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

Round No. 4

Naval Surface Warfare Center Crane
Crane, Indiana

Contract Task Order 0343

August 2005

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

TETRA TECH NUS, Inc.

REVISION 0
AUGUST 2005

MONITORED NATURAL ATTENUATION REPORT
FOR
MINE FILL B (SWMU 13)
ROUND NO. 4

NAVAL INDUSTRIAL WARFARE CENTER, CRANE
CRANE, INDIANA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

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LIST OF ACRONYMS

CMS	Corrective Measures Study
DO	dissolved oxygen
MFB	Mine Fill B
MNA	monitored natural attenuation
NSWC	Naval Surface Warfare Center
ORP	oxidation reduction potential
Plz	Lower Pennsylvanian Water Bearing Zone
Puz	Upper Pennsylvania Water Bearing Zone (Puz)
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RDX	Royal Demolition Explosive
SOPs	Standard Operating Procedures
SWMU	solid waste management unit
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 present in groundwater presented risk and if any residual explosives in soil presented risk. The RFI was conducted in accordance with applicable RCRA corrective action requirements and provides data on the nature and extent of select explosive concentrations in surface soils, subsurface soils, sediment, surface water and groundwater, using a long term monitoring program. The results of the RFI showed there was excess risk as a result of explosives in groundwater.

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 natural attenuation of explosives in 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). The framework provides technical direction for the collection of adequate monitoring data when making monitored natural attenuation (MNA) remedy decisions. In order to determine whether residual explosives are naturally degrading at SWMU 13, a long-term groundwater monitoring plan for explosives and explosives degradation products is being conducted. The long-term monitoring program presently consists of nine rounds of sampling to provide information on trends in groundwater concentrations of explosives and explosives degradation productions. Recently, 4 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], 2005). The results show the presence of explosives [primarily Royal Demolition Explosive (RDX)] above risk-based concentrations in groundwater and surface waters.

The purpose of this report is to present the results of monitoring activities in Round 4, including field documentation, and to provide the framework for evaluation of data once all nine rounds have been completed. Field documentation associated with Round 4 is provided in Appendices A, B, and C of this report. The final report 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 MNA. The MNA program being conducted at SWMU 13 meets the U.S. EPA Region V MNA requirements.

2.0 FIELD INVESTIGATION

This section presents sampling activities, procedures, and documentation utilized during Round 4 field operations performed in 2005 for NSWC Crane SWMU 13. Appendices A through C contain field forms and other miscellaneous documentation associated with Round 4.

2.1 OVERVIEW

RFI field activities for Round 4 were conducted in January and February 2005. All work performed was conducted in accordance with the procedures and methodologies described in the U.S. EPA-approved 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 (TtNUS, 2004).

2.2 ROUND 4 SAMPLING OPERATIONS

This section discusses the methodology for surface water and groundwater sampling activities performed at SWMU 13 during Round 4. Non-conformances or suspected deficiencies did not occur during Round 4. Copies of all field forms, records, field logbooks, and health and safety documentation associated with the Round 4 field investigation are provided in Appendices A through C of this document.

2.2.1 Groundwater Measurements,

Water level measurements were obtained from each monitoring well prior to purging and sampling. All measurements were taken in accordance with SOP CTO166-18. 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. Table 2-1 contains water level/elevation data for Round 4 and previous rounds.

2.2.2 Groundwater Purging and Sampling

Groundwater measurements, purging, and stabilization of wells prior to sampling were accomplished using low-flow techniques in accordance with SOP CTO166-15 and SOP CTO166-16. Sampling was accomplished in accordance with SOP CTO166-05. A listing of all SWMU 13 sample analytes is provided in Table 2-2. All 17 proposed groundwater samples were collected at SWMU 13 during Round 4 (See

Table 2-2). A minimum sample (1 liter for each explosive instead of 2) was collected at monitoring well 13MWT28 due to very slow recharge of the well.

Based on previous rounds of sampling and prior to mobilizing for Round 4, it was determined that monitoring well 13MWT01 would substitute for well 13MWT02 and monitoring well 13MWT45 would substitute for well 13MWT38 for the long-term monitoring program at SWMU 13. The two substitute wells are located in similar areas to the wells they replaced and their ability to produce water was much better and therefore a better choice for the long-term monitoring program.

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 YSI Model 600 series multi-parameter water quality meter and flow-through cell. Longer intervals were used for slower pumping wells. Turbidity readings were measured using a LaMotte 2020 turbidity meter. 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. All pertinent field data, including sampling methods, purge information, pump intake depths, and locations were recorded on low-flow purge data sheets and groundwater sample log sheets (see Appendix A.1.2). See Figure 2-1 for all groundwater sampling locations. The groundwater sampling locations selected to participate in the MNA program are highlighted in yellow in Figure 2-1.

2.2.3 Surface Water Sampling

Surface water samples were collected from intermittent streams, drainage ditches, and surface runoff locations throughout SWMU 13. All eight proposed surface water samples were collected at previously sampled locations which had been marked with a labeled, wooden survey stake (See Table 2-2). 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. All Round 4 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 on a surface water sample log sheet

(see Appendix A.1.1). See Figure 2-2 for all surface water sampling locations. The surface water sampling locations selected to participate in the MNA program are highlighted in yellow in Figure 2-2.

TABLE 2-1

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
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	May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		January 19, 2005	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		Round 1		Round 1		Round 2		Round 3		Round 4	
												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	7.24	708.10
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	16.07	688.65
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	9.84	711.26
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	13.57	693.27
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	6.02	690.42
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	11.37	706.56
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	3.92	683.30
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	4.15	696.41
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	8.16	697.74
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	13.65	686.50
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	8.61	673.68
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	10.52	671.60
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	*	NA
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	13.51	691.99
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	13.71	682.94
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	13.04	671.31
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	9.15	683.86
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	19.04	683.88
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	9.45	696.37
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	4.48	697.59
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	8.94	681.80
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	7.71	664.25
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	7.96	691.18
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	8.83	685.10
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	6.85	674.92

TABLE 2-1

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SWMU 13 - MINE FILL B
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	May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		January 19, 2005	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (feet amsl)		Round 1		Round 1		Round 2		Round 3		Round 4	
												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)
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	9.60	677.89
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	8.20	689.93
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	77.82	627.73
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	5.25	695.19
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	11.08	687.86
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	9.71	686.50
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	8.40	687.64
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	8.93	693.04
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	4.98	690.95
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	64.30	617.43
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	18.73	648.48
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	13.67	648.62
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	61.78	599.26
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	12.76	641.68
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	17.89	649.29
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	66.28	599.39
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	11.45	658.86
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	8.06	682.84
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	64.46	619.36
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	69.81	620.78
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	56.87	596.74
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	7.20	670.03
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	10.13	538.54
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	7.22	546.68
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	7.44	553.05
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	4.07	567.29

TABLE 2-1

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 13 - MINE FILL B
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	May 5, 2003		May 11, 2003		January 19-20, 2004		November 14, 2004		January 19, 2005	
												Round 1		Round 1		Round 2		Round 3		Round 4	
							Top (feet bgs)	Bottom (feet bgs)	Top (feet amsl)	Bottom (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
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	3.70	698.25
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	Dry	Dry
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	2.44	686.55
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	3.88	689.06
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	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	1.52	678.78
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	5.10	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	4.17	671.13
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	4.96	671.14
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	2.45	672.91
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	6.88	588.41
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	5.70	566.65
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	6.31	561.38
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	4.95	534.21
13SG16	10/19/2004	1309270.46	3021074.88	537.01	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	Dry	Dry	Dry	Dry
13SG17	10/19/2004	1309034.25	3020747.93	532.48	NA	NA	NA	NA	NA	NA	Plz	NA	NA	NA	NA	NA	NA	Dry	Dry	Dry	Dry
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	8.18	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.
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.

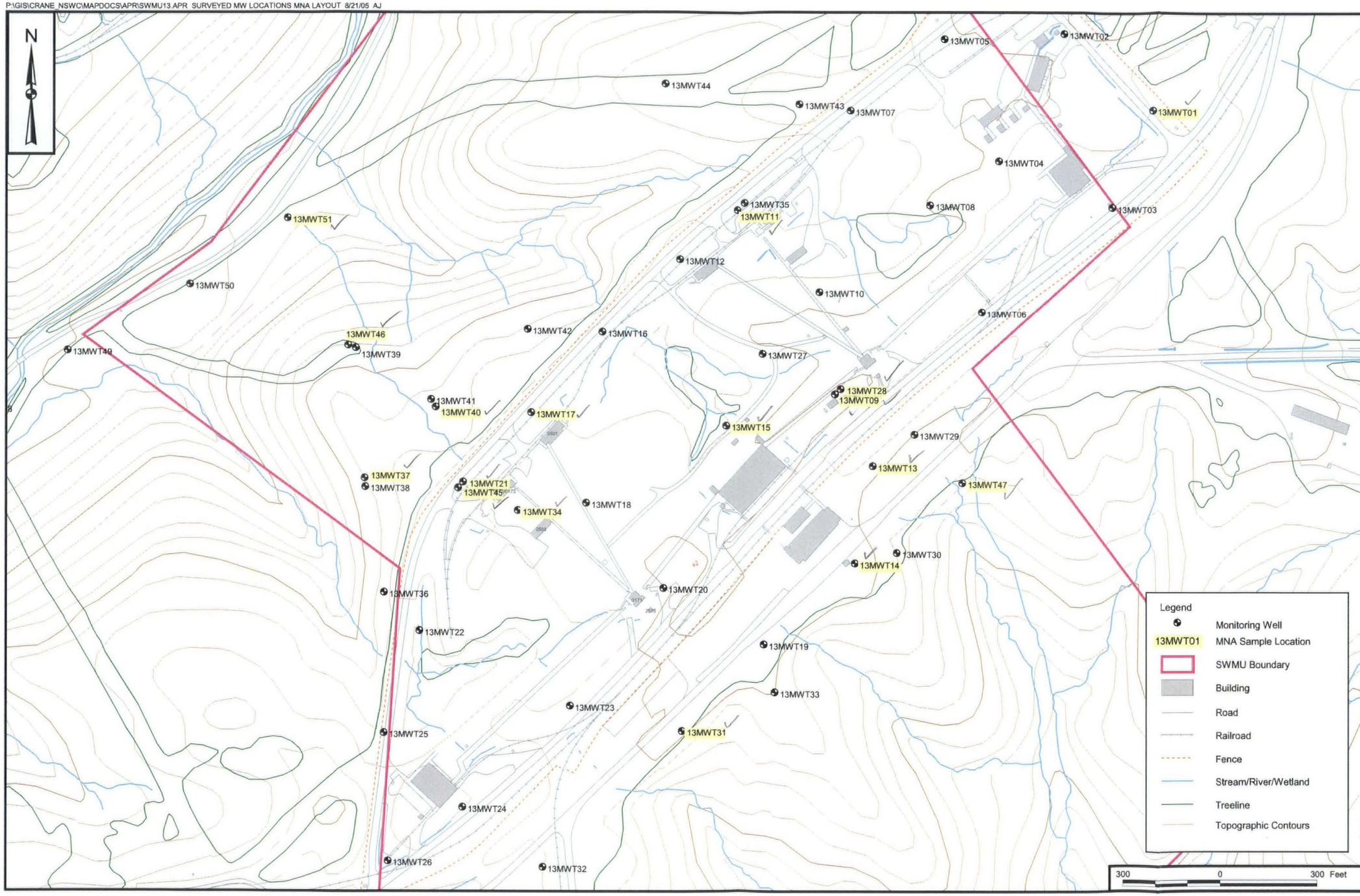
TABLE 2-2

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 13 - MINE FILL B
ROUND 4
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction		
	Explosives		Miscellaneous
	Nitroaromatics and Nitramines SW-846 8330	RDX Degradation Products SW-846 8330, Modified	Nitrate + Nitrite (as N) EPA 353.2
Groundwater (Round 4)			
13GWT0104	X	X	X
13GWT0905	X	X	X
13GWT1104	X	X	X
13GWT1304	X	X	X
13GWT1404	X	X	X
13GWT1504	X	X	X
13GWT1704	X	X	X
13GWT2104	X	X	X
13GWT2803	X	X	X
13GWT3103	X	X	X
13GWT3403	X	X	X
13GWT3703	X	X	X
13GWT4003	X	X	X
13GWT4503	X	X	X
13GWT4603	X	X	X
13GWT4703	X	X	X
13GWT5102	X	X	X
GW TOTALS	**17**	**17**	**17**
Surface Water (Round 4)			
13SW1103	X		
13SW1403	X		
13SW1503	X		
13SW1603	X		
13SW1902	X		
13SW2002	X		
13SW2203	X		
13SW3003	X		
SW TOTALS	**8**	**0**	**0**

X = indicates the sample was 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

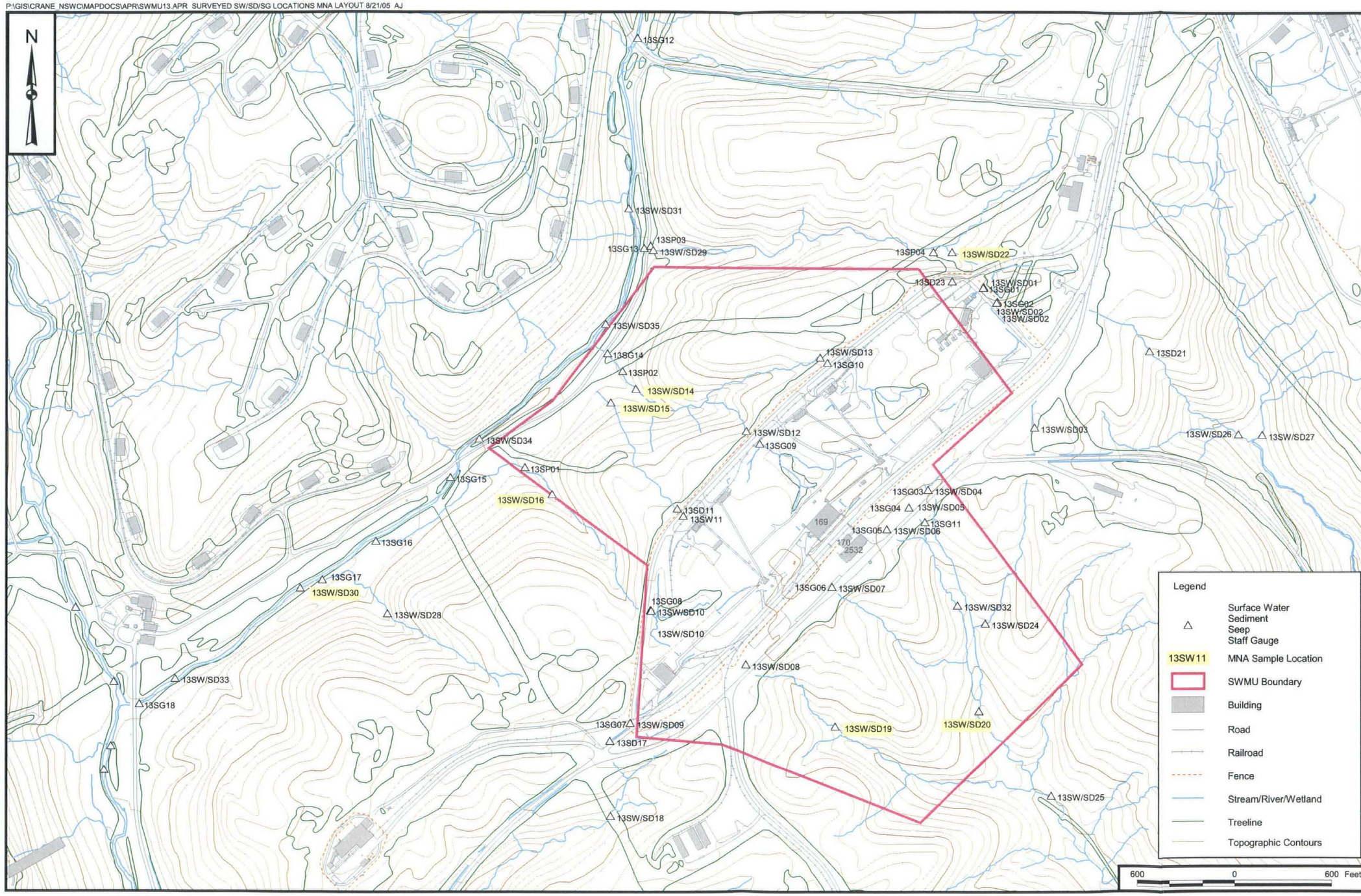
DRAWN BY C. FOSTER DATE 12/29/04

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 8/21/05 AJ



CONTRACT NO. 7448

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 C. FOSTER	DATE 12/29/04	CHECKED BY J. LUCAS	DATE 8/22/05
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 4 at SMWU 13. Analytical results for Rounds 1 through 3 are also provided in this section 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 4.

3.1 GROUNDWATER DATA

Groundwater analytical results for Rounds 1 through 4 at SWMU 13 are presented in Tables 3-1 and 3-2 for select monitoring well locations 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 have completed four rounds of sampling at the time of this report.

3.1.1 Upper Pennsylvania Water Bearing Zone (Puz)

In the Upper Pennsylvania Water Bearing Zone (Puz) (see Table 3-1), the monitoring results through Round 4 indicate positive detections of explosives and explosive degradation products at wells 13MWT09, 13MWT11, 13MWT13, 13MWT14, 13MWT17, 13MWT21, 13MWT31, 13MWT34, 13MWT37, 13MWT40, and 13MWT51. The monitoring wells showing the most detections for RDX, other explosive parameters, and RDX degradation products are wells 13MWT09, 13MWT11, and 13MWT21.

The most frequently detected explosive is RDX with concentrations ranging from 0.3 µg/L at 13MWT01 to 7,700 µg/L at 13MWT21. High RDX concentrations have also occurred at wells 13MWT09 (1,700 µg/L) and 13MWT37 (2,100 µg/L). Other explosives detected include HMX at wells 13MWT09 (140 µg/L), 13MWT11 (68 µg/L), 13MWT17 (140 µg/L), 13MWT21 (640 µg/L), 13MWT37 (110 µg/L), 13MWT40 (270 µg/L), and 13MWT51 (120 µg/L), 2,4,6-trinitrotoluene (TNT) at wells 1MWT09 (25 µg/L), 13MWT11 (44 µg/L), and 13MWT21 (69 µg/L), and 2-amino-4,6-dinitrotoluene at wells 13MWT09 (15 µg/L) and 13MWT11 (12.0 µg/L).

RDX degradations products (DNX, MNX, and TNX) were detected at wells 13MWT09, 13MWT11, 13MWT13, 13MWT14, 13MWT17, 13MWT21, 13MWT31, 13MWT34, 13MWT37, 13MWT40, and 13MWT51. Through Round 4, there have been no positive detections of explosives or RDX degradation

products at wells 13MWT15, 13MWT46, and 13MWT47. A summary of descriptive statistics for Round 4 groundwater samples for the Puz is presented in Table 3-2.

3.1.2 Lower Pennsylvania Water Bearing Zone (Plz)

In the Lower Pennsylvanian Water Bearing Zone (Plz) (see Table 3-3), the monitoring results through Round 4 only show one positive detection of the explosives 3-nitrotoluene (0.34 µg/L) in Round 1. There have been no positive detections of RDX degradation products at wells 13MWT28 and 13MWT45. A summary of descriptive statistics for Round 4 groundwater samples for the Plz wells is given in Table 3-4.

3.2 SURFACE WATER DATA

Surface water analytical results for Rounds 1 through 4 are presented in Table 3-5. Only one sample (13SW1104) could not be collected in Round 4 due to dry conditions. Table 3-5 presents a summary listing of concentrations for target explosives, explosive degradation products, and miscellaneous field parameters.

Monitoring results through Round 4 indicate positive detections of explosives and RDX degradation products at locations 13SW11, 13SW14, 13SW15, 13SW16, 13SW19, 13SW20, 13SW22, and 13SW30. The locations showing the largest number of positive detections include 13SW11, 13SW14, and 13SW16.

Through Round 4, RDX and HMX are the most frequently detected explosives. RDX has been detected at all surface water locations with concentrations ranging from 0.38 µg/L at 13SW/SD20 to 5,500 µg/L at 13SW/SD11. High RDX concentrations have also been detected at 13SW/SD15 (1,500 and 1,000 µg/L). Concentrations of RDX degradation products are highest at 13SW/SD11 and 13SW/SD15 where RDX concentrations are also highest. RDX degradation products have been detected at all surface water locations with the exception of locations 13SW19, 13SW20, and 13SW22. HMX has been detected at all surface water locations with the exception of 13SW20. The highest HMX concentrations have been detected at 13SW11 (730 µg/L) and 13SW15 (210 µg/L).

A summary of descriptive statistics for Round 4 surface water samples is presented in Table 3-6.

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 13 GROUNDWATER
ROUNDS 1 THROUGH 4
UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION	13MWT01									13MWT09									13MWT11							
SAMPLING ROUND	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08
DATE	04/26/03	11/23/03	8/1/04	1/23/05						4/28/03	12/4/03	7/31/04	2/1/05						4/27/03	11/20/03	7/23/04	1/23/05				
PARAMETER																										
Energetics (ug/L)																										
1,3,5-TRINITROBENZENE	0.47 U	0.263 U	0.25 U	0.264 U						0.215 U	1.3	1.1	0.94						0.43 U	0.258 U	0.27 U	0.269 U				
1,3-DINITROBENZENE	0.47 U	0.263 U	0.25 U	0.264 U						1.4	2.4	2.1	2.2						0.83 J	0.258 U	0.46 J	1.2				
2,4,6-TRINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.264 U						19	25	24	22						31	9.5	11	44				
2,4-DIAMINO-6-NITROTOLUENE		0.263 U		0.264 U							3.9		2.5 R							1.4		1.6 R				
2,4-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.264 U						0.215 U	0.253 U	1.4 J	0.25 U						0.43 U	1.2	1.6	4				
2,6-DIAMINO-4-NITROTOLUENE		0.263 U		0.264 U							0.253 U		0.25 U							1.8		0.269 U				
2,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.264 U							9.9	8.8	0.25 U						0.43 U	1.2	2.1	5.7 J				
2-AMINO-4,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.264 U						8.6	13	15	13.0 J						6	4.4	6.6	12 J				
2-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.264 U						0.215 U	0.235 U	0.24 U	2.2 J						0.43 U	0.258 U	0.27 U	0269 U				
3-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.264 U						0.215 U	0.235 U	0.24 U	0.25 U						0.43 U	0.258 U	0.27 U	0.45 R				
4-AMINO-2,6-DINITROTOLUENE	0.47 U	0.263 U	0.25 U	0.264 U						18	18	19	18						19	9.8	14	27				
4-NITROTOLUENE	0.47 U	0.263 U	0.25 U	0.264 U						0.215 U	0.235 U	0.24 U	0.25 U						0.43 U	0.258 U	0.27 U	0.269 U				
DNX		0.263 U		0.264 U							4 J		0.27 R							0.258 U		0.269 U				
HMX	1	1	1.3	0.88						84	130	140	99						34	44	45	68				
MNX		0.263 U		0.264 U							7.1 J		4.2							1.2		0.74 J				
RDX	0.44 U	0.35 J	0.3 J	0.37 J						1100	1700	1500	1200						560	520	490	830				
TNX		0.263 U		0.264 U							1.5 J		1.3 J							0.258 U		0.269 U				
Field Parameters (as indicated)																										
DISSOLVED OXYGEN	1.28	1.4	4.2	0.81							1.5	0.2	0.74							1.5	4.95	0.71				
OXIDATION REDUCTION POTENTIAL (MV)	220	385.4	461.2	295						205.6	251	88.1	29.9						265	355	127	284				
PH (S.U.)	4.68	4.17	3.57	3.98						5.36	5.32	6.27	5.49						3.64		3.85	3.8				
SPECIFIC CONDUCTANCE (MS/CM)	0.229	0.233	0.255	0.192						0.829	0.64	0.773	0.57						0.251	3.93	0.262	0.222				
TEMPERATURE (C)	12.59	17.04	18.75	9.98						13.33	12.82	18.15	12.15						15.73	0.238	21.2	10.8				
TURBIDITY (NTU)	3.8	4.4	9.5	3						3	4.1	3.8	1.6						10	16.4	2.5	10				
Miscellaneous Parameters (mg/L)																										
NITRITE/NITRATE-N	0.07	0.15 J		0.1 J						92	54		77 J						0.02 U	0.19 J		0.1 J				

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 13 GROUNDWATER
ROUNDS 1 THROUGH 4
UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION		13MWT13									13MWT14									13MWT15						
SAMPLING ROUND	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07
DATE		5/7/03	11/25/03	8/1/04	2/2/05						4/29/03	11/24/03	7/27/04	1/25/05						5/6/03	11/23/03	7/29/04	2/3/05			
PARAMETER																										
Energetics (ug/L)																										
1,3,5-TRINITROBENZENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
1,3-DINITROBENZENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
2,4,6-TRINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
2,4-DIAMINO-6-NITROTOLUENE			0.258 U		0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
2,4-DINITROTOLUENE			0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
2,6-DIAMINO-4-NITROTOLUENE			0.258 U		0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
2,6-DINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
2-AMINO-4,6-DINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
2-NITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
3-NITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
4-AMINO-2,6-DINITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
4-NITROTOLUENE		0.37 U	0.258 U	0.24 U	0.245 U						0.345 U	0.25 U	0.25 U	0.242 U						0.485 U	0.258 U	0.25 U	0.238 U			
DNX			0.258 U		0.245 U							0.25 U		0.242 U							0.258 U		0.238 U			
HMX		9.5	12	12	8.4						0.345 U	0.89 J	0.34 J	0.54 J						0.485 U	0.258 U	0.25 U	0.238 U			
MNX			0.258 U		0.245 U							0.25 U		0.242 U							0.258 U		0.238 U			
RDX		12	20	17	18						1.6	4.7	2	2.8						0.485 U	0.258 U	0.25 U	0.238 U			
TNX			0.258 U		0.245 U							0.258 U		0.242 U							0.258 U		0.238 U			
Field Parameters (as indicated)																										
DISSOLVED OXYGEN			11	0.73	5.31								6.74	0.91							0.07	0.53	1.57			
OXIDATION/REDUCTION POTENTIAL (MV)		268.2	385.1	132	392.7						23.2	100.5	71	62.4						286.8	322	6.85	373.3			
PH (S.U.)		4.2	3.56	4.31	3.94						5.5	5.48	6.86	5.58						3.74	3.98	3.26	3.65			
SPECIFIC CONDUCTANCE (MS/CM)		0.106	0.113	0.131	1.01						0.885	0.683	0.714	0.595						0.391	0.34	0.352	0.314			
TEMPERATURE (C)		13.82	12.33	20.61	9.87						14.34	10.8	17.41	14.39						15.89	12.28	15.66	13.29			
TURBIDITY (NTU)		5.8	0.4	0.7	7.2						1.6	0	3	3.3						7.3	45.4	10	8.31			
Miscellaneous Parameters (mg/L)																										
NITRITE/NITRATE-N		1.1	1 J		11 J						0.13	0.05 J		0.025 UJ						0.02 U	0.05 U		0.025 U			

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 13 GROUNDWATER
ROUNDS 1 THROUGH 4
UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION			13MWT17									13MWT21									13MWT31					
SAMPLING ROUND	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06
DATE			5/7/03	11/5/03	7/29/04	1/23/05						4/25/03	11/5/03	7/28/04	1/22/05							11/24/03	7/26/04	2/1/05		
PARAMETER																										
Energetics (ug/L)																										
1,3,5-TRINITROBENZENE			0.43 U	0.25 UJ	0.25 U	0.248 U						0.28 U	1.3 J	0.4 J	0.36 J							0.291 U	0.27 U	0.242 U		
1,3-DINITROBENZENE			0.43 U	0.25 U	0.25 U	0.248 U						0.28 U	1.8 J	0.8	0.78							0.291 U	0.27 U	0.242 U		
2,4,6-TRINITROTOLUENE			0.43 U	0.25 UJ	0.25 U	0.248 U						26 J	69 J	26	24							0.291 U	0.27 U	0.242 U		
2,4-DIAMINO-6-NITROTOLUENE				0.25 U		0.248 U							0.77 J		0.29 R							0.291 U		0.242 U		
2,4-DINITROTOLUENE			0.43 U	0.25 UJ	0.25 U	0.248 U						0.28 U	1.4 J	0.65 J	0.238 U							0.291 U	0.27 U	0.242 U		
2,6-DIAMINO-4-NITROTOLUENE				0.25 UJ		0.248 U							0.24 U		0.238 U							0.291 U		0.242 U		
2,6-DINITROTOLUENE			0.43 U	0.25 UJ	0.25 U	0.248 U						0.28 U	5.8 J	2.8	2.6 J							0.291 U	0.27 U	0.242 U		
2-AMINO-4,6-DINITROTOLUENE			0.43 U	0.28	0.37	0.27 J						0.28 U	0.24 UJ	3.8 J	1.9 J							0.291 U	0.27 U	0.242 U		
2-NITROTOLUENE			0.43 U	0.25 UJ	0.25 U	0.248 U						0.28 U	0.24 UJ	0.24 U	0.238 U							0.291 U	0.37 J	0.242 U		
3-NITROTOLUENE			0.43 U	0.25 UJ	0.25 U	0.248 U						0.28 U	0.24 UJ	0.24 U	0.238 U							0.291 U	0.27 U	0.242 U		
4-AMINO-2,6-DINITROTOLUENE			0.6	0.71	0.84	0.54						0.28 U	0.24 U	2.9 J	3.2							0.291 U	0.27 U	0.242 U		
4-NITROTOLUENE			0.43	0.25 UJ	0.25	0.248 U						0.5 J	0.24 UJ	0.24 U	0.238 U							0.291 U	0.27 U	0.242 U		
DNX				2.2 J		0.41 J							50 J		0.238 U							0.291		0.242 U		
HMX			92J	140	120	100						390	640	460	410							4.5	8.1	7.5		
MNX				11		6.2							9.3 J		3.3 R							0.291 U		0.242 U		
RDX			430	580	490	480						2700	7700	4000	3200							9.3	22	19		
TNX				1.2		0.248 U							1.4 J		0.238 U							0.291 U		0.242 U		
Field Parameters (as indicated)																										
DISSOLVED OXYGEN				0.9	2.01	0.35							1	2.94	1.56								23.4	1.52		
OXIDATION REDUCTION POTENTIAL (MV)			112	338	129.4	4						193.6	247.2	107.3	56.1							246.7	518.6	51.9		
PH (S.U.)			5.35	5.38	5.28	5.4						5.46	5.59	7.32	5.71							5.67	5.39	5.42		
SPECIFIC CONDUCTANCE (MS/CM)			0.17	0.153	0.159	0.118						0.212	0.195	0.298	0.148							0.793	1.444	1228		
TEMPERATURE (C)			15.7	15.97	18.57	11.51						13.01	15.17	20.07	9.15							10.09	15.98	11.08		
TURBIDITY (NTU)			10	3.7	4.1	15						8.2	2.6	4	4							4.7	6.1	5.2		
Miscellaneous Parameters (mg/L)																										
NITRITE/NITRATE-N			0.86	0.65		1.7 J						0.64	1.2		0.81 J							0.13 J		0.06 J		

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 13 GROUNDWATER
ROUNDS 1 THROUGH 4
UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION				13MWT34									13MWT37									13MWT40				
SAMPLING ROUND	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05
DATE					12/4/03	7/29/04	1/23/05							11/6/03	7/30/04	2/2/05							11/5/03	7/30/04	2/2/05	
PARAMETER																										
Energetics (ug/L)																										
1,3,5-TRINITROBENZENE					0.25 U	0.24 U	0.242 U							0.04 U	0.24 U	0.24 U							0.04 U	0.25 U	0.264 U	
1,3-DINITROBENZENE					0.25 U	0.24 U	0.242 U							0.04 U	0.24 U	0.24 U							0.04 U	0.25 U	0.264 U	
2,4,6-TRINITROTOLUENE					0.25 U	0.24 U	0.242 U							0.04 UJ	0.24 U	0.24 U							0.04 UJ	0.25 U	0.264 U	
2,4-DIAMINO-6-NITROTOLUENE					0.25 U		0.242 U							0.26 U		0.24 U							0.26 U		0.264 U	
2,4-DINITROTOLUENE					0.25 U	0.24 U	0.242 U							0.04 UJ	0.24 U	0.24 U							0.04 UJ	0.25 U	0.264 U	
2,6-DIAMINO-4-NITROTOLUENE					0.25 U		0.242 U							0.26 U		0.24 U							0.26 U		0.264 U	
2,6-DINITROTOLUENE					0.25 U	0.24 U	0.242 U							0.04 UJ	0.24 U	0.24 U							0.04 UJ	0.25 U	0.264 U	
2-AMINO-4,6-DINITROTOLUENE					0.25 U	0.24 U	0.242 U							0.04 U	0.24 U	0.24 U							0.04 U	0.25 U	0.264 U	
2-NITROTOLUENE					0.25 U	0.24 U	0.242 U							0.04 UJ	0.24 U	0.24 U							0.04 UJ	0.25 U	0.264 U	
3-NITROTOLUENE					0.25 U	0.24 U	0.242 U							0.04 UJ	0.24 U	0.24 U							0.04 UJ	0.25 U	0.264 U	
4-AMINO-2,6-DINITROTOLUENE					0.29 J	0.26 J	0.242 U							0.04 U	0.5	0.31 J							0.52 J	1.1	0.39 J	
4-NITROTOLUENE					0.25 U	0.24 U	0.242 U							0.04 UJ	0.24 U	0.24 U							0.04 UJ	0.25 U	0.264 U	
DNX					1		0.242 U							1.5		0.47 J							0.9		0.264 U	
HMX					29	28	29							25	140	110							14	22	270	
MNX					4.5		3.3							5.2		6.9							3.3		3.2	
RDX					460	400	440							650	2100	1500							140	230	110	
TNX					0.25 U		0.242 U							0.73		0.24 U							0.26 U		0.264 U	
Field Parameters (as indicated)																										
DISSOLVED OXYGEN					1	13.42	1.3								2.9	4.2								0.39	13.39	
OXIDATION REDUCTION POTENTIAL (MV)					276	149.6	99.9							-144.9	133.5	64.2							100.3	538	168.9	
PH (S.U.)					4.97	5.06	5.05							5.75	6.26	5.65							5.53	5.04	6.51	
SPECIFIC CONDUCTANCE (MS/CM)					0.312	0.347	0.271							0.307	0.174	0.24							0.273	0.329	0.314	
TEMPERATURE (C)					10.94	18.58	12.06							13.32	17.35	10.9							13.28	15.02	11.71	
TURBIDITY (NTU)					6.1	21	5.5							3.2	5	1.3							6.2	1.3	6.5	
Miscellaneous Parameters (mg/L)																										
NITRITE/NITRATE-N					0.3 J		0.24 J							0.28		0.25 J							0.28		0.33 J	

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 13 GROUNDWATER
ROUNDS 1 THROUGH 4
UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION					13MWT47									13MWT51								
SAMPLING ROUND	06	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09
DATE						12/9/03	8/1/04	1/25/05								8/1/04	2/3/05					
PARAMETER																						
Energetics (ug/L)																						
1,3,5-TRINITROBENZENE						0.26 U	0.24 U	0.242 U								0.27 U	0.264 U					
1,3-DINITROBENZENE						0.26 U	0.24 U	0.242 U								0.27 U	0.264 U					
2,4,6-TRINITROTOLUENE						0.26 U	0.24 U	0.242 U								0.27 U	0.264 U					
2,4-DIAMINO-6-NITROTOLUENE						0.26 U		0.242 U									0.264 U					
2,4-DINITROTOLUENE						0.26 U	0.24 U	0.242 U								0.27 U	0.264 U					
2,6-DIAMINO-4-NITROTOLUENE						0.26 U		0.242 U									0.264 U					
2,6-DINITROTOLUENE						0.26 U	0.24 U	0.242 U								0.27 U	0.264 U					
2-AMINO-4,6-DINITROTOLUENE						0.26 U	0.24 U	0.242 U								0.39 J	0.264 U					
2-NITROTOLUENE						0.26 U	0.24 U	0.242 U								0.27 U	0.264 U					
3-NITROTOLUENE						0.26 U	0.24 U	0.242 U								0.27 U	0.264 U					
4-AMINO-2,6-DINITROTOLUENE						0.26 U	0.24 U	0.242 U								0.27 U	0.5 J					
4-NITROTOLUENE						0.26 U	0.24 U	0.242 U								0.27 U	0.264 U					
DNX						0.26 U		0.242 U									0.64 J					
HMX						0.26 U	0.24 U	0.242 U								120	69					
MNX						0.26 U		0.242 U									9.3					
RDX						0.26 U	0.24 U	0.242 U								250	320					
TNX						0.278 U		0.242 U									0.91 J					
Field Parameters (as indicated)																						
DISSOLVED OXYGEN							0.51	0.81								8.32	10.19					
OXIDATION REDUCTION POTENTIAL (MV)						409.9	181.2	353.3								299	254.4					
PH (S.U.)						3.46	3.4	3.63								5.94	6.2					
SPECIFIC CONDUCTANCE (MS/CM)						1634	1.056	0.673								0.278	0.14					
TEMPERATURE (C)						12.42	18.41	8.87								20.57	5.07					
TURBIDITY (NTU)						5.4	7	10								33	9.7					
Miscellaneous Parameters (mg/L)																						
NITRITE/NITRATE-N						0.05 U		0.025 UJ														

Data Validation Qualifiers:

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.

TABLE 3-2

SUMMARY OF DESCRIPTIVE STATISTICS
ROUND 4 GROUNDWATER SAMPLES FROM THE UPPER PENNSYLVANIA WATER BEARING ZONE
SWMU 13 (MINE FILL B)
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	2/14	0.36 J	0.94	0.238 - 0.269	0.200	0.650	13GWT0905
1,3-DINITROBENZENE	3/14	0.78	2.2	0.238 - 0.264	0.396	1.39	13GWT0905
2,4,6-TRINITROTOLUENE	3/14	22	44	0.238 - 0.264	6.53	30.0	13GWT1104
2,4-DIAMINO-6-NITROTOLUENE	0/11	---	---	0.238 - 0.264	0.124	---	---
2,4-DINITROTOLUENE	1/14	4	4	0.238 - 0.264	0.401	4.00	13GWT1104
2,6-DIAMINO-4-NITROTOLUENE	0/14	---	---	0.238 - 0.269	0.125	---	---
2,6-DINITROTOLUENE	2/14	2.6 J	5.7 J	0.238 - 0.264	0.699	4.15	13GWT1104
2-AMINO-4,6-DINITROTOLUENE	4/14	0.27 J	13 J	0.238 - 0.264	2.03	6.79	13GWT0905
2-NITROTOLUENE	0/14	---	---	0.238 - 0.269	0.125	---	---
3,5-DINITROANILINE	1/14	2.2 J	2.2 J	0.238 - 0.269	0.273	2.20	13GWT0905
3-NITROTOLUENE	0/13	---	---	0.238 - 0.264	0.124	---	---
4-AMINO-2,6-DINITROTOLUENE	7/14	0.31 J	27	0.238 - 0.264	3.63	7.13	13GWT1104
4-NITROTOLUENE	0/14	---	---	0.238 - 0.269	0.125	---	---
DNX	3/13	0.41 J	0.64 J	0.238 - 0.269	0.213	0.507	13GWT5102
HMX	12/14	0.54 J	410	0.238 - 0.242	83.8	97.7	13GWT2104
MNX	7/13	0.74 J	9.3	0.238 - 0.264	2.66	4.83	13GWT5102
NITROBENZENE	0/14	---	---	0.238 - 0.269	0.125	---	---
RDX	12/14	0.37 J	3200	0.238 - 0.242	580	677	13GWT2104
TETRYL	0/14	---	---	0.238 - 0.269	0.125	---	---
TNX	2/14	0.91 J	1.3 J	0.238 - 0.269	0.264	1.11	13GWT0905
Field Parameters							
DISSOLVED OXYGEN (mg/L)	14/14	0.35	13.39	---	3.10	3.10	13GWT4003
OXIDATION REDUCTION POTENTIAL (MV)	14/14	4	392.7	---	178	178	13GWT1304
PH (S.U.)	14/14	3.63	6.51	---	5.00	5.00	13GWT4003
SPECIFIC CONDUCTANCE (MS/CM)	14/14	0.118	1228	---	88.1	88.1	13GWT3103
TEMPERATURE (C)	14/14	5.07	14.39	---	10.8	10.8	13GWT1404
TURBIDITY (NTU)	14/14	1.3	15	---	6.47	6.47	13GWT1704
Miscellaneous Parameters (mg/L)							
NITRITE/NITRATE-N	11/14	0.06 J	77 J	0.025	5.94	7.56	13GWT0905

TABLE 3-3

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 13 GROUNDWATER
ROUNDS 1 THROUGH 4
LOWER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION	13MWT28									13MWT45									13MWT46								
SAMPLING ROUND	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09
DATE		12/7/03	7/31/04	2/1/05							12/28/03	7/29/04	1/23/05							12/9/03	7/30/04	2/2/05					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
1,3-DINITROBENZENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
2,4,6-TRINITROTOLUENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
2,4-DIAMINO-6-NITROTOLUENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U		0.245 U					
2,4-DINITROTOLUENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
2,6-DIAMINO-4-NITROTOLUENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U		0.245 U					
2,6-DINITROTOLUENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
2-AMINO-4,6-DINITROTOLUENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
2-NITROTOLUENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
3-NITROTOLUENE		0.258 U	0.25 U	0.275 U							0.34 J	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
4-AMINO-2,6-DINITROTOLUENE		0.258 U	0.25 U	0.275 U								0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
4-NITROTOLUENE		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
DNX		0.258 U		0.275 U							0.258 U		0.24 U							0.278 U		0.245 U					
HMX		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
MNX		0.258 U		0.275 U							0.258 U		0.24 U							0.278 U		0.245 U					
RDX		0.258 U	0.25 U	0.275 U							0.258 U	0.24 U	0.24 U							0.278 U	0.26 U	0.245 U					
TNX		0.258 U		0.275 U							0.258 U		0.24 U							0.278 U		0.245 U					
Field Parameters (as indicated)																											
DISSOLVED OXYGEN		0.5	0.26	8.87							0.55	7.97	0.56								0.05	1.3					
OXIDATION REDUCTION POTENTIAL (MV)		-34.1	73.5	144.6							55.5	116.5	-48							-32.5	131	-21.4					
PH (S.U.)		9.15	8.08	7.78							8.19	6.78	7.08							6.6	6.25	6.45					
SPECIFIC CONDUCTANCE (MS/CM)		0.495	1.217	0.918							0.357	0.703	0.491							1.021	0.786	0.731					
TEMPERATURE (C)		13.59	17.98	13.87							13.36	25.29	10.13							12.45	14.1	10.45					
TURBIDITY (NTU)		260	65	50							75	19	14							8.7	2.8	1.7					
Miscellaneous Parameters (mg/L)																											
NITRITE/NITRATE-N		0.66 J		0.15 J							0.05 U		0.06 J							0.05 U		0.025 UJ					

Data Validation Qualifiers:

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.

TABLE 3-4

SUMMARY OF DESCRIPTIVE STATISTICS
ROUND 4 GROUNDWATER SAMPLES FROM THE LOWER PENNSYLVANIA WATER BEARING ZONE
SWMU 13 (MINE FILL B)
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	0/3	---	---	0.24 - 0.275	0.127	---	---
1,3-DINITROBENZENE	0/3	---	---	0.24 - 0.275	0.127	---	---
2,4,6-TRINITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
2,4-DIAMINO-6-NITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
2,4-DINITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
2,6-DIAMINO-4-NITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
2,6-DINITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
2-AMINO-4,6-DINITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
2-NITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
3,5-DINITROANILINE	0/3	---	---	0.24 - 0.275	0.127	---	---
3-NITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
4-AMINO-2,6-DINITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
4-NITROTOLUENE	0/3	---	---	0.24 - 0.275	0.127	---	---
DNX	0/3	---	---	0.24 - 0.275	0.127	---	---
HMX	0/3	---	---	0.24 - 0.275	0.127	---	---
MNX	0/3	---	---	0.24 - 0.275	0.127	---	---
NITROBENZENE	0/3	---	---	0.24 - 0.275	0.127	---	---
RDX	0/3	---	---	0.24 - 0.275	0.127	---	---
TETRYL	0/3	---	---	0.24 - 0.275	0.127	---	---
TNX	0/3	---	---	0.24 - 0.275	0.127	---	---
Field Parameters							
DISSOLVED OXYGEN (mg/L)	3/3	0.56	8.87	---	3.58	3.58	13GWT2803
OXIDATION REDUCTION POTENTIAL (MV)	3/3	-48	144.6	---	25.1	25.1	13GWT2803
PH (S.U.)	3/3	6.45	7.78	---	7.10	7.10	13GWT2803
SPECIFIC CONDUCTANCE (MS/CM)	3/3	0.491	0.918	---	0.713	0.713	13GWT2803
TEMPERATURE (C)	3/3	10.13	13.87	---	11.5	11.5	13GWT2803
TURBIDITY (NTU)	3/3	1.65	50	---	21.9	21.9	13GWT2803
Miscellaneous Parameters (mg/L)							
NITRITE/NITRATE-N	2/3	0.06 J	0.15 J	0.025	0.0742	0.105	13GWT2803

TABLE 3-5

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SURFACE WATER
SWMU 13 ROUND 4
NSWC CRANE
CRANE, INDIANA

LOCATION	13SW11									13SW14									13SW15							
SAMPLING ROUND	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08
DATE	5/8/03	11/18/03		2/2/05							10/22/03	10/27/04	2/2/05							10/27/03	10/27/04	2/2/05				
PARAMETER																										
Energetics (ug/L)																										
1,3,5-TRINITROBENZENE	0.21 U	0.287 U		0.242 U							0.24 U	0.248 U	0.252 U							0.24 U	0.25 U	0.24 U				
1,3-DINITROBENZENE	0.21 U	0.287 U		0.242 U							0.24 U	0.248 U	0.252 U							0.24 U	0.25 U	0.24 U				
2,4,6-TRINITROTOLUENE	0.21 U	0.287 U		0.242 U							0.24 U	0.42 J	0.252 U							0.24 U	0.25 U	0.24 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							0.24 U	0.248 U	0.252 U							0.24 U	0.25 U	0.24 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							0.24 U	0.248 U	0.252 U							0.24 U	0.25 U	0.24 U				
2-AMINO-4,6-DINITROTOLUENE	0.25 R	0.9 J		0.242 U							1.3 J	1 J	0.252 U							0.24 U	0.26 J	0.24 U				
2-NITROTOLUENE	0.21 U	0.287 U		0.242 U							0.24 U	0.248 U	0.252 U							0.24 U	0.25 U	0.24 U				
3-NITROTOLUENE	0.21 U	0.287 U		0.242 U							0.24 U	0.248 U	0.252 U							0.24 U	0.25 U	0.24 U				
4-AMINO-2,6-DINITROTOLUENE	1 J	4.5 J		0.34 J							2.9	2.5	1.3							0.24 U	0.62	0.29 J				
4-NITROTOLUENE	0.21 U	0.287 U		0.242 U							0.24 U	0.248 U								0.24 U	0.25 U	0.24 U				
DNX		35									2.7 J	0.248 U								23 J	1.8 J					
HMX	93	730		130							20	18	21							210	160	81				
MNX		72									3.8 J	1.9								47	22					
RDX	610	5500		1100							77	97	60							1500	1000	390				
TNX		4									0.62 J	0.248 U								4	0.745					
Field Parameters (as indicated)																										
DISSOLVED OXYGEN	4.35	4.99		12.46							5.93	10.3	13.8							10.59	11.97	13.38				
OXIDATION REDUCTION POTENTIAL (MV)	152.9	216		282							224.7	81.7	178							290.5	101.4	195				
PH (S.U.)	7.67	6.9		7.76							7.33	7.45	7.91							7.43	7.41	8.13				
SPECIFIC CONDUCTANCE (MS/CM)	2.743	1.024		1.439							0.365	0.702	0.278							0.251	0.361	0.132				
TEMPERATURE (C)	16.45	15.2		2.72							12.14	14.69	2.88							8.93	14.22	2.44				
TURBIDITY (NTU)	85	242		7.6							4.4	12.8	4.1							10.4	23.8	85				
Miscellaneous Parameters (mg/L)																										
NITRITE/NITRATE-N	23	8.5 J									0.54 J	7.4								0.14	0.34					

TABLE 3-5

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SURFACE WATER
SWMU 13 ROUND 4
NSWC CRANE
CRANE, INDIANA

LOCATION	13SW16										13SW19									13SW20							
SAMPLING ROUND	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08
DATE			10/22/03	10/27/04	2/2/05							10/23/03		2/2/05							10/23/03		2/2/05				
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE			0.25 U	0.24 U	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
1,3-DINITROBENZENE			0.25 U	0.24 U	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
2,4,6-TRINITROTOLUENE			0.25 U	0.24 U	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
2,4-DIAMINO-6-NITROTOLUENE			0.25 U	0.24 U	0.24 U							0.24 U									0.27 U						
2,4-DINITROTOLUENE			0.25 U	0.24 U	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
2,6-DIAMINO-4-NITROTOLUENE			0.25 U	0.24 U	0.24 U							0.24 U									0.27 U						
2,6-DINITROTOLUENE			0.25 U	0.24 U	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
2-AMINO-4,6-DINITROTOLUENE			0.8 J	0.35 J	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
2-NITROTOLUENE			0.25 U	0.24 U	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
3-NITROTOLUENE			0.29 J	0.24 U	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
4-AMINO-2,6-DINITROTOLUENE			1.6	0.83	0.37 J							0.24 U		0.264 U							0.27 U		0.24 U				
4-NITROTOLUENE			0.25 U	0.24 U	0.24 U							0.24 U		0.264 U							0.27 U		0.24 U				
DNX			3.6 J	0.24 U								0.24 U									0.27 U						
HMX			21	15	13							0.24 U		0.54							0.27 U		0.24 U				
MNX			3	1.2								0.24 U									0.27 U						
RDX			50	43	29							0.24 U		0.92							0.46 J		0.38 J				
TNX			0.48 J	0.24 U								0.24 U									0.27 U						
Field Parameters (as indicated)																											
DISSOLVED OXYGEN			8.48	11.63	13.88							6.03		13.12							4.9		13.25				
OXIDATION REDUCTION POTENTIAL (MV)			213.7	71.5	188							203.5		220							158.3		205.0				
PH (S.U.)			7.17	7.61	8.29							7.25		7.9							7.75		8.17				
SPECIFIC CONDUCTANCE (MS/CM)			0.254	0.297	0.106							0.566		0.236							0.3		0.154				
TEMPERATURE (C)			12.18	14.56	1.43							11.69		2.64							13.22		2.24				
TURBIDITY (NTU)			6.5	12.7	10							1.9		36							6.3		6.1				
Miscellaneous Parameters (mg/L)																											
NITRITE/NITRATE-N			0.66 J	1.3								0.13 U									0.11 U						

TABLE 3-5

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SURFACE WATER
SWMU 13 ROUND 4
NSWC CRANE
CRANE, INDIANA

LOCATION		13SW22									13SW30								
SAMPLING ROUND	09	01	02	03	04	05	06	07	08	09	01	02	03	04	05	06	07	08	09
DATE			10/22/03	10/27/04	2/2/05							10/22/03	10/26/04	2/2/05					
PARAMETER																			
Energetics (ug/L)																			
1,3,5-TRINITROBENZENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
1,3-DINITROBENZENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
2,4,6-TRINITROTOLUENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
2,4-DIAMINO-6-NITROTOLUENE			0.26 U									0.25 U	0.24 U	0.252 U					
2,4-DINITROTOLUENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
2,6-DIAMINO-4-NITROTOLUENE			0.26 U									0.25 U	0.24 U	0.252 U					
2,6-DINITROTOLUENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
2-AMINO-4,6-DINITROTOLUENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
2-NITROTOLUENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
3-NITROTOLUENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
4-AMINO-2,6-DINITROTOLUENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
4-NITROTOLUENE			0.26 U		0.266 U							0.25 U	0.24 U	0.252 U					
DNX			0.26 U									0.25 U	0.24 U						
HMX			0.26 U		0.36 J							3.2 J	0.24 U	2					
MNX			0.26 U									0.28 J	0.31 J						
RDX			1.6		1.1							6.2	9.9	6					
TNX			0.26 U									0.25 U	0.24 U						
Field Parameters (as indicated)																			
DISSOLVED OXYGEN			3.7	10.84	8.25							9.63	9.44	14.1					
OXIDATION REDUCTION POTENTIAL (MV)			264.7	74.1	139							222.1	39.4	201					
PH (S.U.)			7.02	7.7	8.18							7.84	7.52	8.07					
SPECIFIC CONDUCTANCE (MS/CM)			0.434	0.205	0.151							0.395	0.359	0.168					
TEMPERATURE (C)			13.65	15.14	2.02							13.09	14.39	1.63					
TURBIDITY (NTU)			1.5	21.3	3.1							2.6	5.7	4.5					
Miscellaneous Parameters (mg/L)																			
NITRITE/NITRATE-N			0.025 U									0.025 U	0.26						

Data Validation Qualifiers:

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.

TABLE 3-6

SUMMARY OF DESCRIPTIVE STATISTICS
ROUND 4 SURFACE WATER SAMPLES
SWMU 13 (MINE FILL B)
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	0/8	---	---	0.24 - 0.266	0.125	---	---
1,3-DINITROBENZENE	0/8	---	---	0.24 - 0.266	0.125	---	---
2,4,6-TRINITROTOLUENE	0/8	---	---	0.24 - 0.266	0.125	---	---
2,4-DINITROTOLUENE	0/8	---	---	0.24 - 0.266	0.125	---	---
2,6-DINITROTOLUENE	0/8	---	---	0.24 - 0.266	0.125	---	---
2-AMINO-4,6-DINITROTOLUENE	0/8	---	---	0.24 - 0.266	0.125	---	---
2-NITROTOLUENE	0/8	---	---	0.24 - 0.266	0.125	---	---
3-NITROTOLUENE	0/8	---	---	0.24 - 0.266	0.125	---	---
4-AMINO-2,6-DINITROTOLUENE	4/8	0.29 J	1.3	0.24 - 0.266	0.351	0.575	13SW1403
4-NITROTOLUENE	0/8	---	---	0.24 - 0.266	0.125	---	---
HMX	7/8	0.36 J	130	0.24	31.0	35.4	13SW1103
NITROBENZENE	0/8	---	---	0.24 - 0.266	0.125	---	---
RDX	8/8	0.38 J	1100	---	198	198	13SW1103
TETRYL	0/8	---	---	0.24 - 0.266	0.125	---	---
Field Parameters							
DISSOLVED OXYGEN (mg/L)	8/8	8.25	14.1	---	12.8	12.8	13SW3003
OXIDATION REDUCTION POTENTIAL (MV)	8/8	139	282	---	201	201	13SW1103
PH (S.U.)	8/8	7.76	8.29	---	8.05	8.05	13SW1603
SPECIFIC CONDUCTANCE (MS/CM)	8/8	0.106	1.439	---	0.333	0.333	13SW1103
TEMPERATURE (C)	8/8	1.43	2.88	---	2.25	2.25	13SW1403
TURBIDITY (NTU)	8/8	3.1	85	---	19.6	19.6	13SW1503

4.0 DATA EVALUATION

Section 4 presents groundwater and surface monitoring data for Rounds 1 through 4. The information presented includes potentiometric surface contours and temporal plots for each groundwater and surface sampling location included in the SWMU 13 long term monitoring program. The objective of the long term monitoring program at SWMU 13 is to collect nine rounds of monitoring data to determine whether residual explosives are naturally degrading and to 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 RDX, which is the principal chemical of concern, and the degradation products 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, four rounds of groundwater sampling events have been conducted April-May 2003, October-December 2003, July-August 2004, and January-February, 2005. The remaining five rounds of sampling are expected to be completed in 2006 which covers a monitoring period of approximately three years.

- **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 approximately 2 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.** Explosives contamination has been detected in the Upper Pennsylvania aquifer but not the Lower Pennsylvania aquifer at SWMU 13. The long term monitoring program includes monitoring wells located in the Upper and Lower Pennsylvania 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 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 August 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 by-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 Pennsylvania aquifer but not the lower Pennsylvania aquifer at SWMU 13. The long term monitoring program includes monitoring wells located in the Upper and Lower Pennsylvania 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.

- **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 presented 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 by-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 includes the routine indicator parameters dissolved oxygen, oxidation reduction potential, pH, specific conductance, temperature, turbidity, and nitrite/nitrate concentrations. Other parameters that can be used to support decision making includes alkalinity, chloride, nitrite, nitrate, dissolved methane, iron (II) and iron (III), sulfate, sulfide, 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 by-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 by-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). 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 Upper and Lower Pennsylvania Water Bearing Zones:

Upper Pennsylvania Water Bearing Zone Wells

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

Lower Pennsylvania 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 ROUND 4 POTENTIOMETRIC SURFACES

Figures 4-1 and 4-2 show the Round 4 (January 19, 2005) potentiometric surface elevation maps for the Upper and Lower Pennsylvanian water bearing zones, respectively. Groundwater elevations for Rounds 2 and 3 (January and November 2004) are shown in Appendix E.

4.4 GROUNDWATER TEMPORAL PLOT TREND ANALYSIS

Upper Pennsylvanian Water Bearing Zone (Puz)

Figure 4-3 shows temporal plots of RDX and degradation by-product (DNX, MNX, and TNX) groundwater concentrations for Rounds 1 through 4 in the Puz. The temporal plots are arranged in columns by monitoring well location showing concentration trends for RDX followed by the trend for each degradation by-products. All positive hits are shown as a data point on each plot and correspond to data presented in Tables 3-1 and 3-3. Data points are also shown and labeled for cases when "no sample" was collected or when the analytical result was reported as "non-detect".

Through Round 4, RDX has been detected all at MNA monitoring locations with the exception of 13MWT15. Degradation by-products have been detected at all monitoring locations with the exception of 13MWT01, 13MWT13, 13MWT15, 13MWT47. No trend evaluation for groundwater is possible during the early rounds of sampling. However, overall trends will be evaluated after Round 6 and may include a statistical analysis of data.

Lower Pennsylvanian Water Bearing Zone (Plz)

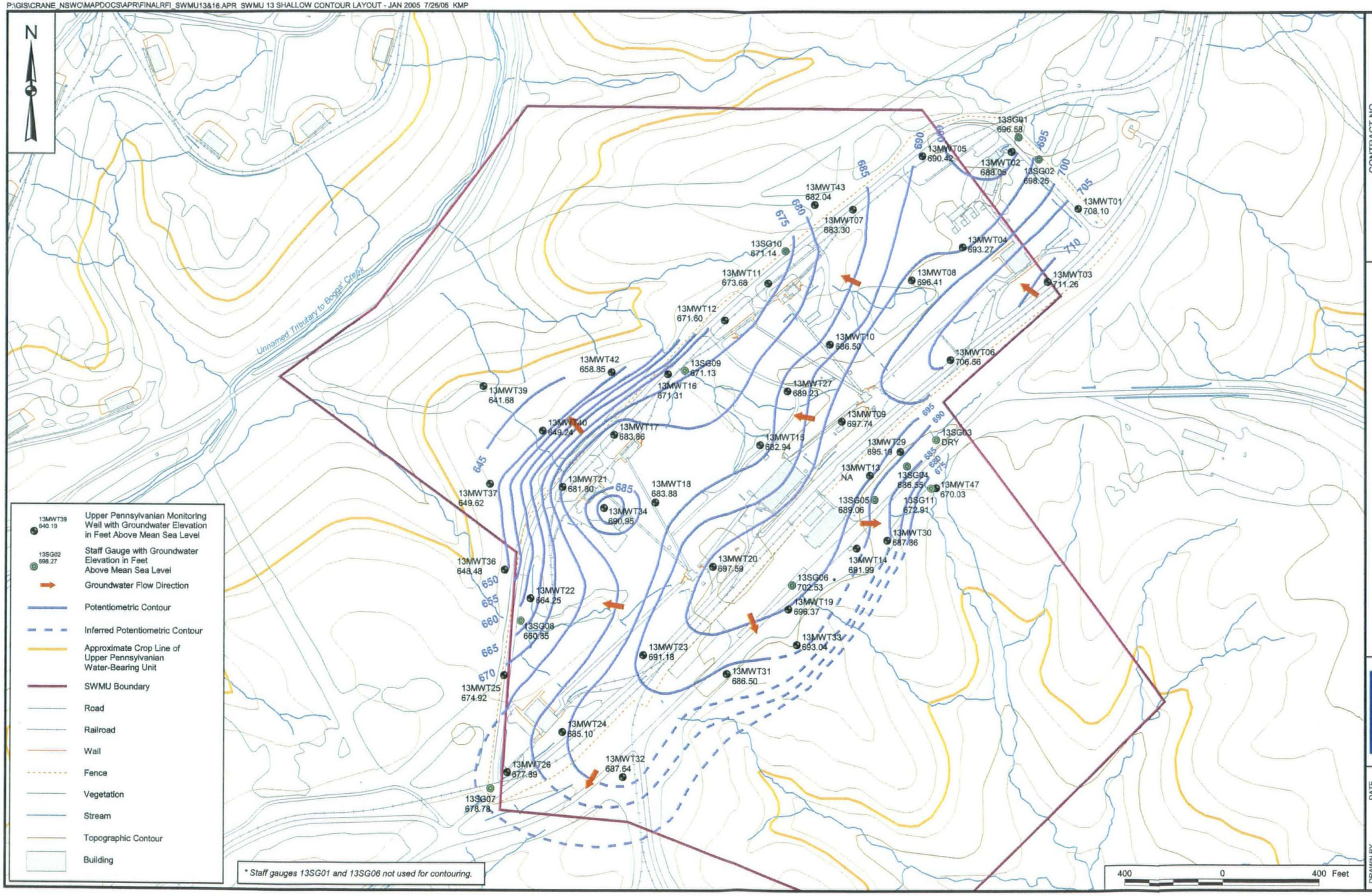
Through Round 4, there have been no positive detections of RDX or degradation by-products in the Plz monitoring wells (13MWT28, 13MWT45, and 13MWT46).

4.5 SURFACE WATER TEMPORAL PLOT TREND ANALYSIS

Figure 4-4 shows temporal plots of explosives and degradation by-product surface water concentrations for Rounds 1 through 4. The temporal plots are arranged in columns by monitoring well location showing concentration trends for RDX followed by the trend for each degradation by-products (DNX, MNX, and TNX). All positive hits are shown as a data point on each plot and correspond to data presented in Table 3-5. Data points are also shown and labeled for cases when "no sample" was collected or when the analytical result was reported as "non-detect".

Through Round 4, RDX and degradation by-products have been detected at all surface water sampling locations with the exception of 13SW19. No significant trend evaluation for groundwater is possible during the early rounds of sampling. However, overall trends will be evaluated after Round 6 and may include a statistical analysis of data.

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINALRFI_SWMU13&16.APR SWMU 13 SHALLOW CONTOUR LAYOUT - JAN 2005 7/26/05 KMP



CONTRACT NO. 7448

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 4 - 1

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE UPPER PENNSYLVANIAN
WATER-BEARING ZONE - JANUARY 19, 2005
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY A. JANOCHA DATE 2/23/04

CHECKED BY J. LUCAS DATE

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINALRFI_SWMU13&16.APR SWMU 13 DEEP CONTOUR LAYOUT - JAN 2005 7/26/05 KMP

CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 4 - 2

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE LOWER PENNSYLVANIAN
WATER-BEARING ZONE - JANUARY 19, 2005
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

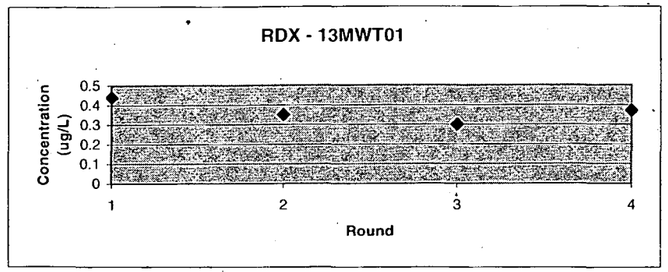
DRAWN BY A. JANOCHA DATE 2/23/04

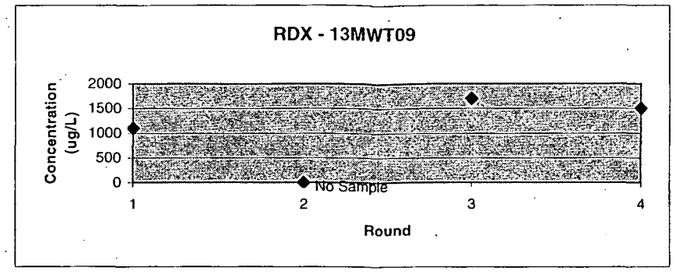
CHECKED BY J. LUCAS DATE ___

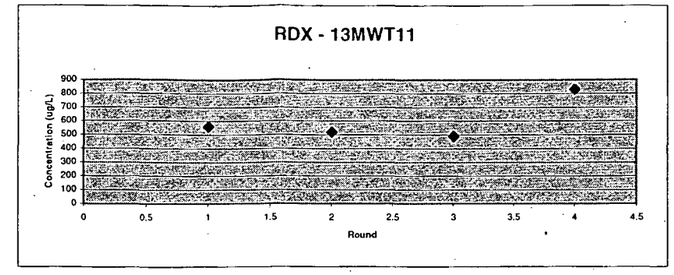
COST/SCHED-AREA ___

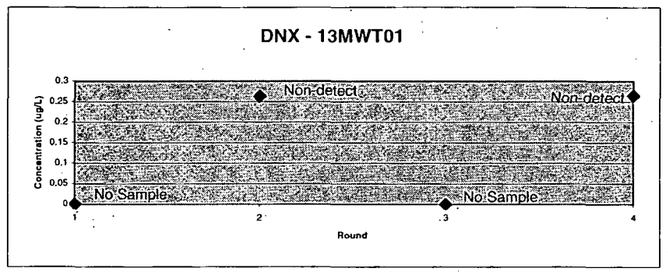
SCALE AS NOTED

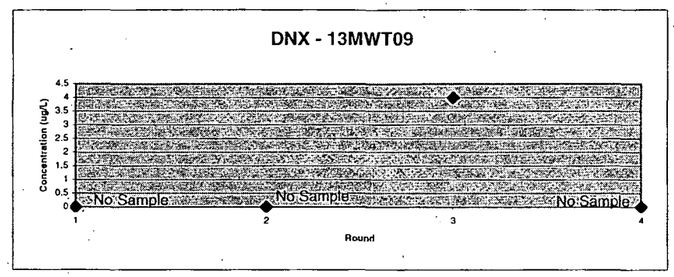
FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT GROUNDWATER CONCENTRATIONS
IN THE UPPER PENNSYLVANIA WATER BEARING ZONE AT SWMU 13 ROUNDS 1 THROUGH ROUND 4
NSWC CRANE, CRANE, INDIANA

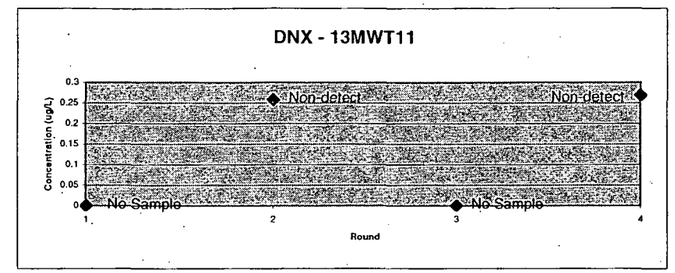


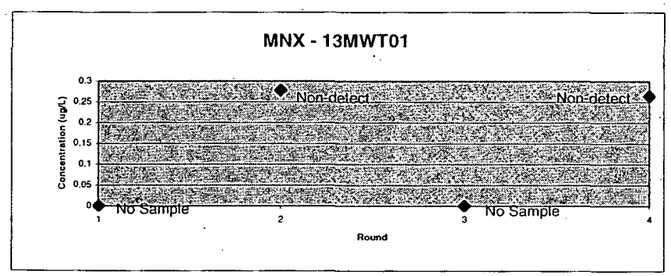


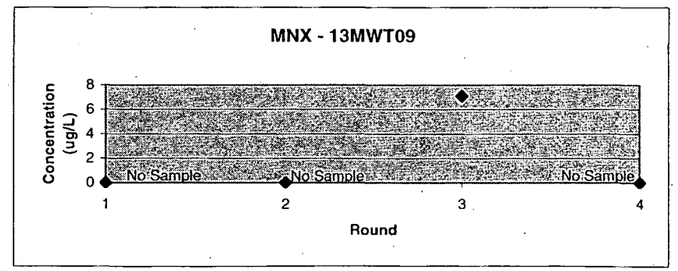


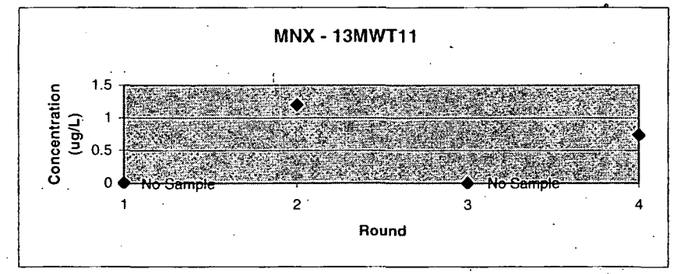


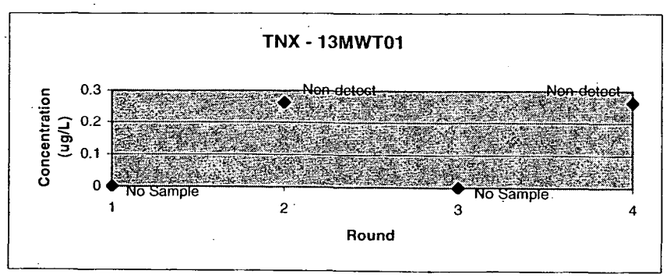


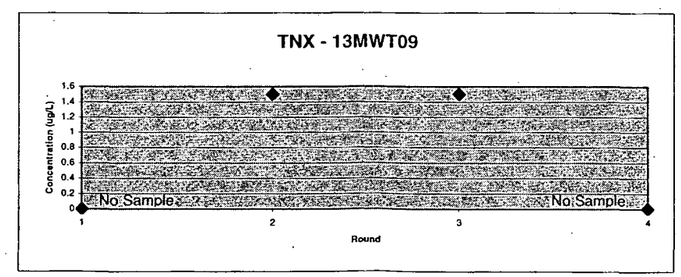












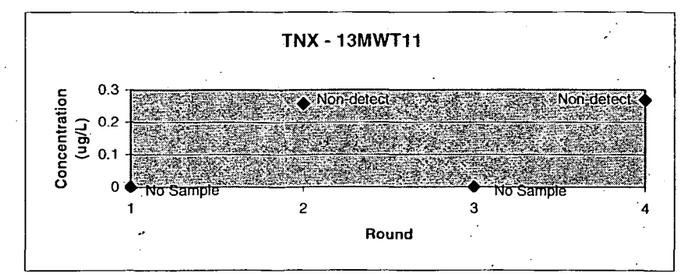
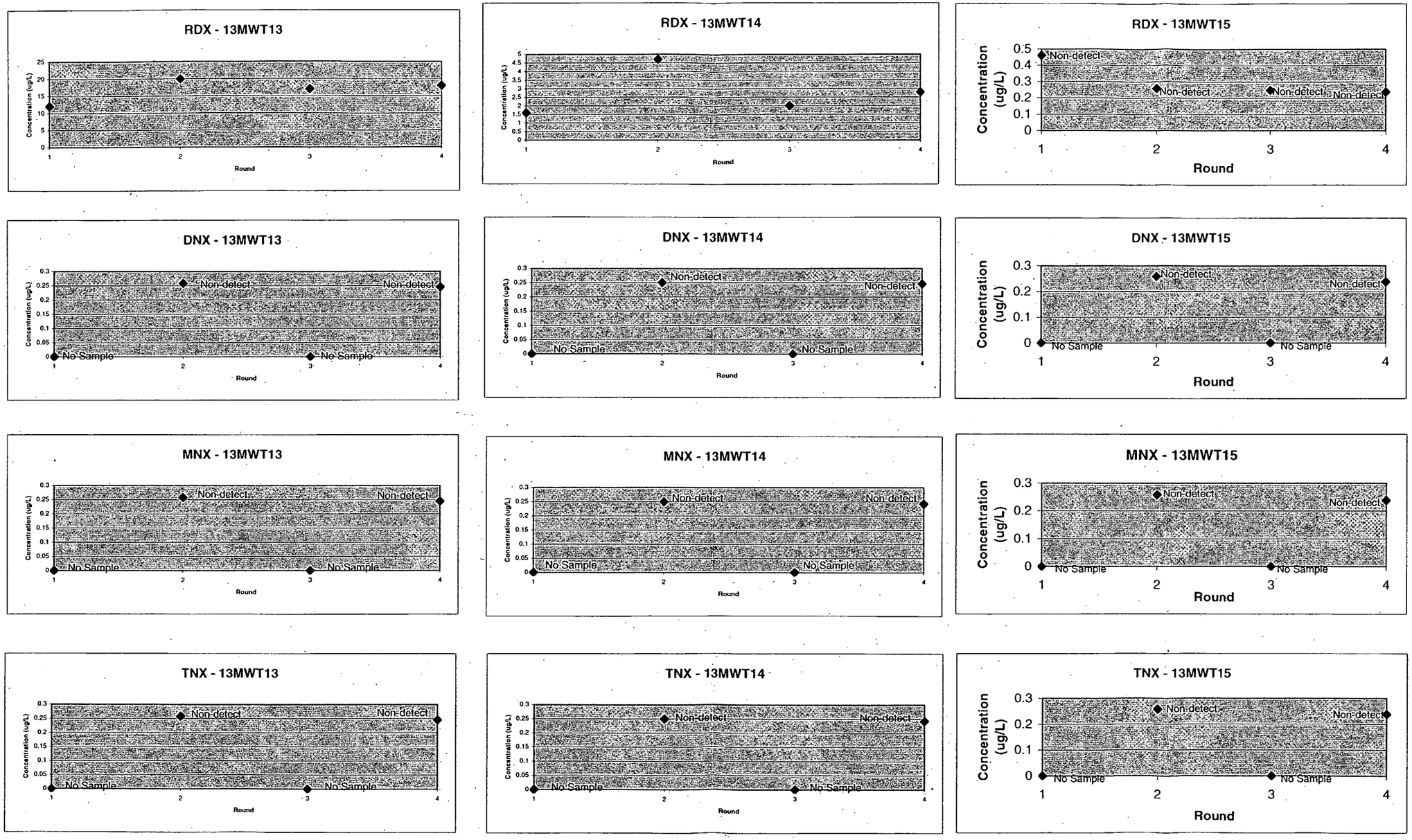


FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT GROUNDWATER CONCENTRATIONS
IN THE UPPER PENNSYLVANIA WATER BEARING ZONE AT SWMU 13 ROUNDS 1 THROUGH ROUND 4
NSWC CRANE, CRANE, INDIANA



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TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT GROUNDWATER CONCENTRATIONS
IN THE UPPER PENNSYLVANIA WATER BEARING ZONE AT SWMU 13 ROUNDS 1 THROUGH ROUND 4
NSWC CRANE, CRANE, INDIANA

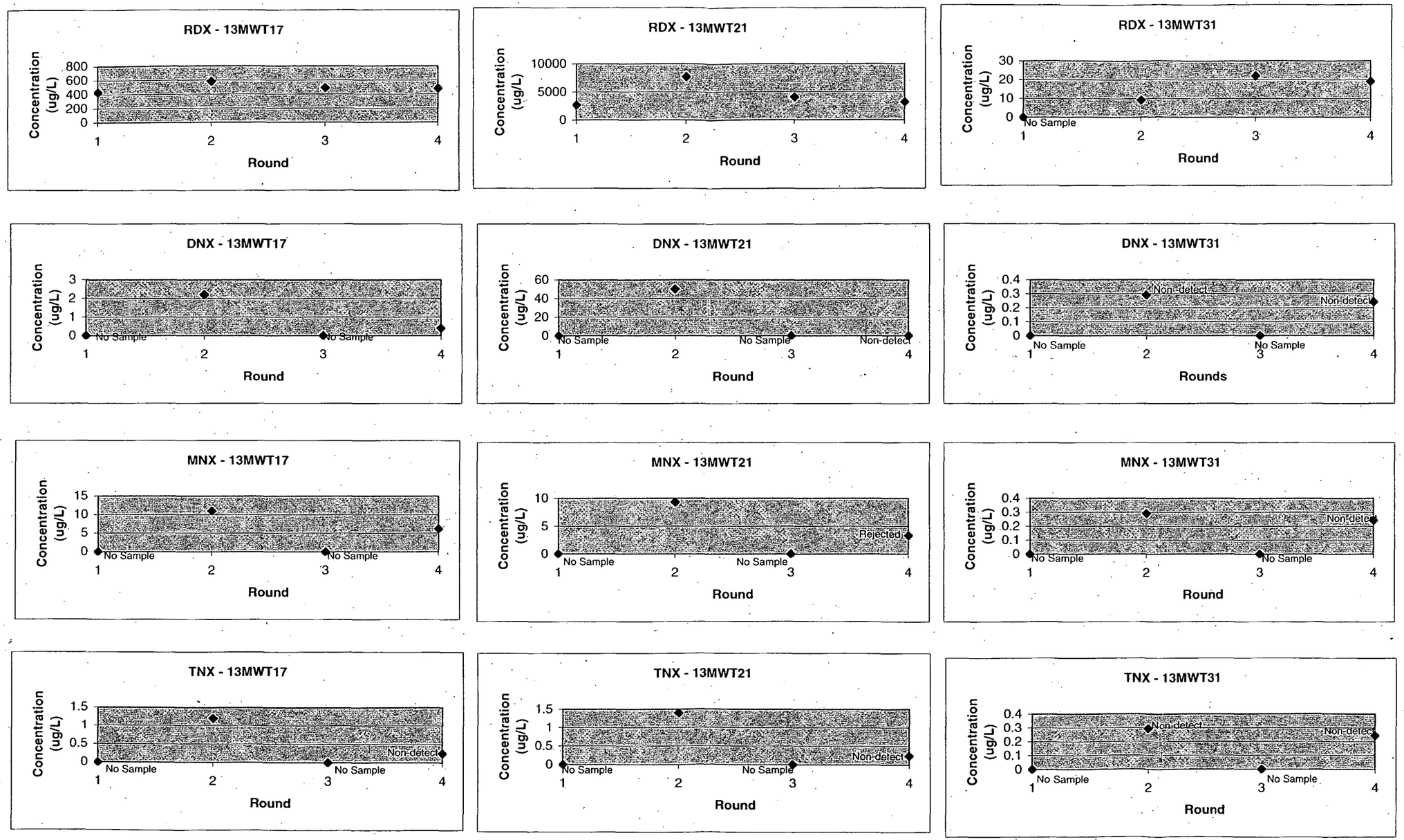


FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT GROUNDWATER CONCENTRATIONS
IN THE UPPER PENNSYLVANIA WATER BEARING ZONE AT SWMU 13 ROUNDS 1 THROUGH ROUND 4
NSWC CRANE, CRANE, INDIANA

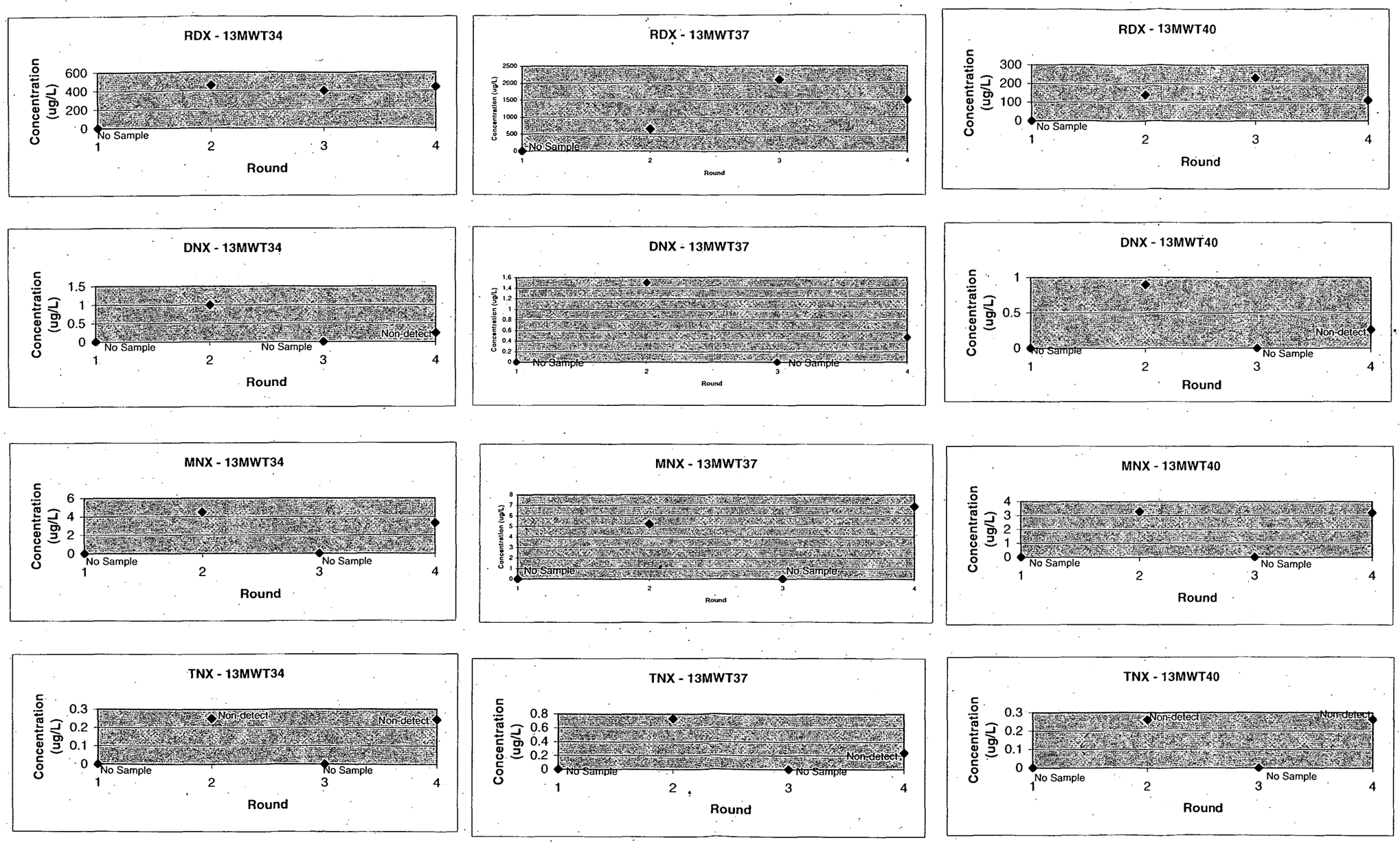
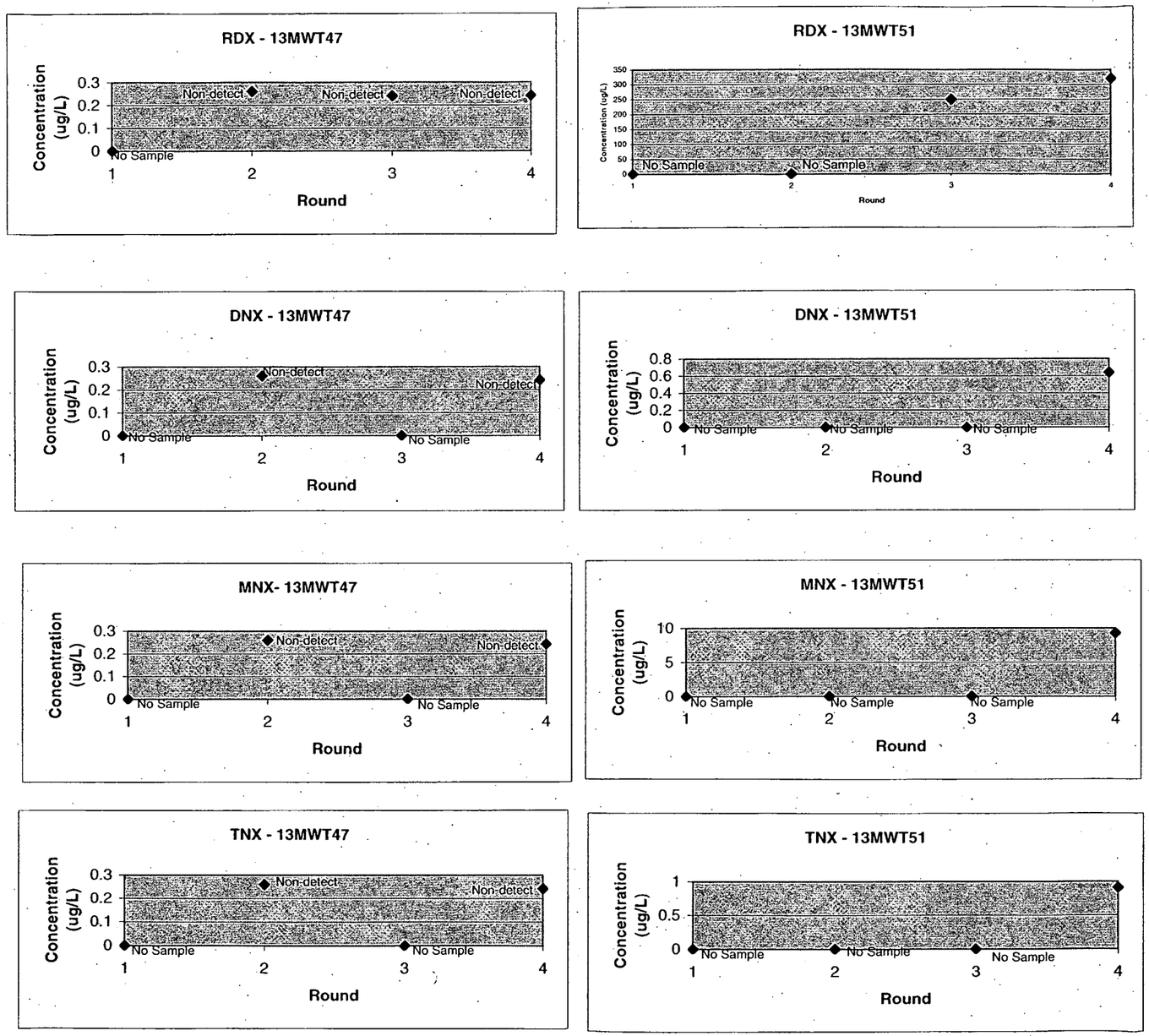


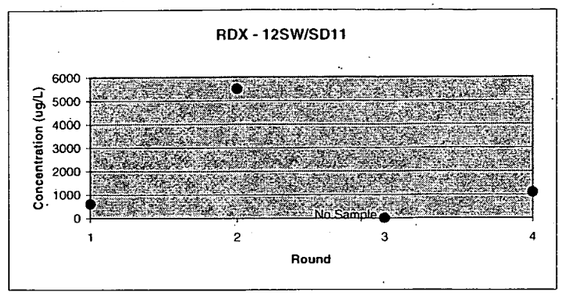
FIGURE 4-3
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT GROUNDWATER CONCENTRATIONS
IN THE UPPER PENNSYLVANIA WATER BEARING ZONE AT SWMU 13 ROUNDS 1 THROUGH ROUND 4
NSWC CRANE, CRANE, INDIANA

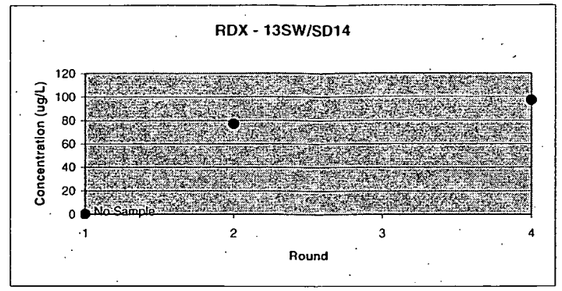


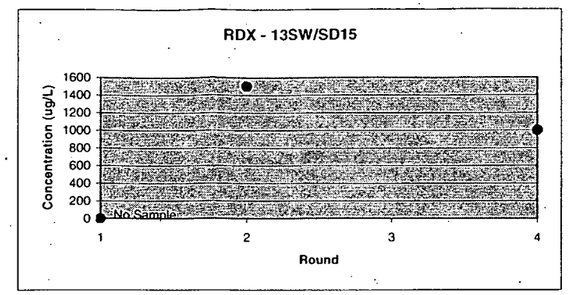
No Sample -This label indicates that no sample was collected to measure this parameter during a round.
Non-detect - This label indicates that the analytical result for a round was reported as non-detect by the laboratory.

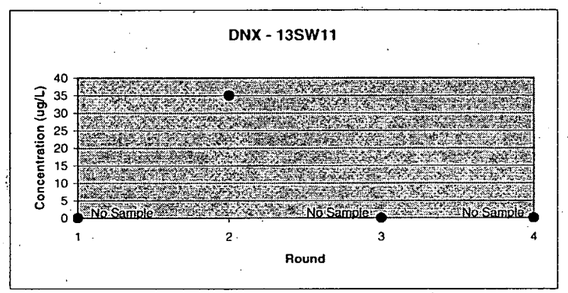
FIGURE 4-4

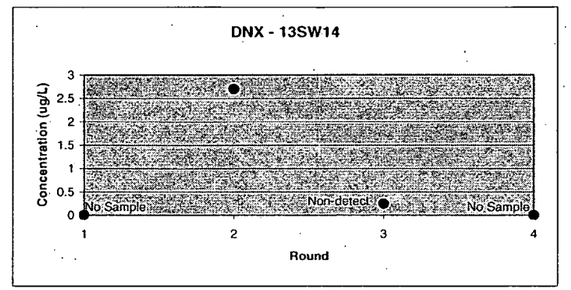
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SMWU 13 ROUNDS 1 THROUGH 4
NSWC CRANE, CRANE, INDIANA
PAGE 1 OF 3

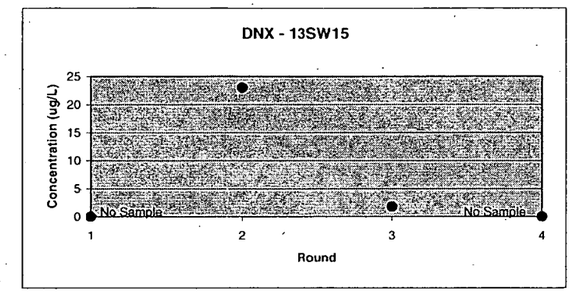


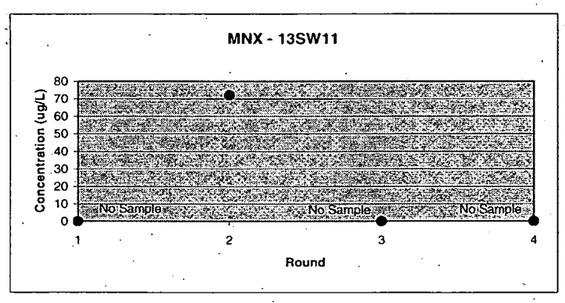


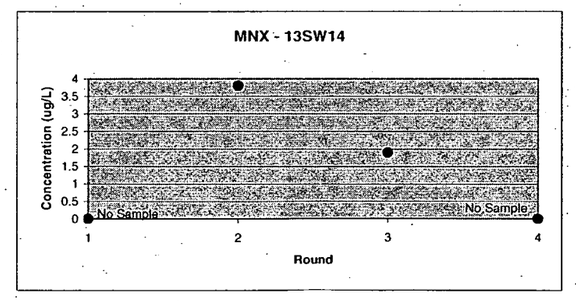


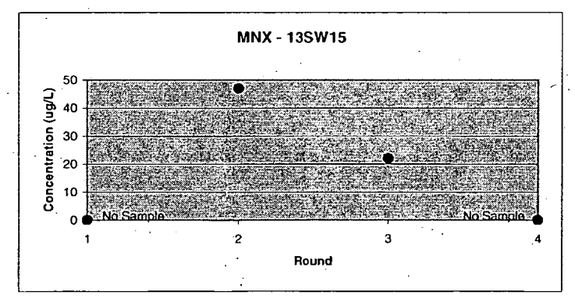


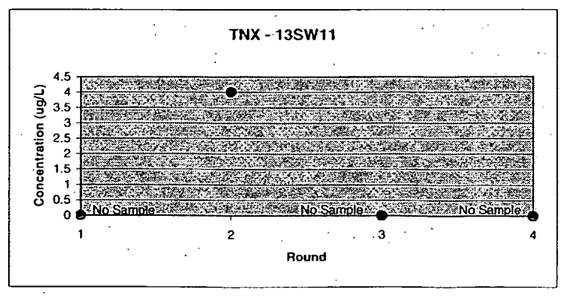


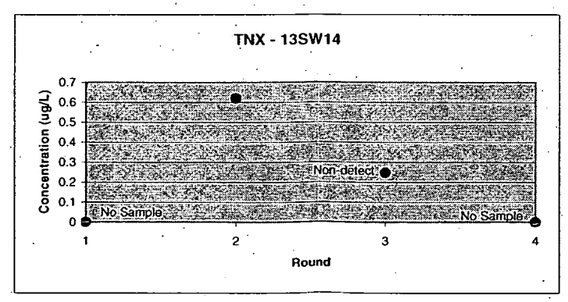












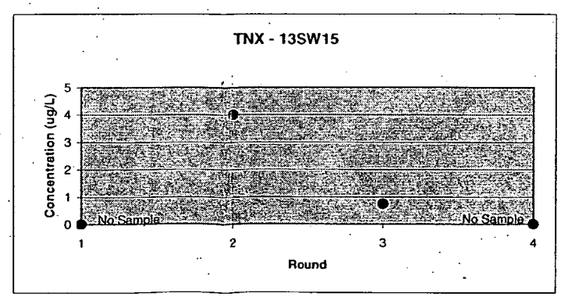
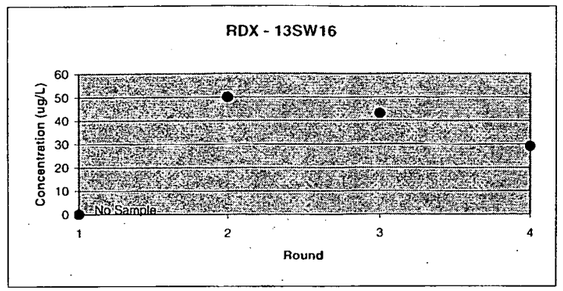
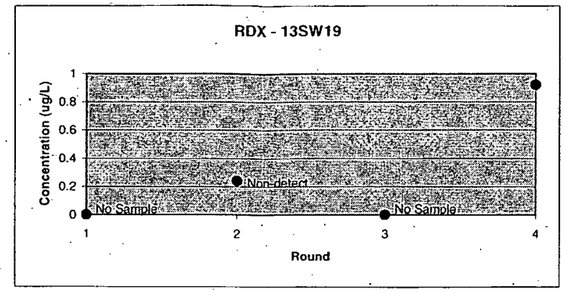
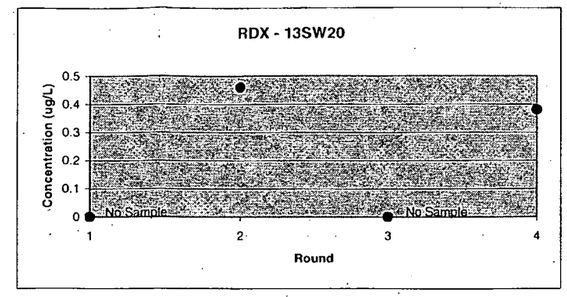


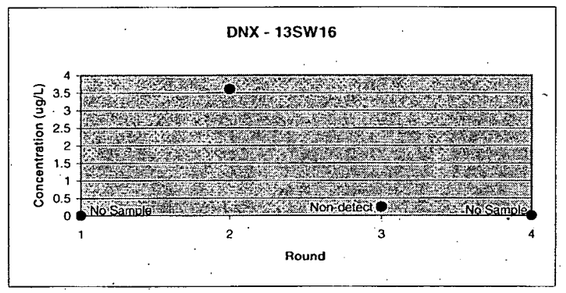
FIGURE 4-4

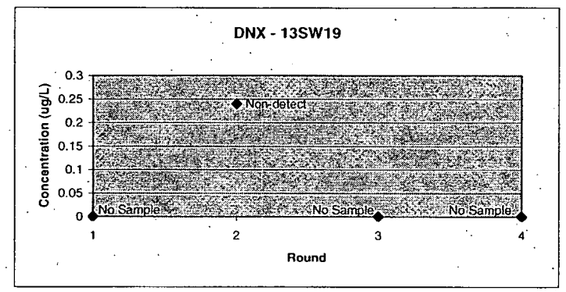
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SMWU 13 ROUNDS 1 THROUGH 4
NSWC CRANE, CRANE, INDIANA
PAGE 2 OF 3

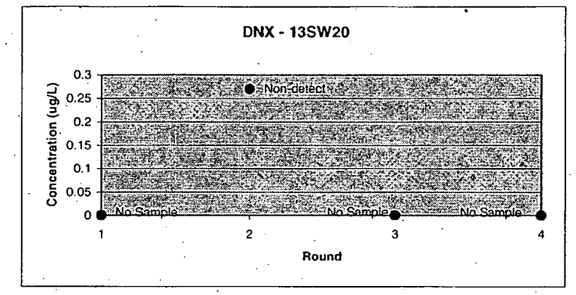


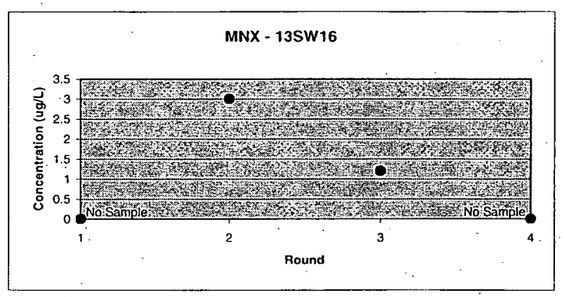


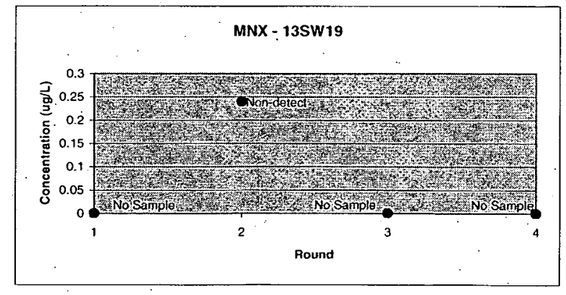


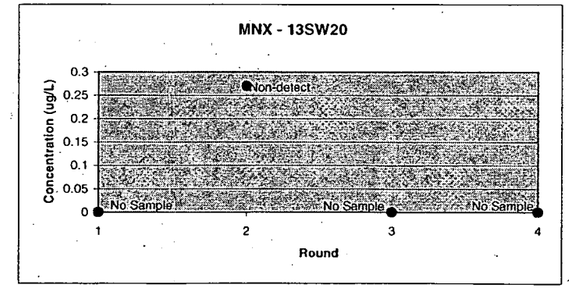


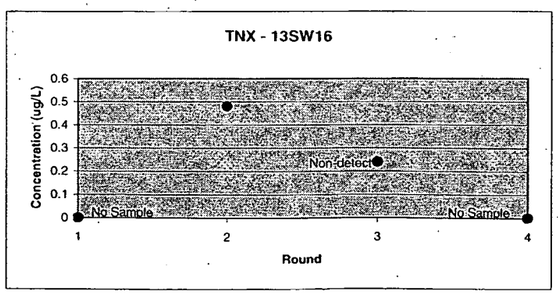


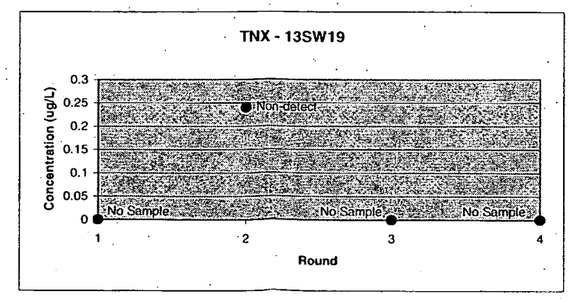












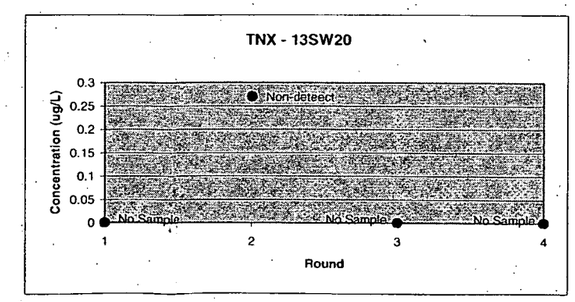
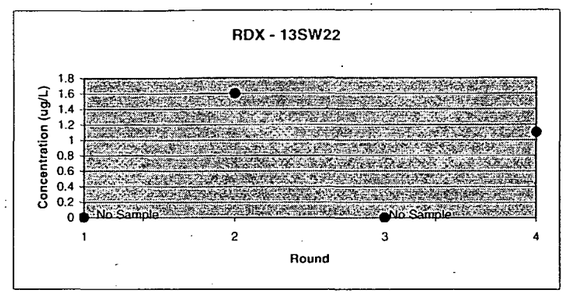
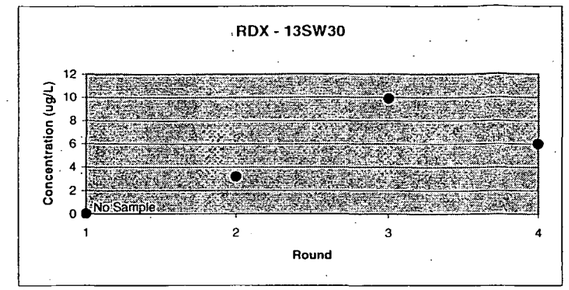
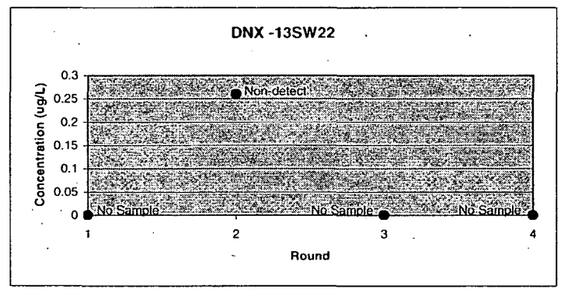


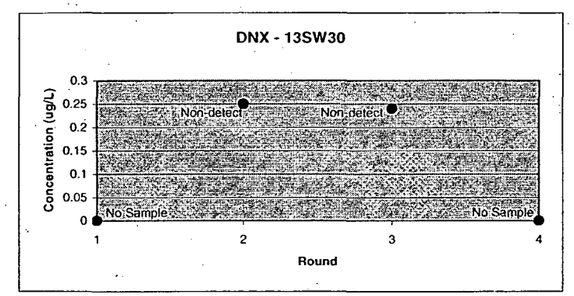
FIGURE 4-4

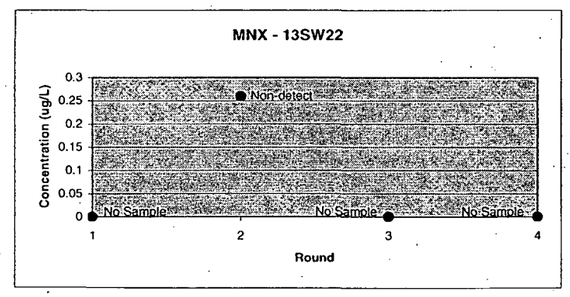
TEMPORAL PLOTS FOR RDX AND DEGRADATION PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SMWU 13 ROUNDS 1 THROUGH 4
NSWC CRANE, CRANE, INDIANA

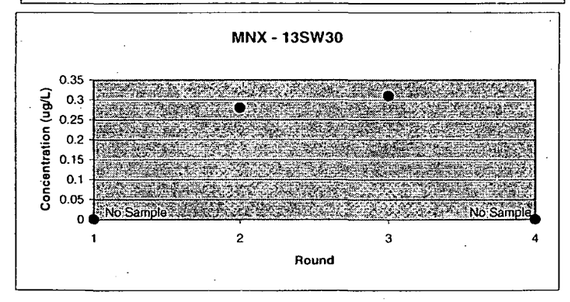


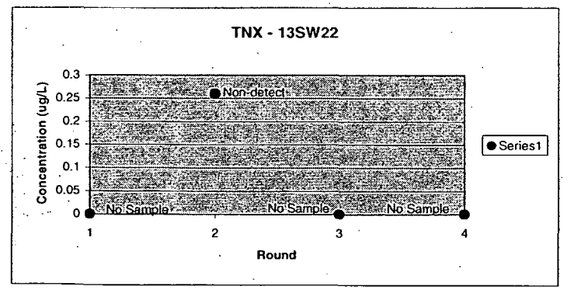


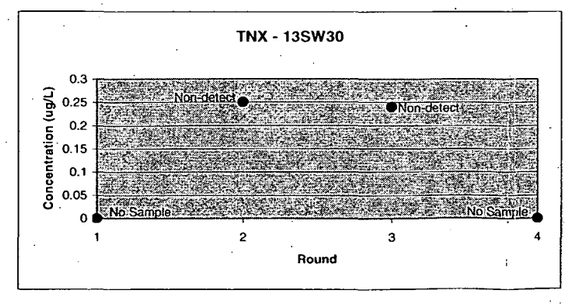












No Sample -This label indicates that no sample was collected to measure this parameter during a round.
Non-detect - This label indicates that the analytical result for a round was reported as non-detect by the laboratory.

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

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 4

A.1.1 SWMU 13 SURFACE WATER SAMPLE LOG SHEETS ROUND 4

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Culvert
[] QA Sample Type:

Sample ID No.: 13SW 1103
Sample Location: 13SW/SD 11
Sampled By: T. ROJAHN
C.O.C. No.: 3678

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 2-2-05								
Time: 1340								
Depth: NA	Yellow tint	7.76	1.439	2.72	7.6	12.46	282	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[ ] No[X] 13GWT NA -F

~ 2.5 oz per min or 0.02 gpm

1414 Hrs Finish @ Culvert

MAP

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 1403
Sample Location: 13SW/SD 14
Sampled By: T. ROJAHN
C.O.C. No.: 3678

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 2-2-05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0955								
Depth: SURFACE	CLEAR	7.91	0.278	2.88	4.1	13.80	178	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[ ] No[X] 13GWT NA -F

FISH N4"

FLOW 1 ft/SEC
44 x 1 x .08' x 1.8' = 65 gpm

MAP

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): Ty Rojahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 1503
Sample Location: 13SW/SD 15
Sampled By: T. ROSAHAL
C.O.C. No.: 3678

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 2-2-05 Time: 1010 Depth: SURFACE Method: DIRECT	SL Cloudy	8.13	.132	24.4	85	13.38	195	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[ ] No[X] 13GWT NA -F

FLOW ~1 gpm

MAP

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 1603
Sample Location: 13SW/SD 16
Sampled By: TIROJAHN
C.O.C. No.: 3678

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 2-2-03 Time: 1023 Depth: SURFACE Method: DIRECT	CLEAR	8.29	0.106	1.43	10	13.88	188	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[ ] No[X] 13GWT NA -F

Flow 1-5 gpm

MAP

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 1902
Sample Location: 13SW/SD 19
Sampled By: T. ROSAHN
C.O.C. No.: 3678

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 2-2-05 Time: 1300 Depth: SURFACE Method: DIRECT	CLEAR	7.90	0.236	2.64	36	13.12	220	-

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[ ] No[X] 13GWT NA -F

Flow 3 - 5 gpm

MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Tey Rosahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 20 02
Sample Location: 13SW/SD 20
Sampled By: T. ROLAHN
C.O.C. No.: 3678

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 2-2-05 Time: 1235 Depth: SURFACE Method: DIRECT	CLEAR	8.17	0.154	2.24	6.1	13.25	205	–

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[ ] No[X] 13GWT NA -F

Flow
6 sec / ft
.12' x 2.3' x 0.17 x 449 =
21 gpm

MAP

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): Troy Rolahn

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: 13SW 2203
Sample Location: 13SW/SD 22
Sampled By: T. Rosahn
C.O.C. No.: 3678

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 2-2-05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 0855								
Depth: SURFACE	CLEAR	8.18	0.151	2.02	3.1	8.25	139	—
Method: Direct								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS/NOTES

Filtered Sample Collected Yes[ ] No[X] 13GWT NA -F

FLOW 1-5 gpm

MAP

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Tey Rogal

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

Sample ID No.: 13SW 3003
Sample Location: 13SW/SD 30
Sampled By: T. Rowan
C.O.C. No.: 3678

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA

Date: 2-2-05 / Time: 1045 / Depth: SURFACE / Method: DIRECT	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
	Clear	8.07	0.168	1.63	4.5	14.10	201	—

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No

OBSERVATIONS / NOTES

Filtered Sample Collected Yes[ ] No[X] 13GWT NA -F

Flow 1 sec/ft
.20' x 6' x 1 x 449 =
539 gal

MAP

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): [signature]

A.1.2 SWMU 13 GROUND WATER SAMPLE LOG SHEETS ROUND 4

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0104
Sample Location: 13MWT01
Sampled By: T. Rosahn
C.O.C. No.: 3669
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/23/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1105								
Method: SAME	CLEAR	3.98	0.192	9.98	3.0	0.81	+295	—

PURGE DATA:

Date: 1/23/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Deo. Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Φ PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.91								
Static Water Level (WL): 8.02								
One Casing Volume(gal/L): 6.1								
Start Purge (hrs): 0950								
End Purge (hrs): 1100								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 7.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT NA -F

9.89 x 0.163 = 1.6 gal or 6.1

Pump intake @ 12'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Terry Rosahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT01
DATE: 1-23-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
0950	8.02	0	—	—	—	—	—	—	—	Start Purge
1000	8.45	1200	120	4.02	0.184	8.3	1.50	8.71	+261	CLEAR
1010	8.73	2300	110	4.02	0.188	6.9	1.22	9.72	275	"
1020	8.74	3300	100	4.01	0.187	5.5	1.12	8.79	282	"
1030	8.61	4300	100	3.89	0.181	0.45	1.00	8.55	293	"
1040	8.76	5300	100	4.01	0.192	3.8	0.86	9.99	289	"
1050	8.74	6300	100	3.99	0.190	2.4	0.83	9.79	294	"
1100	8.74	7300	100	3.98	0.192	3.0	0.81	9.98	295	"

Water Quality Meter (SN): 99K1014 AG
Control Box type (SN): MP10-1231
Turbidity Meter (SN): 4536-3303

Pump Intake: 12'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 0905
Sample Location: 13MWT 09
Sampled By: CD
C.O.C. No.: 3673
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 2/1/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1050								
Method: bladder pump	clear	5.49	.570	12.15	1.6	0.74	29.9	—

PURGE DATA:

Date: 2/1/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 22.96'								
Static Water Level (WL): 9.67'								
One Casing Volume(gal/L): 8.02								
Start Purge (hrs): 0925								
End Purge (hrs): 1045								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 9.33								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] ~~13GWT F~~

Pump intake @ 17.61' bTOC
dedicated bladder pump

22.96
− 9.67
13.29 (.163) = 2.17 gal.
= 8.02 L

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT09
DATE: 2/1/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color. etc)
0925	9.67	—	~~130~~	—	—	—	—	—	—	Start purge
0935	10.05	1.830	130	5.54	.548	0.80	1.10	11.66	9.3	clear
0945	9.97	2.930	110	5.54	.535	0.95	1.06	10.67	15.5	clear
0955	9.98	4.030	110	5.53	.548	1.3	0.88	11.43	22.3	clear
1005	10.00	5.130	110	5.53	.558	1.3	0.78	11.80	11.4	clear
1015	10.00	6.230	110	5.51	.562	1.7	0.79	11.96	8.7	clear
1025	10.01	7.230	100	5.50	.566	1.5	0.74	12.11	21.1	clear
1035	10.01	8.330	100	5.49	.567	1.9	0.77	12.17	22.7	clear
1045	10.01	9.330	100	5.49	.570	1.6	0.74	12.15	29.9	clear, end purge
	←		well	parameters	stabalized			→		
1050	—	—	—	—	—	—	—	—	—	Start sampling

Water Quality Meter (SN): 01D0956 AA
Control Box type (SN): MP10 - 1231
Turbidity Meter (SN): 4175-1503

Pump Intake: 17.61' BTOC
dedicated bladder pump

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1104
Sample Location: 13MWT 11
Sampled By: T. ROJAHN
C.O.C. No.: 3669
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: (TG ~~1505~~ 1/23/05)	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1505								
Method: SAME	CLEAR	3.80	0.222	10.80	10	0.71	+284	---

PURGE DATA:

Date: 1/23/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: DED. Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" Ø PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 17.75								
Static Water Level (WL): 9.36								
One Casing Volume(gal/L):								
Start Purge (hrs): 1400								
End Purge (hrs): 1500								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 5.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[] 13GWT NA -F

8.39' x 0.163 = 1.36 gal 1 in 5.2

Pump intake @ 13.5'

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.: —	Ty Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT 11
DATE: 1/23/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
1400	9.36	0	--	—	—	—	—	—	—	START PURGE
1410	9.72	1200	120	3.93	0.222	12	0.82	10.58	+274	CLEAR
1420	9.85	2200	100	3.91	0.223	12	0.70	10.42	+277	CLEAR
1430	10.00	3200	100	3.91	0.227	12	0.67	11.07	+279	CLEAR
1440	9.98	4000	80	3.88	0.219	10	0.73	10.03	+283	CLEAR
1450	9.99	4700	70	3.89	0.223	10	0.73	10.98	+283	CLEAR
1455	10.00	5100	80	3.89	0.224	11	0.73	10.93	+283	CLEAR
1500	10.00	5500	80	3.8.0	0.222	10	0.71	10.80	+284	CLEAR
1505	—	—	—	—	—	—	—	—	—	START SAMPLING

Water Quality Meter (SN) 99K1014 AG
Control Box type (SN) MP10 - 1231
Turbidity Meter (SN) 4536-3303

Pump Intake 13.5

SIGNATURE(S): Ty Rigel

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 1304
Sample Location: 13MWT 13
Sampled By: Goerdt
C.O.C. No.: 3673
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 2-2-05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1510	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: Bladder	Clear	3.94	1.01	9.87	7.2	5.31	392.7	---

PURGE DATA:

Date: 2-2-05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder								
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 21.44								
Static Water Level (WL): 5.5								
One Casing Volume(gal/L): 9.6								
Start Purge (hrs): 1235								
End Purge (hrs): 1455								
Total Purge Time (min): 140								
Total Vol. Purged (gal/L): 21.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330, Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ ~ 19'
Dedicated pump

21.44
5.50
15.94 (.163) = 2.6 gal
= 9.6 L

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N1245

WELL ID.: 13GWT13
DATE: 2-2-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
1235	5.50	-	-	-	-	-	-	-	-	Start purge
1245	5.65	1.0	100	-	-	-	-	-	-	Clear
1255	5.67	2.0	100	4.	.073	35	8.32	9.31	392.7	"
1305	5.68	3.8	180	4.08	.080	22	7.97	9.97	362.0	"
1315	5.81	5.6	180	4.08	.081	18	7.05	10.10	337.6	"
1325	6.00	7.6	200	4.03	.083	12	6.66	10.11	357.6	"
1335	6.00	9.6	200	4.01	.086	11	6.37	9.87	360.2	"
1345	6.04	11.1	150	3.99	.088	10	6.16	9.91	364.2	"
1355	6.07	12.6	150	4.00	.091	12	6.09	9.94	371.9	"
1405	6.11	14.1	150	3.97	.093	9	5.94	9.96	380.8	"
1415	6.12	15.6	150	3.96	.096	12	5.65	9.99	386.5	"
1425	6.14	17.1	150	3.94	.098	14	5.46	9.98	391.6	"
1435	6.15	18.6	150	3.94	1.01	12	5.37	9.98	394.2	"
1445	6.04	20.1	150	3.93	1.02	7.5	5.33	9.91	394.3	"
1455	6.01	21.6	150	3.94	1.01	7.2	5.31	9.87	392.7	Stop purge

Water Quality Meter (SN) 99K1014 AG
Control Box type (SN) 1588
Turbidity Meter (SN) 4536 3303

Pump Intake Dedicated pump

SIGNATURE(S)

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT14O4
Sample Location: 13MWT14
Sampled By: CD / TR
C.O.C. No.: 3672
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/25/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1340								
Method: bladder pump	CLEAR	5.58	0.595	14.39	3.3	0.91	62.4	--

PURGE DATA:

Date: 1/25/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 25.60'								
Static Water Level (WL): 13.95'								
One Casing Volume(gal/L): 7.03								
Start Purge (hrs): 1210								
End Purge (hrs): 1335								
Total Purge Time (min): 85								
Total Vol. Purged (gal/L) 10.1								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements			Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	Routine 3	(2) L Glass Amber	DUP 2	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	3	(2) L Glass Amber	2	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	3	(1) L HDPE	1	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] ~~13GWT~~

Pump intake @ 20.35' bTOC
dedicated bladder pump

25.60
−13.95
11.65 (.163) = 1.90 gal
= 7.03 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
yes	13FD0125050I

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13 MWT R4
DATE: 1/25/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color. etc)
1210	13.95	—	—	—	—	—	—	—	—	Start purge
1220	14.23	1.525	125	5.45	.768	4.3	1.77	14.45	115.5	clear
1230	14.19	2.525	100	5.50	.745	4.4	1.49	14.17	108.8	clear
1240	14.20	3.725	120	5.51	.714	4.4	1.31	14.46	102.5	clear
1250	14.20	4.925	120	5.54	.684	4.2	1.16	14.44	92.0	clear
1300	14.20	6.125	120	5.55	.664	3.7	1.07	14.59	78.6	clear
1310	14.21	7.325	120	5.57	.630	3.9	0.98	14.54	68.9	clear
1320	14.21	8.425	110	5.57	.607	3.6	0.91	14.56	63.4	clear
1330	14.23	9.525	110	5.58	.600	3.2	0.91	14.45	63.4	CLEAR
1335	14.23	10.075	110	5.58	.595	3.3	0.91	14.39	62.4	CLEAR
1340	—	—	—	—	—	—	—	—	—	START SAMPLING

Water Quality Meter (SN): 0100956 AA
Control Box type (SN): MP10 - 1087
Turbidity Meter (SN): 4175 - 1503

Pump Intake: 20.35' bTOC
dedicated bladder pump

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1504
Sample Location: 13MWT15
Sampled By: CD
C.O.C. No.: 3677
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 2/3/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1115								
Method: bladder pump	clear	3.65	.314	13.29	8.31	1.57	373.3	—

PURGE DATA:

Date: 2/3/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 27.87'								
Static Water Level (WL): 14.58'								
One Casing Volume(gal/L): 8.02								
Start Purge (hrs): 0850								
End Purge (hrs): 1110								
Total Purge Time (min): 140								
Total Vol. Purged (gal/L): 15.85								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] ~~13GWT~~ ~~F~~

Pump intake @ 22.38' bTOC
dedicated bladder pump

27.87
− 14.58
13.29 (.163) = 2.17 gal
= 8.02 L

Circle if Applicable:		Signature(s):
MS/MSD —	Duplicate ID No.: —	[signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: N1245

WELL ID.: 13 MWT 15
DATE: 2/3/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL/Min.)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Volume & Color)
0850	14.58	—	—	—	—	—	—	—	—	Start purge
0900	15.66	1.650	150	3.42	.376	25.9	1.74	12.14	431.5	~~cl~~ slightly cloudy
0910	15.96	2.950	130	3.55	.350	25.7	1.44	12.41	398.7	slightly cloudy
0920	15.96	3.950	100	3.62	.331	23.8	1.95	12.06	377.4	slightly cloudy
0930	15.96	5.150	120	3.68	.318	20.1	2.01	12.09	364.0	clear
0940	15.95	6.150	100	3.68	.317	19.6	1.64	12.29	360.6	clear
0950	15.86	7.150	100	3.70	.309	16.8	2.20	12.28	353.6	clear
1000	15.93	8.350	120	3.70	.307	17.7	2.05	12.19	353.1	clear
1010	15.96	9.450	110	3.69	.309	13.9	2.01	12.46	358.1	clear
1020	15.99	10.550	110	3.69	.307	12.2	1.97	12.46	357.7	clear
1030	15.92	11.450	90	3.69	.299	11.5	2.20	11.67	357.2	clear
1040	15.91	12.650	120	3.66	.305	11.6	2.17	11.78	367.9	clear
1050	15.96	13.750	110	3.64	.316	11.2	1.73	12.70	377.7	clear
1100	16.08	14.850	110	3.64	.316	9.41	1.53	13.04	377.5	clear
1110	16.08	15.850	100	3.65	.314	8.31	1.57	13.29	373.3	clear, end purge
1115	—	—	—	—	—	—	—	—	—	Start sample

Water Quality Meter (SN): 01D0956 AA
Control Box type (SN): MP10-1231
Turbidity Meter (SN): 4175-1503

Pump Intake: 22.38' bTOC
dedicated bladder pump

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT1704
Sample Location: 13MWT 17
Sampled By: CD/TR
C.O.C. No.: 3669
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/23/05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1235	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: bladder pump	clear	5.40	.118	11.51	15	0.35	4.0	---

PURGE DATA:

Date: 1/23/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 20.30'								
Static Water Level (WL): 10.00'								
One Casing Volume(gal/L): 6.21								
Start Purge (hrs): 0935								
End Purge (hrs): 1225								
Total Purge Time (min): 170								
Total Vol. Purged (gal/L): 16.60								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	(Yes)/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	(Yes)/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] ~~13GWT_____F~~

Pump intake @ 15.33' btoc
dedicated bladder pump

20.30
-10.00
10.30(.163) = 1.68 gal
= 6.21 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13 MWT 17
DATE: 1/23/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
0935	10.00	—	—	—	—	—	—	—	—	start purge
0945	10.02	.900	50	5.52	.102	33	1.10	10.57	87.9	clear
0955	10.12	2.30	140	5.49	.113	30	0.55	10.52	66.7	clear
1005	10.10	3.40	110	5.48	.110	23	0.59	9.68	57.3	clear
1015	10.10	4.30	90	5.46	.110	22	0.51	9.26	50.9	clear
1025	10.09	5.40	110	5.47	.112	20	0.48	10.12	41.3	clear
1035	10.14	6.50	110	5.46	.112	17	0.43	10.14	38.1	clear
1045	10.15	7.50	100	5.43	.114	17	0.42	10.58	32.4	clear
1055	10.27	8.50	100	5.44	.112	16	0.43	9.60	25.9	clear
1105	10.28	9.40	90	5.43	.112	15	0.44	9.51	31.6	clear
1115	11.10	10.60	120	5.42	.114	14	0.40	9.47	17.4	clear
1125	14.01	11.20	60	5.44	.106	15	0.48	7.11	19.6	clear
1135	13.98	11.80	60	5.43	.107	19	0.50	7.66	20.7	clear
1145	13.98	12.40	60	5.44	.106	15	0.50	7.84	28.1	clear
1155	10.05	13.00	60	5.44	.107	17	0.47	7.89	25.5	di water read 4.3 NTU used different in scope
1205	10.06	14.20	120	5.41	.116	17	0.39	10.96	12.3	clear
1215	10.06	15.40	120	5.40	.118	14	0.36	11.56	6.5	clear
1225	10.06	16.60	120	5.40	.118	15	0.35	11.51	4.0	clear, end purge
1235	—	—	—	—	—	—	—	—	—	start sampling

Water Quality Meter (SN): 01D0956 AA
Control Box type (SN): MP10-1027
Turbidity Meter (SN): 4175-1503

Pump Intake: 15.33'

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT2104
Sample Location: 13MWT21
Sampled By: CD/TR
C.O.C. No.: 3669
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/22/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1255								
Method: Bladder Pump	Clear	5.71	.148	9.15	4.0	1.56	56.1	--

PURGE DATA:

Date: 1/22/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 17.76'								
Static Water Level (WL): 9.11'								
One Casing Volume(gal/L): 5.22								
Start Purge (hrs): 1120								
End Purge (hrs): 1250								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 9.36								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] 13GWT NA -F

Pump intake @ 13.37' bTOC

17.76
− 9.11
8.65 (.163) = 1.41 gal
= 5.22 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT21
DATE: 1/22/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
1120	8.65	—	—	—	—	—	—	—	—	start purge
1130	9.49	.96	110	5.90	.148	8.9	2.80	9.60	86.1	clear
1140	9.60	2.06	110	5.85	.150	9.8	2.39	9.62	82.3	clear
1150	9.72	3.16	110	5.82	.149	9.3	2.23	9.57	77.5	clear
1200	9.76	4.26	110	5.81	.150	9.5	2.13	9.80	72.0	clear
1210	9.89	5.36	110	5.78	.151	6.7	1.90	9.73	67.8	clear
1220	9.82	6.36	100	5.77	.146	7.0	1.87	9.08	61.6	clear
1230	9.86	7.36	100	5.75	.147	6.2	1.69	9.09	59.5	clear
1240	9.95	8.36	100	5.72	.147	4.9	1.59	9.04	57.8	clear
1250	9.92	9.36	100	5.71	.148	4.0	1.56	9.15	56.1	clear, end purge
1255	—	—	—	—	—	—	—	—	—	Start sample

Water Quality Meter (SN) 01D0956 AA
Control Box type (SN) 1087
Turbidity Meter (SN) 4175 - 1503

Pump Intake 13.37

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 2803
Sample Location: 13MWT 28
Sampled By: Goeydt
C.O.C. No.: 3673
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 2-1-05								
Time: Bladder								
Method: 1345	clear	7.78	.918	13.87	50	8.87	144.6	---

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 2-1-05								
Method: Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 91.70								
Static Water Level (WL): 77.93								
One Casing Volume(gal/L) 8.30								
Start Purge (hrs): 0930								
End Purge (hrs): 1330								
Total Purge Time (min): 240								
Total Vol. Purged (gal/L): 19.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(1) (2) L Glass Amber*	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(1) (2) L Glass Amber*	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

* minimum sample collected due to very slow recharge.

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ ~ 88'

Dedicated pump
WL very close to pump intake depth during sampling.

91.70
77.93
13.77 (.163) = 2.24 g
= 8.30 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Stopped sampling after each bottle to allow for recovery.

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT 28
DATE: 2-1-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
0930	77.93	–	–	–	–	–	–	–	–	Start purge
0940	79.20	1.1	110	7.63	.904	5.9	4.81	11.74	200.7	Clear
0950	81.05	2.0	90	7.68	.927	2.8	2.64	11.88	193.7	"
1000	81.62	2.9	90	7.71	.935	1.7	1.76	12.30	186.4	"
1010	82.00	3.8	90	7.73	.942	0.9	1.41	12.66	181.1	"
1020	82.23	4.7	90	7.74	.893	1.4	1.37	12.78	174.2	"
1030	82.41	5.6	90	7.73	.876	1.7	1.32	13.11	170.3	"
1040	82.69	6.5	90	7.73	.869	8.7	1.59	13.24	168.5	"
1050	83.07	7.4	90	7.74	.874	31.0	1.47	13.32	164.3	"
1100	84.29	8.3	90	7.77	.895	45.0	1.34	13.49	161.9	"
1110	84.73	9.2	90	7.77	.917	50.0	1.21	13.53	160.7	"
1120	85.14	10.1	90	7.76	.931	63.0	1.14	13.61	159.8	"
1130	85.68	11.0	90	7.77	.945	70.0	0.94	13.73	157.4	Slightly cloudy
1140	86.04	11.9	90	7.76	.951	61.0	0.95	13.79	155.9	"
1150	86.93	12.8	90	7.74	.958	52.0	0.95	13.82	155.5	Clear
1200	87.65	13.7	90	7.72	.962	27.0	0.96	13.88	154.9	"
1210	87.95	14.6	90	7.74	.989	–	1.35	14.25	153.1	Near pump bottom.
1220	88.24	15.5	90	7.78	1.015	–	6.31	15.47	152.5	Turned flow down to try to get recharge.
1230	–	16.1	60	–	–	–	–	–	–	
1240	–	16.6	60	–	–	–	–	–	–	
1250	–	17.2	60	–	–	–	–	–	–	
1300		17.8	60	7.81	1.020	60	7.50	21.40	142.1	Slightly cloudy
1310	87.75	18.4	60	7.80	1.109	50	7.70	19.62	142.4	"
1320	–	19.0	60	7.79	.923	–	8.96	14.44	143.5	"
1330	–	19.6	60	7.78	.918	–	8.87	13.87	144.6	↑
										End Purge

Water Quality Meter (SN) 99K1614 AG
Control Box type (SN) 1087
Turbidity Meter (SN) 4536 3303

Pump Intake ~88'

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT3103
Sample Location: 13MWT31
Sampled By: CD
C.O.C. No.: 3673
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 2/1/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1450								
Method: bladder pump	clear	5.42	1228	11.08	5.2	1.52	51.9	—

PURGE DATA:

Date: 2/1/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.5'								
Static Water Level (WL): 11.47								
One Casing Volume(gal/L): 6.65								
Start Purge (hrs): 1245								
End Purge (hrs): 1445								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 12.85								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] ~~13GWT F~~

Pump intake @ 17.65' bTOC
dedicated bladder pump

22.5
−11.47
11.03 (.163) = 1.80 gal.
= 6.65 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT31
DATE: 2/1/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
1245	11.47	—	—	—	—	—	—	—	—	Start Purge
1255	12.54	1.650	150	5.39	1553	75	3.48	11.55	89.2	slightly cloudy
1305	12.69	2.850	120	5.39	1579	45	3.43	11.30	93.7	slightly cloudy
1315	12.74	3.950	110	5.38	1578	35	3.20	11.10	93.2	clear
1325	12.85	5.050	110	5.38	1578	25	3.01	11.24	89.1	clear
1335	12.87	5.950	90	5.38	1549	23	2.88	10.70	85.9	clear
1345	12.89	6.850	90	5.38	1543	18	2.67	10.68	79.3	clear
1355	12.94	8.750	90	5.38	1492	11	2.33	10.64	72.5	clear
1405	12.94	9.550	80	5.39	1454	8.2	2.13	10.70	66.5	clear
1415	12.95	10.350	80	5.40	1392	6.6	1.87	10.81	60.2	clear
1425	12.95	11.150	80	5.41	1330	6.3	1.78	10.78	58.0	clear
1435	12.97	11.950	80	5.41	1286	5.6	1.59	11.00	54.4	clear
1445	12.99	12.850	80	5.42	1228	5.2	1.52	11.08	51.9	clear, end purge
← Well Parameters Stabilized →										
1450	—	—	—	—	—	—	—	—	—	Start sample

Water Quality Meter (SN) 01D0956 AA
Control Box type (SN) MP10 - 1231
Turbidity Meter (SN) 4175 - 1503

Pump Intake 17.65' bTOC
dedicated bladder pump

SIGNATURE(S): [illegible]

PAGE 2 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 34 03
Sample Location: 13MWT 34
Sampled By: CD/TR
C.O.C. No.: 3669
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/23/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1510								
Method: bladder pump	clear	5.05	.271	12.06	5.5	1.30	99.9	—

PURGE DATA:

Date: 1/23/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 22.40'								
Static Water Level (WL): 5.61'								
One Casing Volume(gal/L): 10.13								
Start Purge (hrs): 1345								
End Purge (hrs): 1505								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 10.60								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] ~~13GWT F~~

Pump intake @ 17.58' bTOC dedicated bladder pump

22.40
− 5.61
16.79 (.163) = 2.74 gal.
= 10.13 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT34
DATE: 1/23/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
1345	5.61	—	—	—	—	—	—	—	—	start purge
1355	6.39	2.00	150	5.10	.267	6.9	2.74	11.66	183.4	clear
1405	6.18	3.00	100	5.07	.265	7.7	2.51	11.13	163.1	clear
1415	6.29	4.40	140	5.07	.269	6.5	2.06	11.92	144.0	clear
1425	6.34	5.80	140	5.06	.269	6.6	1.82	12.01	135.5	clear
1435	6.28	7.00	120	5.06	.267	6.2	1.69	11.60	125.7	clear
1445	6.29	8.20	120	5.06	.268	5.6	1.58	11.79	118.9	clear
1455	6.27	9.40	120	5.05	.270	6.1	1.41	12.02	108.3	clear
1505	6.27	10.60	120	5.05	.271	5.5	1.30	12.06	99.9	clear, end purge
1510	—	—	—	—	—	—	—	—	—	start sampling

Water Quality Meter (SN) 01 D 0956 AA
Control Box type (SN) MP10 - 1087
Turbidity Meter (SN) 4175 - 1503

Pump Intake 17.58' BTOC dedicated bladder pump

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT3703
Sample Location: 13MWT37
Sampled By: CD
C.O.C. No.: 3673
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 2/2/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1300								
Method: bladder pump	clear	5.65	.240	10.90	1.30	4.20	64.2	—

PURGE DATA:

Date: 2/2/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 27.15'								
Static Water Level (WL): 13.95'								
One Casing Volume(gal/L): 7.96								
Start Purge (hrs): 1135								
End Purge (hrs): 1255								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 8.55								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] ~~13GWT F~~

Pump intake @ 21.83' b TOC
dedicated bladder pump

27.15
− 13.95
13.2 (.163) = 2.15 gal
= 7.96 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13 MWT 37
DATE: 2/2/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color. etc)
1135	13.95	—	—	—	—	—	—	—	—	Start purge
1145	14.45	1.650	100	5.70	.141	1.99	6.30	10.69	171.3	clear
1155	14.56	2.750	110	5.61	.198	1.27	5.04	10.92	117.4	clear
1205	14.57	3.750	100	5.66	.222	1.84	4.61	10.70	90.3	clear
1215	14.55	4.650	90	5.67	.229	1.79	4.39	10.60	74.2	clear
1225	14.61	5.650	100	5.66	.227	1.62	4.37	10.90	70.5	clear
1235	14.63	6.650	100	5.66	.235	1.43	4.25	10.89	67.1	clear
1245	14.65	7.650	100	5.65	.236	1.25	4.25	10.96	65.1	clear
1255	14.65	8.550	90	5.65	.240	1.30	4.20	10.90	64.2	clear, end purge
1300	—	—	—	—	—	—	—	—	—	Start sample

Water Quality Meter (SN) 01D0956 AA
Control Box type (SN) MP10-1231
Turbidity Meter (SN) 4175-1503

Pump Intake 21.83' bTOC
dedicated bladder pump

SIGNATURE(S): [illegible]

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Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4003
Sample Location: 13MWT 40
Sampled By: Gaeyd
C.O.C. No.: 3673
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 2/2/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1105								
Method: Bladder	Clear	6.51	.314	11.71	6.5	13.39	168.9	---

PURGE DATA:

Date: ~~0930~~ 2/2/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 27.70								
Static Water Level (WL): 18.22								
One Casing Volume(gal/L) 5.8								
Start Purge (hrs): 0930								
End Purge (hrs): 1100								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L) 11.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT_____-F

Pump intake @ 23'

27.70
18.22
9.48(.163) = 1.55 gal
= 5.72 L

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	
—	—	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13GWT40
DATE: 2-2-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
0930	18.22	-	-	-	-	-	-	-	-	Start purge
0940	18.49	1.0	100	6.85	.316	19	14.37	10.14	168.7	Clear
0950	18.39	2.0	100	6.79	.302	8.9	14.50	8.80	170.2	"
1000	18.34	3.0	100	6.77	.302	-	14.38	8.32	170.2	"
1010	18.81	4.8	180	6.70	.320	6.1	13.69	11.55	168.5	"
1020	18.69	5.8	100	6.55	.309	5.8	13.42	11.08	170.5	"
1030	18.79	7.3	150	6.53	.313	7.3	13.41	11.46	170.0	"
1040	18.93	8.8	150	6.53	.316	6.8	13.55	11.74	169.1	"
1050	18.79	9.9	110	6.51	.312	7.4	13.42	11.67	169.6	"
1100	—	11.0	110	6.51	.314	6.5	13.39	11.71	168.9	Stop purge

Water Quality Meter (SN): 99K1014 AC
Control Box type (SN): 1588
Turbidity Meter (SN): 4536 3303

Pump Intake: 23'
Dedicated pump

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 4503
Sample Location: 13MWT 45
Sampled By: T. ROSAHN
C.O.C. No.: 3669
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Date: 1/23/05								
Time: 1250								
Method: SAME	Clear	7.08	0.491	10.13	14	0.56	-48	--

PURGE DATA:

Date: 1-22-05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: DED. Bladder Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2"Ø PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 84.0								
Static Water Level (WL): 69.71								
One Casing Volume(gal/L): 8.8								
Start Purge (hrs): 1100								
End Purge (hrs): 1300								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 16								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	1 ~~(2)~~ L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	1 ~~(2)~~ L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT NA -F

14.29' x 0.163 = 2.3 gal or 8.8 L

Pump intake @ 80'

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT45
DATE: 1/22/04

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
1100	69.71	0	—	—	—	—	—	—	—	Start Purge
1110	70.97	1000	100	7.29	0.467	6.9	2.70	11.32	-13	CLEAR
1120	72.70	2000	100	6.92	0.501	4.7	0.68	11.54	-2	"
1130	73.15	3000	100	6.87	0.500	5.0	0.59	11.65	+10	"
1140	74.04	4000	100	6.80	0.496	5.3	0.55	11.60	25	"
1150	74.85	5500	150	6.75	0.463	11	1.07	11.35	31	"
1200	75.42	7000	150	6.74	0.461	15	1.09	11.10	25	"
1210	76.06	8500	150	6.78	0.467	20	0.95	11.05	9	"
1220	76.85	10000	150	6.82	0.477	25	0.83	10.79	2	"
1230	77.45	11500	150	6.83	0.478	25	0.72	10.52	-3	"
1240	78.10	13000	150	6.89	0.482	28	0.67	10.47	-15	"
1250	78.75	14500	150	7.00	0.488	19	0.61	10.42	-30	"
1300	79.43	16000	150	7.08	0.491	14	0.56	10.13	-48	"
1305	—	—	—	END	—	—	—	—	—	PURGE
		WILL	WAIT	FOR WELL	TO	RECHARGE	&	SAMPLE	1/23/05	
1250	1/23/05	—	—	—	—	—	—	—	—	START SAMPLING

Water Quality Meter (SN): 99K1014 AG
Control Box type (SN): MP10-1231
Turbidity Meter (SN): 4536-3303

Pump Intake: 80'

WELL HISTORICALLY DRIES OUT

SIGNATURE(S): [signature]

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Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT4603
Sample Location: 13MWT46
Sampled By: CD
C.O.C. No.: 3673
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 2/2/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1015								
Method: bladder pump	clear	6.45	.731	10.45	1.65	1.30	-21.4	—

PURGE DATA:

Date: 2/2/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC	See Low Flow Purge Data Sheets							
Total Well Depth (TD): 67.60'								
Static Water Level (WL): 57.11'								
One Casing Volume (gal/L): 6.33								
Start Purge (hrs): 0850								
End Purge (hrs): 1010								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 8.93								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	(Yes)/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	(Yes)/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	(Yes)/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[✓] ~~13GWT F~~

Pump intake @ 63.0' bTOC
dedicated bladder pump

67.60
- 57.11
10.49 (.163) = 1.71 gal.
= 6.33 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT46
DATE: 2/2/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
0850	57.11	—	—	—	—	—	—	—	—	start purge
0900	57.12	1.230	130	6.57	.725	27.1	3.03	10.71	2.5	clear
0910	57.12	2.380	115	6.50	.742	11.1	2.01	10.48	-11.6	clear
0920	57.14	3.480	110	6.47	.742	4.72	1.80	10.37	-17.5	clear
0930	57.14	4.530	105	6.46	.739	3.78	1.67	10.34	-16.2	clear
0940	57.14	5.630	110	6.46	.736	3.12	1.51	10.41	-25.1	clear
0950	57.14	6.730	110	6.45	.733	2.55	1.38	10.41	-24.1	clear
1000	57.14	7.830	110	6.45	.733	2.15	1.34	10.44	-27.4	clear
1010	57.14	8.930	110	6.45	.731	1.65	1.30	10.45	-21.4	clear, end purge
1015	—	—	—	—	—	—	—	—	—	start sample

Water Quality Meter (SN) 01D0956 AA
Control Box type (SN) MP10-1231
Turbidity Meter (SN) 4175-1503

Pump Intake 63.0' bTOC
dedicated bladder pump

SIGNATURE(S): [illegible]

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Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT4703
Sample Location: 13MWT47
Sampled By: CD/TR
C.O.C. No.: 3672
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/25/05	Color (Visual)	pH (S. U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Other NA
Time: 1040								
Method: bladder pump	clear	3.63	.673	8.87	10	0.81	353.3	---

PURGE DATA:

Date: 1/25/05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: bladder pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 20.20'								
Static Water Level (WL): 7.30'								
One Casing Volume(gal/L): 7.78								
Start Purge (hrs): 0910								
End Purge (hrs): 1030								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 9.65								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No✓ ~~13GWT~~ ~~F~~

Pump intake @ 14.82' bTOC
dedicated bladder pump

20.20
- 7.30
12.90 (.163) = 2.10 gal
= 7.78 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13 MWT 47
DATE: 1/25/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color. etc)
0910	7.30	—	—	—	—	—	—	—	—	start purge
0920	8.29	1.800	200	3.65	.679	36	1.14	9.54	360.2	clear
0930	8.29	2.950	115	3.64	.671	27	1.03	9.04	359.6	clear
0940	8.30	4.150	120	3.64	.669	20	0.92	8.93	358.9	clear
0950	8.29	5.250	110	3.64	.670	19	0.86	8.83	357.6	clear
1000	8.28	6.350	110	3.64	.671	15	0.81	8.93	356.8	clear
1010	8.29	7.450	110	3.64	.673	14	0.79	9.10	355.2	clear
1020	8.29	8.550	110	3.64	.675	13	0.80	9.07	354.2	clear
1030	8.30	9.650	110	3.63	.673	10	0.81	8.87	353.3	clear, end purge
1040	—	—	—	—	—	—	—	—	—	start sampling

Water Quality Meter (SN): 01D0956 AA
Control Box type (SN): MP10 - 1087
Turbidity Meter (SN): 475-1503

Pump Intake: 14.82' bTOC
dedicated bladder pump

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC CRANE, SWMU13
Project No.: N7448 CTO 0343

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 13GWT 5102
Sample Location: 13MWT 51
Sampled By: Gould
C.O.C. No.: 3677
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 2-3-05	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: Bladder	(Visual)	(S. U.)	(mS/cm)	(°C)	(NTU)	(mg/L)	(mV)	NA
Method: ~~1110~~ 1140	Clear	6.20	.140	5.07	9.7	10.19	254.4	---

PURGE DATA:

Date: 2-3-05	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Bladder								
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" PVC			See Low Flow Purge Data Sheets					
Total Well Depth (TD): 17.72								
Static Water Level (WL): 4.69								
One Casing Volume(gal/L): 7.9								
Start Purge (hrs): 0850								
End Purge (hrs): 1125								
Total Purge Time (min): ~~228~~ 150								
Total Vol. Purged (gal/L): ~~21.8~~ 26.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Explosives SW-846 8330 Nitroaromatics and Nitramines	4°C	(2) L Glass Amber	Yes/No
Explosives SW-846 8330, Modified RDX Degradation Products	4°C	(2) L Glass Amber	Yes/No
Nitrate + Nitrite (as N) EPA 353.2	4°C/H_2SO_4	(1) L HDPE	Yes/No

OBSERVATIONS / NOTES:

Filtered Sample Collected Yes[] No[X] 13GWT NA -F

Pump intake @ 15'

17.72
4.69
13.03 (.163) = 2.12 gal
= 7.9 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC CRANE
PROJECT NUMBER: 7448

WELL ID.: 13MWT51
DATE: 2-3-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flowrate (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments (Color, etc)
0850	4.69	–	–	–	–	–	–	–	–	Start purge
0900	4.80	1.4	140	5.85	.140	15	12.03	5.12	323.9	Clear
0910	4.78	2.8	140	–	–	–	–	–	–	"
0920	4.71	4.2	140	6.00	.136	–	12.20	4.18	301.5	"
0925	Stop purge: Control box freeze up									–
0935	Restart Purge									–
0945	4.80	6.0	180	6.16	.139	13	10.96	5.02	282.4	"
0955	4.84	7.8	180	6.17	.140	14	10.80	4.98	275.9	"
1005	~~9~~ 4.91	9.8	200	6.18	.139	13	10.82	5.00	274.7	"
1015	4.82	11.8	200	6.17	.138	13	10.58	4.93	272.8	"
1025	4.89	13.8	200	6.17	.138	13	10.09	4.93	266.8	"
1035	4.88	15.8	200	6.18	.139	13	10.10	4.98	264.7	"
1045	4.90	17.8	200	6.17	.137	12	10.07	4.97	263.6	"
1055	4.88	19.8	200	6.18	.139	12	10.03	5.04	262.8	"
1105	4.87	21.8	200	6.18	.139	13	10.01	5.03	261.3	~~end purge~~
1115	4.87	23.8	200	6.19	.138	11	9.98	4.86	260.7	Clear
1125	4.88	25.3	150	6.20	.140	10	10.11	4.98	255.7	"
1135	4.87	26.8	150	6.20	.140	9.7	10.19	5.07	254.4	End purge

Water Quality Meter (SN) 99K1014AG
Control Box type (SN)
Turbidity Meter (SN) 4536 3303

Pump Intake 15'

SIGNATURE(S): [signature]

A.2 SWMU 13 CHAIN OF CUSTODY RECORDS ROUND 4

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 3669 PAGE 1 OF 1

PROJECT NO: CTO 343 NH245 (TS) 331	FACILITY: NSWC CRANE	PROJECT MANAGER: RALPH BASINSKI	PHONE NUMBER: (412) 921-8308
		LABORATORY NAME AND CONTACT: LAUCKS / ANH HO	
SAMPLERS (SIGNATURE): 7448		FIELD OPERATIONS LEADER: TERRY ROJAHN	PHONE NUMBER: (412) 921-8857
		ADDRESS: 940 SOUTH HARNEY ST	
		CARRIER/WAYBILL NUMBER: FED. EX. AB # 8447 8135 7939	CITY, STATE: SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	Nitroaromatics & Nitramines (8330)	RDX Degradation Products (Mod 8330)	Nitrate + Nitrite (as N) EPA 353.2						COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)									G	G	P						
PRESERVATIVE USED									4°C	4°C	4°C/H2SO4						
1/22	1255	13GWT2104	13MW T21	–	–	GW	G	5	2	2	1						
1/23	1105	13GWT0104	13MW T01	–	–	GW	G	5	2	2	1						
1/23	1235	13GWT1704	13MW T17	–	–	GW	G	5	2	2	1						
1/23	1250	13GWT4503	13MW T45	–	–	GW	G	3	1	1	1						
1/23	1505	13GWT1104	13MW T11	–	–	GW	G	5	2	2	1						
1/23	1510	13GWT3403	13MW T34	–	–	GW	G	5	2	2	1						
~~1/24~~	~~1315~~	~~RB0124~~ (TB)															

1. RELINQUISHED BY	DATE 1/24/05	TIME 1830	1. RECEIVED BY FEDERAL EXPRESS	DATE 1/24/05	TIME 1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY) 4/02R

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 3672 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / ANH HO
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 S. HARNEY ST
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8447 8135 7928		SEATTLE WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P

PRESERVATIVE USED: 4°C 4°C 4°C/H2SO4

TYPE OF ANALYSIS: Nitroaromatics & Nitramines (8330); RDX Degradation Products (mod. 8330); Nitrate + Nitrite (as N) EPA 353.2

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	Nitroaromatics & Nitramines (8330)	RDX Degradation Products (mod. 8330)	Nitrate + Nitrite (as N) EPA 353.2						COMMENTS
1/25	1040	13GWT4703	13MW T47	-	-	GW	G	5	2	2	1						
1/25	1340	13GWT1404	13MW T14	-	-	GW	G	9	3	3	3						DO MS/MSD
1/25	0000	13FD01250501	QC	-	-	GW	G	5	2	2	1						DUP OF 13GWT1404

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	1/25/05	1830	1. RECEIVED BY FEDERAL EXPRESS	1/25/05	1830
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 3673 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO N7448 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGE PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB # 8447 8135 7917		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G P
PRESERVATIVE USED: 4°C 4°C 4°C/H2SO4

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: NITROAROMATICS & NITRAMINES (8330)	RDX DEGRADATION PRODUCTS (MOD. 8330)	NITRATE + NITRITE (AS N) EPA 353.2						COMMENTS
2/01	1050	13GWT0905	13MW T09	-	-	GW	G	5	2	2	1						
2/01	1345	13GWT2803	13MW T28	-	-	GW	G	3	1	1	1						MIN VOL
2/01	1450	13GWT3103	13MW T31	-	-	GW	G	5	2	2	1						
2/02	1015	13GWT4603	13MW T46	-	-	GW	G	5	2	2	1						
2/02	1105	13GWT4003	13MW T40	-	-	GW	G	5	2	2	1						
2/02	1300	13GWT3703	13MW T37	-	-	GW	G	5	2	2	1						
2/02	1500	13GWT1304	13MW T13	-	-	GW	G	5	2	2	1						

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Terry Rojahn	2/02/05	1800	1. RECEIVED BY FEDERAL EXPRESS	2/02/05	1800
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY) 4/02R

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 3678 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N7448 CTO 343	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGE PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Terry Rojahn		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX. AB# 8447 8135 7917		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: 4°C

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: NITROAROMATICS & NITRAMINES (8330)								COMMENTS
2/02	0855	13SW2203	13SW 22	–	–	SW	G	2	2								
2/02	0955	13SW1403	13SW 14	–	–	SW	G	2	2								
2/02	1010	13SW1503	13SW 15	–	–	SW	G	2	2								
2/02	1023	13SW1603	13SW 16	–	–	SW	G	2	2								
2/02	1045	13SW3003	13SW 30	–	–	SW	G	2	2								
2/02	1235	13SW2002	13SW 20	–	–	SW	G	2	2								
2/02	1300	13SW1902	13SW 19	–	–	SW	G	2	2								
2/02	1340	13SW1103	13SW 11	–	–	SW	G	2	2								

1. RELINQUISHED BY Terry Rojahn	DATE 2/02/05	TIME 1800	1. RECEIVED BY FEDERAL EXPRESS	DATE 2/02/05	TIME 1800
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS:

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER 3677 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
CTO 343 N7448	NSWC CRANE	RALPH BASINSKI	(412) 921-8308	LAUCKS / HUGH PRENTICE
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		TERRY ROJAHN	(412) 921-8857	940 SOUTH HARNEY ST.
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED. EX AB # 8447 8135 7413		SEATTLE, WA 98108

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: NITROAROMATICS & NITRAMINES (8330)	TYPE OF ANALYSIS: RDX DEGRADATION PRODUCTS (MOD 8330)	TYPE OF ANALYSIS: NITRATE + NITRITE (AS N) EPA 353.2					COMMENTS
									CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	P				
									PRESERVATIVE USED	4°C	4°C	4°C/H2SO4				
2/03	1115	13GWT1504	13MW T15	–	–	GW	G	5	2	2	1					
2/03	1140	13GWT5102	13MW T51	–	–	GW	G	5	2	2	1					

1. RELINQUISHED BY	DATE 2/03/05	TIME 1830	1. RECEIVED BY FEDERAL EXPRESS	DATE 2/03/05	TIME 1830
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

A.3 SWMU 13 WATER LEVEL MEASUREMENTS ROUND 4

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: NSWC CRANE
Project No.: N7448
Location: SWMU 13
Personnel: T. Rojahn/C. Doolan
Weather Conditions: Overcast and 30s
Measuring Device: M-Scope
Tidally Influenced: Yes ___ No _X_
Remarks: ----

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
13MWT01	1/19/2005	1711	715.34		7.24	NA	708.1	
13MWT02	1/19/2005	1706	704.72		16.07	NA	688.65	
13MWT03	1/19/2005	1713	721.10		9.84	NA	711.26	
13MWT04	1/19/2005	1704	706.84		13.57	NA	693.27	
13MWT05	1/19/2005	1658	696.44		6.02	NA	690.42	
13MWT06	1/19/2005	1715	717.93		11.37	NA	706.56	
13MWT07	1/19/2005	1701	687.22		3.92	NA	683.3	
13MWT08	1/19/2005	1703	700.56		4.15	NA	696.41	
13MWT09	1/19/2005	1417	705.90		8.16	NA	697.74	
13MWT10	1/19/2005	1517	700.15		13.65	NA	686.5	
13MWT11	1/19/2005	1511	682.29		8.61	NA	673.68	
13MWT12	1/19/2005	1506	682.12		10.52	NA	671.6	
13MWT13	1/19/2005	1317	701.98			NA	*NA	Problem w/value
13MWT14	1/19/2005	1321	705.50		13.51	NA	691.99	
13MWT15	1/19/2005	1503	696.65		13.71	NA	682.94	
13MWT16	1/19/2005	1451	684.35		13.04	NA	671.31	
13MWT17	1/19/2005	1449	693.01		9.15	NA	683.86	
13MWT18	1/19/2005	1500	702.92		19.04	NA	683.88	
13MWT19	1/19/2005	1334	705.82		9.45	NA	696.37	
13MWT20	1/19/2005	1421	702.07		4.48	NA	697.59	
13MWT21	1/19/2005	1446	690.74		8.94	NA	681.8	
13MWT22	1/19/2005	1437	671.96		7.71	NA	664.25	
13MWT23	1/19/2005	1424	699.14		7.96	NA	691.18	
13MWT24	1/19/2005	1426	693.93		8.83	NA	685.1	
13MWT25	1/19/2005	1432	681.57		6.65	NA	674.92	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N7448
Location:	SWMU 13	**Personnel:**	T. Rojahn/C.Doolan
Weather Conditions:	Overcast and 30s	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ___ No _X_	**Remarks:**	----

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
13MWT26	1/19/2005	1430	687.49		9.60	NA	677.89	
13MWT27	1/19/2005	1505	698.13		8.20	NA	689.93	
13MWT28	1/19/2005	1418	705.55		77.82	NA	627.73	
13MWT29	1/19/2005	1311	700.44		5.25	NA	695.19	
13MWT30	1/19/2005	1327	698.94		11.08	NA	687.86	
13MWT31	1/19/2005	1336	696.21		9.71	NA	686.5	
13MWT32	1/19/2005	1343	696.04		8.40	NA	687.64	
13MWT33	1/19/2005	1330	701.97		8.93	NA	693.04	
13MWT34	1/19/2005	1442	695.93		4.98	NA	690.95	
13MWT35	1/19/2005	1510	681.73		64.30	NA	617.43	
13MWT36	1/19/2005	1410	667.21		18.73	NA	648.48	
13MWT37	1/19/2005	1406	662.29		13.67	NA	648.62	
13MWT38	1/19/2005	1408	661.04		61.78	NA	599.26	
13MWT39	1/19/2005	1401	654.44		12.76	NA	641.68	
13MWT40	1/19/2005	1351	667.18		17.89	NA	649.29	
13MWT41	1/19/2005	1356	665.67		66.28	NA	599.39	
13MWT42	1/19/2005	1358	670.31		11.45	NA	658.86	
13MWT43	1/19/2005	1620	690.9		8.06	NA	682.84	
13MWT44	1/19/2005	1616	683.82		64.46	NA	619.36	
13MWT45	1/19/2005	1445	690.59		69.81	NA	620.78	
13MWT46	1/19/2005	1403	653.61		56.87	NA	596.74	
13MWT47	1/19/2005	1300	677.23		7.20	NA	670.03	
13MWT48	1/19/2005	954	548.67		10.13	NA	538.54	
13MWT49	1/19/2005	1012	553.90		7.22	NA	546.68	
13MWT50	1/19/2005	1016	560.49		7.44	NA	553.05	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	NSWC CRANE	**Project No.:**	N7448
Location:	SWMU 13	**Personnel:**	T. Rojahn/C. Doolan
Weather Conditions:	Overcast and 30s	**Measuring Device:**	M-Scope
Tidally Influenced:	Yes ___ No _X_	**Remarks:**	----

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments / Flow in gpm
13MWT51	1/19/2005	1018	571.36		4.07	NA	567.29	
13SG01	1/19/2005	1706	698.35		1.77	NA	696.58	<1
13SG02	1/19/2005	1709	701.95		3.70	NA	698.25	12.5
13SG03	1/19/2005	1255	696.24		Dry	NA	Dry	0
13SG04	1/19/2005	1310	688.99		2.44	NA	686.55	1.5
13SG05	1/19/2005	1319	692.94		3.88	NA	689.06	1
13SG06	1/19/2005	1325	704.88		2.35	NA	702.53	<!
13SG07	1/19/2005	1430	680.3		1.52	NA	678.78	<1
13SG08	1/19/2005	1438	665.95		5.10	NA	660.85	<5
13SG09	1/19/2005	1457	675.3		4.17	NA	671.13	<5
13SG10	1/19/2005	1515	676.1		4.96	NA	671.14	16
13SG11	1/19/2005	1304	675.36		2.45	NA	672.91	1.5
13SG12	1/19/2005	1053	595.28		6.88	NA	588.41	280
13SG13	1/19/2005	1036	572.52		5.70	NA	566.65	10
13SG14	1/19/2005	1020	567.75		6.31	NA	561.38	29
13SG15	1/19/2005	1006	544.18		4.95	NA	534.21	403
13SG16	1/19/2005	948	537.01		Dry	NA	Dry	0
13SG17	1/19/2005	938	532.48		Dry	NA	Dry	0
13SG18	1/19/2005	930	524.23		8.18	NA	516.07	1210

* All measurements to the nearest 0.01 foot

A.4 SWMU 13 EQUIPMENT CALIBRATION FORMS ROUND 4

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

INSTRUMENT NAME/MODEL: YSI

SITE NAME: SWMUs 08 & 15 12/13/16

MANUFACTURER: YSI

PROJECT No.: N1245, CTO 0331 6878/7498

SERIAL NUMBER: 0100956 AA

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
1/5/05	JG CO	6.99	4.05	455	9.87	256.5 17.61	7.00	4.00	1000	9.50	237.4 17.33	7.0 4110 8/23/05 4.0 4098 8/12/05	
1/6/05	JG CO	7.06	3.92	1069	9.22	219.3 17.61	6.99	4.00	1001	9.10	237.6 17.69	SPC 4387 1/21/05 ORP 032 0667	10/05
1/7/05	CO	7.01	4.21	1009	10.04	238.1 16.55	7.00	4.00	1000	9.61	238.0 16.68	"	
1/8/05	CO	7.10	3.79	946	9.74	250.2 15.07	7.00	4.00	1000	9.97	234.6 15.30	"	
1/9/05	CO	7.01	3.99	1094	9.54	233.8 15.47	7.00	4.00	1000	9.63	238.5 15.55	"	
1/11/05	CO	7.01	4.00	1005	7.64	237.6 17.28	7.00	4.00	1001	9.11	236.8 17.43	"	
1/12/05	TR	7.06	3.90	990	9.15	246 19.25	7.00	4.00	1000	9.07	237.4 19.32	"	
1/22/05	CO	7.04	3.96	1014	8.40	227.3 14.53	7.00	4.00	1000	8.60	238.2 14.62	"	replaced DO membrane
1/23/05	CO	7.00	4.03	998	10.53	242.2 10.63	7.00	4.00	1000	9.62	236.7 10.57	"	
1/25/05	CO	7.00	3.99	1101	10.96	227.9 15.31	7.00	4.00	1000	8.88	238.2 16.62	"	
							SWMU 13/16 R&4						
2/1/05	CO	6.98	4.01	910	10.40	240.6 17.93	7.00	4.00	1000	8.79	237.5 17.57	SPC 4599 7/27/05	
2/2/05	JG	7.06	3.97	865 (-)	1136	233.8 18.05	7.00	4.00	1000	9.42	237.5 18.12	"	
2/3/05	JG	6.86	4.00	1100	9.86 ~~1002~~	241.6 18.23	7.00	4.00	1000	9.45	237.6 18.10	"	
2/5/05	CO	7.10	3.99	1109	4.77	235.6 16.24	7.00	4.00	1000	9.12	237.2 16.30	"	replaced DO membrane
2/6/05	CO	7.03	4.00	1036	9.12	238.6 17.10	7.00	4.00	1000	8.77	237.5 17.04	"	
2/7/05	JG	6.98	4.02	952	9.60	241.2 18.70	7.00	4.00	1000	8.92	238.6 18.60		
2/8/05	JG	6.58	4.03	1016	9.61	242.3 19.87	7.00	4.00	1000	9.15	237.5 19.87		

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME: NSWC CRANE

SITE NAME: SWMUs 08 &15 12/13/16

PROJECT No.: N1245, CTO 0331
6878 & 7498

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99K1014 AG

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
1/5/05	JG CD	7.09	3.84	994	8.46	236.7 17.48	7.00	4.00	1000	9.70	239.8 17.51	7.00 4110 8/23/05 4.00 4098 8/18/05	
1/6/05	JG CD	7.03	3.89	536	8.63	268.7 18.38	7.00	4.01	1000	9.13	239.6 18.01	SPC 4387 1/21/05 ORP 03K0667 10/05	
1/7/05	JG	6.98	3.88	840	9.49	214.5 15.38	7.00	4.00	1000	9.66	240.0 15.63	"	
1/8/05	JG	6.92	3.90	826	9.24	220.7 14.37	7.00	4.00	1000	9.81	239.9 14.16	"	
1/10/05	CD	7.02	3.87	529	9.59	225.5 16.17	7.00	4.00	1000	9.71	251.6 16.44	"	
1/12/05	CD	7.06	3.89	1039	9.57	214.1 17.94	7.00	4.00	1000	9.26	253.1 17.89	"	
1/22/05	CD	6.99	3.89	1068	7.55	253.1 18.25	7.00	4.00	1000	8.43	235.1 18.34	"	replaced DO membrane
1/23/05	CD	7.04	3.82	1065	9.12	217.3 11.75	7.00	4.00	1000	9.91	252.5 11.75	"	
1/25/05	CD	7.08	3.84	1130	8.90	211.5 17.93	7.00	4.00	1000	8.85	252.9 17.92	"	
SWMU 13/16 R&4													
2/1/05	JG	7.02	3.88	978	14.73	210.1 18.40	7.00	4.00	1010	9.27	240.2 18.40	SPC 4599 7/27/05	
2/2/05	JG	7.04	3.95	947	15.62	18.56 208.8	7.00	4.00	1000	9.35	18.78 250.9		
2/3/05	JG	6.96	3.95	1155	12.01	18.14 221.7	7.00	4.00	1000	9.41	18.37 250.7		
2/4/05	JG	7.04	3.94	952	13.65	18.34 209.3	7.00	4.00	1000	9.37	18.32 250.4		
2/5/05	JG	7.00	3.92	945	12.95	[illegible] 208.6	7.00	4.00	1000	9.04	19.09 252.8		
2/6/05	JG	7.11	3.88	1151	12.12	19.74 208.3	7.00	4.00	1000	8.99	19.66 252.9		
2/7/05	JG	6.98	3.92	1173	10.05	208.2 19.77	7.00	4.00	1000	8.97	19.74 252.8		
2/8/05	JG	6.97	4.07	1154	9.02	211.2 19.70	7.00	4.00	1000	9.12	19.70 252.9		

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs ~~08 & 15~~ 13/16

PROJECT No.: N~~1245~~ 7448, CTO ~~0331~~ 357 / 6878 CTO 343

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 02A 0~~257~~ 527 AF

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	INITIAL READINGS PH 4	INITIAL READINGS COND	INITIAL READINGS DO	INITIAL READINGS ORP	FINAL READINGS PH 7	FINAL READINGS PH 4	FINAL READINGS COND	FINAL READINGS DO	FINAL READINGS ORP	Calibration Standard (Lot No.)	Remarks and Comments
2/2/05	JG	6.97	3.94	1095	10.26	251.6 17.28	7.00	4.00	1000	9.25	237.5 17.27	7.0 4110 8/23/05 4.0 4048 8/18/05	
2/3/05	JG	6.87	4.05	888	11.11	234.7 ~~21.79~~ 14.2	7.00	4.00	1000	9.52	237.4 18.02	SPC ~~1000~~ 4590 7/27/05 ORP 03K 0667	10/05
2/5/05	JG	3.38	7.54	1.53	9.39	11.11 242.6	7.00	7.00	1000	8.84	237.5 19.17	"	
2/6/05	CO	—	—	1014	6.91	236.5 17.01	—	—	1000	8.87	237.6 17.17	"	broken pH probe, replaced DO membrane
2/7/05	JG	—	—	1007	9.15	20.26 237.5	—	—	1000	9.12	20.29 237.5	"	"
2/8/05	JG	—	—	1005	9.42	18.50 236.5			1000	9.10	18.25 237.4	"	

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 08 &15 & 12

PROJECT No.: N1245, CTO 0331 6878

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 01D0956 AA

Date of Calibration	Person Performing Calibration	INITIAL READINGS PH 7	PH 4	COND	DO	ORP	FINAL READINGS PH 7	PH 4	COND	DO	ORP	Calibration Standard (Lot No.)	Remarks and Comments
2/15/05	CD	7.03	3.99	1024	10.32	242.2 16.04	7.00	4.00	1000	9.47	237.7 16.08	4.0 4098 8/18/05 7.0 4594 7/28/06	
2/16/05	CD	6.97	4.03	1007	10.22	238.9 12.97	7.00	4.00	1000	9.75	236.4 13.03	SPC 4599 7/27/05 ORP 03150667	
2/17/05	CD	7.00	3.96	1015	9.38	~~716.1~~ ~~@14.10~~	7.00	4.00	1000	9.48	~~232.5~~ ~~@13.93~~	"	
						237.7 14.10					237.2 14.43		
2/18/05	CD	7.00	4.01	997	9.43	234.9 12.36	7.00	4.00	1000	9.77	237.3 12.36	"	
2/19/05	CD	6.99	3.97	1007	9.45	241.3 10.57	7.00	4.00	1000	9.90	237.3 10.57	"	
2/20/05	CD	7.00	4.04	1030	7.69	231.2 14.17	7.00	4.00	1000	9.56	237.5 14.17	"	
2/21/05	CD	7.03	3.99	1002	7.43	236.1 16.67	7.00	4.00	1000	9.41	237.5 16.62	"	
2/22/05	CD	7.03	4.01	1014	14.86	233.2 13.47	7.00	4.00	1000	9.55	237.5 13.74	"	
3/2/05	JG	7.02	4.18	1029	4.24	233.7 14.77	7.00	4.00	1000	9.75	237.5 14.72	"	
3/3/05	JG	6.98	3.99	974	8.80	236.3 14.26	7.00	4.00	1000	9.38	237.5 14.20	"	
3/4/05	JG	7.02	4.24	1065	5.78	234.5 17.62	7.00	4.00	1002	9.74	237.5 17.74	"	
3/5/05	JG	7.25	3.78	974	11.74	234.6 16.31	7.00	4.00	1001	9.23	237.5 16.00	"	
3/6/05	JG	6.97	3.94	995	9.25	235.7 16.72	7.00	4.00	1000	9.54	237.5 16.30	"	
3/7/05	JG	7.03	4.03	948	6.38	237.4 17.14	7.00	4.00	1001	9.15	237.5 17.10		

Tetra Tech NUS, Inc.

DOCUMENTATION OF FIELD CALIBRATION

PROJECT NAME : NSWC CRANE

SITE NAME: SWMUs 08 &15 & 12

PROJECT No.: N1245, CTO 0331
E 6876

INSTRUMENT NAME/MODEL: YSI

MANUFACTURER: YSI

SERIAL NUMBER: 99K1014 AG

Date of Calibration	Person Performing Calibration	INITIAL READINGS					FINAL READINGS					Calibration Standard (Lot No.)	Remarks and Comments
		PH 7	PH 4	COND	DO	ORP	PH 7	PH 4	COND	DO	ORP		
2/15/05	CD	7.10	3.84	1185	5.61	210.5 16.27	7.00	4.00	1000	9.31	252.9 16.37	4.0 4098 8/18/05 7.0 4594 7/28/06	replaced DO membrane
2/16/05	CD	7.07	3.83	1199	8.50	211.4 13.91	7.00	4.00	1000	9.53	252.9 13.73	SPC 4597 7/27/05 ORP 03K0667	
2/17/05	CD	7.00	3.95	1212	7.51	210.1 14.10	7.00	4.00	1000	9.35	252.9 13.93	"	
2/18/05	CD	7.05	3.85	1209	7.92	210.6 13.35	7.00	4.00	1000	9.49	252.9 13.29	"	
2/19/05	CD	7.06	3.90	1196	7.94	210.6 11.94	7.00	4.00	1000	9.63	252.9 11.32	"	
2/20/05	CD	6.98	3.93	1241	7.92	206.3 15.82	7.01	4.00	999	7.89	252.9 15.91	"	
2/21/05	CD	7.01	3.99	1262	8.21	203.2 16.39	7.00	4.00	1000	9.27	252.9 16.40	"	
2/22/05	CD	6.98	3.96	1268	8.88	202.2 14.46	7.00	4.00	1000	9.47	252.9 14.07	"	
3/2/05	JG	6.75	4.06	1305	10.54	201.3 16.95	7.00	4.00	1000	9.70	252.9 16.78	"	
3/3/05	JG	6.92	4.04	926	10.34	198.8 14.26	7.00	4.00	1000	9.33	252.9 14.71		
3/4/05	JG	6.94	4.04	1397	8.83	197.2 16.70	7.00	4.00	1000	9.33	252.9 16.50		

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: SWMUs 08/15 12/13/16

PROJECT NO.: 1245 6878 / 7448

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
1-5-05	LaMotte	4175-1503	QD	0	–	9.96	10.0	NA	ok
1-6-05	"		QD	0	–	9.99	10.0		ok
1-7-05	"		QD	0	—	10.00	10.0		ok
1-8-05	"		QD	0	–	10.0	10.0		ok
1-9-05	"		CO	0.05	0	10.0	10.0		ok
1-10-05	"		CO	0	—	10.0	—		ok
1-11-05	"		CO	0	0	10.0	10.0		ok
1-12-05	"		CO	0	0	9.87	10.0		ok
1-22-05	"		CO	0	—	10.0	—		ok
1-23-05	"		TR	0	0	10.0	—		ok
1-25-05	"		CO	0.0	—	10.0	—		ok

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: SWMU 08/15 12/13/16

PROJECT NO.: 1245 6878/7448

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
1-5-05	Lamotte	4536-3303	QD	0	–	9.98	10.0		ok
1-6-05	"		QD	0	–	10.0	–		ok
1-7-05	"		QD	0	–	10.0	–		"
1-8-05	"		QD	0	–	10.0	–		ok
1-12-05	"		CD	0	–	10.0	–		OK
1-22-05	"		CD	0	–	10.0	–		OK
1-23-05	"		GK	0	0	10.0	–		OK
1-25-05	"		CD	0.0	–	10.0	–		OK

Turbidity Meter
LaMotte
0355-4197

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: NSWC CRANE

PROJECT NO.: 7440/6878

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
2-2-05	2020	0355-4197	TR	0.0	0.0	0.0	0.0	Provided by Vendor	ok
2-3-05			[illegible]	0	0	11	9.9		ok
2-5-05			[illegible]	0	0	9.2	10		
2-6-05			LD	0	0	10	10		ok
2-7-05			TR	0	0	10	10		ok

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: SWMU 13/16 RQ4 12 Rd 2

PROJECT NO.: 7448/6878

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
2-1-05	LaMotte	4536-3303	QS	0	0	10	10	NA	
2-2-05			QS	0	0	10	10		
2-3-05			QS	0	0	10	10		
2-4-05			QS	0	0	11	10		
2-5-05			QS	0	0	10	10		
2-6-05			CD	0	0	10	10		ok
2-7-05			TR	0	0	10	10		
2-8-05			QS	0	0	9.8	10		
2-15-05			CD	0	0	9.9	10		ok
2-16-05			CD	0	0	10	10		ok
2-17-05			CD	0	0	9.5	10		ok
2-18-05			CD	0	0	10	10		ok
2-19-05			CD	0	0	10	10		ok
2-20-05			CD	0	0	10	10		ok
2-21-05			CD	0	0	10.31	10		ok
2-22-05			CD	0	0	10.64	10		ok

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: SWMU 13/16 RD 4 12 Rd 2

PROJECT NO.: 7448 6878

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
2-1-05	Lamotte	4175-1503	QD	0	0	10	10	NA	
2-2-05			QD	0	0	10	10		
2-3-05			QD	0	0	9.97	10		
2-4-05			CD	0	0	10.12	10		
2-5-05			QD	0.7	0	9.98	10		
2-6-05			CD	0	0	9.90	10		OK
2-7-05			TR	0	0	10	10		OK
2-15-05			CD	0	0	9.27	10		replaced battery
2-16-05			CD	0	0	10.54	10		OK
2-17-05			CD	0	0	9.41	10		OK
2-18-05			CD	0	0	9.95	10		OK
2-19-05			CD	0	0	10.26	10		OK
2-20-05			CD	0	0	10	10		OK
2-21-05			CD	0	0	10.07	10		OK
2-21-05			CD	0	0	10.56	10		OK

APPENDIX B

SMWU 13 MISCELLANEOUS FIELD DOCUMENTATION ROUND 4

B.1 SWMU 13 SITE LOGBOOK ROUND 4

NEWC CRUISE

NT448

SWMU 13&16

1376

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©SCIENTIFIC BINDERY PRODUCTIONS, 60 EAST 13TH STREET, CHICAGO, ILLINOIS 60605

* START ROUND #4 *

SUMMARY 1/19

- COMPLETE GW/ & STAFF GAUGE MEAS.
- Conduct Well Insp. @ Monitoring Wells 7/1 - 7/5

DIETZGEN-SUPER-PRODUCTS CHICAGO 60625 MADE IN U.S.A.

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

WED. 1/19/05

Work continued from Page WEATHER: Cold & OVERCAST TEMP 30's

0720 HRS - ARRIVE @ B 3245 - FAX J. SCHUBERT 1 PAGE FAX (WL MEAS.)
C.D. - DECON & T.R. PREP & MEAS. WL & STAFF GAUGES @ SWMU13

MW ID	W.L.	TIME
13MWT01	7.24	1711
02	16.07	1706
03	9.84	1713
04	13.57	1704
05	6.02	1658
06	11.37	1715
07	3.92	1701
08	4.15	1703
09	8.16	1417
10	13.65	1517
11	8.61	1511
12	10.52	1506
13	11.79	13:17
14	13.51	13:21
15	(T4) ~~11.79~~ 13.11	1503
16	13.04	1451
17	9.15	1449
18	19.04	1500
19	9.45	1334
20	4.48	1421
21	8.98	1446
22	7.71	1437
23	7.96	1424
24	8.83	1426
25	6.65	1432
26	9.60	1430
27	8.20	1505
28	77.82	1418
29	5.25	1311
30	11.08	1327

MW ID	WL	TIME
T31	9.71	1336
32	8.40	1343
33	8.93	1330
34	4.98	1442
35	64.30	1510
36	18.73	1410
37	13.67	1406
38	61.78	1408
39	12.76	1401
40	17.89	1351
41	66.28	1356
42	11.45	1358
43	8.06	1620
44	64.46	1616
45	69.91	1445
46	56.87	1403
47	7.20	1300
48	10.13	0954
49	7.22	1012
50	7.44	1016
51	4.07	1018

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tony Rapp

DATE 1/19/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

VOID THIS PAGE

SCIENTIFIC BINDERY PRODUCTS CHICAGO 33535 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 7446

BOOK NO. 1376

WED 1/19/05 con't

Work continued from Page

STAFF GAUGE ID	WATER LEVEL	TIME	FLOW: MEAS. OR ESTIMATE	FLOW GPM
13SG01	1.77	1706	<1	<1
02	3.70	1709	1ft/sec 0.04 x 0.7'	12.5
03	DRY	1255	—	—
04	2.44	1310	SAME AS SG 11	1.5
05	3.88	1319	~1gpm	~1
06	2.35	1325	<1gpm	<1
07	1.52	1430	<1gpm	<1
08	5.10	1439	<5gpm	<5
09	4.17	1457	<5gpm	<5
10	4.96	1515	1ft/sec 0.05 x 0.7	16
11	2.45	1304	1.5 gpm (meas)	1.5
12	6.88	1053	1ft/sec 0.05 x 12.5	280
13	5.70	1036	(12) ~~1ft/sec~~ 10 gpm meas.	[illegible]
14	6.31	10	1ft/3SEC 0.15 x 1.3'	2[illegible]
15	4.95	1006	1ft/sec .05 x 18'	403
16	DRY	0948	—	—
17	DRY	0938	—	—
18	8.18	0930	1ft/sec .3 x 9'	1210

1100 Hrs - Replaced missing well cap @ SWMU 9
1115 Hrs - Flat Tire
Repair Tire w/ Fix a Flat @ Base Gas Station
1150 Hrs - Lunch
1225 Hrs - Arrive @ B-3245
Check in w/ office
1255 Hrs - Meas. staff gauges & w.l. again @ SWMU 13
1534 Hrs - Arrive B 3245 pick up Well Ins. Sheets for SWMU 7
1544-1600 Hrs - Perform well inspections for 7/1 - 7/5
1616 Hrs - Resume water level measurements @ T43 & T44

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page 127

SIGNATURE Terry Rogers DATE 1-19-05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

VOID THIS PAGE

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60625 MADE IN USA

WED 1-19-05 cont

Work continued from Page

1625 Hrs - NEED to WAIT until 1700 Hrs to ENTER B-165 BUFFER ZONE

1700 Hrs - RESUME WATER LEVEL MEAS.

1718 Hrs - Complete WATER level & STAFF GAUGE MEAS.

1726 Hrs - RETURN to B-3245

- Drop off EQ.

1730 Hrs - LEAVE FOR Hotel

END

SIGNATURE

DATE 1-19-05

DISCLOSED TO AND UNDERSTOOD BY

DATE

WITNESS

DATE

SAMPLE SUMMARY 1/22/05

- PURGE 13MWT45
- PURGE & SAMPLE 13MWT21
- Cut day short due to very bad weather conditions.

SAT. 1-22-05

Work continued from Page Weather - Strong wind snow & temp in teens

0705 Hrs - Arrive @ B-3245
- Prep to sample G.W
- Call YSI - change DO membrane
- Check in w/ T. Johnson @ Home
  - Need to check on Microseeps lab for methane, ethane & ethene samples for SWMU 16
- Pick wells @ SWMU 13 that are close in order to train C.D. on bladder pump sampling
- Prep. vehicels for GW sampling

1030 Hrs - Arrive @ SWMU 13

SAMPLE ID	Start Purge	END Purge	VOL. Purges	SAMPLE TIME	SAMPLER
13GWT4503	1100	1300	16L	NA	TK
13GWT21	1120	1250	9.36L	1255	CD

1405 Hrs - Finish clean up @ SWMU 13
1420 Hrs - Return to B-3245
- Process samples
- Bring in all EQ, meters subject to cold
- Unload Nitrogen cylinder for travel to Motel

1505 Hrs - Leave B-3245 for Hotel

END

SIGNATURE Terry Rogers DATE 1/22/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

B 100 P ©

Sample Summary for 1/23/05

Sample ID	Start Purge	End Purge	VOL Purged	Sample Time	Sampler
13GWT0104	0950	1100	7.3 L	1105	T.R.
13GWT1704	0935	1225	16.6 L	1235	C.D.
13GWT4503	1/22	1/22	16 L	1250 (1/23)	T.R.
13GWT1194	1400	1500	5.5 L	1505	TR
13GWT3403	1345	1505	10.6 L	1510	CD

TITLE NSWC CRANE

CREW
C. Doolan
T. McJahn

PROJECT NO. 7448

BOOK NO. 1376

SUN - 1-23-05

Work continued from Page

WEATHER - Very Cold (Teens) & Mostly Sunny

0730 Hrs - Arrive @ B 3245
- PREP FOR GW SAMPLING
- CALI. YSIs & Turb. METERS

0930 Hrs - Arrive @ SWMU 13
- Water Level @ 13MWT45 = 79.0' will return later
- Assist EO Prep. to start sampling 13MWT17

0940 Hrs - Arrive @ 13MWT01

0950 Hrs Start Purge @ 13MWT01
END Purge @ 1100 Hrs
Start Sampling @ 1105 Hrs
Finish @ 1150 Hrs

1200 Hrs - Check on CO - having problems w/ M-Scope - give him more

1215 Hrs - Pick up sandwich @ Subway

1230 Hrs - Return to SWMU 13 - Replace M-Scope batteries
M-Scope OK Now

1250 Hrs - Start sampling @ 13MWT45

1337 Hrs - Finish Clean up @ 13MWT45 min. sample vol.

1348 Hrs - Held CO get set up @ 13MWT34

1400 Hrs - Start Purge @ 13MWT11
END PURGE = 1500 Hrs
SAMPLE TIME = 1505 Hrs

1615 Hrs - Finish @ 13MWT11

1645 Hrs - Arrive @ B 3245
- Secure samples in Frig.
- Unload EQ & Gas cylinders FROM SUVS
- ~~Prep. Sample~~ Paperwork

1655 Hrs - Leave B-3245 For Hotel Room

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tony Hjark

DATE 1/23/05

DISCLOSED TO AND UNDERSTOOD BY **DATE** **WITNESS** **DATE**

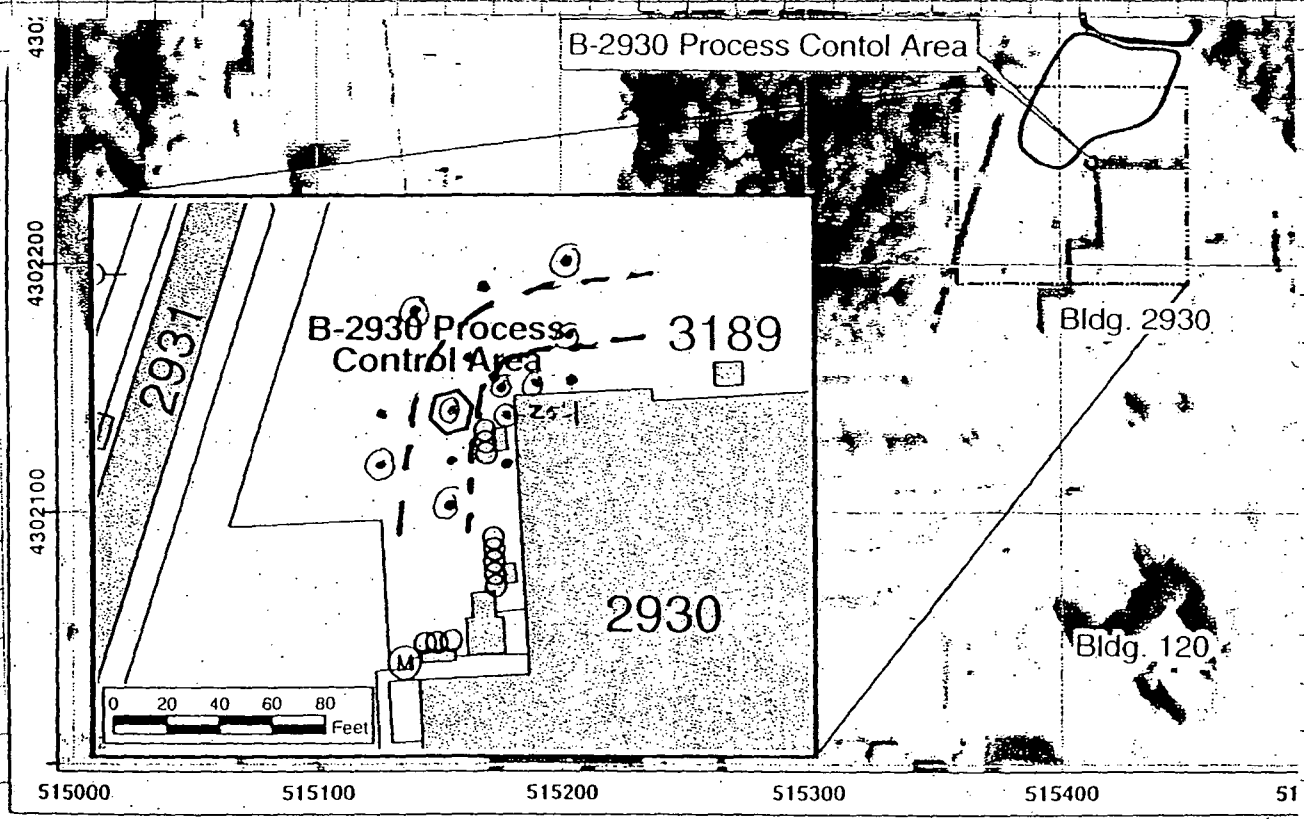
SAMPLE SUMMARY 1/25/05 :

- RECON B-2930 W/ T. BRENT
- CONF. CALL W/ B. GATES, T. BRENT & R. BASINSKI
  NEED to lay out sample locations ASAP FOR
  utility clearance
- RECON. RIFLE RANGE FOR BULLETS
- PICK 55 GAL DRUMS (750 RECEIVED) W/
  ~50 lbs OF additional weight
- ASSEMBLE bladder pump FOR 13MWT51
- SAMPLE MONITORING WELLS 13MWT47 & 14
- MEAS. WLs OF NEW WELLS @ SWMU 16
  PER R. BASINSKI'S Request FOR Round 3

TUES 1-25-05

Work continued from Page

0700 Hrs - Arrive @ B 3245
TR CHECK IN W/ T. BRENT. CD PREP FOR GW SAMPLING
0710 Hrs - Arrive @ B-2930 w/ T. Brent
NEED DPT to sample - WELL packed gravel
Propose the following (SEE Figure):



⊙ = 3 Loc. / composite
• + ⊙ = 5 Loc. / composite

3-5 borings - 5' from wall composite
3-5 " - 30' " " "
3-5 " - 50' " " "

0725 Hrs - Return to BLDG # 3245
• Develope Figure & FAX to R. Basinski
• Prep. Paperwork for GW sampling & assist CD with GW Prep.
0845 Hrs - Arrive @ 13 MILE 47
• Assist CD w/ carrying eq to well & start up
2920 Hrs - Return to B-3245

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page 135

SIGNATURE DATE
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

END

Cont from P. 135 :

WELL ID	W.L.	TIME
16MWT21	65.44	1745
16MWT20	3.43	1602
16MWT19	3.21	1800

1810 Hrs - Leave Base
1855 Hrs - Finish Car Wash
1932 Hrs - Check out supplies & eq. @ Lowe's

END

SCIENTIFIC ENDERY PRODUCTS

TUES 1-25-05 Cont

Work continued from Page

0920 Hrs - Return to B-3245
- PAPERWORK
- FAX COC FROM MON SHIPMENT to LAUCKS
- FAX " " FRI & MON. SHIPMENT to OFFICE

1000 Hrs - Check in w/ Walt Wagoner
RIFLE RANGE RECON

1135 Hrs - Check out w/ Mr. Wagoner

1150 Hrs - Pick up a sub & subway

1200 Hrs - Arrive @ B 3245
- Check in w/ OFFICE (J. Goerdt - to make labels & tables for SWMU 12)
- Prep for CONF. CALL

1230 Hrs - CONF. CALL
W/ B. Gates, T. Brent & R. Bosinski Regarding B2930
NEED to start out right away for utility clearance - will purchase some eq. & supplies tonight

1300 Hrs - CONF. CALL OVER
SEE what supplies we HAVE - 9 steel Rods & five cones; Tom will get some 55 gal Drums to SECTION OFF WORK AREA.

1320 Hrs - Check on CD. - watch well while he gets Lunch @ subway

1420 Hrs - Return to B-3245
- T. Brent RECIEVED 4 drums - TR opened drums & put some weight inside of EACH drum
- PAPERWORK
- Check bladder pump for 13MW T51
Pump Not fully ASSEMBLED - TR ASSEMBLED CAP to twin bonded tubing
- Prep samples for SHIPMENT on COC 3672 via FED EX AB# 8447 8135 7928

1700 Hrs - CD - LEFT B 3245 to Drop OFF FED EX SHIPMENT
TR - SOME CLEAN UP

1730 Hrs - TR START WLS @ SWMU 16 Now We're ready

Work continued to Page 134

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

SIGNATURE Tony Lopez DATE 1/25/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

VOID THIS PAGE

SCIENTIFIC & INDEX PRODUCTS CORPORATION

Work continued from Page

0700 Hrs - Arrive @ B 3245
- Decon Augers
- Prep. to lay out 9 soil boring locations @ B-2930
- Fax COC # 3672 to Laucks Lab & office

0800 Hrs - Arrive @ B-2930
Stake out 9 Boiling locations & set up traffic barricades for steel rods in Parking lot

0925 Hrs - Return to B 3245
- Call J. Goerdt - have him order Tyvek bags (1000)
- Call Lab - request 12 cases of HDPE w/ H_2SO_4 + 9 sets of TOC containers w/ H_3PO_4
- Call In Oxygen order 4 Cylinders of Nitrogen Ask them to pick up 1 empty
- Clean & mop - bathroom, hallways, Lab & office

1045 Hrs - Leave B 3245 for Airport
Remainder of Day Travel
END

SIGNATURE
DATE 1-26/05
DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

TRAVEL DAY 1-31-2005:

- CHECKED ON STATUS OF WATER CHEM. CONTAINERS W/ H_2SO_4 & TOC CONTAINERS W/ H_3PO_4 WITH ANN HO OF LAUCKS, ANN SAID THEY WERE DAY SHIPPED BY SUPPLIERS & SHOULD ARRIVE ON THURS. 2/3/05.
- SEE page 139

SCIENTIFIC SPIRAL PRODUCTS CHICAGO 60607 MADE IN USA

Work continued from Page

TRAVEL DAY

1100 Hrs - CHECK IN @ MOTEL
- GET ON TETRALINK - FROM I PROCUREMENT
- ORDER 3 BEOPUMPS & 2 bladder PUMPS FOR SWMU 12 GW SAMPLING
- SEND E-MAIL to confirm address to T. PATTON FOR SHIPPING

1230 Hrs - ARRIVE @ B-3245 - CO make travel ARRANGEMENTS FOR NEXT SHIFT
- CHECK IN w/ T. BRENT
- Fix broken WATER line discharge BEHIND B-3245 REPLACED VALVE & HOSE, ETC.
- Stocked up CONTAINERS INSIDE OFFICE

1500 Hrs - CHECKED IN @ Public Works to FIND out status OF dig permit FOR B-2930 - DONNA out FOR the day.

1520 Hrs - LEAVE NOTE FOR T. Brent (Donna out will check IN with her tomorrow)

1540 Hrs - LEAVE B-3245 FOR MOTEL

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Tony Rojahn

DATE 1-31-05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLE SUMMARY 2-01-05 :

SAMPLE #/ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	SAMPLER
13GWT 0905	0925	1045	9.33 L	1050	CD
13GWT 2803	0930	1330	19.6 L	1345	JG
13GWT 3103	1245	1445	12.9 L	1450	CD

SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE
TUES. 2-1-05

T. ROJAHN
C. DOOLAN (CD)
J. GOERDT (JG)

PROJECT NO. 7448
BOOK NO. 1376

Work continued from Page

WEATHER - ~~Mostly~~ Partly Cloudy & 40's / 30's

0710 Hrs - ARRIVE @ B-3245

- PULL together PAPERWORK & Labels etc FOR WELLS 13MWT09 & 31 FOR CD & 13MWT28 & 13 FOR JG
- MAKE UP bottle sets FOR ABOVE WELLS
- ORGANIZE PAPERWORK, FILES & WORK BENCHES
- RECEIVE Geopumps (3) & bladder Pumps (2) FROM FED. EX.
- Missing TURBIDY METER & M-SCOPE ordered by JG FROM the OFFICE last WEEK
- CHECKED ON ABOVE w/ T. PATTON - SEEMS PROBLEM lies w/ I PROCUREMENT - wrong delivery date
- CHECK IN w/ Donna Zollman regarding dig permit FOR B 2930 - SHOULD be FINISHED BY Thurs (needs water, sewer, security & communications to complete the permit)
- Split up PAPERWORK FROM last shift (N1245, 6878 & 7448)
- XEROX Flow SHEETS FOR SWMUS 13 & 16
- CALLED R. BASINSKI - No RESPONSE left MESSAGE

1215 Hrs - LUNCH / CHECK IN w/ CD

1245 Hrs - RETURN to B-3245

- WORK ON Logbook
- CHECKED IN w/ R. BASINSKI - Discussed B-2390, SW samples FOR SWMU 12, DRT Status FOR B-2390 & Samples @ SWMU 15 Borings 47 & 48
- CHECK ON TABLE 3-15 FOR Rounds 4-9 NEED to do 1 Dup & 1 MS/MSD per ROUND
- Organize & consolidate Containers & SUPPLIES IN GARAGE
- Go through all coolers FOR Bubble WRAP & TEMP blanks
- REFRIGERATE TEMP Blanks
- PREP COCs FOR SWMUS 13, 16 & 12
- UP DATED COC #3673 w/ samples shown on P 140

1700 Hrs - LEFT B-3245 FOR Motel

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page —

SIGNATURE [signature] DATE 2-1-05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLE SUMMARY 02/02/05:

SAMPLE ID	START PURGE	END PURGE	VOL. PURGED	SAMPLE TIME	SAMPLER
13GWT4603	0850	1010	8.9L	1015	CD
13GWT4003	0930	1100	11L	1105	JG
13GWT3703	1135	1255	8.6 L	1300	CD
13GWT1304	1235	1455	21.6 L	1500	JG

COMPLETED SURFACE WATER SAMPLING @ SWMU 13.

SCIENTIFIC SINGER PRODUCTS CHICAGO

TITLE NSWC CRANE

CREW
J. Goerdt (JG)
C. Doolan (CD)
T. Rojahn (TR)

PROJECT NO. 7448
BOOK NO. 1376

WED 2-2-05

Work continued from Page

Weather - Mostly Cloudy - Overcast - & 30's

0700 Hrs - Arrive @ B-3245
- Select wells for CD & JG to sample
- Locate SW sample locations on Fig. 3-3 (SWMU 13) and Fig. 3-4 (SWMU 16) for sampling this shift
- Prep. to sample surface water @ SWMU 13

0855 Hrs - Collected 13SW2203
0955 Hrs - " 13SW1403
1010 Hrs - " 13SW1503
1023 Hrs - " 13SW1603
1045 Hrs - " 13SW3003
1100 Hrs - Arrive @ B-3245 - Process above samples
1200 Hrs - Lunch
1235 Hrs - Collected 13SW2002
1300 Hrs - " 13SW1902
1340 Hrs - " 13SW1103
1414 Hrs - Finish @ Location 13SW11
1420 Hrs - Check on CD
1450 Hrs - Arrive @ B-3245
- Process samples
- Paperwork & Package samples for shipment
- Order Nitrogen Cylinders
- Fax COCs 3673 & 3678 to office & lab

1630 Hrs - Leave B-3245 for Fed-Ex
1710 Hrs - Drop off samples on AB # 8947 8135 7917

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Terry Rojahn

DATE 2-2-05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

SAMPLE SUMMARY 020305:

SAMPLE ID	START PURGE	END PURGE	VOL PURGED	SAMPLE TIME	SAMPLER
13GWT1504	0850	1110	15.9L	1115	CD
13GWT5102	0850	1135	26.8L	1140	JG

FINISHED SAMPLING GW @ SWMU 13 this date.
Completed surface water sampling @ SWMU 16 with the collection of SW @ 16SW10, 12, 13 & 30

SHIPPED SAMPLES IN COCS 3677 & 3679 via FED EX. AB# 8497 8135 7413

SOUTHWORTH INTERPRODUCTS CORPORATION MADE IN USA

THURS 2-3-05

Work continued from Page WEATHER - Mostly Sunny & 40's

0705 Hrs - ARRIVE @ B-3245

- SELECT WELLS & PREP PAREWHACK FOR GWL CREW ALSO select WELLS 12MWT05 & 25 FOR this AFTERNOON
- SHOULD complete GWL sampling @ SWMU 13 this date
- Call DAVE BAKER SEVERAL times to give him A heads up that WE will be starting work IN SWMU 12 MFA - missed him both times

0820 Hrs - Install Bladder PUMP @ 13MWT51 w/ JG

QED PUMP CERTIFICATION

13MWT51

Quality Certification Manager: [illegible] — Date: MAY 23 2004

Pump Model: T1250 — Batch Serial Number: 050402

If you need further information on
QED's Pump Certification Program,
please contact QED Environmental Systems at 1-800-624-2026

0850 Hrs - Return to B-3245

- Checked in w - DAVE BAKER (MFA SUPERVISOR) - OK to work inside MFA
- Talked to T. Brent to let security known WE WILL be working IN MFA AREA

0925 Hrs - Check in on DC @ 13MWT15

0938 Hrs - CHECK contractors lock @ MFA South Gate - OK

0949 Hrs - Stop & SWMU 16 Break bldg - FRI. No work @ B-146 CHECK contractor Lock - OK

1000 Hrs - Return to B-3245

- H2SO4 Containers arrived - Stock office
- PREP. to COLLECT SW SAMPLES @ SWMU 16
- CHOSE one TRIP BLANK 16TB02030501

SIGNATURE: [signature] DATE: 2/3/05

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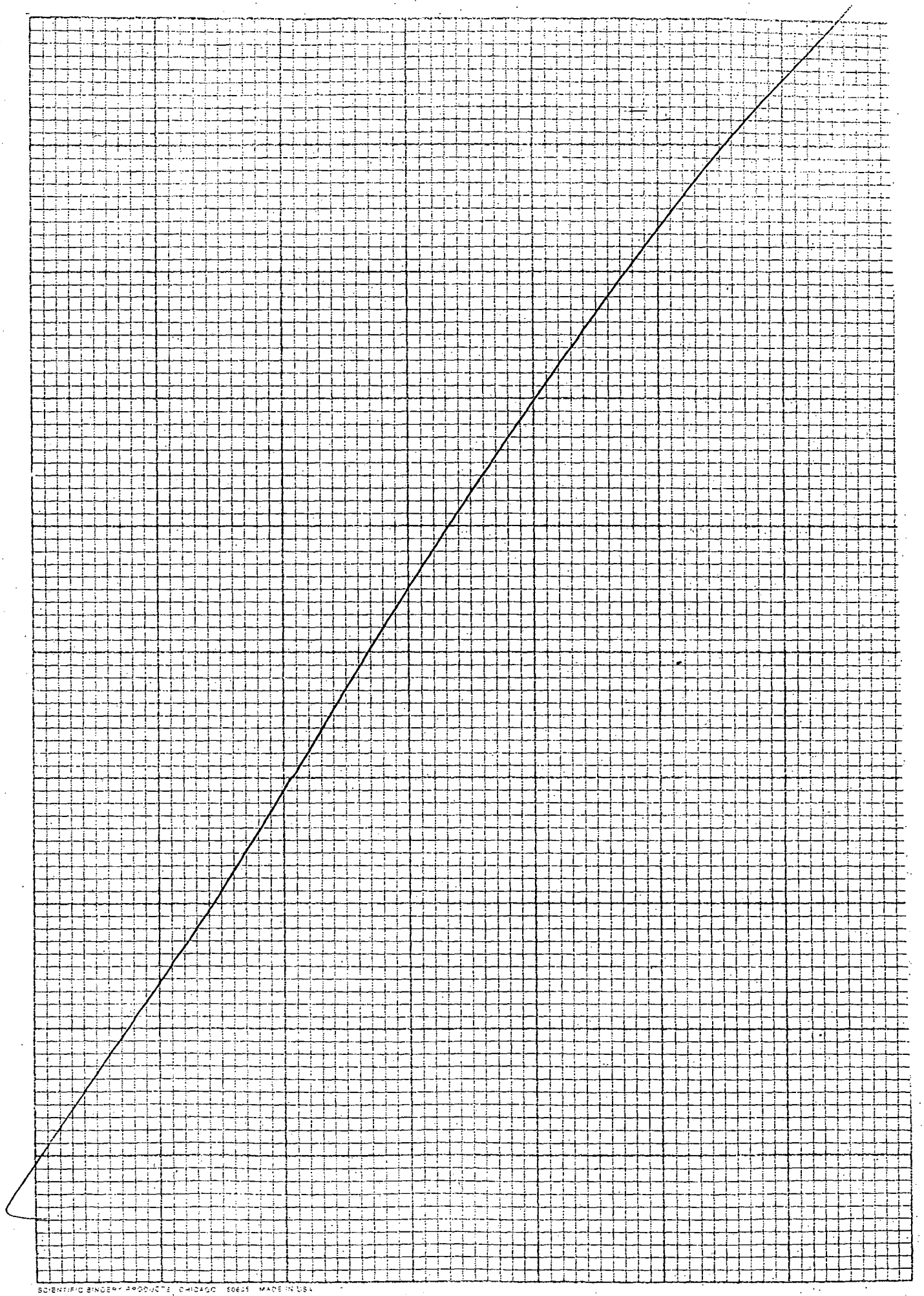


SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60625 MADE IN USA

2-03-05 Cont

Work continued from Page

1105 Hrs - Arrive @ SWMU 16 to collect SW samples
1120 Hrs - Collected 16SW3002 & FD0203050 1
1145 Hrs - Return to B-3245 to Process the above samples
1235 Hrs - Lunch
1300 Hrs - Pick up dig permit for B-2930 @ Public Works
1313 Hrs - Return to B-3245
• Assist Colin D. w/ Prep for Peristaltic well @ SWMU 12
1335 Hrs - Arrive @ SWMU 16
COLLECTED 16SW1303 1410 Hrs
16SW1204 1425 Hrs
16SW1003 1445 Hrs
1510 Hrs - Arrive @ B-3245
• Unload Truck
• Process samples & paperwork COCs # 3677 & 3679
• Package samples for shipment on AB#
1 8447 8135 7413
1700 Hrs - Leave B-3245 for FED EX
1731 Hrs - Drop off samples @ FED. EX.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 2/03/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

MONITORING WELLS @ SWMU 16

WELL ID	WL	TIME		
16MW 01	~~15.88~~	~~0848~~	32.33	0947
02	15.94	0840		
03	~~28.88~~	~~0917~~	20.45	0932
04	~~17.29~~	~~0911~~	28.70	0938
05	34.88	0942		
16MW 01	15.88	0848		
02	12.61	0921		
03	28.88	0914		
04	14.29	0911		
05	32.11	0924		
06	17.79	0850		
07	Dry	0854	* Bottom @ 28'	
08	46.60	0859		
09	15.25	0903		
10	22.30	0906		
11	96.41	0908		
12	20.94	0928		
13	11.36	0919		
14	ABONDONED			
15	54.99	0917		
16	34.40	1135		
17	15.78	0844		
18	95.75	0956		
19	3.25	1012		
20	3.66	1014		
21	65.46	0936		

0830 - Attempted to enter in @ Bldg 2708. Doors locked. (SWMU 16)

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60601 MADE IN USA

TITLE NSWC CRANE

FRI 2-4-05

CREW
JG
CD
TR
EFS - Josh Dutton

B-2930 SAMPLING

PROJECT NO. 7448

BOOK NO. 1376

Work continued from Page

WEATHER - Mostly Sunny high 40's low 50's

0645 Hrs - Arrive @ B 3245
- Prep. for soil sampling
- Give Josh Dutton & C.D. site specific HES training

0805 Hrs - Arrive @ B-2930

0900 Hrs - Collect B2930SSCP001 0002 } MS/MSD & B2930 FD020405 01
0925 Hrs - " B2930SSCP002 0002 } SEE P. 131 FOR Burning locations
0955 Hrs - " B2930SSCP003 0002 }

1020 Hrs - Finish clean up @ B 2930, broke down
1030 Hrs → barricade & Removed rebar stakes
Arrive @ B-3245
- Unload Drums
- Unload SUV - Refrigerate samples
- Prep to meas. staff gauges @ SWMU 16

1115 Hrs - Arrive @ SG06 @ SWMU 16
MEAS. SG06-09

1200 Hrs - Lunch

1235 Hrs - Return to SWMU 16
MEAS. staff gauges SG01-05

1340 Hrs - Return to B-3245
- Calc. flows & FAX GW & SG measurements to J. Schubert
- Also, FAX COFCs from 2-3-05 to Office (#s 3682, 3677 & 3679) to E. Sedlmyerek
- Process soil samples & prep for shipping
- Check in w/ office (R. Basinski) - discuss survey of Dump site A wells (7/1-7/5) - ok to survey - R.B. will FAX a map of said wells

1705 Hrs - Left B-3245 for Fed. Ex.
Shipped samples on COFCs #3683 & 3684 via Fed. Ex AB# 8447 8135 7424

1739 Hrs - Drop off samples @ Fed. Ex.

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE Ted Hyatt DATE 2-4-05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

STAFF GAUGES @ SWMU 16 (2-04-05)

STAFF GAUGE ID	W.L	TIME	~~WIDE~~ DEPTH (TC) (AVE)	~~LENGTH~~ WIDTH (AVE)	FLOW (SEC/FT)	FLOW RATE
165601	DRY	1245	—	—	—	0
02	5.29	1314	STAGNATE	→		0
03	5.03	1253	STAGNATE	→		0
04	2.15	1259	"	→		0
05	DRY	1301	DRY	→		0
06	3.51	1119	NA	NA	NA	202
07	5.99	1130	0.34	3.9'	1 SEC	580
08	4.16	1141	NA	NA	NA	18
09	6.34	1151	0.17	3	3 sec	76
~~10~~ (TC)						
~~11~~ (TC)		END				

SCIENTIFIC BINDERY PRODUCTS, CHICAGO 60605 MADE IN USA

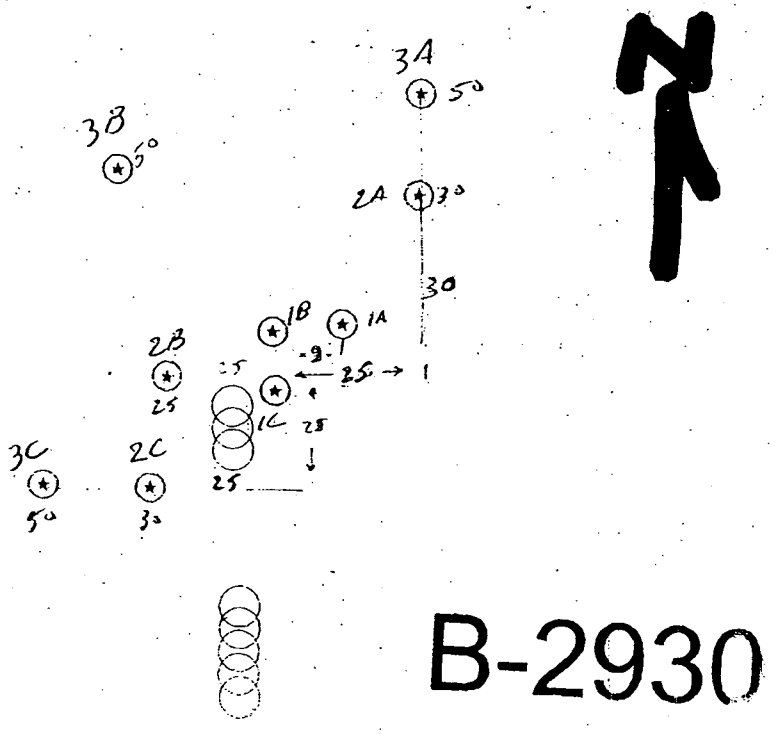
FRI 2-04-05 Con't

Work continued from Page

SAMPLE SUMMARY FOR 02-04-05:

- B2930 SAMPLING COMPLETED this date
- MEAS. water levels of staff gauges & WELLS @ SWMU 16

SAMPLE ID	Start Purge	END Purge	VOL PURGED	SAMPLE TIME	SAMPLER
16MWT11	1058	1144	1.6 L	NA	JG
16MWT13	1257	1425	16.0 L	NA	JG
16MW02	1435	1610	9.5 L	1615	JG



Work continued to Page

SCIENTIFIC

SIGNATURE

DATE 2-4-05

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE

SAMPLE SUMMARY 02/05/05 :

SEE TABLE PAGE 153

SCIENTIFIC SUPPLY PRODUCTS CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

SAT 2-5-05

CREW
JG
CD
TR

PROJECT NO. 7448
BOOK NO. 1376

Work continued from Page

WEATHER: Mostly Sunny & mild 40°s & 50°s

0653 Hrs - Arrive @ B3245

- Select Wells to be sampled - Rep. Paragon-K
- Prep for GW Sampling / Prep. Sample Container sets

0900 Hrs - Arrive @ SWMU 16
to sample ground water

SAMPLE ID	Start PURGE	END PURGE	Vol. PURGED	SAMPLE TIME	SAMPLER / REMARKS
16GWT1103	2/4/05	→	→	0850	JG (EXP. only)
16GWT1303	2/4/05	→	→	0925	JG
16GW0304	0932	1152	11.8 L	1157	TR
16GWT0605	0920	1320	13.7 L	1325	CD
16GWT1503	1025	1430	17 L	1435	JG
16GWT0404	1415	1535	8.3 L	1540	TR DUP ED020505 01
16GWT1703	1510	1640	12.4 L	1645	CD

1800 Hrs - Arrive @ B 3245
Refrigerate samples
Drop off EQ, meters, etc

1820 Hrs - Leave B-3245 for Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 02-05-05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

Sample Summary 02/06/05

See TABLE on Page 155

CD also sampled 12MW101

SCIENTIFIC BINDERY PRODUCTS CHICAGO 57605 MADE IN USA

SUN 2-06-05

Work continued from Page WEATHER - OVERCAST & 50's

0655 Hrs - Arrive @ B3245

- Select well to be sampled & Prep. Paperwork
- Prep for Groundwater Sampling
- Prep sample sets (Containers)

SAMPLE ID	Start Purge	End Purge	Vol Purged	Sample Time	Sampler / Remarks
16GWT0903	0845	1015	9.2L	1020	CD
16GW0904	0855	1025	13.5L	1030	TR D.O MS/MSD
16GWT1203	0845	1045	7.0L	1050	JG
16GWT1003	1220	1340	8.0L	1345	JG

1300 Hrs - Lunch & Set CD up w/ well 12MWT01 to sample

1330 Hrs - Set up @ 16MWT11 to attempt to collect additional sample - well didn't recharge since 2/5/05.

1410 Hrs - Arrive @ B3245

- Clean up office
- Restock sample containers
- Paper work
- Wait for CD to complete sampling @ 12MWT01

1530 Hrs - CD arrives @ B3245

1545 Hrs - Leave B3245 for Motel

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 2/06/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

VOID THIS PAGE

SCIENTIFIC SINGERY PRODUCTS, CHICAGO 60605 MADE IN USA

MON. 02-07-05

Work continued from Page

SHIPPED SAMPLES ON COC # 3681, 3680 & 3685

LABS = Microscops ↑ ← LAWCKS

5

END

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5

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5

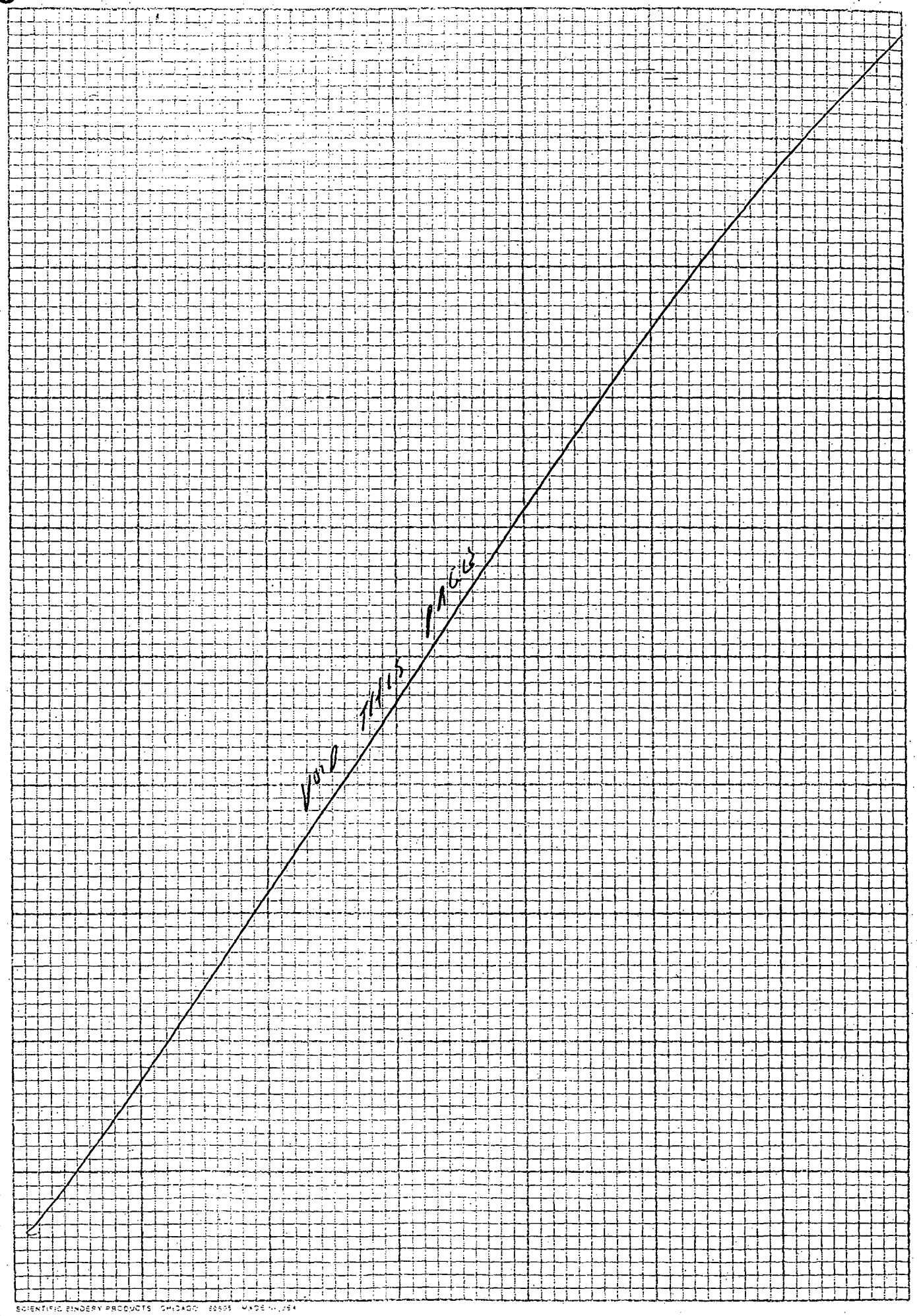
SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE

DATE 2-07-05

DISCLOSED TO AND UNDERSTOOD BY | DATE | WITNESS | DATE



SCIENTIFIC BINDERY PRODUCTS CHICAGO 60605 MADE IN USA

TITLE NSWC CRANE

PROJECT NO. 7448

BOOK NO. 1376

SUN 2-20-05

Work continued from Page WEATHER - RAIN/OVERCAST 50°S

1530 HRS - SAMPLED 16 MWT 11 (16 GWT 1103)

- FOR VOLATILES / Nitrate + Nitrite / Sulfide & Chloride
  SEE COC # 3699 - will ship to Laucks on 2/21/05
- Add GASES Methane, Ethane & Ethane
  SEE COC # 3698 - will ship to Microseeps on 2/21/05

END

SCIENTIFIC BINDERY PRODUCTIONS CHICAGO 60605 MADE IN USA

Work continued to Page

SIGNATURE [signature] DATE 2/20/05

DISCLOSED TO AND UNDERSTOOD BY DATE WITNESS DATE

APPENDIX C

SWMU 13 HEALTH AND SAFETY DOCUMENTATION ROUND 4

C.1 SWMU 13 HEALTH AND SAFETY DOCUMENTATION ROUND 4

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing investigation activities at NSWC Crane, and that I have received site-specific training that included the elements presented below:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan including Table 5-1 and 6-1
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets
- Review of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction. The dates of my training and my medical surveillance requirements are accurate and correct to the best of my knowledge.

	Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam	
1245	Jay McFall Jay McFall	12/7/04	2/19/04	N/A	N/A	7/30/04	
SWMU 9	DON WOESTEHOFF [illegible]	"	1/93	8/04	8/04	2/12/03	
	TERRY RUAHN [illegible]	"	10/85	1/04	1/04	11/10/04	ALSO SWMU 9
1245 6875 7448	[illegible] [illegible]	12/8/04	12/91	10/04	NA	11/7/04	
	Stan Conti SJ Conti	12/8/04	8/83	5/04	8/84	12/6/04	
	Colin Doolan Colin Doolan	1/6/05	5/99	12/04	NA	12/04	

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

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Terry 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

January 30, 2004

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

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

WORKCARE™

A Trademark of WorkCare, Inc.

RELEASE TO DUTY

CLINIC INSTRUCTIONS: Complete and give to employee before they leave the facility. This is a requirement of Tetra-Tech.

Employee Name: Stanley J. Conti

Office Location: PIT

Yes	No	
☑	☐	To work with hazardous materials in accordance with 29 CFR 1910.120.
☑	☐	To use respiratory protective equipment in accordance with 29 CFR 1910.134.

Based on the limited information available to me at this time, I find no necessity for immediate restrictions and I release this employee for duty. It is understood and agreed upon by the employer or potential employer of this examinee that subsequent comprehensive review of all laboratory and other test data by WorkCare may detect health conditions not apparent to me. It is further agreed and understood that such health conditions may necessitate the need for workplace restrictions. Examination has been performed in compliance with 1910.120 and 1910.134.

Signed: [illegible] M.D.

Date: 12-6-04

Employee

Bring this form back to the office and fax it to:
Matt Soltis, Corporate Health & Safety (412) 921-4040

333 S. Anita Drive, Suite 630, Orange, CA 92868 • (714) 978-7488 • (800) 455-6155 • FAX (714) 456-2154
E-mail: info@workcare.com • Website: www.workcare.com

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Stan Conti

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

May 14, 2004
Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Taffing
Manager
Training Services

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, Pennsylvania 15220-2745
(412) 921-7090 • FAX (412) 921-4040 • www.tetratech.com

March 11, 2003

Mr. Stanley Conti
Tetra Tech NUS, Inc.
Foster Plaza 7
661 Andersen Drive
Pittsburgh, PA 15220

Whom It May Concern:

This letter is to certify that Mr. Stanley Conti successfully completed a course of instruction in Hazardous Materials Handling for Hazardous Waste Site Workers which meets the criteria established in 29 CFR 1910.120(e)(3)(i). This course was prepared and conducted by Tetra Tech NUS (formerly Brown and Root Environmental, a division of HALLIBURTON NUS Corporation) in September 1983. If you have any questions, please feel free to contact me.

Very truly yours,

James K. Laffey
Manager, Training Resources

JKL:lld

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

EMPLOYEE:	Goerdt, James	COMPANY:	TT/NUS
SSN:	481-86-2691	POSITION:	Environmental Scientist
DATE OF EXAM:	11/07/2003	LOCATION:	TT/NUS-Pittsburgh
EXPIRATION DATE:	11/07/2005	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: Scott Hardy, M.D. Date: 11/11/03

Signature: Scott Hardy MD

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

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Jim Goerdt

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

October 22, 2004

Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

APPLIED 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: Baseline Examination **UPDATE**

EMPLOYEE:	Doolan, Colin	COMPANY:	TT/NUS
SSN:	XXX-XX-8351	POSITION:	Earth Scientist
DATE OF EXAM:	12/02/2004	LOCATION:	TT/NUS-Pittsburgh
EXPIRATION DATE:	12/02/2006	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: ***Status changed to Biennial.***

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: 12/07/04

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

TETRA TECH NUS

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Colin A. Doolan

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 23, 2004
Date of Award

Clyde Snyder
Senior Instructor
Training Services

James K. Laffey
Manager
Training Services

TETRA TECH NUS, INC.
661 Andersen Drive • Pittsburgh, PA 15220
Tel 412.921.7090 • Fax 412.921.4040 • www.tetratech.com

PITT-12-4-053

December 30, 2004

Project Numbers 3961, 1245, 7448, and 6878

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: William Gates (Code ES31)
P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Numbers 0160, 0331, 0343, an[redacted]

Subject: Personnel Clearance for Site Visit

Dear Mr. Gates:

The purpose of this letter is to inform you of upcoming site activities to be performed by Tetra Tech NUS, Inc. employees under the CLEAN contract, and to attest that the individuals identified herein are in compliance with applicable OSHA regulations. This information is being submitted as specified in Section H.14 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62467-94-D-0888. The specific OSHA regulations involved for this project pertain to employee health and safety training and medical surveillance requirements, as identified in OSHA 29 CFR 1910.120.

The subject project and planned activities include staking locations of intrusive sampling; installation/development and sampling of monitoring wells; surface water, seep and sediment sampling; and soil sampling using DPT and hand augering techniques at the NSWC Crane site in Indiana. This is scheduled to be conducted from January 4-28, 2005. The individuals that will perform these tasks are employees of Tetra Tech NUS. They will follow these listed health and safety plans.

- Health and Safety Plan for Solid Waste Management Unit 7, dated December 2004, prepared under CTO 0160.
- Health and Safety Plan for RCRA Facility Investigation at Building 106 Pond (SWMU 8) and Roads and Grounds Area (SWMU 15), dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Environmental Indicator Investigation for SWMUs 18, 19, 20, and the Old Gun Tub Storage Lot, dated November 2004, prepared under CTO 0331.
- Health and Safety Plan for Cast High Explosives Fill and B-146 Incinerator, dated August 2004, prepared under CTO 0343.
- Health and Safety Plan for Mine Fill A (SWMU 12), Revision 1, dated August 2004, prepared under CTO 0357.

These individuals are as follows:

Stan Conti
Colin Doolan
Jim Goerdt
Terry Rojahn

APPENDIX D

SWMU 13 ROUND 4

ANALYTICAL DATA

APPENDIX D.1

SUMMARY OF ANALTYICAL RESULTS

SWMU 13

ROUND 4

GROUNDWATER

UPPER PENNSYLVANIA WATER BEARING ZONE

TABLE D-1
SUMMARY OF ANALYTIC RESULTS
ROUND 4 GROUNDWATER SAMPLES FROM THE UPPER PENNSYLVANIA WATER BEARING ZONE
SWMU 13 (MINE FILL B)
CRANE, INDIANA

WATER BEARING ZONE	UPPER PA	UPPER PA	UPPER PA	UPPER PA	UPPER PA	UPPER PA	UPPER PA	UPPER PA	UPPER PA	UPPER PA
SAMPLING ROUND	04	04	04	04	04	04	04	04	04	04
LOCATION	13MWT01	13MWT09	13MWT11	13MWT13	13MWT14	13MWT14	13MWT15	13MWT17	13MWT21	13MWT31
SAMPLE NUMBER	13GWT0104	13GWT0905	13GWT1104	13GWT1304	13GWT1404	13GWT1404-D	13GWT1504	13GWT1704	13GWT2104	13GWT3103
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	1/23/2005	2/1/2005	1/23/2005	2/2/2005	1/25/2005	1/25/2005	2/3/2005	1/23/2005	1/22/2005	2/1/2005
Energetics (ug/L)										
1,3,5-TRINITROBENZENE	0.264 U	0.94	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.36 J	0.242 U
1,3-DINITROBENZENE	0.264 U	2.2	1.2	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.78	0.242 U
2,4,6-TRINITROTOLUENE	0.264 U	22	44	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	24	0.242 U
2,4-DIAMINO-6-NITROTOLUENE	0.264 U	2.5 R	1.6 R	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.29 R	0.242 U
2,4-DINITROTOLUENE	0.264 U	0.25 U	4	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
2,6-DIAMINO-4-NITROTOLUENE	0.264 U	0.25 U	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
2,6-DINITROTOLUENE	0.264 U	0.25 U	5.7 J	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	2.6 J	0.242 U
2-AMINO-4,6-DINITROTOLUENE	0.264 U	13 J	12 J	0.245 U	0.242 U	0.24 U	0.238 U	0.27 J	1.9 J	0.242 U
2-NITROTOLUENE	0.264 U	0.25 U	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
3,5-DINITROANILINE	0.264 U	2.2 J	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
3-NITROTOLUENE	0.264 U	0.25 U	0.45 R	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
4-AMINO-2,6-DINITROTOLUENE	0.264 U	18	27	0.245 U	0.242 U	0.24 U	0.238 U	0.54	3.2	0.242 U
4-NITROTOLUENE	0.264 U	0.25 U	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
DNX	0.264 U	0.27 R	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.41 J	0.238 U	0.242 U
HMX	0.88	99	68	8.4	0.54 J	0.52 J	0.238 U	100	410	7.5
MNX	0.264 U	4.2	0.74 J	0.245 U	0.242 U	0.24 U	0.238 U	6.2	3.3 R	0.242 U
NITROBENZENE	0.264 U	0.25 U	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
RDX	0.37 J	1200	830	18	2.8	2.8	0.238 U	480	3200	19
TETRYL	0.264 U	0.25 U	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
TNX	0.264 U	1.3 J	0.269 U	0.245 U	0.242 U	0.24 U	0.238 U	0.248 U	0.238 U	0.242 U
Field Parameters										
DISSOLVED OXYGEN (mg/L)	0.81	0.74	0.71	5.31	0.91		1.57	0.35	1.56	1.52
OXIDATION REDUCTION POTENTIAL (MV)	295	29.9	284	392.700000	62.4		373.3	4	56.1	51.9
PH (S.U.)	3.98	5.49	3.8	3.94	5.58		3.65	5.4	5.71	5.42
SPECIFIC CONDUCTANCE (MS/CM)	0.192	0.57	0.222	1.01	0.595		0.314	0.118	0.148	1228
TEMPERATURE (C)	9.98	12.15	10.8	9.87	14.39		13.29	11.51	9.15	11.08
TURBIDITY (NTU)	3	1.6	10	7.2	3.3		8.31	15	4	5.2
Miscellaneous Parameters (mg/L)										
NITRITE/NITRATE-N	0.1 J	77 J	0.1 J	1.1 J	0.025 UJ	0.94 J	0.025 U	1.7 J	0.81 J	0.06 J

TABLE D-1
SUMMARY OF ANALYTIC RESULTS
ROUND 4 GROUNDWATER SAMPLES FROM THE UPPER PENNSYLVANIA WATER BEARING ZONE
SWMU 13 (MINE FILL B)
CRANE, INDIANA

WATER BEARING ZONE	UPPER PA	UPPER PA	UPPER PA	UPPER PA	UPPER PA
SAMPLING ROUND	04	04	04	04	04
LOCATION	13MWT34	13MWT37	13MWT40	13MWT47	13MWT51
SAMPLE NUMBER	13GWT3403	13GWT3703	13GWT4003	13GWT4703	13GWT5102
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	1/23/2005	2/2/2005	2/2/2005	1/25/2005	2/3/2005
Energetics (ug/L)					
1,3,5-TRINITROBENZENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
1,3-DINITROBENZENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
2,4,6-TRINITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
2,4-DIAMINO-6-NITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
2,4-DINITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
2,6-DIAMINO-4-NITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
2,6-DINITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
2-AMINO-4,6-DINITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
2-NITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
3,5-DINITROANILINE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
3-NITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
4-AMINO-2,6-DINITROTOLUENE	0.242 U	0.31 J	0.39 J	0.242 U	0.5 J
4-NITROTOLUENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
DNX	0.242 U	0.47 J	0.264 U	0.242 U	0.64 J
HMX	29	110	270	0.242 U	69
MNX	3.3	6.9	3.2	0.242 U	9.3
NITROBENZENE	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
RDX	440	1500	110	0.242 U	320
TETRYL	0.242 U	0.24 U	0.264 U	0.242 U	0.264 U
TNX	0.242 U	0.24 U	0.264 U	0.242 U	0.91 J
Field Parameters					
DISSOLVED OXYGEN (mg/L)	1.3	4.2	13.39	0.81	10.19
OXIDATION REDUCTION POTENTIAL (MV)	99.9	64.2	168.9	353.3	254.4
PH (S.U.)	5.05	5.65	6.51	3.63	6.2
SPECIFIC CONDUCTANCE (MS/CM)	0.271	0.24	0.314	0.673	0.14
TEMPERATURE (C)	12.06	10.9	11.71	8.87	5.07
TURBIDITY (NTU)	5.5	1.3	6.5	10	9.7
Miscellaneous Parameters (mg/L)					
NITRITE/NITRATE-N	0.24 J	0.25 J	0.33 J	0.025 UJ	1.5

APPENDIX D.2

SUMMARY OF ANALTYICAL RESULTS

SWMU 13

ROUND 4

GROUNDWATER

LOWER PENNSYLVANIA WATER BEARING ZONE

TABLE D-2
SUMMARY OF ANALYTIC RESULTS
ROUND 4 GROUNDWATER SAMPLES FROM THE LOWER PENNSYLVANIA WATER BEARING ZONE
SWMU 13 (MINE FILL B)
CRANE, INDIANA

WATER BEARING ZONE	LOWER PA	LOWER PA	LOWER PA
SAMPLING ROUND	04	04	04
LOCATION	13MWT28	13MWT45	13MWT46
SAMPLE NUMBER	13GWT2803	13GWT4503	13GWT4603
SAMPLE CODE	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/1/2005	1/23/2005	2/2/2005
Energetics (ug/L)			
1,3,5-TRINITROBENZENE	0.275 U	0.24 U	0.245 U
1,3-DINITROBENZENE	0.275 U	0.24 U	0.245 U
2,4,6-TRINITROTOLUENE	0.275 U	0.24 U	0.245 U
2,4-DIAMINO-6-NITROTOLUENE	0.275 U	0.24 U	0.245 U
2,4-DINITROTOLUENE	0.275 U	0.24 U	0.245 U
2,6-DIAMINO-4-NITROTOLUENE	0.275 U	0.24 U	0.245 U
2,6-DINITROTOLUENE	0.275 U	0.24 U	0.245 U
2-AMINO-4,6-DINITROTOLUENE	0.275 U	0.24 U	0.245 U
2-NITROTOLUENE	0.275 U	0.24 U	0.245 U
3,5-DINITROANILINE	0.275 U	0.24 U	0.245 U
3-NITROTOLUENE	0.275 U	0.24 U	0.245 U
4-AMINO-2,6-DINITROTOLUENE	0.275 U	0.24 U	0.245 U
4-NITROTOLUENE	0.275 U	0.24 U	0.245 U
DNX	0.275 U	0.24 U	0.245 U
HMX	0.275 U	0.24 U	0.245 U
MNX	0.275 U	0.24 U	0.245 U
NITROBENZENE	0.275 U	0.24 U	0.245 U
RDX	0.275 U	0.24 U	0.245 U
TETRYL	0.275 U	0.24 U	0.245 U
TNX	0.275 U	0.24 U	0.245 U
Field Parameters			
DISSOLVED OXYGEN (mg/L)	8.87	0.56	1.3
OXIDATION REDUCTION POTENTIAL (MV)	144.6	-48	-21.4
PH (S.U.)	7.78	7.08	6.45
SPECIFIC CONDUCTANCE (MS/CM)	0.918	0.491	0.731
TEMPERATURE (C)	13.87	10.13	10.45
TURBIDITY (NTU)	50	14	1.65
Miscellaneous Parameters (mg/L)			
NITRITE/NITRATE-N	0.15 J	0.06 J	0.025 UJ

APPENDIX D.3

SUMMARY OF ANALTYICAL RESULTS

SWMU 13

ROUND 4

SURFACE WATER

TABLE D-3
SUMMARY OF ANALYTIC RESULTS
ROUND 4 SURFACE WATER SAMPLES
SWMU 13 (MINE FILL B)
CRANE, INDIANA

SAMPLING ROUND	04	04	04	04	04	04	04	04
LOCATION	13SW11	13SW/SD14	13SW/SD15	13SW/SD16	13SW/SD19	13SW/SD20	13SW/SD22	13SW/SD30
SAMPLE NUMBER	13SW1103	13SW1403	13SW1503	13SW1603	13SW1902	13SW2002	13SW2203	13SW3003
SAMPLE CODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
SAMPLE DATE	2/2/2005	2/2/2005	2/2/2005	2/2/2005	2/2/2005	2/2/2005	2/2/2005	2/2/2005
Energetics (ug/L)								
1,3,5-TRINITROBENZENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
1,3-DINITROBENZENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
2,4,6-TRINITROTOLUENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
2,4-DINITROTOLUENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
2,6-DINITROTOLUENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
2-AMINO-4,6-DINITROTOLUENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
2-NITROTOLUENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
3-NITROTOLUENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
4-AMINO-2,6-DINITROTOLUENE	0.34 J	1.3	0.29 J	0.37 J	0.264 U	0.24 U	0.266 U	0.252 U
4-NITROTOLUENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
HMX	130	21	81	13	0.54	0.24 U	0.36 J	2
NITROBENZENE	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
RDX	1100	60	390	29	0.92	0.38 J	1.1	6
TETRYL	0.242 U	0.252 U	0.24 U	0.24 U	0.264 U	0.24 U	0.266 U	0.252 U
Field Parameters								
DISSOLVED OXYGEN (mg/L)	12.46	13.8	13.38	13.88	13.12	13.25	8.25	14.1
OXIDATION REDUCTION POTENTIAL (MV)	282	178	195	188	220	205	139	201
P.H (S.U.)	7.76	7.91	8.13	8.29	7.9	8.17	8.18	8.07
SPECIFIC CONDUCTANCE (MS/CM)	1.439	0.278	0.132	0.106	0.236	0.154	0.151	0.168
TEMPERATURE (C)	2.72	2.88	2.44	1.43	2.64	2.24	2.02	1.63
TURBIDITY (NTU)	7.6	4.1	85	10	36	6.1	3.1	4.5

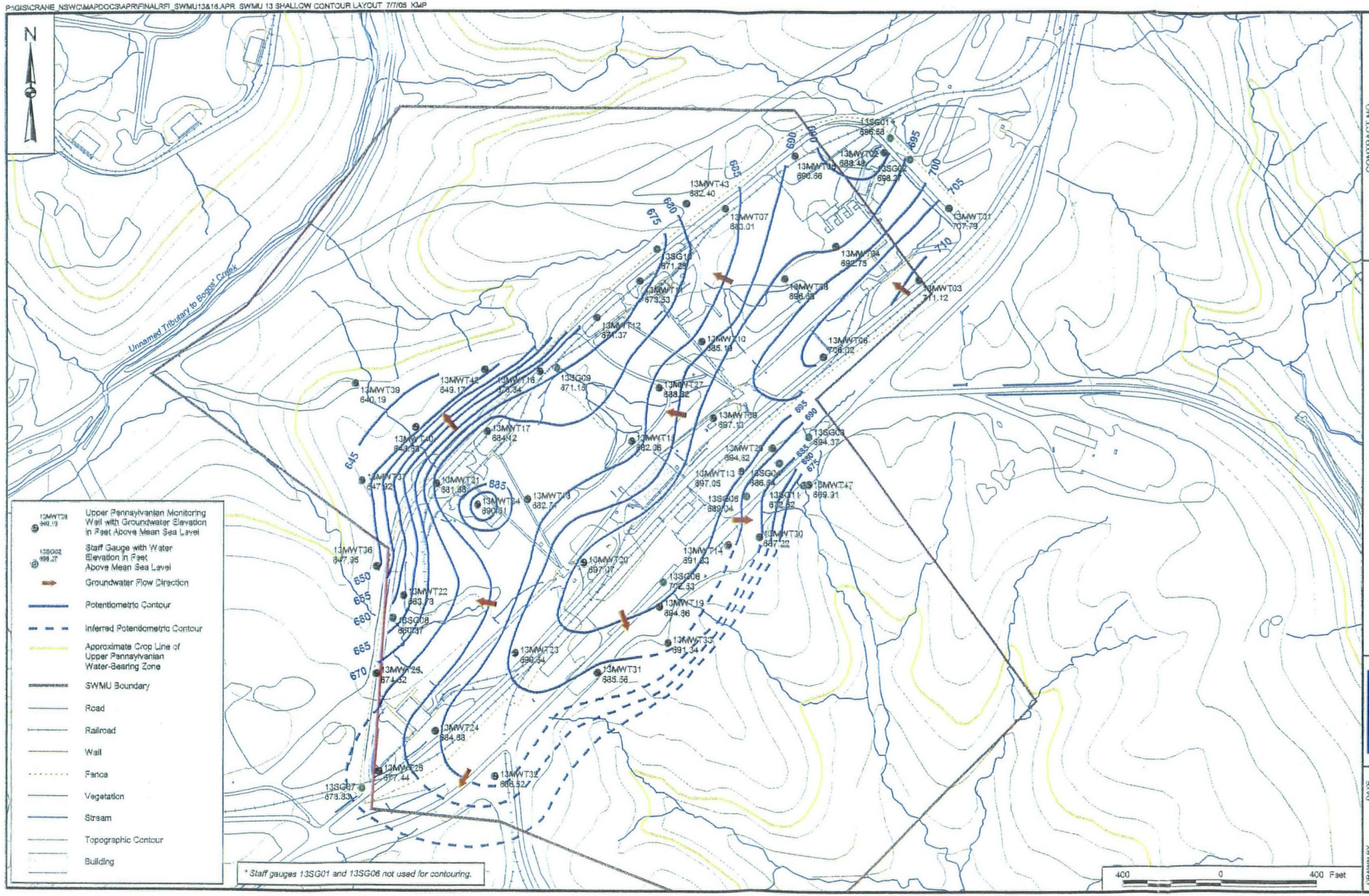
APPENDIX E

SWMU 13

POTENTIOMETRIC SURFACE MAPS

JANUARY AND NOVEMBER 2004

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINAL\RFI_SWMU13&16.APR SWMU 13 SHALLOW CONTOUR LAYOUT 7/7/05 KMP



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 4-9

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE UPPER PENNSYLVANIAN
WATER-BEARING ZONE - JANUARY 19 AND 20, 2004
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

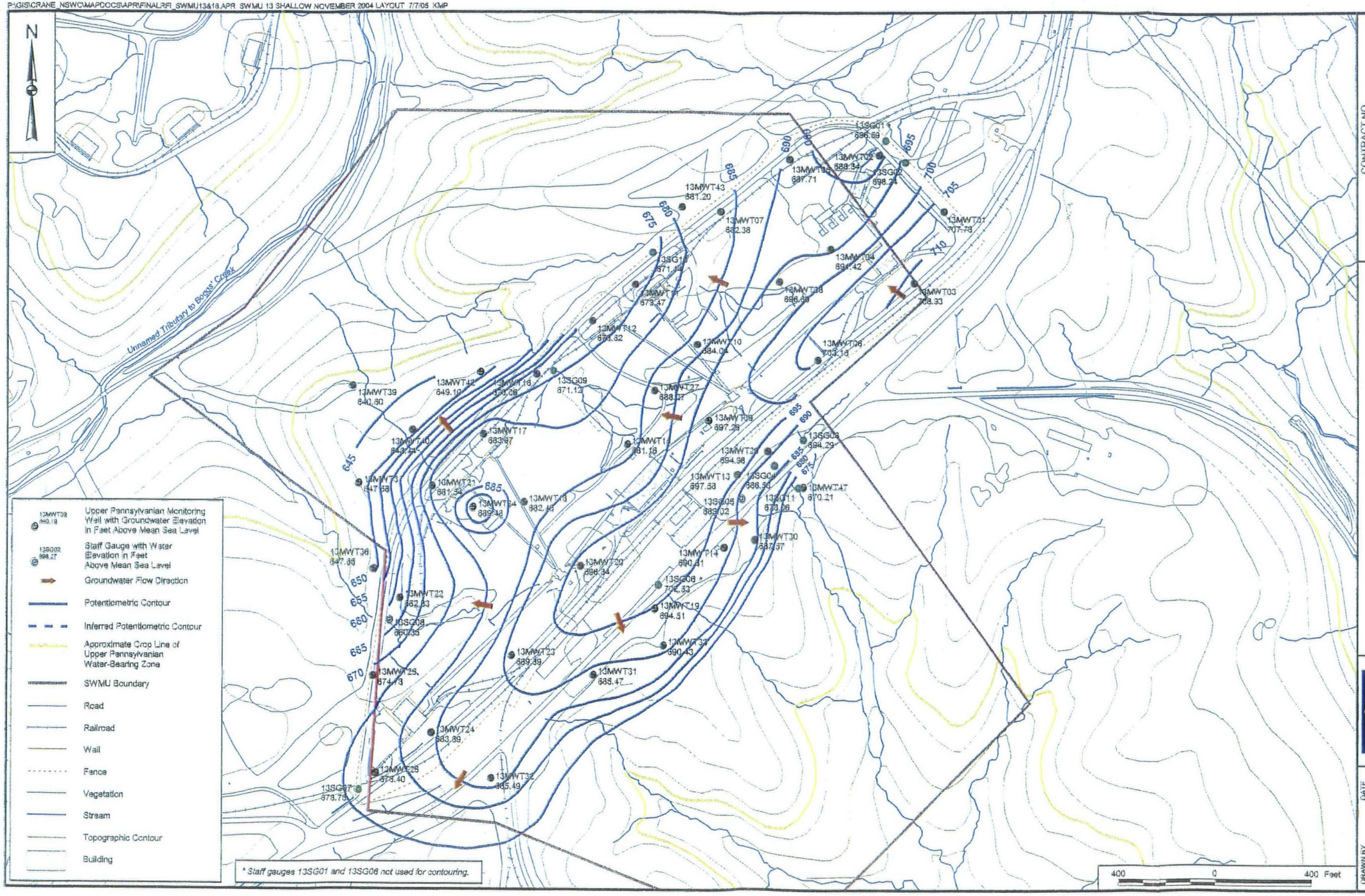
DRAWN BY A. JANOCHA DATE 2/23/04

CHECKED BY J. LUCAS DATE 6/13/04

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINAL\RFI_SWMU13&16.APR SWMU 13 SHALLOW NOVEMBER 2004 LAYOUT 7/7/05 KMP



CONTRACT NO. 7448

APPROVED BY ____ DATE ____

APPROVED BY ____ DATE ____

DRAWING NO. FIGURE 4-10

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE UPPER PENNSYLVANIAN
WATER-BEARING ZONE - NOVEMBER 14, 2004
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY A. JANOCHA	DATE 2/23/04		
CHECKED BY J. LUCAS	DATE 5/13/04		
COST/SCHED-AREA		SCALE AS NOTED	

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINALRFI_SWMU13&18.APR SWMU 13 DEEP CONTOUR LAYOUT 1/27/05 KMP

CONTRACT NO. 7448

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 4-11

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE LOWER PENNSYLVANIAN
WATER-BEARING ZONE - JANUARY 19 AND 20, 2004
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

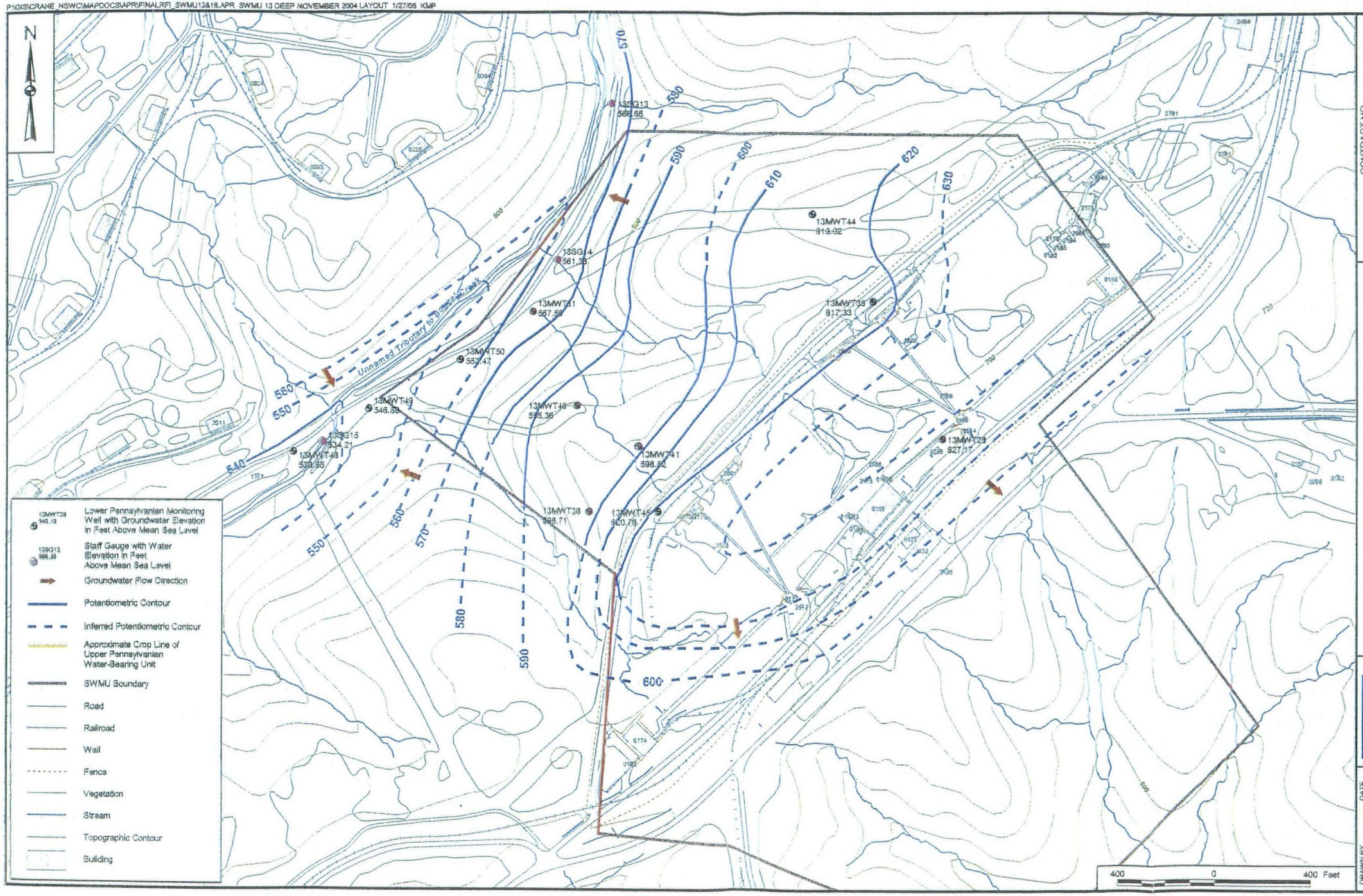
DRAWN BY A. JANOCHA DATE 2/23/04

CHECKED BY F. RAMSER DATE 3/17/04

COST/SCHED-AREA

SCALE AS NOTED

P:\GIS\CRANE_NSWC\MAPDOCS\APR\FINAL\RFI_SWMU13&16_APR_SWMU 13 DEEP NOVEMBER 2004 LAYOUT 1/27/05 KMP



CONTRACT NO. 7448

APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 4-12

REV 0

POTENTIOMETRIC SURFACE ELEVATION MAP
FOR THE LOWER PENNSYLVANIAN
WATER-BEARING ZONE - NOVEMBER 14, 2004
SWMU 13 MINE FILL B
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY K. PEILA DATE 1/27/05

CHECKED BY J. SCHUBERT DATE 1/27/05

COST/SCHED-AREA

SCALE AS NOTED