Comprehensive Long-term Environmental Action Navy

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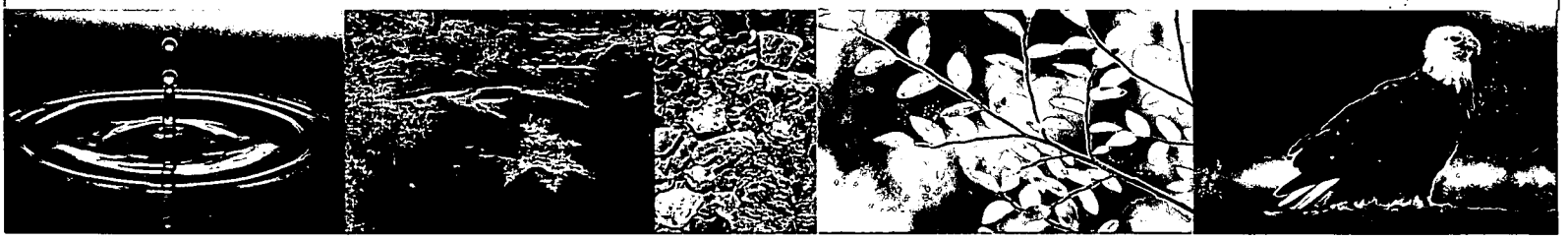

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Monitored Natural Attenuation Report
for
Mine Fill B (SWMU 13)

Round No. 7

Naval Surface Warfare Center Crane
Crane, Indiana

Contract Task Order 0377

August 2006

NAVFAC
Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

REVISION 0
AUGUST 2006

MONITORED NATURAL ATTENUATION REPORT FOR MINE FILL B (SWMU 13)

ROUND NO. 7

NAVAL SURFACE WARFARE CENTER, CRANE
CRANE, INDIANA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command
Southeast
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North Charleston, South Carolina 29406

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AUGUST 2006

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LIST OF ACRONYMS

CMS	Corrective Measures Study
DNX	hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine
DO	dissolved oxygen
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
MFB	Mine Fill B
MNA	monitored natural attenuation
MNX	Hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine
NSWC	Naval Surface Warfare Center
ORP	oxidation reduction potential
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	polychlorinated biphenyls
Plz	Lower Pennsylvanian Water Bearing Zone
Puz	Upper Pennsylvania Water Bearing Zone (Puz)
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RDX	Royal Demolition Explosive
SOPs	Standard Operating Procedures
SVOCs	Semivolatile Organic Compounds
SWMU	solid waste management unit
TNX	Hexahydro-1,3,5-trinitroso-1,3,5-triazine
TOC	Total organic carbon
TtNUS	Tetra Tech NUS, Inc.
U.S. EPA	United States Environmental Protection Agency
µg/L	micrograms per liter

1.0 INTRODUCTION

A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) has been conducted at the Naval Surface Warfare Center (NSWC) Crane Mine Fill B (MFB) solid waste management unit (SWMU), also known as SWMU 13. The purpose of the RFI was to determine whether explosives contamination in groundwater, surface water or sediment presented unacceptable risk, or if any residual explosives in soil presented unacceptable levels of risk to human health and the environment. The RFI was conducted at SWMU 13 in accordance with applicable RCRA corrective action requirements and provides data on the nature and extent of select explosives, metals, miscellaneous semivolatile organic compounds (SVOCs), herbicides, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs) concentrations in surface soils, subsurface soils, sediment, surface water and groundwater. The RFI indicates that explosives and herbicide contamination remains in soil around buildings and that explosives have migrated to groundwater and gully water and unacceptable levels of risk remain for various combinations of human and ecological receptors.

Historically, MFB was used for the production of large mines, depth charges, rocket heads, aerial bombs, and projectiles. In the past, explosive powders were released from roof vents. The explosive powders accumulated on the roofs and were washed down to the ground, resulting in the contamination of surface soils. In addition, wastewaters containing explosives were previously discharged into ditches. These explosives migrated into subsurface soils and into groundwater and from groundwater into surface water. The Navy has conducted a remedial action at MFB in which explosive-contaminated soils have been remediated by composting procedures. Therefore, the source of explosives contamination has been largely removed. In the absence of a source, residual explosives remain in the soil and may be naturally degrading.

A corrective measures study (CMS) will be conducted at SWMU 13. Among the remedial alternatives expected to be evaluated will be the potential for natural attenuation to reduce concentrations of explosives in the groundwater. The United States Environmental Protection Agency (U.S. EPA) Region 5 has established a framework entitled "Region 5 Framework for Monitored Natural Attenuation Decisions for Groundwater" (U.S. EPA, 2000). This framework provides technical direction for the collection of adequate monitoring data to support evaluations of the effectiveness of monitored natural attenuation (MNA). In order to determine whether residual explosives are naturally degrading at SWMU 12, a long-term groundwater monitoring plan for explosives and explosives degradation products is being conducted. The long-term monitoring program, as planned, consists of nine rounds of sampling to provide information on trends in groundwater concentrations of explosives and explosives degradation

productions. Recently, 7 rounds of quarterly groundwater, soils, sediments, and surface water sampling and analyses were completed at SWMU 13. Information regarding the results of Rounds 1 through 3 is presented in the SWMU 13 RFI (Tetra Tech NUS, Inc. [TtNUS], 2005a). The results for Round 4 and Rounds 5 and 6 sampling have been provided in separate reports (TtNUS, 2005b and TtNUS, 2006).

The purpose of this report is to present the results of monitoring activities in Round 7, including field documentation, and to provide the framework for evaluation of data once all nine rounds have been completed. Field documentation associated with Round 7 is provided in Appendices A, B, and C of this report. Analytical results for Round 7 are presented in Appendix D. The final MNA report for SWMU 13 will contain an evaluation as to whether residual explosives may be naturally degrading and if MNA is a viable remedial option for contaminated groundwater and surface water at SWMU 13. Information obtained from the long term monitoring program will be used in the CMS to evaluate the effectiveness of MNA. The MNA program being conducted at SWMU 13 meets the U.S. EPA Region V MNA requirements (U.S. EPA, 2000).

2.0 FIELD INVESTIGATION

This section presents sampling activities, procedures, and documentation utilized during Round 7 field operations performed in 2006 for NSWC Crane SWMU 13.

2.1 OVERVIEW

Field activities were conducted in January 2006 and all work performed was conducted in accordance with the procedures and methodologies described in the U.S. EPA-approved Quality Assurance Project Plan (QAPP) Addendum No. 2 to the approved QAPP (TtNUS, 2004). Standard operating procedures (SOPs) that governed the field work are included in Appendix C of Addendum No. 2 to the approved QAPP.

All field activities were electronically recorded and copies of all field forms, records, daily activities, and health and safety documentation associated with the field investigation for Round 7 are provided in Appendices A through C of this document.

2.2 SAMPLING OPERATIONS

This section discusses the methodology for groundwater and surface water sampling activities performed at SWMU 13 during Round 7. Table 2-1 contains well construction information and water level/elevation data for Rounds 1 through 7. A listing of all SWMU 13 sample analytical fractions conducted for groundwater and surface water samples in Round 7 is provided in Table 2-2. Further discussion of the specific target analytes for each fraction is discussed in Section 3 of the QAPP Addendum No. 2. Instruments used in the field were calibrated daily prior to use according to manufacturer's requirements and in accordance with all applicable standard operating procedures (SOPs). No nonconformances or suspected deficiencies occurred during sampling in Round 7.

2.2.1 Groundwater Purging and Sampling

During Round 7 the groundwater wells were sampled using dedicated bladder pumps. Groundwater quality parameters including pH, specific conductance, temperature, dissolved oxygen (DO), and oxidation reduction potential (ORP) were measured during purging at 5- to 10-minute intervals using a multi-parameter water quality meter and flow-through cell. Longer intervals were used for slower pumping wells. Water levels and pumping rates were also measured during purging at 5- to 10-minute intervals. Purging continued until a minimum of one well volume was removed and the above parameters stabilized, or until the well had been purged for 4 hours, in accordance with SOP CTO166-15 and SOP CTO166-16.

To the extent possible, the pumping rates were adjusted to prevent drawdown from exceeding 0.3 foot during purging. Immediately following the purging process and before sampling, the temperature, pH, specific conductance, DO, ORP, and turbidity were measured and recorded on the groundwater sample log sheets.

Sample containers were filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. All pertinent field data, including sampling methods, purge information, pump intake depths, and locations were recorded electronically on low-flow purge data forms and groundwater sample log forms (see Appendix A.1). See Figure 2-1 for all groundwater sampling locations.

All 17 proposed groundwater samples were collected at SWMU 13 during Round 7 (See Table 2-2). As in previous rounds, monitoring well 13MWT28 recharged at a very slow rate. The well was purged on one day and sampled the next.

2.2.2 Surface Water Sampling

Surface water samples were collected from intermittent streams, drainage ditches, and surface runoff locations throughout SWMU 13. All samples were collected at previously sampled locations which had been marked with a labeled, wooden survey stake. Fluorescent flagging had been tied to the stake and to a nearby tree (if available) to facilitate relocation of the sample location for future sampling. Round 7 surface water samples were collected in accordance with Addendum No. 2 to the approved QAPP (TtNUS, 2004). All pertinent field data, including water quality parameters, sampling methods, and locations were recorded electronically on a surface water sample log sheet (see Appendix A.2). See Figure 2-2 for all surface water sampling locations.

All 8 proposed surface water samples were collected at SWMU 13 during Round 7 (See Table 2-2).

2.3 QUALITY CONTROL SAMPLES

Quality assurance (QA)/quality control (QC) samples were generated and collected during sampling activities in Round 7 to monitor both field and laboratory procedures. These procedures for collecting these samples are detailed in the approved QAPP Addendum No. 2. QA/QC samples included field duplicates, equipment rinsate blanks, source water blanks, and temperature blanks. Field duplicate results are tabulated in Appendix D (Analytical Data) of this document.

2.4 WATER LEVEL MEASUREMENTS

2.4.1 Groundwater Level Measurements

A complete synoptic round of water levels for all SMWU 13 groundwater wells was taken prior to sampling activities in Round 7. The synoptic water level measurements were obtained within a 24 to 48 hour time period. Measurements were taken with an electrical water level indicator (M-scope), using the top of the riser pipe as the reference point to determine water depth for monitoring wells and using a surveyed mark for staff gauge measurements. All measurements were taken in accordance with the specific SOP contained in the QAPP addendum. A mark was placed at the top of the riser pipe to ensure that measurements were taken from a consistent reference point. Water level measurements and staff gauge measurements were recorded to the nearest 0.01 foot on groundwater level measurement forms, which are provided in Appendix A.5 of this document. Table 2-1 contains water level/elevation data.

TABLE 2-1

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
ROUNDS 1 THROUGH 6
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Top of Riser Elevation (feet amsl)	Total Depth[1] (feet bgs)	Screened Interval				Water-Bearing Zone	Round 1		Round 2		Round 3		Round 4		Round 5		Round 6		Round 7	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		May 3, 2005		August 9, 2005		January 4, 2006	
												Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)
MONITORING WELLS																									
13MWT01	3/30/2003	1310541.57	3025015.94	713.10	715.34	15.00	5.00	15.00	708.10	698.10	Puz	6.21	709.13	5.82	709.52	7.55	707.79	7.56	707.78	7.71	707.63	9.79	705.55	7.20	708.14
13MWT02	3/29/2003	1310776.56	3024743.55	702.10	704.72	27.00	17.00	27.00	685.10	675.10	Puz	17.15	687.57	17.10	687.62	16.24	688.48	15.88	688.84	16.19	688.53	16.00	688.72	15.37	689.35
13MWT03	3/30/2003	1310240.95	3024891.66	718.34	721.10	15.00	5.00	15.00	713.34	703.34	Puz	8.79	712.31	8.88	712.22	9.98	711.12	12.17	708.93	9.72	711.38	11.18	709.92	9.63	711.47
13MWT04	3/30/2003	1310383.40	3024546.11	704.37	706.84	15.00	5.00	15.00	699.37	689.37	Puz	12.98	693.86	12.75	694.09	14.09	692.75	15.42	691.42	14.27	692.57	15.83	691.01	14.31	692.53
13MWT05	3/29/2003	1310758.93	3024380.03	693.61	696.44	16.00	6.00	16.00	687.61	677.61	Puz	5.42	691.02	4.13	692.31	5.78	690.66	8.73	687.71	5.96	690.48	8.31	688.13	5.75	690.69
13MWT06	4/7/2003	1309916.18	3024495.27	715.30	717.93	15.00	5.00	15.00	710.30	700.30	Puz	15.11	702.82	15.62	702.31	11.91	706.02	14.78	703.15	11.66	706.27	14.95	702.98	13.91	704.02
13MWT07	3/29/2003	1310539.32	3024094.13	684.38	687.22	15.00	5.00	15.00	679.38	669.38	Puz	3.12	684.10	3.10	684.12	4.21	683.01	4.84	682.38	3.44	683.78	3.35	683.87	4.32	682.90
13MWT08	3/30/2003	1310247.86	3024337.56	698.42	700.56	15.00	5.00	15.00	693.42	683.42	Puz	3.17	697.39	2.92	697.64	3.88	696.68	3.87	696.69	4.85	695.71	8.77	691.79	3.35	697.21
13MWT09	4/1/2003	1309662.07	3024049.03	703.29	705.90	20.00	10.00	20.00	693.29	683.29	Puz	7.74	698.16	7.40	698.50	8.77	697.13	8.64	697.26	9.15	696.75	10.40	695.50	8.10	697.80
13MWT10	3/27/2003	1309979.69	3024001.26	697.77	700.15	25.00	15.00	25.00	682.77	672.77	Puz	13.65	686.50	13.11	687.04	14.96	685.19	16.11	684.04	13.68	686.47	15.32	684.83	15.14	685.01
13MWT11	3/28/2003	1310233.72	3023750.09	679.76	682.29	15.00	5.00	15.00	674.76	664.76	Puz	7.87	674.42	7.00	675.29	8.76	673.53	8.82	673.47	9.03	673.26	10.14	672.15	8.64	673.65
13MWT12	3/27/2003	1310080.21	3023574.95	679.96	682.12	20.00	10.00	20.00	669.96	659.96	Puz	7.88	674.24	7.78	674.34	10.75	671.37	11.50	670.62	10.14	671.98	11.93	670.19	11.27	670.85
13MWT13	4/23/2003	1309441.27	3024163.61	699.28	701.98	19.00	8.00	18.00	691.28	681.28	Puz	3.62	698.36	3.18	698.80	4.93	697.05	4.40	697.58	5.13	696.85	6.04	695.94	4.49	697.49
13MWT14	3/31/2003	1309142.23	3024110.17	703.15	705.50	23.00	13.00	23.00	690.15	680.15	Puz	13.25	692.25	13.08	692.42	14.17	691.33	14.69	690.81	14.10	691.40	16.09	689.41	14.00	691.50
13MWT15	3/25/2003	1309565.52	3023717.80	694.27	696.65	25.00	15.00	25.00	679.27	669.27	Puz	12.88	683.77	12.63	684.02	14.59	682.06	15.49	681.16	13.88	682.77	15.89	680.76	14.92	681.73
13MWT16	3/27/2003	1309854.28	3023341.92	682.13	684.35	15.00	5.00	15.00	677.13	667.13	Puz	8.49	675.86	8.61	675.74	11.01	673.34	14.29	670.06	12.33	672.02	14.76	669.59	13.39	670.96
13MWT17	3/26/2003	1309605.27	3023123.97	690.68	693.01	18.00	8.00	18.00	682.68	672.68	Puz	8.70	684.31	8.09	684.92	8.89	684.12	9.04	683.97	9.91	683.10	11.23	681.78	8.48	684.53
13MWT18	3/26/2003	1309326.98	3023293.42	700.05	702.92	30.00	20.00	30.00	680.05	670.05	Puz	19.06	683.86	19.04	683.88	20.21	682.71	20.52	682.40	19.41	683.51	20.31	682.61	20.02	682.90
13MWT19	3/31/2003	1308893.97	3023834.57	703.10	705.82	19.00	9.00	19.00	694.10	684.10	Puz	8.31	697.51	6.80	699.02	10.96	694.86	11.31	694.51	10.40	695.42	12.08	693.74	10.78	695.04
13MWT20	4/1/2003	1309066.76	3023527.23	699.33	702.07	20.00	10.00	20.00	689.33	679.33	Puz	4.22	697.85	4.00	698.07	5.00	697.07	5.23	696.84	4.94	697.13	4.96	697.11	4.76	697.31
13MWT21	3/28/2003	1309391.01	3022916.22	688.37	690.74	15.00	5.00	15.00	683.37	673.37	Puz	7.69	683.05	7.34	683.40	9.09	681.65	9.20	681.54	9.30	681.44	10.37	680.37	8.30	682.44
13MWT22	3/28/2003	1308936.34	3022785.67	669.53	671.96	15.00	5.00	15.00	664.53	654.53	Puz	7.44	664.52	7.25	664.71	8.18	663.78	9.13	662.83	8.21	663.75	9.92	662.04	8.40	663.56
13MWT23	4/1/2003	1308708.02	3023245.12	696.66	699.14	22.00	11.50	21.50	685.16	675.16	Puz	7.45	691.69	7.17	691.97	8.50	690.64	9.25	689.89	8.60	690.54	9.39	689.75	8.90	690.24
13MWT24	4/1/2003	1308397.23	3022916.48	691.33	693.93	22.00	12.00	22.00	679.33	669.33	Puz	8.45	685.48	8.23	685.70	9.25	684.68	10.04	683.89	9.27	684.66	10.52	683.41	9.41	684.52
13MWT25	3/28/2003	1308625.62	3022677.44	678.87	681.57	15.00	5.00	15.00	673.87	663.87	Puz	16.00	665.57	16.61	664.96	7.05	674.52	6.79	674.78	6.65	674.92	9.27	672.30	5.86	675.71
13MWT26	3/28/2003	1308232.69	3022690.14	684.86	687.49	20.00	10.00	20.00	674.86	664.86	Puz	9.10	678.39	8.93	678.56	10.05	677.44	11.09	676.40	9.81	677.68	10.79	676.70	10.51	676.98
13MWT27	11/5/2003	1309786.55	3023829.07	696.09	698.13	21.00	10.00	20.00	686.09	676.09	Puz	NA	NA	NA	NA	9.31	688.82	9.86	688.27	9.27	688.86	10.97	687.16	8.80	689.33
13MWT28	11/19/2003	1309678.62	3024066.67	703.54	705.55	88.00	78.00	88.00	625.54	615.54	Plz	NA	NA	NA	NA	79.63	625.92	78.38	627.17	77.88	627.67	71.76	633.79	77.21	628.34

TABLE 2-1

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
ROUNDS 1 THROUGH 6
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Top of Riser Elevation (feet amsl)	Total Depth[1] (feet bgs)	Screened Interval				Water-Bearing Zone	Round 1		Round 2		Round 3		Round 4		Round 5		Round 6		Round 7	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		May 3, 2005		August 9, 2005		January 4, 2006	
												Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)
13MWT29	11/4/2003	1309538.75	3024290.72	698.10	700.44	20.00	9.00	19.00	689.10	679.10	Puz	NA	NA	NA	NA	5.82	694.62	5.46	694.98	5.61	694.83	6.32	694.12	5.51	694.93
13MWT30	11/6/2003	1309174.84	3024237.45	696.57	698.94	25.00	14.00	24.00	682.57	672.57	Puz	NA	NA	NA	NA	11.72	687.22	11.37	687.57	11.55	687.39	13.13	685.81	11.13	687.81
13MWT31	11/5/2003	1308631.83	3023583.85	693.56	696.21	20.00	10.00	20.00	683.56	673.56	Puz	NA	NA	NA	NA	10.65	685.56	10.74	685.47	10.74	685.47	13.00	683.21	10.39	685.82
13MWT32	10/29/2003	1308214.11	3023162.00	693.62	696.04	25.00	8.00	18.00	685.62	675.62	Puz	NA	NA	NA	NA	9.52	686.52	10.55	685.49	9.02	687.02	10.16	685.88	10.00	686.04
13MWT33	11/6/2003	1308749.27	3023868.77	700.14	701.97	20.00	10.00	20.00	690.14	680.14	Puz	NA	NA	NA	NA	10.63	691.34	11.54	690.43	10.41	691.56	13.92	688.05	12.21	689.76
13MWT34	11/11/2003	1309304.31	3023084.25	693.35	695.93	20.50	10.00	20.00	683.35	673.35	Puz	NA	NA	NA	NA	5.42	690.51	6.45	689.48	5.26	690.67	5.81	690.12	5.64	690.29
13MWT35	11/19/2003	1310254.91	3023773.29	679.51	681.73	69.00	57.00	67.00	622.51	612.51	Plz	NA	NA	NA	NA	63.96	617.77	64.40	617.33	63.94	617.79	63.98	617.75	63.65	618.08
13MWT36	11/5/2003	1309053.39	3022677.86	664.91	667.21	26.00	15.00	25.00	649.91	639.91	Puz	NA	NA	NA	NA	19.26	647.95	19.56	647.65	18.83	648.38	18.80	648.41	18.61	648.60
13MWT37	10/24/2003	1309402.93	3022617.27	659.96	662.29	25.00	14.50	24.50	645.46	635.46	Puz	NA	NA	NA	NA	14.37	647.92	14.71	647.58	13.64	648.65	13.56	648.73	14.14	648.15
13MWT38	11/4/2003	1309376.76	3022619.53	659.03	661.04	80.00	55.00	65.00	604.03	594.03	Plz	NA	NA	NA	NA	61.90	599.14	62.33	598.71	61.81	599.23	61.63	599.41	61.41	599.63
13MWT39	11/4/2003	1309804.48	3022589.03	652.42	654.44	25.00	14.00	24.00	638.42	628.42	Puz	NA	NA	NA	NA	14.25	640.19	13.84	640.60	13.36	641.08	16.31	638.13	3.47	650.97
13MWT40	10/23/2003	1309622.33	3022833.33	664.93	667.18	25.50	15.00	25.00	649.93	639.93	Puz	NA	NA	NA	NA	18.55	648.63	18.74	648.44	18.15	649.03	17.93	649.25	18.16	649.02
13MWT41	11/10/2003	1309645.20	3022819.00	663.65	665.67	66.00	55.00	65.00	608.65	598.65	Plz	NA	NA	NA	NA	66.58	599.09	67.05	598.62	65.52	600.15	66.21	599.46	66.03	599.64
13MWT42	10/22/2003	1309862.28	3023113.22	668.05	670.31	25.00	11.00	21.00	657.05	647.05	Puz	NA	NA	NA	NA	21.14	649.17	21.21	649.10	20.38	649.93	20.28	650.03	20.77	649.54
13MWT43	11/6/2003	1310558.56	3023939.45	688.88	690.90	21.00	10.00	20.00	678.88	668.88	Puz	NA	NA	NA	NA	8.50	682.40	9.70	681.20	8.17	682.73	10.05	680.85	8.77	682.13
13MWT44	11/10/2003	1310621.14	3023530.33	682.11	683.82	88.00	73.00	83.00	609.11	599.11	Plz	NA	NA	NA	NA	64.57	619.25	64.80	619.02	64.36	619.46	64.47	619.35	64.13	619.69
13MWT45	11/10/2003	1309373.68	3022901.38	688.76	690.59	84.00	70.00	80.00	618.76	608.76	Plz	NA	NA	NA	NA	72.75	617.84	69.83	620.76	70.76	619.83	70.55	620.04	70.39	620.20
13MWT46	11/22/2003	1309812.02	3022565.94	651.64	653.61	68.00	55.00	65.00	596.64	586.64	Plz	NA	NA	NA	NA	58.10	595.51	58.25	595.36	56.61	597.00	57.12	596.49	57.34	596.27
13MWT47	11/20/2003	1309389.47	3024437.45	675.41	677.23	21.00	8.00	18.00	667.41	657.41	Puz	NA	NA	NA	NA	7.32	669.91	7.02	670.21	7.15	670.08	3.95	673.28	7.68	669.55
13MWT48	7/28/2004	1309618.82	3021409.02	546.20	548.67	10.50	5.00	10.00	541.20	536.20	Valley Fill[2]	NA	NA	NA	NA	NA	NA	10.02	538.65	10.29	538.38	12.21	536.46	9.78	538.89
13MWT49	7/27/2004	1309795.96	3021713.21	551.05	553.90	9.50	4.00	9.00	547.05	542.05	Valley Fill[2]	NA	NA	NA	NA	NA	NA	7.21	546.69	7.25	546.65	8.65	545.25	7.19	546.71
13MWT50	7/27/2004	1310002.40	3022085.22	557.77	560.49	26.00	15.00	25.00	542.77	532.77	Valley Fill[2]	NA	NA	NA	NA	NA	NA	7.02	553.47	7.90	552.59	8.76	551.73	7.43	553.06
13MWT51	7/27/2004	1310206.30	3022381.03	569.28	571.36	16.00	5.00	15.00	564.28	554.28	Valley Fill[2]	NA	NA	NA	NA	NA	NA	3.77	567.59	5.80	565.56	14.00	557.36	5.80	565.56

TABLE 2-1

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
ROUNDS 1 THROUGH 6
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet)	Easting (feet)	Ground Elevation (feet amsl)	Top of Riser Elevation (feet amsl)	Total Depth[1] (feet bgs)	Screened Interval				Water-Bearing Zone	Round 1		Round 2		Round 3		Round 4		Round 5		Round 6		Round 7	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		May 3, 2005		August 9, 2005		January 4, 2006	
												Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)	Depth to Water (feet btor)	Water Elevation (feet amsl)
STAFF GAUGES																									
13SG01	3/29/2003	1310836.89	3024771.44	698.35	NA	NA	NA	NA	NA	NA	(3)	NA	NA	1.73	696.62	1.77	696.58	1.76	696.59	1.77	696.58	Dry	NA	1.77	696.58
13SG02	3/29/2003	1310746.57	3024854.37	701.95	NA	NA	NA	NA	NA	NA	Puz	NA	NA	3.64	698.31	3.68	698.27	3.71	698.24	3.73	698.22	Dry	NA	3.69	698.26
13SG03	3/29/2003	1309585.70	3024436.89	696.24	NA	NA	NA	NA	NA	NA	Puz	NA	NA	1.96	694.28	1.87	694.37	1.95	694.29	1.96	694.28	Dry	NA	1.94	694.30
13SG04	3/29/2003	1309478.26	3024317.86	688.99	NA	NA	NA	NA	NA	NA	Puz	NA	NA	2.38	686.61	2.45	686.54	2.46	686.53	2.45	686.54	Dry	NA	2.42	686.57
13SG05	3/29/2003	1309341.46	3024185.40	692.94	NA	NA	NA	NA	NA	NA	Puz	NA	NA	3.89	689.05	3.90	689.04	3.92	689.02	3.89	689.05	Dry	NA	3.90	689.04
13SG06	3/29/2003	1308991.98	3023849.68	704.88	NA	NA	NA	NA	NA	NA	(3)	NA	NA	2.37	702.51	2.35	702.53	2.35	702.53	Dry	NA	Dry	NA	2.35	702.53
13SG07	3/29/2003	1308164.25	3022622.07	680.30	NA	NA	NA	NA	NA	NA	Puz	NA	NA	1.50	678.80	1.47	678.83	1.55	678.75	1.69	678.61	Dry	NA	1.48	678.82
13SG08	3/29/2003	1308846.74	3022744.78	665.95	NA	NA	NA	NA	NA	NA	Puz	NA	NA	5.05	660.90	5.08	660.87	5.10	660.85	5.13	660.82	Dry	NA	5.10	660.85
13SG09	3/29/2003	1309868.61	3023412.15	675.30	NA	NA	NA	NA	NA	NA	Puz	NA	NA	4.15	671.15	4.15	671.15	4.18	671.12	4.21	671.09	Dry	NA	4.15	671.15
13SG10	3/29/2003	1310366.98	3023821.25	676.10	NA	NA	NA	NA	NA	NA	Puz	NA	NA	4.78	671.32	4.82	671.28	4.96	671.14	4.84	671.26	Dry	NA	4.80	671.30
13SG11	1/19/2004	1309388.01	3024416.84	675.36	NA	NA	NA	NA	NA	NA	Puz	NA	NA	NA	NA	2.74	672.62	2.30	673.06	2.51	672.85	Dry	NA	2.15	673.21
13SG12	10/19/2004	1312371.18	3022662.06	595.28	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	6.87	588.41	6.85	588.43	Dry	NA	6.81	588.47
13SG13	10/19/2004	1311077.60	3022704.86	572.52	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	5.87	566.65	6.06	566.46	Dry	NA	5.58	566.94
13SG14	10/19/2004	1310424.91	3022481.79	567.75	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	6.37	561.38	6.41	561.34	Dry	NA	6.32	561.43
13SG15	10/19/2004	1309660.62	3021524.54	544.18	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	9.97	534.21	5.24	538.94	Washed Away[4]	NA	Destroyed from Construction	NA
13SG16	10/19/2004	1309270.46	3021074.88	537.01	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	Dry	Na	Dry	NA	Dry	NA	Dry	NA
13SG17	10/19/2004	1309034.25	3020747.93	532.48	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	Dry	Na	Dry	NA	Dry	NA	Dry	NA
13SG18	10/19/2004	1308276.51	3019633.62	524.23	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	8.16	516.07	8.19	516.04	Dry	NA	8.16	516.07

Notes:
1 = Total depth of boring, total depth of well may be less.
2 = Valley Fill includes alluvium, colluvium, and weathered siltstone directly below fill material. Total thickness of these materials is 26 feet or less.
3 = Staff gauge measured surface water level that appears to be perched above groundwater in the Pennsylvanian geologic unit immediately adjacent to or underlying the drainageway.
4 = Staff gauge washed away due to construction of water line in vicinity.
bgs = Below ground surface.
btor = Below top of riser/reference point.
amsl = Above mean sea level (NAVD88).
NA = Not applicable.
NAVD88 = North American Vertical Datum of 1988.
Puz = Upper Pennsylvanian water-bearing zone.
Plz = Lower Pennsylvanian water-bearing zone.

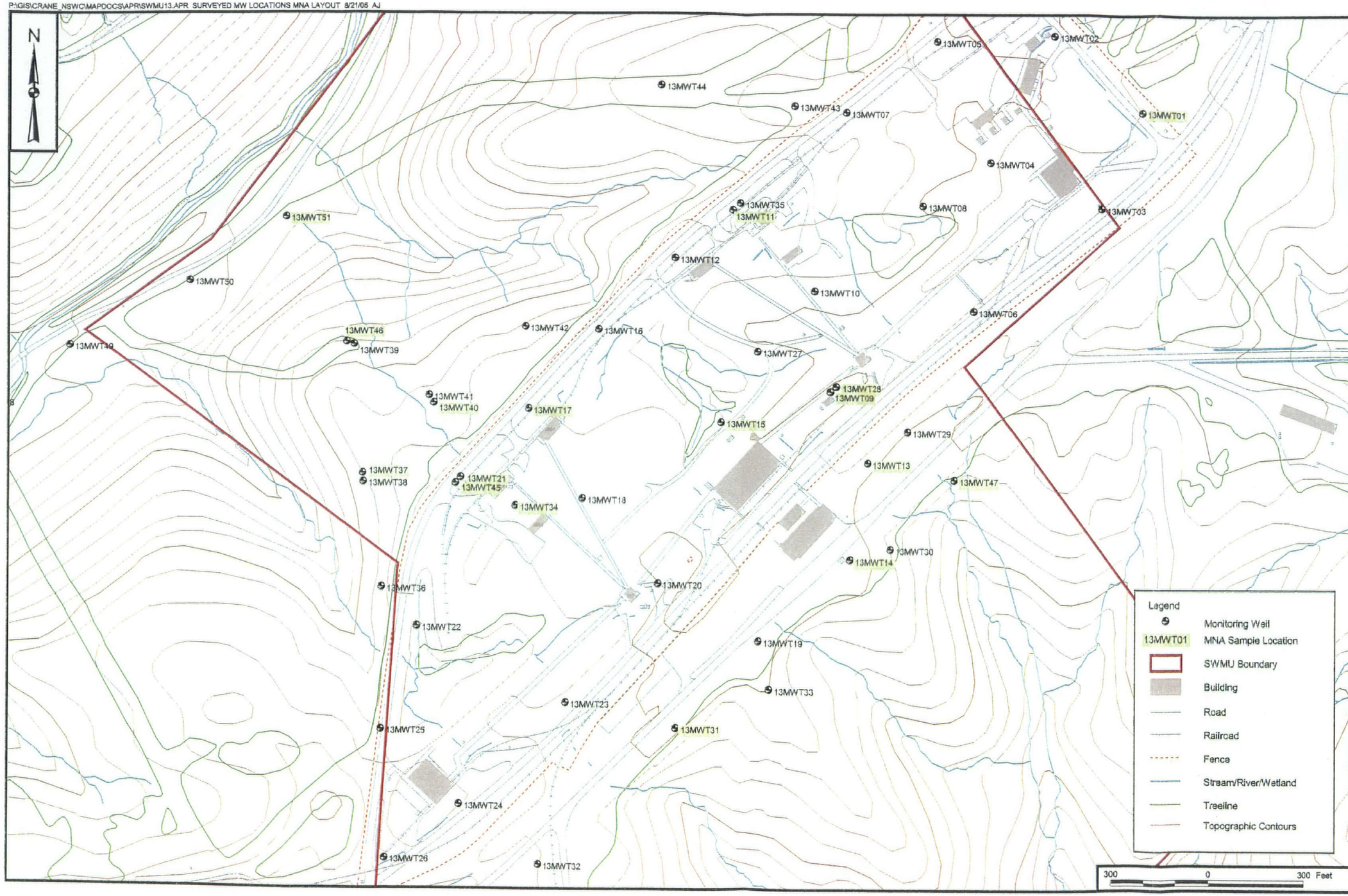
TABLE 2-2

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 13 - MINE FILL B
ROUND 7
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction: Explosives: Nitroaromatics and Nitramines SW-846 8330	Reasoning Why Sample Was Not Collected
Groundwater (Round 7)		
13GWT0107	X	
13GWT0908	X	
13GWT1107	X	
13GWT1307	X	
13GWT1407	X	
13GWT1507	X	
13GWT1707	X	
13GWT2107	X	
13GWT2806	X	
13GWT3106	X	
13GWT3406	X	
13GWT3706	X	
13GWT4006	X	
13GWT4506	X	
13GWT4606	X	
13GWT4706	X	
13GWT5105	X	
GW TOTALS	**17**	
Surface Water (Round 7)		
13SW1104	X	
13SW1406	X	
13SW1506	X	
13SW1606	X	
13SW1905	X	
13SW2005	X	
13SW2205	X	
13SW3006	X	
SW TOTALS	**8**	

X - Sample collected as proposed.

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR SURVEYED MW LOCATIONS MNA LAYOUT 8/21/05 AJ



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 2 - 1

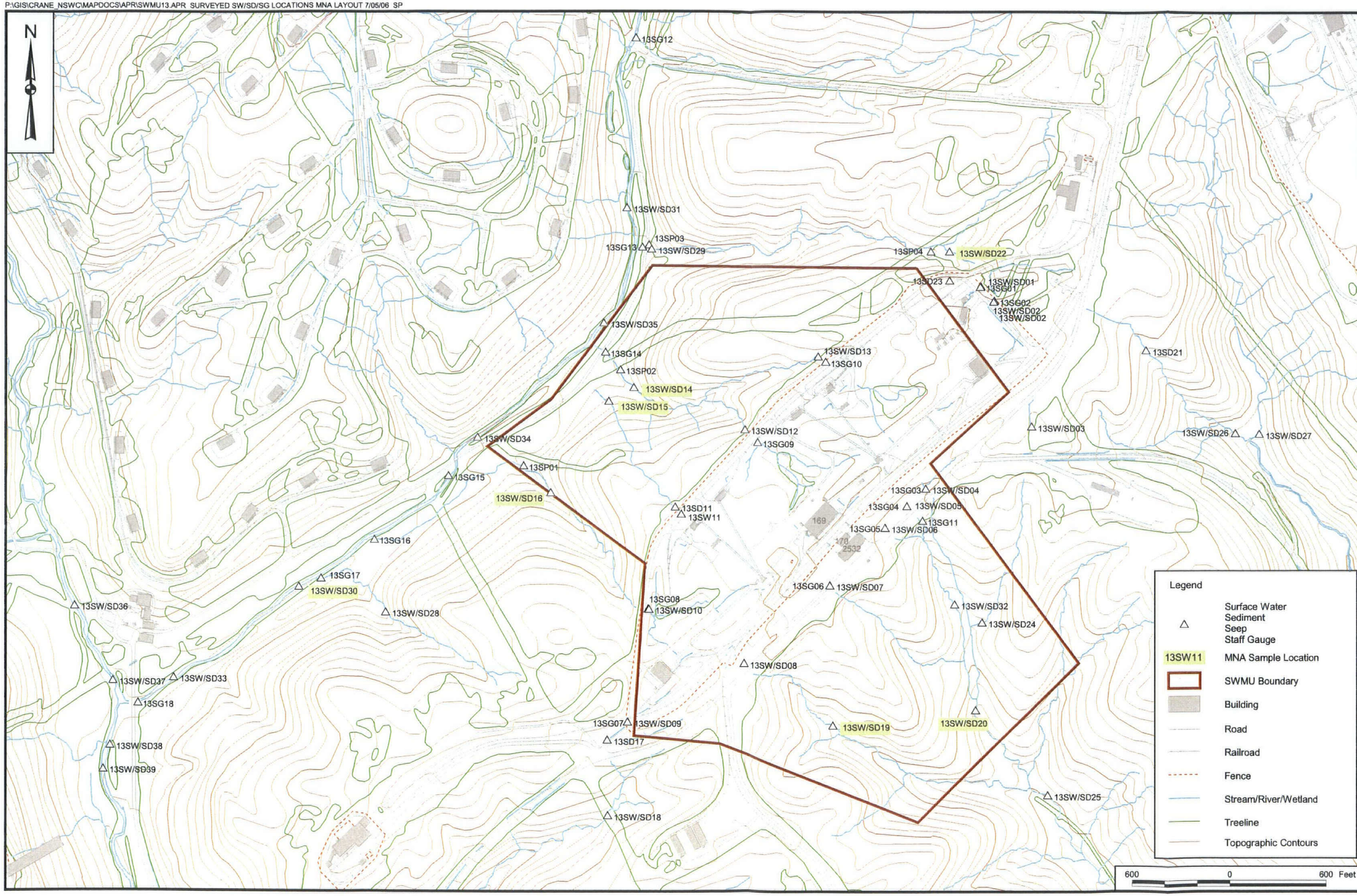
REV 0

MONITORING WELL LOCATIONS
SWMU 13 MINE FILL B
NWSC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER	DATE 12/29/04
CHECKED BY J. LUCAS	DATE 8/21/05
COST/SCHED-AREA	
SCALE AS NOTED	

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU13.APR SURVEYED SW/SD/SG LOCATIONS MNA LAYOUT 7/05/06 SP



CONTRACT NO.
CTO 0377

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 2 - 2

REV 0

SURVEYED SURFACE WATER, SEDIMENT, SEEP, AND STAFF GAUGE LOCATIONS
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY A. JANOCHA DATE 11/17/05

CHECKED BY J. LUCAS DATE 7/05/06

COST/SCHED-AREA

SCALE AS NOTED

3.0 DATA PRESENTATION

This section presents the analytical results for groundwater and surface water sampling conducted in Round 7 at SMWU 13 (see Tables 3-1 to 3-6). The analytical results for Rounds 1 through 6 are also presented to support data evaluation which is discussed in Section 4. Appendix D contains a summary of analytical results for groundwater and surface water samples collected in Round 7.

As stated previously, the SWMU 13 RFI indicated that explosives contamination remains in soil around SWMU 13 buildings and explosives have migrated to groundwater, surface water, and gully water. RDX was identified as the most frequently detected explosive in groundwater, surface water, and surface water. As a result, RDX is being considered as a parent compound for evaluating the effectiveness of natural attenuation at SWMU 13. Over time, natural attenuation will reduce the mass or concentration of RDX in soil and groundwater and RDX will decompose in stages to other well-defined intermediate products. In the case of RDX, it will degrade to give the nitroso derivatives hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine (MNX), hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine (DNX) and hexahydro-1,3,5-trinitroso-1,3,5-triazine (TNX). As a result, the presentation and interpretation of analytical results in Sections 3 and 4 of this report will focus on RDX and its associated degradation products.

3.1 GROUNDWATER DATA

Tables 3-1 and 3-3 show the groundwater analytical results for Rounds 1 through 7 in the Upper and Lower Pennsylvanian Water Bearing Zones, respectively. Both tables show summary listings of concentrations for explosives, explosive degradation products, and miscellaneous field parameters. Concentrations are presented in micrograms per liter (µg/L) along with data validation qualifiers, as applicable. Due to the staggered nature of the groundwater sampling, not all wells were sampled in each of the seven rounds of sampling.

3.1.1 Upper Pennsylvanian Water Bearing Zone (Puz)

Analytical results for Round 7 sampling at the Pennsylvanian Upper Water Bearing Zone (Puz) wells are presented in Table 3-1. A summary of descriptive statistics for Round 7 is shown in Table 3-2. A discussion of analytical results for each is presented below.

In Round 7, explosives were detected at wells 13MWT01, 13MWT09, 13MWT11, 13MWT13, 13MWT14, 13MWT17, 13MWT21, 13MWT31, 13MWT34, 13MWT37, 13MWT40, and 13MWT51. There was no analysis for RDX degradation products in Round 7. The most frequently detected explosive in Round 7

was RDX, followed by HMX. No explosives were detected at 13MWT15 or 13MWT47, which are upgradient and downgradient, respectively, of the RDX plume. The highest concentrations of RDX were reported at wells 13MWT11 (2,100 µg/L), 13MWT37 (2,100 µg/L), and 13MWT09 (1,300 µg/L). The highest concentrations of HMX were reported at wells 13MWT21 (230 µg/L), 13MWT37 (170 µg/L), and 13MWT09 (110 µg/L).

In addition to RDX and HMX, several additional energetic compounds were detected in Round 7 including 1,3,5-trinitrobenzene, 1,3 dinitrobenzene, 2,4,6-trinitrotoluene, 2,6 dinitrotoluene, 2,4-dintrotoluene, 2-amino-4,6-dinitrotoluene, and 4-amino-2,6-dintrotoluene. One or more of these explosives were detected at wells 13MWT09, 13MWT11, 13MWT21, and 13MWT37.

3.1.2 Lower Pennsylvanian Water Bearing Zone (Plz)

Analytical results for Round 7 sampling in the Lower Pennsylvanian Water Bearing Zone (Plz) wells are presented in Table 3-3. A summary of descriptive statistics for Round 7 is shown in Tables 3-4. In Round 7, there were no positive detections of explosives. There was no analysis for RDX degradation products in Round 7.

3.2 SURFACE WATER DATA

Analytical results for Round 7 surface water sampling is are presented in Table 3-5. A summary of descriptive statistics for Round 7 is shown in Tables 3-6, respectively. A discussion of analytical results for each round is presented below.

In Round 7, explosives were detected at all seven surface water monitoring locations (13SW11, 13SW14, 13SW15, 13SW16, 13SW19, 13SW20, 13SW22, and 13SW30. There was no analysis for RDX degradation products in Round 7. The most frequently detected explosive in Round 5 was RDX, followed by HMX. RDX was detected at all sampling locations. Surface water concentrations of RDX ranged from 0.31 µg/L at 13SW20 to 1,500 µg/L at 13SW11. HMX was detected at all locations with exception of 13SW20 and 13SW22. HMX concentrations ranged from 0.55 µg/L at 13SW19 to 210 µg/L at 13SW11.

TABLE 3-1

GROUNDWATER ANALYTICAL RESULTS
PUZ WATER BEARING ZONE
SWMU 13 MINE FILL B
ROUNDS 1 THROUGH 7

		13MWT01							13MWT09								13MWT11						
		1	2	3	4	5	6	7	1	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Parameter	units	4/26/03	11/23/03	8/1/04	1/23/05	5/3/05	8/15/05	1/23/06	4/28/03	5/9/03	12/4/03	7/31/04	2/1/05	5/3/05	8/27/05	1/9/06	4/27/03	11/20/03	7/23/04	1/23/05	5/4/05	8/11/05	1/24/06
Energetics (µg/L)																							
1,3,5-TRINITROBENZENE	UG/L	0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	0.215 U		1.3	1.1	0.94	0.94	1.2	1.2	0.43 U	0.258 U	0.27 U	0.269 U	0.248 U	0.26 U	0.26 U
1,3-DINITROBENZENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	1.4 J		2.4	2.1	2.2	2.1	2.2	2.3	0.83 J	0.258 U	0.46 J	1.2	0.248 U	0.55	1.4
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.526 U								0.505 U							0.515 U					
2,4,6-TRINITROTOLUENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	19		25	24	22	21	23	22	31	9.5	11	44	47	16	49
2,4-DIAMINO-6-NITROTOLUENE			0.263 U		0.264 U		0.27 U				3.9		2.5 R		2.6 R			1.4 J		1.6 R		0.77 J	
2,4-DINITROTOLUENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	0.215 U		0.253 U	1.4 J	0.25 U	0.288 U	0.26 U	1.2 J	0.43 U	1.2	1.6	4	4.3	1.9	4.1 J
2,6-DIAMINO-4-NITROTOLUENE			0.263 U		0.264 U		0.27 U				0.253 U		0.25 U		0.26 U			1.8 J		0.269 U		0.26 U	
2,6-DINITROTOLUENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	0.215 U		9.9	8.8 J	0.25 U	8.3	8.9	7.4 J	0.43 U	1.2 J	2.1 J	5.7 J	6.5	3.2	0.26 U
2-AMINO-4,6-DINITROTOLUENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	8.6 J		13	15 J	13 J	15	18 J	17	6 J	4.4 J	6.6 J	12 J	20	11 J	14 J
2-NITROTOLUENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	0.215 U		0.253 U	0.24 U	0.25 U	0.288 U	0.26 U	0.26 U	0.43 U	0.258 U	0.27 U	0.269 U	0.248 U	0.26 U	0.26 U
3,5-DINITROANILINE			0.263 U		0.264 U		0.27 U				0.253 U		2.2 J		2.1 J			0.258 U		0.269 U		0.26 U	
3-NITROTOLUENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	0.215 U		0.253 U	0.24 U	0.25 U	0.288 U	0.26 U	0.26 U	0.43 U	0.258 U	0.58 J	0.45 R	0.47 J	0.26 U	1.3 J
4,4'-TN-AZOXY					0.528 U		0.54 U						0.5 U		0.52 U					0.538 U		0.52 U	
4-AMINO-2,6-DINITROTOLUENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	18		18	19	18	17	19	21	19	9.8	14	27	29	18	29
4-NITROTOLUENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	0.215 U		0.253 U	0.24 U	0.25 U	0.288 U	0.26 U	0.26 U	0.43 U	0.258 U	0.27 U	0.269 U	0.248 U	0.26 U	0.26 U
DNX			0.263 U		0.264 U		0.27 U				4 J		0.27 R		0.27 R			0.258 U		0.269 U		0.26 U	
HMX		1	1	1.3	0.88	0.84	1	0.84	84		130	140	99	91	110	110 J	34	44	45	68	70	66	80
MNX			0.263 U		0.264 U		0.27 U				7.1 J		4.2		2.8 J			1.2		0.74 J		0.75 J	
TNX			0.263 U		0.264 U		0.27 U				1.5 J		1.3 J		0.26 U			0.258 U		0.269 U		0.26 U	
NITROBENZENE		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	0.215 U		0.253 U	0.24 U	0.25 U	0.288 U	0.26 U	0.26 U	0.43 U	0.258 U	0.27 U	0.269 U	0.248 U	0.26 U	0.26 U
RDX		0.44 U	0.35 J	0.3 J	0.37 J	0.278 U	0.27 U	0.26 U	1100		1700	1500	1200	1300	1400	1300	560	520	490	830	830	620	760
TETRYL		0.47 U	0.263 U	0.25 U	0.264 U	0.278 U	0.27 U	0.26 U	0.215 U		0.253 U	0.24 U	0.25 U	0.288 U	0.26 U	0.26 U	0.43 U	0.258 U	0.27 U	0.269 U	0.248 U	0.26 U	0.26 U
Field Parameters																							
TEMPERATURE (°c)	C	12.59	17.04	18.75	9.98	11.12	20.97		13.33	14.36	12.82	18.15	12.15	12.47	17.69	12.22	15.73	16.35	21.2	10.8	15.27	23	9.55
ALKALINITY	MG/L										0							10 U					
CARBON DIOXIDE											48							165					
DISSOLVED OXYGEN				4.2	0.81						1.5	0.2	0.74			0.73		1.5	4.95	0.71			0.82
DISSOLVED OXYGEN - METER		1.28	1.4			0.96	0.73		1.69	1.21	1.14			1.5	0.065		0.85	3.49			0.73	0.39	
HYDROGEN SULFIDE (H2S)											0							0					
IRON(+2)											0							3.3 >					
MANGANESE(+2)											0.4							0.3					
NITRITE-N											0.023							0.009					
SULFIDE											0.01							0.01					
SPECIFIC CONDUCTANCE (MS/CM)	MS/CM	0.229	0.233	0.255	0.192	0.17	188		0.829	0.725	0.64	0.773	0.57	0.576	0.427	0.784	0.251	0.238	0.262	0.222	0.224	0.253	0.307
OXIDATION REDUCTION POTENTIAL (MV)	MV	220	385.4	461.2	295	403.8	687.8		205.6	148	251	88.1	29.9	250.1	544.3	302	265	355	127	284	401	154.1	290
TURBIDITY (NTU)	NTU	3.8	4.39	9.5	3	1	0.73		3	0.1	4.07	3.8	1.6	0.15	1.1	7.8	10	4.52	2.5	10	6.1	6.3	8.8
PH	S.U.	4.68	4.17	3.57	3.98	4.45	3.56		5.36	5.38	5.32	6.27	5.49	5.29	4.73	5.62	3.64	3.93	3.85	3.8	3.2	4.09	4.19
Miscellaneous Parameters																							
AMMONIA-N	MG/L	0.01 U	0.005 UJ						3.3		3.4						0.1	0.1 J					
NITRITE/NITRATE-N		0.07	0.15 J		0.1 J		0.025 U		92		54 J		77 J		59		0.02 U	0.19 J		0.1 J		0.025 U	
TOTAL ORGANIC CARBON							1 U								2.3							1.7	

TABLE 3-1

GROUNDWATER ANALYTICAL RESULTS
PUZ WATER BEARING ZONE
SWMU 13 MINE FILL B
ROUNDS 1 THROUGH 7

		13MWT13							13MWT14							13MWT15						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Parameter	units	5/7/03	11/25/03	8/1/04	2/2/05	5/5/05	8/15/05	1/8/06	4/29/03	11/24/03	7/27/04	1/25/05	5/5/05	8/16/05	1/9/06	5/6/03	11/25/03	7/29/04	2/3/05	5/5/05	8/11/05	1/19/06
Energetics (µg/L)																						
1,3,5-TRINITROBENZENE	UG/L	0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
1,3-DINITROBENZENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.515 U							0.5 U							0.515 U					
2,4,6-TRINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
2,4-DIAMINO-6-NITROTOLUENE			0.258 U		0.245 U		0.26 U			0.25 U		0.242 U		0.24 U			0.258 U		0.238 U		0.27 U	
2,4-DINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
2,6-DIAMINO-4-NITROTOLUENE			0.258 U		0.245 U		0.26 U			0.25 U		0.242 U		0.24 U			0.258 U		0.238 U		0.27 U	
2,6-DINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
2-AMINO-4,6-DINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
2-NITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
3,5-DINITROANILINE			0.258 U		0.245 U		0.26 U			0.25 U		0.242 U		0.24 U			0.258 U		0.238 U		0.27 U	
3-NITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
4,4'-TN-AZOXY					0.49 U		0.52 U					0.485 U		0.48 U					0.475 U		0.53 U	
4-AMINO-2,6-DINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
4-NITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
DNX			0.258 U		0.245 U		0.26 U			0.25 U		0.242 U		0.24 U			0.258 U		0.238 U		0.27 U	
HMX		9.5	12	12	8.4	8.8	11	9.7 J	0.345 U	0.89 J	0.34 J	0.54 J	0.38 J	0.52	0.76 J	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
MNX			0.258 U		0.245 U		0.26 U			0.25 U		0.242 U		0.24 U			0.258 U		0.238 U		0.27 U	
TNX			0.258 U		0.245 U		0.26 U			0.25 U		0.242 U		0.24 U			0.258 U		0.238 U		0.27 U	
NITROBENZENE		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
RDX		12	20	17	18	15	21	17	1.6	4.7	2	2.8	2.2	2.7	3.7	0.46 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
TETRYL		0.37 U	0.258 U	0.24 U	0.245 U	0.255 U	0.26 U	0.26 U	0.345 U	0.25 U	0.25 U	0.242 U	0.258 U	0.24 U	0.25 U	0.485 U	0.258 U	0.25 U	0.238 U	0.252 U	0.27 U	0.264 U
Field Parameters																						
TEMPERATURE (°c)	C	13.82	12.33	20.61	9.87	13.3	19.47	12.32	14.34	10.77	17.41	14.39	15.29	19.15	10.98	15.89	12.28	15.66	13.29	13.95	18.4	13.6
ALKALINITY	MG/L		10 U														10 U					
CARBON DIOXIDE			120														137					
DISSOLVED OXYGEN			11	0.73	5.31			3.12			6.74	0.91			1.43		0.07	0.53	1.57			0.58
DISSOLVED OXYGEN - METER		3.37	3.26			3.67	3.3		1.2	0.52			1.69	0.54		0.53	7.79			1	0.91	
HYDROGEN SULFIDE (H2S)			0														0					
IRON(+2)			0.03														3.3 >					
MANGANESE(+2)			0.5														0.9					
NITRITE-N			0														0.001					
SULFIDE			0														0.14					
SPECIFIC CONDUCTANCE (MS/CM)	MS/CM	0.106	0.113	0.131	1.01	0.085	97	0.127	0.885	0.623	0.714	0.595	0.704	586	1.03	0.391	0.34	0.352	0.314	0.313	0.309	0.449
OXIDATION REDUCTION POTENTIAL (MV)	MV	268.2	385.1	132	392.7	421.6	688.9	396	23.2	100.5	71	62.4	134.8	526.8	97	286.8	322	6.85	373.3	401	342	326
TURBIDITY (NTU)	NTU	5.8	0.38	0.7	7.2	1	0	4.3	1.6	0	3	3.3	2.6	0.8	4.1	7.3	45.4	10	8.31	15	4.4	10
PH	S.U.	4.2	3.56	4.31	3.94	4.52	3.58	4.28	5.5	5.48	6.86	5.58	5.84	5.48	5.77	3.74	3.98	3.26	3.65	3.02	3.14	3.92
Miscellaneous Parameters																						
AMMONIA-N	MG/L	0.03	0.01						0.08	0.06 J						1	1.3					
NITRITE/NITRATE-N		1.1	1 J		1.1 J		0.025 U		0.13	0.05 J		0.025 UJ		0.025 U		0.02 U	0.05 U		0.025 U		0.025 U	
TOTAL ORGANIC CARBON							1 U							4.2			1.1				1.1	

TABLE 3-1

GROUNDWATER ANALYTICAL RESULTS
PUZ WATER BEARING ZONE
SWMU 13 MINE FILL B
ROUNDS 1 THROUGH 7

		13MWT17							13MWT21							13MWT31						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Parameter	units	5/7/03	11/5/03	7/29/04	1/23/05	5/4/05	8/11/05	1/24/06	4/25/03	11/5/03	7/28/04	1/22/05	5/4/05	8/10/05	1/19/06	No Sample	11/24/03	7/26/04	2/1/05	5/5/05	8/29/05	1/10/06
Energetics (µg/L)																						
1,3,5-TRINITROBENZENE	UG/L	0.43 U	0.25 UJ	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.28 U	1.3 J	0.4 J	0.36 J	0.41 J	0.47 J	0.26 U		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
1,3-DINITROBENZENE		0.43 U	0.25 U	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.28 U	1.8 J	0.8	0.78	0.26 U	0.96	0.26 U		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.5 U							0.481 U							0.581 U					
2,4,6-TRINITROTOLUENE		0.43 U	0.25 UJ	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	26 J	69 J	26	24	29	30	0.48 J		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
2,4-DIAMINO-6-NITROTOLUENE			0.25 U		0.248 U		0.26 U			0.77 J		0.29 R		0.3 J			0.291 U		0.242 U		0.25 U	
2,4-DINITROTOLUENE		0.43 U	0.25 UJ	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.28 U	1.4 J	0.65 J	0.238 U	0.26 U	0.28 U	0.26 U		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
2,6-DIAMINO-4-NITROTOLUENE			0.25 U		0.248 U		0.26 U			0.24 U		0.238 U		0.28 U			0.291 U		0.242 U		0.25 U	
2,6-DINITROTOLUENE		0.43 U	0.25 UJ	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.28 U	5.8 J	2.8	2.6 J	2.9	2.8	0.26 U		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
2-AMINO-4,6-DINITROTOLUENE		0.43 U	0.28 J	0.37 J	0.27 J	0.271 U	0.31 J	0.4 J	0.28 U	0.24 UJ	3.8 J	1.9 J	0.26 U	8.1 J	0.76 J		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
2-NITROTOLUENE		0.43 U	0.25 UJ	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.28 U	0.24 UJ	0.24 U	0.238 U	0.26 U	0.28 U	0.26 U		0.291 U	0.37 J	0.242 U	0.248 U	0.25 U	0.26 U
3,5-DINITROANILINE			0.25 U		0.248 U		0.26 U			0.24 U		0.238 U		0.31 J			0.291 U		0.242 U		0.25 U	
3-NITROTOLUENE		0.43 U	0.25 UJ	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.28 U	0.24 UJ	0.24 U	0.238 U	0.26 U	0.28 U	0.26 U		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
4,4'-TN-AZOXY					0.495 U		0.51 U					0.475 U		0.56 U					0.485 U		0.5 U	
4-AMINO-2,6-DINITROTOLUENE		0.6 J	0.71	0.84	0.54	0.44 J	0.56	0.41 J	0.28 U	0.24 U	2.9 J	3.2	3 J	5	1.1		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
4-NITROTOLUENE		0.43 U	0.25 UJ	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.5 J	0.24 UJ	0.24 U	0.238 U	0.26 U	0.28 U	0.26 U		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
DNX			2.2 J		0.41 J		0.44 J			50 J		0.238 U		0.28 U			0.291 U		0.242 U		0.25 U	
HMX		92 J	140	120	100	80	110	92	390	640	460	410	430	560	230		4.5	8.1	7.5	7.5	7.9	9.6 J
MNX			11		6.2		6.5			9.3 J		3.3 R		0.28 U			0.291 U		0.242 U		0.25 U	
TNX			1.2		0.248 U		0.3 J			1.4 J		0.238 U		0.28 U			0.291 U		0.242 U		0.25 U	
NITROBENZENE		0.43 U	0.25 U	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.28 U	0.24 U	0.24 U	0.238 U	0.26 U	0.28 U	0.26 U		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
RDX		430	580	490	480	390	560	500	2700	7700	4000	3200	4500	4200	180		9.3	22	19	18	14	21
TETRYL		0.43 U	0.25 U	0.25 U	0.248 U	0.271 U	0.26 U	0.26 U	0.28 U	0.24 U	0.24 U	0.238 U	0.26 U	0.28 U	0.26 U		0.291 U	0.27 U	0.242 U	0.248 U	0.25 U	0.26 U
Field Parameters																						
TEMPERATURE (°C)	C	15.7	15.97	18.57	11.51	13.52	21.81	12.05	13.01	15.17	20.07	9.15	13.1	22.3	10.7		10.09	15.98	11.08	13.77	19.09	8.65
ALKALINITY	MG/L		10 U							10 U												
CARBON DIOXIDE			170							125												
DISSOLVED OXYGEN			0.9	2.01	0.35			0.48		1	2.94	1.56			6.41			23.4	1.52			1.93
DISSOLVED OXYGEN - METER		0.53	0.84			0.18	0.96		1.45	2.09			0.42	0.65			5.66			2.39	0.98	
HYDROGEN SULFIDE (H2S)			0							0												
IRON(+2)			0.06							0.1												
MANGANESE(+2)			0							0.6												
NITRITE-N			0.006							0.031												
SULFIDE			0.02							0.04												
SPECIFIC CONDUCTANCE (MS/CM)	MS/CM	0.17	0.153	0.159	0.118	0.135	0.233	0.368	0.212	0.195	0.298	0.148	0.176	171	0.371		0.793	1.444	1228	1.119	0.749	1.58
OXIDATION REDUCTION POTENTIAL (MV)	MV	112	338	129.4	4	289.6	517	230	193.6	247.2	107.3	56.1	283.7	748.2	259		246.7	518.6	51.9	271.8	126	272
TURBIDITY (NTU)	NTU	10	3.74	4.1	15	0.4	0	1.1	8.2	2.61	4	4	2.8	4.2	5		4.69	6.1	5.2	3.4	4.4	8.8
PH	S.U.	5.35	5.38	5.28	5.4	5.16	4.43	5.28	5.46	5.59	7.32	5.71	5.42	5	6.83		5.67	5.39	5.42	5.74	5.5	5.56
Miscellaneous Parameters																						
AMMONIA-N	MG/L	0.01	0.005 U						0.05	0.02							0.005 UJ					
NITRITE/NITRATE-N		0.86	0.65		1.7 J		0.22		0.64	1.2		0.81 J		0.45			0.13 J		0.06 J		0.025 U	
TOTAL ORGANIC CARBON							3.4							2.3							1 U	

TABLE 3-1

GROUNDWATER ANALYTICAL RESULTS
PUZ WATER BEARING ZONE
SWMU 13 MINE FILL B
ROUNDS 1 THROUGH 7

		13MWT34							13MWT37							13MWT40						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Parameter	units	No Sample	12/4/03	7/29/04	1/23/05	5/5/05	8/11/05	1/10/06	No Sample	11/6/03	7/30/04	2/2/05	5/4/05	8/11/05	1/6/06	No Sample	11/5/03	7/30/04	2/2/05	5/4/05	8/11/05	1/5/06
Energetics (µg/L)																						
1,3,5-TRINITROBENZENE	UG/L		0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 U	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 U	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
1,3-DINITROBENZENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 U	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 U	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.5 U							0.52 U							0.51 UJ					
2,4,6-TRINITROTOLUENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 UJ	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 UJ	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
2,4-DIAMINO-6-NITROTOLUENE			0.25 U		0.242 U		0.26 U			0.26 U		0.24 U		0.26 J			0.26 U		0.264 U		0.28 U	
2,4-DINITROTOLUENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 UJ	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 UJ	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
2,6-DIAMINO-4-NITROTOLUENE			0.25 U		0.242 U		0.26 U			0.26 U		0.24 U		0.26 U			0.26 U		0.264 U		0.28 U	
2,6-DINITROTOLUENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 UJ	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 UJ	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
2-AMINO-4,6-DINITROTOLUENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 U	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 U	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
2-NITROTOLUENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 UJ	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 UJ	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
3,5-DINITROANILINE			0.25 U		0.242 U		0.26 U			0.26 U		0.24 U		0.26 U			0.26 U		0.264 U		0.28 U	
3-NITROTOLUENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 UJ	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 UJ	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
4,4'-TN-AZOXY					0.485 U		0.52 U					0.48 U		0.52 U					0.528 U		0.56 U	
4-AMINO-2,6-DINITROTOLUENE			0.29 J	0.26 J	0.242 U	0.245 U	0.26 U	0.242 U		0.04 U	0.5	0.31 J	0.58	0.51 J	0.36 J		0.52 J	1.1	0.39 J	0.81	1.1	1.1
4-NITROTOLUENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 UJ	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 UJ	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
DNX			1		0.242 U		0.26 U			1.5 J		0.47 J		0.41 J			0.9 J		0.264 U		0.33 J	
HMX			29	28	29	24	28	38 J		25	140	110	160	160	170 J		14	22	270	100	31	31 J
MNX			4.5		3.3		2.8			5.2		6.9		7.8			3.3		3.2		3.6	
TNX			0.25 U		0.242 U		0.26 U			0.73		0.24 U		0.26 U			0.26 U		0.264 U		0.28 U	
NITROBENZENE			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 U	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 U	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
RDX			460	400	440	340	380	500		650	2100	1500	2300	2100	2100		140	230	110	200	250	250
TETRYL			0.25 U	0.24 U	0.242 U	0.245 U	0.26 U	0.242 U		0.04 U	0.24 U	0.24 U	0.248 U	0.26 U	0.24 U		0.04 U	0.25 U	0.264 U	0.271 U	0.28 U	0.258 U
Field Parameters																						
TEMPERATURE (°c)	C		10.94	18.58	12.06	15.29	16.85	10.75		13.32	17.35	10.9	13.5	16.53	9.61		13.28	15.02	11.71	11.87	15.03	11.65
ALKALINITY	MG/L		10 U																			
CARBON DIOXIDE			32																			
DISSOLVED OXYGEN			1	13.42	1.3			0.84			2.9	4.2			9.29			0.39	13.39			8.46
DISSOLVED OXYGEN - METER			2.35			0.62	0.36			4.82			4.64	4.39			6.28			8.41	7.84	
HYDROGEN SULFIDE (H2S)			0																			
IRON(+2)			0.18																			
MANGANESE(+2)			0.8																			
NITRITE-N			0.005																			
SULFIDE			0																			
SPECIFIC CONDUCTANCE (MS/CM)	MS/CM		0.312	0.347	0.271	0.311	0.289	0.391		0.307	0.174	0.24	0.127	127	0.309		0.273	0.329	0.314	0.287	248	0.383
OXIDATION REDUCTION POTENTIAL (MV)	MV		276	149.6	99.9	640	244.6	329		-145	133.5	64.2	300.8	472.7	235		100.3	538	168.9	256.7	588.7	269
TURBIDITY (NTU)	NTU		6.07	21	5.5	28	1.1	5.2		3.2	5	1.3	2.8	1.6	4.3		6.2	1.28	6.5	2.3	1.4	6.4
PH	S.U.		4.97	5.06	5.05	3.87	4.49	5.12		5.75	6.26	5.65	5.37	5	5.6		5.53	5.04	6.51	6.1	6	5.68
Miscellaneous Parameters																						
AMMONIA-N	MG/L		0.04							0.005 U							0.11 J					
NITRITE/NITRATE-N			0.3 J		0.24 J		0.19			0.28		0.25 J		0.22			0.28		0.33 J		0.37	
TOTAL ORGANIC CARBON							1 U							1 U							1 U	

TABLE 3-1

GROUNDWATER ANALYTICAL RESULTS
PUZ WATER BEARING ZONE
SWMU 13 MINE FILL B
ROUNDS 1 THROUGH 7

		13MWT47							13MWT51						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
Parameter	units	No Sample	12/9/03	8/1/04	1/25/05	5/5/05	8/15/05	1/5/06	No Sample	No Sample	8/1/04	2/3/05	5/5/05	8/11/05	1/20/06
Energetics (µg/L)															
1,3,5-TRINITROBENZENE	UG/L		0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
1,3-DINITROBENZENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.521 U												
2,4,6-TRINITROTOLUENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
2,4-DIAMINO-6-NITROTOLUENE			0.26 U		0.242 U		0.27 U					0.264 U		0.38 J	
2,4-DINITROTOLUENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
2,6-DIAMINO-4-NITROTOLUENE			0.26 U		0.242 U		0.27 U					0.264 U		0.26 UJ	
2,6-DINITROTOLUENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
2-AMINO-4,6-DINITROTOLUENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.39 J	0.264 U	0.39 J	0.26 UJ	0.242 U
2-NITROTOLUENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
3,5-DINITROANILINE			0.26 U		0.242 U		0.27 U					0.264 U		0.26 UJ	
3-NITROTOLUENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
4,4'-TN-AZOXY					0.485 U		0.54 U					0.528 U		0.51 UJ	
4-AMINO-2,6-DINITROTOLUENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.5 J	0.72	0.26 UJ	0.242 U
4-NITROTOLUENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
DNX			0.26 U		0.242 U		0.27 U					0.64 J		0.44 J	
HMX			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			120	69	80	86 J	18
MNX			0.26 U		0.242 U		0.27 U					9.3		0.26 UJ	
TNX			0.26 U		0.242 U		0.27 U					0.91 J		0.26 UJ	
NITROBENZENE			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
RDX			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			250	320	230	27 J	58
TETRYL			0.26 U	0.24 U	0.242 U	0.291 U	0.27 U	0.242 U			0.27 U	0.264 U	0.269 U	0.26 UJ	0.242 U
Field Parameters															
TEMPERATURE (°c)	C		12.42	18.41	8.87	11.59	19.16	8.66			20.57	5.07	11.07	17.78	8.22
ALKALINITY	MG/L														
CARBON DIOXIDE															
DISSOLVED OXYGEN				0.51	0.81			0.64			8.32	10.19			5.48
DISSOLVED OXYGEN - METER			1.5			0.07							0.17	0.52	
HYDROGEN SULFIDE (H2S)															
IRON(+2)															
MANGANESE(+2)															
NITRITE-N															
SULFIDE															
SPECIFIC CONDUCTANCE (MS/CM)	MS/CM		1634	1.056	0.673	0.075	0.793	1.32			0.278	0.14	0.131	344	0.231
OXIDATION REDUCTION POTENTIAL (MV)	MV		409.9	181.2	353.3	320.1	353	303			299	254.4	249.6	356.2	208
TURBIDITY (NTU)	NTU		5.4	7	10	0.18	10	10			33	9.7	8.3	110	8.9
PH	S.U.		3.46	3.4	3.63	3.41	3.38	3.79			5.94	6.2	5.93	6	7.17
Miscellaneous Parameters															
AMMONIA-N	MG/L		0.44												
NITRITE/NITRATE-N			0.05 U		0.025 UJ		0.025 U					1.5		0.025 U	
TOTAL ORGANIC CARBON							2.1							5.4	

A blank cell indicates that no sample was collected or analysis was conducted for the parameter.

manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ – Indicates that the chemical was not detected; however, the detection limit (sample-specific detection limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

J – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

> - Indicates that the true value is probably greater than the reported value. This "qualifier flag" is used to identify reported values that exceed the calibration range of field measurements but

R – Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

TABLE 3-2

DESCRIPTIVE STATISTICS FOR
SWMU 13 (MINE FILL B) ROUND 7 GROUNDWATER
IN THE PENNSYLVANIA UPPER WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration	Average of Positive Detects	Sample of Maximum Detect
Energetics (ug/L)							
1,3,5-Trinitrobenzene	1/14	1.2	1.3	0.24 - 0.264	0.204	1.20	13GWT0908-D
1,3-Dinitrobenzene	2/14	1.4	2.4	0.24 - 0.264	0.373	1.85	13GWT0908-D
2,4,6-Trinitrotoluene	3/14	0.48 J	49	0.24 - 0.264	5.20	23.8	13GWT1107
2,4-Dinitrotoluene	2/14	1.2 J	4.1 J	0.24 - 0.264	0.487	2.65	13GWT1107
2,6-Dinitrotoluene	1/14	7.4 J	7.9 J	0.24 - 0.264	0.646	7.40	13GWT0908-D
2-Amino-4,6-Dinitrotoluene	4/14	0.4 J	18	0.24 - 0.264	2.39	8.04	13GWT0908-D
3-Nitrotoluene	1/14	1.3 J	1.3 J	0.24 - 0.27	0.211	1.30	13GWT1107
4-Amino-2,6-Dinitrotoluene	6/14	0.36 J	29	0.242 - 0.264	3.86	8.83	13GWT1107
HMX	12/14	0.76 J	230	0.242 - 0.264	56.4	65.8	13GWT2107
RDX	11/14	3.7	2100	0.242 - 0.264	406	517	13GWT3706
Field Parameters							
Dissolved Oxygen (mg/L)	13/13	0.48	9.29	- - -	3.09	3.09	13GWT3706
Oxidation Reduction Potential (MV)	13/13	97	396	- - -	270	270	13GWT1307
pH	13/13	3.79	7.17	- - -	5.29	5.29	13GWT5105
Specific Conductance (ms/cm)	13/13	0.127	1.58	- - -	0.588	0.588	13GWT3106
Temperature (C)	13/13	8.22	13.6	- - -	10.7	10.7	13GWT1507
Turbidity (NTU)	13/13	1.1	10	- - -	6.52	6.52	13GWT1507, 13GWT4706

Associated Samples
13GWT0107
13GWT0908
13GWT0908-D
13GWT1107
13GWT1307
13GWT1407
13GWT1507
13GWT1707
13GWT2107
13GWT3106
13GWT3406
13GWT3706
13GWT4006
13GWT4706
13GWT5105

TABLE 3-3

GROUNDWATER ANALYTICAL RESULTS
PLZ WATER BEARING ZONE
SWMU 13 MINE FILL B
ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA

		13MWT28							13MWT45							13MWT46						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Parameter	Units	No Sample	12/07/03	07/31/04	02/01/05	05/03/05	08/09/05	01/10/06	No Sample	12/08/03	07/29/04	01/23/05	05/05/05	08/10/05	01/19/06	No Sample	12/09/03	07/30/04	02/02/05	05/04/05	08/10/05	01/06/06
Energetics																						
1,3,5-TRINITROBENZENE	UG/L		0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
1,3-DINITROBENZENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.515 U							0.515 U							0.556 U					
2,4,6-TRINITROTOLUENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
2,4-DIAMINO-6-NITROTOLUENE			0.258 U		0.275 U		0.27 U			0.258 U		0.24 U		0.27 U			0.278 U		0.245 U		0.28 U	
2,4-DINITROTOLUENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
2,6-DIAMINO-4-NITROTOLUENE			0.258 U		0.275 U		0.27 U			0.258 U		0.24 U		0.27 U			0.278 U		0.245 U		0.28 U	
2,6-DINITROTOLUENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
2-AMINO-4,6-DINITROTOLUENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
2-NITROTOLUENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
3,5-DINITROANILINE			0.258 U		0.275 U		0.27 U			0.258 U		0.24 U		0.27 U			0.278 U		0.245 U		0.28 U	
3-NITROTOLUENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.34 J	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
4,4'-TN-AZOXY					0.55 U		0.54 U					0.48 U		0.54 U					0.49 U		0.55 U	
4-AMINO-2,6-DINITROTOLUENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
4-NITROTOLUENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
DNX			0.258 U		0.275 U		0.27 U			0.258 U		0.24 U		0.27 U			0.278 U		0.245 U		0.28 U	
MNX			0.258 U		0.275 U		0.27 U			0.258 U		0.24 U		0.27 U			0.278 U		0.245 U		0.28 U	
TNX			0.258 U		0.275 U		0.27 U			0.258 U		0.24 U		0.27 U			0.278 U		0.245 U		0.28 U	
RDX			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
NITROBENZENE			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
TETRYL			0.258 U	0.25 U	0.275 U	0.269 U	0.27 U	0.242 U		0.258 U	0.24 U	0.24 U	0.252 U	0.27 U	0.252 U		0.278 U	0.26 U	0.245 U	0.252 U	0.28 U	0.252 U
Field Parameters																						
TEMPERATURE	C		13.59	17.98	13.87	14.09	16.4	11.52		13.36	25.29	10.13	16.63	17.09	9.1		12.45	14.1	10.45	13.64	15.05	10.28
ALKALINITY	MG/L		150																			
CARBON DIOXIDE			10 U																			
DISSOLVED OXYGEN			0.5	0.26	8.87			1.78			7.97	0.56			0.94			0.05	1.3			2.64
DISSOLVED OXYGEN - METER			0.57			0.59	0.49			0.55			0.91	0.72			0.99			0.92	0.84	
HYDROGEN SULFIDE (H2S)			0																			
IRON(+2)			0.01																			
MANGANESE(+2)			0																			
NITRITE-N			0.007																			
SULFIDE			0																			
SPECIFIC CONDUCTANCE	MS/CM		0.495	1.217	0.918	0.771	808	1.23		0.357	0.703	0.491	0.518	505	0.733		1.021	0.786	0.731	0.596	554	1.07
OXIDATION REDUCTION POTENTIAL	MV		-34.1	73.5	144.6	191.3	564.4	112		55.5	116.5	-48	71	580.3	146		-32.5	131	-21.4	64.7	597.6	-31
TURBIDITY	NTU		260	65	50	42	11	54		75	19	14	13	34	14		8.72	2.81	1.65	3.5	0.35	6.2
PH	S.U.		9.15	8.08	7.78	7.58	4.14	7.75		8.19	6.78	7.08	6.7	4.76	7.17		6.6	6.25	6.45	6.44	0	6.56
Miscellaneous Parameters																						
AMMONIA-N	MG/L		0.46 J							0.26							0.12					
NITRITE/NITRATE-N			0.66 J		0.15 J		0.77			0.05 U		0.06 J		0.025 U			0.05 U		0.025 UJ		0.025 U	
TOTAL ORGANIC CARBON							1 U							1 U							1 U	

U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

J – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

UJ – Indicates that the chemical was not detected; however, the detection limit (sample-specific detection limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

R – Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

TABLE 3-4

DESCRIPTIVE STATISTICS FOR
SWMU 13 (MINE FILL B) ROUND 7 GROUNDWATER
IN THE PENNSYLVANIA LOWER WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration	Average of Positive Detects	Sample of Maximum Detect
Field Parameters							
Dissolved Oxygen (mg/L)	3/3	0.94	2.64	- - -	1.79	1.79	13GWT4606
Oxidation Reduction Potential (MV)	3/3	-31	146	- - -	75.7	75.7	13GWT4506
pH	3/3	6.56	7.75	- - -	7.16	7.16	13GWT2806
Specific Conductance (ms/cm)	3/3	0.733	1.23	- - -	1.01	1.01	13GWT2806
Temperature (C)	3/3	9.1	11.52	- - -	10.3	10.3	13GWT2806
Turbidity (NTU)	3/3	6.2	54	- - -	24.7	24.7	13GWT2806

Associated Samples
13GWT2806
13GWT4506
13GWT4606

TABLE 3-5

EXPLOSIVE AND DEGRADATION PRODUCT CONCENTRATIONS AND OTHER PARAMETERS
IN SURFACE WATER FOR ROUNDS 1 THROUGH 7
SWMU 13 - MINE FILL A
NSWC CRANE
CRANE, INDIANA

		13SW11							13SW/SD14							13SW/SD15						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Parameter	Units	5/8/2003	11/18/2003	No Sample	2/2/2005	No Sample	No Sample	1/5/2006	No Sample	10/22/2003	10/27/2004	2/2/2005	5/8/2005	8/16/2005	1/5/2006	No Sample	10/27/2003	10/27/2004	2/2/2005	5/8/2005	8/16/2005	1/5/2006
Energetics																						
1,3,5-TRINITROBENZENE	UG/L	0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
1,3-DINITROBENZENE		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.575 U							0.47 U							0.49 U					
2,4,6-TRINITROTOLUENE		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.42 J	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
2,4-DIAMINO-6-NITROTOLUENE			0.287 U							0.24 U	0.248 U						0.24 U	0.25 U				
2,4-DINITROTOLUENE		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
2,6-DIAMINO-4-NITROTOLUENE			0.287 U							0.24 U	0.248 U						0.24 U	0.25 U				
2,6-DINITROTOLUENE		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
2-AMINO-4,6-DINITROTOLUENE		0.25 R	0.9 J		0.242 U			0.242 U		1.3	1 J	0.252 U	0.82 J	0.89 J	0.84 J		0.24 U	0.26 J	0.24 U	0.25 U	0.29 U	0.25 U
2-NITROTOLUENE		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
3,5-DINITROANILINE			0.287 U							0.24 U	0.248 U						0.24 U	0.25 U				
3-NITROTOLUENE		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
4,4'-TN-AZOXY											0.495 U							0.5 U				
4-AMINO-2,6-DINITROTOLUENE		1 J	4.5 J		0.34 J			0.242 U		2.9	2.5	1.3	1.9	2.2	1.9		0.24 U	0.62	0.29 J	0.32 J	0.29 U	0.25 U
4-NITROTOLUENE		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
DNX			35							2.7 J	1						23 J	1.8 J				
HMX		93	730		130			210 J		20	18	21	30	18	25 J		210	160	81	60	47	94 J
MNX			72							3.8 J	1.9						47	22				
NITROBENZENE		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
TETRYL		0.21 U	0.287 U		0.242 U			0.242 U		0.24 U	0.248 U	0.252 U	0.25 U	0.24 U	0.248 U		0.24 U	0.25 U	0.24 U	0.25 U	0.29 U	0.25 U
RDX		610	5500		1100			1500		77	97	60	46	47	76		1500	1000	390	100	200	450
TNX			4							0.62 J	0.248 U						4	0.74 J				
Field Parameters																						
TEMPERATURE	C	16.45	15.2		2.72			5.22		12.14	14.69	2.88	15.05	21.68	5.21		8.93	14.22	2.44	16.88	21.47	4.88
DISSOLVED OXYGEN	MG/L				12.46			10.18			10.3	13.8			10.91			11.97	13.38			11.02
DISSOLVED OXYGEN - METER		4.35	4.99							5.93			11.85	7.78			10.59			10.43	8.56	
SPECIFIC CONDUCTANCE	MS/CM	2.743	1.024		1.439			2.34		0.365	0.702	0.278	0.223	0.323	0.605		0.251	0.361	0.132	0.14	0.181	0.276
OXIDATION REDUCTION POTENTIAL	MV	152.9	216		282			200		224.7	81.7	178	208	78.6	233		290.5	101.4	195	194	74.6	209
TURBIDITY	NTU	85	242		7.6			14		4.4	12.8	4.1	10 U	9.1	6.5		10.4	23.8	85	10 U	655	34
PH	S.U.	7.67	6.9		7.76			7.49		7.33	7.45	7.91	7.51	8.23	6.63		7.43	7.41	8.13	7.4	8.6	6.98
Miscellaneous Parameters																						
AMMONIA-N	MG/L	3.4	0.26 J							0.005 UJ							0.01					
NITRITE/NITRATE-N		23	8.5 J							0.54 J	7.4						0.14	3.4				

TABLE 3-5

EXPLOSIVE AND DEGRADATION PRODUCT CONCENTRATIONS AND OTHER PARAMETERS
IN SURFACE WATER FOR ROUNDS 1 THROUGH 7
SWMU 13 - MINE FILL A
NSWC CRANE
CRANE, INDIANA

		13SW/SD16							13SW/SD19							13SW/SD20					
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	4	5	6	7
Parameter	Units	No Sample	10/22/2003	10/27/2004	2/2/2005	5/8/2005	8/16/2005	1/5/2006	No Sample	10/23/2003	No Sample	2/2/2005	5/8/2005	8/16/2005	1/5/2006	No Sample	10/23/2003	2/2/2005	5/8/2005	8/16/2005	1/5/2006
Energetics																					
1,3,5-TRINITROBENZENE	UG/L		0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
1,3-DINITROBENZENE			0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.5 U							0.49 U							0.54 U				
2,4,6-TRINITROTOLUENE			0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
2,4-DIAMINO-6-NITROTOLUENE			0.25 U	0.24 U						0.24 U							0.27 U				
2,4-DINITROTOLUENE			0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
2,6-DIAMINO-4-NITROTOLUENE			0.25 U	0.24 U						0.24 U							0.27 U				
2,6-DINITROTOLUENE			0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
2-AMINO-4,6-DINITROTOLUENE			0.8 J	0.35 J	0.24 U	0.36 J	1 J	0.28 J		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
2-NITROTOLUENE			0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
3,5-DINITROANILINE			0.25 U	0.24 U						0.24 U							0.27 U				
3-NITROTOLUENE			0.29 J	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
4,4'-TN-AZOXY				0.48 U																	
4-AMINO-2,6-DINITROTOLUENE			1.6	0.83	0.37 J	0.87 J	2.2	0.59		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
4-NITROTOLUENE			0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
DNX			3.6 J	0.24 U						0.24 U							0.27 U				
HMX			21	15	13	22 J	23	17 J		0.24 U		0.54	0.51	0.29 U	0.55 J		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
MNX			3	1.2						0.24 U							0.27 U				
NITROBENZENE			0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
TETRYL			0.25 U	0.24 U	0.24 U	0.29 UJ	0.29 U	0.242 U		0.24 U		0.264 U	0.25 U	0.29 U	0.238 U		0.27 U	0.24 U	0.26 U	0.29 U	0.242 U
RDX			50	43	29	37 J	41	34		0.24 U		0.92	0.41 J	0.29 U	0.84		0.46 J	0.38 J	0.26 U	0.29 U	0.31 J
TNX			0.48 J	0.24 U						0.24 U							0.27 U				
Field Parameters																					
TEMPERATURE	C		12.18	14.56	1.43	14.24	21.08	5		11.69		2.64	15.03	21.35	4.9		13.22	2.24	14.94	21.73	5.4
DISSOLVED OXYGEN	MG/L			11.63	13.88			10.67				13.12			9.91			13.25			10.44
DISSOLVED OXYGEN - METER			8.48			11.35	5.4			6.03			11.58	12.02			4.39		11.18	2.54	
SPECIFIC CONDUCTANCE	MS/CM		0.254	0.297	0.106	0.134	0.215	0.614		0.566		0.236	0.316	0.376	0.562		0.3	0.154	0.174	0.231	0.396
OXIDATION REDUCTION POTENTIAL	MV		213.7	71.5	188	173	92.3	244		203.5		220	213	134.2	136		158.3	205	214	103.3	163
TURBIDITY	NTU		6.5	12.7	10	10 U	24.5	12		1.93		36	10 U	12	0.5		6.25	6.1	10 U	3.71	3.3
PH	S.U.		7.17	7.61	8.29	7.53	7.91	6.87		7.25		7.9	7.13	8.51	7.67		7.75	8.17	7.21	7.58	8.11
Miscellaneous Parameters																					
AMMONIA-N	MG/L		0.005 UJ							0.04 J							0.005 UJ				
NITRITE/NITRATE-N			0.66 J	1.3						0.13 U							0.11 U				

TABLE 3-5

EXPLOSIVE AND DEGRADATION PRODUCT CONCENTRATIONS AND OTHER PARAMETERS
IN SURFACE WATER FOR ROUNDS 1 THROUGH 7
SWMU 13 - MINE FILL A
NSWC CRANE
CRANE, INDIANA

		13SW/SD22						13SW/SD30						
		1	2	3	4	5	7	1	2	3	4	5	6	7
Parameter	Units	No Sample	10/22/2003	10/27/2004	2/2/2005	5/8/2005	1/5/2006	No Sample	10/22/2003	10/26/2004	2/2/2005	5/8/2005	8/16/2005	1/5/2006
Energetics														
1,3,5-TRINITROBENZENE	UG/L		0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
1,3-DINITROBENZENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
2,2',6,6'-TETRANITRO-4,4'-AZOXYTOLUENE			0.52 U						0.5 U					
2,4,6-TRINITROTOLUENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
2,4-DIAMINO-6-NITROTOLUENE			0.26 U						0.25 U	0.24 U				
2,4-DINITROTOLUENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
2,6-DIAMINO-4-NITROTOLUENE			0.26 U						0.25 U	0.24 U				
2,6-DINITROTOLUENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
2-AMINO-4,6-DINITROTOLUENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
2-NITROTOLUENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
3,5-DINITROANILINE			0.26 U						0.25 U	0.24 U				
3-NITROTOLUENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
4,4'-TN-AZOXY										0.48 U				
4-AMINO-2,6-DINITROTOLUENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
4-NITROTOLUENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
DNX			0.26 U						0.25 U	0.24 U				
HMX			0.26 U		0.36 J	0.27 U	0.258 U		3.2 J	2.9	2	2.6	2.4	2.4 J
MNX			0.26 U						0.28 J	0.31 J				
NITROBENZENE			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
TETRYL			0.26 U		0.266 U	0.27 U	0.258 U		0.25 U	0.24 U	0.252 U	0.25 U	0.25 U	0.26 U
RDX			1.6		1.1	0.33 J	1		6.2	9.9	6	4.9	5.3	6.7
TNX			0.26 U						0.25 U	0.24 U				
Field Parameters														
TEMPERATURE	C		13.65	15.14	2.02	13.53	5.12		13.09	14.39	1.63	19.29	22.52	4.91
DISSOLVED OXYGEN	MG/L			10.84	8.25		9.72			9.44	14.1			11.18
DISSOLVED OXYGEN - METER			3.71			6.86			9.63			11.3	10.21	
SPECIFIC CONDUCTANCE	MS/CM		0.434	0.205	0.151	0.184	0.342		0.395	0.359	0.168	0.234	0.364	0.389
OXIDATION REDUCTION POTENTIAL	MV		264.7	74.1	139	199	188		222.1	39.6	201	165	71	199
TURBIDITY	NTU		1.5	21.3	3.1	10 U	6.7		2.6	5.69	4.5	3.5	2.18	40
PH	S.U.		7.02	7.7	8.18	7.03	7.24		7.84	7.52	8.07	8.06	8.59	7.15
Miscellaneous Parameters														
AMMONIA-N	MG/L		0.005 UJ						0.005 UJ					
NITRITE/NITRATE-N			0.025 U						0.025 U	0.26				

A blank cell indicates that no sample was collected or analysis was conducted for the parameter.

reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to

UJ – Indicates that the chemical was not detected; however, the detection limit (sample-specific detection limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

J – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

R – Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be

TABLE 3-6

DESCRIPTIVE STATISTICS FOR
SWMU 13 (MINE FILL B) ROUND 7 SURFACE WATER
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration	Average of Positive Detects	Sample of Maximum Detect
Energetics (ug/L)							
2-Amino-4,6-Dinitrotoluene	2/8	0.28 J	0.84 J	0.238 - 0.26	0.233	0.560	13SW1406
4-Amino-2,6-Dinitrotoluene	2/8	0.59	1.9	0.238 - 0.26	0.404	1.25	13SW1406
HMX	6/8	0.55 J	210 J	0.242 - 0.258	43.7	58.2	13SW1104
RDX	8/8	0.31 J	1500	- - -	259	259	13SW1104
Field Parameters							
Dissolved Oxygen (mg/L)	8/8	9.72	11.18	- - -	10.5	10.5	13SW3006
Oxidation Reduction Potential (MV)	8/8	136	244	- - -	197	197	13SW1606
pH	8/8	6.63	8.11	- - -	7.27	7.27	13SW2005
Specific Conductance (ms/cm)	8/8	0.276	2.34	- - -	0.691	0.691	13SW1104
Temperature (C)	8/8	4.88	5.4	- - -	5.08	5.08	13SW2005
Turbidity (NTU)	8/8	0.5	40	- - -	14.6	14.6	13SW3006

Associated Samples
13SW1406
13SW1506
13SW1606
13SW1905
13SW2005
13SW2205
13SW3006
13SW3006-D
13SW1104

4.0 DATA EVALUATION

Section 4 presents groundwater and surface monitoring data for Rounds 1 through 7. The information presented includes temporal plots of RDX and degradation product concentration results by round for each groundwater and surface sampling location included in the SWMU 13 long term monitoring program. Also presented in this section are potentiometric surface maps showing groundwater elevations at all SWMU 13 wells in Round 7. The objective of the long term monitoring program at SWMU 13 is to collect enough monitoring data (up to nine rounds) to determine the nature and extent of contamination, whether residual explosives are naturally degrading, and provide data for making remedy decisions for residual explosives contamination to complete the CMS.

The information being provided in this monitoring program fulfills the requirements established by the U.S. EPA Region 5 as described in the document entitled "Region 5 Framework for Monitored Natural Attenuation Decisions for Groundwater" (U.S. EPA 2000). The framework summarizes the current state-of-the-science and U.S. EPA policy on the use of MNA. The framework also provides technical direction for the collection of specific primary and secondary monitoring information to demonstrate a net loss of contaminants and processes responsible for the loss.

The primary MNA monitoring information requirements are identified below in bold type along with supporting information being provided by the SWMU 13 long term monitoring program:

- **Monitoring data should include analytical results for the contaminants of concern and their degradation products from nine or more rounds of samples collected under non-pumping conditions over a period of three to five years.** The SWMU 13 long term monitoring program is providing analytical results for select explosives and degradation products. As indicated in the SWMU 13 RFI, RDX is considered to be the principal chemical of concern because it is a site related contaminant and has been detected more frequently and at higher concentrations than any other explosive compound. The degradation products for RDX are DNX, MNX, and TNX. The long-term monitoring program will include nine rounds of sampling, under non-pumping conditions, to provide information on trends in groundwater concentrations of explosives and explosives degradation productions. To date, seven rounds of groundwater sampling events have been conducted April-May 2003, October-December 2003, July-August 2004, January-February 2005, May 2005, August 2005, and January 2006. The remaining two rounds of sampling will be completed in 2006.

- **There should be at least two years of quarterly sampling to evaluate seasonal effects on the contaminant concentrations.** At the completion of the ninth round of sampling at SWMU 13, quarterly monitoring will have been conducted for a period spanning 3 years.

- **The data should be collected from appropriately located sampling points, including within the source area, within the center of the plume and at the leading edges of the plume.** The SWMU 13 long term monitoring program includes 17 wells. The location of each well relative to the contamination plume is discussed in Section 4.1 below.

- **Samples should be collected from points located vertically (above and below) and horizontally (upgradient and downgradient) outside the area of groundwater contamination.** At SWMU 13, explosives contamination has been detected in the Puz aquifer but not in the Plz aquifer. The long term monitoring program includes monitoring wells located in the Upper and Lower Pennsylvanian water bearing zones to evaluate if contamination is migrating to the lower aquifer. In addition, the monitoring program includes monitoring wells positioned upgradient and downgradient of the source area, within the source plume and along the outside area of the groundwater contamination. The location of each well relative to the contamination plume is discussed in Section 4.1 below.

- **The most recent analytical data on groundwater should be no more than two years old at the time of evaluation.** The ninth round of sampling is expected to be completed in May 2006. A final report evaluating the MNA program through nine rounds of sampling is expected to be issued in September 2006. As a result, the most recent analytical data will be no more than two years old.

- **Demonstration of a trend of decreasing contamination concentration must be clear and meaningful and be based on statistical tests which indicate a high degree of confidence in the apparent trend line.** The SWMU 13 MNA report for nine rounds of sampling will include temporal plots of RDX and degradation product concentrations, along with a detailed statistical evaluation.

- **Additional rounds of samples, beyond nine rounds, may be required to demonstrate the decreasing trend.** SWMU 13 MNA monitoring data will be evaluated after nine rounds and a decision will be made if additional data is needed.

The secondary MNA monitoring information requirements are identified below in bold type along with supporting information being provided by the SWMU 13 long term monitoring program:

- **The monitoring data should be collected from appropriate locations that are distributed both vertically and horizontally throughout the plume.** As indicated previously, explosives contamination has been detected in the upper Pennsylvanian aquifer but not the lower Pennsylvanian aquifer at SWMU 13. The long term monitoring program includes monitoring wells located in the Upper and Lower Pennsylvanian water bearing zones to evaluate if contamination is migrating to the lower aquifer. In addition, the monitoring program includes monitoring wells positioned upgradient and downgradient of the source area, within the source plume and along the outside area of the groundwater contamination. The location of each well relative to the contamination plume is discussed in Section 4.1 below.

- **Sample locations should consider heterogeneities in geologic structures and in the spatial distribution of contaminants. Groundwater flow paths and rates should be fully and accurately defined.** Groundwater elevations are being measured during each sampling round to develop potentiometric analyses of groundwater direction and flow rates and the results will be evaluated in the final MNA report.

- **Locations should be sampled under non-pumping conditions and should include the following information:**

  - **Contaminants of concern and potential degradation products.** All sampling is being conducted under non-pumping conditions. The SWMU 13 monitoring program is providing analytical results for RDX and the degradation products DNX, MNX, and TNX.

  - **Routine and Other Indicator Parameters.** The monitoring data being collected in each round also includes the routine indicator parameters DO, ORP, pH, specific conductance, temperature, turbidity, and total organic carbon (TOC).

  - **Vertical and horizontal characterization of the distribution of hydraulic conductivity and its affect on contaminant concentrations.** Information collected in nine rounds of sampling will be evaluated and used to characterize vertical and horizontal hydraulic conductivity.

  - **Water levels should be measured to determine groundwater flow direction.** Groundwater elevations are being measured at each well during each of the nine sampling rounds and the results will be presented in the final MNA report in the form of potentiometric surface figures.

- **Seasonal variations and trends should be evaluated by obtaining data from different times of the year to determine if changes in contaminant concentrations, indicator parameters or water types are caused by natural attenuation or may be attributed to seasonal variability.** The SWMU 13 monitoring program includes quarterly monitoring which will measure RDX and degradation product concentrations and routine indicator parameters by season. The final MNA report will include the presentation of temporal plots to discern seasonal trends of RDX and degradation product concentrations, as well as routine indicator parameters.

4.1 GROUNDWATER MONITORING PROGRAM

MNA groundwater sampling is being conducted at 17 select well locations across SWMU 13 (see Figure 2-1). Fourteen wells are located in the Puz aquifer, while the remaining three wells are in the Plz aquifer. These wells have been established in accordance with U.S. EPA Region 5 MNA guidance (U.S. EPA 2000). The monitoring wells have a specific role in the monitoring program and represent locations within the plume source area, within the center and leading edges of the plume, and from points located vertically (above and below) and horizontally (upgradient and downgradient) outside the area of groundwater contamination. The selected wells are distributed as follows in the Puz and Plz:

Upper Pennsylvanian Water Bearing Zone Wells

- Two clean, laterally upgradient wells (13MWT01 and 13MWT15)
- Four source area wells (13MWT09, 13MWT11, 13MWT17, and 13 MWT21)
- Four wells within the RDX plumes (13 MWT13, 13 MWT34, 13MWT37, and 13MWT40)
- Three wells at the leading edge of the RDX plumes (13MWT14, 13MWT31, and 13MWT51)
- One laterally downgradient well that is clean (13MWT47)

Lower Pennsylvanian Water Bearing Zone Wells

- Three clean, deep wells below the RDX plumes (13MWT28, 13MWT45, and 13MWT46)

In Rounds 4 through 9, all groundwater samples are being analyzed for explosives and well stabilization parameters with occasional analyses for routine indicator MNA parameters and RDX degradation products. Groundwater elevations are also being collected during each sampling round.

4.2 SURFACE WATER MONITORING PROGRAM

In support of the MNA demonstration, surface water samples are also being collected at eight select locations (see Figure 2-2). These locations include 13SW11, 13SW14, 13SW15, 13SW16, 13SW19, 13SW20, 13SW22, and 13SW30. In Rounds 4 through 9, these locations are being analyzed for explosives only.

4.3 POTENTIOMETRIC SURFACES

Groundwater elevations were measured at all Puz and Plz monitoring wells in Round 7. The potentiometric surface maps for Round 7 are shown in Figures 4-1 and 4-2. Groundwater measurements for each well are shown in Table 2-1.

On January 4, 2006, water level elevations were measured in the Puz monitoring wells. The potentiometric surface for Puz wells in Round 5 is shown in Figure 4-1. In general, groundwater elevations measured on January 4, 2006 in the Puz were 2 to 3 feet higher in elevation than the measurements made during Round 6. The lowest groundwater elevation in the Puz was 648.15 feet above mean sea level (amsl) in well 13MWT37 located on the western boundary of SWMU 13. The highest elevation in the Puz was 711.47 feet amsl at well 13MWT03 located on the northeastern boundary of SWMU 13. Groundwater flow directions in the Puz in Round 7 were same as reported in previous rounds

Figure 4-2 presents the potentiometric surface map for groundwater elevations measured in Plz wells in Round 7. Groundwater elevations measured in Round 7 ranged from 596.27 feet amsl in well 13MWT46 to 628.34 feet amsl in monitoring well 13MWT28. With the exception of well 13MWT28, groundwater elevations in the Plz in Round 6 were generally the same as compared to Round 6. In Round 7, the elevation of well 13MWT28 was about 5.5 feet lower as compared to Round 6. The groundwater flow directions in the Plz in Round 7 were essentially the same as in Round 6.

4.4 GROUNDWATER TEMPORAL PLOT TREND ANALYSIS

The section presents temporal plots of RDX and degradation product concentrations by round for groundwater and surface water. The temporal plots are arranged in columns by monitoring well location showing the concentration trend for RDX followed by the trend for each degradation product. The data points shown in each plot represent the parameter concentration by round and the data validation qualifier abbreviation, as needed. The absence of a data point in a round indicates that no sample was collected or no analysis was conducted for a specific parameter.

Puz Aquifer

Figure 4-3 shows temporal plots of RDX and degradation product (DNX, MNX, and TNX) concentrations for Rounds 1 through 7 in the Puz wells. A review of analytical results for Rounds 1 through 7 indicates some evidence of potential concentration trends for RDX or degradation products at selected wells. Potential trends in RDX or degradation product concentrations after 7 rounds are indicated at the following wells:

- 13MWT09 (source area well) – decrease in MNX
- 13MWT11 (source area well)- increase in RDX
- 13MWT14 (leading edge well) – increase in RDX
- 13MWT21 (source area well) – decrease in RDX
- 13MWT34 (in RDX plume) – decrease in MNX
- 13MWT37 (in RDX plume) – increase in RDX; decrease in DNX; and increase in MNX
- 13MWT51 (leading edge well) – decrease in RDX

Plz Aquifer

Figure 4-4 shows temporal plots of RDX and degradation products for Rounds 1 through 7 at Plz well locations. Through Round 7, there have been no positive detections of RDX or degradation products in the Plz monitoring wells (13MWT28, 13MWT45, and 13MWT46).

4.5 SURFACE WATER TEMPORAL PLOT TREND ANALYSIS

Figure 4-5 shows temporal plots of explosive and degradation product surface water concentrations for Rounds 1 through 7. RDX has been detected at all surface water monitoring locations in 3 or more rounds or sampling. With the exception of location 13SW19, through 7 rounds of sampling, RDX concentrations have generally trended toward decreasing concentrations. In the case of 13SW19, insufficient data is available to discern a tread in RDX. Analysis for degradation products has not been conducted since Round 3. As a result, there is insufficient data to indicate a trend in degradation products in surface water.

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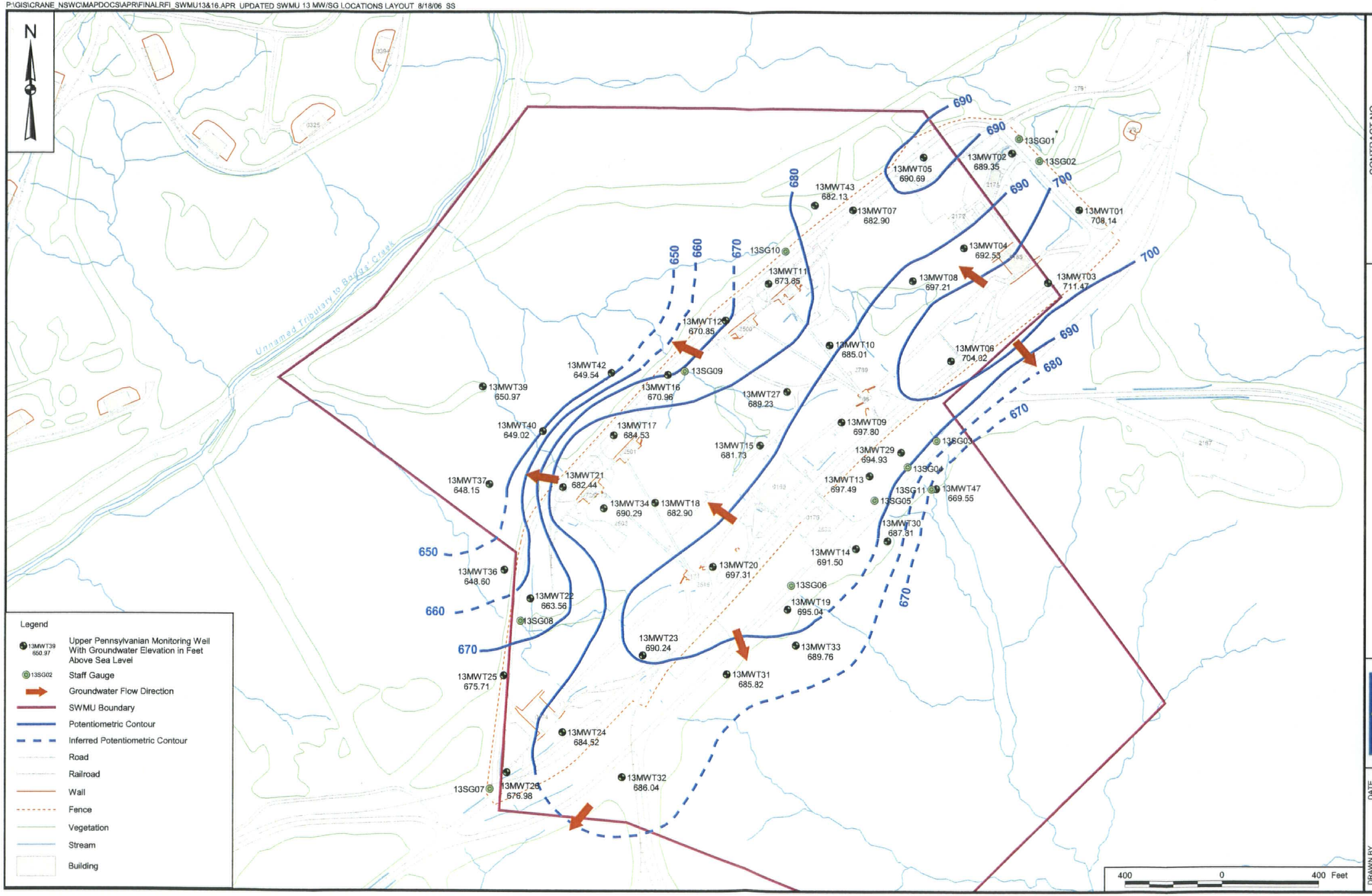

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APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 4 - 1

REV 0

MONITORING WELL AND STAFF GAUGE LOCATION MAP
FOR THE UPPER PENNSYLVANIAN
WATER-BEARING ZONE - JANUARY 4, 2006
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY S. STROZ DATE 8/17/06

CHECKED BY J. LUCAS DATE 8/18/06

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINALRFI_SWMU13&16.APR UPDATED SWMU 13 MW LOCATIONS LAYOUT - MAY 2005 8/18/06 SS

CONTRACT NO.
CTO 0377

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 4 - 2

REV 0

MONITORING WELL LOCATION MAP
FOR THE LOWER PENNSYLVANIAN
WATER-BEARING ZONE - JANUARY 4, 2006
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

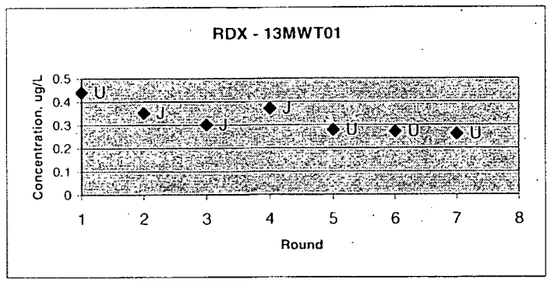
DRAWN BY S. STROZ DATE 8/16/06

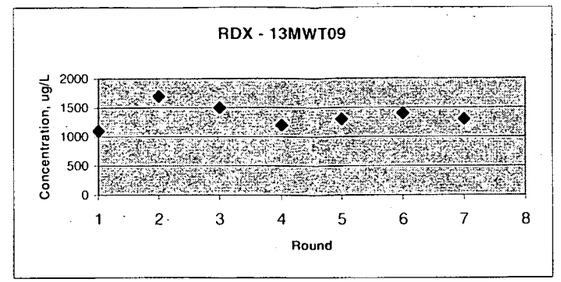
CHECKED BY J. LUCAS DATE 8/18/06

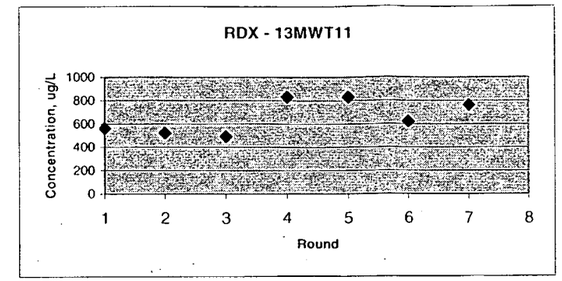
COST/SCHED-AREA

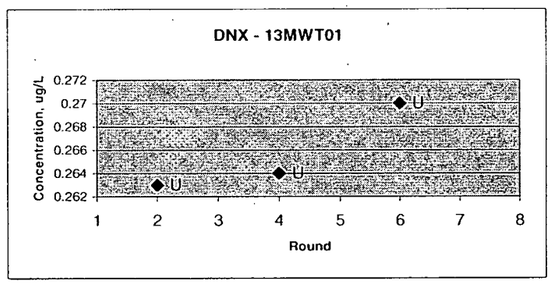
SCALE AS NOTED

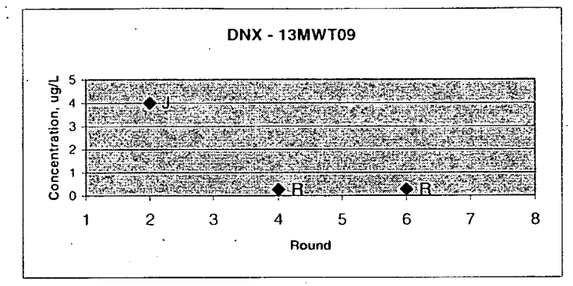
FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN THE UPPER PENNSYLVANIAN WATER BEARING ZONE
AT SWMU 13 FOR ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 5

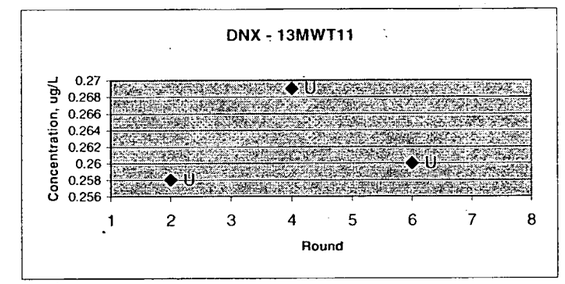


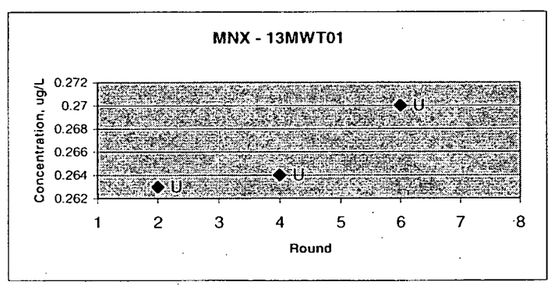


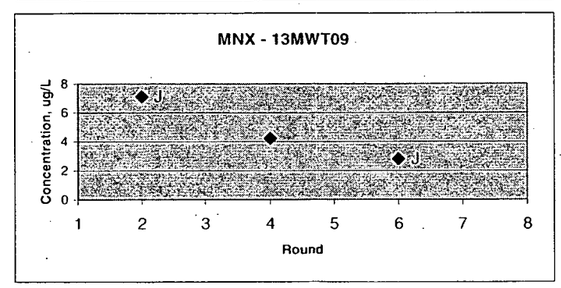


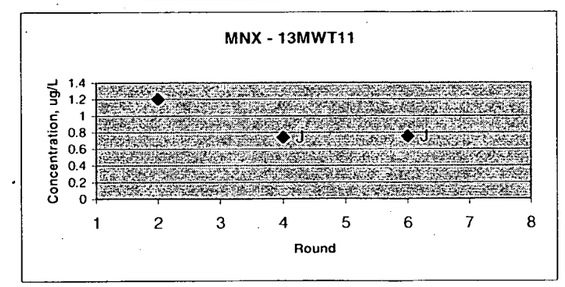


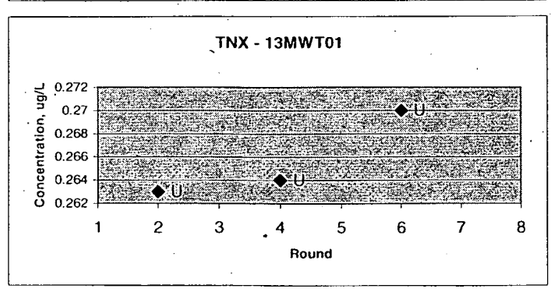


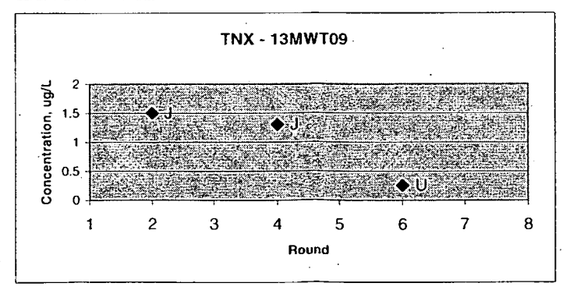












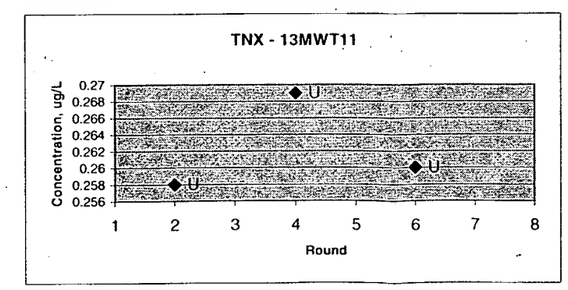
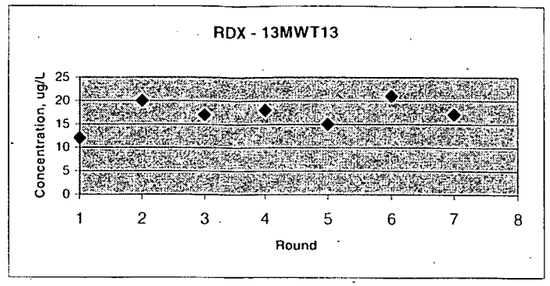
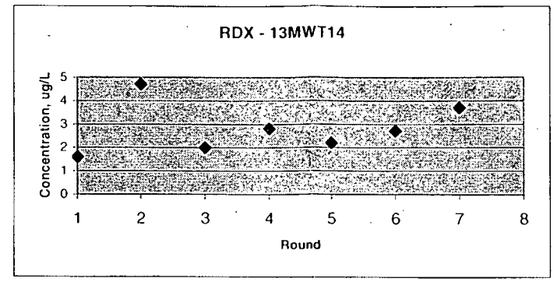
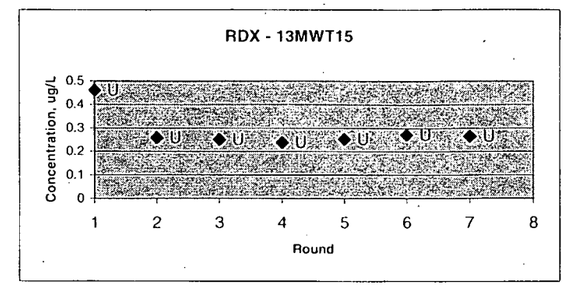
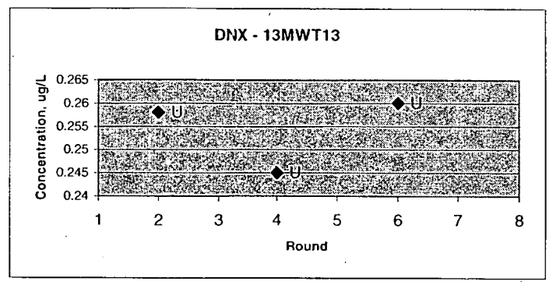


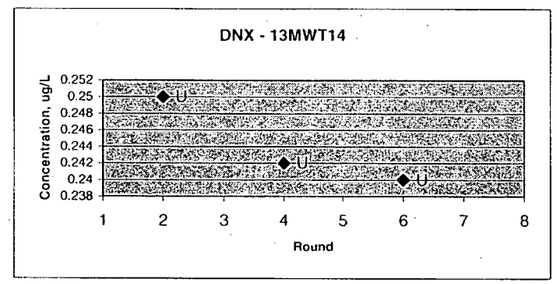
FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN THE UPPER PENNSYLVANIAN WATER BEARING ZONE
AT SWMU 13 FOR ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 5

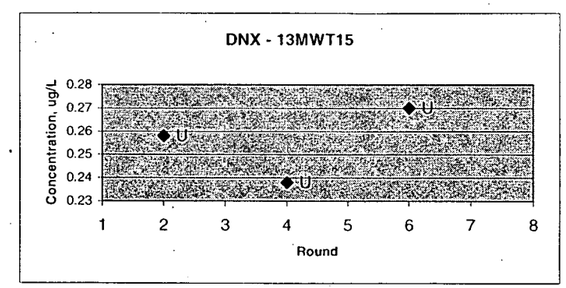


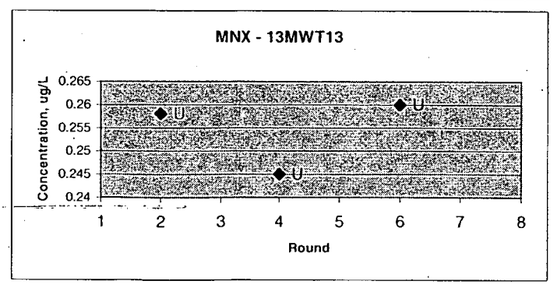


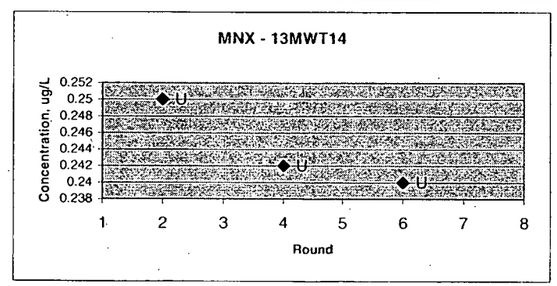


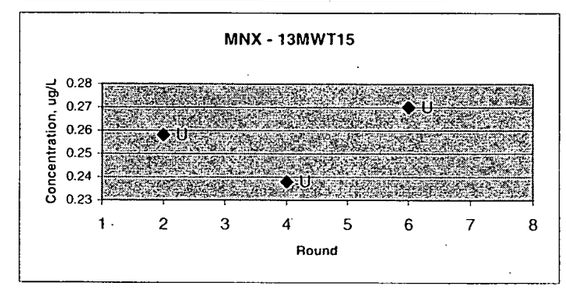


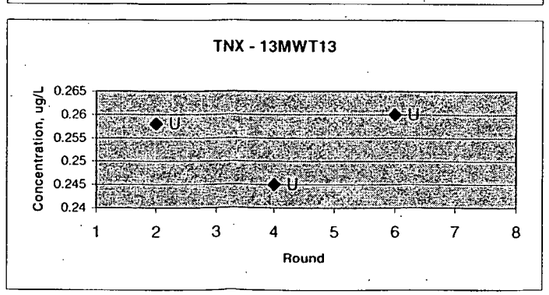


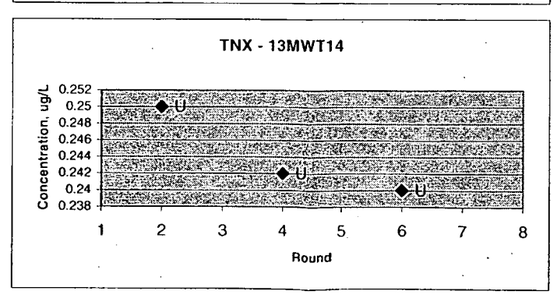












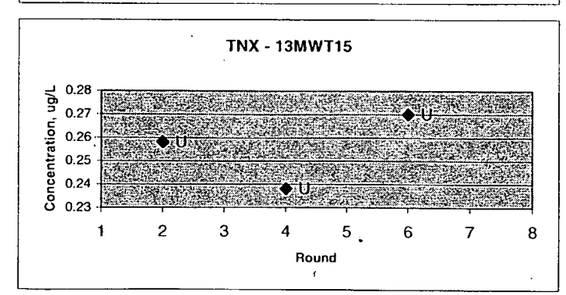


FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN THE UPPER PENNSYLVANIAN WATER BEARING ZONE
AT SWMU 13 FOR ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA

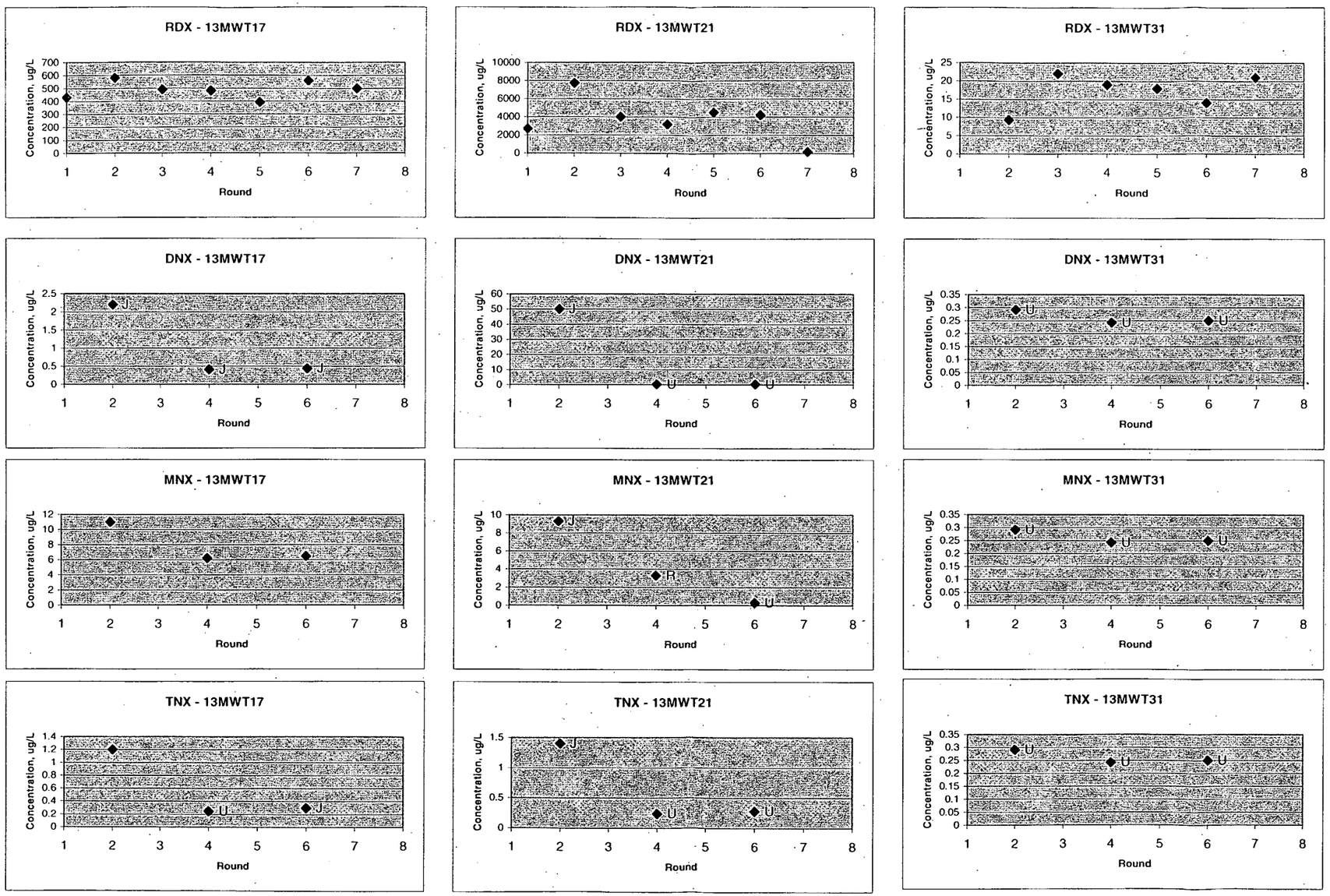


FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN THE UPPER PENNSYLVANIAN WATER BEARING ZONE
AT SWMU 13 FOR ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA

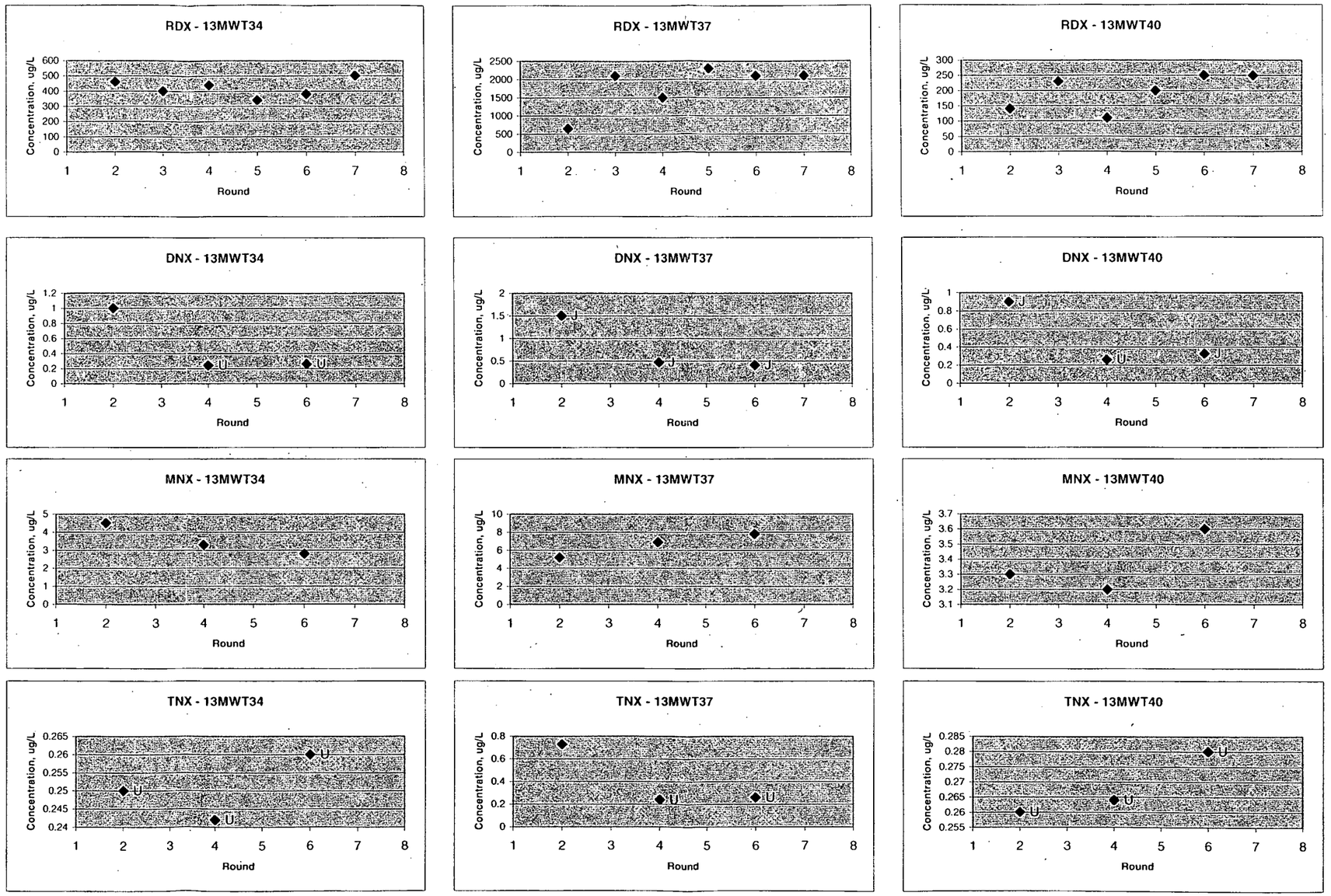
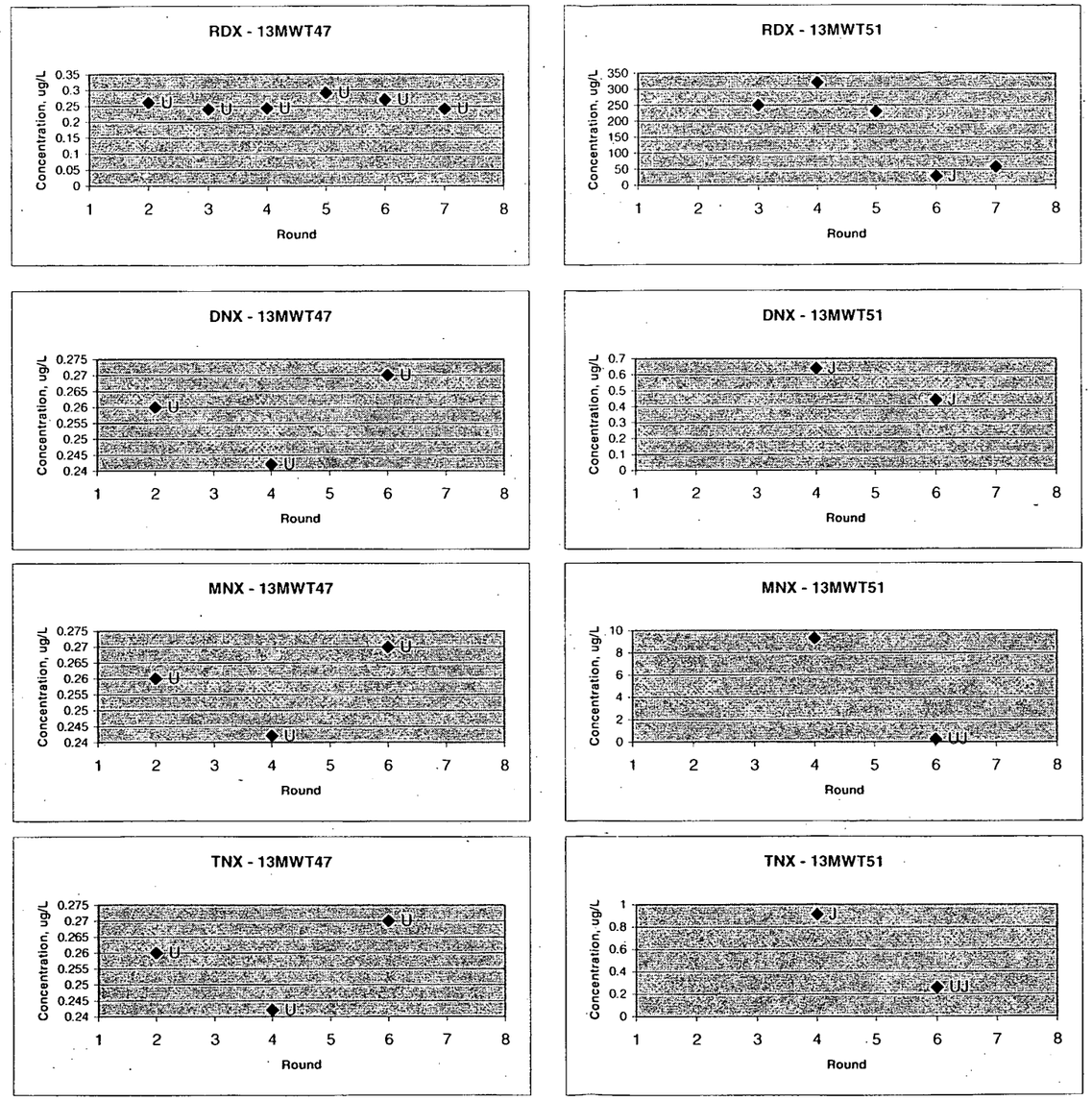
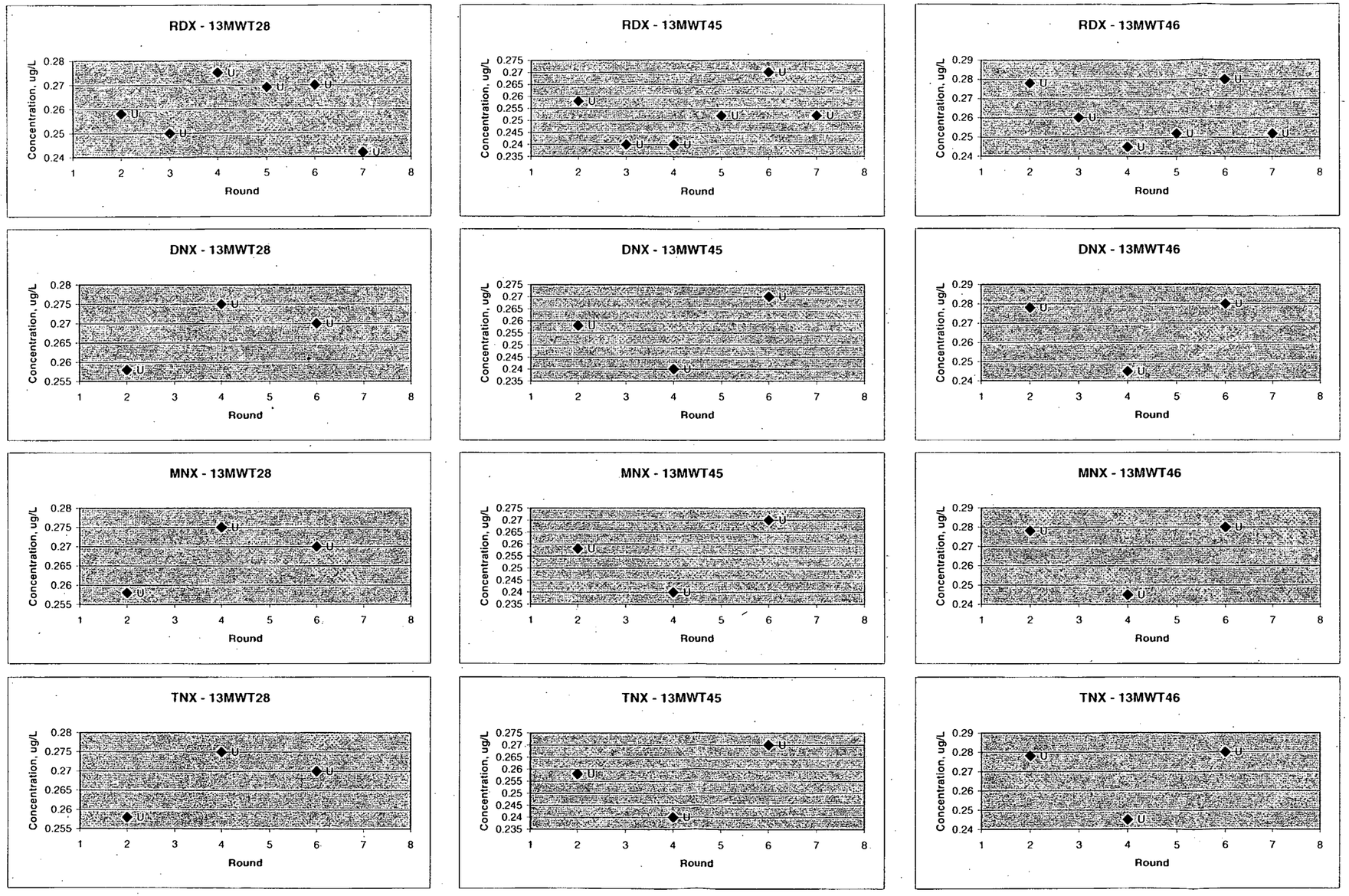


FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN THE UPPER PENNSYLVANIAN WATER BEARING ZONE
AT SWMU 13 FOR ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA



U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.
UJ – Indicates that the chemical was not detected; however, the detection limit (sample-specific detection limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.
J – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.
R – Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

FIGURE 4-4
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN THE LOWER PENNSYLVANIAN WATER BEARING ZONE AT SWMU13
FOR ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA



U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

FIGURE 4-5
TEMPORAL PLOTS OF RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SWMU 13
IN ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 3

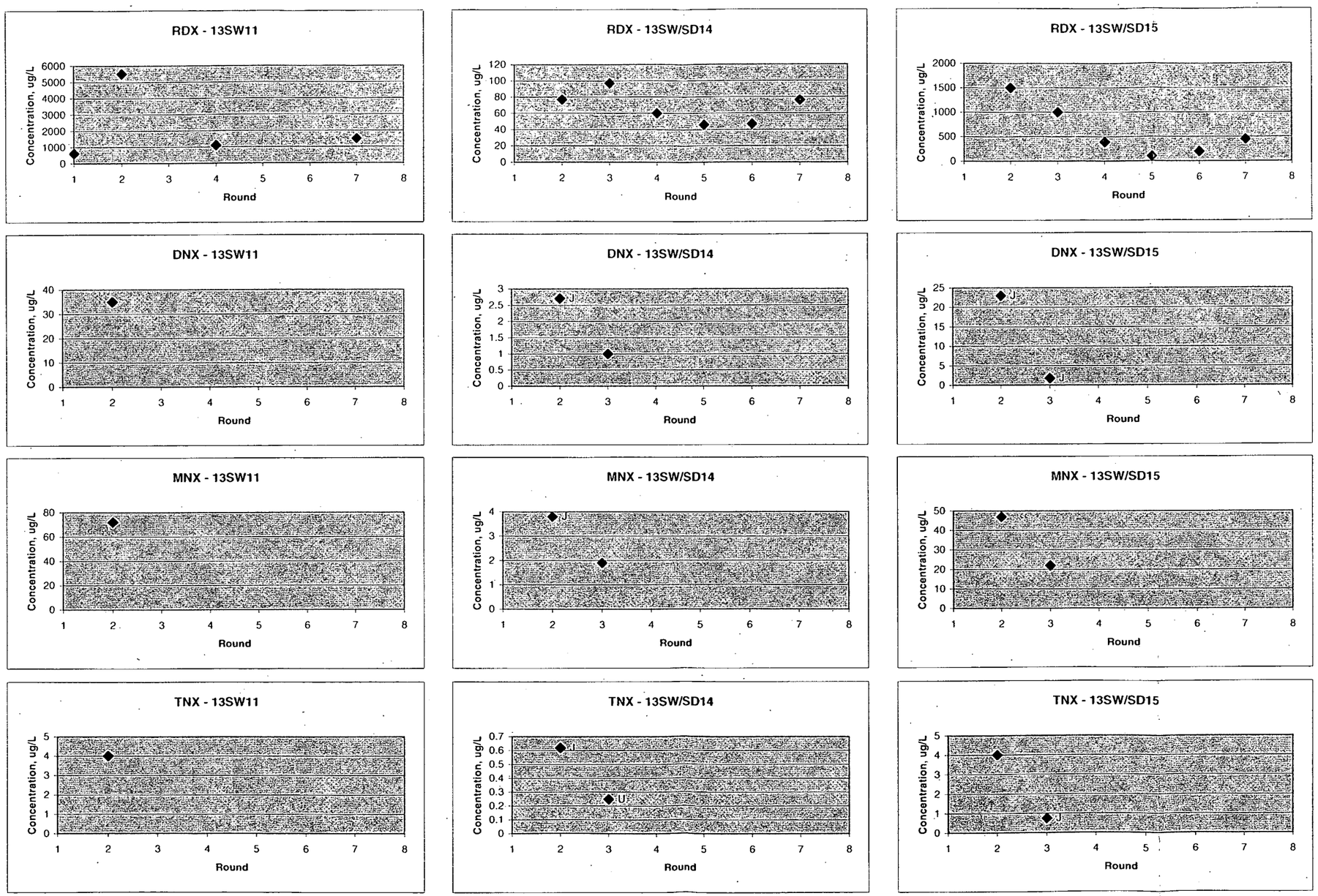


FIGURE 4-5
TEMPORAL PLOTS OF RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SWMU 13
IN ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 3

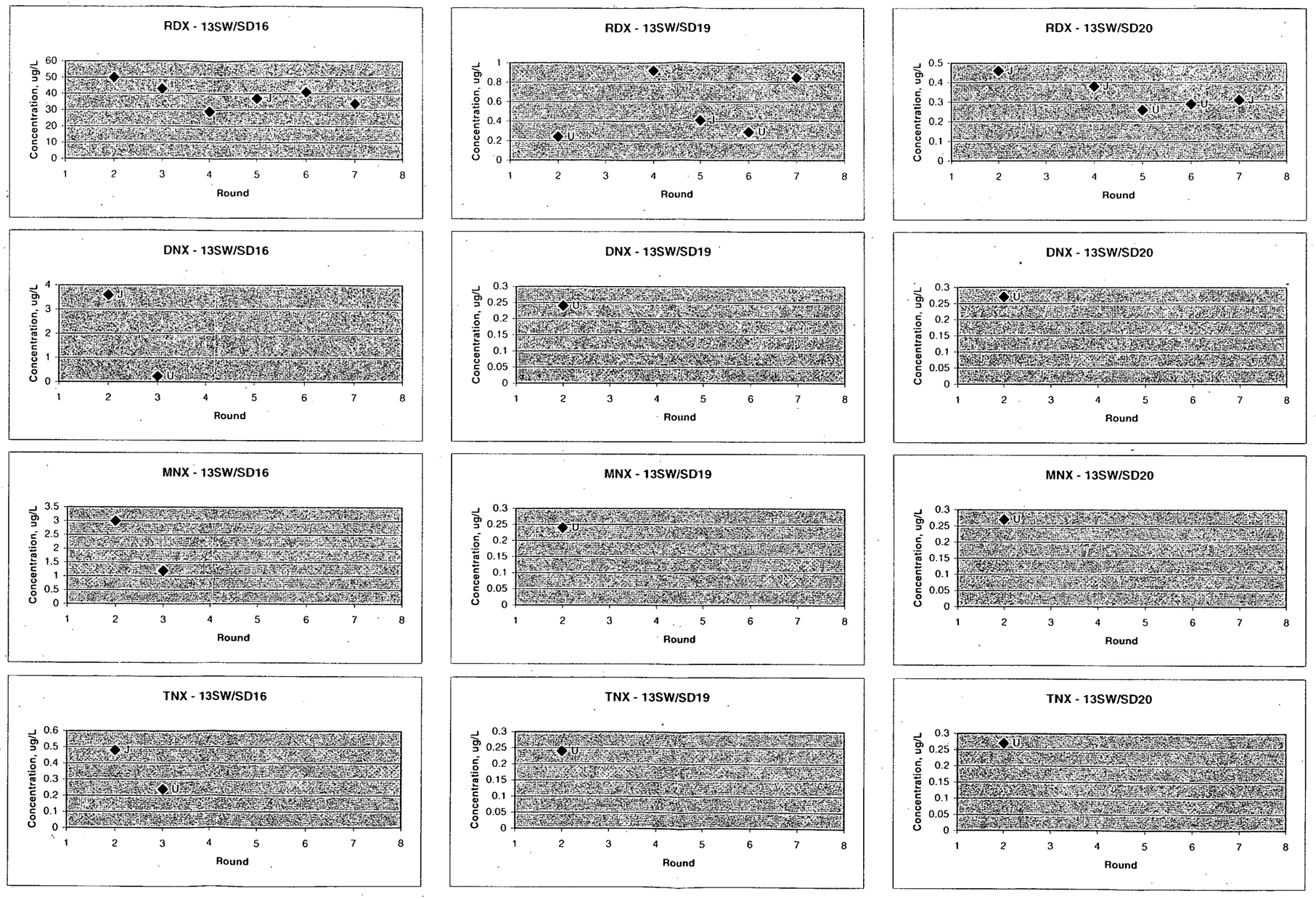
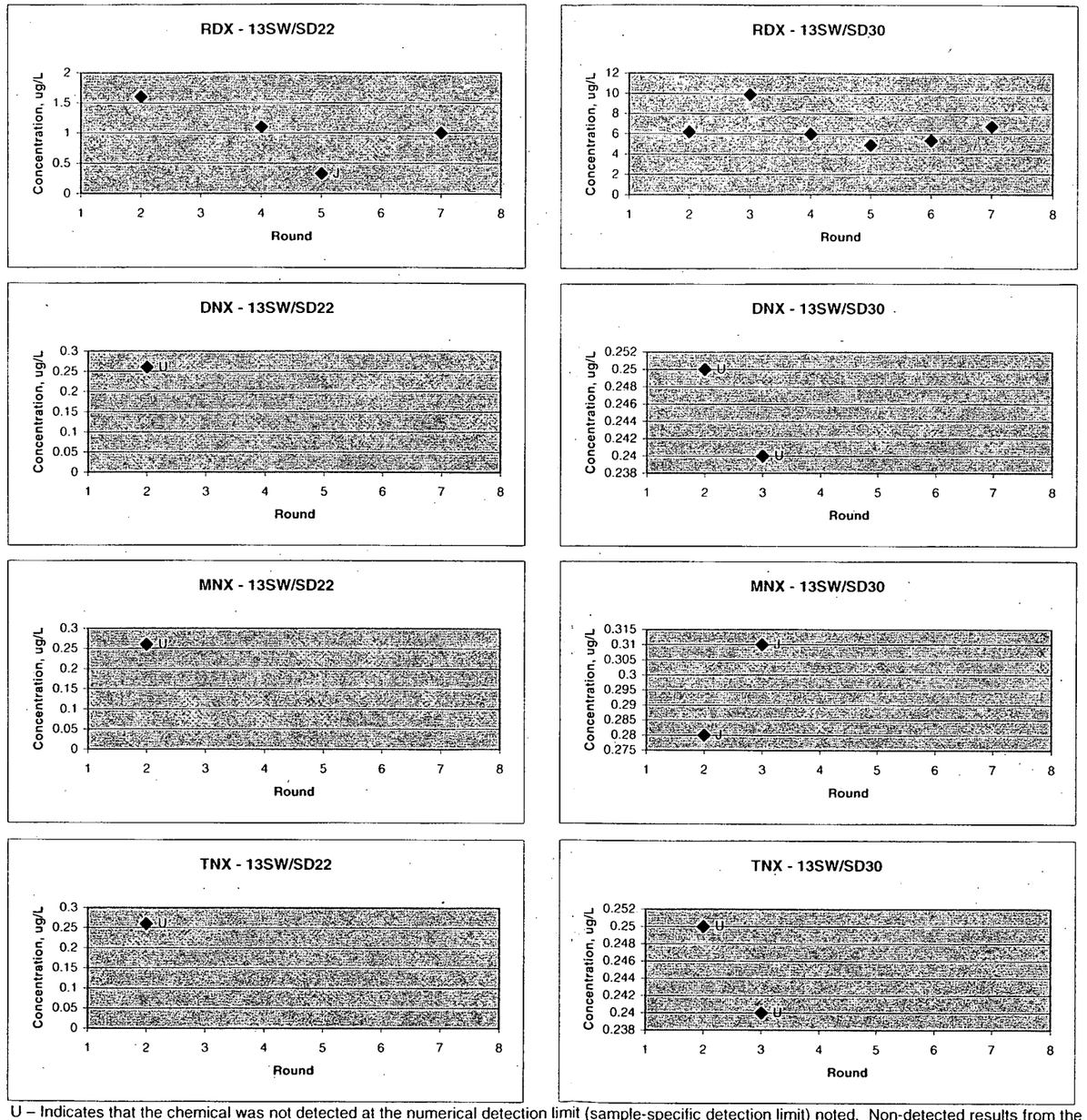


FIGURE 4-5
TEMPORAL PLOTS OF RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SWMU 13
IN ROUNDS 1 THROUGH 7
NSWC CRANE
CRANE, INDIANA
PAGE 3 OF 3



U – Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted. Non-detected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.
J – Indicates that the chemical was detected; however, the associated numerical result is not a precise representation of the concentration that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

REFERENCES

Tetra Tech NUS, Inc. (TtNUS), 2004. QAPP Addendum No. 2 for Mine Fill A (SWMU 12), Mine Fill B (SWMU 13), Cast High Explosives Fill/B146 Incinerator (SWMU 16), and Pyrotechnic Test Area (SWMU 19) RCRA Facility Investigation, Tetra Tech NUS, Inc., June.

TtNUS, 2005a. Resource Conservation and Recovery Act Facility Investigation Report for Mine Fill B (SWMU 13), Tetra Tech NUS, Inc., July.

TtNUS, 2005b. Monitored Natural Attenuation Report for Mine Fill B (SWMU 13), Round No. 4, Tetra Tech NUS, Inc., August.

TtNUS, 2006. Monitored Natural Attenuation Report for Mine Fill B (SWMU 13), Rounds No. 5 and 6, Tetra Tech NUS, Inc., December.

United States Environmental Protection Agency (U.S. EPA), 2000. Region 5 Framework for Monitored Natural Attenuation Decisions for Groundwater, U.S. EPA Region 5, September.

APPENDIX A

SWMU 13

SAMPLE LOG SHEETS AND OTHER FIELD FORMS

ROUND 7

A.1.1

SWMU 13

SURFACE WATER SAMPLE LOG SHEETS

ROUND 7

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SW1104			**Printed By**	James Goerdt
Sample Location ID	13SWSD11			**Printed Date**	8/3/06

Sample Collection Records

Date	1/5/06	**Color**	yellow	**Temp (C)**	5.22
Time	10:25	**pH (S.U.)**	7.49	**ORP (mV)**	200
Depth (ft.)		**S.C. (mS/cm)**	2.34	**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**	10.18		
MS/MSD Collected	N	**Turbidity (NTUs)**	14		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	1/5/06	10:25	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4° C		112G00041-162006-1

General Observations and Notes

0.1 gpm

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SW1406			**Printed By**	James Goerdt
Sample Location ID	13SWSD14			**Printed Date**	8/3/06

Sample Collection Records

Date	1/5/06	**Color**	clear	**Temp (C)**	5.21
Time	08:44	**pH (S.U.)**	6.63	**ORP (mV)**	233
Depth (ft.)	0.1	**S.C. (mS/cm)**	.605	**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**	10.91		
MS/MSD Collected	Y	**Turbidity (NTUs)**	6.5		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	1/5/06	08:44	Explosives Nitroaromatics and Nitramines	SW-846-8330	4	Glass	1L Amber	4° C	Do MS/MSD	112G00041-162006-1

General Observations and Notes

l.0 wide

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SW1506			**Printed By**	James Goerdt
Sample Location ID	13SWSD15			**Printed Date**	8/3/06

Sample Collection Records

Date	1/5/06	**Color**	clear	**Temp (C)**	4.88
Time	09:00	**pH (S.U.)**	6.98	**ORP (mV)**	209
Depth (ft.)	.06	**S.C. (mS/cm)**	0.276	**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**	11.02		
MS/MSD Collected	N	**Turbidity (NTUs)**	34		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	1/5/06	09:00	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4° C		112G00041-162006-1

General Observations and Notes

2.0 gpm

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SW1606			**Printed By**	James Goerdt
Sample Location ID	13SWSD16			**Printed Date**	8/3/06

Sample Collection Records

Date	1/5/06	**Color**	clear	**Temp (C)**	5.0
Time	09:22	**pH (S.U.)**	6.87	**ORP (mV)**	244
Depth (ft.)	.05	**S.C. (mS/cm)**	0.614	**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**	10.67		
MS/MSD Collected	N	**Turbidity (NTUs)**	12		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	1/5/06	09:22	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4° C		112G00041-162006-1

General Observations and Notes

1.0 ft/sec.

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SW1905			**Printed By**	James Goerdt
Sample Location ID	13SWSD19			**Printed Date**	8/3/06

Sample Collection Records

Date	1/5/06	**Color**	clear	**Temp (C)**	4.90
Time	11:05	**pH (S.U.)**	7.67	**ORP (mV)**	136
Depth (ft.)	.11	**S.C. (mS/cm)**	0.562	**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**	9.91		
MS/MSD Collected	N	**Turbidity (NTUs)**	0.50		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	1/5/06	11:05	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4° C		112G00041-162006-1

General Observations and Notes

2.0 ft/sec

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SW2005			**Printed By**	James Goerdt
Sample Location ID	13SWSD20			**Printed Date**	8/3/06

Sample Collection Records

Date	1/5/06	**Color**	Clear	**Temp (C)**	5.40
Time	10:46	**pH (S.U.)**	8.11	**ORP (mV)**	163
Depth (ft.)	1.08	**S.C. (mS/cm)**	0.396	**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**	10.44		
MS/MSD Collected	N	**Turbidity (NTUs)**	3.3		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	1/5/06	10:44	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4° C		112G00041-162006-1

General Observations and Notes

0.5' wide

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SW2205			**Printed By**	James Goerdt
Sample Location ID	13SWSD22			**Printed Date**	8/3/06

Sample Collection Records

Date	1/5/06	**Color**	clear	**Temp (C)**	5.12
Time	10:11	**pH (S.U.)**	7.24	**ORP (mV)**	188
Depth (ft.)	0.05	**S.C. (mS/cm)**	0.342	**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**	9.72		
MS/MSD Collected	N	**Turbidity (NTUs)**	6.7		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	1/5/06	10:11	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4° C		112G00041-162006-1

General Observations and Notes

7' wide

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Sample ID Number	13SW3006			**Printed By**	James Goerdt
Sample Location ID	13SWSD30			**Printed Date**	8/3/06

Sample Collection Records

Date	1/5/06	**Color**	clear	**Temp (C)**	4.91
Time	09:37	**pH (S.U.)**	7.15	**ORP (mV)**	199
Depth (ft.)	0.16	**S.C. (mS/cm)**	0.389	**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**	11.18		
MS/MSD Collected	N	**Turbidity (NTUs)**	40		
Duplicate Collected	Y				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	1/5/06	09:37	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4° C		112G00041-162006-1

General Observations and Notes

13FD01050601

- End of Report -

A.2.1

SWMU 13

GROUNDWATER SAMPLE LOG SHEETS

ROUND 7

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	John Wright	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	2/9/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT0107
TtNUS Project #	112G00041	**Well ID**	13MWT01
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	1/23/06	**Static Water Level (ft.)**	6.86	**Water Quality Meter**	4103008
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	15.00	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	0359-4197
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/22/06	09:05	6.86	0	Clear	NA	NA	NA	NA	NA	NA			0
1/23/06	09:15	7.32	120	Clear	4.18	0.281	1.48	3.0	6.40	292			1200
1/23/06	09:25	7.15	60	Clear	4.25	0.276	1.25	2.3	6.40	295			600
1/23/06	09:35	7.11	50	Clear	4.29	0.279	1.19	1.2	6.50	299			500
1/23/06	09:45	7.11	50	Clear	4.30	0.270	1.15	1.3	8.88	3.02			500
1/23/06	09:55	7.35	100	Clear	4.35	0.271	0.92	0.60	8.58	305			1000
1/23/06	10:05	7.30	70	Clear	4.35	0.272	0.99	0.55	8.52	307			700
1/23/06	10:15	7.32	80	Clear	4.36	0.273	0.87	0.65	9.15	309			800

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/23/06	10:25	7.30	70	Clear	4.35	0.275	0.88	0.80	8.88	310			700
1/23/06	10:35	7.30	70	Clear	4.39	0.273	0.86	0.45	9.46	309			700
1/23/06	10:45	7.30	70	Clear	4.39	0.274	0.84	0.70	9.12	309			700
1/23/06	10:55	7.30	70	Clear	4.39	0.273	0.81	0.40	9.30	308			700

Final Purge / Sample Data

One Casing Volume	5.03	**Method**	**Dissolved Oxygen (mg/L)**
Total Vo. Purge (L)	8.1	**Waterlevel (ft.)**	**Turbidity (NTUs)**
Start Purge (hrs.)	9:05:00 AM	**Flowrate (mL/min)**	**Temp (C)**
End Purge (hrs.)	10:55:00 AM	**Color**	**ORP (mV)**
Total Purge Time (min.)	110	**pH (S.U.)**	**Salinity**
		Conductivity (mS/cm)	**Other**

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/23/06	11:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1232006-5

General Observations and Notes

Sample pH (paper) = ~4.5 SUs

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/9/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT0908
TtNUS Project #	112G00041	**Well ID**	13MWT09
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	1/9/06	**Static Water Level (ft.)**	9.10	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	23.0	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	4073-1103
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	Y	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/9/06	08:30	9.10		Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
1/9/06	08:40	9.35	90	Clear	5.51	.769	2.66	25	11.02	319	NA	NA	900
1/9/06	08:50	9.45	150	Clear	5.48	.746	1.49	16	11.94	328	NA	NA	1500
1/9/06	09:00	9.58	150	Clear	5.59	.757	1.00	15	12.38	330	NA	NA	1500
1/9/06	09:10	9.62	150	Clear	5.61	.760	0.92	9.7	12.30	325	NA	NA	1500
1/9/06	09:20	9.66	150	Clear	5.61	.767	0.89	7.6	12.21	321	NA	NA	1500
1/9/06	09:30	9.68	130	Clear	5.63	.776	0.83	3.2	12.13	317	NA	NA	0
1/9/06	09:40	9.64	130	Clear	5.63	.779	0.78	5.7	12.15	310	NA	NA	1300

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/9/06	09:50	9.63	130	Clear	5.62	.782	0.76	9.6	12.20	306	NA	NA	2600
1/9/06	10:00	9.64	130	Clear	5.62	.784	0.73	7.8	12.22	302	NA	NA	3900

Final Purge / Sample Data

One Casing Volume	8.4	**Method**		**Dissolved Oxygen (mg/L)**	0.73
Total Vo. Purge (L)	8202.6	**Waterlevel (ft.)**	9.64	**Turbidity (NTUs)**	7.8
Start Purge (hrs.)	1/9/06	**Flowrate (mL/min)**	130	**Temp (C)**	12.22
End Purge (hrs.)	1/9/06	**Color**	Clear	**ORP (mV)**	302
Total Purge Time (min.)	0	**pH (S.U.)**	5.62	**Salinity**	NA
		Conductivity (mS/cm)	.784	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/9/06	10:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-192006-2

General Observations and Notes

13FD01090601

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	Michael Quaill	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	6/13/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT1107
TtNUS Project #	112G00041	**Well ID**	13MWT11
Task/Contract #	CTO 0377	**Well Type**	-Select-
WBS Code #	0000	**Sampled By**	Terry Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	1/24/06	**Static Water Level (ft.)**	8.41	**Water Quality Meter**	4103008
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	15.00	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**		**Turbidity Meter**	0359-4197
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/24/06	08:40	8.41	0	Slightly Turbid	NA	NA	NA	NA	NA	NA			0
1/24/06	08:50	9.03	200	Clear	4.23	0.315	1.13	120	9.84	292			2000
1/24/06	09:00	9.33	150	Clear	4.15	0.311	1.00	45	9.75	291			1500
1/24/06	09:10	9.41	110	Clear	4.17	0.312	1.00	15	9.77	292			1100
1/24/06	09:20	9.54	110	Clear	4.18	0.311	0.87	8.9	9.72	291			1100
1/24/06	09:30	9.51	100	Clear	4.18	0.308	0.83	8.3	9.52	290			1000
1/24/06	09:35	9.49	100	Clear	4.19	0.307	0.82	8.8	9.55	290			500

Final Purge / Sample Data

One Casing Volume	5.8	**Method**	Low flow - Bladder	**Dissolved Oxygen (mg/L)**	0.82
Total Vo. Purge (L)	7.2	**Waterlevel (ft.)**	9.49	**Turbidity (NTUs)**	8.8
Start Purge (hrs.)	8:40:00 AM	**Flowrate (mL/min)**	100	**Temp (C)**	9.55
End Purge (hrs.)	9:35:00 AM	**Color**	Clear	**ORP (mV)**	290
Total Purge Time (min.)	55	**pH (S.U.)**	4.19	**Salinity**	
		Conductivity (mS/cm)	0.307	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/24/06	09:40	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1242006-6

General Observations and Notes

Sample pH (paper) = ~4.2 SUs

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/8/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT1307
TtNUS Project #	112G00041	**Well ID**	13MWT13
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	1/8/06	**Static Water Level (ft.)**	4.65	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	21.40	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	4073-1103
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/8/06	11:20	4.65	110	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
1/8/06	11:30	4.86	110	Slightly Turbid	4.27	.124	3.74	85	11.29	393	NA	NA	1100
1/8/06	11:40	4.89	110	Clear	4.28	.126	3.46	39	11.18	398	NA	NA	1100
1/8/06	11:50	4.89	110	Clear	4.28	.127	3.38	22	11.05	398	NA	NA	1100
1/8/06	12:00	4.89	110	Clear	4.26	.127	3.34	16	11.12	400	NA	NA	1100
1/8/06	12:10	4.88	110	Clear	4.26	.126	3.30	9.5	11.26	399	NA	NA	1100
1/8/06	12:20	4.89	110	Clear	4.28	.126	3.23	7.7	11.43	400	NA	NA	1100
1/8/06	12:30	4.89	110	Clear	4.27	.129	3.18		11.42	400	NA	NA	1100

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/8/06	12:40	4.87	110	Clear	4.27	.128	3.17	5.2	11.66	400	NA	NA	1100
1/8/06	12:50	4.85	110	Clear	4.27	.127	3.14	5.1	11.91	396	NA	NA	1100
1/8/06	13:00	4.88	110	Clear	4.28	.127	3.12	4.3	12.32	396	NA	NA	1100

Final Purge / Sample Data

One Casing Volume	10.1	**Method**		**Dissolved Oxygen (mg/L)**	3.12
Total Vo. Purge (L)	8801.1	**Waterlevel (ft.)**	4.88	**Turbidity (NTUs)**	4.3
Start Purge (hrs.)	1/8/06	**Flowrate (mL/min)**	110	**Temp (C)**	12.32
End Purge (hrs.)	1/8/06	**Color**	Clear	**ORP (mV)**	396
Total Purge Time (min.)	0	**pH (S.U.)**	4.28	**Salinity**	NA
		Conductivity (mS/cm)	.127	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/8/06	13:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-192006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/9/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT1407
TtNUS Project #	112G00041	**Well ID**	13MWT14
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	1/9/06	**Static Water Level (ft.)**	14.57	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	25.55	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	4073-1103
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/9/06	13:45	14.57	60	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
1/9/06	13:55	14.78	60	Clear	5.83	1.37	4.80	27	11.43	246	NA	NA	600
1/9/06	14:05	14.71	60	Clear	5.76	1.29	4.45	8.5	10.58	149	NA	NA	0
1/9/06	14:15	14.73	60	Clear	5.74	1.24	4.19	10	10.88	128	NA	NA	600
1/9/06	14:25	14.73	60	Clear	5.75	1.22	4.05	6.9	10.87	122	NA	NA	1200
1/9/06	14:35	14.72	60	Clear	5.75	1.21	3.94	5.7	10.78	118	NA	NA	1800
1/9/06	14:45	14.70	60	Clear	5.75	1.17	9.8	3.72	11.01	114	NA	NA	2400
1/9/06	15:05	14.72	60	Clear	5.76	1.17	3.23	5.9	10.62	108	NA	NA	3600

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/9/06	15:15	14.71	60	Clear	5.75	1.15	3.21	6.4	10.58	110	NA	NA	4200
1/9/06	15:25	14.73	60	Clear	5.76	1.12	3.32	5.3	10.67	106	NA	NA	4800
1/9/06	15:35	14.72	60	Clear	5.75	1.09	3.21	4.7	10.73	108	NA	NA	4860
1/9/06	15:45	14.72	60	Clear	5.76	1.07	1.50	4.7	11.05	102	NA	NA	600
1/9/06	15:55	14.73	60	Clear	5.77	1.06	1.46	4.2	10.95	98	NA	NA	0
1/9/06	16:05	14.74	60	Clear	5.77	1.03	1.43	4.1	10.98	97	NA	NA	600

Final Purge / Sample Data

One Casing Volume	6.6	**Method**		**Dissolved Oxygen (mg/L)**	1.43
Total Vo. Purge (L)	24060.6	**Waterlevel (ft.)**	14.74	**Turbidity (NTUs)**	4.1
Start Purge (hrs.)	1/9/06	**Flowrate (mL/min)**	60	**Temp (C)**	10.98
End Purge (hrs.)	1/9/06	**Color**	Clear	**ORP (mV)**	97
Total Purge Time (min.)	0	**pH (S.U.)**	5.77	**Salinity**	NA
		Conductivity (mS/cm)	1.03	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/9/06	16:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1112006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/19/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT1507
TtNUS Project #	112G00041	**Well ID**	13MWT15
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	1/19/06	**Static Water Level (ft.)**	14.48	**Water Quality Meter**	4103008
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	27.87	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	0359-4197
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/19/06	12:05	14.48	0	Clear	NA	NA	NA	NA	NA	NA			0
1/19/06	12:15	14.95	60	Clear	3.76	0.570	1.97	20	13.69	359			600
1/19/06	12:25	15.62	120	Clear	3.77	0.547	1.07	23	13.89	364			1200
1/19/06	12:35	15.70	100	Clear	3.84	0.510	1.04	19	13.79	345			1000
1/19/06	12:45	16.15	120	Clear	3.84	0.498	0.77	15	13.45	344			1200
1/19/06	12:55	15.80	70	Clear	3.91	0.477	0.69	15	13.76	330			700
1/19/06	13:05	15.80	80	Clear	3.91	0.464	0.63	16	13.48	326			800
1/19/06	13:15	15.80	80	Clear	3.92	0.457	0.60	14	13.70	325			800

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/19/06	13:25	15.80	80	Clear	3.91	0.454	0.62	13	13.60	326			800
1/19/06	13:35	15.80	80	Clear	3.91	0.452	0.60	11	13.62	327			800
1/19/06	13:45	15.80	80	Clear	3.92	0.449	0.58	10	13.60	326			800

Final Purge / Sample Data

One Casing Volume	8.3	**Method**		**Dissolved Oxygen (mg/L)**	0.58
Total Vo. Purge (L)		**Waterlevel (ft.)**	15.80	**Turbidity (NTUs)**	10
Start Purge (hrs.)	1/19/06	**Flowrate (mL/min)**	80	**Temp (C)**	13.60
End Purge (hrs.)	1/19/06	**Color**	Clear	**ORP (mV)**	326
Total Purge Time (min.)	0	**pH (S.U.)**	3.92	**Salinity**	
		Conductivity (mS/cm)	0.449	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/19/06	13:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1192006-4

General Observations and Notes

Sample pH (paper) = ~4.0 SUs

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	Lee Leck	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	7/7/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT1707
TtNUS Project #	112G00041	**Well ID**	13MWT17
Task/Contract #	CTO 0377	**Well Type**	-Select-
WBS Code #	0000	**Sampled By**	Terry Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	1/24/06	**Static Water Level (ft.)**	8.28	**Water Quality Meter**	4103008
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	18.00	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**		**Turbidity Meter**	0359-4197
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/24/06	10:25	8.28	0	Clear	NA	NA	NA	NA	NA	NA			0
1/24/06	10:35	8.29	40	Clear	5.28	0.346	1.82	7.5	10.61	262			400
1/24/06	10:45	8.31	110	Clear	5.32	0.363	0.79	3.9	10.97	256			1100
1/24/06	10:55	8.31	110	Clear	5.33	0.359	0.59	1.9	11.60	250			1100
1/24/06	11:05	8.31	110	Clear	5.32	0.360	0.59	1.9	11.64	245			1100
1/24/06	11:15	8.31	110	Clear	5.32	0.362	0.53	1.5	11.84	240			0
1/24/06	11:25	8.32	110	Clear	5.32	0.359	0.49	1.0	12.11	235			1100
1/24/06	11:35	8.32	110	Clear	5.29	0.366	0.48	1.0	12.11	232			1100

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/24/06	11:45	8.32	110	Clear	5.28	0.368	0.48	1.1	12.05	230			1100

Final Purge / Sample Data

One Casing Volume	7.3	**Method**	Low flow - Bladder	**Dissolved Oxygen (mg/L)**	0.48
Total Vo. Purge (L)	2601.1	**Waterlevel (ft.)**	8.32	**Turbidity (NTUs)**	1.1
Start Purge (hrs.)		**Flowrate (mL/min)**	110	**Temp (C)**	12.05
End Purge (hrs.)	12:00:00 AM	**Color**	Clear	**ORP (mV)**	230
Total Purge Time (min.)	0	**pH (S.U.)**	5.28	**Salinity**	
		Conductivity (mS/cm)	0.368	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/24/06	11:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1242006-6

General Observations and Notes

Sample pH (paper)= ~5.25 SUs

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/19/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT2107
TtNUS Project #	112G00041	**Well ID**	13MWT21
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	1/19/06	**Static Water Level (ft.)**	7.97	**Water Quality Meter**	4103008
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	17.76	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	0359-4197
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/19/06	08:55	7.97	0	Clear	NA	NA	NA	NA	NA	NA			0
1/19/06	09:05	8.55	140	Clear	6.54	0.376	6.52	14	10.40	239			1400
1/19/06	09:15	8.43	100	Clear	6.66	0.376	6.50	12	10.20	246			1000
1/19/06	09:25	8.55	110	Clear	6.76	0.374	6.46	8.6	10.51	252			1100
1/19/06	09:35	8.58	100	Clear	6.80	0.374	6.41	7.8	10.51	255			1000
1/19/06	09:45	8.59	100	Clear	6.82	0.373	6.39	5.6	10.65	257			1000
1/19/06	09:55	8.61	100	Clear	6.83	0.371	6.41	5.0	10.70	259			1000

Final Purge / Sample Data

One Casing Volume	6.0	**Method**		**Dissolved Oxygen (mg/L)**	6.41
Total Vo. Purge (L)	4501	**Waterlevel (ft.)**	8.61	**Turbidity (NTUs)**	5.0
Start Purge (hrs.)	1/19/06	**Flowrate (mL/min)**	100	**Temp (C)**	10.70
End Purge (hrs.)	1/19/06	**Color**	Clear	**ORP (mV)**	259
Total Purge Time (min.)	0	**pH (S.U.)**	6.83	**Salinity**	
		Conductivity (mS/cm)	0.371	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/19/06	10:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1192006-4

General Observations and Notes

Sample pH (paper) = ~6.5 SUs

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/10/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT2806
TtNUS Project #	112G00041	**Well ID**	13MWT28
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	1/9/06	**Static Water Level (ft.)**	77.52	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	90.40	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	4073-1103
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/9/06	10:35	77.52		Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
1/9/06	10:45	78.45	150	Clear	7.55	1.09	5.04	55	12.71	228	NA	NA	1500
1/9/06	10:55	80.55	150	Clear	7.63	1.24	1.11	21	12.50	203	NA	NA	1500
1/9/06	11:05	81.09	150	Clear	7.65	1.24	0.96	11	12.61	190	NA	NA	150
1/9/06	11:15	82.12	150	Clear	7.67	1.20	1.39	78	12.75	177	NA	NA	1500
1/9/06	11:25	82.75	150	Clear	7.68	1.20	1.49	150	12.88	170	NA	NA	3000
1/9/06	11:45	84.96	150	Clear	7.72	1.24	0.83	110	12.81	146	NA	NA	6000
1/9/06	11:55	85.55	150	Clear	7.72	1.24	0.78	98	12.90	141	NA	NA	7500

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/9/06	12:05	86.17	160	Clear	7.73	1.23	0.82	110	12.28	134	NA	NA	9600
1/9/06	12:15	87.59	160	Clear	7.73	1.22	0.75	74	12.27	127	NA	NA	11200
1/9/06	12:25		160	Clear	7.75	1.22	0.78	55	12.07	119	NA	NA	12800
1/9/06	12:35		160	Clear	7.75	1.23	1.78	54	11.52	112	NA	NA	1600

Final Purge / Sample Data

One Casing Volume	7.8	**Method**		**Dissolved Oxygen (mg/L)**	1.78
Total Vo. Purge (L)	54751.6	**Waterlevel (ft.)**		**Turbidity (NTUs)**	54
Start Purge (hrs.)	1/9/06	**Flowrate (mL/min)**	160	**Temp (C)**	11.52
End Purge (hrs.)	1/9/06	**Color**	Clear	**ORP (mV)**	112
Total Purge Time (min.)	0	**pH (S.U.)**	7.75	**Salinity**	NA
		Conductivity (mS/cm)	1.23	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/10/06	08:25	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1112006-3

General Observations and Notes

Well historically dries out. Well was purged dry on 1/9/06 and sampled 1/10/06.

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/10/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT3106
TtNUS Project #	112G00041	**Well ID**	13MWT31
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	1/10/06	**Static Water Level (ft.)**	11.09	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	22.35	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	4073-1103
MS/MSD Collected?		**Well Volumes Req.**			
Duplicate Sample Collected?		**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/10/06	09:05	11.09		Slightly Turbid	NA	NA	NA	NA	NA	NA	NA	NA	0
1/10/06	09:15	12.22	60	Slightly Turbid	5.43	2.07	4.44	200	9.70	237	NA	NA	600
1/10/06	09:25	12.18	60	Slightly Turbid	5.43	2.07	4.33	150	8.97	245	NA	NA	600
1/10/06	09:35	12.20	60	Slightly Turbid	5.43	2.08	4.24	98	8.75	255	NA	NA	600
1/10/06	09:45	12.30	60	Clear	5.45	2.09	4.12	84	8.90	260	NA	NA	1200
1/10/06	09:55	12.36	60	Clear	5.46	2.06	3.99	87	8.87	265	NA	NA	1800
1/10/06	10:05	12.36	60	Clear	5.47	2.08	3.91	82	8.41	268	NA	NA	2400
1/10/06	10:15	12.28	60	Clear	5.47	2.04	3.77	80	8.21	271	NA	NA	2400

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/10/06	10:25	12.32	60	Clear	5.49	2.04	3.58	59	8.25	272	NA	NA	3600
1/10/06	10:35	23.34	60	Clear	5.50	2.00	3.34	42	8.39	271	NA	NA	4200
1/10/06	10:45	12.36	60	Clear	5.50	1.92	3.05	35	8.10	272	NA	NA	4800
1/10/06	10:55	12.34	60	Clear	5.52	1.87	2.78	30	8.62	271	NA	NA	5400
1/10/06	11:05	12.33	60	Clear	5.52	1.81	2.58	28	8.60	271	NA	NA	6000
1/10/06	11:15	12.35	60	Clear	5.54	1.73	2.22	26	8.55	270	NA	NA	6600
1/10/06	11:25	12.35	60	Clear	5.54	1.69	2.16	25	8.51	272	NA	NA	7200
1/10/06	11:35	12.35	60	Clear	5.54	1.68	2.12	18	8.76	273	NA	NA	6600
1/10/06	11:45	12.37	60	Clear	5.55	1.65	2.09	14	8.52	273	NA	NA	600
1/10/06	11:55	12.38	60	Clear	5.55	1.63	2.02	11	8.69	274	NA	NA	1200
1/10/06	12:05	12.36	60	Clear	5.56	1.58	1.93	8.8	8.65	272	NA	NA	1800

Final Purge / Sample Data

One Casing Volume	6.8	**Method**		**Dissolved Oxygen (mg/L)**	1.93
Total Vo. Purge (L)	54601.2	**Waterlevel (ft.)**	12.36	**Turbidity (NTUs)**	8.8
Start Purge (hrs.)	1/10/06	**Flowrate (mL/min)**	60	**Temp (C)**	8.65
End Purge (hrs.)	1/10/06	**Color**	Clear	**ORP (mV)**	272
Total Purge Time (min.)	0	**pH (S.U.)**	5.56	**Salinity**	NA
		Conductivity (mS/cm)	1.58	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/10/06	12:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1112006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/10/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT3406
TtNUS Project #	112G00041	**Well ID**	13MWT34
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	1/10/06	**Static Water Level (ft.)**	6.01	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	22.90	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	4073-1103
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp. °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/10/06	13:30	6.01		Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
1/10/06	13:40	6.63	130	Clear	5.13	.394	4.67	43	10.76	308	NA	NA	1300
1/10/06	13:50	6.61	130	Clear	5.13	.393	2.25	32	10.52	313	NA	NA	1300
1/10/06	14:00	6.61	130	Clear	5.12	.393	1.89	26	10.76	317	NA	NA	0
1/10/06	14:10	6.61	130	Clear	5.13	.390	1.68	28	10.70	318	NA	NA	2600
1/10/06	14:20	6.62	130	Clear	5.13	.392	1.48	21	11.10	321	NA	NA	1300
1/10/06	14:30	6.63	130	Clear	5.13	.392	1.32	18	11.19	323	NA	NA	1300
1/10/06	14:40	6.60	130	Clear	5.13	.392	1.28	16	11.18	323	NA	NA	1300

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/10/06	14:50	6.61	130	Clear	5.12	.389	1.17	18	10.84	325	NA	NA	1300
1/10/06	15:00	6.62	130	Clear	5.11	.392	1.14	17	10.63	326	NA	NA	1300
1/10/06	15:10	6.59	130	Clear	5.13	.390	1.04	12	11.05	327	NA	NA	1300
1/10/06	15:20	6.63	130	Clear	5.12	.391	1.00	17	10.87	NA	NA		1300
1/10/06	15:30	6.61	130	Clear	5.13	.390	0.98	19	10.89	328	NA	NA	1300
1/10/06	15:40	6.66	130	Clear	5.12	.392	0.92	17	10.61	328	NA	NA	1300
1/10/06	15:50	6.60	130	Clear	5.12	.389	0.87	4.8	10.84	328	N	NA	1300
1/10/06	16:00	6.63	130	Clear	5.12	.391	0.84	5.2	10.75	329	NA	NA	15600

Final Purge / Sample Data

One Casing Volume	10.2	**Method**	1	**Dissolved Oxygen (mg/L)**	0.84
Total Vo. Purge (L)	19.5	**Waterlevel (ft.)**	6.63	**Turbidity (NTUs)**	5.2
Start Purge (hrs.)	1:30:00 PM	**Flowrate (mL/min)**	130	**Temp (C)**	10.75
End Purge (hrs.)	4:00:00 PM	**Color**	Clear	**ORP (mV)**	329
Total Purge Time (min.)	150	**pH (S.U.)**	5.12	**Salinity**	NA
		Conductivity (mS/cm)	.391	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/10/06	16:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1112006-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/9/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT3706
TtNUS Project #	112G00041	**Well ID**	13MWT37
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	1/6/06	**Static Water Level (ft.)**	14.46	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	27.20	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	4073-1103
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/6/06	14:50	14.46	120	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
1/6/06	15:00	14.80	120	Clear	5.61	.163	9.58	44	9.87	225	NA	NA	1200
1/6/06	15:10	15.21	120	Clear	5.61	.236	6.76	20	11.25	221	NA	NA	1200
1/6/06	15:20	15.30	120	Clear	5.61	.267	8.52	18	11.08	220	NA	NA	1200
1/6/06	15:30	15.46	120	Clear	5.59	.271	8.25	17	11.36	229	NA	NA	1200
1/6/06	15:40	15.51	120	Clear	5.60	.280	9.50	12	11.14	226	NA	NA	1200
1/6/06	15:50	15.57	120	Clear	5.60	.284	9.21	5.5	10.84	224	NA	NA	1200
1/6/06	16:00	15.18	90	Clear	5.63	.343	10.99	5.9	8.42	218	NA	NA	900

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/6/06	16:10	15.22	100	Clear	5.59	.323	9.71	8.9	9.59	228	NA	NA	1000
1/6/06	16:20	15.18	100	Clear	5.59	.318	9.54	7.6	9.38	231	NA	NA	1000
1/6/06	16:30	15.20	100	Clear	5.59	.312	9.32	5.2	9.57	233	NA	NA	1000
1/6/06	16:40	15.17	100	Clear	5.60	.309	9.29	4.3	9.61	235	NA	NA	1000

Final Purge / Sample Data

One Casing Volume	7.7	**Method**		**Dissolved Oxygen (mg/L)**	9.29
Total Vo. Purge (L)	11101	**Waterlevel (ft.)**	15.17	**Turbidity (NTUs)**	4.3
Start Purge (hrs.)	1/6/06	**Flowrate (mL/min)**	100	**Temp (C)**	9.61
End Purge (hrs.)	1/6/06	**Color**	Clear	**ORP (mV)**	235
Total Purge Time (min.)	0	**pH (S.U.)**	5.60	**Salinity**	NA
		Conductivity (mS/cm)	.309	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/6/06	16:45	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-192006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	James Goerdt	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/6/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT4006
TtNUS Project #	112G00041	**Well ID**	13MWT40
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	1/6/06	**Static Water Level (ft.)**	18.51	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	27.75	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	4073-1103
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/3/06	08:55	18.51	100	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
1/6/06	09:05	18.84	100	Clear	5.68	.384	9.02	21	11.50	268	NA	NA	1000
1/6/06	09:15	18.87	100	Clear	5.67	.382	8.73	18	11.58	268	NA	NA	1000
1/6/06	09:25	18.89	100	Clear	5.68	.384	8.64	11	11.70	270	NA	NA	1000
1/6/06	09:35	18.92	100	Clear	5.67	.383	8.55	10	11.80	270	NA	NA	1000
1/6/06	09:45	18.97	100	Clear	5.68	.383	8.57	7.5	11.69	270	NA	NA	1000
1/6/06	09:55	18.96	100	Clear	5.67	.383	8.54	7.3	11.59	270	NA	NA	1000
1/6/06	10:05	18.97	100	Clear	5.68	.383	8.46	6.4	11.65	269	NA	NA	1000

Final Purge / Sample Data

One Casing Volume	5.6	**Method**		**Dissolved Oxygen (mg/L)**	8.46
Total Vo. Purge (L)	5001	**Waterlevel (ft.)**	18.97	**Turbidity (NTUs)**	6.4
Start Purge (hrs.)	1/6/06	**Flowrate (mL/min)**	100	**Temp (C)**	11.65
End Purge (hrs.)	1/3/06	**Color**	Clear	**ORP (mV)**	269
Total Purge Time (min.)	-4320	**pH (S.U.)**	5.68	**Salinity**	NA
		Conductivity (mS/cm)	.383	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/6/06	10:08	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-162006-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	6/1/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT4506
TtNUS Project #	112G00041	**Well ID**	13MWT45
Task/Contract #	CTO 0377	**Well Type**	CRA
WBS Code #	0000	**Sampled By**	T. Rojahn
		Concentration	-Select-

Well and Sample Data

Date	1/18/06	**Static Water Level (ft.)**	70.50	**Water Quality Meter**	4103008
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	84.00	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**		**Turbidity Meter**	0359-4197
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/18/06	14:50	70.50	0	Clear	NA	NA	NA	NA	NA	NA			0
1/18/06	15:00	72.43	130	Clear	6.87	0.696	1.17	16	12.85	143			1300
1/18/06	15:10	73.00	150	Clear	6.80	0.656	0.96	9.0	12.77	129			1500
1/18/06	15:20	73.73	120	Clear	6.73	0.636	0.80	4.4	12.38	128			1200
1/18/06	15:30	74.50	130	Clear	6.70	0.616	1.37	9.6	12.91	131			1300
1/18/06	15:40	75.28	150	Clear	6.72	0.617	1.48	14	12.78	137			1500
1/18/06	15:50	76.10	150	Clear	6.77	0.622	1.21	19	12.82	137			1500
1/18/06	16:00	76.93	150	Clear	6.79	0.635	1.04	20	12.88	135			1500

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/18/06	16:10	77.75	150	Clear	6.82	0.648	0.88	23	12.90	130			1500
1/18/06	16:20	78.58	150	Clear	6.91	0.674	0.74	18	12.58	158			1500
1/18/06	16:30	*	150	Clear	7.03	0.698	0.71	15	11.81	155			1500
1/18/06	16:40	*	150	Clear	7.10	0.714	0.75	16	10.40	153			1500
1/18/06	16:50	*	150	Clear	7.14	0.724	0.85	13	9.25	149			1500
1/18/06	16:55	*	100	Clear	7.17	0.733	0.94	14	9.10	146			500

Final Purge / Sample Data

One Casing Volume	8.3	**Method**	Low flow - Bladder	**Dissolved Oxygen (mg/L)**	0.94
Total Vo. Purge (L)	17.8	**Waterlevel (ft.)**	*	**Turbidity (NTUs)**	14
Start Purge (hrs.)	2:50:00 PM	**Flowrate (mL/min)**	100	**Temp (C)**	9.10
End Purge (hrs.)	4:55:00 PM	**Color**	Clear	**ORP (mV)**	146
Total Purge Time (min.)	125	**pH (S.U.)**	7.17	**Salinity**	
		Conductivity (mS/cm)	0.733	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/19/06	10:35	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1192006-4

General Observations and Notes

Sample pH (paper) = ~6.8 SUs

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	John Wright	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	5/22/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT4606
TtNUS Project #	112G00041	**Well ID**	13MWT46
Task/Contract #	CTO 0377	**Well Type**	-Select-
WBS Code #	0000	**Sampled By**	James Goerdt
		Concentration	-Select-

Well and Sample Data

Date	1/6/06	**Static Water Level (ft.)**	57.56	**Water Quality Meter**	4143006
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**		**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**		**Turbidity Meter**	4073-1103
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/6/06	12:35	57.56	110	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
1/6/06	12:45	57.59	110	Clear	6.59	.987	8.85	94	10.43	-22	NA	NA	1100
1/6/06	12:55	57.55	110	Clear	6.59	.994	8.06	58	10.22	-25	NA	NA	1100
1/6/06	13:05	57.58	110	Clear	6.57	1.02	6.21	12	10.21	-26	NA	NA	1100
1/6/06	13:15	57.57	110	Clear	6.57	1.08	5.01	13	10.19	-29	NA	NA	1100
1/6/06	13:25	57.57	110	Clear	6.56	1.07	4.62	9.5	10.13	-28	NA	NA	1100
1/6/06	13:35	57.58	110	Clear	6.56	1.07	4.02	10	10.09	-28	NA	NA	1100
1/6/06	13:45	57.59	110	Clear	6.56	1.07	3.31	7.8	10.18	-29	NA	NA	1100

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/6/06	13:55	57.58	110	Clear	6.56	1.07	2.73	7.6	10.25	-30	NA	NA	1100
1/6/06	14:05	57.58	110	Clear	6.56	1.07	2.68	6.4	10.31	-30	NA	NA	1100
1/6/06	14:15	57.57	110	Clear	6.56	1.07	2.64	6.2	10.28	-31	NA	NA	1100

Final Purge / Sample Data

One Casing Volume	6.1	**Method**	Low flow - Bladder	**Dissolved Oxygen (mg/L)**	2.64
Total Vo. Purge (L)	11	**Waterlevel (ft.)**	57.57	**Turbidity (NTUs)**	6.2
Start Purge (hrs.)	12:35:00 PM	**Flowrate (mL/min)**	110	**Temp (C)**	10.28
End Purge (hrs.)	2:15:00 PM	**Color**	Clear	**ORP (mV)**	-31
Total Purge Time (min.)	100	**pH (S.U.)**	6.56	**Salinity**	NA
		Conductivity (mS/cm)	1.07	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/6/06	14:20	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-192006-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	John Wright	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/9/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT4706
TtNUS Project #	112G00041	**Well ID**	13MWT47
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	1/6/06	**Static Water Level (ft.)**	7.64	**Water Quality Meter**	4103008
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	20.23	**Pump Control Box**	MP10-1578
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	0359-4197
MS/MSD Collected?	Y	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/6/06	09:25	7.64	0	Clear	na	na	na	na	na	na	na	na	0
1/6/06	09:35	8.8	170	Clear	3.74	1.31	0.99	60	9.36	321			1700
1/6/06	09:45	8.78	160	Clear	3.75	1.32	1.01	55	8.67	316			1600
1/6/06	09:55	8.76	120	Clear	3.75	1.31	0.90	45	8.46	313			1200
1/6/06	10:05	8.78	120	Clear	3.77	1.31	0.78	29	8.69	310			1200
1/6/06	10:15	8.78	120	Clear	3.78	1.32	0.75	26	8.75	309			1200
1/6/06	10:25	8.78	120	Clear	3.79	1.32	0.71	19	8.69	307			1200
1/6/06	10:35	8.78	120	Clear	3.79	1.32	0.64	16	8.72	306			1200

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/6/06	10:45	8.80	120	Clear	3.79	1.32	0.64	12	8.72	304			1200
1/6/06	10:55	8.81	120	Clear	3.79	1.32	0.64	10	8.66	303			1200

Final Purge / Sample Data

One Casing Volume	7.8	**Method**		**Dissolved Oxygen (mg/L)**	0.64
Total Vo. Purge (L)	4501.2	**Waterlevel (ft.)**	8.81	**Turbidity (NTUs)**	10
Start Purge (hrs.)	1/6/06	**Flowrate (mL/min)**	120	**Temp (C)**	8.66
End Purge (hrs.)	1/6/06	**Color**	Clear	**ORP (mV)**	303
Total Purge Time (min.)	0	**pH (S.U.)**	3.79	**Salinity**	
		Conductivity (mS/cm)	1.32	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
X	1/3/06	00:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		
✓	1/6/06	11:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	4	Glass	1L Amber		112G00041-162006-1
X	1/6/06	11:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	4	Glass	1L Amber		

General Observations and Notes

Sample pH paper ~3.9 SUs

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**	Terry Rojahn	**Printed By**	James Goerdt
Created Date	1/3/06	**Modified Date**	1/20/06	**Printed Date**	7/11/06

Project Information

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	13GWT5105
TtNUS Project #	112G00041	**Well ID**	13MWT51
Task/Contract #	CTO 0377	**Well Type**	Monitoring Well
WBS Code #	0000	**Sampled By**	Terry Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	1/20/06	**Static Water Level (ft.)**	4.30	**Water Quality Meter**	4103008
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	17.75	**Pump Control Box**	MP10-1334
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	0359-4197
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/20/06	15:10	4.30	0	Clear	NA	NA	NA	NA	NA	NA			0
1/20/06	15:20	4.45	110	Clear	7.17	0.241	5.88	110	8.65	206			1100
1/20/06	15:30	4.44	80	Clear	7.09	0.236	5.76	90	8.53	210			800
1/20/06	15:40	4.44	80	Clear	7.10	0.233	5.65	50	8.47	209			800
1/20/06	15:50	4.45	80	Clear	7.12	0.233	5.62	37	8.36	208			800
1/20/06	16:00	4.45	80	Clear	7.14	0.232	5.56	24	8.32	208			800
1/20/06	16:10	4.46	80	Clear	7.16	0.231	5.53	19	8.25	208			800
1/20/06	16:20	4.45	80	Clear	7.16	0.231	5.51	18	8.26	208			800

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
1/20/06	16:30	4.45	80	Clear	7.17	0.231	5.49	18	8.17	208			800
1/20/06	16:40	4.45	80	Clear	7.17	0.231	5.49	13	8.18	208			800
1/20/06	16:50	4.45	80	Clear	7.17	0.231	5.48	8.9	8.22	208			0

Final Purge / Sample Data

One Casing Volume	8.3	**Method**		**Dissolved Oxygen (mg/L)**	5.48
Total Vo. Purge (L)	6700.8	**Waterlevel (ft.)**	4.45	**Turbidity (NTUs)**	8.9
Start Purge (hrs.)	1/20/06	**Flowrate (mL/min)**	80	**Temp (C)**	8.22
End Purge (hrs.)	1/20/06	**Color**	Clear	**ORP (mV)**	208
Total Purge Time (min.)	0	**pH (S.U.)**	7.17	**Salinity**	
		Conductivity (mS/cm)	0.231	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	1/20/06	16:55	SW-846-8330	Explosives Nitroaromatics and Nitramines	4° C	2	Glass	1L Amber		112G00041-1232006-5

General Observations and Notes

Sample pH (paper) = ~7.0 SUs

- End of Report -

A.3.1

SWMU 13

CHAIN OF CUSTODY RECORDS

ROUND 7

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/24/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112G00041-1242006-6	**Carrier**	Federal Express	**Printed By**	James Goerdt
		Carrier/Waybill No.	8494 1921 7735	**Printed Date**	7/11/06

Chain of Custody Information

Chain of Custody #	**112G00041-1242006-6**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Federal Express	**Address**	940 South Harney Street	**Date**	1/24/06
Carrier/Waybill No.	8494 1921 7735	**City, State, Zip**	Seattle, WA 98108	**Time**	12:57
		Lab Contact	Hugh Prentice/Elaine Walker	**Received By:**	Federal Express
		Lab Telephone	206-767-5060 x1028	**Date**	1/24/06
				Time	13:57

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/24/06	13GWT1107	09:40	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT11	GW	4°C	2	Glass	1L Amber	
1/24/06	13GWT1707	11:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT17	GW	4°C	2	Glass	1L Amber	

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/11/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112G00041-1112006-3	**Carrier**	Federal Express	**Printed By**	James Goerdt
		Carrier/Waybill No.	8494 1921 7790	**Printed Date**	7/11/06

Chain of Custody Information

Chain of Custody #	**112G00041-1112006-3**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Federal Express	**Address**	940 South Harney Street	**Date**	1/11/06
Carrier/Waybill No.	8494 1921 7790	**City, State, Zip**	Seattle, WA 98108	**Time**	
		Lab Contact	Hugh Prentice/Elaine Walker	**Received By:**	Federal Express
		Lab Telephone	206-767-5060 x1028	**Date**	1/11/06
				Time	

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/9/06	13GWT1407	16:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT14	GW	4°C	2	Glass	1L Amber	
1/10/06	13GWT2806	08:25	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT28	GW	4°C	2	Glass	1L Amber	
1/10/06	13GWT3106	12:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT31	GW	4°C	2	Glass	1L Amber	

1/10/06	13GWT3406	16:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT34	GW	4°C	2	Glass	1L Amber	

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/19/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112G00041-1192006-4	**Carrier**	Federal Express	**Printed By**	James Goerdt
		Carrier/Waybill No.	8494 1921 7779	**Printed Date**	7/11/06

Chain of Custody Information

Chain of Custody #	**112G00041-1192006-4**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Federal Express	**Address**	940 South Harney Street	**Date**	1/19/06
Carrier/Waybill No.	8494 1921 7779	**City, State, Zip**	Seattle, WA 98108	**Time**	
		Lab Contact	Hugh Prentice/Elaine Walker	**Received By:**	Federal Express
		Lab Telephone	206-767-5060 x1028	**Date**	1/19/06
				Time	

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/19/06	13GWT1507	13:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT15	GW	4°C	2	Glass	1L Amber	
1/19/06	13GWT2107	10:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT21	GW	4°C	2	Glass	1L Amber	
1/19/06	13GWT4506	10:35	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT45	GW	4°C	2	Glass	1L Amber	

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/6/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112G00041-162006-1	**Carrier**	Federal Express	**Printed By**	James Goerdt
		Carrier/Waybill No.	8244 4672 4260	**Printed Date**	7/11/06

Chain of Custody Information

Chain of Custody #	**112G00041-162006-1**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Federal Express	**Address**	940 South Harney Street	**Date**	1/6/06
Carrier/Waybill No.	8244 4672 4260	**City, State, Zip**	Seattle, WA 98108	**Time**	
		Lab Contact	Hugh Prentice/Elaine Walker	**Received By:**	Federal Express
		Lab Telephone	206-767-5060 x1028	**Date**	1/6/06
				Time	

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/5/06	13SW1104	10:25	SW-846-8330	Explosives Nitroaromatics and Nitramines	13SWSD11	SW	4°C	2	Glass	1L Amber	

1/5/06	13SW1406	08:44	SW-846-8330	Explosives Nitroaromatics and Nitramines	13SWSD14	SW	4°C	4	Glass	1L Amber	Do MS/MSD
1/5/06	13SW1506	09:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	13SWSD15	SW	4°C	2	Glass	1L Amber	
1/5/06	13SW1606	09:22	SW-846-8330	Explosives Nitroaromatics and Nitramines	13SWSD16	SW	4°C	2	Glass	1L Amber	
1/5/06	13SW1905	11:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	13SWSD19	SW	4°C	2	Glass	1L Amber	
1/5/06	13SW2005	10:44	SW-846-8330	Explosives Nitroaromatics and Nitramines	13SWSD20	SW	4°C	2	Glass	1L Amber	
1/5/06	13SW2205	10:11	SW-846-8330	Explosives Nitroaromatics and Nitramines	13SWSD22	SW	4°C	2	Glass	1L Amber	
1/5/06	13SW3006	00:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	QC	SW	4°C	2	Glass	1L Amber	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/5/06	13SW3006	09:37	SW-846-8330	Explosives Nitroaromatics and Nitramines	13SWSD30	SW	4°C	2	Glass	1L Amber	
1/5/06	16SW1004	15:49	SW-846-8330	Explosives Nitroaromatics and Nitramines	16SWSD10	SW	4°C	2	Glass	1L Amber	
1/5/06	16SW1004	15:49	SW-846 8260B	Volatile Organic Compounds	16SWSD10	SW	4°C/HCL	3	Glass	40ml vials	
1/5/06	16SW1205	14:44	SW-846 8260B	Volatile Organic Compounds	16SWSD12	SW	4°C/HCL	3	Glass	40ml vials	
1/5/06	16SW1205	14:44	SW-846-8330	Explosives Nitroaromatics and Nitramines	16SWSD12	SW	4°C	2	Glass	1L Amber	
1/5/06	16SW1305	14:31	SW-846 8260B	Volatile Organic Compounds	16SWSD13	SW	4°C/HCL	3	Glass	40ml vials	
1/5/06	16SW1305	14:31	SW-846-8330	Explosives Nitroaromatics and Nitramines	16SWSD13	SW	4°C	2	Glass	1L Amber	
1/5/06	16SW3004	00:00	SW-846 8260B	Volatile Organic Compounds	QC	SW	4°C/HCL	3	Glass	40ml vials	
1/5/06	16SW3004	00:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	QC	SW	4°C	2	Glass	1L Amber	
1/5/06	16SW3004	12:56	SW-846-8330	Explosives Nitroaromatics and Nitramines	16SWSD30	SW	4°C	4	Glass	1L Amber	DO MS/MSD
1/5/06	16SW3004	12:56	SW-846 8260B	Volatile Organic Compounds	16SWSD30	SW	4°C/HCL	9	Glass	40ml vials	DO MS/MSD
1/5/06	TB01050601	07:30	SW-846 8260B	Volatile Organic Compounds	QC	AQ	4°C/HCL	2	Glass	40ml vials	Trip Blank
1/6/06	13GWT4006	10:08	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT40	GW	4°C	2	Glass	1L Amber	
1/6/06	13GWT4706	11:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT47	GW	4°C	4	Glass	1L Amber	Do MS/MSD

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/9/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112G00041-192006-2	**Carrier**	Federal Express	**Printed By**	James Goerdt
		Carrier/Waybill No.	8244 4672 4281	**Printed Date**	7/11/06

Chain of Custody Information

Chain of Custody #	**112G00041-192006-2**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Federal Express	**Address**	940 South Harney Street	**Date**	1/9/06
Carrier/Waybill No.	8244 4672 4281	**City, State, Zip**	Seattle, WA 98108	**Time**	
		Lab Contact	Hugh Prentice/Elaine Walker	**Received By:**	Federal Express
		Lab Telephone	206-767-5060 x1028	**Date**	1/9/06
				Time	

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/6/06	13GWT3706	16:45	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT37	GW	4°C	2	Glass	1L Amber	
1/6/06	13GWT4606	14:20	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT46	GW	4°C	2	Glass	1L Amber	
1/7/06	16GW0307	11:00	SW-846 8260B	Volatile Organic Compounds	16MW03	GW	4°C/HCL	3	Glass	40ml vials	

1/7/06	16GW0307	11:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MW03	GW	4°C	2	Glass	1L Amber	
1/7/06	16GW0407	11:10	SW-846 8260B	Volatile Organic Compounds	16MW04	GW	4°C/HCL	3	Glass	40ml vials	
1/7/06	16GW0407	11:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MW04	GW	4°C	2	Glass	1L Amber	
1/7/06	16GWT0906	16:25	SW-846 8260B	Volatile Organic Compounds	16MWT09	GW	4°C/HCL	3	Glass	40ml vials	
1/7/06	16GWT0906	16:25	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT09	GW	4°C	2	Glass	1L Amber	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/7/06	16GWT1206	15:20	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT12	GW	4°C	2	Glass	1L Amber	
1/7/06	16GWT1206	15:20	SW-846 8260B	Volatile Organic Compounds	16MWT12	GW	4°C/HCL	3	Glass	40ml vials	
1/7/06	TB01070601	07:00	SW-846 8260B	Volatile Organic Compounds	QC	AQ	4°C/HCL	2	Glass	40ml vials	Trip Blank
1/8/06	13GWT1307	13:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT13	GW	4°C	2	Glass	1L Amber	
1/8/06	16GW0207	10:30	SW-846 8260B	Volatile Organic Compounds	16MW02	GW	4°C/HCL	3	Glass	40ml vials	
1/8/06	16GW0207	10:30	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MW02	GW	4°C	2	Glass	1L Amber	
1/8/06	16GWT0608	13:35	SW-846 8260B	Volatile Organic Compounds	16MWT06	GW	4°C/HCL	3	Glass	40ml vials	Hot sample in past!
1/8/06	16GWT0608	13:35	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT06	GW	4°C	2	Glass	1L Amber	
1/9/06	13GWT0908	00:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	QC	GW	4°C	2	Glass	1L Amber	Field Dup
1/9/06	13GWT0908	10:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT09	GW	4°C	2	Glass	1L Amber	
1/9/06	16GWT1006	10:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT10	GW	4°C	2	Glass	1L Amber	
1/9/06	16GWT1006	10:50	SW-846 8260B	Volatile Organic Compounds	16MWT10	GW	4°C/HCL	3	Glass	40ml vials	

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/23/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112G00041-1232006-5	**Carrier**	Federal Express	**Printed By**	James Goerdt
		Carrier/Waybill No.	8494 1921 7746	**Printed Date**	7/11/06

Chain of Custody Information

Chain of Custody #	**112G00041-1232006-5**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Federal Express	**Address**	940 South Harney Street	**Date**	1/23/06
Carrier/Waybill No.	8494 1921 7746	**City, State, Zip**	Seattle, WA 98108	**Time**	
		Lab Contact	Hugh Prentice/Elaine Walker	**Received By:**	Federal Express
		Lab Telephone	206-767-5060 x1028	**Date**	1/23/06
				Time	

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/20/06	13GWT5105	16:55	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT51	GW	4°C	2	Glass	1L Amber	
1/21/06	16GWT0407	17:35	SW-846 8260B	Volatile Organic Compounds	16MWT04	GW	4°C/HCL	9	Glass	40ml vials	Do MS/MSD
1/21/06	16GWT0407	17:35	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT04	GW	4°C	4	Glass	1L Amber	Do MS/MSD

1/21/06	16GWT1506	09:05	SW-846 8260B	Volatile Organic Compounds	16MWT15	GW	4°C/HCL	3	Glass	40ml vials	
1/21/06	16GWT1506	09:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT15	GW	4°C	2	Glass	1L Amber	
1/21/06	TB01210601	07:10	SW-846 8260B	Volatile Organic Compounds	QC	AQ	4°C/HCL	2	Glass	40ml vials	Trip Blank
1/22/06	16GWT1106	09:30	SW-846 8260B	Volatile Organic Compounds	16MWT11	GW	4°C/HCL	3	Glass	40ml vials	
1/22/06	16GWT1106	09:30	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT11	GW	4°C	2	Glass	1L Amber	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
1/22/06	16GWT1306	08:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT13	GW	4°C	2	Glass	1L Amber	
1/22/06	16GWT1306	08:50	SW-846 8260B	Volatile Organic Compounds	16MWT13	GW	4°C/HCL	3	Glass	40ml vials	Hot in past!
1/22/06	16GWT1706	00:00	SW-846 8260B	Volatile Organic Compounds	QC	GW	4°C/HCL	3	Glass	40ml vials	DUP - Hot in past!
1/22/06	16GWT1706	00:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	QC	GW	4°C	2	Glass	1L Amber	DUP
1/22/06	16GWT1706	12:05	SW-846 8260B	Volatile Organic Compounds	16MWT17	GW	4°C/HCL	3	Glass	40ml vials	Hot in past!
1/22/06	16GWT1706	12:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	16MWT17	GW	4°C	2	Glass	1L Amber	
1/23/06	13GWT0107	11:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	13MWT01	GW	4°C	2	Glass	1L Amber	

General Observations and Notes

No Notes

- End of Report -

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SWMU 13

WATER LEVEL MEASUREMENTS

ROUND 7

Tetra Tech NUS, Inc.

GROUNDWATER MEASUREMENT LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Sample ID #**	SWMU 13	**Created By**	James Goerdt
TtNUS Project #	112G00041	**Well ID**		**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Sampled By**	James Goerdt/Terry Rojahn	**Modified By**	
WBS Code #	0000			**Modified Date**	
Well Type		**Concentration**		**Printed By**	James Goerdt
QA Sample Type				**Printed Date**	7/11/06

Groundwater Measurements

Well ID	Date	Time	Water Level Indicator Reading (ft)	Total Well Depth (ft)	Free Product Thickness (ft)	PID/FID (ppm)	Reference Elevation (ft)	Groundwater Elevation	Tidally Influenced
13MWT01	1/4/06	09:44	7.20	17.90	NA	NA		e	N
13MWT02	1/4/06	09:55	15.37	29.47	NA	NA		e	N
13MWT03	1/4/06	11:50	9.63	18.00	NA	NA		e	N
13MWT04	1/4/06	10:20	14.31	17.80	NA	NA		e	N
13MWT05	1/4/06	09:59	5.75	19.07	NA	NA		e	N
13MWT06	1/4/06	11:48	13.91	17.60	NA	NA		e	N
13MWT07	1/4/06	10:29	4.32	17.95	NA	NA		e	N
13MWT08	1/4/06	10:22	3.35	16.60	NA	NA		e	N

Tetra Tech NUS, Inc.

GROUNDWATER MEASUREMENT LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Groundwater Measurements

Well ID	Date	Time	Water Level Indicator Reading (ft)	Total Well Depth (ft)	Free Product Thickness (ft)	PID/FID (ppm)	Reference Elevation (ft)	Groundwater Elevation	Tidally Influenced
13MWT09	1/4/06	11:44	8.10	23.00	NA	NA		e	N
13MWT10	1/4/06	10:26	15.14	28.14	NA	NA		e	N
13MWT11	1/4/06	10:37	8.64	17.72	NA	NA		e	N
13MWT12	1/4/06	10:41	11.27	22.30	NA	NA		e	N
13MWT13	1/4/06	15:18	4.49	21.40	NA	NA		e	N
13MWT14	1/4/06	14:53	14.00	25.55	NA	NA		e	N
13MWT15	1/4/06	10:46	14.92	27.65	NA	NA		e	N
13MWT16	1/4/06	10:56	13.39	17.25	NA	NA		e	N
13MWT17	1/4/06	11:02	8.48	20.25	NA	NA		e	N
13MWT18	1/4/06	10:53	20.02	33.20	NA	NA		e	N
13MWT19	1/4/06	14:48	10.78	22.03	NA	NA		e	N
13MWT20	1/4/06	11:38	4.76	22.75	NA	NA		e	N
13MWT21	1/4/06	11:08	8.30	17.70	NA	NA		e	N
13MWT22	1/4/06	11:22	8.40	17.70	NA	NA		e	N
13MWT23	1/4/06	11:36	8.90	24.45	NA	NA		e	N
13MWT24	1/4/06	11:34	9.41	25.15	NA	NA		e	N
13MWT25	1/4/06	11:27	5.86	17.95	NA	NA		e	N
13MWT26	1/4/06	11:30	10.51	22.15	NA	NA		e	N
13MWT27	1/4/06	10:44	8.80	22.45	NA	NA		e	N
13MWT28	1/4/06	11:41	77.21	90.40	NA	NA		e	N

Tetra Tech NUS, Inc.

GROUNDWATER MEASUREMENT LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Groundwater Measurements

Well ID	Date	Time	Water Level Indicator Reading (ft)	Total Well Depth (ft)	Free Product Thickness (ft)	PID/FID (ppm)	Reference Elevation (ft)	Groundwater Elevation	Tidally Influenced
13MWT29	1/4/06	15:22	5.51	21.25	NA	NA		e	N
13MWT30	1/4/06	14:57	11.13	26.65	NA	NA		e	N
13MWT31	1/4/06	14:43	10.39	22.35	NA	NA		e	N
13MWT32	1/4/06	14:37	10.00	20.75	NA	NA		e	N
13MWT33	1/4/06	14:40	12.21	21.80	NA	NA		e	N
13MWT34	1/4/06	11:16	5.64	22.90	NA	NA		e	N
13MWT35	1/4/06	10:34	63.65	70.25	NA	NA		e	N
13MWT36	1/4/06	14:05	18.61	27.35	NA	NA		e	N
13MWT37	1/4/06	14:10	14.14	27.20	NA	NA		e	N
13MWT38	1/4/06	14:08	61.41	67.70	NA	NA		e	N
13MWT39	1/4/06	14:20	3.47	26.75	NA	NA		e	N
13MWT40	1/4/06	14:23	18.16	27.75	NA	NA		e	N
13MWT41	1/4/06	14:26	66.03	67.85	NA	NA		e	N
13MWT42	1/4/06	14:30	20.77	23.50	NA	NA		e	N
13MWT43	1/4/06	10:13	8.77	22.53	NA	NA		e	N
13MWT44	1/4/06	10:08	64.13	85.88	NA	NA		e	N
13MWT45	1/4/06	11:11	70.39	82.20	NA	NA		e	N
13MWT46	1/4/06	14:16	57.34	67.65	NA	NA		e	N
13MWT47	1/4/06	15:02	7.68	20.23	NA	NA		e	N
13MWT48	1/4/06	13:37	9.78	12.75	NA	NA		e	N

Tetra Tech NUS, Inc.

GROUNDWATER MEASUREMENT LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Groundwater Measurements

Well ID	Date	Time	Water Level Indicator Reading (ft)	Total Well Depth (ft)	Free Product Thickness (ft)	PID/FID (ppm)	Reference Elevation (ft)	Groundwater Elevation	Tidally Influenced
13MWT49	1/4/06	13:35	7.19	11.90	NA	NA		e	N
13MWT50	1/4/06	13:32	7.43	28.20	NA	NA		e	N
13MWT51	1/4/06	13:26	5.80	17.75	NA	NA		e	N

General Observations and Notes

Water levels and total well depths measured. Dedicated well pump depths also measured where applicable.

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER MEASUREMENT LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	James Goerdt
TtNUS Project #	112G00041	**PM Telephone**	412-921-8308	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	0000	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	James Goerdt
		Carrier/Waybill No.		**Printed Date**	7/11/06

Surface Water Measurements

Location ID	Date	Time	Flow Rate (est.)	Type	Measurement	Flow Width	Flow Depth	Flow Velocity
13SG01	1/4/06	09:57	< 1	Estimated	1.77			
13SG02	1/4/06	09:51	3.5	Estimated	3.69			
13SG03	1/4/06	15:12	<1	Estimated	1.94			
13SG04	1/4/06	15:14	1.5	Measured	2.42			
13SG05	1/4/06	15:16	1.5	Measured	3.90			
13SG06	1/4/06	14:50		Stagnant	2.35			
13SG07	1/4/06	11:32	<1	Estimated	1.48			
13SG08	1/4/06	11:24		Measured	5.10	1.1	.03	1.0

Tetra Tech NUS, Inc.

SURFACE WATER MEASUREMENT LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Surface Water Measurements

Location ID	Date	Time	Flow Rate (est.)	Type	Measurement	Flow Width	Flow Depth	Flow Velocity
13SG09	1/4/06	10:58		Measured	4.15	1.0	.05	1
13SG10	1/4/06	10:31		Measured	4.80	0.8	.05	1
13SG11	1/4/06	15:08	1.5	Measured	2.15			
13SG12	1/4/06	13:07		Measured	6.81	11.0	.04	2
13SG13	1/4/06	13:16	30	Measured	5.58			
13SG14	1/4/06	13:21		Stagnant	6.32			
13SG15	1/4/06		Destroyed					
13SG16	1/4/06	13:49		Dry				
13SG17	1/4/06	13:46		Dry				
13SG18	1/4/06	13:55		Measured	8.16	17.0	.05	2

General Observations and Notes

No Notes

- End of Report -

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SWMU 13

EQUIPMENT CALIBRATION FORMS

ROUND 7

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	Water Quality Meter U22	**Created By**	James Goerdt
TtNUS Project #	112G00041	**Manufacturer**	Horiba	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Serial Number**	4143006	**Modified By**	John Wright
WBS Code #	0000			**Modified Date**	8/18/06
Client				**Printed By**	John Wright
				Printed Date	8/18/06

Calibration Records

Date	Calibrator	pH	Conductivity	DO	ORP	Turbidity	Comments
1/5/06	James Goerdt	Pre: 3.98 Post: 3.99 Std: 4920 Exp: 5/10/07	Pre: 4.50 Post: 4.50 Std: 4920 Exp: 5/10/07	Pre: 8.19 Post: 8.46 Std: Exp:	Pre: 285 Post: 294 Std: Exp: ORP: 19.05	Pre: 0 Post: Std: 4920 Exp: 5/10/07	
1/6/06	James Goerdt	Pre: 3.96 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.61 Post: 4.49 Std: 4920 Exp: 5/10/07	Pre: 6.63 Post: 8.05 Std: Exp:	Pre: 303 Post: 303 Std: Exp: ORP: 16.68	Pre: 4 Post: 0 Std: 4920 Exp: 5/10/07	
1/7/06	James Goerdt	Pre: 3.98 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.28 Post: 4.48 Std: 4920 Exp: 5/10/07	Pre: 10.62 Post: 9.36 Std: Exp:	Pre: 296 Post: 294 Std: Exp: ORP: 18.08	Pre: 1 Post: 1 Std: 4920 Exp: 5/10/07	
1/8/06	James Goerdt	Pre: 4.04 Post: 3.99 Std: 4920 Exp: 5/10/07	Pre: 4.46 Post: 4.48 Std: 4920 Exp: 5/10/07	Pre: 9.30 Post: 9.25 Std: Exp:	Pre: 289 Post: 289 Std: Exp: ORP: 18.67	Pre: 1 Post: 1 Std: 4920 Exp: 5/10/07	
1/9/06	James Goerdt	Pre: 3.98 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.51 Post: 4.49 Std: 4920 Exp: 5/10/07	Pre: 8.76 Post: 9.03 Std: Exp:	Pre: 276 Post: 275 Std: Exp: ORP: 19.55	Pre: 1 Post: 0 Std: 4920 Exp: 5/10/07	
1/10/06	T. Rojahn	Pre: 4.01 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.66 Post: 4.49 Std: 4920 Exp: 5/10/07	Pre: 8.52 Post: 8.70 Std: Exp:	Pre: 344 Post: 342 Std: Exp: ORP: 19.64	Pre: 6 Post: 0 Std: 4920 Exp: 5/10/07	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	Water Quality Meter U22	**Created By**	James Goerdt
TtNUS Project #	112G00041	**Manufacturer**	Horiba	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Serial Number**	4103008	**Modified By**	John Wright
WBS Code #	0000			**Modified Date**	8/18/06
Client				**Printed By**	John Wright
				Printed Date	8/18/06

Calibration Records

Date	Calibrator	pH	Conductivity	DO	ORP	Turbidity	Comments
1/6/06	James Goerdt	Pre: 3.86 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.65 Post: 4.49 Std: 4920 Exp: 5/10/07	Pre: 11.45 Post: 10.09 Std: Exp:	Pre: 380 Post: 376 Std: Exp: ORP: 16.80	Pre: 2 Post: 0 Std: 4920 Exp: 5/10/07	
1/7/06	James Goerdt	Pre: 4.02 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.38 Post: 4.48 Std: 4920 Exp: 5/10/07	Pre: 8.97 Post: 9.09 Std: Exp:	Pre: 316 Post: 313 Std: Exp: ORP: 18.44	Pre: 0 Post: 0 Std: 4920 Exp: 5/10/07	
1/8/06	James Goerdt	Pre: 3.97 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.54 Post: 4.48 Std: 4920 Exp: 5/10/07	Pre: 8.93 Post: 9.01 Std: Exp:	Pre: 380 Post: 371 Std: Exp: ORP: 19.21	Pre: 9 Post: 0 Std: 4920 Exp: 5/10/07	
1/9/06	James Goerdt	Pre: 4.06 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.45 Post: 4.49 Std: 4920 Exp: 5/10/07	Pre: 8.99 Post: 8.90 Std: Exp:	Pre: 344 Post: 339 Std: Exp: ORP: 20.37	Pre: 13 Post: 0 Std: 4920 Exp: 5/10/07	
1/18/06	T. Rojahn	Pre: 3.97 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.47 Post: 4.49 Std: 4920 Exp: 5/10/07	Pre: 8.18 Post: 8.55 Std: 4920 Exp: 5/10/07	Pre: 312 Post: 309 Std: 4920 Exp: 5/10/07 ORP: 20.76	Pre: NA Post: NA Std: Exp:	
1/19/06	T. Rojahn	Pre: 3.98 Post: 4.00 Std: 4920 Exp: 5/10/07	Pre: 4.33 Post: 4.50 Std: 4920 Exp: 5/10/07	Pre: 9.12 Post: 9.20 Std: 4920 Exp: 5/10/07	Pre: 308 Post: 300 Std: 4920 Exp: 5/10/07 ORP: 19.02	Pre: NA Post: NA Std: Exp:	
1/20/06	T. Rojahn	Pre: 4.03 Post: 4.00 Std: 4920 Exp:	Pre: 4.75 Post: 4.49 Std: 4920 Exp:	Pre: 9.05 Post: 9.11 Std: 4920 Exp:	Pre: 423 Post: 417 Std: 4920 Exp:	Pre: NA Post: NA Std:	

		5/10/07	5/10/07	5/10/07	5/10/07 ORP: 19.85	Exp:	
1/21/06	T. Rojahn	Pre: 4.02 Post: 4.00 Std: 4920 Exp: 05/10/07	Pre: 4.39 Post: 4.49 Std: 4920 Exp: 05/10/07	Pre: 9.32 Post: 9.25 Std: 4920 Exp: 05/10/07	Pre: 174 Post: 172 Std: 4920 Exp: 05/10/07 ORP: 19.41	Pre: NA Post: NA Std: Exp:	Checked ORP with Zobell Solution (should read ~238) reading = 201mV
1/22/06	T. Rojahn	Pre: 4.00 Post: 4.00 Std: 4920 Exp: 05/10/07	Pre: 4.52 Post: 4.49 Std: 4920 Exp: 05/10/07	Pre: 9.32 Post: 9.38 Std: 4920 Exp: 05/10/07	Pre: 299 Post: 298 Std: 4920 Exp: 05/10/07 ORP: 18.78	Pre: NA Post: NA Std: Exp:	
1/23/06	T. Rojahn	Pre: 4.02 Post: 4.00 Std: 4920 Exp: 05-10-2007	Pre: 4.47 Post: 4.49 Std: 4920 Exp: 05-10-2007	Pre: 9.44 Post: 9.45 Std: 4920 Exp: 05-10-2007	Pre: 299 Post: 300 Std: 4920 Exp: 05-10-2007 ORP: 18.83	Pre: NA Post: NA Std: Exp:	
1/24/06	T. Rojahn	Pre: 4.00 Post: 4.00 Std: 4920 Exp: 05/10/2007	Pre: 4.40 Post: 4.49 Std: 4920 Exp: 05/10/2007	Pre: 9.27 Post: 9.49 Std: 4920 Exp: 05/10/2007	Pre: 334 Post: 330 Std: 4920 Exp: 05/10/2007 ORP: 18.66	Pre: NA Post: NA Std: Exp:	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	Turbidity Meter	**Created By**	James Goerdt
TtNUS Project #	112G00041	**Manufacturer**	LaMotte 2020	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Serial Number**	0359-4197	**Modified By**	John Wright
WBS Code #	0000			**Modified Date**	8/18/06
Client				**Printed By**	John Wright
				Printed Date	8/18/06

Calibration Records

Date	Calibrator	Turbidity - 0 NTU	Turbidity - 10 NTU	Comments
1/2/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 9.95 Post: 10.00 Std: Exp:	
1/4/06	James Goerdt	Pre: 0.0 Post: 0.0 Std: Exp:	Pre: 10 Post: 10 Std: Exp:	
1/7/06	James Goerdt	Pre: 0 Post: 0 Std: Exp:	Pre: 9.9 Post: 9.9 Std: Exp:	
1/8/06	James Goerdt	Pre: 0 Post: 0 Std: Exp:	Pre: 10 Post: 10 Std: Exp:	
1/9/06	James Goerdt	Pre: 0 Post: 0 Std: Exp:	Pre: 10 Post: 10 Std: Exp:	
1/18/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 10.25 Post: 10.00 Std: Exp:	
1/19/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 9.95 Post: 10.0 Std: Exp:	
1/20/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 9.90 Post: 10.00 Std: Exp:	
1/21/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 9.88 Post: 10.00 Std: Exp:	

1/22/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 9.9 Post: 10.00 Std: Exp:	
1/23/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 9.95 Post: 10.00 Std: Exp:	
1/24/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 10.05 Post: 10.00 Std: Exp:	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	Turbidity Meter	**Created By**	James Goerdt
TtNUS Project #	112G00041	**Manufacturer**	LaMotte 2020	**Created Date**	1/4/06
Task/Contract #	CTO 0377	**Serial Number**	4073-1103	**Modified By**	John Wright
WBS Code #	0000			**Modified Date**	8/18/06
Client				**Printed By**	John Wright
				Printed Date	8/18/06

Calibration Records

Date	Calibrator	Turbidity - 0 NTU	Turbidity - 10 NTU	Comments
1/4/06	James Goerdt	Pre: 0.0 Post: 0.0 Std: Exp:	Pre: 9.9 Post: 10 Std: Exp:	
1/6/06	James Goerdt	Pre: 0 Post: 0 Std: Exp:	Pre: 10 Post: 10 Std: Exp:	
1/7/06	James Goerdt	Pre: 0 Post: 0 Std: Exp:	Pre: 9.7 Post: 10.0 Std: Exp:	
1/8/06	James Goerdt	Pre: 0 Post: 0 Std: Exp:	Pre: 10 Post: 10 Std: Exp:	
1/9/06	James Goerdt	Pre: 0 Post: 0 Std: Exp:	Pre: 10 Post: 10 Std: Exp:	
1/10/06	T. Rojahn	Pre: 0.00 Post: 0.00 Std: Exp:	Pre: 10.06 Post: 10.00 Std: Exp:	

APPENDIX B

SMWU 13

MISCELLANEOUS FIELD DOCUMENTATION

ROUND 7

B.1.1

SWMU 13

DAILY ACTIVITIES RECORD

ROUND 7

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/03/2006	**Weather/Temp**		**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;T. Rojahn	**Created Date**	1/4/06
TtNUS Project #	112G00041			**Modified By**	Terry Rojahn
Task/Contract #	0000	**Subcontractor Personnel**		**Modified Date**	3/9/06
WBS Code #	0000	**Visitors**		**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/3/06	07:35	Terry Rojahn	Due to the cancellation of TR's 0835 Hr flight in Pittsburgh and a 1700 Hr arrival into Indy airport - this date was all travel. JG arrived in Bloomington in time to pick up equipment shipments at Fed. Ex. Station in Bloomington (JG's flight out of Pittsburgh was delayed).
1/3/06	07:40	Terry Rojahn	TR arrived in Bloomington at 18:40 Hrs and JG arrived at 1700 Hrs on 1/3/2006.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/04/2006	**Weather/Temp**	Mostly sunny & High 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;T. Rojahn	**Created Date**	1/4/06
TtNUS Project #	112G00041			**Modified By**	Terry Rojahn
Task/Contract #	0000	**Subcontractor Personnel**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/4/06	06:45	Terry Rojahn	Arrive at Bloomington gate for NSWC Crane pass.
1/4/06	07:00	Terry Rojahn	Arrive at B-3245:
1/4/06	09:18	Terry Rojahn	Check in w/Mr. Roach - no production this shift at SWMUs 13 &16
1/4/06	09:30	Terry Rojahn	Install well tag on monitoring well 12MWT14.
1/4/06	09:39	Terry Rojahn	Begin synoptic water levels at SWMU 13.
1/4/06	11:55	Terry Rojahn	Break for lunch after completing ground water and surface water levels inside the fence at SWMU 13. Measurements taken for both the monitoring wells (WL, TD & bladder pump intake) and staff gauges(surface water level and flow).
1/4/06	12:20	Terry Rojahn	Return to B-3245:
1/4/06	12:49	Terry Rojahn	Leave B-3245 for SWMU13 to continue synoptic water level measurements.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/4/06	15:25	Terry Rojahn	Complete synoptic water levels for monitoring wells and staff gauges at SWMU 13.
1/4/06	15:30	Terry Rojahn	Return to B-3245:
1/4/06	16:30	Terry Rojahn	Leave B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/05/2006	**Weather/Temp**	Overcast & 30's	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;T. Rojahn	**Created Date**	1/5/06
TtNUS Project #	112G00041			**Modified By**	Terry Rojahn
Task/Contract #	0000	**Subcontractor Personnel**		**Modified Date**	3/9/06
WBS Code #	0000	**Visitors**		**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/5/06	06:50	Terry Rojahn	Arrive at B-3245:
1/5/06	07:30	Terry Rojahn	Collect Trip Blank 16TB01050601.
1/5/06	08:30	Terry Rojahn	Arrive at SWMU 13 to collect surface water samples.
1/5/06	11:20	Terry Rojahn	Return to B-3245 after collecting all Round 7 surface water samples (13SW1104, 1406, 1506, 1606, 1905, 2005, 2205 & 3006) at SWMU 13.
1/5/06	11:50	Terry Rojahn	Leave B-3245 for lunch at cafe.
1/5/06	12:20	Terry Rojahn	Finish lunch
1/5/06	12:34	Terry Rojahn	Arrive at SWMU 16 after a quick stop at B-3245 to collect surface water samples and measure monitoring well and staff gauge water levels.
1/5/06	17:00	Terry Rojahn	Arrive at B-3245 after collecting all Round 7 surface water samples (16SW1004, 1205, 1305 and 3004) at SWMU 16. Also, completed the round of synoptic water levels and staff gauge measurements at SWMU 16.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/5/06	18:20	Terry Rojahn	Leave B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/06/2006	**Weather/Temp**	Overcast & 30s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;T.Rojahn	**Created Date**	1/6/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/6/06	07:00	Terry Rojahn	Arrive at B-3245:
1/6/06	08:55	Terry Rojahn	Arrive at SWMU 13
1/6/06	09:25	Terry Rojahn	Begin purge at 13MWT47.
1/6/06	10:55	Terry Rojahn	End purge at 13MWT47.
1/6/06	11:00	Terry Rojahn	Begin collecting ground water sample 13GWT4706.
1/6/06	11:55	Terry Rojahn	Finish sampling and clean up at 13MWT47.
1/6/06	12:00	Terry Rojahn	Arrive at cafe - lunch.
1/6/06	12:30	Terry Rojahn	Return to B-3245:

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/6/06	16:25	Terry Rojahn	Prep to leave B-3245 for Fed Ex.
1/6/06	17:00	Terry Rojahn	Drop off samples at Fed Ex.
1/6/06	17:32	Terry Rojahn	Picked up supplies at Lowe's.
1/6/06	17:45	Terry Rojahn	SAMPLE SUMMARY FOR THIS DATE:

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/07/2006	**Weather/Temp**	Partly cloudy and 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J.Goerdt;T. Rojahn	**Created Date**	1/7/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/7/06	07:00	Terry Rojahn	Arrive at B-3245:
1/7/06	09:00	Terry Rojahn	Arrive at SWMU 12
1/7/06	09:25	Terry Rojahn	Begin purging monitoring well 16MW04.
1/7/06	11:05	Terry Rojahn	Finish purging monitoring well 16MW04.
1/7/06	11:10	Terry Rojahn	Start collecting ground water sample 16GW0407.
1/7/06	11:45	Terry Rojahn	Finish clean up at monitoring well 16MW04.
1/7/06	12:00	Terry Rojahn	Lunch
1/7/06	12:45	Terry Rojahn	Prep to retake photos of select monitoring wells at SWMUs 8 & 13.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/7/06	12:58	Terry Rojahn	Return to SWMU 16.
1/7/06	14:20	Terry Rojahn	Begin purging monitoring well 16MWT09.
1/7/06	16:20	Terry Rojahn	Finish purging monitoring well 16MWT09.
1/7/06	16:25	Terry Rojahn	Start collecting ground water sample 16GWT0906.
1/7/06	17:00	Terry Rojahn	Finish clean up at monitoring well 16MWT09.
1/7/06	17:05	Terry Rojahn	Arrive at B3245:
1/7/06	17:30	Terry Rojahn	Leave B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/08/2006	**Weather/Temp**	Partly Cloudy & 50s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;T. Rojahn	**Created Date**	1/8/06
TtNUS Project #	112G00041			**Modified By**	Terry Rojahn
Task/Contract #	0000	**Subcontractor Personnel**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/8/06	07:10	Terry Rojahn	Arrive at B-3245:
1/8/06	09:10	Terry Rojahn	Arrive at SWMU 16.
1/8/06	09:30	Terry Rojahn	Begin purge at 16MWT06.
1/8/06	13:30	Terry Rojahn	End purge at 16MWT06.
1/8/06	13:35	Terry Rojahn	Begin collecting ground water sample 16GWT0608.
1/8/06	14:26	Terry Rojahn	Finish clean up at 16MWT06.
1/8/06	14:30	Terry Rojahn	Arrive at B3245:
1/8/06	15:00	Terry Rojahn	Leave B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/09/2006	**Weather/Temp**	Partly cloudy & 30s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;T. Rojahn	**Created Date**	1/9/06
TtNUS Project #	112G00041			**Modified By**	Terry Rojahn
Task/Contract #	0000	**Subcontractor Personnel**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV	**Visitors**		**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/9/06	07:00	Terry Rojahn	Arrive at B-3245:
1/9/06	08:50	Terry Rojahn	Arrive at SWMU 16 - check in with B-146 supervisor (Pam) - OK to work this date.
1/9/06	09:25	Terry Rojahn	Begin purge at 16MWT10.
1/9/06	10:45	Terry Rojahn	End purge at 16MWT10.
1/9/06	10:50	Terry Rojahn	Begin collecting ground water sample 16GWT1006.
1/9/06	11:35	Terry Rojahn	Finish clean up at 16MWT10.
1/9/06	11:45	Terry Rojahn	Lunch
1/9/06	12:15	Terry Rojahn	Install weep hole in monitoring well 13MWT47.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/9/06	12:25	Terry Rojahn	Check on JG at 13MWT28. Got JGs Thoughbook to sync for COC generating.
1/9/06	12:40	Terry Rojahn	Arrive at B-3245:
1/9/06	14:01	Terry Rojahn	Took photo #1340 @ monitoring well 16MWT19.
1/9/06	14:03	Terry Rojahn	Took photo #1341 @ monitoring well 16MWT20.
1/9/06	14:13	Terry Rojahn	Took photo #1342 @ monitoring well 16MWT21.
1/9/06	14:14	Terry Rojahn	Took photo #1343 @ monitoring well 16MW04.
1/9/06	14:20	Terry Rojahn	Return to B-3245:
1/9/06	17:00	Terry Rojahn	Leave B-3245 for Fed. Ex.
1/9/06	17:50	Terry Rojahn	Drop off samples at Bloomington Fed Ex.
1/9/06	17:55	Terry Rojahn	SAMPLE SUMMARY FOR THIS DATE:

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/10/2006	**Weather/Temp**	Rain & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	R. Basinski;J. Goerdt;T. Rojahn	**Created Date**	1/10/06
TtNUS Project #	112G00041			**Modified By**	Terry Rojahn
Task/Contract #	0000	**Subcontractor Personnel**		**Modified Date**	3/9/06
WBS Code #	0000	**Visitors**	Mr. Tom Brent	**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/10/06	07:00	Terry Rojahn	Arrive @ B-3245
1/10/06	10:00	Terry Rojahn	Lay out soil boring sampling (DPT) locations at SWMU 13.
1/10/06	11:45	Terry Rojahn	Lunch
1/10/06	12:30	Terry Rojahn	Continue laying out DPT boring locations.
1/10/06	17:00	Terry Rojahn	Finish laying out DPT boring locations and return to B-3245.
1/10/06	17:10	Terry Rojahn	Soil borings laid out this date:
1/10/06	17:30	Terry Rojahn	Leave B-3245 for Lowe's
1/10/06	18:15	Terry Rojahn	Purchase wooden grade stakes - need to replace pin flags at SWMU 12 with wooden stakes.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/10/06	18:16	Terry Rojahn	SAMPLE SUMMARY FOR THIS DATE:

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/11/2006	**Weather/Temp**	Partly cloudy & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	1/11/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/11/06	07:15	Terry Rojahn	Arrive @ B-3245:
1/11/06	12:10	Terry Rojahn	Lunch
1/11/06	12:45	Terry Rojahn	Return to B3245 - receive MFA and MFB maps from Mr. Tom Brent to locate and map soil boring locations.
1/11/06	13:35	Terry Rojahn	Arrive at MFB - located all previously staked out boring locations - mapped and photographed said boring locations (13SB48 through 13SB71).
1/11/06	15:05	Terry Rojahn	Arrive at MFA - located previously staked out boring locations - mapped and photographed boring locations (12SB40 through 13SB55 and 12SB57 through 13SB67).
1/11/06	15:40	Terry Rojahn	Returned to B-3245:
1/11/06	18:05	Terry Rojahn	Leave B-3245 for Fed Ex.
1/11/06	18:40	Terry Rojahn	Drop off samples and equipment on above AB #s.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/12/2006	**Weather/Temp**	Mostly sunny & 50s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	1/12/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/12/06	07:15	Terry Rojahn	Arrive at B-3245:
1/12/06	08:50	Terry Rojahn	Located and photographed soil boring 12SB56, replaced pin flags W/wooden stakes, mapped and photographed 12SB68 - 71.
1/12/06	10:30	Terry Rojahn	Return to B-3245:
1/12/06	10:56	Terry Rojahn	Leave B-3245 for Fed Ex.
1/12/06	11:35	Terry Rojahn	Drop off package at Fed Ex - leave Fed Ex for Indy Airport - remainder of day = Travel.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/18/2006	**Weather/Temp**	Partly sunny & 30s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	1/18/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/18/06	06:30	Terry Rojahn	Arrive at PIT airport:
1/18/06	13:15	Terry Rojahn	Arrive at B-3245:
1/18/06	14:15	Terry Rojahn	Check in with Mr. Mike Roach @ MFA - no production at MFB or in the area of B-146 for the duration of this shift.
1/18/06	14:25	Terry Rojahn	Arrive at SWMU 13
1/18/06	14:50	Terry Rojahn	Begin purge at monitoring well 13MWT45.
1/18/06	16:55	Terry Rojahn	End purge at monitoring well 13MWT45 - dry out well - will sample tomorrow.
1/18/06	17:15	Terry Rojahn	Finish clean up at monitoring well 13MWT45.
1/18/06	17:25	Terry Rojahn	Return to B-3245:

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/18/06	17:35	Terry Rojahn	Leave B-3245 for Bloomington.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/19/2006	**Weather/Temp**	Partly sunny & 50s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	1/19/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/19/06	07:05	Terry Rojahn	Arrive at B-3245:
1/19/06	08:30	Terry Rojahn	Arrive at monitoring well 13MWT21.
1/19/06	08:55	Terry Rojahn	Begin purge at monitoring well 13MWT21.
1/19/06	09:55	Terry Rojahn	End purge at monitoring well 13MWT21.
1/19/06	10:00	Terry Rojahn	Begin collecting ground water sample 13GWT2107.
1/19/06	10:25	Terry Rojahn	Finish clean up at monitoring well 13MWT21.
1/19/06	10:35	Terry Rojahn	Begin collecting ground water sample 13GWT4506 - purged on 1/18/2006.
1/19/06	11:37	Terry Rojahn	Finish clean up at monitoring well 13MWT45.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/19/06	12:05	Terry Rojahn	Begin purge at monitoring well 13MWT15.
1/19/06	13:45	Terry Rojahn	End purge at monitoring well 13MWT15.
1/19/06	13:50	Terry Rojahn	Begin collecting ground water sample 13GWT1507.
1/19/06	14:21	Terry Rojahn	Finish clean up at monitoring well 13MWT15.
1/19/06	14:30	Terry Rojahn	Return to B-3245:
1/19/06	14:45	Terry Rojahn	Sync Toughbook.
1/19/06	16:30	Terry Rojahn	Leave B-3245 for Fed Ex.
1/19/06	17:10	Terry Rojahn	Drop off samples at Bloomington Fed Ex.
1/19/06	17:25	Terry Rojahn	SAMPLE SUMMARY FOR THIS DATE:

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/20/2006	**Weather/Temp**	Overcast & 50s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	Terry Rojahn	**Created Date**	1/20/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/20/06	07:10	Terry Rojahn	Arrive at B-3245:
1/20/06	09:10	Terry Rojahn	Arrive at Break Bldg #2708 - check in with Pam - OK to work in the area of B-146 (today and this weekend).
1/20/06	09:19	Terry Rojahn	Arrive at monitoring well 16MWT15.
1/20/06	09:40	Terry Rojahn	Start purge at monitoring well 16MWT15.
1/20/06	13:40	Terry Rojahn	End purge at monitoring well 16MWT15 after 4 Hrs. - will allow the well time to recover and sample tomorrow..
1/20/06	14:05	Terry Rojahn	Finish clean up at monitoring well 16MWT15.
1/20/06	14:15	Terry Rojahn	Lunch
1/20/06	14:50	Terry Rojahn	Arrive at monitoring well 13MWT51.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/20/06	15:10	Terry Rojahn	Begin purge at monitoring well 13MWT51.
1/20/06	16:50	Terry Rojahn	End purge at monitoring well 13MWT51.
1/20/06	16:55	Terry Rojahn	Begin collecting ground water sample 13GWT5105.
1/20/06	17:30	Terry Rojahn	Finish clean up at monitoring well 13MWT51.
1/20/06	17:38	Terry Rojahn	Return to B-3245:
1/20/06	18:10	Terry Rojahn	Prep to leave B-3245 for Bloomington

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/21/2006	**Weather/Temp**	Overcast & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	1/21/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/21/06	07:05	Terry Rojahn	Arrive at B-3245.
1/21/06	08:50	Terry Rojahn	Arrive at SWMU 16 (16MWT15)
1/21/06	08:51	Terry Rojahn	Begin collecting ground water sample 16GWT1506 (purged 1/20/06).
1/21/06	09:45	Terry Rojahn	Begin purge at 16MWT13.
1/21/06	13:43	Terry Rojahn	End purge at 16MWT13 - dropped water level below the bottom of pump - will sample tomorrow.
1/21/06	14:00	Terry Rojahn	Lunch - Checked in w/R. Basinski.
1/21/06	14:35	Terry Rojahn	Arrive at monitoring well 16MWT11 - water level below the top of the pump - pulled pump and purged well w/ dedicated teflon bailer - saved purge water for sample - well historically has a very slow recharge rate.
1/21/06	15:05	Terry Rojahn	Arrive at monitoring well 16MWT04.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/21/06	15:25	Terry Rojahn	Start purge at monitoring well 16MWT04.
1/21/06	17:30	Terry Rojahn	End purge at monitoring well 16MWT04.
1/21/06	17:35	Terry Rojahn	Begin collecting ground water sample 16GWT0407 - also, collect MS/MSD.
1/21/06	18:30	Terry Rojahn	Return to B-3245:
1/21/06	18:45	Terry Rojahn	Prep to leave B-3245 for Bloomington

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/22/2006	**Weather/Temp**	Overcast & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	T. Rojahn	**Created Date**	1/22/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/22/06	07:44	Terry Rojahn	Arrive at B-3245
1/22/06	08:50	Terry Rojahn	Begin collecting ground water sample 16GWT1306 (purged 1/21/06).
1/22/06	09:22	Terry Rojahn	Finish clean up at monitoring well 16MWT13.
1/22/06	09:30	Terry Rojahn	Begin collecting ground water sample 16GWT1106 (purged 1/21/06).
1/22/06	10:40	Terry Rojahn	Finished clean up at 16MWT11 - replaced bladder pump after collecting sample w/dedicated teflon bailer.
1/22/06	10:50	Terry Rojahn	Start purge at monitoring well 16MWT17.
1/22/06	12:00	Terry Rojahn	End purge at monitoring well 16MWT17.
1/22/06	12:00	Terry Rojahn	Begin collecting ground water sample 16GWT1706 - also, collect 16FD01220601.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/22/06	13:10	Terry Rojahn	Finish clean up at 16MWT17.
1/22/06	13:20	Terry Rojahn	Return to B-3245:
1/22/06	14:00	Terry Rojahn	Prep to leave B-3245 for Bloomington

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/23/2006	**Weather/Temp**	Mostly sunny & 40s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	Terry Rojahn	**Created Date**	1/23/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/23/06	07:10	Terry Rojahn	Arrive at B-3245:
1/23/06	08:55	Terry Rojahn	Arrive at monitoring well 13MWT01
1/23/06	09:05	Terry Rojahn	Begin purge at monitoring well 13MWT01.
1/23/06	10:55	Terry Rojahn	End purge at monitoring well 13MWT01.
1/23/06	11:00	Terry Rojahn	Begin collecting ground water sample 13GWT0107.
1/23/06	11:45	Terry Rojahn	Finish clean up at monitoring well 13MWT01.
1/23/06	11:55	Terry Rojahn	Lunch
1/23/06	12:25	Terry Rojahn	Return to B-3245:

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/23/06	15:00	Terry Rojahn	Arrived at Public Works to see if Branda Chen received Digging Permit request - she wasn't in but talked to her on the phone - she had received our request letter/package and requested that we fill out the top portion of the NSWC Crane Digging Permit forms and return them to her desk.
1/23/06	15:15	Terry Rojahn	Returned to B-3245:
1/23/06	15:45	Terry Rojahn	Returned to Public Works - access door to Branda's office was locked - will drop off Digging Permits tomorrow.
1/23/06	16:00	Terry Rojahn	Return to B-3245:
1/23/06	16:15	Terry Rojahn	Drop off sample shipment at Fed Ex.
1/23/06	16:25	Terry Rojahn	Leave B-3245 for Bloomington Fed Ex.

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	01/24/2006	**Weather/Temp**	Mostly sunny & 30s	**Created By**	Terry Rojahn
Facility Name	CRANE NSWC	**TtNUS Personnel**	Terry Rojahn	**Created Date**	1/24/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	Terry Rojahn
Task/Contract #	0000	**Visitors**		**Modified Date**	3/9/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
1/24/06	07:00	Terry Rojahn	Arrive at B-3245:
1/24/06	08:10	Terry Rojahn	Drop off Digging Permits at Public Works B-56.
1/24/06	08:20	Terry Rojahn	Arrive at monitoring well 13MWT11.
1/24/06	08:40	Terry Rojahn	Begin purge at monitoring well 13MWT11.
1/24/06	09:35	Terry Rojahn	End purge at monitoring well 13MWT11.
1/24/06	09:40	Terry Rojahn	Begin collecting ground water sample 13GWT1107.
1/24/06	10:10	Terry Rojahn	Finish clean up at monitoring well 13MWT11.
1/24/06	10:25	Terry Rojahn	Begin purge at monitoring well 13MWT17.

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Daily Activity

Date	Time	Author	Notes
1/24/06	11:45	Terry Rojahn	End purge at monitoring well 13MWT17.
1/24/06	11:50	Terry Rojahn	Begin collecting ground water sample 13GWT1707.
1/24/06	12:25	Terry Rojahn	Finish clean up at monitoring well 13MWT17.
	12:34	Terry Rojahn	Return to B-3245:
1/24/06	12:45	Terry Rojahn	Sync Toughbook.
1/24/06	17:00	Terry Rojahn	Leave B-3245 for Fed Ex.
	17:40	Terry Rojahn	Drop off shipments at Bloomington Fed Ex.
1/24/06	17:45	Terry Rojahn	SAMPLE SUMMARY FOR THIS DATE:

- End of Report -

Tetra Tech NUS, Inc.

DAILY ACTIVITY LOG

SWMU 13 and 16 Round 7 Sampling - CRANE NSWC

Project Information

Activity Date	05/06/2006	**Weather/Temp**	am-sun upper 40's	**Created By**	James Goerdt
Facility Name	CRANE NSWC	**TtNUS Personnel**	J. Goerdt;D.Hickey	**Created Date**	5/6/06
TtNUS Project #	112G00041	**Subcontractor Personnel**		**Modified By**	James Goerdt
Task/Contract #	0000	**Visitors**		**Modified Date**	5/6/06
WBS Code #	0000			**Printed By**	James Goerdt
Client	SOUTHDIV			**Printed Date**	7/11/06

Daily Activity

Date	Time	Author	Notes
5/6/06	07:30	James Goerdt	Arrive at Bldg. 3245 from Martinsville. Sync computers and load vehicles for sampling GW at SWMU 16.
5/6/06	08:20	James Goerdt	Arrived at SWMU 16 to begn GW sampling. Setting up on well 16MWT12.

- End of Report -

APPENDIX C

SWMU 13

HEALTH AND SAFETY DOCUMENTATION

ROUND 7

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Terry R. Rojahn

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER REFRESHER AND SUPERVISOR REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

February 25, 2005

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

NUS CORPORATION

Certificate of Training

THIS CERTIFIES THAT

TERRY ROJAHN

has successfully completed a course of instruction on

SUPERFUND TRAINING CLASS

prepared and conducted by the
NUS Corporation, Pittsburgh, Pennsylvania

SEPT. 30 - OCT. 4, 1985
Date of Award

Gary F. Smith, C.S.P.
Director; Health, Safety Training

E. Dennis Escher, P.E.
Vice President

Basinski, Ralph

From: Soltis, Matthew
Sent: Tuesday, August 31, 2004 3:18 PM
To: Basinski, Ralph
Cc: Rojahn, Terry; Diano, Linda
Subject: Training Certificate

Ralph:

As I mentioned earlier, one of the action items from my recent H&S audit at NSWC Crane was to follow up on the matter of an 8-hour training certificate for Management/Supervisor H&S training for our FOL on this field effort (Terry Rojahn). This was the only mandatory training element that I could not find documentation for during my audit.

In checking our corporate training database, I have confirmed that Terry did satisfactorily complete this training with us on March 31, 1988. We do not maintain copies of every training certificate that we issue. Please have Terry use this message as interim confirmation of his satisfying this training requirement. The next time that we prepare training certificates, Linda Diano will prepare a replacement certificate for Terry and provide it to him for his records/use.

If there are any questions, let me know.

Matt

Matthew M. Soltis, CIH, CSP.
Corporate Health and Safety Manager
Tetra Tech NUS, Inc.
Foster Plaza 7, 661 Andersen Drive
Pittsburgh, PA 15220-2745
Telephone: (412) 921-8912
FAX: (412) 921-4040
soltism@ttnus.com
http://www.ttnus.com
http://www.tetratech.com

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WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Rojahn, Terry	COMPANY:	TT/NUS
SSN:	XXX-XX-8670	POSITION:	Environmental Sampling
DATE OF EXAM:	11/05/2004	LOCATION:	TT/NUS-Pittsburgh
EXPIRATION DATE:	11/05/2006	SITE:	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☑	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☑	☐

STATUS

1. ☑ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 11/10/04

Signature: Peter P Greaney MD

WorkCare
333 S. Anita Drive, Suite 630, Orange, CA 92868
(714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154

October 28, 2005

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

James Goerdt

has successfully completed an 8-hour course of instruction in

OSHA 29 CFR 1910.120

GENERAL SITE WORKER
REFRESHER TRAINING

prepared and instructed by
Tetra Tech NUS, Inc.
Pittsburgh, Pennsylvania

December 29, 2005

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

A PLIED EDUCATIONAL SERIES

James D. Goerdt

APPLIED ASSOCIATES INTERNATIONAL INC.

CERTIFICATE

OSHA, 1910.120
Hazardous Waste Operations and Emergency Response 40 Hour Course

ISSUE DATE: December 13, 1991

EXPIRATION: December 13, 1992

CERTIFICATE: HAZ9112001058

STEVEN L. WILLIAMS
President

THOMAS O. MURRAY
Certified Industrial Hygenist

P. O. Box 300068
Fern Park, Florida 32730-0068

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Goerdt, James	**COMPANY:**	TT/NUS
SSN:	XXX-XX-2691	**POSITION:**	Environmental Scientist
DATE OF EXAM:	11/22/2005	**LOCATION:**	TT/NUS-Pittsburgh
EXPIRATION DATE:	11/22/2007	**SITE:**	Pittsburgh

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☒	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☒	☐

STATUS

1. ☒ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 11/29/05

Signature: Pet P. Greaney MD

WorkCare
300 S. Harbor Blvd., Suite 600, Anaheim, CA 92805
(714) 978-7488 - (800) 455-6155 - FAX (714) 456-2154

APPENDIX D

SWMU 13

ANALYTICAL DATA

ROUND 7

APPENDIX D.1
SWMU 13
GROUNDWATER
ANALYTICAL DATA
ROUND 7

NSWC CRANE
SUMMARY OF ANALYTIC RESULTS - GROUNDWATER ROUND 7
PENNSYLVANIA UPPER WATER BEARING ZONE
SWMU 13 (MINE FILL B)

SITE	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B
AOC	PUZ-UPGRAD	PUZ	PUZ	PUZ	PUZ	PUZ	PUZ-UPGRAD	PUZ
SWMU	13	13	13	13	13	13	13	13
PHASE	07	07	07	07	07	07	07	07
LOCATION	13MWT01	13MWT09	13MWT09	13MWT11	13MWT13	13MWT14	13MWT15	13MWT17
NSAMPLE	13GWT0107	13GWT0908	13GWT0908-D	13GWT1107	13GWT1307	13GWT1407	13GWT1507	13GWT1707
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	DUP	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	1/23/2006	1/9/2006	1/9/2006	1/24/2006	1/8/2006	1/9/2006	1/19/2006	1/24/2006
EXPLOSIVES (UG/L)								
1,3,5-TRINITROBENZENE	0.26 U	1.2	1.3	0.26 U	0.26 U	0.25 U	0.264 U	0.26 U
1,3-DINITROBENZENE	0.26 U	2.3	2.4	1.4	0.26 U	0.25 U	0.264 U	0.26 U
2,4,6-TRINITROTOLUENE	0.26 U	22	25	49	0.26 U	0.25 U	0.264 U	0.26 U
2,4-DINITROTOLUENE	0.26 U	1.2 J	1.3 J	4.1 J	0.26 U	0.25 U	0.264 U	0.26 U
2,6-DINITROTOLUENE	0.26 U	7.4 J	7.9 J	0.26 U	0.26 U	0.25 U	0.264 U	0.26 U
2-AMINO-4,6-DINITROTOLUENE	0.26 U	17	18	14 J	0.26 U	0.25 U	0.264 U	0.4 J
2-NITROTOLUENE	0.26 U	0.26 U	0.27 U	0.26 U	0.26 U	0.25 U	0.264 U	0.26 U
3-NITROTOLUENE	0.26 U	0.26 U	0.27 U	1.3 J	0.26 U	0.25 U	0.264 U	0.26 U
4-AMINO-2,6-DINITROTOLUENE	0.26 U	21	24	29	0.26 U	0.25 U	0.264 U	0.41 J
4-NITROTOLUENE	0.26 U	0.26 U	0.27 U	0.26 U	0.26 U	0.25 U	0.264 U	0.26 U
HMX	0.84	110 J	110 J	80	9.7 J	0.76 J	0.264 U	92
NITROBENZENE	0.26 U	0.26 U	0.27 U	0.26 U	0.26 U	0.25 U	0.264 U	0.26 U
RDX	0.26 U	1300	1300	760	17	3.7	0.264 U	500
TETRYL	0.26 U	0.26 U	0.27 U	0.26 U	0.26 U	0.25 U	0.264 U	0.26 U
FIELD PARAMETERS								
DISSOLVED OXYGEN (MG/L)		0.73		0.82	3.12	1.43	0.58	0.48
OXIDATION REDUCTION POTENTIAL (MV)		302		290	396	97	326	230
PH		5.62		4.19	4.28	5.77	3.92	5.28
SPECIFIC CONDUCTANCE (MS/CM)		0.784		0.307	0.127	1.03	0.449	0.368
TEMPERATURE (C)		12.22		9.55	12.32	10.98	13.6	12.05
TURBIDITY (NTU)		7.8		8.8	4.3	4.1	10	1.1

NSWC CRANE
SUMMARY OF ANALYTIC RESULTS - GROUNDWATER ROUND 7
PENNSYLVANIA UPPER WATER BEARING ZONE
SWMU 13 (MINE FILL B)

SITE	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B
AOC	PUZ	PUZ	PUZ	PUZ	PUZ	PUZ	VALLEY
SWMU	13	13	13	13	13	13	13
PHASE	07	07	07	07	07	07	07
LOCATION	13MWT21	13MWT31	13MWT34	13MWT37	13MWT40	13MWT47	13MWT51
NSAMPLE	13GWT2107	13GWT3106	13GWT3406	13GWT3706	13GWT4006	13GWT4706	13GWT5105
MATRIX	GW	GW	GW	GW	GW	GW	GW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	1/19/2006	1/10/2006	1/10/2006	1/6/2006	1/5/2006	1/5/2006	1/20/2006
EXPLOSIVES (UG/L)							
1,3,5-TRINITROBENZENE	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
1,3-DINITROBENZENE	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
2,4,6-TRINITROTOLUENE	0.48 J	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
2,4-DINITROTOLUENE	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
2,6-DINITROTOLUENE	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
2-AMINO-4,6-DINITROTOLUENE	0.76 J	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
2-NITROTOLUENE	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
3-NITROTOLUENE	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
4-AMINO-2,6-DINITROTOLUENE	1.1	0.26 U	0.242 U	0.36 J	1.1	0.242 U	0.242 U
4-NITROTOLUENE	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
HMX	230	9.6 J	38 J	170 J	31 J	0.242 U	18
NITROBENZENE	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
RDX	180	21	500	2100	250	0.242 U	58
TETRYL	0.26 U	0.26 U	0.242 U	0.24 U	0.258 U	0.242 U	0.242 U
FIELD PARAMETERS							
DISSOLVED OXYGEN (MG/L)	6.41	1.93	0.84	9.29	8.46	0.64	5.48
OXIDATION REDUCTION POTENTIAL (MV)	259	272	329	235	269	303	208
PH	6.83	5.56	5.12	5.6	5.68	3.79	7.17
SPECIFIC CONDUCTANCE (MS/CM)	0.371	1.58	0.391	0.309	0.383	1.32	0.231
TEMPERATURE (C)	10.7	8.65	10.75	9.61	11.65	8.66	8.22
TURBIDITY (NTU)	5	8.8	5.2	4.3	6.4	10	8.9

APPENDIX D.2
SWMU 13
SURFACE WATER
ANALYTICAL DATA
ROUND 7

NSWC CRANE
SUMMARY OF ANALYTIC RESULTS - SURFACE WATER ROUND 7
SWMU 13 (MINE FILL B)

SITE	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B	MINE FILL B
AOC	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY	GULLY
SWMU	13	13	13	13	13	13	13	13
PHASE	07	07	07	07	07	07	07	07
LOCATION	13SW/SD14	13SW/SD15	13SW/SD16	13SW/SD19	13SW/SD20	13SW/SD22	13SW/SD30	13SW/SD30
SAMPLE	13SW1406	13SW1506	13SW1606	13SW1905	13SW2005	13SW2205	13SW3006	13SW3006-D
MATRIX	SW	SW	SW	SW	SW	SW	SW	SW
SACODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP
SAMPLE DATE	1/5/2006	1/5/2006	1/5/2006	1/5/2006	1/5/2006	1/5/2006	1/5/2006	1/5/2006
EXPLOSIVES (UG/L)								
1,3,5-TRINITROBENZENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
1,3-DINITROBENZENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
2,4,6-TRINITROTOLUENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
2,4-DINITROTOLUENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
2,6-DINITROTOLUENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
2-AMINO-4,6-DINITROTOLUENE	0.84 J	0.25 U	0.28 J	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
2-NITROTOLUENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
3-NITROTOLUENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
4-AMINO-2,6-DINITROTOLUENE	1.9	0.25 U	0.59	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
4-NITROTOLUENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
HMX	25 J	94 J	17 J	0.55 J	0.242 U	0.258 U	2.4 J	2.4 J
NITROBENZENE	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
RDX	76	450	34	0.84	0.31 J	1	6.7	6.8
TETRYL	0.248 U	0.25 U	0.242 U	0.238 U	0.242 U	0.258 U	0.26 U	0.258 U
FIELD PARAMETERS								
DISSOLVED OXYGEN (MG/L)	10.91	11.02	10.67	9.91	10.44	9.72	11.18	
OXIDATION REDUCTION POTENTIAL (MV)	233	209	244	136	163	188	199	
PH	6.63	6.98	6.87	7.67	8.11	7.24	7.15	
SPECIFIC CONDUCTANCE (MS/CM)	0.605	0.276	0.614	0.562	0.396	0.342	0.389	
TEMPERATURE (C)	5.21	4.88	5	4.9	5.4	5.12	4.91	
TURBIDITY (NTU)	6.5	34	12	0.5	3.3	6.7	40	

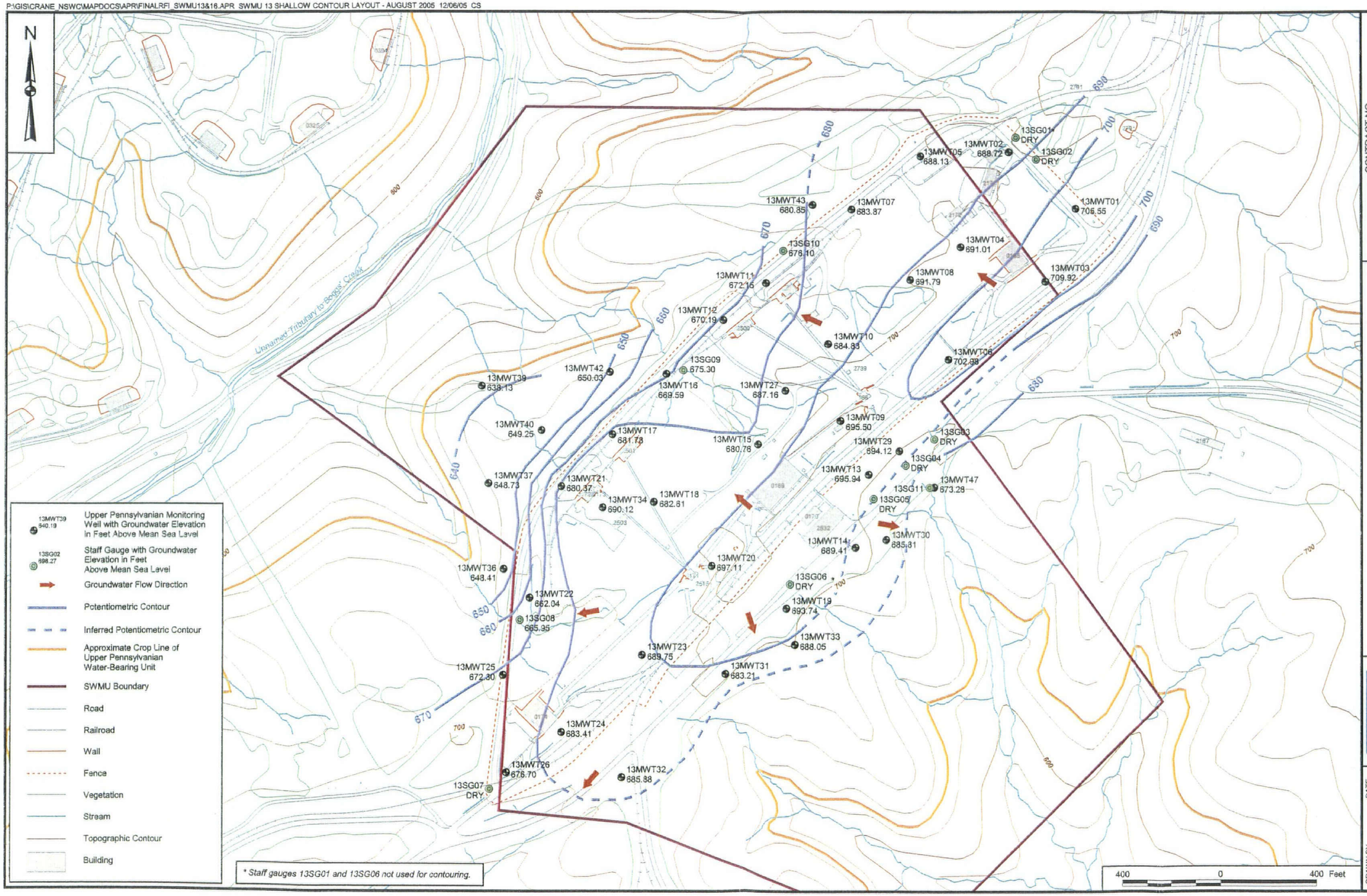
APPENDIX E

SWMU 13

POTENTIOMETRIC SURFACE MAPS

ROUND 6

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINALRFI_SWMU13&16.APR SWMU 13 SHALLOW CONTOUR LAYOUT - AUGUST 2005 12/06/05 CS



CONTRACT NO. 00041

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 4 - 2

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE UPPER PENNSYLVANIAN
WATER-BEARING ZONE - AUGUST 9, 2005
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. SPEHAR DATE 12/06/05

CHECKED BY J. LUCAS DATE 12/06/05

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINALRFI_SWMU13&16.APR SWMU 13 DEEP CONTOUR LAYOUT - AUGUST 2005 12/08/05 CS

CONTRACT NO. 00041

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 4 - 4

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE LOWER PENNSYLVANIAN
WATER-BEARING ZONE - AUGUST 9, 2005
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. SPEHAR DATE 12/08/05

CHECKED BY J. LUCAS DATE 12/08/05

COST/SCHED-AREA

SCALE AS NOTED