan	5	1	2140	02M008	02M004
SITE 12 PUBLIC MEETING PRESENTATION POSTERS (G2)						
022001	Prepare Posters	21	1	2245	20M004	24J004
022004	Submit Posters to COE	1	1	2245	20J004	20J004
022005	COE E-Transmittal for Team Review Posters	1	1	2245	20J004	20J004
022006	COE H-Transmittal for Team Review Posters	5	1	2245	20J004	06L004
022007	MTSWACK Rev of Posters	31	2	2245	07L004	04M004
022008	CIEMEN Rev of Posters	31	2	2245	07L004	04M004
022009	COE Review of Posters	31	2	2245	07L004	04M004
022010	ACE Review of Posters	31	2	2245	07L004	04M004
022012	EPA Region 6 Review Posters	31	2	2245	07L004	04M004
022014	TAC Review Posters	31	2	2245	07L004	04M004
022015	TOC Review Posters	31	2	2245	07L004	04M004
022016	US Fish & Wildlife Review Posters	31	2	2245	07L004	04M004
022017	Reserve Reg Review Comments Posters	20	1	2245	04M004	03E004
022022	Contractor Resolution Meeting - Posters	1	1	2245	03E004	03E004
022024	Submit Responses to Comments to COE Posters	2	1	2245	03E004	03E004
FINAL SITE 12 POSTERS (G2)						
023001	Prepare Final Posters	3	1	2245	03E004	03E004
023002	Final Poster Presentation Peer Review	3	1	2245	03E004	03E004
023004	Submit Final Poster Session to COE	2	1	2245	03E004	03E004
023005	COE E-Transmittal for Approval Final Poster	1	1	2245	03E004	03E004
023006	COE H-Transmittal for Approval Final Poster	5	1	2245	03E004	03E004



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Sheet 10 of 15

TULSA TERC
TASK ORDER #109

ENVIRONMENTAL INVESTIGATION & REMEDIATION @ LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

031326

Activity ID	Activity Description	Orig	Cal	Item	Early Start	Early Finish
FINAL SITE 1, SITES (G2)						
022480	Regulator Approve Final Policy Presentation	5	1	226	08/07/04	08/07/04
022481	COE Transmittal to Public Meeting	5	1	226	07/07/04	07/07/04
022482	Meeting Presentation to Public Meeting	4	1	226	07/07/04	07/07/04
022483	Public Meeting Final Meeting	1	1	226	06/07/04	06/07/04
022484	Public Meeting	1	1	226	05/07/04	05/07/04
022485	Public Meeting	1	1	226	04/07/04	04/07/04
022486	Public Comment Period on Policy Presentation	2	1	226	03/07/04	03/07/04
022487	Prepare Response Final Proposed Plan	1	1	226	02/07/04	02/07/04
DRAFT SITE 12 ROD (G2)						
022488	Draft ROD	20	1	220	07/07/04	07/07/04
022489	Draft ROD Peer Review	1	1	220	06/07/04	06/07/04
022490	Submit Draft ROD to COE	1	1	220	05/07/04	05/07/04
022491	COE E-Transmittal for Team Review Draft Rod	1	1	220	04/07/04	04/07/04
022492	COE H-Transmittal for Team Review Draft Rod	1	1	220	03/07/04	03/07/04
022493	HERNIMEX Rev of Draft Rod	3	2	220	02/07/04	02/07/04
022494	COE Rev of Draft Rod	3	2	220	01/07/04	01/07/04
022495	COE Review of Draft Rod	3	2	220	12/06/03	12/06/03
022496	MEC Review of Draft Rod	3	2	220	11/06/03	11/06/03
022497	TEPA Regional Review Draft Rod	3	2	220	10/06/03	10/06/03
022498	TEPA Review Draft Rod	3	2	220	09/06/03	09/06/03
022499	COE Review Draft Rod	3	2	220	08/06/03	08/06/03
022500	U.S. Fish & Wildlife Review Draft Rod	3	2	220	07/06/03	07/06/03
022501	Resubmit Reg. Rev Comments Draft Rod	20	1	220	06/06/03	06/06/03
022502	Comment Resolution Meeting Draft ROD	1	1	220	05/06/03	05/06/03
022503	Submit Response to Comments to COE Draft ROD	2	1	220	04/06/03	04/06/03
SITE 12 FINAL ROD (G2)						
022504	Final ROD	10	1	220	03/06/03	03/06/03
022505	Final ROD Peer Review	5	1	220	02/06/03	02/06/03
022506	Submit Final ROD to COE	2	1	220	01/06/03	01/06/03



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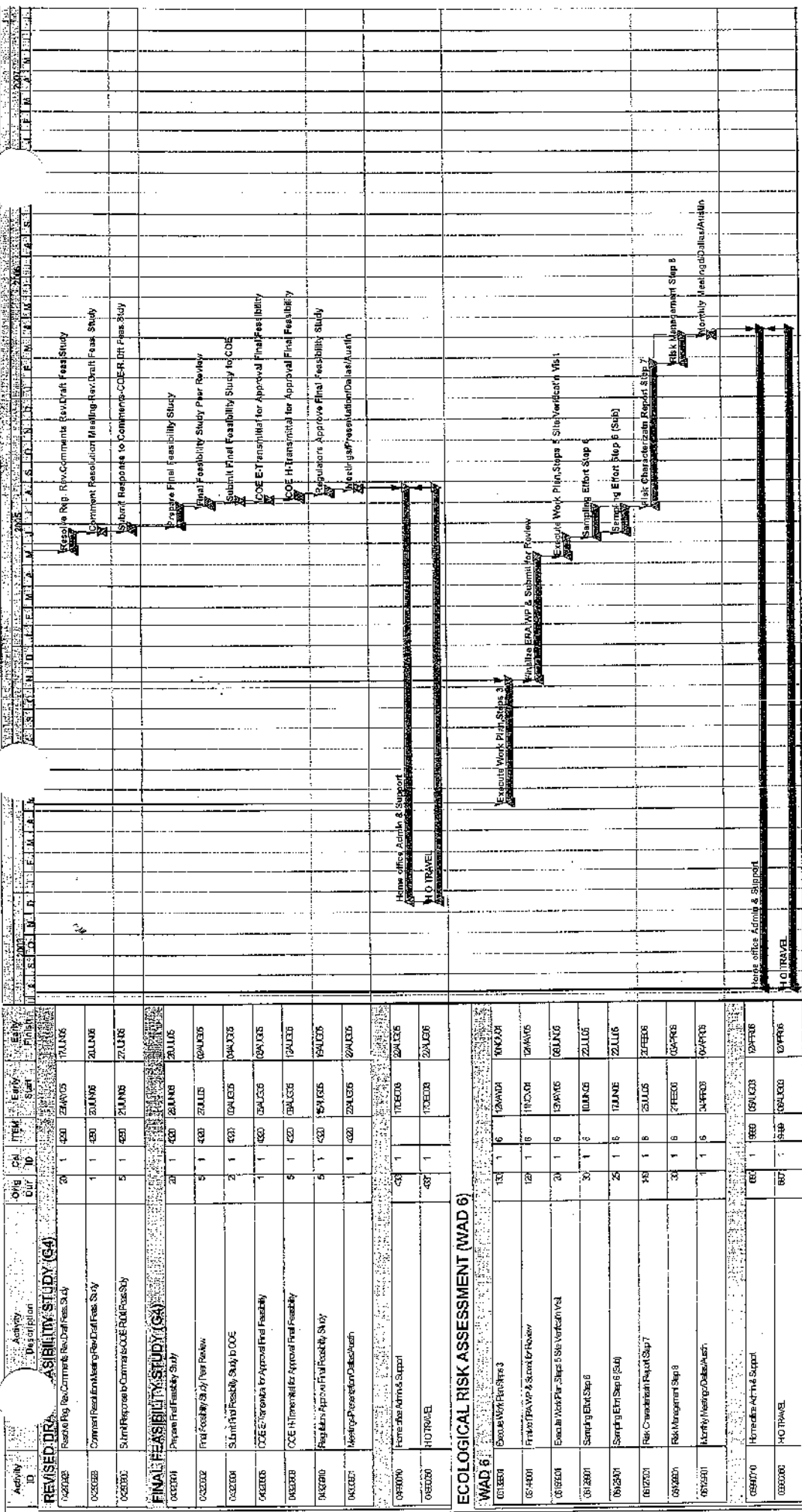
TULSA TERC
TASK ORDER #109

ENVIRONMENTAL INVESTIGATION & REMEDIATION @ LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

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Activity ID	Activity Description	Orig	Cal	Item	Early Start	Early Finish
SITE 12 FINAL (WAD 4)						
020000	COE E-Transmittal to Approval Final ROD	1	1	240	14FEB05	14FEB05
020100	COE H-Transmittal to Approval Final ROD	5	1	240	15FEB05	21FEB05
020190	Regulator Approval Final ROD	5	1	240	27FEB05	28FEB05
020300	COE Transmittal to Public Final ROD	5	1	240	01MAR05	01MAR05
020301	Public Notice Final ROD	1	1	240	03MAR05	03MAR05
020400	Public Comment Period Final ROD	2	1	240	04MAR05	05MAR05
020401	Public Response Final ROD	10	1	240	05MAR05	04APR05
030000	Home Office Admin & Support	30	1		24FEB05	19APR05
030100	NO REPAIR	30	1		24FEB05	19APR05
INVESTIGATE GROUP 4 SITES (WAD 4)						
GR INFORMATION & DATA GAPS WORKPLANS (G4)						
041000	Review GFI Information	10	1	415	11AUG00	03SEP00
041001	Prepare Draft Workplans Addendum	27	1	415	03SEP00	05OCT00
041002	Prepare Draft Workplans Peer Review	4	1	415	10OCT00	15OCT00
041003	Stoppage Meeting Austin	1	1	415	16OCT00	16OCT00
041004	Submit Draft Workplans to COE	1	1	415	16OCT00	16OCT00
041005	COE E-Transmittal for Team Review Draft Workplan	1	1	415	17OCT00	17OCT00
041006	COE H-Transmittal for Team Review Draft Workplan	5	1	415	20OCT00	24OCT00
041007	TRV/COE Rev of Draft Workplans	30	2	415	20OCT00	23OCT00
041008	Support Rev of Draft Workplans	30	2	415	20OCT00	23OCT00
041009	COE Review of Draft Workplans	30	2	415	20OCT00	23OCT00
041010	MEG Review of Draft Workplans	30	2	415	20OCT00	23OCT00
041011	EPA Region 6 Review Draft Workplans	30	2	415	20OCT00	23OCT00
041012	TAG Review Draft Workplans	30	2	415	20OCT00	23OCT00
041013	TRV/COE Review Draft Workplans	30	2	415	20OCT00	23OCT00
041014	U.S. Fish & Wildlife Review Draft Workplans	30	2	415	20OCT00	23OCT00
041015	Resolve Reg. Rev Comments Draft Workplans	30	1	415	24OCT00	03NOV00

Activity ID	Activity Description	Orig. Dur.	Est. ID	Item	Early Start	Early Finish
IGFI INFORMATION & DATA GAPS WORKPLANS (G4)						
0411302	On-site Review Meeting Draft Workplans	1	415	10/03/03	10/03/03	
FINAL WORKPLANS (G4)						
0411301	Final Workplans	15	416	10/03/03	02/04/04	
0411302	Final Workplans Peer Review	2	419	02/04/04	02/04/04	
0411303	Submit Final Workplans to COE to Regs	1	418	02/04/04	02/04/04	
0411304	COE E-Transmittal for Approval Final Workplan	1	419	02/04/04	03/04/04	
0411305	COE H-Transmittal for Approval Final Workplan	5	418	04/04/04	09/04/04	
0411306	Regulators Approve Final Workplan	2	416	09/04/04	09/04/04	
GROUP 4 DATA GAPS - SAMPLING						
0451001	Group 4 Data Gaps - Sampling	22	450	03/04/04	09/04/04	
0451002	Group 4 Data Gaps - Sampling	7	450	04/04/04	12/04/04	
0451003	Lab Analysis	10	450	03/04/04	09/04/04	
0451004	Data Validation	10	450	03/04/04	09/04/04	
0451005	Data Summary Report Group 4 Data Gaps	15	450	03/04/04	09/04/04	
0451006	Data Summary Report Group 4 Data Gaps Peer Review	1	450	09/04/04	09/04/04	
0451007	Submit Data Summary Report Group 4 Data Gaps to COE	5	450	09/04/04	09/04/04	
0451008	Meetings/Presentations Dallas Austin	1	450	09/04/04	09/04/04	
DRAFT RI RPT ADDNDM includes RISK ASSESSMENT (G4)						
0460001	Prepare Draft RI Rpt (including Risk Assessment)	42	460	03/04/04	03/04/04	
0460002	Draft RI Rpt Peer Review	3	460	04/04/04	06/04/04	
0460003	Submit Draft RI Rpt (including Risk Assessment) to COE	1	460	06/04/04	07/04/04	
0460004	COE E-Transmittal for Peer Review Draft RI Rpt	1	460	07/04/04	08/04/04	
0460005	COE H-Transmittal for Peer Review Draft RI Rpt	5	460	08/04/04	13/04/04	
0460006	RI Rpt Peer Review	3	460	13/04/04	14/04/04	
0460007	RI Rpt Peer Review	3	460	14/04/04	15/04/04	
0460008	RI Rpt Peer Review	3	460	15/04/04	16/04/04	
0460009	RI Rpt Peer Review	3	460	16/04/04	17/04/04	
0460010	RI Rpt Peer Review	3	460	17/04/04	18/04/04	
0460011	RI Rpt Peer Review	3	460	18/04/04	19/04/04	
0460012	RI Rpt Peer Review	3	460	19/04/04	20/04/04	
0460013	RI Rpt Peer Review	3	460	20/04/04	21/04/04	
0460014	RI Rpt Peer Review	3	460	21/04/04	22/04/04	
0460015	RI Rpt Peer Review	3	460	22/04/04	23/04/04	
0460016	RI Rpt Peer Review	3	460	23/04/04	24/04/04	



**AGENDA
COMMENT RESOLUTION MEETING
INSTALLATION-WIDE ECOLOGICAL RISK ASSESSMENT
LONGHORN ARMY AMMUNITION PLANT
VENUE: TCEQ OFFICES, ROOM B201A, AUSTIN, TX
NOVEMBER 3-4, 2003**

Monday, November 3, 2003

9:00	AM	Opening Remarks	David Tolbert, LHAAP Bill Nelson, AEC
		Introductions	
9:30	AM	Discussion of USFWS Data	Paul Bruckwicki, USFWS
10:00	AM	Comment Resolution, ERA Work Plan*	Mark Weisberg/Jon Lindberg, Shaw
11:00	AM	*****15 Minute Break*****	
11:15	AM	Continue with ERA Comment Resolution	
12:00	PM	Lunch Break till 1:30	
1:30	PM	Continue with Comment Resolution	
3:00	PM	*****15 Minute Break*****	
3:15	PM	Background Sampling Update	Praveen Srivastav, Shaw
3:30	PM	Open Discussion – ERA	
5:00	PM	Closing	Mark Weisberg, Shaw

Tuesday, November 4, 2003

8:30	AM	USACHPPM Presentation of RSA Study	Larry Tannenbaum/Keith Williams, USACHPPM
9:30	AM	*****15 Minute Break*****	
9:45	AM	Reconvene	
11:30	AM	Closing	David Tolbert/Bill Nelson

* The comment resolution discussion will focus on major issues brought out in the comments on the ERA work plan. Please see page 2 of this agenda for topics of discussion.

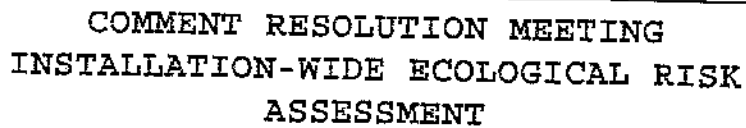


**COMMENT RESOLUTION MEETING
INSTALLATION-WIDE ECOLOGICAL RISK
ASSESSMENT**

Location	Austin, Texas
Date	November 3, 2003

ATTENDEES

Name (printed)	Signature	Organization	Phone Number	E-mail
Praveen Srivastava	<i>[Signature]</i>	Shaw Env., Inc.	281-368-4588	praveen.Srivastava@shawgrp.com
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Prose M. Zeiler	<i>[Signature]</i>	Fort Chaffee/Bragg	479-484-2516	Zeiler@sil.army.mil
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James Sher	<i>[Signature]</i>	TCEQ	512-239-2446	Jsher@TCEQ.state.tx.us
Chip Wood	<i>[Signature]</i>	TPWD	512-912-7155	Charles.Wood@tpwd.state.tx.us
Paul Brockwick	<i>[Signature]</i>	USFWS	903-679-4536	paul_brockwick@fws.gov
Susan Roddy	<i>[Signature]</i>	US EPA	214-665-8518	Roddy.Susan@epa.gov

[illegible]

**Major Items of Discussion Related To Comment Resolution
LHAAP Ecological Risk Assessment Work Plan
Austin, November 3-4, 2003**

Issue 1:

Organization of work plan: How does step 3 fit in? And what does this document represent?

Issue 2:

Assessment endpoints

Issue 3:

Selection of measurement receptors

Issue 4:

Approach for addressing terrestrial organisms at the base of the food chain in the ecological risk assessment

Issue 5:

Calculation of exposure point concentrations for measurement receptors and use of area use factors (AUFs)

Issue 6:

Development of toxicity reference values (TRVs)

Issue 7:

Adequacy of facility-wide characterization of environmental media

Issue 8:

Selection of organisms for toxicity testing, tissue analysis, and bioaccumulation tests

Other issues from stakeholders

Comment Resolution Meeting
Installation-Wide Ecological Risk Assessment
Longhorn Army Ammunition Plant

November 3-4, 2003
Austin, Texas



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ISSUE 1: ORGANIZATION OF WORK PLAN:

HOW DOES STEP 3 FIT IN?

WHAT DOES THIS DOCUMENT REPRESENT?

Pertinent Comments: 29, 31, 66, 156

- This document is a work plan detailing how Steps 3, 4, 5, 6, 7, and 8 of the ERA process will be conducted.
- Step 3 has not yet been performed, but many of the details necessary for completion of Step 3 have been included in the work plan.
- Steps 4 through 8 of the process will be completed, if appropriate, although details may need to be revised pending results of Step 3.
- The methodologies for Steps 4 through 8 are presented in this work plan as a “worst case” scenario.
- It is anticipated that many COPECs will be eliminated after Step 3.
- The portion of the work plan that describes Steps 4 through 8 will be revised and submitted as a Work Plan Addendum for review after Step 3 has been performed.
- Many of the comments from regulatory agencies that pertain to Steps 4 through 8 will be deferred until the Work Plan Addendum.



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ISSUE 1 CONTINUED

- The sequence of events for conducting the baseline ecological risk assessment at Longhorn is envisioned as follows:
 1. Obtain regulatory agreement on the methodologies used to conduct Step 3.
 2. Submit the results of Step 3 and the revised work plan for Steps 4 through 8 for regulatory review. This document is referred to as the work plan addendum.
 3. Following approval of the work plan addendum, conduct Steps 4 through 8.
 4. Submit final baseline risk assessment results for regulatory review.



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ISSUE 2: ASSESSMENT ENDPOINTS

Step 3 Assessment and Measurement Endpoints
Ecological Risk Assessment Work Plan, LHAAP, Karnack, Texas
(Adapted from Table 3-9 in the Ecological Risk Assessment Work Plan)

Assessment Endpoints	Measurement Endpoints	Measurement Receptor
Terrestrial Habitats		
Protection of Trophic Level 2 Herbivore Populations	Mortality; Reproduction, Growth as measured by NOAEL and LOAEL based TRVs	Deer Mouse
Protection of Trophic Level 3 Omnivore Populations	Mortality; Reproduction, Growth as measured by NOAEL and LOAEL based TRVs	Raccoon
Protection of Trophic Level 3 Insectivore Populations	Mortality; Reproduction, Growth as measured by NOAEL and LOAEL based TRVs	Short-Tailed shrew
Protection of Trophic Level 4 Carnivore Populations	Mortality; Reproduction, Growth as measured by NOAEL and LOAEL based TRVs	Red Fox



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ISSUE 2 CONTINUED

Step 3 Assessment and Measurement Endpoints Ecological Risk Assessment Work Plan, LHAAP, Karnack, Texas (Adapted from Table 3-9 in the Ecological Risk Assessment Work Plan)

Assessment Endpoints	Measurement Endpoints	Measurement Receptor
Aquatic Habitats		
Protection of Trophic Level 2 Herbivore Populations	Mortality; Reproduction, Growth as measured by NOAEL and LOAEL based TRVs	Common Muskrat
Protection of Trophic Level 3 Omnivore Populations	Mortality; Reproduction, Growth as measured by NOAEL and LOAEL based TRVs	Common Snapping Turtle
Protection of Trophic Level 3 Insectivore Populations	Mortality; Reproduction, Growth as measured by NOAEL and LOAEL based TRVs	Bank Swallow
Protection of Trophic Level 4 Carnivore Populations	Mortality; Reproduction, Growth as measured by NOAEL and LOAEL based TRVs	Belted Kingfisher
Protection of populations of aquatic biota	Mortality; Reproduction, Growth as measured by comparison of surface water and sediment COPEC concentrations with water and sediment quality criteria	fish (e.g., fathead minnow), Water column invertebrates (e.g., water fleas), Benthic invertebrates (e.g., amphipods).

ISSUE 3: SELECTION OF MEASUREMENT RECEPTORS

Pertinent Comments: 14, 15, 36, 139, 157, 177, 180, 181, 183, 184, 186, 211

- The number of potential receptors is endless. The measurement receptors selected for the ecological risk assessment are:
 1. Representative of the major feeding guilds at the site.
 2. Protective of other species and feeding guilds.
 3. Consistent with previous (i.e., screening-level) evaluations at LHAAP and discussions with regulatory agencies.
- Including additional measurement receptors will not significantly improve the information available for making remedial decisions.



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ISSUE 4: APPROACH FOR ADDRESSING TERRESTRIAL ORGANISMS AT THE BASE OF THE FOOD CHAIN IN THE ECOLOGICAL RISK ASSESSMENT

Pertinent Comments: 68, 75, 78, 144, 236, 240

- Risk management decisions will not be based on direct toxicity for terrestrial organisms such as earthworms and plants.
- Earthworms and terrestrial plants will only be evaluated for uptake of constituents and as a food source for higher trophic level consumers.
- In the event toxicity to these organisms is predicted or measured during the ERA, the reduction of organisms at the base of the food chain will be considered. Otherwise, it will be assumed that establishing ecological PCLs for upper trophic level organisms will suffice.



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031342

ISSUE 5: CALCULATION OF EXPOSURE POINT CONCENTRATIONS (EPC) FOR MEASUREMENT RECEPTORS AND USE OF AREA USE FACTORS (AUF)

Pertinent Comments: 37, 195, 204, 206, 207, 208, 209

- HQs for measurement receptors will be calculated using conservative estimates of the mean (i.e., UCL_{95}) and average concentration.
- The current methods of calculating a UCL_{95} using various equations depending on the distribution of the data will be replaced by a simpler method using a nonparametric bootstrap technique, as recommended in USEPA guidance.



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031343

ISSUE 5 CONTINUED

Organisms with home ranges less than the size of the site.

- In the assessment of the maximum exposure for an organism, multiple EPCs will not be calculated for organisms that have home ranges that are smaller than a site.
 - Conservatism already built into the risk assessment process should result in an adequately protective HQ.
 - With the exception of threatened and endangered species, focus should be on the population, not individual organisms that might experience "worst case" conditions.

Organisms with home ranges greater than the size of the site.

- If an organism has a home range that is greater than the size of the sub-area, an AUF will be used to adjust the exposure of the receptor by the fraction of the site size to home range size.
- If a receptor's home range could overlap more than one watershed (aquatic receptors) or sub-area (terrestrial receptors), the HQs for the appropriate watersheds or sub-areas will be summed.

ISSUE 6: DEVELOPMENT OF TOXICITY REFERENCE VALUES (TRV)

Pertinent Comments: 55, 56

- Allometric (i.e., body weight scaling) equations will be used as the primary method of developing species-specific TRVs.
- Uncertainty factors will be used to adjust the final toxicity endpoint (e.g., an uncertainty factor of 10 will be used to estimate a NOAEL dose from a LOAEL dose.)



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ISSUE 7: ADEQUACY OF FACILITY-WIDE CHARACTERIZATION OF ENVIRONMENTAL MEDIA

Pertinent Comments: 59, 158

- A combination of random and targeted samples are currently proposed to complete the characterization for the ecological risk assessment.
- Extensive characterization sampling has already been completed at LHAAP.
- Every effort has been made to address regulatory concerns and fill data gaps.
- The Army does not intend to collect additional samples, above and beyond those outlined in the Work Plan.



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ISSUE 8: SELECTION OF ORGANISMS FOR TOXICITY AND TISSUE (BIOACCUMULATION) TESTS

Pertinent Comments: 68, 71, 74, 75, 78, 87, 112, 114, 124, 137, 149, 236, 242

Toxicity Testing

- Toxicity testing is proposed for selected aquatic organisms only (i.e., benthic invertebrates, aquatic invertebrates, fish).
- Protection of receptors at the base of the terrestrial food chain are included as a measurement endpoint for higher order consumers, (e.g., food supply) and are not themselves an assessment endpoint.
- NOAEL and LOAEL values will not be developed using dilutions.
- It is expected that the toxicity testing performed on undiluted media will cover COPEC concentration gradients, and PCLs may be based on these results.



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ISSUE 8 CONTINUED

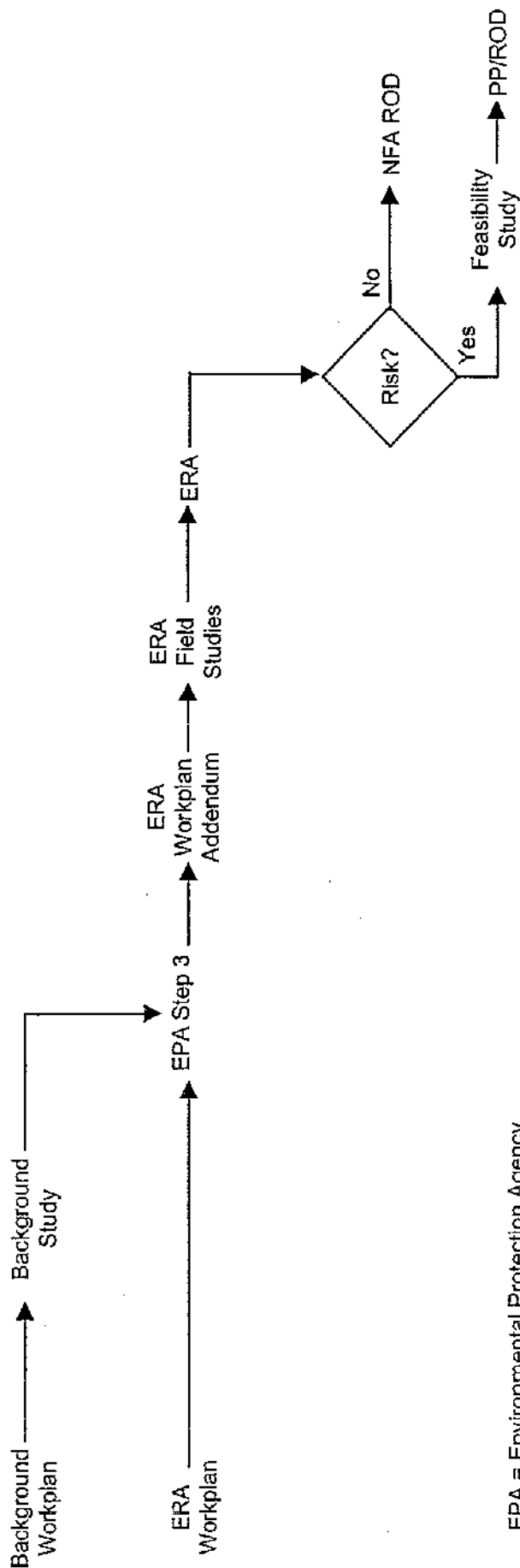
Tissue Testing

- Tissue tests are proposed for terrestrial (small mammals, earthworms, plants) and aquatic (fish, plants) organisms.
- The impact to higher order consumers from ingestion of contaminants in benthic invertebrates is expected to be indirectly accounted for through the sampling of fish tissue.



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LHAAP Ecological Risk Assessment Decision Documentation (from Figure 1-4 in the Ecological Risk Assessment Work Plan)



EPA = Environmental Protection Agency

ERA = Ecological risk assessment

NFA = No further action

ROD = Record of decision

PP/ROD = Proposed plan/record of decision



Shaw Shaw Environmental & Infrastructure, Inc.

Longhorn AAP
Monthly Managers Meeting (a.m.)
Partnering/Transition (p.m.)

031350

19 November 2003 -- Dallas, Texas

Courtyard Marriott
(Super Shuttle Service is Available from DFW
7 miles from DFW for those interested)
2201 Airport Freeway
Bedford, Texas 76021
(817)545-2202
Conference Room: Meeting Room A

Page 1 of 2

As of 13 November 2003

19 November 2003 (Wednesday)

Time

Event

POC

Attendees:

EPA, TCEQ, USFWS, BRAC, USACE, Shaw Group

Monthly Managers Meeting

0830 – 1130

Agenda will be sent out separately

1130 – 1230

Lunch (on your own)

Partnering/Transition Meeting

Longhorn Project Delivery Team – Organizing for Success

Attendees:

Louisiana AAP, BRAC, AEC APGEA, Corps of Engineers and Shaw Group

1245 -1300

Welcome

1300-1310

Objective of meeting: To focus on teamwork, communication and common goals between the new key players of our organizations. Team members will get a better understanding of our collective capabilities.

1310-1330

Introductions

All

1330-1345

History of Longhorn

Cliff Murray

1345-1400

Remaining Longhorn Program

Tom Lederle

Agenda
Monthly Managers Meeting
Longhorn Army Ammunition Plant
Venue: Courtyard Marriott, Dallas, TX
8:30 – 11:30, November 19, 2003

8:30	AM	Opening Remarks	
8:45	AM	Discussion – Regulatory Comments on Draft-Final Group 2 Feasibility Study as related to Site 12 FS	Prabal Amin/Praveen Srivastav
		• Introduction to Site 12 • Specific Issues*	
10:00	AM	*****10 Minute Break*****	
10:10	AM	Continue	
11:00	AM	Modeling Approach – Derivation of Protective Concentrations**	Praveen Srivastav
11:30	AM	Lunch	

* The discussion will focus on major issues brought out in the comments on the Draft-Final Group 2 Feasibility Study. Please see page 2 of this agenda for topics of discussion.

** This will be a brief presentation of the approach outlined in the Draft Technical Memorandum submitted by Shaw on October 30, 2003. Technical questions may have to be deferred to a separate meeting or conference call because of time constraints.

Points for Discussion – Revised Draft Final Site 12 Feasibility Study

Site 12 Remedial Action Objective (RAO)

- The RAO goals for Site 12 are as follows:
 - Prevent exposure to landfill waste or soil contamination in excess of the 1×10^{-4} to 1×10^{-6} target risk range and an HI of 1 for the future maintenance worker.
 - Prevent exposure to contaminated groundwater in excess of the 1×10^{-4} to 1×10^{-6} target risk range and an HI of 1 for the future maintenance worker, meet groundwater ARARs and prevent potential site groundwater impacts to nearby surface water bodies such that ARARs are not exceeded.

Site 12 Contaminants of Concern (COCs) and Alternate Concentration Limit (ACL) Development

- The principle Site 12 groundwater COCs addressed in the Feasibility Study (FS) are assumed to be trichloroethene (TCE) and perchlorate.
- ACLs would be developed for only TCE and perchlorate in Site 12 groundwater. It is understood that ACLs are risk-based concentration limits that can be used to establish alternate groundwater protection standards.
- Identify a protective perchlorate level in Caddo Lake for use in the development of a perchlorate ACL for Site 12 groundwater.
- Identify the appropriate ARAR(s) for Central Creek surface water based on an assumed use classification, i.e., “sustainable” or “incidental” fishery.

Remedial Alternatives

- The four alternatives to be considered for detailed analysis in the FS are as follows:
 - Alternative 1 – No Action
 - Alternative 2 – Existing Landfill Cap, ACL Development with Institutional Controls
 - Alternative 3 – Existing Landfill Cap, Groundwater Extraction to achieve MCLs at and beyond the Waste Unit Boundary, Institutional Controls
 - Alternative 4 – Landfill Removal, Off-site Disposal, In-situ Bioremediation and Monitored Natural Attenuation to achieve MCLs throughout the site, Institutional Controls (short term)
- The technologies for the landfill waste material originally presented in the Group 2 Sites FS (May 2002) will be used for the Site 12 FS, and no further enhancement of the range of alternatives for landfill waste will be performed. Technologies such as soil vapor extraction and land farming are not viable soil action strategies for the Site 12 landfill due to the presence of wood, plastics, glass, and other miscellaneous debris other than soil, and will not be considered.

Other Issues

- Residential Risk Assessment, Ecological Risk Assessment, Background Study – Impact on Site 12 FS

**Longhorn Army Ammunition Plant
Monthly Managers Meeting**

Location	Dallas, Texas
Date	19-Nov-03

ATTENDEES

Name (printed)	Signature	Organization	Phone	E-mail
CHRIS VILLARREAL	<i>Chris Villarreal</i>	U.S. EPA	214.665.6758	villarreal.chris@epa.gov
Tom Erny	<i>Tom Erny</i>	TCEQ	903-535-5142	terny@tceq.state.tx.us
JOHN ROBERTS	<i>John Roberts</i>	USACE	918-669-7201	roberj@swt02.swt.usace.army.mil
Lori Hunninghake	<i>Lori Hunninghake</i>	USACE	918-669-7224	Lori.Hunninghake@us.army.mil
Craig GIGGLEMAN	<i>Craig Giggleman</i>	USFWS	817/277-1100	craig-giggleman@fws.gov
Paul Bruckwicks	<i>Paul Bruckwicks</i>	USFWS	903.679.4536	paul.bruckwicks@fws.gov
Brian Gebhart	<i>Brian Gebhart</i>	BRAC TSO	309-782-1387	raymond.brian.gebhart@us.army.mil
Barry Forsythe	<i>Barry Forsythe</i>	USFWS	214-665-8462	Forsythe.barry@epa.gov
THOMAS LEDERLE	<i>Thomas Lederle</i>	BRAC	757 788 4350	THOMAS.LEDERLE@US.ARMY.MIL
Rose M. Zeiter	<i>Rose M. Zeiter</i>	BRAC-LHAAP	479-484-2516	zeiter.rose@ll.army.mil
Michelle Rhodes	<i>Michelle Rhodes</i>	USACE	918/669-4308	michelle.m.rhodes@usace.army.mil
Andy Obrochta	<i>Andy Obrochta</i>	USACE	918-669-7155	joseph.obrochta@usace.army.mil
James Sher	<i>James Sher</i>	TCEQ	512-239-2444	Jsher@TCEQ.state.tx.us
JONNA POLK	<i>Jonna Polk</i>	USACE	918-669-7482	JONNA.POLK@USACE.ARMY.MIL
DAVID TOLBERT	<i>David Tolbert</i>	LHAAP	318-459-5102	d.tolbert@usa.com
FRANCINE COLE	<i>Francine Cole</i>	BRAC	757-789-4370	Colef@monroe.Army.mil
Cliff MURRAY	<i>Cliff Murray</i>	USACE	918-669-7573	Cliff.Murray@usace.army.mil
Praveen Srivastava	<i>Praveen Srivastava</i>	Shaw	281-368-4588	Praveen.Srivastava@shawgrp.com
Prabhat Amin	<i>Prabhat Amin</i>	Shaw	732-346-2920	Prabhat.Amin@shawgrp.com
DWYER	<i>Dwyer</i>	Shaw	281-368-4582	DWYER@shawgrp.com
Bill Nelson	<i>Bill Nelson</i>	USACE	410 436 1516	william.c.nelson@us.army.mil
John W. Nelson	<i>John W. Nelson</i>	COENSA	918 669 7281	



Subject: Draft Minutes from the Monthly Managers Meeting, Longhorn Army Ammunition Plant (LHAAP)

Location of Meeting: Courtyard Marriott, Bedford (Dallas), TX

Date of Meeting: 8:30-11:30 AM, November 19, 2003

Meeting Participants:

Shaw Environmental

David Tester
Praveen Srivastav
Prabal Amin

USAEC

Bill Nelson

USACE-Tulsa

Andy Obrochta
John Roberts
Lori Hunninghake
Michelle Rhodes
Jonna Polk
Cliff Murray
John Weatherly

USEPA Region 6

Chris Villarreal

BRAC

Brian Gebhart
Tom Lederle
Rose M. Zeiler
Francine Cole

LHAAP

David Tolbert

TCEQ

Jim Sher
Tom Erny

USFWS

Paul Bruckwicki
Barry Forsythe
Craig Giggelman

A Monthly Managers Meeting was held in Dallas, Texas on November 19, 2003. Agenda for the meeting included resolution of regulatory comments on the Draft-Final Feasibility Study, Group 2 Sites, a presentation of alternate concentration limit (ACL) modeling approach, and a presentation of soil and sediment data collected by USFWS. The Monthly Managers Meeting was held in morning and was followed in the afternoon by a Partnering/Transition meeting attended by representatives from the Army and Shaw Environmental.

Summary of Discussion on Comment Resolution, D-F Feasibility Study, Group 2

- Praveen Srivastav indicated that a Draft-Final Group 2 Feasibility Study (FS) was submitted by Jacobs in May 2002 and review comments from the regulators were received. A response to the comments was prepared by Jacobs and submitted to regulators in May 2003. Shaw is tasked with preparing a Revised Draft-Final FS for Site 12 so that a proposed plan (PP) and record of decision (ROD) may be prepared for this site. The discussion would focus on the resolution of comments that had impact on the FS for Site 12. A list of points of discussion was included with the agenda for the meeting. The agenda is attached with these minutes.
- Cliff Murray indicated that the Army will be submitting FS, PP and ROD for two sites: Site 12 and Site 29. Comment resolution for Site 12 will also be applicable to Site 29. He also clarified, upon a question from Jim Sher (TCEQ), that the documents would be submitted separately because Site 29 is more complicated than Site 12.
- Bill Nelson pointed out that the RODs for Sites 12 and 29 have to be signed by September 2004 because this deadline is entered into Army's database and is tied to funding for these sites. He, however, also mentioned that Site 29 may be exchanged for another site that is more straight forward with respect to preparation of a ROD.

Prabal Amin led the discussion of issues listed on the agenda.

Issue 1: Site 12 Remedial Action Objectives

The following RAOs were accepted:

- Prevent exposure to landfill waste or soil contamination in excess of the 1×10^{-4} to 1×10^{-6} target risk range and an HI of 1 for the future maintenance worker.
- Prevent exposure to contaminated groundwater in excess of the 1×10^{-4} to 1×10^{-6} target risk range and an HI of 1 for the future maintenance worker, address groundwater ARARs and prevent potential site groundwater impacts to nearby surface water bodies such that ARARs are not exceeded.

Issue 2: Site 12 Contaminants of Concern (COCs) and Alternate Concentration Limit (ACL) Development

- Primary contaminants to be addressed in the Site 12 FS are trichloroethene (TCE) and perchlorate. ACLs will be calculated for these contaminants.
- A to-be-considered (TBC) level of 4 ppb will be used for perchlorate at the mouth of the Central Creek for ACL calculations. In the absence of an in-stream standard for perchlorate, the TCEQ requires that the 4 ppb level be also met for the surface water in the creek up to the point where groundwater discharges into the surface water. For TCE, the respective levels are MCL (5 ppb) at the mouth of Central Creek and the ecological benchmark value for in-stream surface water.
- For ACL calculations, the compliance point will be set at the site, where an ACL will be met, and the exposure point will be set at the mouth of Central Creek where MCL or TBC will be met. For perchlorate, the TBC level of 4 ppb will also be met in the in-stream surface water.

- No mixing zone is to be used for ACL calculations because groundwater seepage into the creek and creek discharge into the lake are considered non-point sources. Assume an instantaneous dilution at the point of discharge.

Issue 3: Remedial Alternatives

The four alternatives to be considered for detailed analysis in the FS are:

- Alternative 1 – No Action
- Alternative 2 – Existing Landfill Cap, ACL Development with Institutional Controls
- Alternative 3 – Existing Landfill Cap, Groundwater Extraction to achieve MCLs at and beyond the Waste Unit Boundary, Institutional Controls
- Alternative 4 – Landfill Removal, Off-site Disposal, In-situ Bioremediation and Monitored Natural Attenuation to achieve MCLs throughout the site, Institutional Controls (short term)

Jim Sher stated that the Army does not need to produce full-blown FSs for every site. Focused FSs may be submitted for sites where remedies are in place (e.g. landfill cap at Site 12).

Praveen Srivastav indicated that such an approach will be considered for future FSs. However, most of the work for the Site 12 FS has been completed and it may be prudent to submit it in its current form of a traditional FS.

Considerable discussion occurred on the role of institutional controls in remedial alternatives. Highlights of this discussion are:

- EPA and TCEQ would like to see details of institutional controls. Chris Villarreal (EPA) indicated that the EPA liked Navy's institutional control document. He distributed several copies of the document.
- The institutional control approach should be worked out by the Army prior to the submittal of a ROD that includes institutional controls as a part of the preferred remedy. Specifically, EPA would like to know how the institutional controls will be enforced, what agreement will be reached between the Army and the USFWS, and who will sign the agreement. USAEC and BRAC indicated that the details need to be worked out with USFWS.
- Regarding concern for failure of institutional controls, Rose Zeiler suggested that there is always the 5-year review that the Army will conduct. Jim Sher and Chris Villarreal indicated that the institutional controls have to be detailed in the ROD or in a separate document before the submittal of the ROD.
- The Army should submit an interim ROD for Site 12 because the installation-wide ecological risk assessment (ERA) is not yet complete. As an alternative, the ERA may be conducted as an operable unit with its own ROD and it may be possible to finalize the ROD for Site 12 (or other sites) before the ERA is complete. However, there was no agreement on whether or not the ROD for a site can be finalized prior to completion of the ERA, even if the ERA is conducted as an operable unit.

ACL Calculation Approach Presentation

Praveen Srivastav briefly discussed the approach to be used in the calculation of ACLs. This approach is outlined in a draft technical memorandum currently in review with the team. Jim

Sher and Chris Villarreal suggested that Shaw should keep the calculations simple where possible and not do complicated modeling in every case. In response to a question by Rose Zeiler, Praveen Srivastav indicated that no new data will be collected as a part of the modeling effort. Site-specific data will be used, where available, and calibration of the modeling effort will be limited to actual observed concentrations in various media.

USFWS Presentation

Craig Giggelman presented results of soil and sediment sampling conducted by USFWS.

Highlights of the presentation are:

- Objective of the sampling was to facilitate administrative transfer of approximately 7,000 acres of LHAAP to USFWS
- Sample locations were selected based on a stratified random grid sampling approach
- Soil samples were collected from 250 locations across the installation at 0-6 inch depth. The USFWS sampling area excluded known contaminated areas and designated sites.
- Western third of the LHAAP was sampled in 2002 and the remainder in 2003
- Analytes were metals, perchlorate, organo-chlorine pesticides, PCBs, and SVOCs. Ten percent of samples were analyzed for dioxins/furans.
- The data were compared to human health and ecological benchmark values.
- Metals, organo-chlorine pesticides, PCBs (total), and dioxins/furans were detected above ecological risk screening levels
- Cadmium, copper, beryllium, and boron are elevated near the center of the installation
- Lead is elevated in the NE corner of the installation by Caddo Lake in Goose Prairie Creek drainage
- Mercury is elevated in the eastern and north-eastern portions of the installation. Source of mercury is unknown. It is possible that the two mercury contamination areas connect and the contamination is all along the Goose Prairie Creek. This middle area was not sampled because it is a known operational area.
- Perchlorate was detected in the soil near the southern edge of the installation. Source of perchlorate in this area is unknown. Concentration of perchlorate was up to 267 ppb. Perchlorate was also detected in the northwest corner of the installation. The method detection limit was 8 ppb.
- DDT was detected over most of the installation at concentrations up to 334 ppb
- Most soil samples were sandy and only 3 samples were clayey
- Dioxins were found in the central and north-east portions of the installation
- Other items and features observed during the study included unidentified drums, transformers, flares, and pits throughout the installation

The meeting was adjourned.

Consensus Reached

- Consensus on RAOs as proposed by Shaw
- Consensus on addressing TCE and perchlorate in the Site 12 FS
- Consensus on ACL calculations for TCE and perchlorate. The calculations will be simplified where possible.
- Consensus that a TBC level of 4 ppb will be used for perchlorate in Caddo Lake at the mouth of Central Creek for ACL calculations. Also, a TBC level of 4 ppb is to be used

for perchlorate in the surface water of Central Creek up to the point of seepage of groundwater. Instantaneous dilution may be used in the creek but no zone of mixing is to be used. For TCE, an ecological screening level is to be used for Central Creek and the MCL (5 ppb) at the creek mouth.

- Consensus on remedial alternatives as proposed by Shaw. Focused FS may be acceptable to regulators for certain sites where remedies are already in place.

Meeting Action Items

- Shaw will calculate ACLs for TCE and perchlorate based on TBC levels mentioned under "Consensus Reached". Shaw will look up the ecological benchmark value for TCE in the Central Creek for use in ACL calculations.
- The Army needs to formalize an approach for institutional controls. It was mentioned that the Navy's guidance may be used but the Army needs a vehicle to ensure the execution of ICs in coordination with USFWS.
- The USFWS will provide a copy of their presentation and their analytical data to the Army.

Longhorn AAP Monthly Managers Meeting

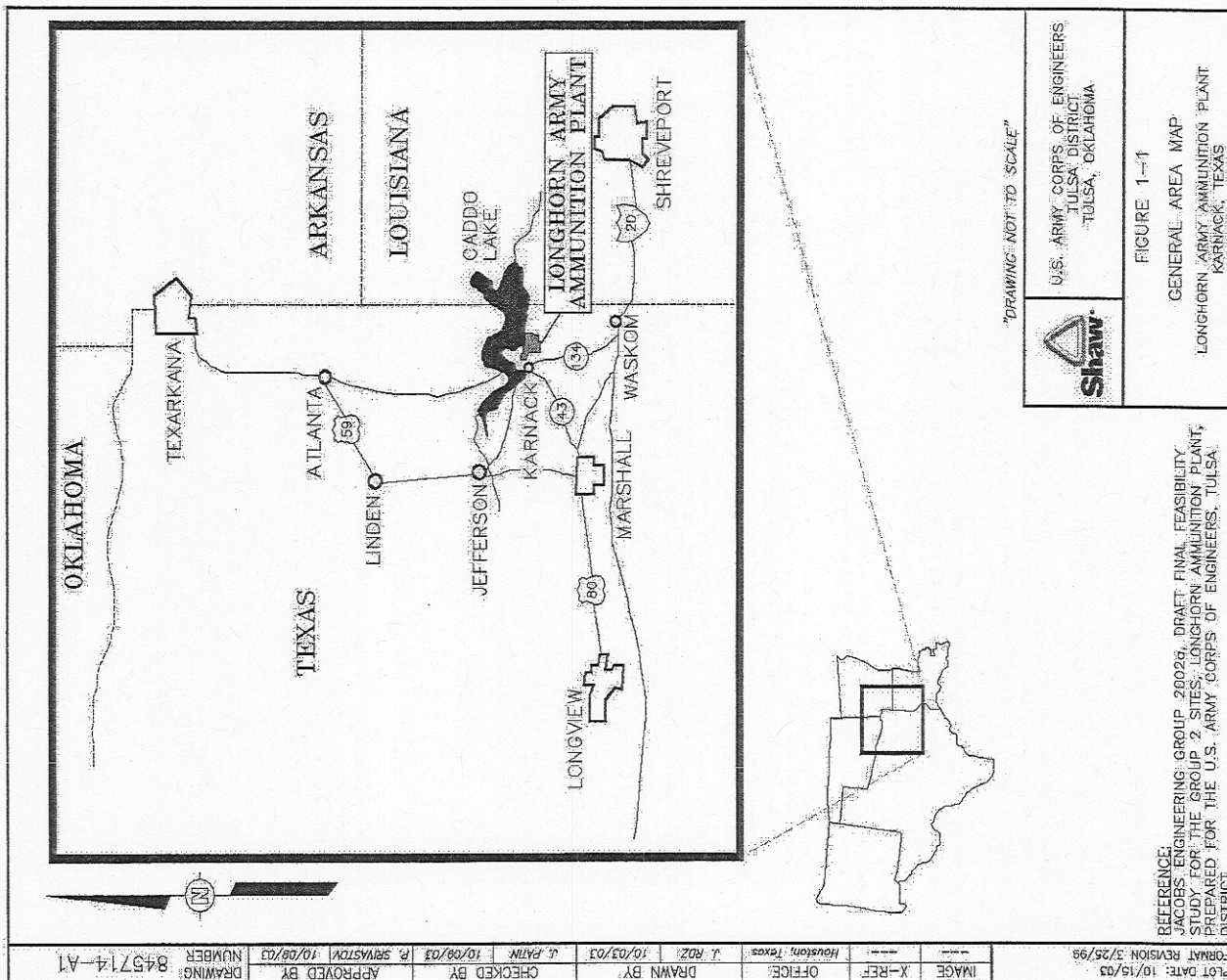
Dallas, TX

November 19, 2003

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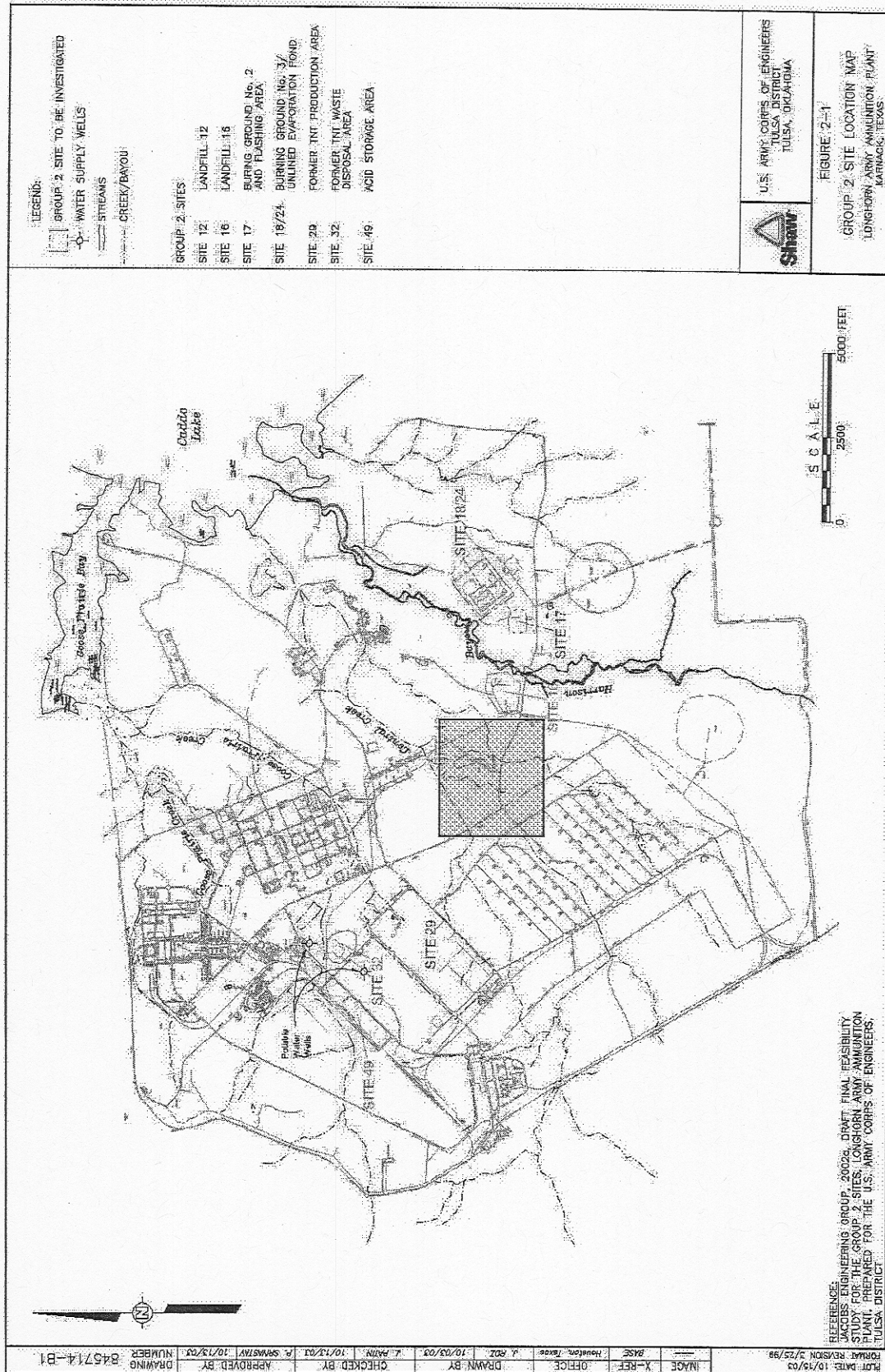
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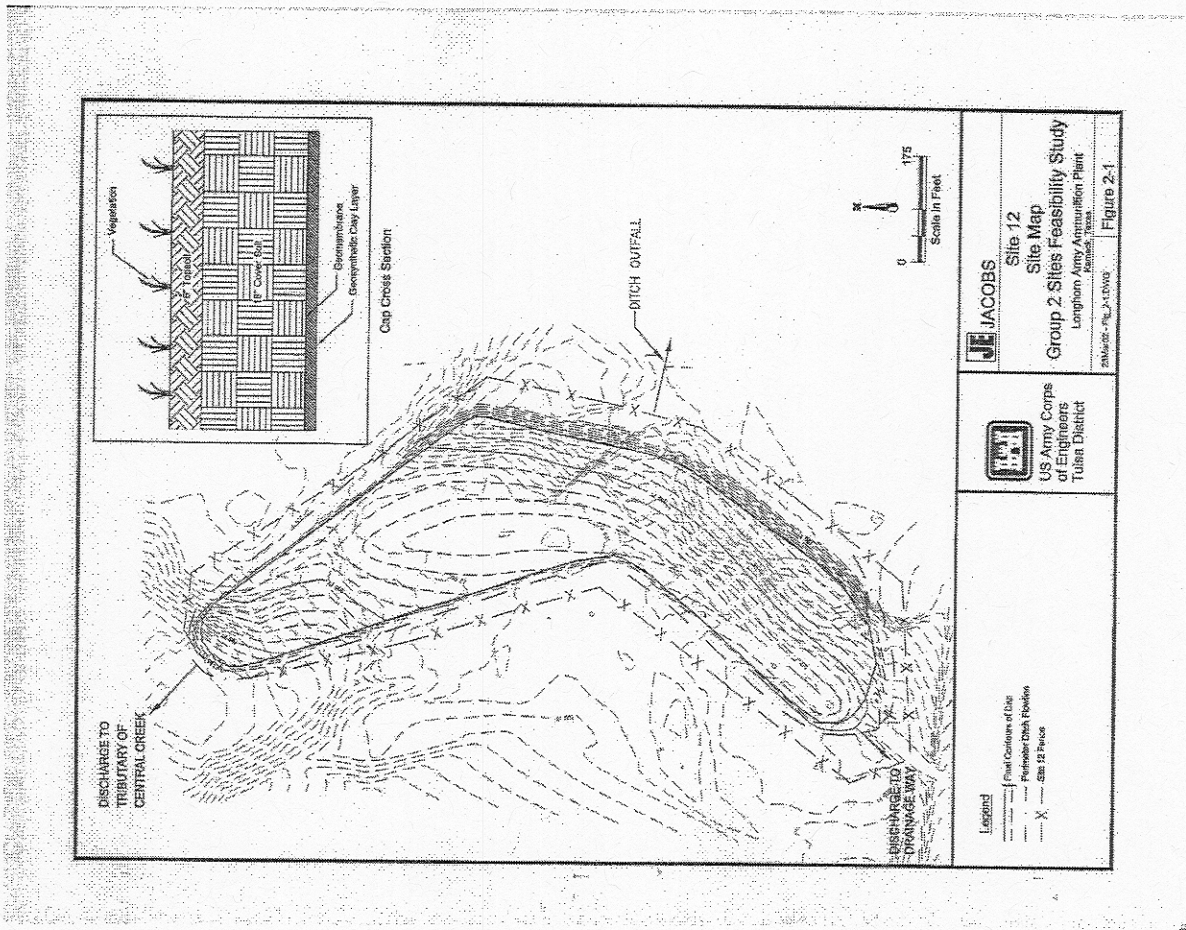
Longhorn AAP

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Site 12 - Landfill 12

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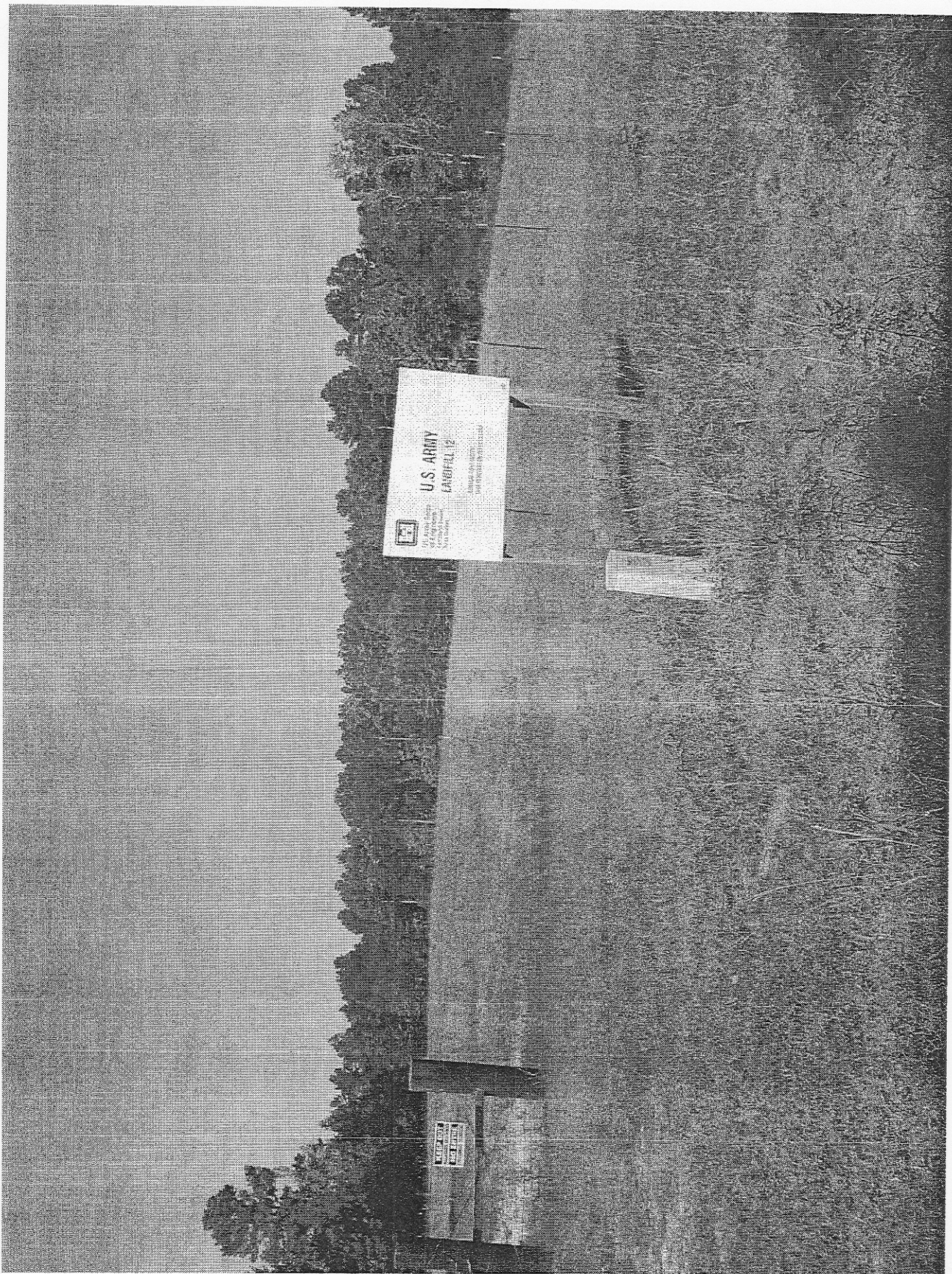


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Figure 2-2

Site 12 -

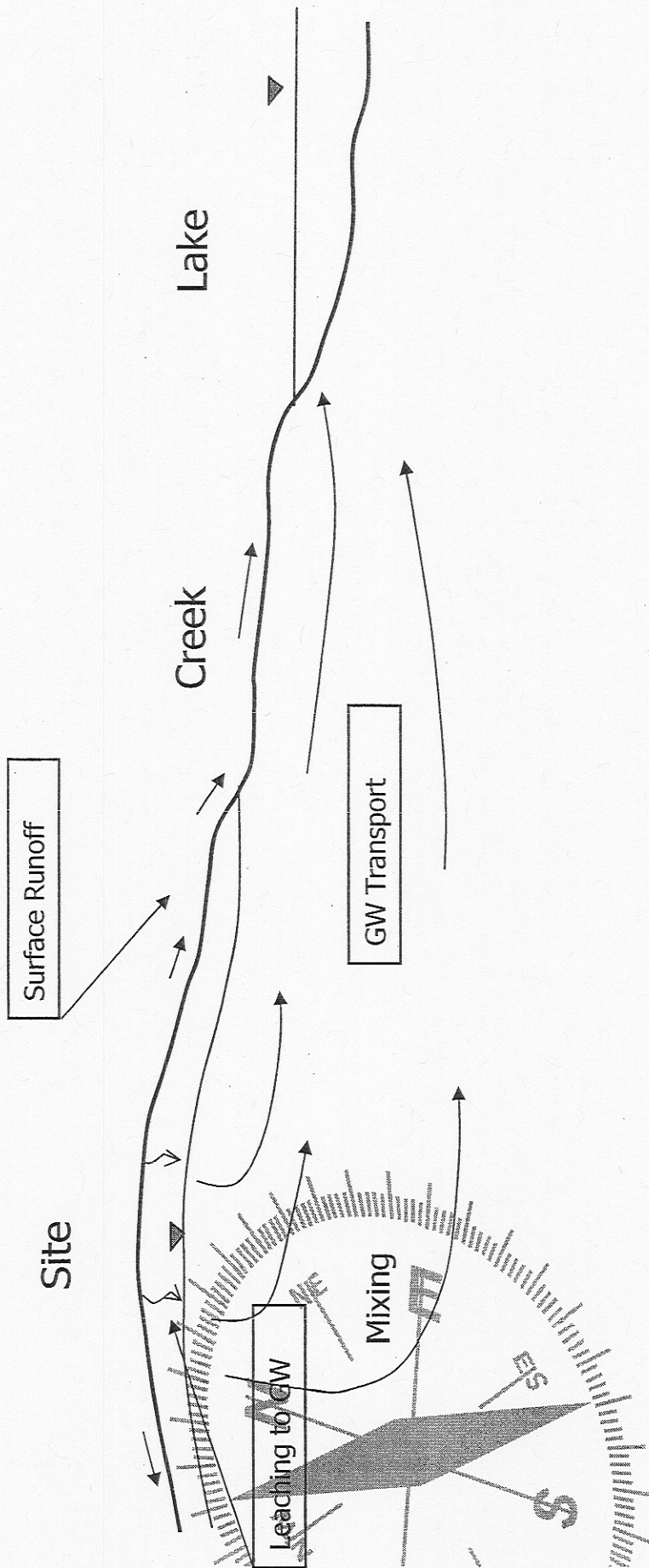
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Protective Level Calculations – Modeling Approach

- Draft Technical Memorandum, Modeling Approach for Derivation of Soil and Groundwater Concentrations Protective of Surface Water and Sediments, October 30, 2003.

Simplified Conceptual Model



Fate and Transport Modeling Locations at Group 2 Sites			
Sites: 12, 17, 18/24, 29, 32, 49, Harrison Bayou, and Caddo Lake			
Longhorn Army Ammunition Plant			
Karnack, Texas			
Modeling			
Location ^a	Type	Path ^a	Chemical ^{a,b}
	Shallow to intermediate groundwater	From Site 12 To Groundwater	VOCs (6) perchlorate
1	Groundwater to surface water, sediment	Site 12 Central Creek	Phthalate esters VOCs (6) perchlorate
2	Groundwater to surface water, sediment	Site 12 Drainage Way	Phthalate esters VOCs (6) perchlorate
	Shallow to intermediate groundwater	Site 16 Groundwater	Phthalate esters VOCs (6) perchlorate
3	Groundwater to surface water, sediment	Site 16 Harrison Bayou	Phthalate esters VOCs (6) perchlorate
4	Soil runoff to surface water, sediment	Site 17 Ditches at Ave. Q	Phthalate esters Nitrated toluenes (3)
	Soil leaching to groundwater	Sites 17, 18/24 Groundwater	Phthalate esters Nitrated toluenes (3)
	Shallow to intermediate groundwater	Sites 17, 18/24 Groundwater	Phthalate esters VOCs (6) perchlorate
5	Groundwater to surface water, sediment	Sites 17, 18/24 Harrison Bayou	Phthalate esters VOCs (6) perchlorate
	Shallow to intermediate groundwater	Sites 29, 32 Groundwater	Phthalate esters VOCs (6) perchlorate
6	Groundwater to surface water, sediment	Sites 29, 32 Central Creek	Nitrated toluenes (5) Phthalate esters VOCs (6) perchlorate
	Soil leaching to groundwater	Site 32 Groundwater	Phthalate esters 2,4,6-trinitrotoluene
7	Soil runoff to surface water, sediment	Sites 32, 04, 35A Goose Prairie Creek	Phthalate esters 2,4,6-trinitrotoluene Phthalate esters
No modeling will be done for Site 49.			
a See Table 1 and Figure 1.			
b Jacobs Engineering Group, Inc., 2002c, "Draft Final Feasibility Study for the Group 2 Sites, Sites 12, 16, 17, 18/24, 29, 32, and 49, Longhorn Army Ammunition, Karnack, Texas," October.			
Nitrated toluenes (3) = 2,4,6-trinitrotoluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene			
Nitrated toluenes (5) = 2-nitrotoluene, 3-nitrotoluene, 4-nitrotoluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene			
Phthalate esters = bis(2-ethylhexyl)phthalate, di-n-butylphthalate			
VOCs (6) = trichloroethene, 1,1-dichloroethene, cis-1,2-dichloroethene, 1,2-dichloroethane, methylene chloride, and chloroform			

Table 4

Fate and Transport Modeling Locations at Group 4 Sites

Sites: 04, 08, 35A, 35C, 46, 47, 48, 50, 60, 67,

Goose Prairie Creek, Saunder's Branch, Central Creek, and Caddo Lake

Longhorn Army Ammunition Plant
Karnack, Texas

Modeling

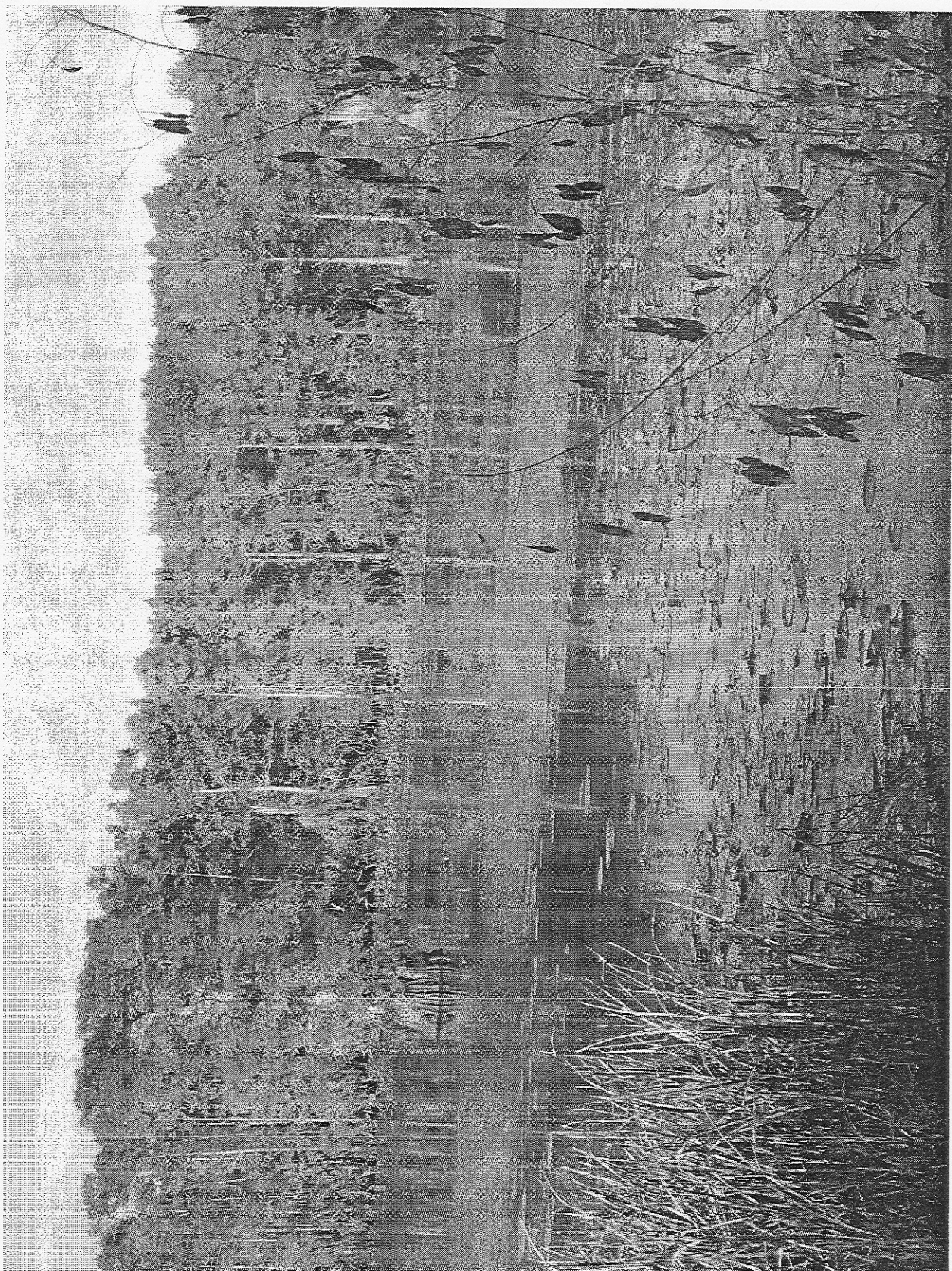
Location ^a	Type	Path ^a		Chemical ^{a,b}
		From	To	
7	Soil runoff to surface water, sediment	Sites 32, 04, 35A	Goose Prairie Creek	perchlorate
	Soil leaching to groundwater	Site 04	Groundwater	Phthalate esters
	Shallow to intermediate groundwater	Sites 04, 35A	Groundwater	perchlorate
	Groundwater to surface water, sediment	Sites 04, 35A	Goose Prairie Creek	Phthalate esters
8, 9, 10	Shallow to intermediate groundwater	Site 35B, 47	Groundwater	VOCs (6)
	Groundwater to surface water, sediment	Site 35B, 47, 50	Goose Prairie Creek	perchlorate
	Shallow to intermediate groundwater	Site 67	Groundwater	Phthalate esters
	Groundwater to surface water, sediment	Site 67	Central Creek	VOCs (6)
11	Shallow to intermediate groundwater	Site 67	Groundwater	Phthalate esters
	Groundwater to surface water, sediment	Site 67	Central Creek	VOCs (6)
	Shallow to intermediate groundwater	Site 67	Groundwater	Phthalate esters
	Groundwater to surface water, sediment	Site 67	Central Creek	VOCs (6)
^a See Table 3 and Figure 1.				
^b Jacobs Engineering Group, Inc., 2002d, "Draft Final Feasibility Study for the Group 4 Sites, Sites 04, 08, 35A, 35B, 35C, 46, 47, 48, 50, 60, 67, Goose Prairie Creek, Saunder's Branch, Central Creek, and Caddo Lake, Longhorn Army Ammunition Plant, Karnack, Texas," October.				
Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, October.				
Phthalate esters = bis(2-ethylhexyl)phthalate, di-n-butylphthalate				
VOCs (6) = trichloroethene, 1,1-dichloroethene, cis-1,2-dichloroethene, 1,2-dichloroethane, methylene chloride, and chloroform				

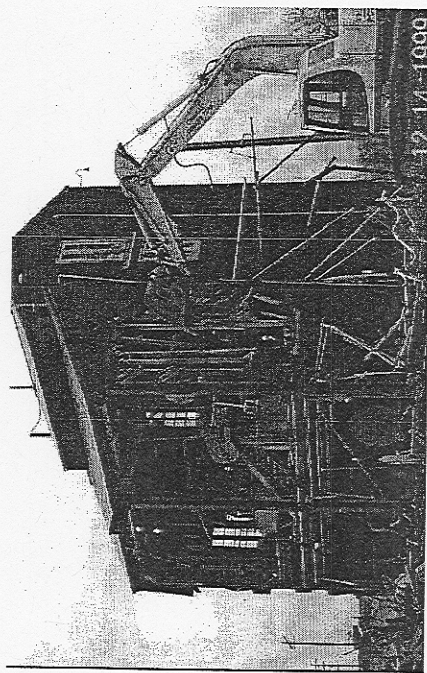
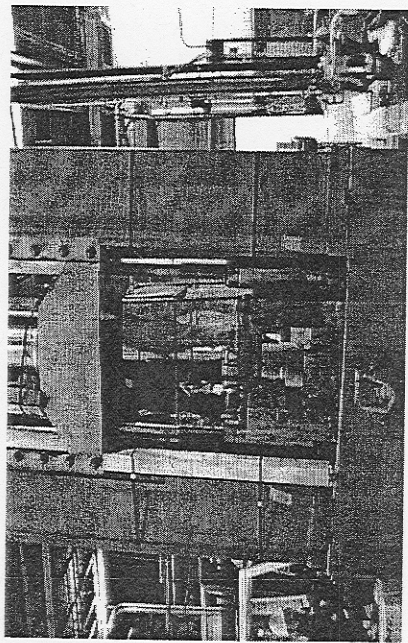
031369



Caddo Lake

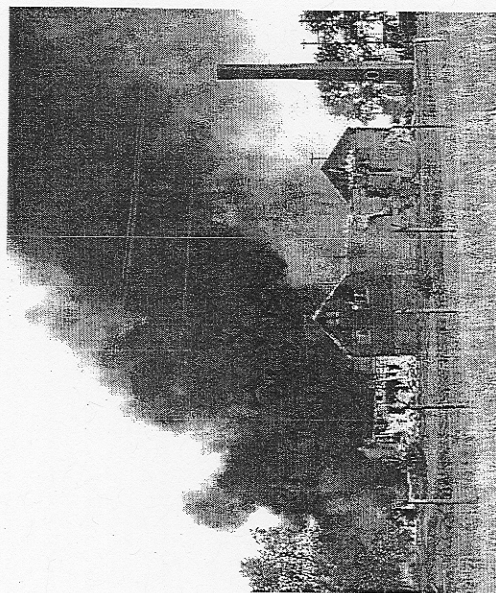
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Technical Support Office Capabilities

October 2003



031371

Our Goals

- **Reduce Excess Military Infrastructure**
- **Reduce Operating Costs**
- **Reduce Cost of Disposal**
- **Protect Human Health and the Environment
While Facilitating Transfer of Government
Property**
- **Compliance with Federal, State, and Local
Environmental Laws**
- **Take actions in an economical manner that's in
the Army/taxpayer's best interest**

Expertise

- **Engineers:**
 - **Industrial**
 - **Environmental**
 - **Mechanical**
 - **Electrical**
- **Industrial Specialists**
- **Environmental Specialists**
- **Real Estate Specialists**

Acquisition Capabilities

- **Engineers & Ind Specialist:**
 - **Part of Acquisition Workforce**
 - **Contracting Officer Technical Representative (COTR) trained**
- **Technical Resource Management**
 - **Budget Development**
 - **Scope of Work Preparation**
 - **Operations & Maintenance**
 - **Disposal (asbestos/PCB/explosives/personal property liquidation, etc)**
 - **Environmental Baseline Surveys**
 - **Explosive Safety Submission**
 - **RCRA Closures**

Acquisition Capabilities

- Tech Review of Proposals
 - Evaluate overall cost base (ER,A; Natural Resource, O&M, Disposal projects)
 - Technical approach
 - Direct/In-direct labor
- Execution:
 - Prioritize requirements
 - Monitor and track performance against Scope of Work and Disposal Goals and Milestones
 - Track expenditures of funds

Regulatory Framework for Successful Property Transfer

- **Resource Conservation and Recovery Act (RCRA)**
- **Unexploded Ordinance (UXO) and Explosive
Safety Compliance Issue**
- **Comprehensive Environmental Response and
Liability Act (CERCLA)**
- **National Environmental Policy Act (NEPA)**
- **National Historic Preservation Act (NHPA) –
Section 106 process**
- **Endangered Species Act (ESA)**

Project Management

- **Cradle to Grave (from Budget to Physical Acceptance) Management, with emphasis on innovative execution, cost control and objective performance for various types of efforts:**
 - **Asbestos/PCB/Halon/Mercury Decontamination**
 - **Explosive Decontamination**
 - **RCRA Closures**
 - **Deactivation and Mothballing Facilities, Utilities, and Equipment**
 - **Plant Closures/Downsizing/Equipment Relocations**
 - **Liquidation of Various types of Personal Property (Chemical/Machine Tools/Utilities/TDA equipment/etc)**
 - **Plant (Facility and Equipment) Maintenance Projects**

Real Estate Capabilities

BRAC & Non-BRAC

- **Direct/Approve Real Estate Actions**
- **Develop/Review Documentation for Implementation/Legal sufficiency**
 - **FOST/FOSL/FOSET/ECOP Documentation**
 - **Section 106, NHPA compliance**
 - **McKinney Act**
 - **NEPA/CERCLA**
- **337 Documentation**
- **Coordinate Army Real Estate Requirements with GSA/COE**
- **Facilitate development of interim use plans and ultimate re-use/disposal strategy**

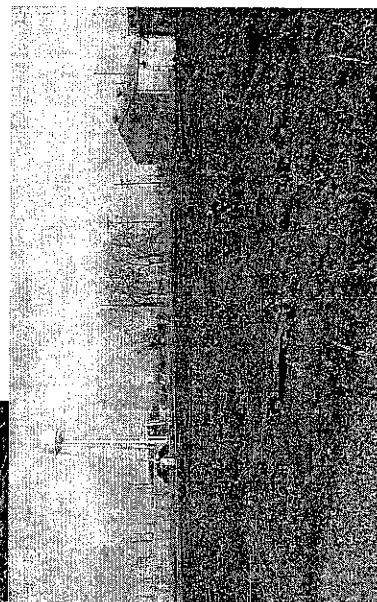
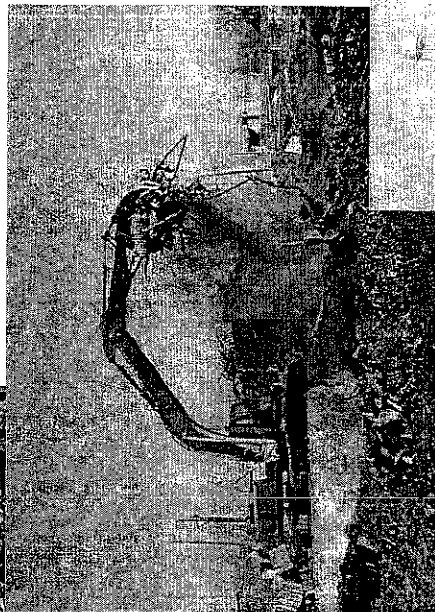
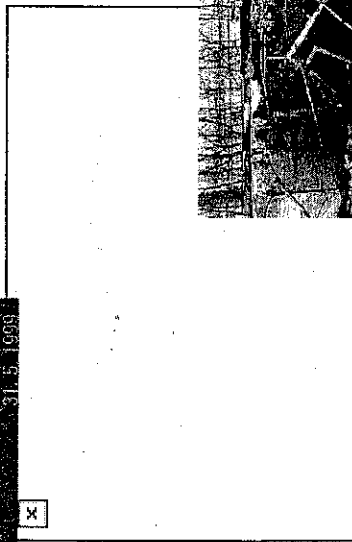
The Technical Office Excels In

- **Managing Overall Costs at Excess Facilities**
 - **Big Picture (Gov't Liabilities/Cost of Ownership/Disposal)**
 - **Using Sale Proceeds to Off-Set Current/Future Disposal Cost**
 - **Develop SOW/negotiate contracts that will allow 100% use of personal property sale proceeds**
 - **Develop SOW/negotiate contracts that allows use of scrap/equipment/wood values as a consideration for demolition costs**
- **Obtaining EPA regulator approvals others say are impossible**
 - **Clean closures which require no monitoring**
 - **Burn permits**

The Technical Office Excels In

- **Innovative Disposal Applications**
 - **Remote Decontamination of OB/OD Grounds with UXO**
 - **Thermal Decomposition of Explosively Contaminated Buildings**
 - **Hydro-jet Cleaning of Contaminated Sewer Lines**
 - **Bio-Remediation**
 - **Natural Attenuation**
- **Real Estate**
 - **Developing compatible interim leasing strategy to generate revenue to help reduce Government cost of ownership**
 - **Developing long-term re-use and disposal strategies**

Start to Finish



The Technical Support Office

Can Do It For You!

Attendees for Longhorn AAP

Partnering/Transition/Program Review Meeting

19 November 2003

1245-1700

Dallas, Texas

Louisiana AAP

David Tolbert

BRAC

Tom Lederle
Rose Zeiler
Francine Cole
Brian Gebhart

AEC APGEA

Bill Nelson

Corps of Engineers

John Roberts	Clif Warren
Jonna Polk	John Weatherly
Andy Obrochta	
Clif Murray	
Michelle Rhodes	
Kevin Davee	

Shaw Group

David Tester
Praveen Srivastav

Agenda
Longhorn Army Ammunition Plant
Technical Review Committee Meeting
Venue: LHAAP, GWTP Office Trailer
10:30 AM, December 03, 2003

10:30	AM	Opening Remarks and Introductions	David Tolbert
10:35	AM	Executive Summary	Praveen Srivastav
11:00	AM	Groundwater Treatment Plant Report	CES
11:30	AM	Quarterly Groundwater and Surface Water Sampling Report	Cliff Murray
12:00	AM	Groups 2 and 4 Data Gaps Work Plan Comments	Praveen Srivastav
12:15	AM	Meeting Schedule	Andy Obrochta
12:30	AM	Meeting Adjourned	

Longhorn Army Ammunition Plant Technical Review Committee Meeting

Location	LHAAP, TX
Date	3-Dec-03

[illegible]



Subject: Draft Minutes, Quarterly Technical Review Committee Meeting/Monthly Managers Meeting, Longhorn Army Ammunition Plant (LHAAP)

Location of Meeting: LHAAP

Date of Meeting: 10:30 AM – 12:30 PM, December 03, 2003

Meeting Participants:

Shaw Environmental: Praveen Srivastav

USACE-Tulsa: Andy Obrochta, Michelle Rhodes, Cliff Murray

USEPA Region 6: Chris Villarreal

BRAC: Rose M. Zeiler, Lanis Rieger

TCEQ: Jim Sher, Tom Erny

USFWS: Paul Bruckwicki, Mark Williams

CES: Bill Corrigan

TPWD: Todd Dickinson

DOD TAP: J.L. "Bud" Jones

A Technical Review Committee (TRC) Meeting/Monthly Managers Meeting was held at LHAAP on December 03, 2003. The agenda of the meeting included a project status review, presentation of Site 18/24 groundwater treatment plant report, and presentation of quarterly surface water sampling. The agenda is attached with these minutes.

Rose Zeiler opened the meeting by introducing herself as the LHAAP Site Manager. She invited everyone present to introduce themselves. The meeting began after introductions. A summary of the discussions is given below.

Project Status Summary

Praveen Srivastav discussed the project status summary. A table showing the project status was distributed to the attendees and is also attached with these minutes. It was pointed out that two documents (Groups 2 and 4 Data Gaps Work Plan and Modeling Technical Memorandum) are in review and the comments are past due. Following is the summary of discussion:

- Jim Sher stated that the Army may want to consider reducing the frequency of quarterly perimeter well sampling because previous years' sampling has not shown contamination in the wells. However, parties other than TCEQ will have to be involved in the decision. These include water supply departments of cities or towns receiving water from Caddo Lake, Caddo Lake Institute, and possibly other stakeholders.

Reduction of sampling frequency may be proposed at a future TRC meeting for public input.

- The draft technical memorandum for alternate concentration limit (ACL) calculations is in review with TCEQ's modeling group and may take 45-60 days from the date of submittal.
- TCEQ agreed to the use of the Bootstrap technique for installation-wide ERA for non-parametric data. However, TCEQ recommends checking for normality prior to the use of the method. TCEQ agreed to provide an e-mail outlining their recommended preferred approach for the use of the Bootstrap method.
- Shaw to provide a map showing surface water/sediment sample locations to-date and also include tabulated data for these samples.

Groundwater Treatment Plant Report

Bill Corrigan of Complete Environmental Services (CES) presented a report on the operation of the Site 18/24 groundwater treatment plant (GWTP). He distributed copies of the report to the meeting participants. Summary of discussion is given below:

- Harrison Bayou currently has no flowing water so GWTP discharge can not be directed to it. The discharge is being directed to the retention pond which is becoming full. Bill Corrigan's recommendation to the Army was that a water truck be used to pump out the water from the pond and to spread the water on streets. The Army concurred with CES's recommendation. Regulators were in agreement with this decision. The method will be used for December 2003 and re-evaluated in January 2004.
- TCEQ suggested that reinjection may be another alternative.
- Perchlorate was detected in an effluent sample in October but the detection was below the reporting limit.

Quarterly Groundwater and Surface Water Sampling Report

Cliff Murray presented results of the quarterly groundwater and surface water sampling effort being conducted by the USACE. Copies of the presentation were distributed to the participants. Summary of discussion is given below.

- TCEQ showed concern over the detection of perchlorate in the surface water of Goose Prairie Creek in the area northeast of Site 29. The source of the perchlorate is not clear.
- TCEQ showed concern over the detection of 99 ppb of perchlorate in the pooled surface water of Harrison Bayou near Site 16. This concentration is higher than those detected in shallow monitoring wells adjacent to the bayou to the west and northwest. Jim Sher stated that contamination may be moving at a deeper level than the existing shallow wells and getting into the creek. The Army stated that it will review the data from Site 16 and will consider the possibility of a data gap in the vertical extent of contamination.

Additional Discussion

Bud Jones gave a synopsis of his work on the subsurface geology of LHAAP. He mentioned sand channels that are present under some of the sites and may be acting as preferred pathways for contaminants. He mentioned that the channels are up to 3000 feet wide and contain 200-300 feet of sandy material of Wilcox Group. He indicated that he has submitted copies of his maps and cross-sections to the USACE in the past.

The meeting was adjourned.

Meeting Action Items

1. The Army will review the perimeter well sampling with a view to reduce the frequency of sampling. Any reduction in sampling frequency will be proposed during a future TRC meeting.
2. TCEQ will provide an e-mail outlining their recommendations for the use of Bootstrap technique.
3. The Army will review detections of perchlorate in the surface water of Goose Prairie Creek in order to locate a potential source. The Army will also review information from Site 16 to determine if there is a data gap in the definition of the vertical extent of groundwater contamination near the bayou.
4. Shaw will prepare a map of surface water/sediment sample locations and a table of results
5. USFWS will provide a copy of their presentation made during November 19, 2003 meeting in Dallas and results of their study.
6. Final documents will be submitted in hard copy as well as in PDF format
7. Comments are due for the ACL modeling technical memorandum and Groups 2 and 4 Data Gaps Work Plan.
8. USACE to provide a copy of quarterly groundwater/surface water sampling results to TCEQ in PDF format.
9. Rose Zeiler to provide point of contact (POC) information to the stakeholders.

LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY
DECEMBER 03, 2003
 Page 1 of 2

031388

Task Name	Task Phase	Task Status	Next Milestone
Groups 2 and 4: Quarterly Sampling	Remedial Investigation/ Feasibility Study	Last quarterly surface water and perimeter well sampling completed on August 03, 2003	Next sampling scheduled for December 2003. Sampling could not be done in November due to less than normal precipitation
Groups 2 and 4: Data Gaps Work Plan	Remedial Investigation/ Feasibility Study	Draft work plan submitted on October 15, 2003. Currently in review.	- Resolve comments and submit final work plan - Begin monitoring well installation and sampling in January 2004
Groups 2 and 4: ACL Modeling	Remedial Investigation/ Feasibility Study	Draft Technical Memorandum submitted on October 30, 2003. Currently in review.	Resolve comments and submit final technical memorandum
Installation-wide Background Work Plan and Sampling	Remedial Investigation/ Feasibility Study	- Comments on draft-final work plan resolved - Final work plan in preparation - Background soil sampling completed on October 30, 2003 - Data Quality Summary Report in preparation	- Final work plan to be submitted in December 2003. - Background groundwater sampling to be completed in December 2003. - Background groundwater, surface water, and sediment sampling to be completed in February-March 2004. - Submit Data Quality Summary report in December 2003

LONGHORN ARMY AMMUNITION PLANT
IRP STATUS SUMMARY
DECEMBER 03, 2003
Page 2 of 2

Sites 12: Landfill 12	Feasibility Study	Revised draft-final FS report in preparation	Revised draft-final FS report to be submitted in December, 2003
Site 18/24: Groundwater Treatment Plant	Interim Remedial Action	Normal operation	
Caddo Lake Sampling	Remedial Investigation/Feasibility Study	Sediment sampling report in preparation	The report will be submitted in January, 2004
Transition Mgmt Group			

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Information for Quarterly TRC Meeting

Longhorn Army Ammunition Plant Groundwater Treatment Plant Report

Site 18/24/16

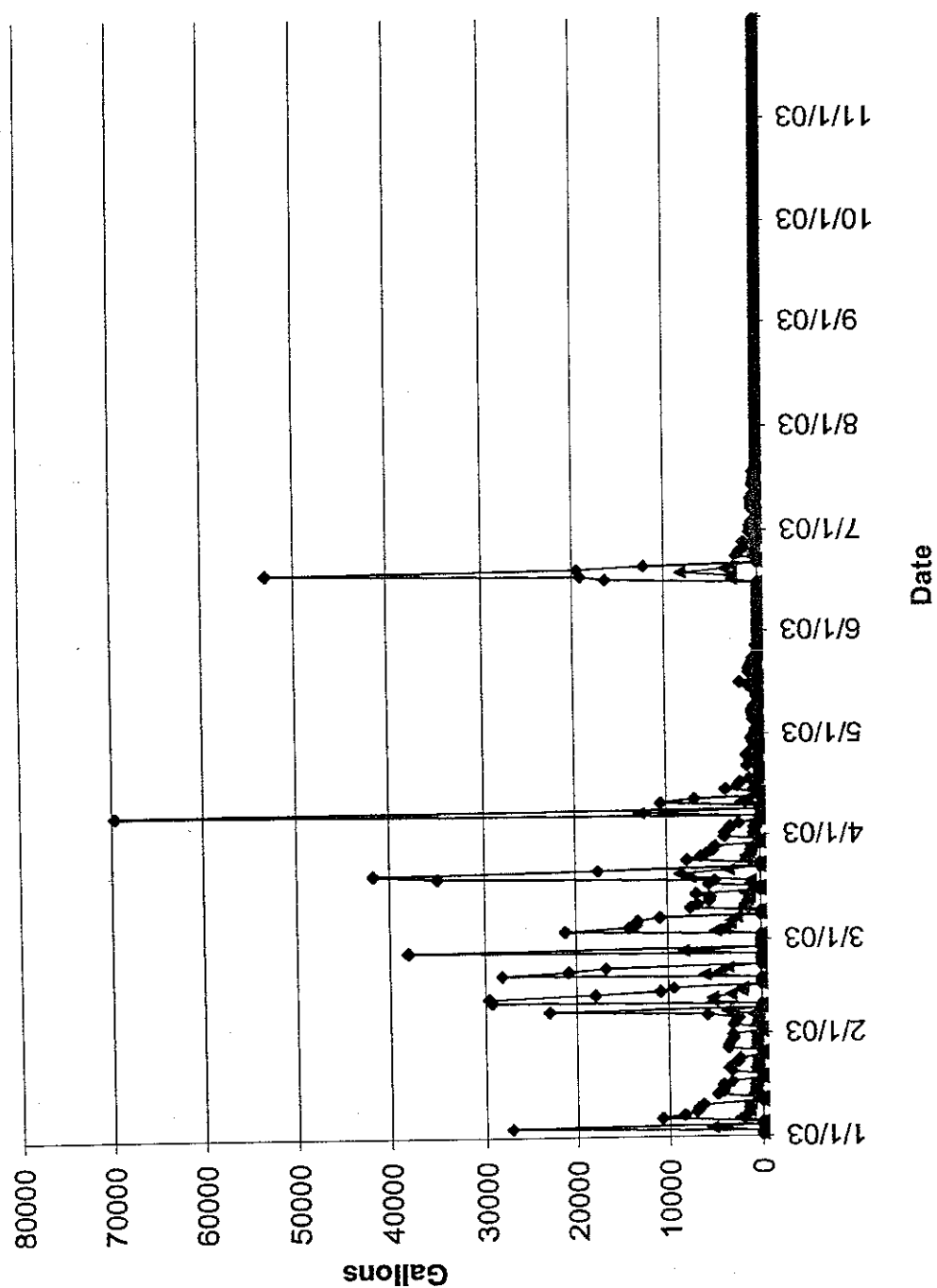
December 3, 2003



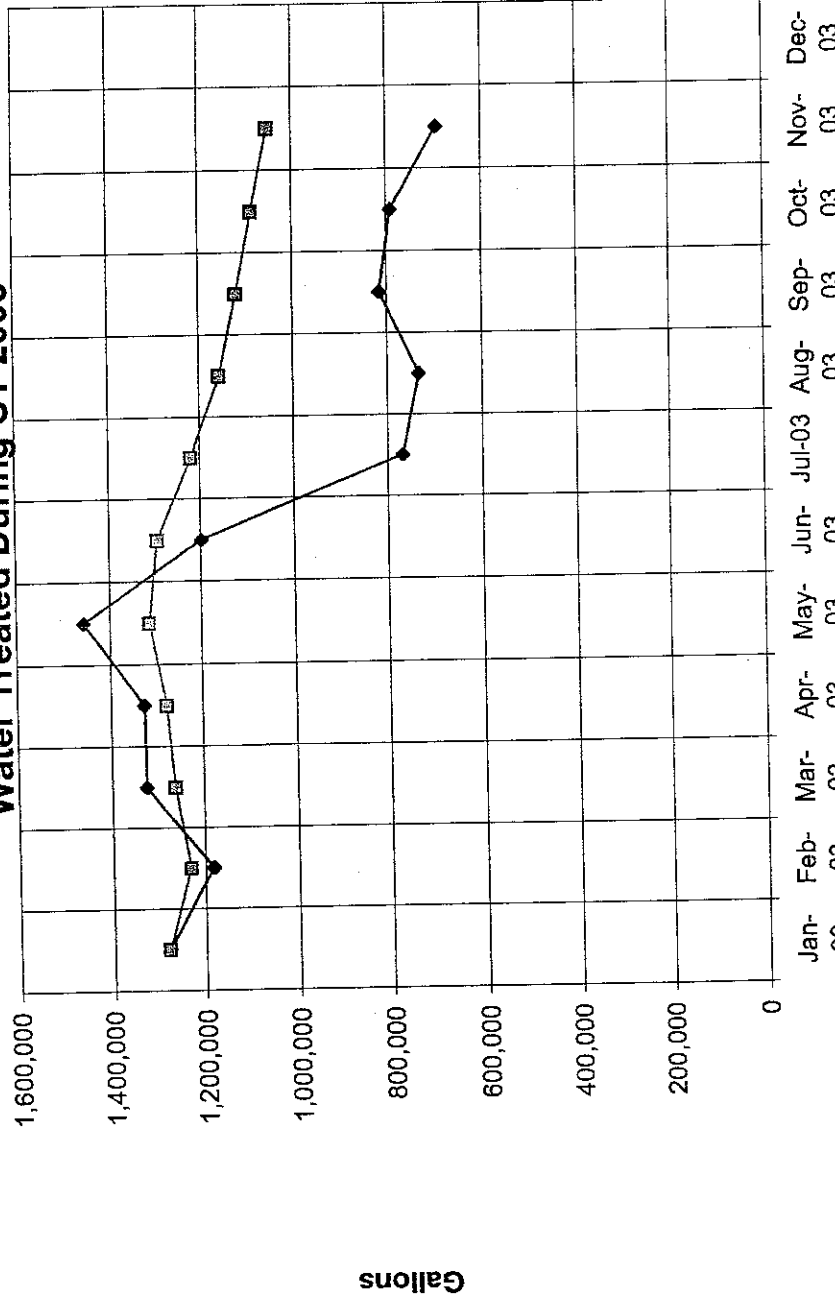
GWTP OPERATIONS

- An electrical pole with a transformer (and circuit breaker panel to some ICT's) at BG-3 broke and fell across the fence. The weight of the pole pulled down another pole on the corner and it fell across the fence. The weight of the corner pole placed another corner pole in tension and it split about halfway up. Fortunately, electrical disconnect switches were installed this year that can isolate Site 18/24. The GWTP was able to stay online. The incident happened on a Monday and the lines were back in service on Wednesday morning of the same week.
- The Catalytic Oxidizer blower is scheduled for removal and replacement the week of December 8. The blower currently in service is corroded beyond repair. It has been temporarily patched to prevent air leaks. The plant will be non-operable for about five days. Water will be stored in Tank 630 in order to keep the FBR in service.
- Automatic callout system temporarily down because AT&T and other phone companies discontinued their Telelocator Alphanumeric Protocol (TAP) service. This prevents the PLC that operates the plant from communicating and sending a text message to a mobile phone. Service is now being obtained through a company that provides pagers.
- Effluent samples have been sent to two of our contract laboratories and a different laboratory that using a Mass Spec in conjunction with an Ion Chromatograph for Perchlorate analysis. The purpose is for a quality check of perchlorate sample analysis at our contract laboratories.
- An effluent sample has been sent to "Applied Research Associates". Under ERDC-CRREL funding they have developed a field screening method for Perchlorate that is good to 1 ug/L for water and 0.3 ug/g for soil. If workable, this method would allow for near real time analysis of FBR effluent onsite and would serve a better purpose than the weekly Perchlorate samples.
- There has been no flow in Harrison Bayou since July. The FBR has been discharging effluent to the INF Pond since July and it is now at capacity. One of two alternatives can be implemented at this time.
 1. Place the FBR on "recycle". After about 24-hours the biomass will begin deteriorating. After a week the FBR will have to be re-inoculated if we want to begin discharging effluent.
 2. Rent a water truck and pump effluent from the INF Pond and spread on roadways. The truck should be able to keep up with GWTP flowrates. The FBR can be run on recycle at nights if necessary.
- All ICT pump station casings and cleanouts have been surveyed for coordinates and elevation. This information will be utilized to evaluate groundwater levels at the site and compare to the bottom of the ICT's. The perimeter fence corners were also surveyed.

Harrison Bayou Flow Data 2002

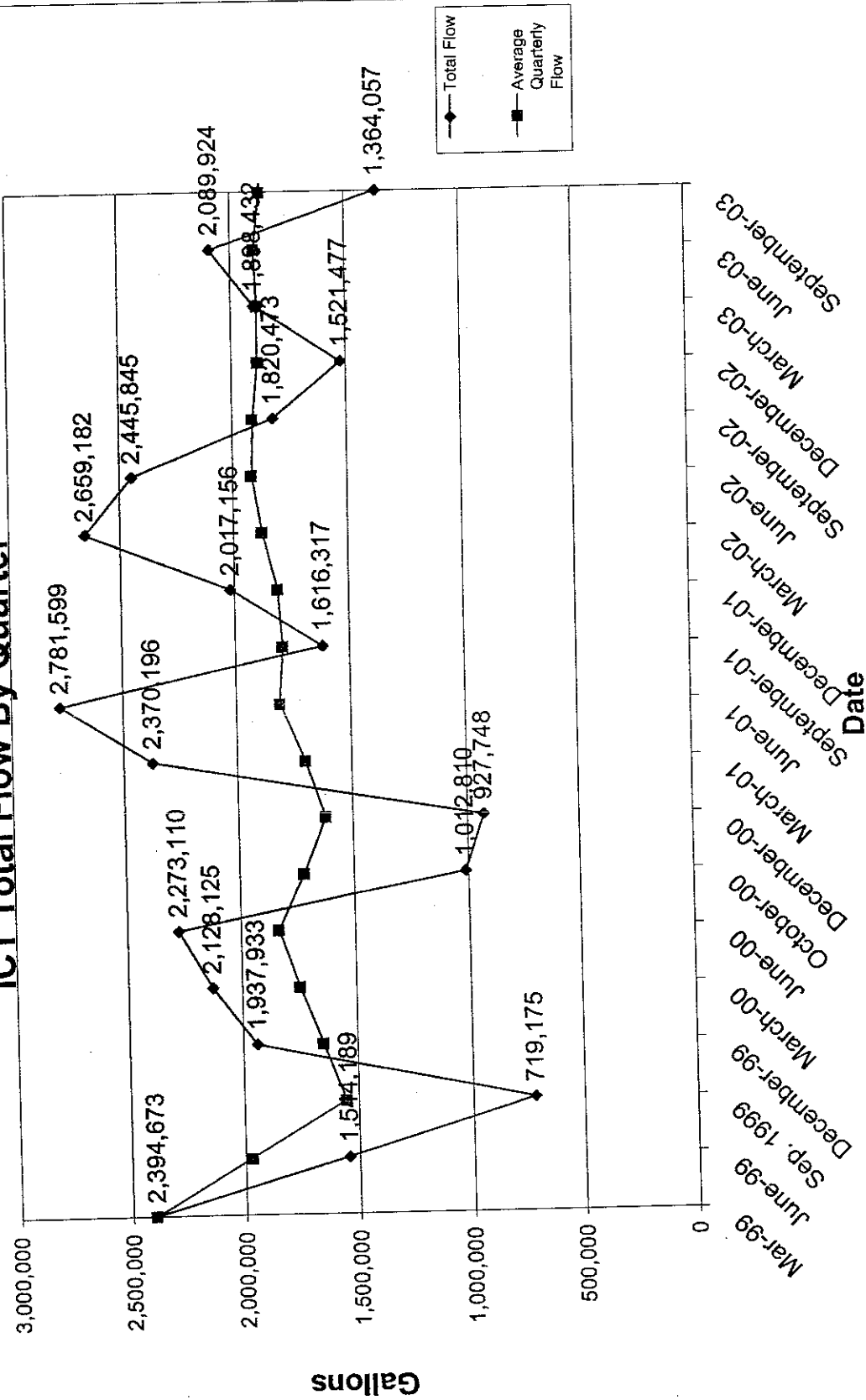


Longhorn AAP Groundwater Treatment Plant Water Treated During CY 2003

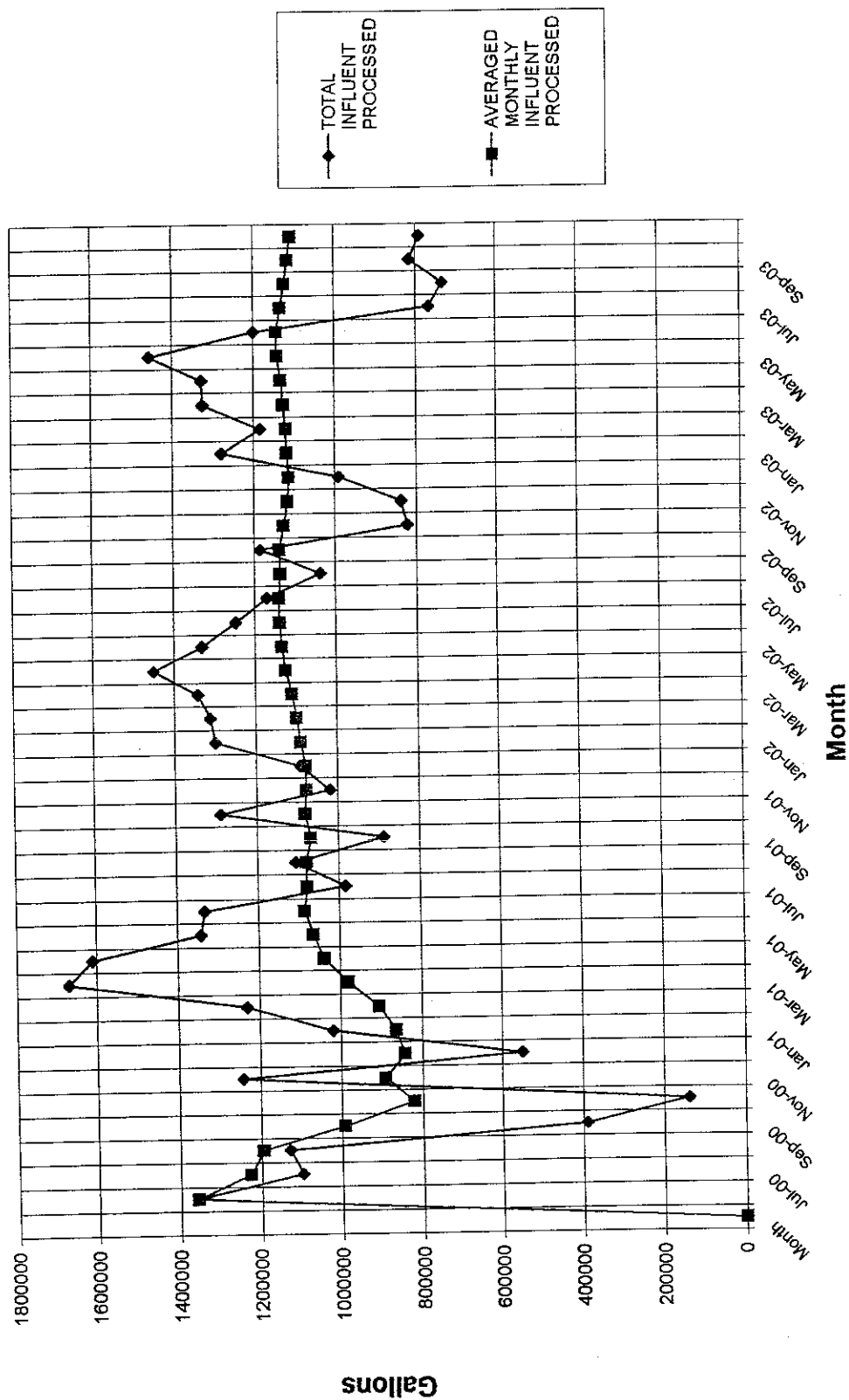


		Month											
		Jan-03	Feb-03	Mar-03	Apr-03	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
TOTAL INFLUENT PROCESSED		1,278,739	1,182,158	1,324,578	1,327,604	1,456,143	1,197,662	767,198	732,855	814,841	790,492	693,217	
AVERAGED MONTHLY INFLUENT PROCESSED (Jan. 03-Dec. 03)		1,278,739	1,230,449	1,261,825	1,278,270	1,313,844	1,294,479	1,219,153	1,158,341	1,120,152	1,087,186	1,051,371	

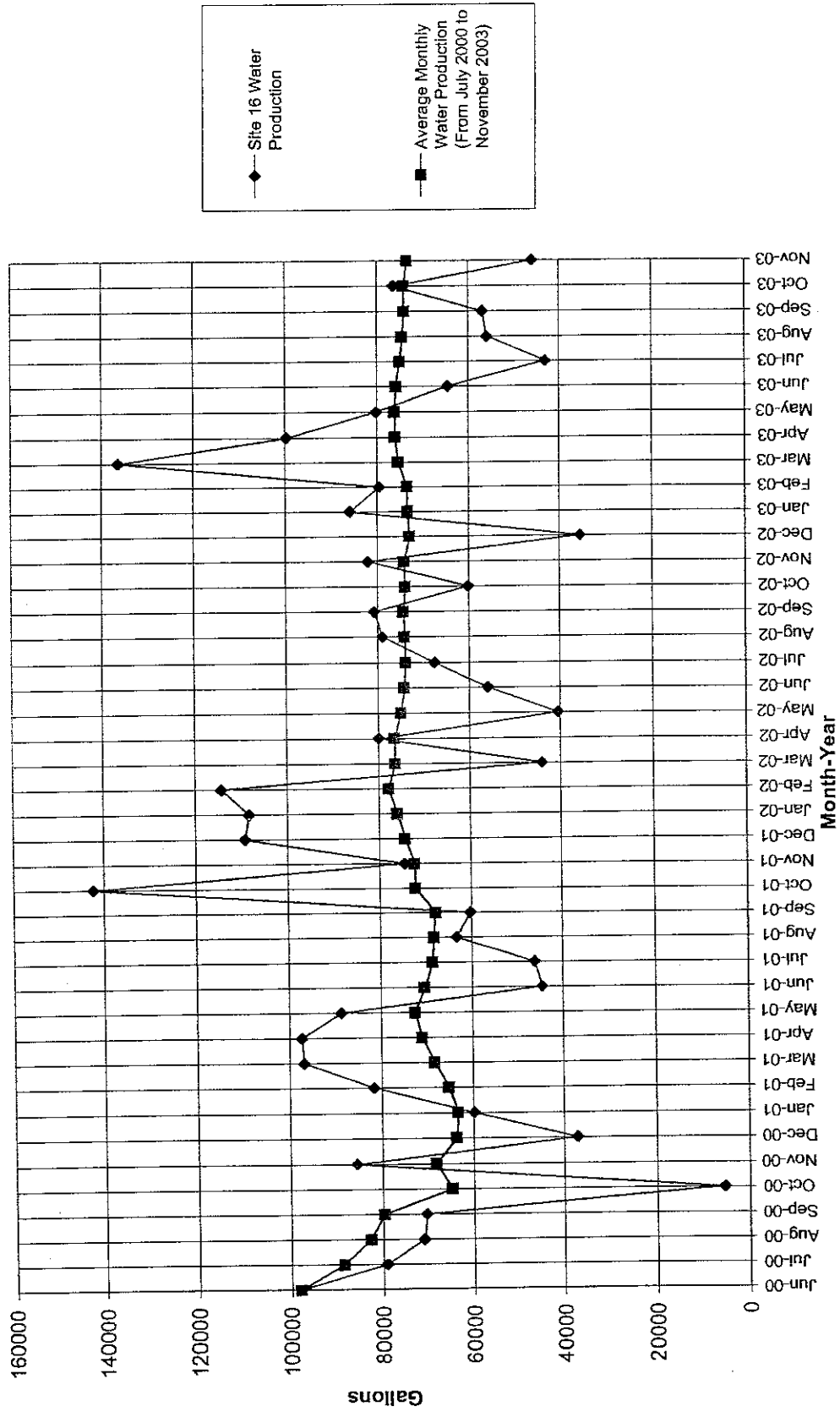
Site 18/24 ICT Total Flow By Quarter



Longhorn AAP Groundwater Treatment Plant
Water Treated June 2000 thru October 2003



LONGHORN ARMY AMMUNITION PLANT
GROUNDWATER TREATMENT PLANT
SITE 16 WATER PRODUCTION

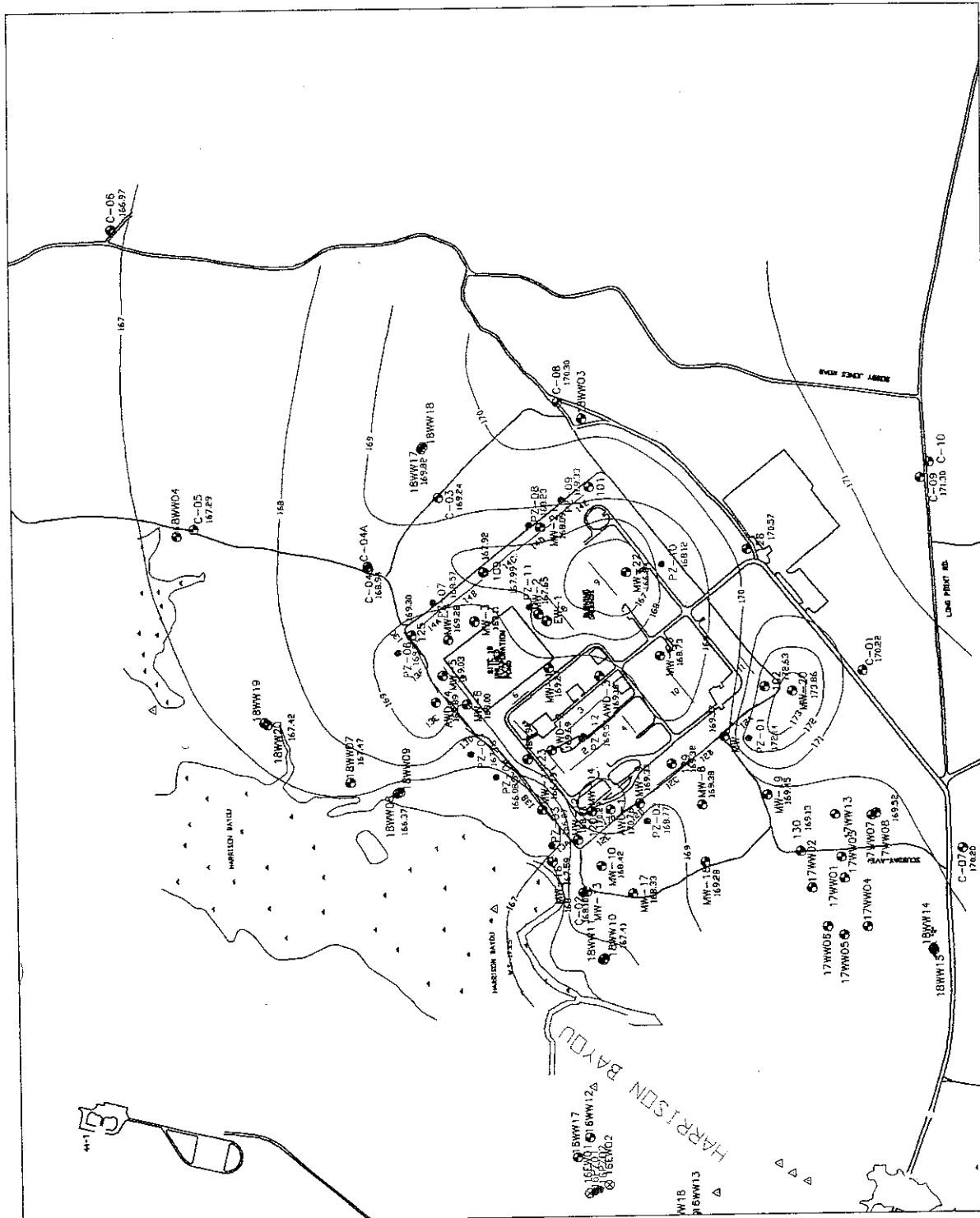


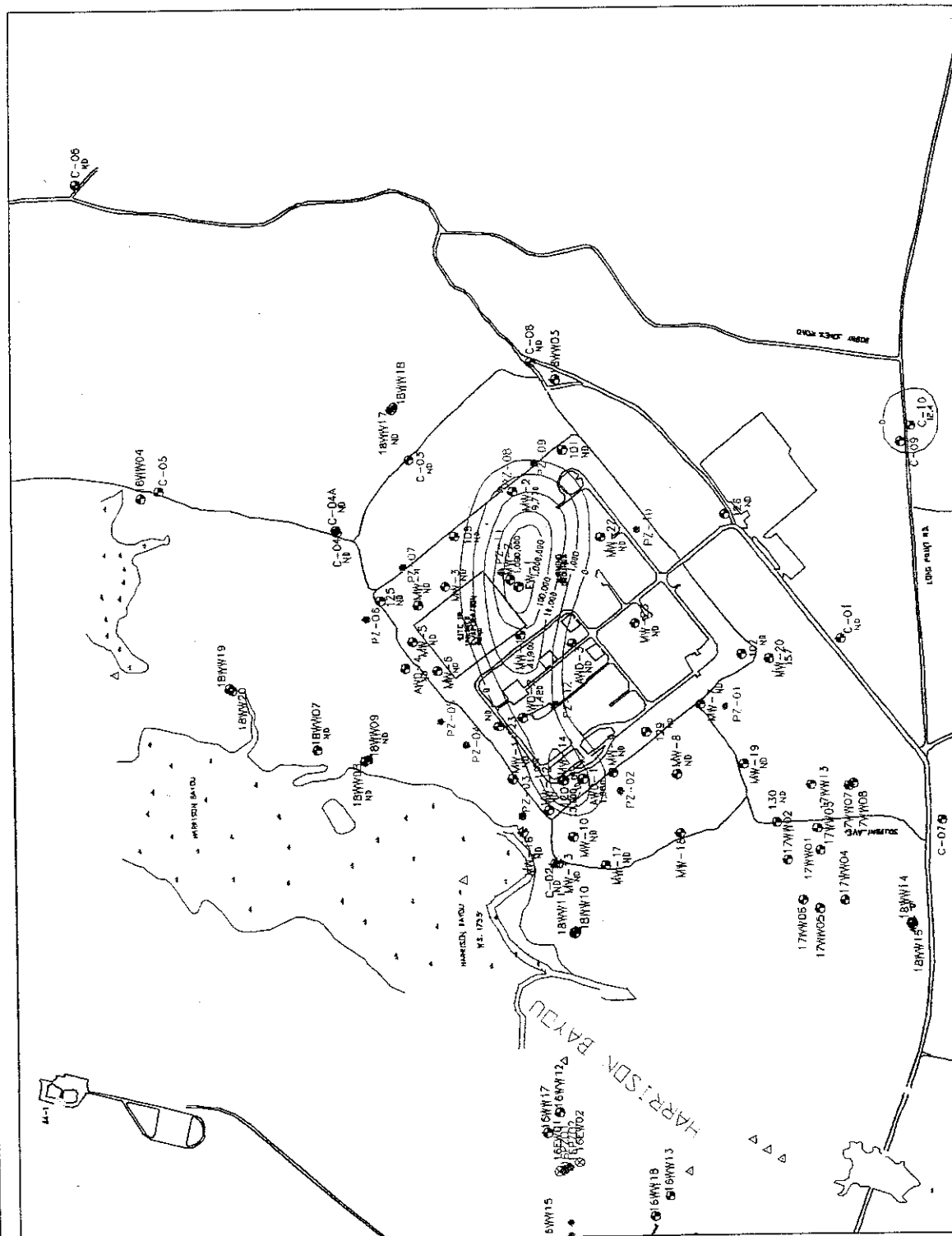
Complete Environmental Service

LHAAP Sites 18 & 24

DATE: October 2, 2003

Groundwater Levels



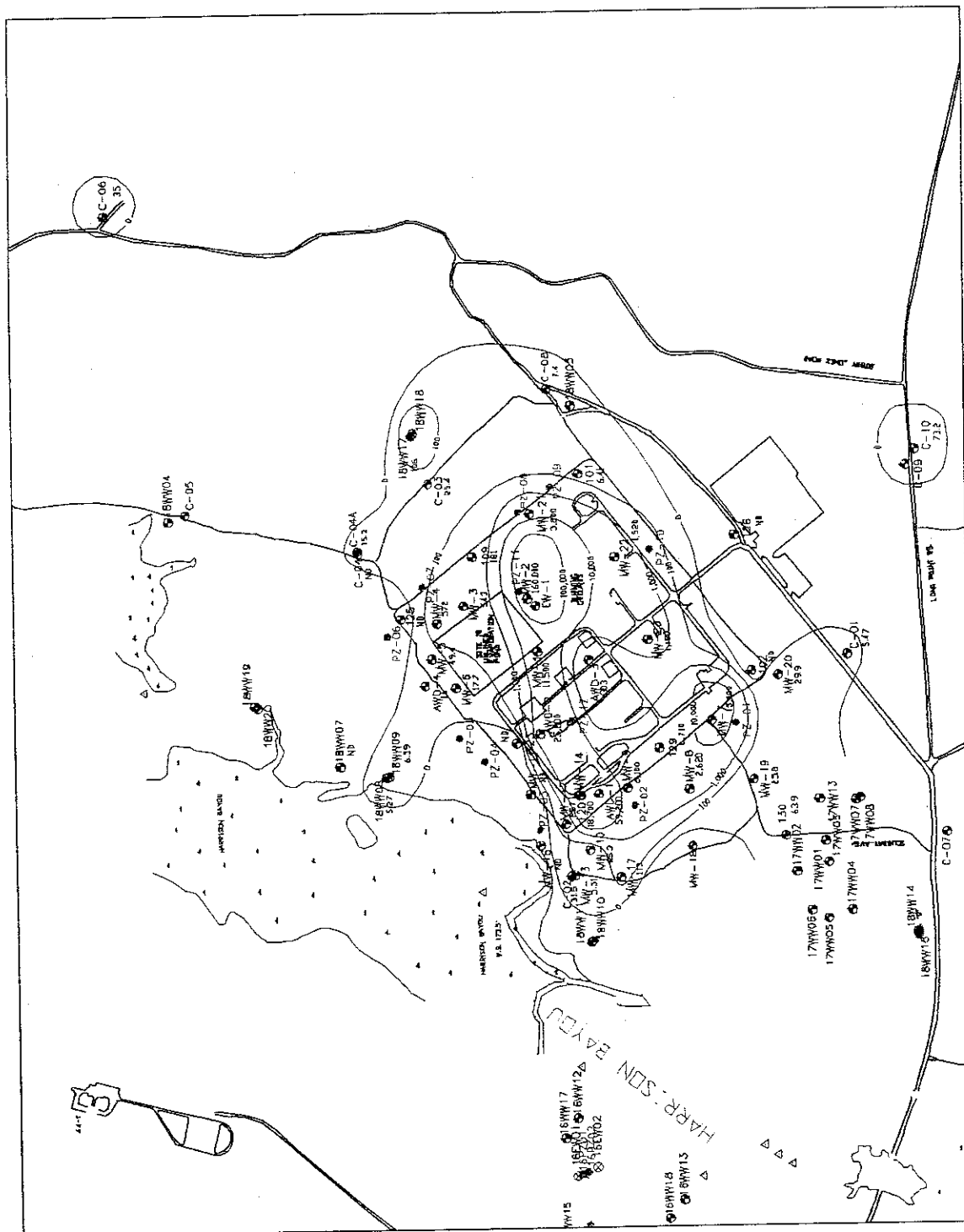


Complete Environmental Service

LHAAP Sites 18 & 24

DATE: May 2003

Methylene Chloride



Complete Environmental Service

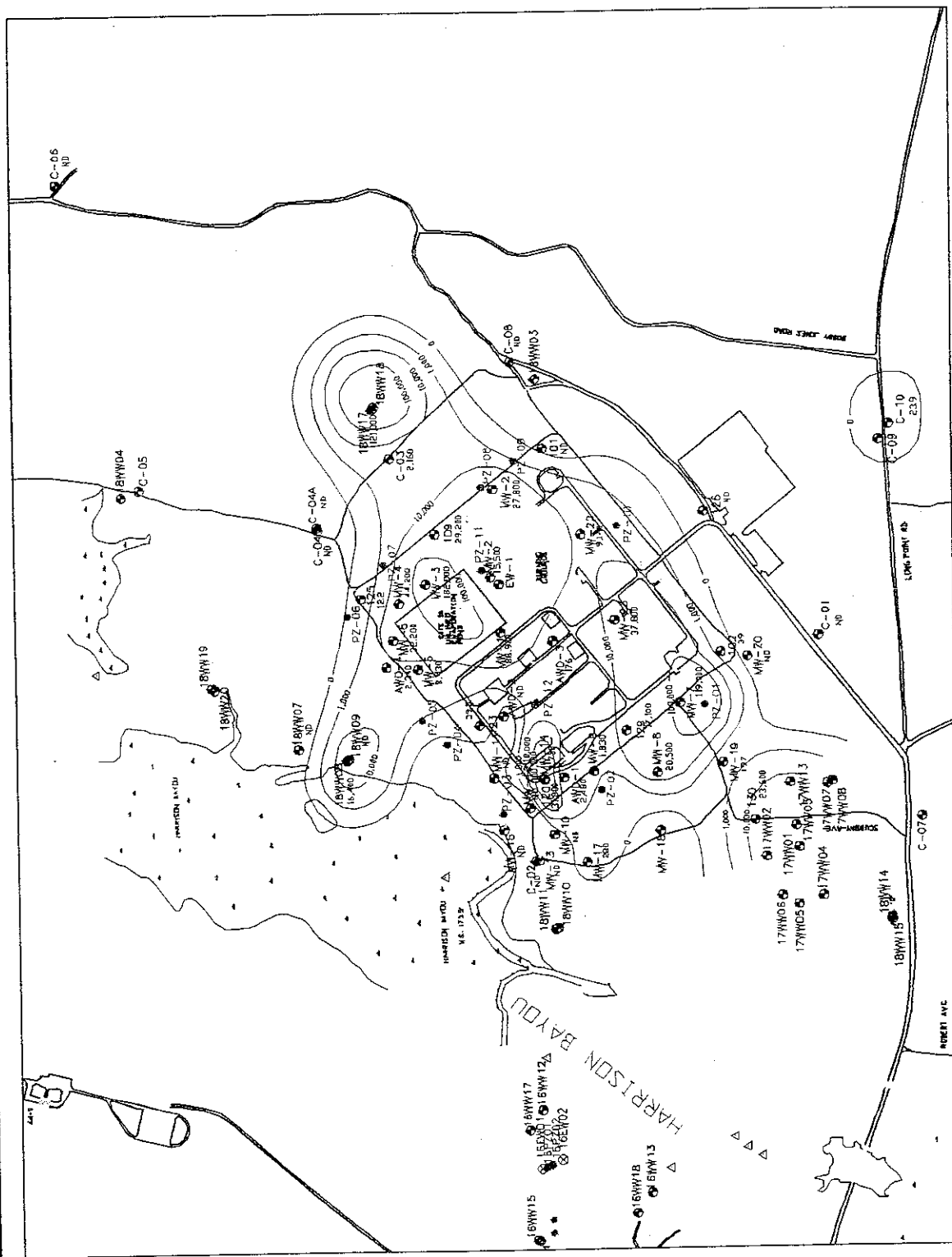
LHAAP Sites 18 & 24

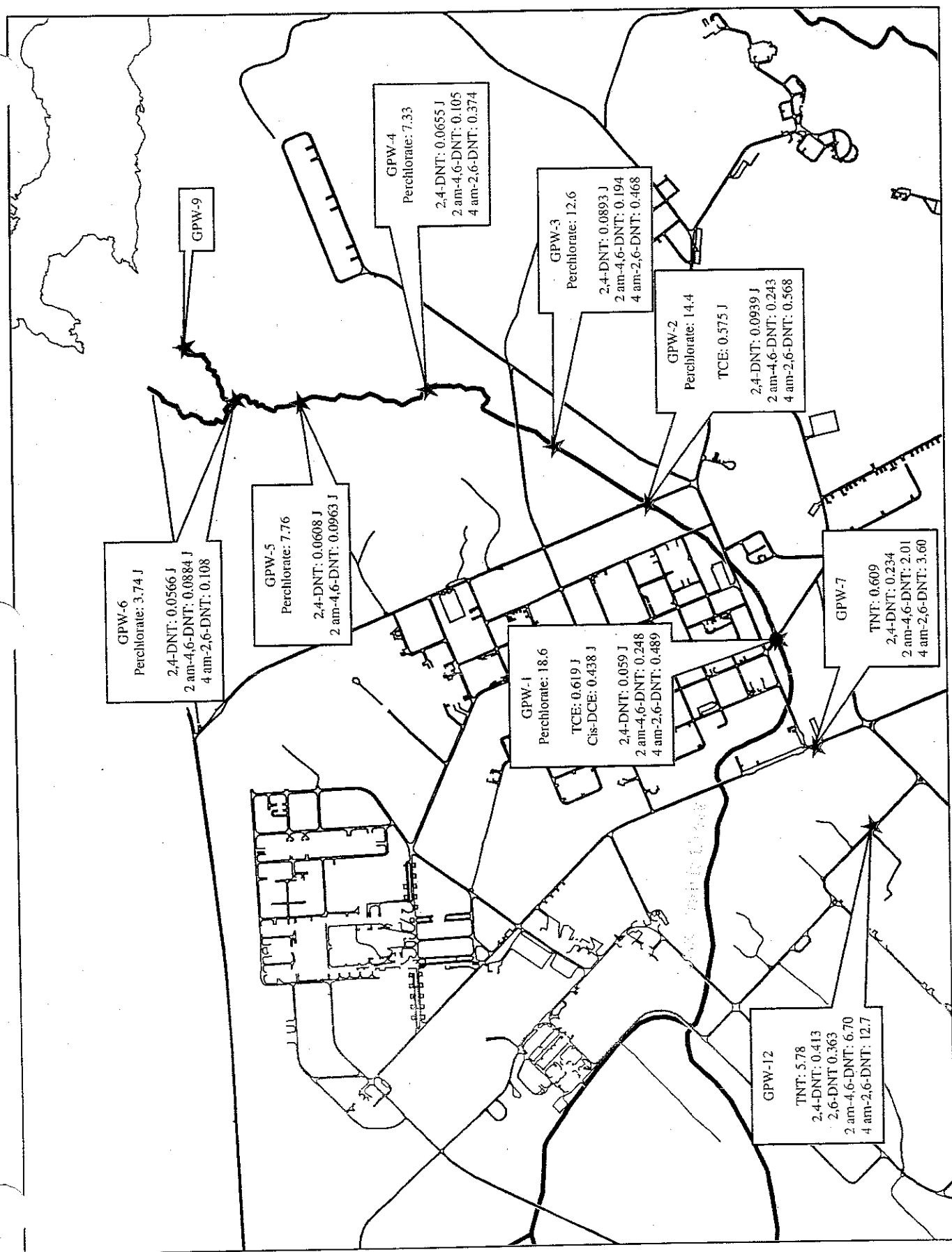
DATE: May 2003

Trichloroethene

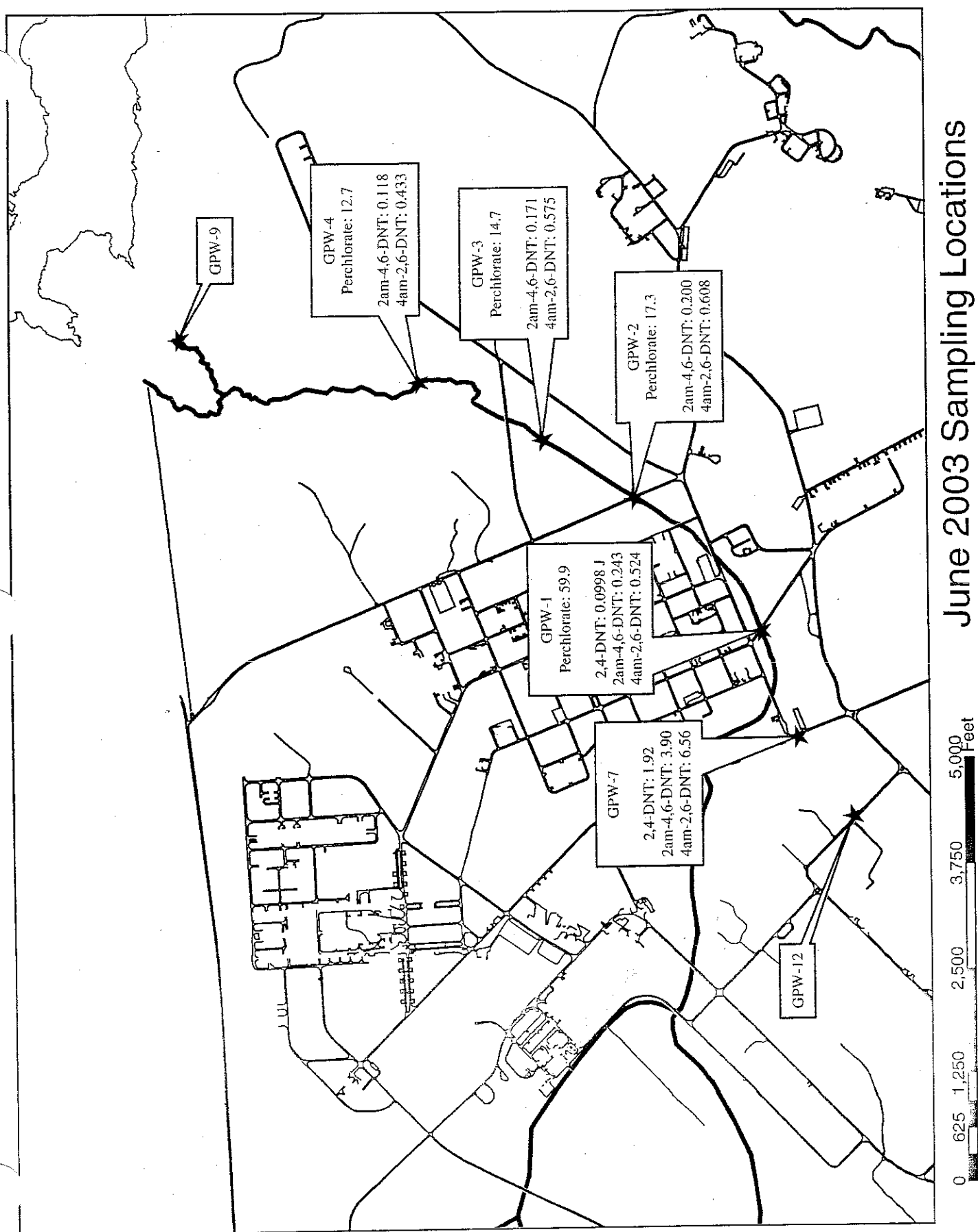
Complete Environmental Service
 LHAAP Sites 18 & 24
 DATE: May 2003
 Perchlorate in UG/L

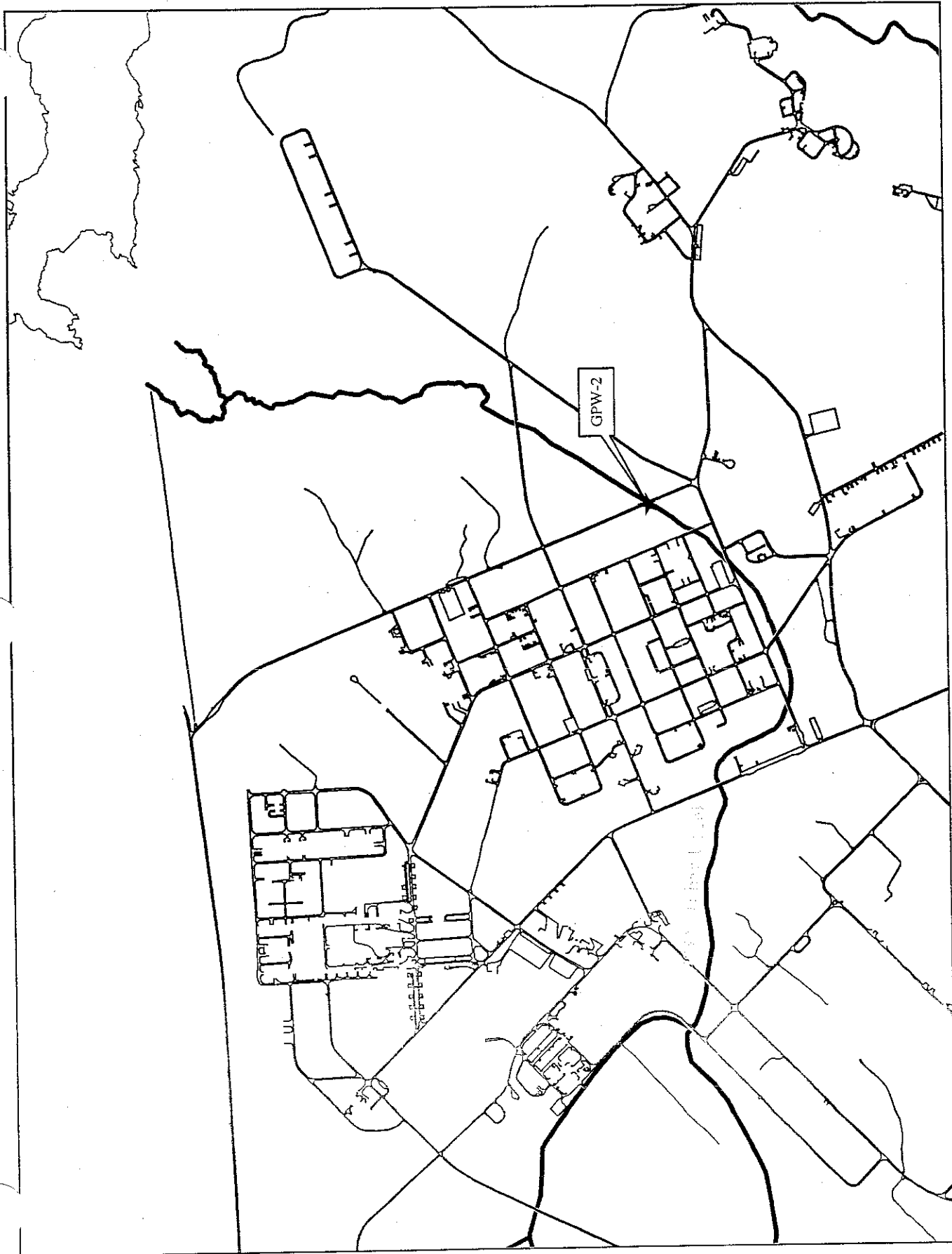
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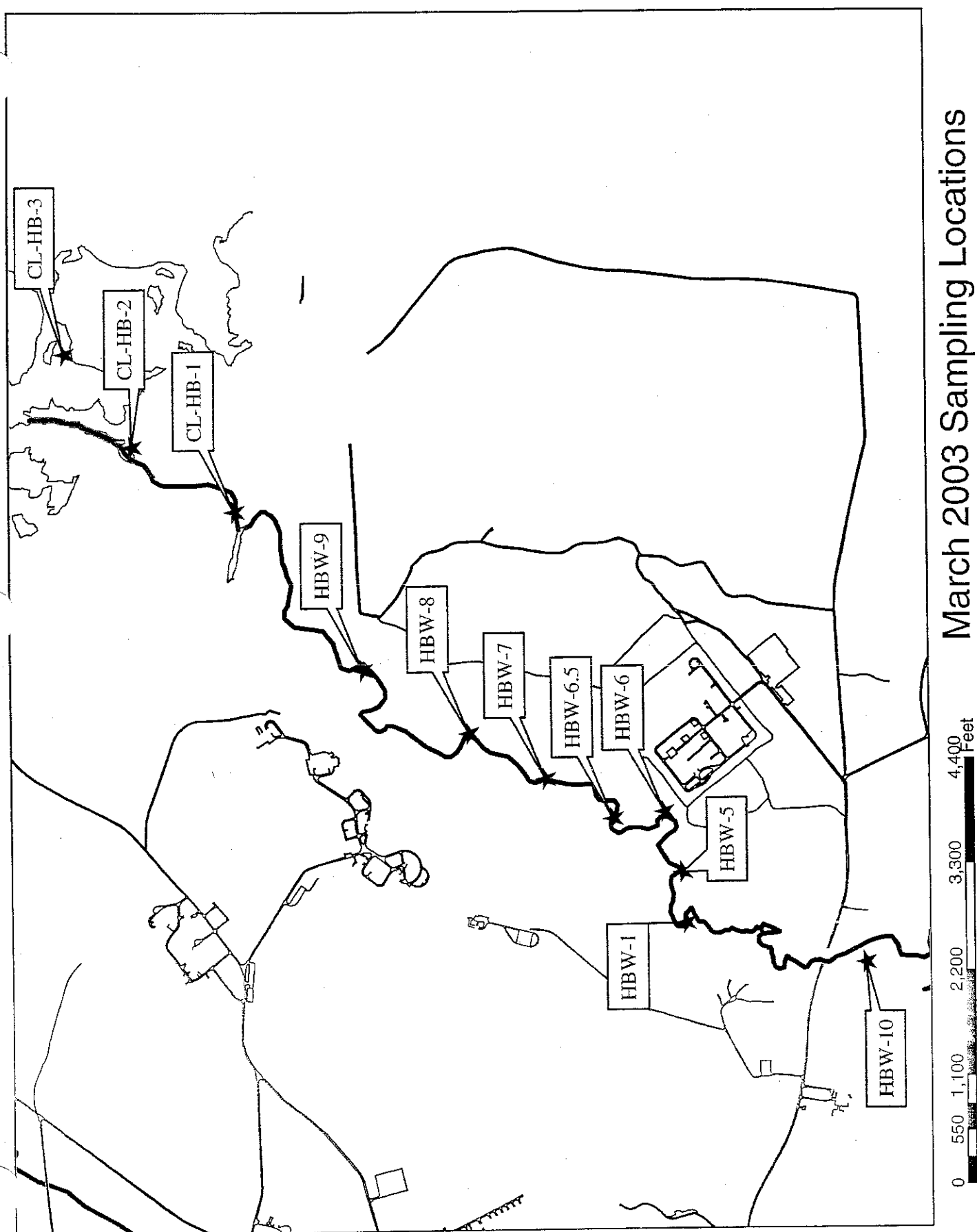


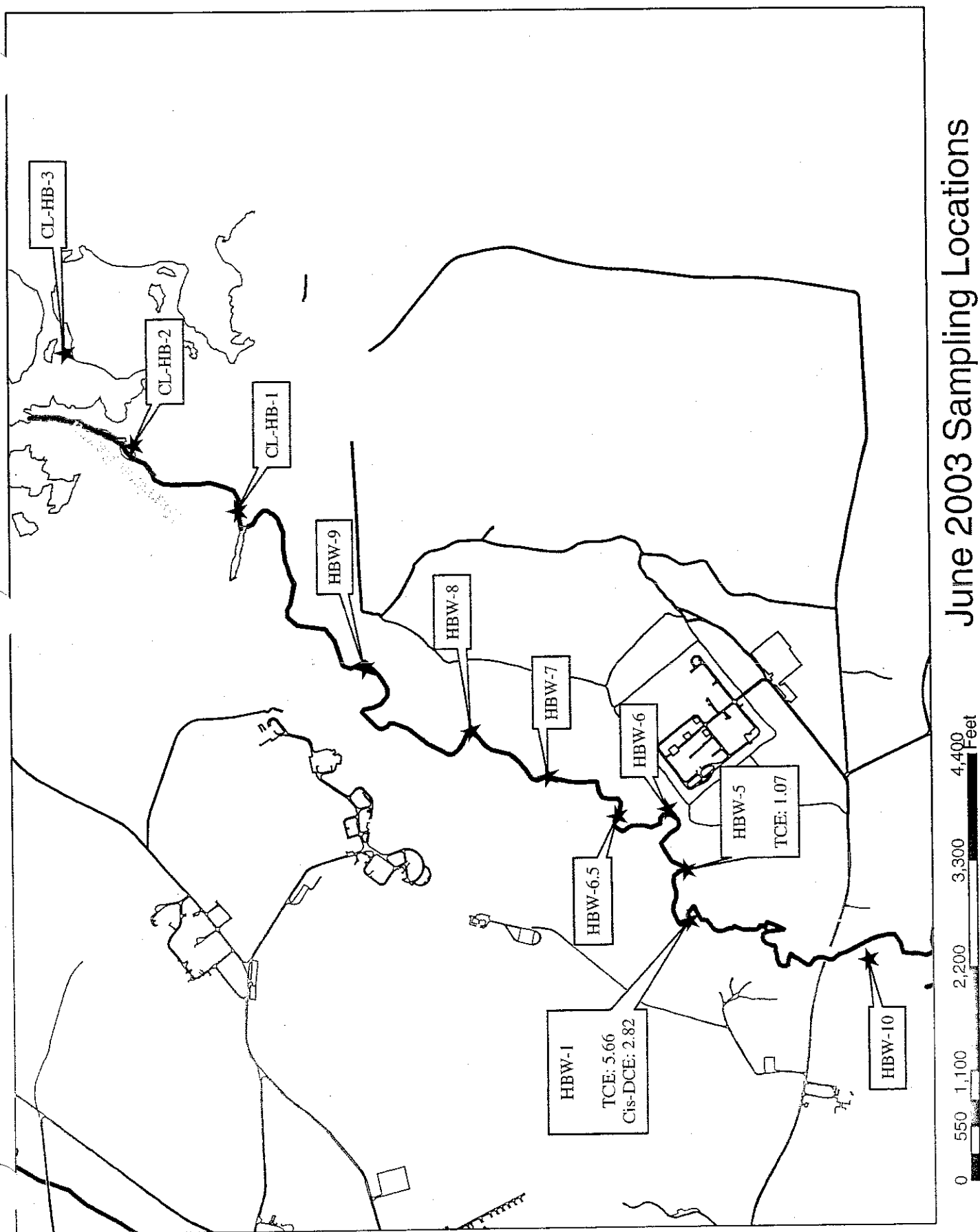
February 2003 Sampling Locations



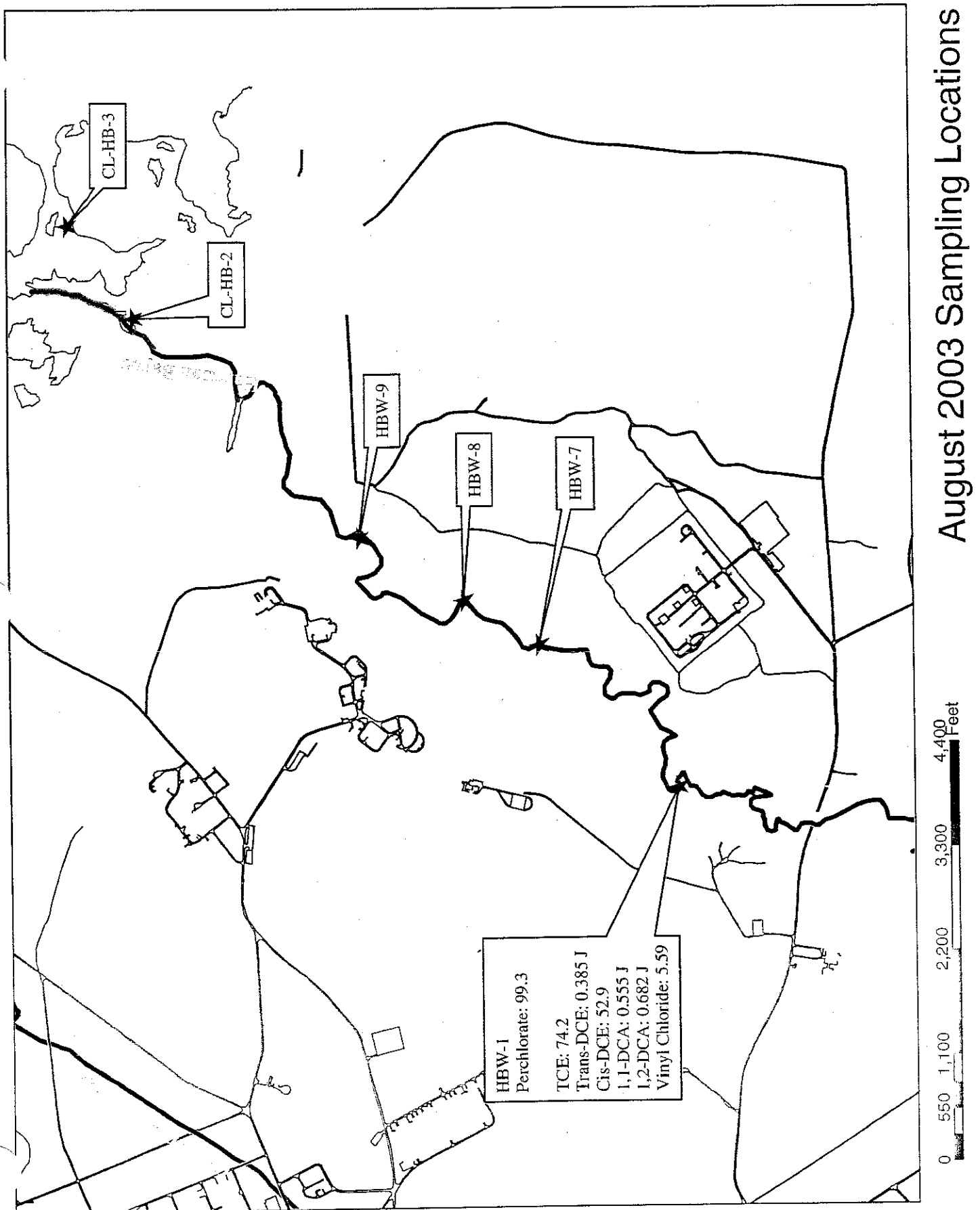


August 2003 Sampling Location





June 2003 Sampling Locations





REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
ARMY BASE REALIGNMENT AND CLOSURE, HAMPTON FIELD OFFICE
102 MCNAIR DRIVE
FORT MONROE VIRGINIA 23651-1048

031407

December 8, 2003

Director, Base Realignment and Closure

Chris Villarreal
US Environmental Protection Agency
Superfund Division (6SF-AT)n
1445 Ross Avenue
Dallas, TX 75202-2733

Dear Mr. Villarreal:

This is to inform you that Dr. Rose Zeiler been appointed Site Manager of Longhorn Army Ammunition Plant, Karnack, Texas. Effective December 15, 2003, Dr. Zeiler will be taking over David Tolbert's duties at Longhorn.

As the Army's point-of-contact for the environmental program at Longhorn, Dr. Zeiler can be contacted by telephone at 479-484-2083 (or 2516), by email at zeiler@sil.army.mil, and by regular mail at Post Office Box 23610, Barling, Arkansas 72923.

A copy of this letter had been sent to James Sher of the Texas Commission on Environmental Quality.

Sincerely,

THOMAS E. LEDERLE

Director, Base Realignment and Closure
Hampton Field Office