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Monitored Natural Attenuation Report
for
Mine Fill A (SWMU 12)

Round No. 4

Naval Surface Warfare Center Crane
Crane, Indiana

Contract Task Order 0357

April 2006

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
APRIL 2006

MONITORED NATURAL ATTENUATION REPORT FOR MINE FILL A (SWMU 12)

ROUND NO. 4

NAVAL SURFACE WARFARE CENTER, CRANE
CRANE, INDIANA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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LIST OF ACRONYMS

µg/L	micrograms per liter
asml	above mean sea level
CMS	Corrective Measures Study
DNX	hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine
DO	Dissolved Oxygen
IRA	Interim Removal Action
MFA	Mine Fill A
mL	milliliters
Mgd	Mississippi Glen Dean Water Bearing Zone
MNA	Monitored natural attenuation
MNX	hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine
NSWC	Naval Surface Warfare Center
ORP	Oxidation-reduction potential
Puz	Upper Pennsylvanian Water Bearing Zone
Pmz	Middle Pennsylvanian Water Bearing Zone
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RFI	RCRA Facility Investigation
SOPs	Standard operating procedures
SVOC	Semivolatile organic compound
SWMU	Solid waste management unit
TNX	hexahydro-1,3,5-trinitroso-1,3,5-triazine
TtNUS	Tetra Tech NUS
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile organic compound

1.0 INTRODUCTION

A Phase III Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) has been conducted at the Naval Surface Warfare Center (NSWC) Crane Mine Fill A (MFA), also known as solid waste management unit (SWMU) 12. The purpose of the RFI was to determine whether explosives in groundwater, surface water, or sediment present unacceptable risk, or if any residual explosives in soil present unacceptable levels of risk to human health and the environment. The RFI was conducted at SWMU 12 in accordance with applicable RCRA corrective action requirements and provides data on the nature and extent of select explosive, metals, miscellaneous semivolatile organic compound (SVOC) and volatile organic compound (VOC) concentrations in surface soils, subsurface soils, sediment, surface water and groundwater. The RFI indicates that explosives contamination remains in soil around buildings and that explosives have migrated to groundwater and unacceptable levels of risk remain for various combinations of human and ecological receptors, with the majority of risk attributable to the use of groundwater by select human receptors.

MFA was used for the production of large mines, depth charges, rocket heads, aerial bombs, and projectiles in buildings. MFA also includes battery and soil disposal areas that are located at the extreme south end of the SWMU. In the past, explosives powders discharged from production building roof vents that accumulated on the roofs were washed down to the ground by precipitation, resulting in the contamination of soils. In addition, wastewaters containing explosives were discharged into nearby ditches. The battery area was used to dispose of AA household type batteries on the ground surface. The soil disposal area was used to dump soil and construction debris on the ground surface. During the period 1997 to 2000, an interim removal action (IRA) was conducted in which explosive-contaminated soils were removed for treatment via bioremediation. Treated soils were then placed into the excavations from which the contaminated soils were removed. Just prior to the MFA battery area IRA, the batteries were all but unrecognizable, and only their inner cores were visible on the ground surface. MFA is currently used as a renovation facility for explosives-loaded bombs, demilitarized gas generators, and paint bombs.

A corrective measures study (CMS) will be conducted at SWMU 12. Among the remedial alternatives expected to be evaluated will be the potential for natural attenuation to reduce concentrations of explosives in the groundwater. The United States Environmental Protection Agency (U.S. EPA) Region 5 has established a framework entitled "Region 5 Framework for Monitored Natural Attenuation Decisions for Groundwater" (U.S. EPA, 2000). This framework provides technical direction for the collection of adequate monitoring data to support evaluations of the effectiveness of monitored natural attenuation

(MNA). In order to determine whether residual explosives are naturally degrading at SWMU 12, a long-term groundwater monitoring plan for explosives and explosives degradation products is being conducted. The long-term monitoring program, as planned, consists of nine rounds of sampling to provide information on trends in groundwater concentrations of explosives and explosives degradation productions. Recently, three rounds of quarterly groundwater, soils, sediments, seeps, and surface water sampling and analyses were completed at SWMU 12. Information regarding the results of Rounds 1 through 2 is presented in the SWMU 12 RFI (Tetra Tech NUS, Inc. [TtNUS], 2005a). The results for Round 3 were reported in the SWMU 12 Round 3 MNA report (TtNUS, 2005b).

The purpose of this report is to present the results of groundwater and surface water 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. Appendices D and E present analytical results for Round 4 and potentiometric surface maps for groundwater elevations obtained in Round 3, respectively. The final monitoring report (after Round 9) will contain an evaluation as to whether residual explosives may be naturally degrading and whether MNA is a viable remedial option for contaminated groundwater and surface water at SWMU 12. Information obtained from the long term monitoring program will be used in the CMS to evaluate the effectiveness of MNA. The MNA program being conducted at SWMU 12 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 12.

2.1 OVERVIEW

Field activities were conducted in August 2005. All work performed for Round 4 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). All field activities were electronically recorded and 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 SAMPLING OPERATIONS

This section discusses the methodology for groundwater and surface water sampling activities performed at SWMU 12 during Round 4. Table 2-1 contains well construction information and water level/elevation data for Rounds 1 through 4. A listing of all SWMU 12 sample analytical fractions conducted for groundwater and surface water in Round 4 is provided in Table 2-2. Further discussion of the target analytes for each fraction in Round 4 sampling is discussed in Section 3 of the QAPP Addendum No. 2. No non-conformances or suspected deficiencies occurred during this round of field investigation. Instruments used in the field were calibrated daily prior to use according to manufacturer's requirements and in accordance with all applicable standard operating procedures (SOPs).

2.2.1 Groundwater Purging and Sampling

Purging and stabilization of wells prior to sampling was accomplished using low-flow techniques in accordance with SOP CTO166-15 and SOP CTO166-16. Sampling was accomplished in accordance with SOP CTO166-05. Sample analytes for groundwater samples are provided in Table 2-2.

All groundwater monitoring wells proposed for long-term monitoring had been equipped with dedicated bladder pumps. The selection of the 21 long-term monitoring wells was based on historical data regarding well location, recharge rate, etc.

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 CTO166-16 and SOP CTO166-15. To the extent possible, the pumping rates were adjusted to prevent drawdown from exceeding 0.3 foot during purging.

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

Twenty of the proposed 21 groundwater samples were collected at SWMU 12 during Round 4 (See Table 2-2). Monitoring well 12MWT30 was dry during this sampling period. A minimum volume (1 liter instead of 2) for Nitroaromatics and Nitramines was collected at monitoring well 12MWT17 due to the water level falling below the pump intake during sampling.

Surface Water Sampling

Surface water samples were collected from intermittent streams, drainage ditches, and surface runoff locations throughout SWMU 12. All samples were collected at previously sampled locations which had been marked with a labeled, wooden survey stake. Fluorescent flagging had been tied to the stake and to a nearby tree (if available) to facilitate relocation of the sample location for future sampling. Round 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 electronically on a surface water sample log sheet (see Appendix A.2). See Figure 2-2 for all surface water sampling locations.

Six of the eight proposed surface water samples were collected at SWMU 12 during Round 4. Locations 12SW/SD14 and 12SW/SD31 were found to be dry during the sampling event (See Table 2-2).

2.3 QUALITY CONTROL SAMPLES

Quality assurance (QA)/quality control (QC) samples were generated and collected during sampling activities to monitor both field and laboratory procedures. These procedures are detailed in the approved QAPP addendum. QA/QC samples included field duplicates, equipment rinsate blanks, source water blanks, and temperature blanks.

2.4 WATER LEVEL MEASUREMENTS AND AQUIFER TESTING

2.4.1 Groundwater Level Measurements

A complete synoptic round of water levels, including all SWMU 12 wells, was taken prior to any groundwater monitoring well sampling activity. The synoptic water level measurements were obtained within a 24 hour time period. Measurements were taken with an electrical water level indicator (M-scope), using the top of the riser pipe as the reference point to determine water depth for monitoring wells and using a surveyed mark for staff gauge measurements. All measurements were taken in accordance with the specific SOP contained in the QAPP addendum. A mark was placed at the top of the riser pipe to ensure that measurements were taken from a consistent reference point. Water level measurements and staff gauge measurements were recorded to the nearest 0.01 foot on groundwater level measurement forms, which are provided in Appendix A.3 of this document. Table 2-1 contains water level/elevation data.

TABLE 2-1

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 12 - MINE FILL A
ROUNDS 1 THROUGH 4
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet) NAD83	Easting (feet) NAD83	Ground Elevation (feet amsl)	Top of Riser or Reference Point Elevation (feet amsl) NAVD88	Total Depth (feet bgs)(1)	Screened Interval				Water-Bearing Zone	October 17, 2004		December 15, 2004		January 18, 2005		May 18, 2005		August 10, 2005	
							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)
MONITORING WELLS																					
12MWT01	7/24/04	1312852.79	3026150.48	724.06	726.87	35.0	24.00	34.00	700.06	690.06	Puz	11.10	715.77	9.68	717.19	9.34	717.53	9.27	717.60	11.15	715.72
12MWT02	7/25/04	1312701.31	3026218.56	723.57	725.64	29.0	18.00	28.00	705.57	695.57	Puz	10.02	715.62	8.63	717.01	8.32	717.32	8.25	717.39	10.19	715.45
12MWT03	8/31/04	1312747.34	3026026.90	732.39	734.44	26.0	15.00	25.00	717.39	707.39	Puz	16.91	717.53	16.21	718.23	16.00	718.44	15.29	719.15	15.82	718.62
12MWT04	9/10/04	1312647.57	3026082.64	728.62	730.74	25.0	14.00	24.00	714.62	704.62	Puz	14.94	715.80	13.67	717.07	13.35	717.39	13.29	717.45	15.14	715.60
12MWT05	9/8/04	1312511.09	3026137.13	722.90	725.36	25.0	14.00	24.00	708.90	698.90	Puz	10.12	715.24	8.72	716.64	8.41	716.95	8.41	716.95	10.39	714.97
12MWT06	8/15/04	1311833.50	3026562.65	724.59	726.70	24.0	13.00	23.00	711.59	701.59	Puz	9.54	717.16	10.51	716.19	10.75	715.95	10.18	716.52	9.50	717.20
12MWT07	8/27/04	1311707.13	3026615.62	726.03	728.40	25.0	14.00	24.00	712.03	702.03	Puz	11.80	716.60	13.05	715.35	13.42	714.98	12.62	715.78	11.86	716.54
12MWT08	7/25/04	1311609.35	3026660.10	726.73	728.83	24.0	13.00	23.00	713.73	703.73	Puz	12.03	716.80	13.05	715.78	13.19	715.64	12.71	716.12	12.05	716.78
12MWT09	8/29/04	1311595.76	3026580.09	725.78	728.00	25.0	14.00	24.00	711.78	701.78	Puz	13.44	714.56	13.60	714.40	13.40	714.60	12.37	715.63	12.43	715.57
12MWT10	8/11/04	1311456.81	3026649.95	723.84	726.68	25.0	14.00	24.00	709.84	699.84	Puz	15.17	711.51	14.67	712.01	14.19	712.49	13.17	713.51	14.08	712.60
12MWT11	8/14/04	1313014.33	3026776.15	738.45	740.79	25.0	14.00	24.00	724.45	714.45	Puz	15.55	725.24	12.96	727.83	12.88	727.91	13.01	727.78	15.25	725.54
12MWT12	8/14/04	1312972.30	3026791.19	739.51	741.66	25.0	14.00	24.00	725.51	715.51	Puz	13.03	728.63	10.61	731.05	9.95	731.71	10.18	731.48	12.47	729.19
12MWT13	7/31/04	1313060.01	3026835.37	733.55	735.81	21.0	10.00	20.00	723.55	713.55	Puz	8.21	727.60	5.30	730.51	4.63	731.18	4.83	730.98	7.33	728.48
12MWT14	8/31/04	1312965.79	3026875.34	734.54	736.67	26.0	15.00	25.00	719.54	709.54	Puz	19.51	717.16	20.05	716.62	20.75	715.92	21.28	715.39	20.30	716.37
12MWT15	8/31/04	1312876.08	3026906.85	734.40	736.74	25.0	14.00	24.00	720.40	710.40	Puz	16.32	720.42	18.52	718.22	19.17	717.57	18.24	718.50	16.63	720.11
12MWT16	8/14/04	1312096.13	3027182.94	743.63	745.97	25.0	14.00	24.00	729.63	719.63	Puz	20.97	725.00	21.95	724.02	22.13	723.84	21.62	724.35	21.37	724.60
12MWT17	8/15/04	1312047.38	3027205.14	744.84	747.23	26.0	15.00	25.00	729.84	719.84	Puz	22.79	724.44	24.11	723.12	24.63	722.60	23.73	723.50	23.05	724.18
12MWT18	8/27/04	1312114.82	3027253.63	743.93	745.94	26.0	15.00	25.00	728.93	718.93	Puz	21.55	724.39	22.61	723.33	23.06	722.88	22.68	723.26	21.80	724.14
12MWT19	8/28/04	1312026.45	3027292.38	744.55	746.89	27.0	16.00	26.00	728.55	718.55	Puz	25.83	721.06	27.06	719.83	27.77	719.12	27.68	719.21	26.66	720.23
12MWT20	9/1/04	1311919.40	3027337.61	744.40	746.56	26.0	15.00	25.00	729.40	719.40	Puz	23.86	722.70	24.97	721.59	25.35	721.21	25.45	721.11	24.47	722.09
12MWT21	9/12/04	1312878.00	3026436.50	735.16	737.72	25.0	14.00	24.00	721.16	711.16	Puz	21.42	716.30	19.92	717.80	19.54	718.18	19.46	718.26	21.49	716.23
12MWT22	9/11/04	1311937.84	3026901.94	737.50	739.74	25.0	14.00	24.00	723.50	713.50	Puz	16.56	723.18	17.40	722.34	17.71	722.03	17.10	722.64	16.60	723.14
12MWT23	8/10/04	1311150.87	3027466.57	737.29	739.75	31.0	20.00	30.00	717.29	707.29	Puz	27.20	712.55	28.22	711.53	28.65	711.10	21.89	717.86	27.52	712.23

TABLE 2-1

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ROUNDS 1 THROUGH 4
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet) NAD83	Easting (feet) NAD83	Ground Elevation (feet amsl)	Top of Riser or Reference Point Elevation (feet amsl) NAVD88	Total Depth (feet bgs)[1]	Screened Interval				Water-Bearing Zone	October 17, 2004		December 15, 2004		January 18, 2005		May 18, 2005		August 10, 2005	
							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)
12MWT24	8/10/04	1310974.75	3027184.02	738.28	740.60	31.0	20.00	30.00	718.28	708.28	Puz	32.07	708.53	32.38	708.22	32.34	708.26	32.35	708.25	32.36	708.24
12MWT24A	8/16/04	1310968.91	3027192.97	737.99	740.53	54.0	44.00	54.00	693.99	683.99	Puz	34.68	705.85	35.00	705.53	35.23	705.30	34.93	705.60	35.13	705.40
12MWT25	9/12/04	1313924.59	3026269.42	746.55	748.66	26.0	15.00	25.00	731.55	721.55	Puz	17.80	730.86	17.35	731.31	17.35	731.31	16.55	732.11	16.81	731.85
12MWT26	9/12/04	1313638.57	3025981.12	741.64	743.72	25.0	14.00	24.00	727.64	717.64	Puz	10.56	733.16	10.91	732.81	11.01	732.71	10.02	733.70	9.79	733.93
12MWT27	9/2/04	1313736.63	3026477.23	738.42	740.52	26.0	15.00	25.00	723.42	713.42	Puz	10.96	729.56	9.35	731.17	9.24	731.28	9.18	731.34	10.02	730.50
12MWT28	8/30/04	1313506.96	3026352.09	743.27	745.53	26.0	15.00	25.00	728.27	718.27	Puz	12.96	732.57	12.78	732.75	12.78	732.75	11.8	733.73	12.10	733.43
12MWT29	9/10/04	1312653.54	3026079.78	729.13	731.23	89.0	70.00	88.00	659.13	641.13	Pmz	59.97	671.26	61.20	670.03	61.34	669.89	59.83	671.40	58.83	672.40
12MWT30	8/29/04	1311604.34	3026576.32	725.67	727.59	90.5	70.00	90.00	655.67	635.67	Pmz	92.71	634.88	92.74	634.85	92.69	634.90	92.56	635.03	92.59	635.00
12MWT31	8/30/04	1312970.99	3026872.87	734.55	736.75	89.0	68.00	88.00	666.55	646.55	Pmz	85.17	651.58	68.86	667.89	68.72	668.03	67.87	668.88	61.18	675.57
12MWT32	9/1/04	1312015.49	3027297.24	744.51	747.44	100.0	79.00	99.00	665.51	645.51	Pmz	68.55	678.89	85.93	661.51	86.11	661.33	84.75	662.69	84.99	662.45
12MWT33	9/2/04	1313725.86	3026481.26	738.32	740.49	95.0	74.00	94.00	664.32	644.32	Pmz	44.99	695.50	42.44	698.05	41.80	698.69	41.34	699.15	43.30	697.19
12MWT34	8/13/04	1310967.35	3027183.73	738.02	740.52	87.0	76.00	86.00	662.02	652.02	Pmz	88.42	652.10	88.32	652.20	88.12	652.40	87.98	652.54	87.95	652.57
12MWT35	8/27/04	1312711.38	3027111.95	732.17	734.64	27.0	16.00	26.00	716.17	706.17	Puz	12.33	722.31	12.53	722.11	12.70	721.94	12.11	722.53	11.90	722.74
12MWT36	8/27/04	1312466.54	3027186.16	736.51	738.63	26.0	15.00	25.00	721.51	711.51	Puz	13.15	725.48	14.19	724.44	14.58	724.05	14.12	724.51	13.17	725.46
12MWT37	7/29/04	1311630.57	3027496.41	736.35	738.77	25.0	14.00	24.00	722.35	712.35	Puz	22.20	716.57	25.74	713.03	26.24	712.53	25.98	712.79	23.51	715.26
12MWT38	9/11/04	1312353.89	3026531.17	726.05	728.03	25.0	14.00	24.00	712.05	702.05	Puz	10.03	718.00	10.64	717.39	10.63	717.40	9.69	718.34	9.46	718.57
12MWT39	7/30/04	1311015.63	3027662.97	735.33	737.64	35.0	24.00	34.00	711.33	701.33	Puz	35.83	701.81	36.05	701.59	35.82	701.82	35.56	702.08	35.50	702.14
12MWT40	8/12/04	1310616.56	3027037.67	725.37	727.50	29.0	18.00	28.00	707.37	697.37	Puz	22.23	705.27	23.11	704.39	23.18	704.32	23.04	704.46	23.83	703.67
12MWT41	10/27/04	1310642.00	3026376.75	621.30	622.97	35.0	24.00	34.00	597.30	587.30	Mgd	NA	NA	20.33	602.64	20.42	602.55	19.75	603.22	20.10	602.87
12MWT42	9/1/04	1312364.70	3026127.28	717.93	720.22	29.0	13.00	28.00	704.93	689.93	Puz	15.03	705.19	13.02	707.20	12.13	708.09	11.69	708.53	13.67	706.55
12MWT43	11/12/04	1310955.52	3026125.55	677.03	679.01	81.0	65.00	80.00	612.03	597.03	Plz	NA	NA	78.15	600.86	78.56	600.45	78.19	600.82	NA	NA
12MWT44	10/27/04	1310276.64	3026617.87	624.81	626.69	35.5	25.00	35.00	599.81	589.81	Mgd	NA	NA	26.25	600.44	26.58	600.11	26.14	600.55	26.60	600.09
12MWT45	10/29/04	1313384.30	3027614.01	688.37	691.07	25.0	14.00	24.00	674.37	664.37	Pmz	NA	NA	17.07	674.00	16.03	675.04	15.62	675.45	19.97	671.10
12MWT46	10/30/04	1312828.63	3027864.12	673.31	675.67	24.5	14.00	24.00	659.31	649.31	Pmz	NA	NA	16.07	659.60	16.02	659.65	15.80	659.87	21.66	654.01
12MWT47	10/31/04	1312455.99	3028025.00	660.79	663.12	25.0	14.00	24.00	646.79	636.79	Pmz	NA	NA	12.85	650.27	12.67	650.45	14.00	649.12	16.02	647.10

TABLE 2-1

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 12 - MINE FILL A
ROUNDS 1 THROUGH 4
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet) NAD83	Easting (feet) NAD83	Ground Elevation (feet amsl)	Top of Riser or Reference Point Elevation (feet amsl) NAVD88	Total Depth (feet bgs)[1]	Screened Interval				Water-Bearing Zone	October 17, 2004		December 15, 2004		January 18, 2005		May 18, 2005		August 10, 2005	
							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)
12MWT48	11/9/04	1312052.61	3028122.50	647.84	650.05	30.0	19.00	29.00	628.84	618.84	Pmz	NA	NA	30.50	619.55	30.41	619.64	30.36	619.69	30.34	619.71
12MWT49	11/10/04	1310956.27	3028138.17	616.96	619.25	30.0	19.00	29.00	597.96	587.96	Mgd	NA	NA	30.03	589.22	25.66	593.59	26.24	593.01	27.92	591.33
12MWT50	10/29/04	1310582.27	3028100.87	606.85	609.01	35.0	24.00	34.00	582.85	572.85	Mgd	NA	NA	DRY	NA	35.34	573.67	34.76	574.25	34.60	574.41
WES-7-1-81	—	1309481.87	3026477.49	628.95	631.95	41.5	27.02	36.20	601.93	592.75	Plz	NA	NA	NA	NA	20.41	611.54	19.86	612.09	23.70	608.25
WES-7-2-81	—	1309501.85	3026589.93	601.72	604.72	35.0	20.27	29.62	581.45	572.10	Mgd	NA	NA	NA	NA	34.26	570.46	33.93	570.79	35.99	568.73
WES-7-3-81	—	1309677.40	3026457.16	596.22	599.22	38.0	23.40	32.72	572.82	563.50	Mgd	NA	NA	NA	NA	28.82	570.40	27.11	572.11	29.15	570.07
WES-7-4-81	—	1309586.54	3026531.10	595.22	598.22	39.0	24.31	33.64	570.91	561.58	Mgd	NA	NA	NA	NA	26.53	571.69	26.23	571.99	NA	NA
WES-7-5-81	—	1309640.94	3026503.16	593.50	596.50	39.0	24.30	33.65	569.20	559.85	Mgd	NA	NA	NA	NA	24.25	572.25	23.98	572.52	26.14	570.36
STAFF GAUGES																					
12SG01	10/14/04	1313149.25	3026817.59	NA	730.97	NA	NA	NA	NA	NA	NA	NA	NA	3.19	NA	Dry	NA	Dry	NA	Dry	NA
12SG02	10/14/04	1312731.07	3027125.37	NA	731.64	NA	NA	NA	NA	NA	NA	NA	NA	Dry	NA	Dry	NA	Dry	NA	Dry	NA
12SG03	10/14/04	1312335.43	3027317.19	NA	735.03	NA	NA	NA	NA	NA	NA	NA	NA	1.87	NA	Dry	NA	1.92	733.11	Dry	NA
12SG04	10/14/04	1311657.15	3027481.28	NA	736.72	NA	NA	NA	NA	NA	NA	NA	NA	4.50	NA	Dry	NA	4.11	732.61	Dry	NA
12SG05	10/14/04	1310844.41	3026971.44	NA	724.28	NA	NA	NA	NA	NA	NA	NA	NA	Dry	NA	Dry	NA	Dry	NA	Dry	NA
12SG06	10/14/04	1312141.14	3026445.52	NA	713.38	NA	NA	NA	NA	NA	NA	NA	NA	3.75	NA	3.95	NA	Dry	NA	Dry	NA
12SG07	10/14/04	1312447.98	3026302.90	NA	713.45	NA	NA	NA	NA	NA	NA	NA	NA	4.28	NA	4.26	NA	4.27	709.18	Dry	NA
12SG08	10/14/04	1316378.17	3028951.05	NA	668.56	NA	NA	NA	NA	NA	NA	NA	NA	5.05	NA	5.23	NA	5.74	662.82	Dry	NA
12SG09	10/14/04	1308584.68	3028722.93	NA	529.35	NA	NA	NA	NA	NA	NA	NA	NA	17.24	NA	17.40	NA	17.40	511.95	17.55	511.80
12SG10	10/14/04	1307698.34	3029600.29	NA	517.21	NA	NA	NA	NA	NA	NA	NA	NA	14.58	NA	14.69	NA	14.69	502.52	15.05	502.16
12SG11	10/14/04	1305640.98	3027744.30	NA	513.47	NA	NA	NA	NA	NA	NA	NA	NA	20.00	NA	19.94	NA	19.90	493.57	20.05	493.42
12SG12	10/14/04	1308475.83	3027438.49	NA	538.45	NA	NA	NA	NA	NA	NA	NA	NA	6.02	NA	6.05	NA	6.06	532.39	Dry	NA

TABLE 2-1

MONITORING WELL CONSTRUCTION INFORMATION AND WATER LEVEL MEASUREMENTS
SWMU 12 - MINE FILL A
ROUNDS 1 THROUGH 4
NSWC CRANE
CRANE, INDIANA

Well or Gauge Number	Installation Date	Northing (feet) NAD83	Easting (feet) NAD83	Ground Elevation (feet amsl)	Top of Riser or Reference Point Elevation (feet amsl) NAVD88	Total Depth (feet bgs)[1]	Screened Interval				Water-Bearing Zone	October 17, 2004		December 15, 2004		January 18, 2005		May 18, 2005		August 10, 2005	
							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)

Notes:
1 = Total depth of boring, total depth of well may be less.
2 = 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.
amsl = Above mean sea level (NAVD88).
bgs = Below ground surface.
btor = Below top of riser/reference point.
MGD = Mississippian (Glen Dean) aquifer
NA = Not available.
NAD83 = North American Datum 1983
NAVD83 = North American Vertical Datum 1983
Puz = Upper Pennsylvanian water-bearing zone
Plz = Lower Pennsylvanian water-bearing zone

TABLE 2-2

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSES
SWMU 12 - MINE FILL A
ROUND 4
NSWC CRANE
CRANE, INDIANA

Sample Number	Analytical Fraction				Reasoning Why Sample Was Not Collected
	Explosives		Miscellaneous		
	Nitroaromatics and Nitramines SW-846 8330	RDX Degradation Products SW-846 8330, Modified	Nitrate + Nitrite (as N) EPA 353.2	Total Organic Carbon SW-846 9060	
Groundwater (Round 4)					
12GWT0304	X	X	X		
12GWT0604	X	X	X		
12GWT0904	X	X	X		
12GWT1004	X	X	X		
12GWT1104	X	X	X		
12GWT1204	X	X	X		
12GWT1604	X	X	X		
12GWT1704	X	X	X		
12GWT1804	X	X	X		
12GWT2004	X	X	X		
12GWT2204	X	X	X		
12GWT2304	X	X	X		
12GWT2804	X	X	X		
12GWT3002	O	O	O		Dry Well
12GWT3104	X	X	X		
12GWT3204	X	X	X		
12GWT3604	X	X	X		
12GWT3804	X	X	X		
12GWT4104	X	X	X		
12GWT4204	X	X	X		
12GWT4704	X	X	X		
GW TOTALS	**20**	**20**	**20**		
Surface Water (Round 4)					
12SW0904	X	X	X	X	
12SW1104	X	X	X	X	
12SW1404	O	O	O	O	Dry
12SW2404	X	X	X	X	
12SW2504	X	X	X	X	
12SW2704	X	X	X	X	
12SW3103	O	O	O	O	Dry
12SW3403	X	X	X	X	
SW TOTALS	**6**	**6**	**6**		

X = Sample was collected as proposed.
O = Sample not collected.

3.0 DATA PRESENTATION

This section presents the analytical results for groundwater and surface water sampling conducted in Round 4 at SMWU 12 (see Tables 3-1 to 3-8). Analytical results for Rounds 1 through 3 are also provided 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.

As stated previously, the SWMU 12 RFI indicated that explosives contamination remains in soil around SWMU 12 buildings and explosives have migrated to groundwater and surface water. RDX was identified as the most frequently detected explosive in groundwater and surface water. As a result, RDX is being considered as a parent compound for evaluating the effectiveness of natural attenuation at SWMU 12. Over time, natural attenuation will reduce the mass or concentration of the parent compound in soil and groundwater and the parent compound will decompose in stages to other well-defined intermediate products. In the case of RDX, it will degrade to give the nitroso derivatives hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine (MNX), hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine (DNX) and hexahydro-1,3,5-trinitroso-1,3,5-triazine (TNX). As a result, the presentation and interpretation of analytical results in Sections 3 and 4 for SWMU 12 monitoring will focus on RDX and its associated degradation by-products.

3.1 GROUNDWATER DATA

Groundwater analytical results for Rounds 1 through 4 at SWMU 12 are presented in Tables 3-1, 3-3, and 3-5 for select monitoring well locations in the Upper and Middle Pennsylvanian, and the Mississippi Glen Dean Water Bearing Zones, respectively. These tables show a listing of concentrations for explosives, explosive degradation products, and miscellaneous field parameters. Descriptive statistics for Round 4 samples are presented in 3-2, 3-4, and 3-6. Concentrations are presented in micrograms per liter (µg/L) along with data validation qualifiers, as applicable. Due to the staggered nature of the groundwater sampling, not all wells were sampled in each of the four rounds of sampling.

3.1.1 Upper Pennsylvania Water Bearing Zone (Puz)

Monitoring results for Round 4 groundwater sampling at the Puz monitoring wells are presented in Table 3-1. As shown in Table 3-1, explosives were detected at wells 12MWT06, 12MWT09, 12MWT10, 12MWT11, 12MWT12, 12MWT16, 12MWT17, 12MWT18, 12MWT20, 12MWT22, 12MWT28, 12MWT36, 12MWT38, and 12MWT42. No explosives were detected at wells 12MWT03 and 12MWT23. Well location 12MWT28 is considered to be upgradient of SWMU 12. RDX degradation products were detected at wells 12MWT06, 12MWT09, 12MWT11, 12MWT12, 12MWT16, 12MWT17, 12MWT36, and

12MWT38. The most frequently detected degradation product was MNX with concentrations ranging from 0.28 J micrograms per liter (µg/L) at 12MWT38 to 260 µg/L at 12MWT16. DNX was detected at 12MWT06 (1.7 µg/L J), 12MWT16 (21 µg/L), and 12MWT17 (5.1 J µg/L). TNX was only detected at 12MWT16 (8.9 µg/L), and 12MWT17 (2.3 µg/L).

Table 3-2 presents descriptive statistics for monitoring results from Round 4 and indicates that RDX and HMX were the most frequently detected explosives. The concentrations of RDX ranged from 0.29 J µg/L at 12MWT28 to 8,500 µg/L at 12MWT16. High RDX concentrations were also detected at wells 12MWT11 (5,000 µg/L), 12MWT12 (5,000 µg/L), and 12MWT17 (2,600 µg/L)). Groundwater concentrations of HMX ranged from 0.67 µg/L at 12MWT18 to 650 µg/L at 12MWT16. Several other explosives were also detected at monitoring wells 12MWT06, 12MWT09, 12MWT11, 12MWT16, and 12MWT22, but on a much less frequent basis.

3.1.2 Middle Pennsylvania Water Bearing Zone (Pmz)

Monitoring results for sampling at the Middle Pennsylvanian Water Bearing Zone (Pmz) wells are presented in Table 3-3. The descriptive statistics for Round 4 detections and field parameters are shown in Table 3-4. In Round 4, there were no detections of explosives or degradation by-products.

3.1.3 Mississippi Glen Dean Water Bearing Zone (Mgd)

Monitoring results for sampling conducted in the Mississippi Glen Dean (Mgd) water bearing zone in Round 4 are presented in Table 3-5. In Round 4, there were no detections of explosives or degradation products. A summary of descriptive statistics for Round 4 field parameters is presented in Table 3-6.

3.2 SURFACE WATER DATA

Surface water analytical results for Round 4 are presented in Table 3-7, along with a statistical summary in Table 3-8. In Round 4, the only explosives detected were HMX and RDX. RDX was detected at 12SW/SD09 (9.2 µg/L) and 12SW/SD34 (3.1 µg/L). HMX was also detected at locations 12SW/SD09 (7.4 µg/L) and 12SW/SD34 (11 µg/L). The only degradation by-product detected in Round 4 was MNX at 12SW/SD09 (0.72 µg/L).

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 GROUNDWATER
ROUNDS 1 THROUGH 4 IN THE UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION	12MWT03									12MWT06									12MWT09								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	09/27/04	03/03/05	05/22/05	08/29/05						09/14/04	02/21/05	05/21/05	08/26/05						09/10/04	03/02/05	05/21/05	08/26/05					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE	0.27 U	0.284 U	0.264 U	0.27 U						16	19	15	23 J						0.264 U	0.271 U	0.25 U	0.25 U					
1,3-DINITROBENZENE	0.27 U	0.284 U	0.264 U	0.27 U						8	8.9	7.4	10 J						0.264 U	0.271 U	0.25 U	0.25 U					
2,4,6-TRINITROTOLUENE	0.27 U	0.284 U	0.264 U	0.27 UJ						160	170	140	210 J						0.264 U	0.271 U	0.25 U	0.31 R					
2,4-DIAMINO-6-NITROTOLUENE	0.27 U	0.284 U		0.27 U						4.9 J	7.8 J		7.5 J						0.264 U	0.271 U		0.25 U					
2,4-DINITROTOLUENE	0.27 U	0.284 U	0.264 U	0.27 U						2.4 J	0.24 U	0.269 U	5.4 J						0.264 U	0.271 U	0.25 U	0.25 U					
2,6-DIAMINO-4-NITROTOLUENE	0.27 U	0.284 U		0.27 U						0.255 U	0.24 U		0.26 U						0.264 U	0.271 U		0.25 U					
2,6-DINITROTOLUENE	0.27 U	0.284 U	0.264 U	0.27 U						9.8 J	0.24 U	12	15 J						0.264 U	0.34 J	0.25 U	0.29 J					
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.284 U	0.264 U	0.27 U						32 J	40 J	68	82 J						5.4 J	4 J	4 J	5.2 J					
2-NITROTOLUENE	0.27 U	0.284 U	0.264 U	0.27 U						0.255 U	0.24 U	0.269 U	0.26 U						0.264 U	0.271 U	0.25 U	0.25 U					
3,5-DINITROANILINE	0.27 U	0.284 U		0.27 U						4.6	9.4		9.7 J						0.264 U	0.271 U		0.25 U					
3-NITROTOLUENE	0.27 U	0.284 U	0.264 U	0.27 U						0.255 U	0.24 U	0.269 U	0.26 U						0.264 U	0.271 U	0.25 U	0.25 U					
4,4'-TN-AZOXY	0.532 U	0.568 U		0.53 U						0.51 U	0.48 U		0.52 U						0.528 U	0.542 U		0.5 U					
4-AMINO-2,6-DINITROTOLUENE	0.27 U	0.284 U	0.264 U	0.27 U						34	53	62 J	71 J						7.3	5.2	4.6	5.8					
4-NITROTOLUENE	0.27 U	0.284 U	0.264 U	0.27 U						0.255 U	5.8 J	0.269 U	6.7 J						0.264 U	0.271 U	0.25 U	0.25 U					
DNX	0.27 U	0.284 U		0.27 U						1.6 J	1.9 J		1.7 J						0.264 U	0.271 U		0.25 UJ					
MNX	0.27 U	0.284 U		0.27 U						23	30		21 J						0.264 U	0.33 J		0.82 J					
RDX	0.27 U	0.284 U	0.264 U	0.27 U						6300 J	7200	5000	5400 J						480 J	510	370	460					
TNX	0.27 U	0.284 U		0.27 U						0.255 U	0.74 J		0.26 U						0.264 U	0.271 U		0.25 U					
Field Parameters (as indicated)																											
DISSOLVED OXYGEN (mg/L)	2.66	12.29	3.32	0.98						5.67	3.51	1.27	0.63						4.61	5.57	0.99	2.38					
OXIDATION REDUCTION POTENTIAL (MV)	13.9	26	66	553.6						65	91	253.7	435.5						140	370.2	375	163					
PH (S.U.)	7.25	6.32	6.07	5.42						5.85	5.2	4.17	4.91						5.04	4.25	4.26	4.5					
SPECIFIC CONDUCTANCE (MS/CM)	1.638	1.425	1.205	1.151						0.282	0.265	0.317	0.303						0.403	0.313	0.257	0.264					
TEMPERATURE (°C)	14.58	12.55	16.3	19.34						17.35	11.39	13.69	16.66						18.78	10.31	14.69	18.97					
TURBIDITY (NTU)	303	7.71	290	18						0.75	0.28	0.1	0.6						6.99	2.31	3.3	9.7					
Miscellaneous Parameters (mg/L)																											
AMMONIA-N	0.11 J	0.15								0.005 U	0.01 UJ								0.005 U	0.01 U							
NITRITE/NITRATE-N	0.05 U	0.05 U		0.25 U						3.3 J	1.8		0.025 U						1.8 J	0.3		0.025 U					

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 GROUNDWATER
ROUNDS 1 THROUGH 4 IN THE UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION	12MWT10									12MWT11									12MWT12								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	09/25/04	02/07/05	05/19/05	08/26/05						09/13/04	02/22/05	05/19/05	08/23/05						09/14/04	02/22/05	05/19/05	08/23/05					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE	0.27 U	0.264 U	0.248 U	0.26 U						110	110	99	130						0.26 U	0.24 U	0.269 U	130					
1,3-DINITROBENZENE	0.27 U	0.264 U	0.248 U	0.26 U						4	6.3	7.5	9.4						0.26 U	0.24 U	0.269 U	9.4					
2,4,6-TRINITROTOLUENE	0.27 U	0.264 U	0.248 U	0.26 U						110	110	110	160						1.4	2.9	0.32 J	160					
2,4-DIAMINO-6-NITROTOLUENE	0.27 U	0.264 U		0.26 U						69 J	75 J		77 R						0.67 J	0.24 U		77 R					
2,4-DINITROTOLUENE	0.27 U	0.264 U	0.248 U	0.26 U						2.8 J	0.24 U	0.264 U	4.4 R						0.26 U	0.24 U	0.269 U	4.4 R					
2,6-DIAMINO-4-NITROTOLUENE	0.27 U	0.264 U		0.26 U						0.266 U	0.24 U		0.26 U						0.26 U	0.24 U		0.26 U					
2,6-DINITROTOLUENE	0.27 U	0.264 U	0.248 U	0.26 U						8.1 J	0.24 U	11	0.26 U						0.29 J	0.24 U	0.269 U	0.26 U					
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.264 U	0.248 U	0.26 U						39 J	31 J	52 J	34 J						6.1 J	5.3 J	4.2 J	34 J					
2-NITROTOLUENE	0.27 U	0.264 U	0.248 U	0.26 U						0.45 J	0.24 U	0.264 U	0.26 U						0.26 U	0.24 U	0.269 U	0.26 U					
3,5-DINITROANILINE	0.27 U	0.264 U		0.26 U						11	12 J		13						0.91 J	0.92 J		13					
3-NITROTOLUENE	0.27 U	0.264 U	0.248 U	0.26 U						0.266 U	0.24 U	0.264 U	0.26 U						0.26 U	1.6 J	0.269 U	0.26 U					
4,4'-TN-AZOXY	0.538 U	0.528 U		0.52 U						0.532 U	0.48 U		0.53 U						0.52 U	0.48 U		0.53 U					
4-AMINO-2,6-DINITROTOLUENE	0.27 U	0.264 U	0.248 U	0.26 U						78 J	43	41	50 J						6.9	6.4	4.2	50 J					
4-NITROTOLUENE	0.27 U	0.264 U	0.248 U	0.26 U						0.266 U	0.24 U	4.1 R	0.26 U						0.26 U	0.24 U	0.269 U	0.26 U					
DNX	0.27 U	0.264 U		0.26 U						0.266 U	1.9 J		0.26 U						1.3 J	0.36 J		0.26 U					
MNX	0.39 J	0.33 J		0.35 J						10 J	2.4 J		14 J						7.8	4.8		14 J					
RDX	22	30	33	37						3900 J	4900	4100	5000						480 J	380	390	5000					
TNX	0.27 U	0.264 U		0.26 U						0.266 U	11 J		0.26 U						0.26 U	0.54 J		0.26 U					
Field Parameters (as indicated)																											
DISSOLVED OXYGEN (mg/L)	4.78	5.26	0.58	0.81						1.63	1.71	1.4	1.15						0.97	1.76	1.47	0.52					
OXIDATION REDUCTION POTENTIAL (MV)	149	387	354	488.7						190	243.7	343.5	696.7						72	56	189.7	624.5					
PH (S.U.)	4.64	4.5	3.83	3.29						3.08	3.89	3.96	2.93						6.12	6.08	6.05	5.35					
SPECIFIC CONDUCTANCE (MS/CM)	0.724	0.57	0.587	550						0.299	0.197	0.249	0.27						0.683	0.607	0.79	0.63					
TEMPERATURE (°C)	17.5	12.1	15.02	16.87						20.89	10.33	17.1	18.73						18.58	10.82	22.38	16.98					
TURBIDITY (NTU)	4.1	2	0.35	36						0.5	0.21	2.4	0						0.35	0.71	6.8	0					
Miscellaneous Parameters (mg/L)																											
AMMONIA-N	0.06 U	0.13								0.04	0.11								0.03	0.1							
NITRITE/NITRATE-N	0.05	0.05 U		0.025 U						10 J	4.8		2.4						2.9 J	4.7		1.4					

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 GROUNDWATER
ROUNDS 1 THROUGH 4 IN THE UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION	12MWT16									12MWT17									12MWT18								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	09/12/04	02/16/05	05/22/05	08/23/05						09/11/04	02/22/05	05/19/05	08/23/05						09/26/04	03/03/05	05/22/05	08/24/05					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE	1.1 J	1.3 J	2.4 J	3.1 J						0.66 J	0.82 J	0.74 J	0.92 J						0.27 U	0.25 U	0.252 U	0.27 U					
1,3-DINITROBENZENE	0.271 U	0.245 U	0.25 U	0.27 U						0.43 J	0.34 J	0.266 U	0.27 U						0.27 U	0.28 J	0.252 U	0.27 U					
2,4,6-TRINITROTOLUENE	0.271 U	8.2	10	0.27 U						0.255 UJ	2.3	2.2	0.27 U						0.27 U	0.25 U	0.252 U	0.27 U					
2,4-DIAMINO-6-NITROTOLUENE	1.6 J	1.8 J		2.1 R						0.57 J	1.4 J		1.2 R						0.27 U	0.25 U		0.27 U					
2,4-DINITROTOLUENE	0.271 U	0.3 J	0.32 J	0.27 U						0.255 UJ	0.258 U	0.3 J	0.27 U						0.27 U	0.25 U	0.252 U	0.27 U					
2,6-DIAMINO-4-NITROTOLUENE	0.271 U	0.245 U		0.27 U						0.255 UJ	0.258 U		0.27 U						0.27 U	0.25 U		0.27 U					
2,6-DINITROTOLUENE	1.8	1.7 J	1.9	2						0.82 J	1.6	12 J	1.1						0.27 U	0.25 U	0.252 U	0.27 U					
2-AMINO-4,6-DINITROTOLUENE	76	100 J	120 J	160 J						14 J	30 J	12 J	32 J						0.27 U	0.25 U	0.252 U	0.27 U					
2-NITROTOLUENE	0.271 U	0.245 U	0.25 U	0.27 U						0.255 UJ	0.258 U	0.266 U	0.27 U						0.27 U	0.25 U	0.252 U	0.27 U					
3,5-DINITROANILINE	0.271 U	5.8		0.27 U						0.78 J	1.6		0.27 U						0.27 U	0.25 U		0.27 U					
3-NITROTOLUENE	0.68 J	0.245 U	0.25 U	0.34 R						0.255 UJ	0.258 U	0.266 U	0.27 U						0.27 U	0.25 U	0.252 U	0.27 U					
4,4'-TN-AZOXY	0.542 U	0.49 U		0.53 U						0.51 UJ	0.515 U		0.54 U						0.538 U	0.5 U		0.54 U					
4-AMINO-2,6-DINITROTOLUENE	160	190	210	260						25 J	43	41	47						0.27 U	0.25 U	0.252 U	0.27 U					
4-NITROTOLUENE	0.271 U	0.245 U	0.25 U	0.27 U						0.255 UJ	0.258 U	0.266 U	0.27 U						0.27 U	0.25 U	0.252 U	0.27 U					
DNX	22	18		21 J						3.7 J	6.1		5.1						0.27 U	0.25 U		0.27 U					
MNX	250	200		260						44 J	79		67						0.27 U	0.25 U		0.27 U					
RDX	6300 J	7400	6500	8500						1600 J	2600	2000	2600						20	32	24	14					
TNX	7.8	6.2		8.9						1.3 J	2		2.3						0.27 U	0.25 U		0.27 U					
Field Parameters (as indicated)																											
DISSOLVED OXYGEN (mg/L)	4.79	4.49	4.27							6.05	8.3	8.54							2.38	19.36	0.38	5.11					
OXIDATION REDUCTION POTENTIAL (MV)	54	101.4	246.5	186						144	131	249.9	170						41	376.6	14.9	408					
PH (S.U.)	6.05	6.25	4.27	1.49						5.43	5.88	4.72	1.52						4.95	4.13	4.58	5.5					
SPECIFIC CONDUCTANCE (MS/CM)	0.616	0.336	0.337	0.374						1.212	0.592	0.621	0.702						2.472	2.132	1.457	1.384					
TEMPERATURE (°C)	15.52	15.02	16.89	18.34						19.24	13.02	15.88	18.94						17	12.75	14.9	20.02					
TURBIDITY (NTU)	512	144	31	280						226	131	29	130						15	26.4	40	70					
Miscellaneous Parameters (mg/L)																											
AMMONIA-N	0.07	0.11								0.04	0.18 J								0.18 J	0.34							
NITRITE/NITRATE-N	5.7 J	4.2		0.23						4.6 J	1.7		0.06						0.71	0.05 U		0.025 U					

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 GROUNDWATER
ROUNDS 1 THROUGH 4 IN THE UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION	12MWT20									12MWT22									12MWT23								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	09/27/04	02/07/05	05/22/05	08/28/05						10/10/04	02/21/05	05/21/05	08/25/05						09/10/04	02/20/05	05/21/05	08/26/05					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE	0.245 U	0.238 U	0.258 U	0.26 U						2.6	0.24 U	0.255 U	0.27 U						0.258 U	0.24 U	0.275 U	0.26 U					
1,3-DINITROBENZENE	0.245 U	0.238 U	0.258 U	0.26 U						0.49 J	0.24 U	0.255 U	0.27 U						0.258 U	0.24 U	0.275 U	0.26 U					
2,4,6-TRINITROTOLUENE	0.245 U	0.238 U	0.258 U	0.26 U						96	0.26 J	0.255 U	0.54 R						0.258 U	0.24 U	0.275 U	0.26 U					
2,4-DIAMINO-6-NITROTOLUENE	0.245 U	0.238 U		0.26 U						2.3 J	0.48 J		0.27 U						0.258 U	0.24 U		0.26 U					
2,4-DINITROTOLUENE	0.245 U	0.238 U	0.258 U	0.26 U						0.73	0.24 U	0.255 U	0.27 U						0.258 U	0.24 U	0.275 U	0.26 U					
2,6-DIAMINO-4-NITROTOLUENE	0.245 U	0.238 U		0.26 U						0.266 U	0.24 U		0.27 U						0.258 U	0.24 U		0.26 U					
2,6-DINITROTOLUENE	0.245 U	0.238 U	0.258 U	0.26 U						2	0.24 U	0.255 U	0.27 U						0.258 U	0.24 U	0.275 U	0.26 U					
2-AMINO-4,6-DINITROTOLUENE	0.245 U	0.238 U	0.258 U	0.26 U						5.9	0.24 U	0.255 U	0.27 U						0.258 U	0.24 U	0.275 U	0.26 U					
2-NITROTOLUENE	0.245 U	0.238 U	0.258 U	0.26 U						0.266 U	0.24 U	0.255 U	0.27 U						0.258 U	0.24 U	0.275 U	0.26 U					
3,5-DINITROANILINE	0.245 U	0.238 U		0.26 U						0.63 J	0.24 U		0.27 U						0.258 U	0.24 U		0.26 U					
3-NITROTOLUENE	0.245 U	0.238 U	0.258 U	0.26 U						0.266 U	0.24 U	0.255 U	0.27 U						0.258 U	0.24 U	0.275 U	0.26 U					
4,4'-TN-AZOXY	0.49 U	0.475 U		0.52 U						0.532 U	0.48 U		0.53 U						0.515 U	0.48 U		0.51 U					
4-AMINO-2,6-DINITROTOLUENE	0.245 U	0.238 U		0.26 U						9.6	0.62	0.255 U	0.74						0.258 U	0.24 U	0.275 U	0.26 U					
4-NITROTOLUENE	0.245 U	0.238 U	0.258 U	0.26 U						0.266 U	0.24 U	0.255 U	0.27 U						0.258 U	0.24 U	0.275 U	0.26 U					
DNX	0.245 U	0.238 U		0.26 U						0.266 U	0.24 U		0.27 U						0.258 U	0.24 U		0.26 U					
MNX	0.245 U	0.238 U		0.26 U						0.81	0.43 J		0.35 J						0.258 U	0.24 U		0.26 U					
RDX	1.4	3.1	4.2	1.2						590	34	26	61						0.258 U	0.24 U	0.275 U	0.26 U					
TNX	0.245 U	0.238 U		0.26 U						0.266 U	0.24 U		0.27 U						0.258 U	0.24 U		0.26 U					
Field Parameters (as indicated)																											
DISSOLVED OXYGEN (mg/L)	2.5	4.26	0.47	5.18						6.02	6.1	5.84	4.54						5.08	1.79	1.73	2.82					
OXIDATION REDUCTION POTENTIAL (MV)	89.5	45.4	365	185						365.3	182.1	290.6	159						301	504.6	498.5	493					
PH (S.U.)	5.35	5.25	4.84	5.5						5.27	5.61	5.65	5.5						2.94	3.33	2.93	4					
SPECIFIC CONDUCTANCE (MS/CM)	2.095	1.696	1.783	1.327						0.448	0.186	0.172	0.175						6.359	4.644	5.05	4.549					
TEMPERATURE (°C)	18.4	12.07	17.33	21.32						15.13	12.51	13.54	17.49						18.14	12.66	17.46	20.57					
TURBIDITY (NTU)	1	0.8	3.8	5.2						7.79	9.66	73	50						218	6.8	12	150					
Miscellaneous Parameters (mg/L)																											
AMMONIA-N	0.18	0.2								0.005 UJ	0.01 UJ								8.9 J	4 J							
NITRITE/NITRATE-N	0.67	0.97		0.025 U						0.63	0.19		0.025 U						2.3 J	0.22		0.025 U					

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 GROUNDWATER
ROUNDS 1 THROUGH 4 IN THE UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION	12MWT28									12MWT36									12MWT38								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	09/13/04	02/15/05	05/23/05	08/28/05						09/24/04	03/04/05	05/22/05	08/24/05						10/09/04	02/20/05	05/19/05	08/28/05					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
1,3-DINITROBENZENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
2,4,6-TRINITROTOLUENE	0.269 U	0.242 U	0.271 U	0.26 UJ						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 UJ					
2,4-DIAMINO-6-NITROTOLUENE	0.269 U	0.242 U		0.26 U						0.252 U	0.24 U		0.24 U						0.25 U	0.242 U		0.26 U					
2,4-DINITROTOLUENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
2,6-DIAMINO-4-NITROTOLUENE	0.269 U	0.242 U		0.26 U						0.252 U	0.24 U		0.24 U						0.25 U	0.242 U		0.26 U					
2,6-DINITROTOLUENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
2-AMINO-4,6-DINITROTOLUENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
2-NITROTOLUENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
3,5-DINITROANILINE	0.269 U	0.242 U		0.26 U						0.252 U	0.24 U		0.24 U						0.25 U	0.242 U		0.26 U					
3-NITROTOLUENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
4,4'-TN-AZOXY	0.538 U	0.485 U		0.52 U						0.505 U	0.48 U		0.49 U						0.5 U	0.485 U		0.52 U					
4-AMINO-2,6-DINITROTOLUENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.26 J	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
4-NITROTOLUENE	0.269 U	0.242 U	0.271 U	0.26 U						0.252 U	0.24 U	0.271 U	0.24 U						0.25 U	0.242 U	0.252 U	0.26 U					
DNX	0.269 U	0.242 U		0.26 U						0.39 J	0.24 U		0.34 R						0.25 U	0.242 U		0.26 U					
MNX	0.269 U	0.242 U		0.26 U						1.1	1.1		1.1						0.25 U	0.36 J		0.28 J					
RDX	0.269 U	0.242 U	0.271 U	0.29 J						41	42	35	42						42	52 J	59	57					
TNX	0.269 U	0.242 U		0.26 U						0.252 U	0.24 U		0.24 U						0.25 U	0.242 U		0.26 U					
Field Parameters (as indicated)																											
DISSOLVED OXYGEN (mg/L)	7.29	4.17	1.63	1.83						3.69	2.63	2.98	2.54						6.88	3.67	2.87	3.46					
OXIDATION REDUCTION POTENTIAL (MV)	75	82.7	237.4	704.3						332.5	222.7	232.6	636.8						171.3	399.7	420	688.6					
PH (S.U.)	6.33	6.41	6	1.32						6.02	6.29	6	5.9						4.2	3.6	3.7	2.97					
SPECIFIC CONDUCTANCE (MS/CM)	1.937	1.208	1.05	1.021						0.65	0.55	0.464	0.494						0.607	0.33	0.297	0.321					
TEMPERATURE (°C)	16.31	16.17	14.49	19.73						19.94	13.02	16.67	26.34						17.61	10.48	15.02	22.36					
TURBIDITY (NTU)	10.83	9.03	4.72	60						0.82	0.22	0	0						5	1.21	1.4	0.4					
Miscellaneous Parameters (mg/L)																											
AMMONIA-N	0.005 U	0.01 U								0.1 J	0.01 U								0.005 UJ	0.08 J							
NITRITE/NITRATE-N	0.81 J	0.25		0.025 U						5.4	6.1		0.025 U						0.07	0.05 U		0.025 U					

TABLE 3-1

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 GROUNDWATER
ROUNDS 1 THROUGH 4 IN THE UPPER PENNSYLVANIA WATER BEARING ZONE
NSWC CRANE
CRANE, INDIANA

LOCATION	12MWT42								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9
DATE	09/28/04	02/19/05	05/22/05	08/25/05					
PARAMETER									
Energetics (ug/L)									
1,3,5-TRINITROBENZENE	0.266 U	0.245 U	0.26 U	0.26 U					
1,3-DINITROBENZENE	0.266 U	0.245 U	0.26 U	0.26 U					
2,4,6-TRINITROTOLUENE	0.266 U	0.245 U	0.26 U	0.26 U					
2,4-DIAMINO-6-NITROTOLUENE	0.266 U	0.245 U	0.26 U	0.26 U					
2,4-DINITROTOLUENE	0.266 U	0.245 U	0.26 U	0.26 U					
2,6-DIAMINO-4-NITROTOLUENE	0.266 U	0.245 U	0.26 U	0.26 U					
2,6-DINITROTOLUENE	0.266 U	0.245 U	0.26 U	0.26 U					
2-AMINO-4,6-DINITROTOLUENE	0.266 U	0.245 U	0.26 U	0.26 U					
2-NITROTOLUENE	0.266 U	0.245 U	0.26 U	0.26 U					
3,5-DINITROANILINE	0.266 U	0.245 U	0.26 U	0.26 U					
3-NITROTOLUENE	0.266 U	0.245 U		0.26 U					
4,4'-TN-AZOXY	0.532 U	0.49 U		0.52 U					
4-AMINO-2,6-DINITROTOLUENE	0.266 U	0.245 U		0.26 U					
4-NITROTOLUENE	0.266 U	0.245 U		0.26 U					
DNX	0.266 U	0.245 U		0.26 U					
MNX	0.266 U	0.245 U	0.26 U	0.26 U					
RDX	11	19	0.26 U	17					
TNX	0.266 U	0.245 U		0.26 U					
Field Parameters (as indicated)									
DISSOLVED OXYGEN (mg/L)	0.18	1.25		0.82					
OXIDATION REDUCTION POTENTIAL (MV)	523	279.9		806.6					
PH (S.U.)	4	4.24		3.43					
SPECIFIC CONDUCTANCE (MS/CM)	0.625	0.303		0.299					
TEMPERATURE (°C)	17.5	11.27		14.86					
TURBIDITY (NTU)	1.01	0.55		7.8					
Miscellaneous Parameters (mg/L)									
AMMONIA-N	0.005 U	0.01 UJ							
NITRITE/NITRATE-N	0.4	0.21		0.025 U					

U - Indicates that the chemical was not detected at the numerical detection limit (sample-specific detection limit) noted.
Non-detected results from the laboratory are reported in this manner.
This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.
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 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.
Note: It is suspected that the analytical results for explosives in Round 3 at well 12MWT32 were switched with the results for Round 3 at well 12MWT32. As a result, the analytical results for 12MWT16 have been switched with the results for 12MWT32 in Table 3-2.

TABLE 3-2

DESCRIPTIVE STATISTICS FOR
SWMU 12 (MINE FILL A) ROUND 4 GROUNDWATER IN THE UPPER PENNSYLVANIAN ZONE
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration	Average of Positive Detects	Sample of Maximum Detect
Energetics (ug/L)							
1,3,5-TRINITROBENZENE	4/16	0.92 J	130	0.24 - 0.27	9.91	39.3	12GWT1104
1,3-DINITROBENZENE	2/16	9.4	10 J	0.24 - 0.27	1.33	9.70	12GWT0604
2,4,6-TRINITROTOLUENE	3/14	6.1	210 J	0.24 - 0.27	27.0	125	12GWT0604
2,4-DIAMINO-6-NITROTOLUENE	1/13	7.5 J	7.5 J	0.24 - 0.27	0.697	7.50	12GWT0604
2,4-DINITROTOLUENE	1/15	5.4 J	5.4 J	0.24 - 0.27	0.482	5.40	12GWT0604
2,6-DINITROTOLUENE	4/16	0.29 J	15 J	0.24 - 0.27	1.25	4.60	12GWT0604
2-AMINO-4,6-DINITROTOLUENE	6/16	5.2 J	160 J	0.24 - 0.27	20.1	53.5	12GWT1604
3,5-DINITROANILINE	3/16	1.7	13	0.24 - 0.27	1.63	8.13	12GWT1104
4-AMINO-2,6-DINITROTOLUENE	7/16	0.74	260	0.24 - 0.27	27.9	63.6	12GWT1604
4-NITROTOLUENE	1/16	6.7 J	6.7 J	0.24 - 0.27	0.542	6.70	12GWT0604
DNX	3/14	1.7 J	21 J	0.25 - 0.27	2.09	9.27	12GWT1604
HMX	12/16	0.67	650	0.26 - 0.27	129	172	12GWT1604
MNX	10/16	0.28 J	260	0.26 - 0.27	23.1	36.9	12GWT1604
RDX	14/16	0.29 J	8500	0.26 - 0.27	1404	1604	12GWT1604
TNX	2/16	2.3	8.9	0.24 - 0.27	0.814	5.60	12GWT1604
Field Parameters							
DISSOLVED OXYGEN - METER (MG/L)	14/14	0.52	5.18	- - -	2.34	2.34	12GWT2004
OXIDATION REDUCTION POTENTIAL (MV)	16/16	159	806.6	- - -	462	462	12GWT4204
PH (S.U.)	16/16	1.32	5.9	- - -	3.97	3.97	12GWT3604
SPECIFIC CONDUCTANCE (MS/CM)	16/16	0.175	550	- - -	35.2	35.2	12GWT1004
TEMPERATURE (C)	16/16	14.86	26.34	- - -	19.2	19.2	12GWT3604
TURBIDITY (NTU)	16/16	0	280	- - -	51.1	51.1	12GWT1604
NITRITE/NITRATE-N (MG/L)	4/16	0.06	2.4	0.025 - 0.025	0.265	1.02	12GWT1104
TOTAL ORGANIC CARBON (MG/L)	16/16	1.1	12	- - -	4.28	4.28	12GWT2304

TABLE 3-3

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS, AND MISCELLANEOUS PARAMETERS
FOR SWMU 12 GROUNDWATER
ROUNDS 1 THROUGH 4 IN THE MIDDLE PENNSYLVANIA WATER BEARING ZONE
NWSC CRANE
CRANE, INDIANA

LOCATION	12MWT30									12MWT31									12MWT32								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	No Sample	No Sample	05/21/05	No Sample						09/27/04	02/08/05	05/22/05	08/24/05						09/28/04	02/08/05	05/22/05	08/25/05					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
1,3-DINITROBENZENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
2,4,6-TRINITROTOLUENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
2,4-DIAMINO-6-NITROTOLUENE										0.27 U	0.275 U		0.27 U						0.248 U	0.242 U		0.27 U					
2,4-DINITROTOLUENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
2,6-DIAMINO-4-NITROTOLUENE										0.27 U	0.275 U		0.27 U						0.248 U	0.242 U		0.27 U					
2,6-DINITROTOLUENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
2-AMINO-4,6-DINITROTOLUENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
2-NITROTOLUENE			3.2 J							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
3,5-DINITROANILINE										0.27 U	0.275 U		0.27 U						0.248 U	0.242 U		0.27 U					
3-NITROTOLUENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
4,4'-TN-AZOXY										0.532 U	0.55 U		0.54 U						0.495 U	0.485 U		0.53 U					
4-AMINO-2,6-DINITROTOLUENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
4-NITROTOLUENE			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
DNX										0.27 U	0.275 U		0.27 U						0.248 U	0.242 U		0.27 U					
MNX										0.27 U	0.275 U		0.27 U						0.248 U	0.242 U		0.27 U					
RDX			2.78 U							0.27 U	0.275 U	0.258 U	0.27 U						0.248 U	0.242 U	0.245 U	0.27 U					
TNX										0.27 U	0.275 U		0.27 U						0.248 U	0.242 U		0.27 U					
Field Parameters (as indicated)																											
DISSOLVED OXYGEN (mg/L)										6.45	1.16	3.77	0.54						11.72	1.06	0	0.64					
OXIDATION REDUCTION POTENTIAL (MV)										301.9	70.7	335	576						121.2	-7.1	41	150					
PH (S.U.)										7.05	8.09	7.58	6.93						6.57	6.7	6.2	6.2					
SPECIFIC CONDUCTANCE (MS/CM)										0.507	0.431	0.374	337						1.257	1.355	1.324	1.23					
TEMPERATURE (°C)										16.87	10.99	18.04	16.95						14.28	11.67	19.18	19.49					
TURBIDITY (NTU)										25	75	25	9.8						315	360	50	9.4					
Miscellaneous Parameters (mg/L)																											
AMMONIA-N										0.37 J	0.45								1	1.7							
NITRITE/NITRATE-N										0.05 U	0.05 U		1						0.025 U	0.05 U		0.025 U					

TABLE 3-3

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS, AND MISCELLANEOUS PARAMETERS
FOR SWMU 12 GROUNDWATER
ROUNDS 1 THROUGH 4 IN THE MIDDLE PENNSYLVANIA WATER BEARING ZONE
NWSC CRANE
CRANE, INDIANA

LOCATION	12MWT46								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9
DATE	11/13/04	03/03/05	No Sample	No Sample					
PARAMETER									
Energetics (ug/L)									
1,3,5-TRINITROBENZENE	0.255 U	0.26 U							
1,3-DINITROBENZENE	0.255 U	0.26 U							
2,4,6-TRINITROTOLUENE	0.255 U	0.26 U							
2,4-DIAMINO-6-NITROTOLUENE	0.255 U	0.26 U							
2,4-DINITROTOLUENE	0.255 U	0.26 U							
2,6-DIAMINO-4-NITROTOLUENE	0.255 U	0.26 U							
2,6-DINITROTOLUENE	0.255 U	0.26 U							
2-AMINO-4,6-DINITROTOLUENE	0.255 U	0.26 U							
2-NITROTOLUENE	0.255 U	0.26 U							
3,5-DINITROANILINE	0.255 U	0.26 U							
3-NITROTOLUENE	0.255 U	0.26 U							
4,4'-TN-AZOXY	0.51 U	0.52 U							
4-AMINO-2,6-DINITROTOLUENE	0.255 U	0.26 U							
4-NITROTOLUENE	0.255 U	0.26 U							
DNX	0.255 U	0.26 U							
MNX	0.255 U	0.26 U							
RDX	0.255 U	0.26 U							
TNX	0.255 U	0.26 U							
Field Parameters (as indicated)									
DISSOLVED OXYGEN (mg/L)	5.42	0.64							
OXIDATION REDUCTION POTENTIAL (MV)	101	-10							
PH (S.U.)	5.68	6.02							
SPECIFIC CONDUCTANCE (MS/CM)	0.382	0.296							
TEMPERATURE (°C)	14.99	12.99							
TURBIDITY (NTU)	23	4.61							
Miscellaneous Parameters (mg/L)									
AMMONIA-N	1.8 J	0.82							
NITRITE/NITRATE-N	0.025 U	0.05 U							

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

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

Note: It is suspected that the analytical results for explosives in Round 3 at well 12MWT32 were switched with the results for Round 3 at well 12MWT16. As a result, the reported analytical results for 12MWT32 have been switched with the results for 12MWT16 in Table 3-1.

TABLE 3-4

DESCRIPTIVE STATISTICS FOR
SWMU 12 (MINE FILL A) ROUND 4 GROUNDWATER IN THE MIDDLE PENNSYLVANIAN ZONE
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration	Average of Positive Detects	Sample of Maximum Detect
Field Parameters							
DISSOLVED OXYGEN - METER (MG/L)	2/2	0.54	0.64	0.54 - 0.64	0.59	0.59	12GWT3204
OXIDATION REDUCTION POTENTIAL (MV)	2/2	150	576	150 - 576	363	363	12GWT3104
PH (S.U.)	2/2	6.2 *	6.93	6.2 - 6.93	6.565	6.565	12GWT3104
SPECIFIC CONDUCTANCE (MS/CM)	2/2	1.23	337	1.23 - 337	169.115	169.115	12GWT3104
TEMPERATURE (C)	2/2	16.95	19.49	16.95 - 19.49	18.22	18.22	12GWT3204
TURBIDITY (NTU)	2/2	9.4	9.8	9.4 - 9.8	9.6	9.6	12GWT3104
NITRITE/NITRATE-N (MG/L)	1/2	1	1	1 - 1	0.50625	1	12GWT3104

TABLE 3-5

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS, AND MISCELLANEOUS PARAMETERS
FOR SWMU 12 GROUNDWATER ROUNDS 1 THROUGH 4
IN THE MISSISSIPPIAN GLEN DEAN AQUIFER
NSWC CRANE
CRANE, INDIANA

LOCATION	12MWT41								
SAMPLING ROUND	1	02	03	4	5	6	7	8	9
DATE	11/10/04	02/19/05	05/23/05	08/25/05					
PARAMETER									
Energetics (ug/L)									
1,3,5-TRINITROBENZENE	0.266 U	0.255 U	0.26 U	0.26 U					
1,3-DINITROBENZENE	0.266 U	0.255 U	0.26 U	0.26 U					
2,4,6-TRINITROTOLUENE	0.266 U	0.255 U	0.26 U	0.26 U					
2,4-DIAMINO-6-NITROTOLUENE	0.266 U	0.255 U		0.26 U					
2,4-DINITROTOLUENE	0.266 U	0.255 U	0.26 U	0.26 U					
2,6-DIAMINO-4-NITROTOLUENE	0.266 U	0.255 U		0.26 U					
2,6-DINITROTOLUENE	0.266 U	0.255 U	0.26 U	0.26 U					
2-AMINO-4,6-DINITROTOLUENE	0.266 U	0.255 U	0.26 U	0.26 U					
2-NITROTOLUENE	0.266 U	0.255 U	0.26 U	0.26 U					
3,5-DINITROANILINE	0.266 U	0.255 U		0.26 U					
3-NITROTOLUENE	0.266 U	0.255 U	0.26 U	0.26 U					
4,4'-TN-AZOXY	0.532 U	0.51 U		0.53 U					
4-AMINO-2,6-DINITROTOLUENE	0.266 U	0.255 U	0.26 U	0.26 U					
4-NITROTOLUENE	0.266 U	0.255 U	0.26 U	0.26 U					
DNX	0.266 U	0.255 U		0.26 U					
MNX	0.266 U	0.255 U		0.26 U					
RDX	0.266 U	0.255 U	0.26 U	0.26 U					
TNX	0.266 U	0.255 U		0.26 U					
Field Parameters (as indicated)									
DISSOLVED OXYGEN (mg/L)	2.8	1.26	0.59	0.54					
OXIDATION REDUCTION POTENTIAL (MV)	71	-39	23.8	767.6					
PH (S.U.)	6.85	6.78	6	2.81					
SPECIFIC CONDUCTANCE (MS/CM)	0.922	0.754	0.579	0.544					
TEMPERATURE (°C)	14.12	10.02	13.77	15.5					
TURBIDITY (NTU)	4	3.6	7.6	34					
Miscellaneous Parameters (mg/L)									
AMMONIA-N	0.16 J	0.46 J							
NITRITE/NITRATE-N	0.025 U	0.05 U		0.025 U					

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

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

TABLE 3-6

DESCRIPTIVE STATISTICS FOR
SWMU 12 (MINE FILL A) ROUND 4 GROUNDWATER IN THE MISSISSIPPIAN GLEN DEAN ZONE
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration	Average of Positive Detects	Sample of Maximum Detect
Field Parameters							
DISSOLVED OXYGEN - METER (MG/L)	1/1	0.54	0.54	---	0.54	0.54	12GWT4104
OXIDATION REDUCTION POTENTIAL (MV)	1/1	767.6	767.6	---	767.6	767.6	12GWT4104
PH (S.U.)	1/1	2.81	2.81	---	2.81	2.81	12GWT4104
SPECIFIC CONDUCTANCE (MS/CM)	1/1	0.544	0.544	---	0.544	0.544	12GWT4104
TEMPERATURE (C)	1/1	15.5	15.5	---	15.5	15.5	12GWT4104
TURBIDITY (NTU)	1/1	34	34	---	34	34	12GWT4104

TABLE 3-7

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 SURFACE WATER
ROUNDS 1 THROUGH 4
NSWC CRANE
CRANE, INDIANA

LOCATION	12SW/SD09									12SW/SD11									12SW/SD14								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	10/27/04	3/6/05	5/20/2005	08/27/05						10/12/04	3/5/05	5/20/2005	08/27/05						11/1/04	3/7/05	5/20/2005	No Sample					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE	0.264 U	0.258 U	0.248 U	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						0.24 U	0.248 U	0.25 U						
1,3-DINITROBENZENE	0.264 U	0.258 U	0.248 U	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						0.24 U	0.248 U	0.25 U						
2,4,6-TRINITROTOLUENE	0.264 U	0.258 U	0.248 U	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						0.24 U	0.248 U	0.25 U						
2,4-DIAMINO-6-NITROTOLUENE	0.264 U	0.258 U		0.26 U						0.24 UJ	0.24 U		0.25 U						0.24 U	0.248 U							
2,4-DINITROTOLUENE	0.264 U	0.258 U	0.248 U	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						0.24 U	0.248 U	0.25 U						
2,6-DIAMINO-4-NITROTOLUENE	0.264 U	0.258 U		0.26 U						0.24 UJ	0.24 U		0.25 U						0.24 U	0.248 U							
2,6-DINITROTOLUENE	0.264 U	0.258 U	0.248 U	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						0.24 U	0.248 U	0.25 U						
2-AMINO-4,6-DINITROTOLUENE	0.264 U	0.258 U	0.26 J	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						2.1 J	0.65 J	0.62 J						
2-NITROTOLUENE	0.264 U	0.258 U	0.248 U	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						0.24 U	0.248 U	0.25 U						
3,5-DINITROANILINE	0.264 U	0.258 U		0.26 U						0.24 UJ	0.24 U		0.25 U						0.24 U	0.248 U							
3-NITROTOLUENE	0.264 U	0.258 U	0.248 U	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						0.71 J	0.248 U	0.25 U						
4,4'-TN-AZOXY	0.528 U	0.515 U		0.52 U						0.48 UJ	0.48 U		0.5 U						0.48 U	0.495 U							
4-AMINO-2,6-DINITROTOLUENE	0.61	0.36 J	0.68	0.43 J						0.24 UJ	0.24 U	0.278 U	0.25 U						5.6	1.3	2						
4-NITROTOLUENE	0.264 U	0.258 U	0.248 U	0.26 U						0.24 UJ	0.24 U	0.278 U	0.25 U						0.24 U	0.248 U	0.25 U						
DNX	0.264 U	0.258 U		0.26 U						0.24 UJ	0.24 U		0.25 U						0.24 U	0.248 U							
MNX	0.52 J	0.258 U		0.72						0.24 UJ	0.24 U		0.25 U						0.24 U	0.41 J							
RDX	19	8.3	12	9.2						5.6 J	1.9	4.5	0.25 U						12	55	25						
TNX	0.264 U	0.258 U		0.26 U						0.24 UJ	0.24 U		0.25 U						0.24 U	0.248 U							
Field Parameters (as indicated)																											
DISSOLVED OXYGEN (mg/L)	10.28	4.64	9.65	6.77						1.19	2.45	9.21	7.02						10.26	4.33	7.98						
OXIDATION REDUCTION POTENTIAL (MV)	67.7	189	193	157						169.6	76	109	209						52.3	241	187						
PH (S.U.)	7.41	6.59	7.01	7.27						6.98	6.63	6.63	6.83						7.69	5.99	7.36						
SPECIFIC CONDUCTANCE (MS/CM)	0.299	0.095	0.117	0.184						0.427	0.107	0.116	0.11						0.86	0.301	0.32						
TEMPERATURE (°C)	15.72	2.86	15.3	21.78						12.13	4.89	14.57	20.43						15.07	8.6	17.33						
TURBIDITY (NTU)	17.1	2.7	21	21						82.6	5.56	19	27						137	59	800						
Miscellaneous Parameters (mg/L)																											
AMMONIA-N	0.03 J	0.005 U								4.2 J	0.005 U								0.24 J	0.07							
NITRITE/NITRATE-N	1.9	0.37 J		0.2						0.025 U	0.025 UJ		0.025 U						3.8	1.2							

TABLE 3-7

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 SURFACE WATER
ROUNDS 1 THROUGH 4
NSWC CRANE
CRANE, INDIANA

LOCATION	12SW/SD24									12SW/SD25									12SW/SD27								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	10/27/04	3/5/05	5/20/2005	08/27/05						10/11/04	3/5/05	5/20/2005	08/27/05						10/12/04	3/5/05	5/20/2005	08/27/05					
PARAMETER																											
Energetics (ug/L)																											
1,3,5-TRINITROBENZENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
1,3-DINITROBENZENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
2,4,6-TRINITROTOLUENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
2,4-DIAMINO-6-NITROTOLUENE	0.248 U	0.252 U		0.24 U						0.258 U	0.26 U		0.26 U						0.242 U	0.25 U		0.25 U					
2,4-DINITROTOLUENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
2,6-DIAMINO-4-NITROTOLUENE	0.248 U	0.252 U		0.24 U						0.258 U	0.26 U		0.26 U						0.242 U	0.25 U		0.25 U					
2,6-DINITROTOLUENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
2-AMINO-4,6-DINITROTOLUENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
2-NITROTOLUENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
3,5-DINITROANILINE	0.248 U	0.252 U		0.24 U						0.258 U	0.26 U		0.26 U						0.242 U	0.25 U		0.25 U					
3-NITROTOLUENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
4,4'-TN-AZOXY	0.495 U	0.505 U		0.48 U						0.515 U	0.52 U		0.51 U						0.485 U	0.5 U		0.5 U					
4-AMINO-2,6-DINITROTOLUENE	0.56	0.252 J	0.41 J	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
4-NITROTOLUENE	0.248 U	0.252 U	0.25 U	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.25 U	0.25 U					
DNX	0.248 U	0.252 U		0.24 U						0.258 U	0.26 U		0.26 U						0.242 U	0.25 U		0.25 U					
MNX	0.248 U	0.252 U		0.24 U						0.258 U	0.26 U		0.26 U						0.242 U	0.25 U		0.25 U					
RDX	0.8	0.39 J	0.46 J	0.24 U						0.258 U	0.26 U	0.248 U	0.26 U						0.242 U	0.25 U	0.28 J	0.25 U					
TNX	0.248 U	0.252 U		0.24 U						0.258 U	0.26 U		0.26 U						0.242 U	0.25 U		0.25 U					
Field Parameters (as indicated)																											
DISSOLVED OXYGEN (mg/L)	11.74	2.79	9.88	2.6						8.89	2.97	10.27	7.15						7.44	1.95	10.02	7.27					
OXIDATION REDUCTION POTENTIAL (MV)	61.8	126	187	390						260.5	116	173	246						266.2	113	172	242					
PH (S.U.)	7.55	7.1	7.16	6.16						6.92	7.13	6.88	7.4						6.81	6.76	6.77	7.47					
SPECIFIC CONDUCTANCE (MS/CM)	0.271	0.14	0.144	0.218						0.282	0.078	0.082	0.224						0.267	0.092	0.087	0.221					
TEMPERATURE (°C)	15.66	5.59	15.08	18.33						12.58	5.25	14.17	21.75						13.55	5.21	14.18	22.74					
TURBIDITY (NTU)	18.3	3.1	17	0						2.4	3.76	16	0							9.15	30	14					
Miscellaneous Parameters (mg/L)																											
AMMONIA-N	0.021 J	0.005 U								0.005 UJ	0.005 U								0.18 J	0.005 U							
NITRITE/NITRATE-N	0.1	0.025 UJ		0.025 U						0.025 U	0.025 UJ		0.025 U						0.025 U	0.025 UJ		0.025 U					

TABLE 3-7

SUMMARY OF CHEMICALS DETECTED, FIELD PARAMETERS,
AND MISCELLANEOUS PARAMETERS FOR SWMU 12 SURFACE WATER
ROUNDS 1 THROUGH 4
NSWC CRANE
CRANE, INDIANA

LOCATION	12SW/SD31									12SW/SD34								
SAMPLING ROUND	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
DATE	No Sample	3/5/05	5/20/05	No Sample						No Sample	3/6/05	5/20/05	08/27/05					
PARAMETER																		
Energetics (ug/L)																		
1,3,5-TRINITROBENZENE		0.96 J	0.75 J								0.271 U	0.271 U	0.29 U					
1,3-DINITROBENZENE		0.258 U	0.25 U								0.271 U	0.271 U	0.29 U					
2,4,6-TRINITROTOLUENE		79	240								0.271 U	0.271 U	0.29 U					
2,4-DIAMINO-6-NITROTOLUENE		1.6 J									0.271 U		0.29 U					
2,4-DINITROTOLUENE		0.36 J	0.25 J								0.271 U	0.271 U	0.29 U					
2,6-DIAMINO-4-NITROTOLUENE		0.258 U									0.271 U		0.29 U					
2,6-DINITROTOLUENE		0.258 U	0.25 U								0.271 U	0.271 U	0.29 U					
2-AMINO-4,6-DINITROTOLUENE		11 J	16 J								0.8 J	0.271 U	0.29 U					
2-NITROTOLUENE		0.258 U	0.25 U								0.271 U	0.271 U	0.29 U					
3,5-DINITROANILINE		1.2									0.271 U		0.29 U					
3-NITROTOLUENE		0.258 U	0.25 U								0.271 U	0.271 U	0.29 U					
4,4'-TN-AZOXY		0.515 U									0.542 U		0.59 U					
4-AMINO-2,6-DINITROTOLUENE		24	51								1.7	0.51 J	0.29 U					
4-NITROTOLUENE		0.258 U	0.25 U								0.271 U	0.271 U	0.29 U					
DNX		0.258 U									0.271 U		0.29 U					
MNX		0.258 U									1.9		0.29 U					
RDX		20	34								140	99	3.1					
TNX		0.258 U									0.271 U		0.29 U					
Field Parameters (as indicated)																		
DISSOLVED OXYGEN (mg/L)		3.55	9.63								3.52	8.61	2.75					
OXIDATION REDUCTION POTENTIAL (MV)		98	138								141	177	116					
PH (S.U.)		7.46	7.42								7.18	7.58	7.46					
SPECIFIC CONDUCTANCE (MS/CM)		0.081	0.18								0.404	0.462	0.456					
TEMPERATURE (°C)		7.35	15.8								10.04	16.28	20.56					
TURBIDITY (NTU)		40	40								130	130	8.7					
Miscellaneous Parameters (mg/L)																		
AMMONIA-N		0.14									0.08							
NITRITE/NITRATE-N		0.51 J									0.81		0.025 U					

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.

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.

TABLE 3-8

DESCRIPTIVE STATISTICS FOR
SWMU 12 (MINE FILL A) ROUND 4 SURFACE WATER
NSWC CRANE
CRANE, INDIANA

Parameter	Frequency of Detection	Minimum Concentration	Maximum Concentration	Range of Nondetects	Mean Concentration	Average of Positive Detects	Sample of Maximum Detect
Energetics (ug/L)							
4-AMINO-2,6-DINITROTOLUENE	1/6	0.43 J	0.43 J	0.24 - 0.29	0.179	0.430	12SW0904
HMX	2/6	7.4	11	0.24 - 0.26	3.15	9.20	12SW3403
MNX	1/6	0.72	0.72	0.24 - 0.29	0.228	0.720	12SW0904
RDX	2/6	3.1	9.2	0.24 - 0.26	2.13	6.15	12SW0904
Field Parameters							
DISSOLVED OXYGEN - METER (MG/L)	6/6	2.6	7.27	- - -	5.59	5.59	12SW2704
OXIDATION REDUCTION POTENTIAL (MV)	6/6	116	390	- - -	227	227	12SW2404
PH (S.U.)	6/6	6.16	7.47	- - -	7.10	7.10	12SW2704
SPECIFIC CONDUCTANCE (MS/CM)	6/6	0.11	0.456	- - -	0.236	0.236	12SW3403
TEMPERATURE (C)	6/6	18.33	22.74	- - -	20.9	20.9	12SW2704
TURBIDITY (NTU)	6/6	0	27	- - -	11.8	11.8	12SW1104
NITRITE/NITRATE-N (MG/L)	1/6	0.2	0.2	0.025	0.044	0.200	12SW0904

4.0 DATA EVALUATION

Section 4 presents groundwater and surface water monitoring data for Rounds 1 through 4. The information presented includes potentiometric surface contours and temporal plots for each groundwater and surface water sampling location included in the SWMU 12 long term monitoring program. The objective of the long term monitoring program at SWMU 12 is to collect enough monitoring data (up to nine rounds) to determine the nature and extent of contamination, whether residual explosives are naturally degrading, and provide data for making remedy decisions for residual explosives contamination to complete the CMS.

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

The primary MNA monitoring information requirements are identified below in bold type along with supporting information being provided by the SWMU 12 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 12 long term monitoring program is providing analytical results for select explosives and degradation by-products. As indicated in the SWMU 12 RFI, RDX is considered to be the principal chemical of concern because is it a site-related contaminant and has been detected more frequently and at higher concentrations than any other explosive. The degradation by-products for RDX are DNX, MNX, and TNX. The long-term monitoring program is scheduled to include nine rounds of sampling, under non-pumping conditions, to provide information on trends in groundwater and surface water concentrations of explosives and explosives degradation by-productions. To date, four rounds of groundwater sampling events have been conducted in September 2004, March 2005, May, 2005, and August 2005. The remaining five rounds of sampling are expected to be completed in 2006 if monitoring continues on a quarterly basis.

- **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 12, 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 12 long term monitoring program includes 21 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.** The SMWU 12 long term monitoring program includes wells located in the Puz, Pmz, and Mgd water bearing zones to evaluate if contamination is migrating vertically to the lower aquifer (Mgd). Through Round 4, explosives contamination has been detected in the Puz and Pmz aquifers, but not in the Mgd 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 November or December 2006. A final report evaluating the MNA program through nine rounds of sampling is expected to be issued in March 2007. 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 12 MNA report summarizing 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 12 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 12 long term monitoring program.

- **The monitoring data should be collected from appropriate locations that are distributed both vertically and horizontally throughout the plume.** The SWMU 12 long term monitoring program includes monitoring wells located in the Puz, Pmz, and Mgd water bearing zones to evaluate if contamination is migrating vertically to the lower aquifers. In addition, the monitoring program includes monitoring wells positioned upgradient and downgradient of the source area, within the source plume and along the outside area of the groundwater contamination. The location of each well relative to the contamination plume is discussed in Section 4.1 below.

- **Sample locations should consider heterogeneities in geologic structures and in the spatial distribution of contaminants. Groundwater flow paths and rates should be fully and accurately defined.** Groundwater elevations are being measured during each sampling round to develop potentiometric analyses of groundwater direction and flow rates and the results will be 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 12 monitoring program is providing analytical results for RDX and the degradation by-products DNX, MNX, and TNX.

  - **Routine and Other Indicator Parameters.** The monitoring data also includes the routine indicator parameters DO, ORP, pH, specific conductance, temperature, turbidity, ammonia, and nitrite/nitrate concentrations.

  - **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 12 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 21 select well locations across SWMU 12 (see Figure 2-1). Sixteen wells are located in the Puz aquifer; four wells are located in the Pmz aquifer; and the remaining well is in the Mgd aquifer. These wells have been established in accordance with U.S. EPA Region 5 MNA guidance (U.S. EPA 2000). The monitoring wells have a specific role in the monitoring program and represent locations within the plume source area, within the center and leading edges of the plume, and from points located vertically (above and below) and horizontally (upgradient and downgradient) outside the area of groundwater contamination. The selected wells are distributed as follows in the Puz, Pmz and the Mgd water bearing zones:

Puz Aquifer Wells

- Three source area wells (12MWT06, 12MWT11, and 12MWT16)
- Three wells located within the center of the plume (12MWT09, 12MWT12, and 12MWT17)
- Seven wells at the leading edge of the plume (12MWT10, 12MWT18, 12MWT20, 12MWT22, 12MWT36, 12MWT38,and 12MWT42)
- One well upgradient of the plume (12MWT28)
- Two wells laterally downgradient of the plume (12MWT03 and 12MWT23)

Pmz Aquifer Wells

- Three wells vertically below the plume (12MWT30, 12MWT31, and 12MWT32)
- One well laterally downgradient of the plume (12MWT46)

Mgd Aquifer Well

- One well laterally downgradient of the plume (12MWT41)

In Rounds 3 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 by-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 12SW/SD09, 12SW/SD11, 12SW/SD14, 12SW/SD24, 12SW/SD25, 12SW/SD27, 12SW/SD31, and 12SW/SD34. The location 12SW/SD25 is considered to be upgradient of SWMU 12. In Rounds 3 through 9, samples from these locations are being analyzed for explosives and the routine indicator parameters DO, ORP, pH, specific conductance, temperature, turbidity, ammonia and nitrite/nitrate concentrations.

4.3 ROUND 4 POTENTIOMETRIC SURFACES

Figures 4-1, 4-2, and 4-3 show the Round 4 (August 10, 2005) potentiometric surface elevation maps for the Puz, Pmz, and Mgd water bearing zones, respectively. The groundwater elevations collected in Round 4 for all three zones were compared to groundwater elevations reported in RFI for Round 3 (see Appendix E). The comparison revealed only minor fluctuations (± 0 to 2 feet) in groundwater elevations at most wells from Round 3 to Round 4 and similar flow directions for each zone. The largest changes occurred at well 12M WT23 (-5.63 feet) in the Puz and wells 12MWT31 (+6.69 feet), 12MWT45 (-4.35 feet), and 12MWT46 (-5.86 feet) in the Pmz.

Figure 4-1 presents the potentiometric surface for the Puz measured in Round 4. The highest groundwater elevations were measured at the far northwest end of SWMU 12 at wells 12MWT25 to 12MWT28 (730.50 feet asml to 733.93 feet asml). There are two ridges of higher groundwater elevations that extend from the groundwater high at the north end of SWMU 12. The larger more pronounced ridge runs southeast along the centerline of the SWMU 12 ridgetop through wells 12MWT16, 12MWT17, and 12MWT23. The groundwater elevations decrease from 734 to 712 along this groundwater ridge. To the northeast and southwest of this groundwater ridge, the groundwater elevations decreased rapidly to the sides of the ridge. Shallow groundwater on the northeastern side of this groundwater ridge flows to the northeast and shallow groundwater on the southwestern side of the ridge flows southwest. A second ridge extends from the northern high area toward the southwest. The groundwater elevations decrease gradually along the crest of the groundwater ridge at well 12MWT28 (733.43 feet asml) down to well 12MWT42 (706.55 feet amsl). Groundwater is flowing toward the cropline on the sides of the ridges.

Groundwater elevations measured in the Pmz monitoring wells in Round 4 are shown in Figure 4-2. The highest groundwater elevation in Round 4 was at well 12MWT33 (697.19 feet amsl) in the northwestern end of SWMU 12. A groundwater ridge in the Pmz extends from the northwest end of the SWMU toward the southeast. Groundwater elevations decrease toward the southeast and toward the southwest from the groundwater ridge. The lowest groundwater elevations were measured in wells 12MWT30 (635.0 ft amsl) on the southwest side of SWMU 12 and 12MWT48 (619.71 ft amsl) on the southeast side of SWMU 12.

Round 4 groundwater level measurements in the Mgd zone are presented in Figure 4-3. In this aquifer, the groundwater elevations ranged from 574.41 ft amsl at 12MWT50 to 602.87 ft amsl at 12MWT41. The general groundwater flow direction in the Mgd in Round 4 was to the south and southeast toward Turkey Creek.

4.4 GROUNDWATER TEMPORAL PLOT TREND ANALYSIS

The temporal plots shown in Figures 4-4, 4-5, and 4-6 are arranged in columns by monitoring well location showing concentration trends for RDX followed by the trend for each degradation by-product. The analytical results for each round are shown as a data point and include the validation qualifier if applicable and correspond to the datum presented in Tables 3-1, 3-3, and 3-5, respectively, for the Puz, Pmz, and Mgd. The absence of a data point for a Round indicates no sample was collected.

Puz Aquifer

Figure 4-4 shows temporal plots of RDX and degradation by-product groundwater concentrations for Rounds 1 through 4 in the Puz. Through Round 4, RDX has been detected all at MNA monitoring locations with the exception of 12MWT03 and 12MWT23, which are laterally downgradient of the contamination plume at SWMU 12. At the present time, monitoring wells 12MWT10, 12MWT12, 12MWT16, and 12MWT17 are showing a potential upward trend in RDX concentrations through Round 4. Monitoring well 12MWT18 is showing a potential downward trend in RDX since Round 2. Otherwise, all other Puz wells display no trend in RDX concentrations. Degradation by-products have been detected at all monitoring locations with the exception of 12MWT03, 12MWT18, 12MWT20, 12MWT23, 12MWT28, and 12MWT42. At the present time, there is insufficient data to discern any trend in degradation by-product concentrations.

Pmz Aquifer

Figure 4-5 shows temporal plots of RDX and degradation by-product concentrations for Round 1 through 4 in Pmz wells. Through Round 4, there have been no positive detections of RDX or degradation by-products in the Pmz monitoring wells 12MWT30, 12MWT31, 12MWT32, and 12MWT46.

Mgd Aquifer

Figure 4-6 shows temporal plots of RDX and degradation by-product concentrations for Round 1 through 4 in the single Mgd well 12MWT41. Through Round 4, there have been no positive detections of RDX or degradation by-products at well 12MWT41.

4.5 SURFACE WATER TEMPORAL PLOT TREND ANALYSIS

Figure 4-7 shows temporal plots of explosives and degradation by-product surface water concentrations for Rounds 1 through 4. Through Round 4, RDX has been detected at all surface water sampling locations with the exception of 12SW/SD25, which is considered to be an upgradient location. RDX concentrations at locations 12SW/SD09, 12SW/SD11, 12SW/SD24, and 12SW/SD34 show a potential downward trend in concentrations through Round 4. The only RDX degradation by-product detected through Round 4 is MNX at locations 12SW/SD09, 12SW/SD14, and 12SW/SD34. At the present time, there is insufficient data to conduct an evaluation regarding trends for MNX concentrations.

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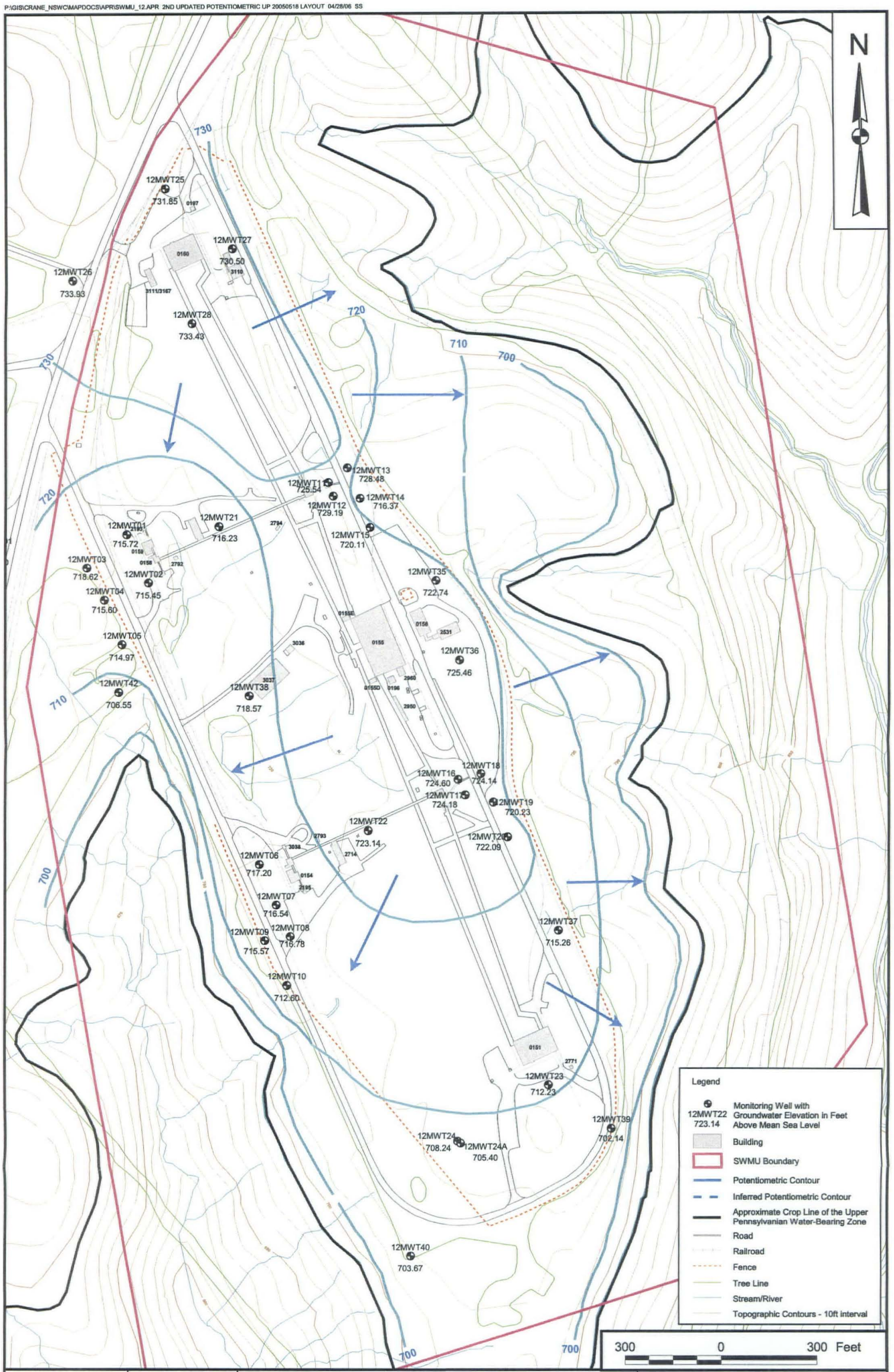

DRAWN BY S. STROZ	DATE 04/14/06	POTENTIOMETRIC SURFACE MAP FOR THE UPPER PENNSYLVANIAN WATER-BEARING ZONE - AUGUST 10, 2005 SWMU 12 MINE FILL A NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 6878
CHECKED BY J. LUCAS	DATE 04/28/06		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4 - 1 REV 0

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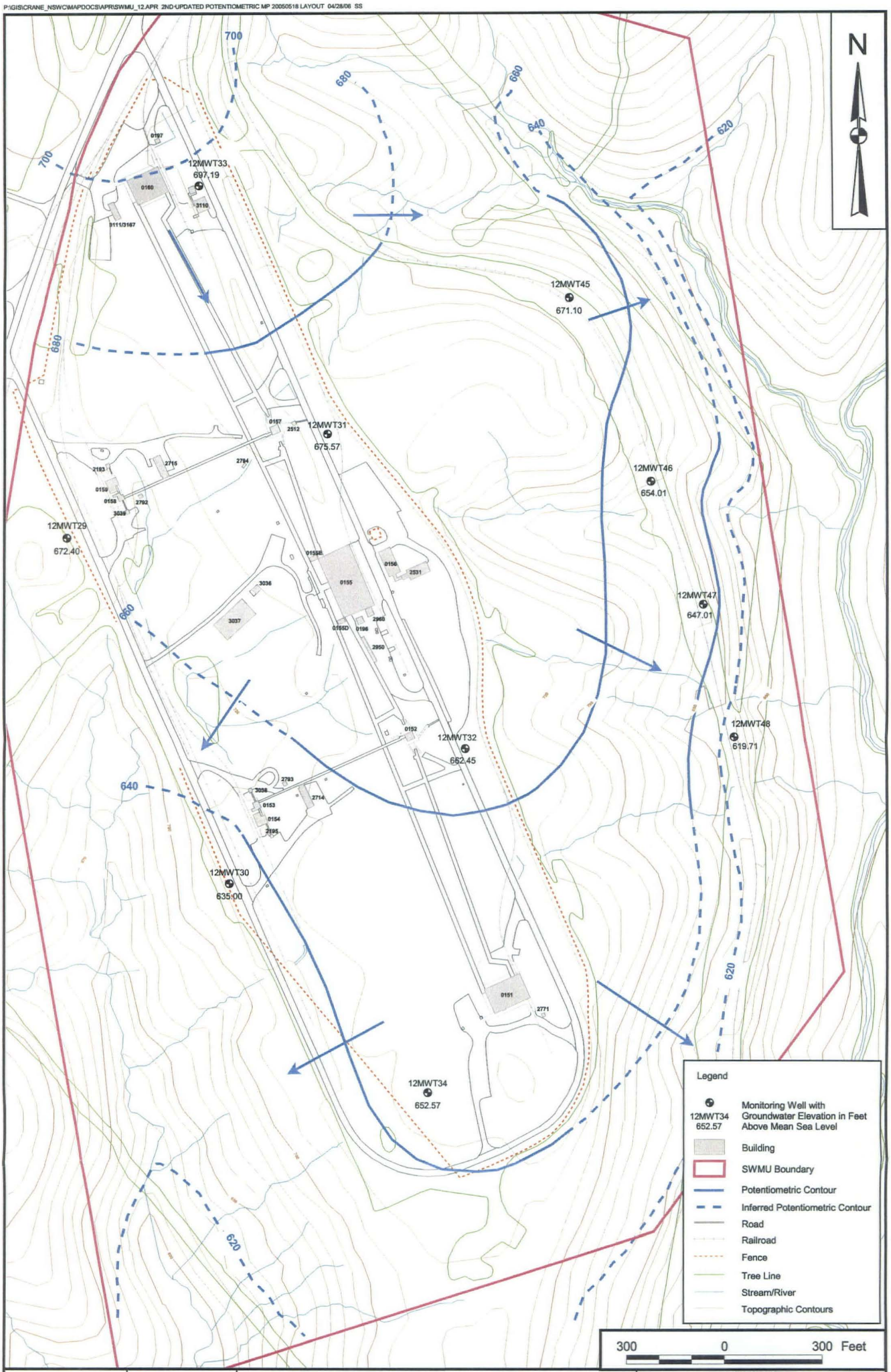

DRAWN BY S. STROZ	DATE 04/14/06	POTENTIOMETRIC SURFACE MAP FOR THE MIDDLE PENNSYLVANIAN WATER-BEARING ZONE - AUGUST 10, 2005 SWMU 12 MINE FILL A NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 6878
CHECKED BY J. LUCAS	DATE 04/28/06		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4 - 2 / REV 0

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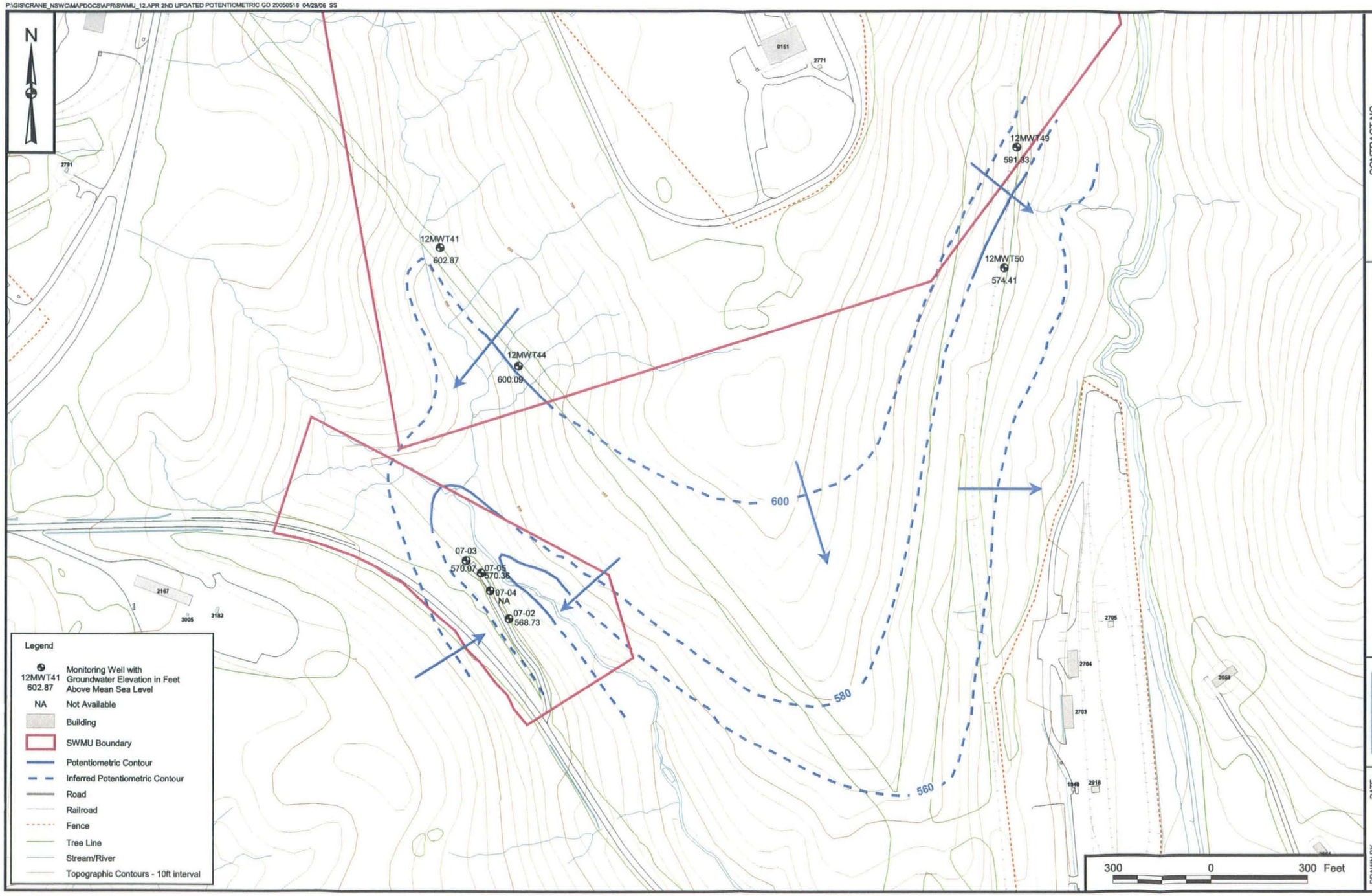

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APPROVED BY ___ DATE ___

APPROVED BY ___ DATE ___

DRAWING NO. FIGURE 4 - 3 REV 0

POTENTIOMETRIC SURFACE MAP FOR THE GLEN DEAN LIMESTONE (MISSISSIPPIAN) AQUIFER ON AUGUST 10, 2005
SWMU 12 MINE FILL A
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY S. STROZ DATE 04/14/06

CHECKED BY J. LUCAS DATE 04/28/06

COST/SCHED-AREA

SCALE AS NOTED

FIGURE 4-4

TEMPORAL PLOTS FOR RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN THE PENNSYLVANIA UPPER WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 6

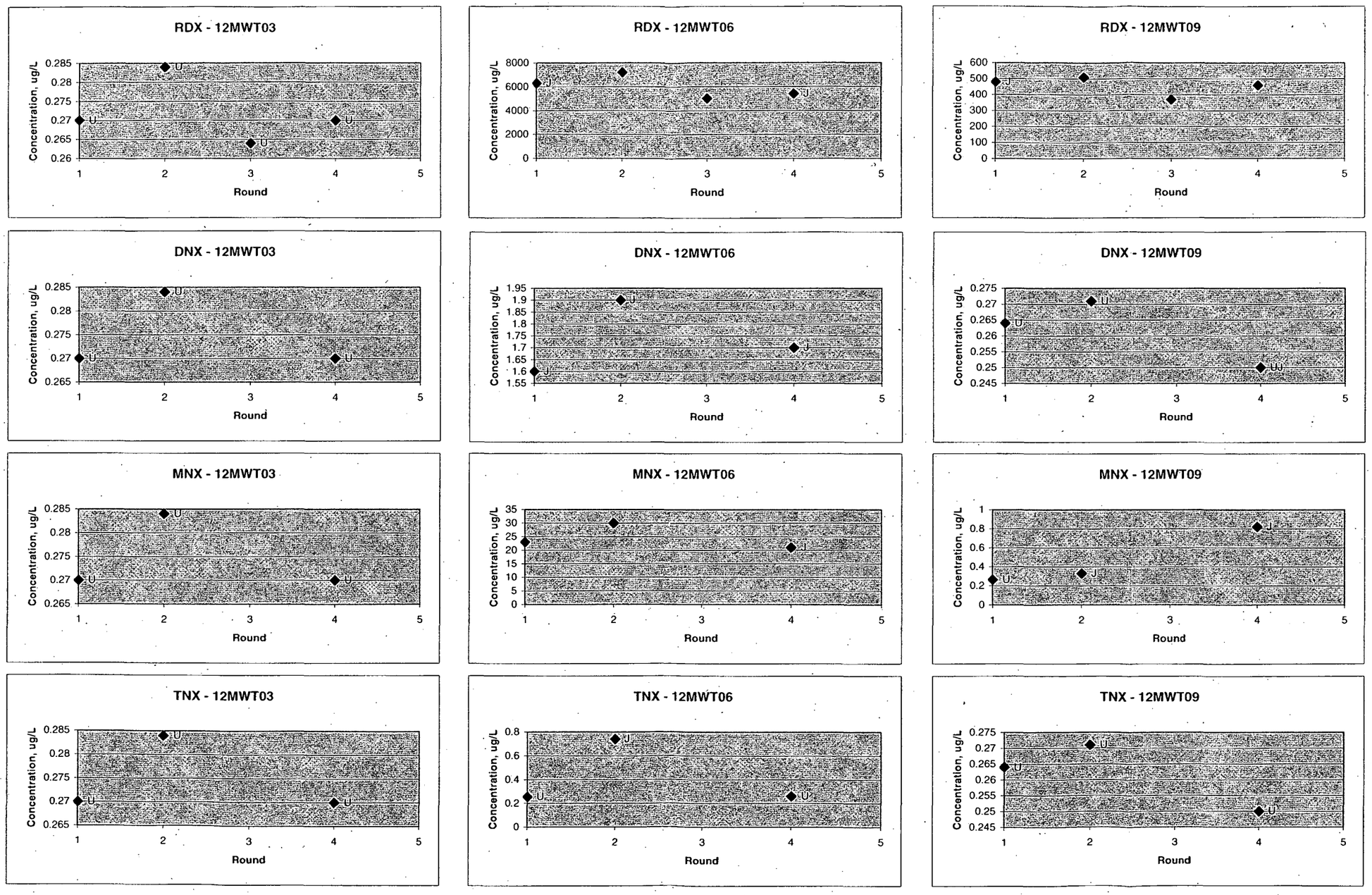


FIGURE 4-4

TEMPORAL PLOTS FOR RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN THE PENNSYLVANIA UPPER WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 6

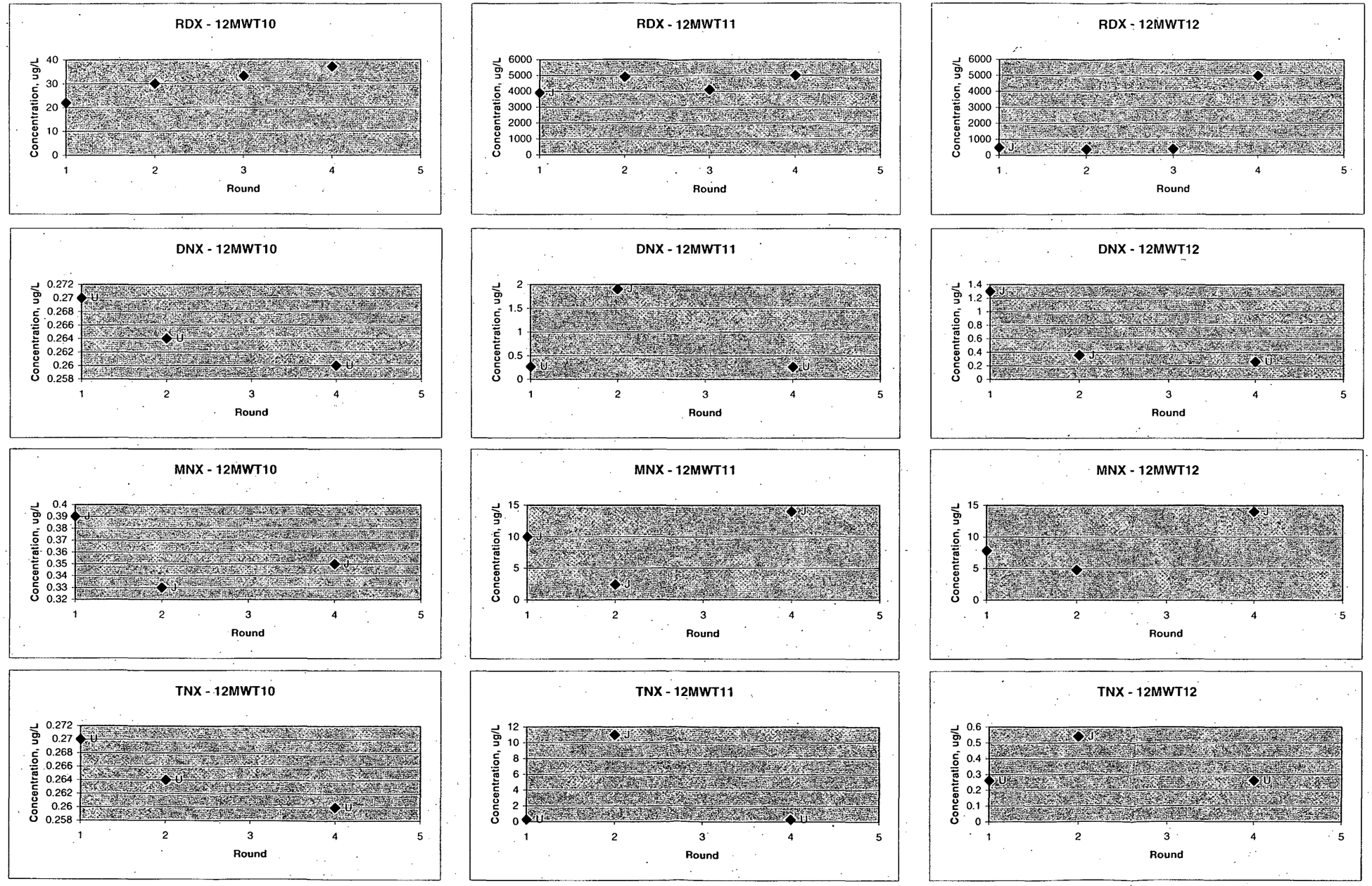


FIGURE 4-4

TEMPORAL PLOTS FOR RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN THE PENNSYLVANIA UPPER WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 3 OF 6

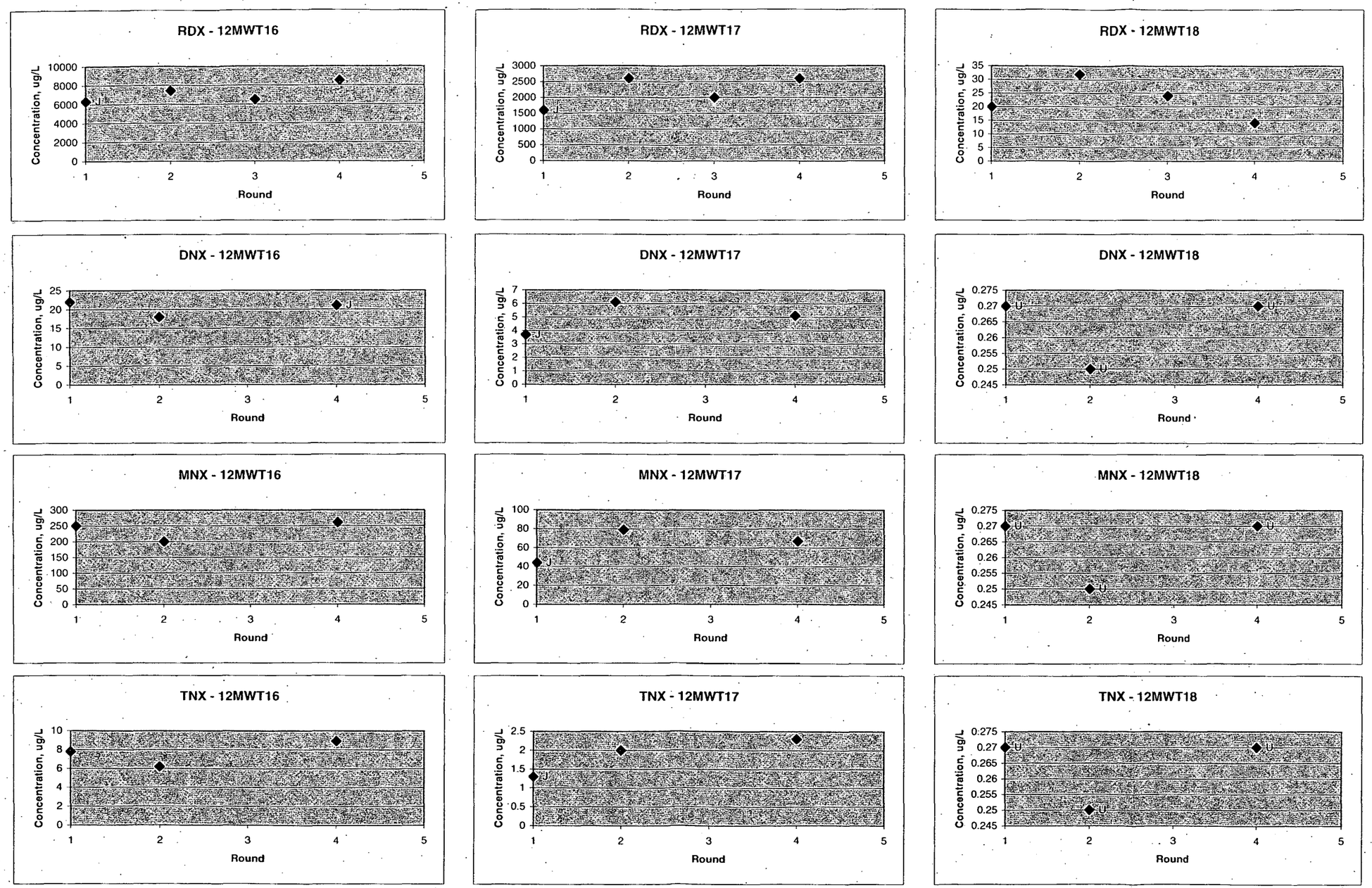


FIGURE 4-4

TEMPORAL PLOTS FOR RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN THE PENNSYLVANIA UPPER WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 4 OF 6

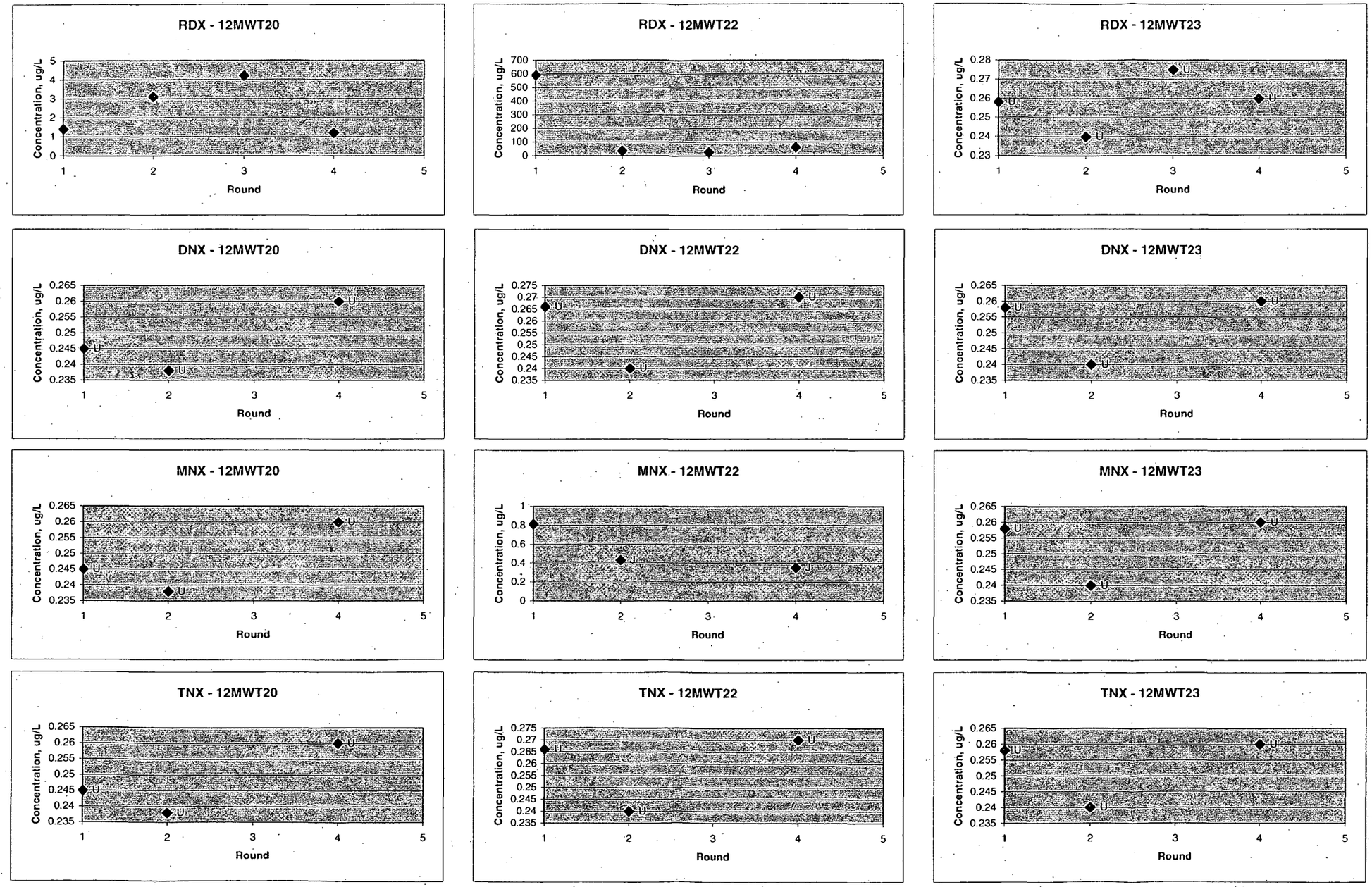


FIGURE 4-4

TEMPORAL PLOTS FOR RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN THE PENNSYLVANIA UPPER WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA

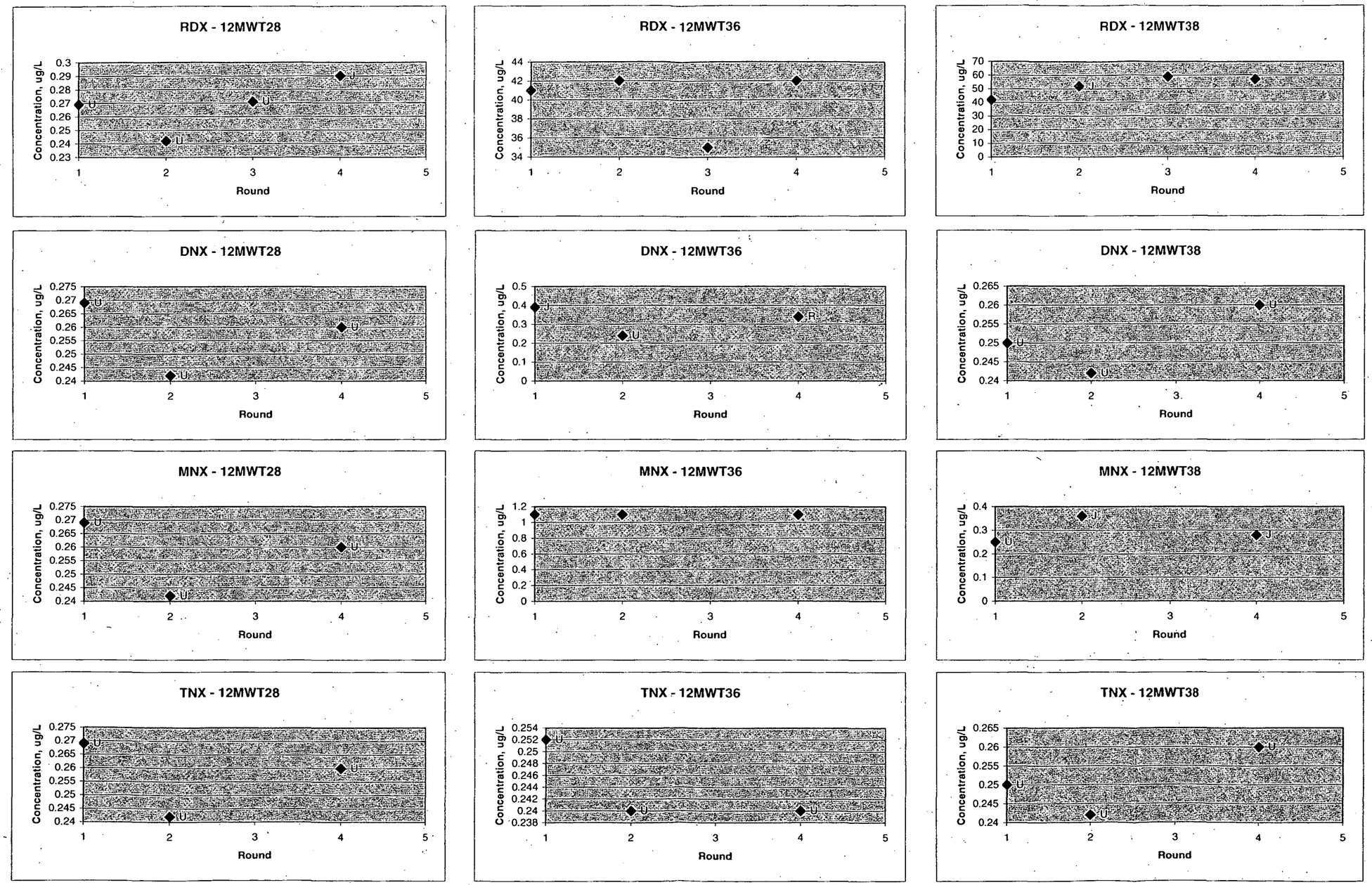
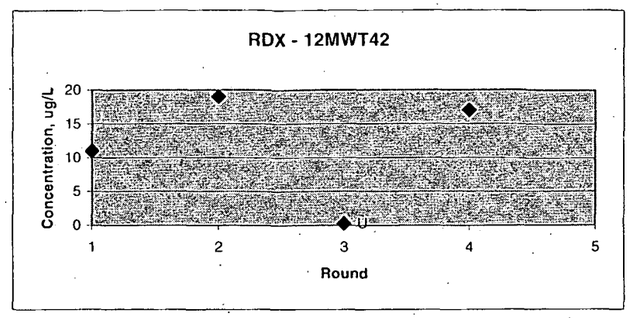
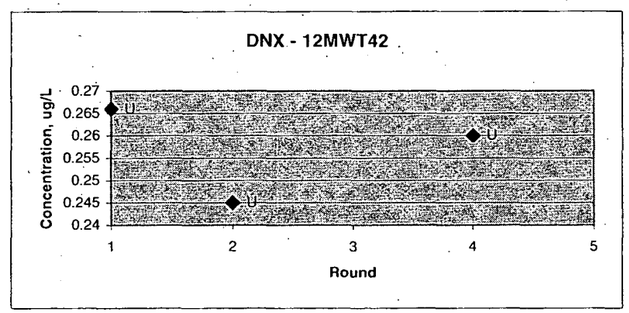
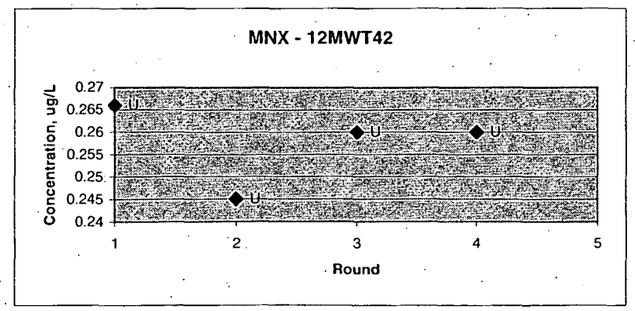


FIGURE 4-4

TEMPORAL PLOTS FOR RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN THE PENNSYLVANIA UPPER WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 6 OF 6







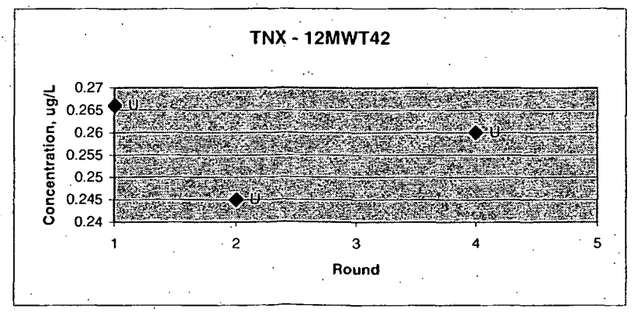


FIGURE 4-5

TEMPORAL PLOTS OF RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN THE PENNSYLVANIAN MIDDLE WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 2

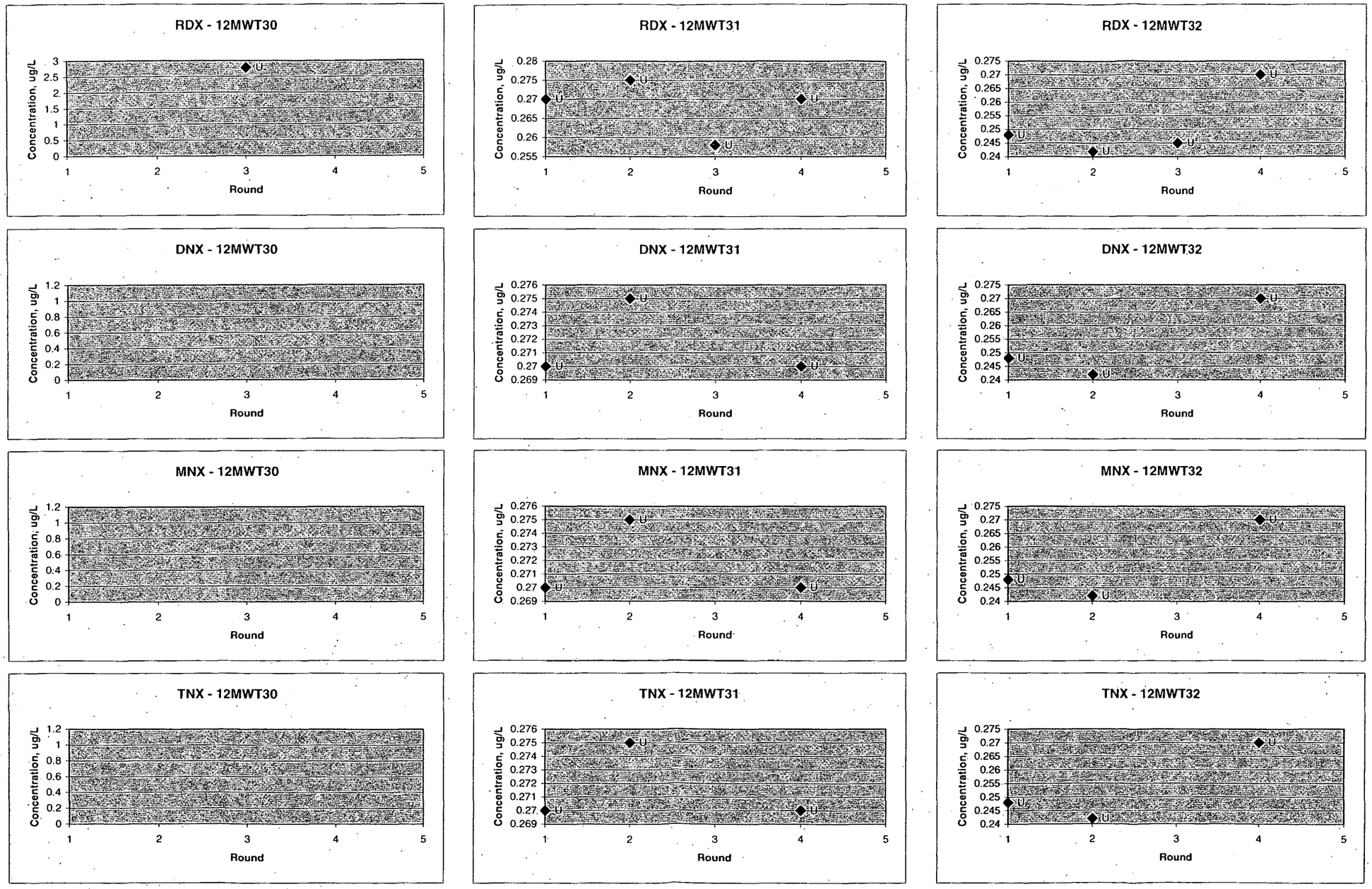
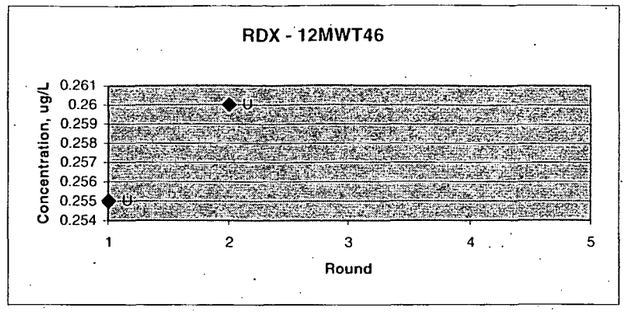
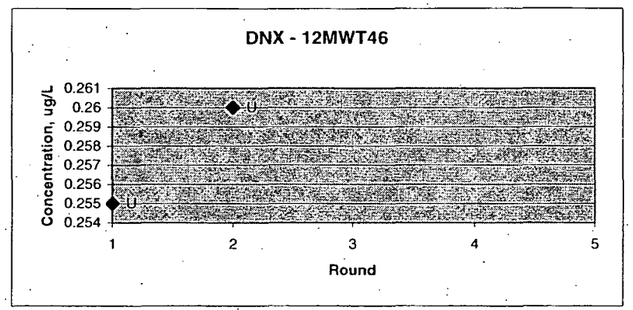
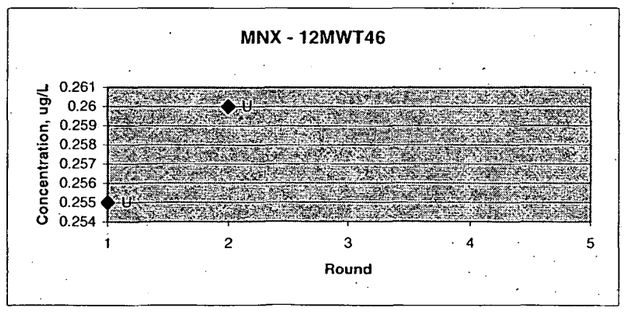


FIGURE 4-5

TEMPORAL PLOTS OF RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN THE PENNSYLVANIAN MIDDLE WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 2







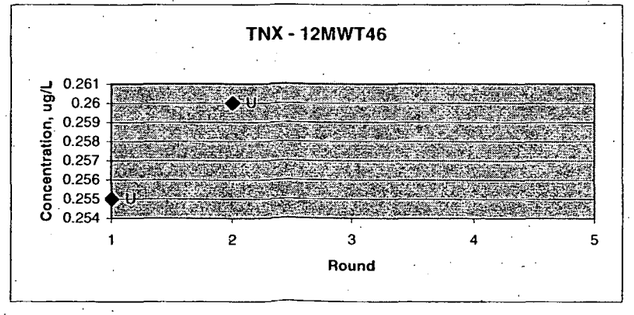
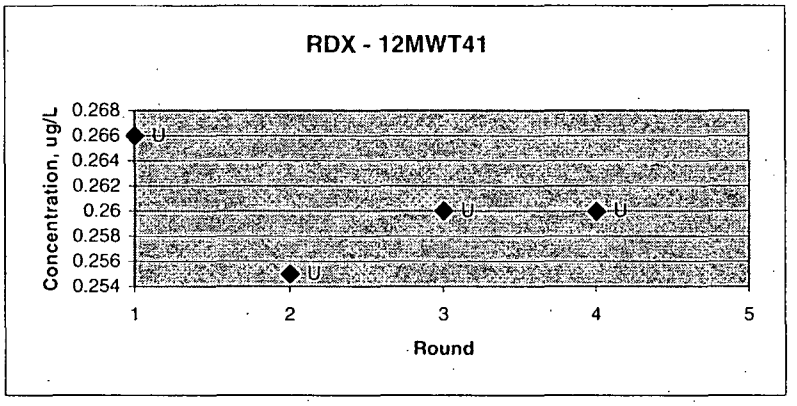
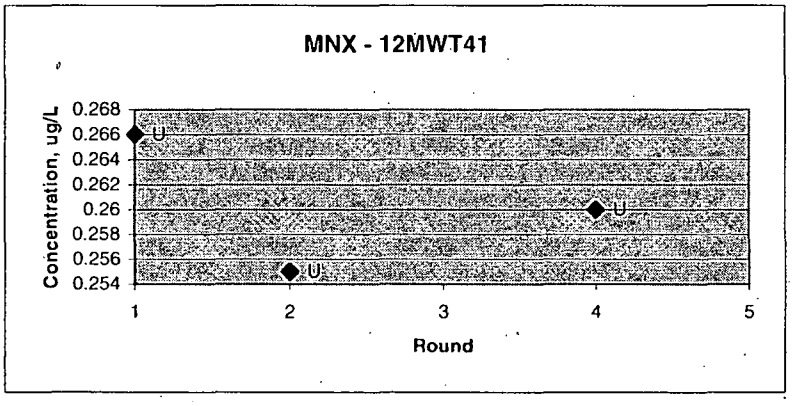
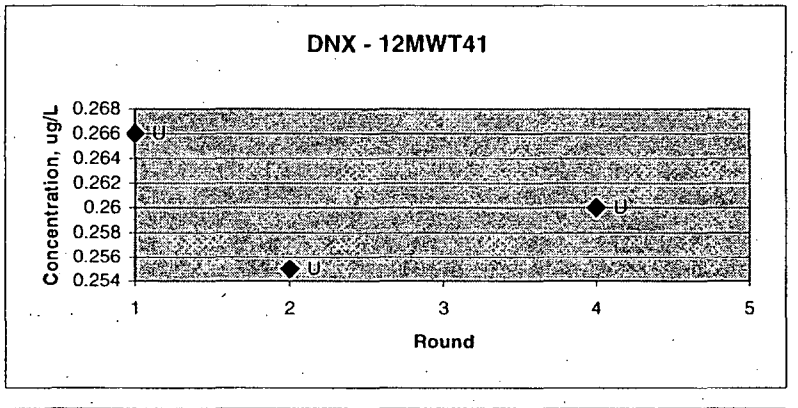


FIGURE 4-6

TEMPORAL PLOTS OF RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS IN THE MISSISSIPPIAN GLEN DEAN WATER BEARING ZONE AT SWMU 12
NSWC CRANE
CRANE, INDIANA







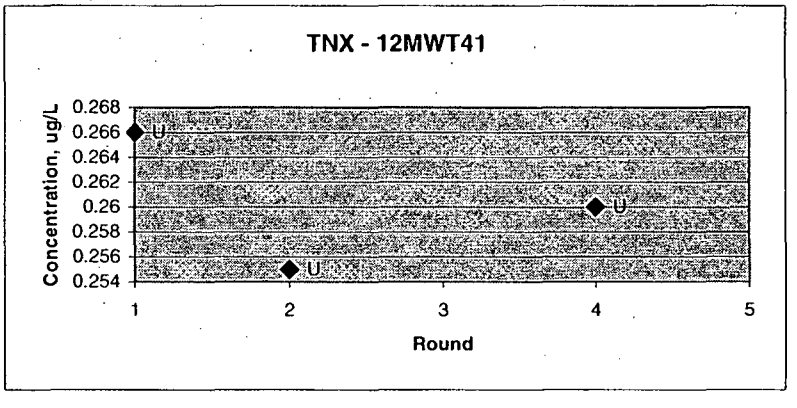


FIGURE 4-7

TEMPORAL PLOTS OF RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 1 OF 3

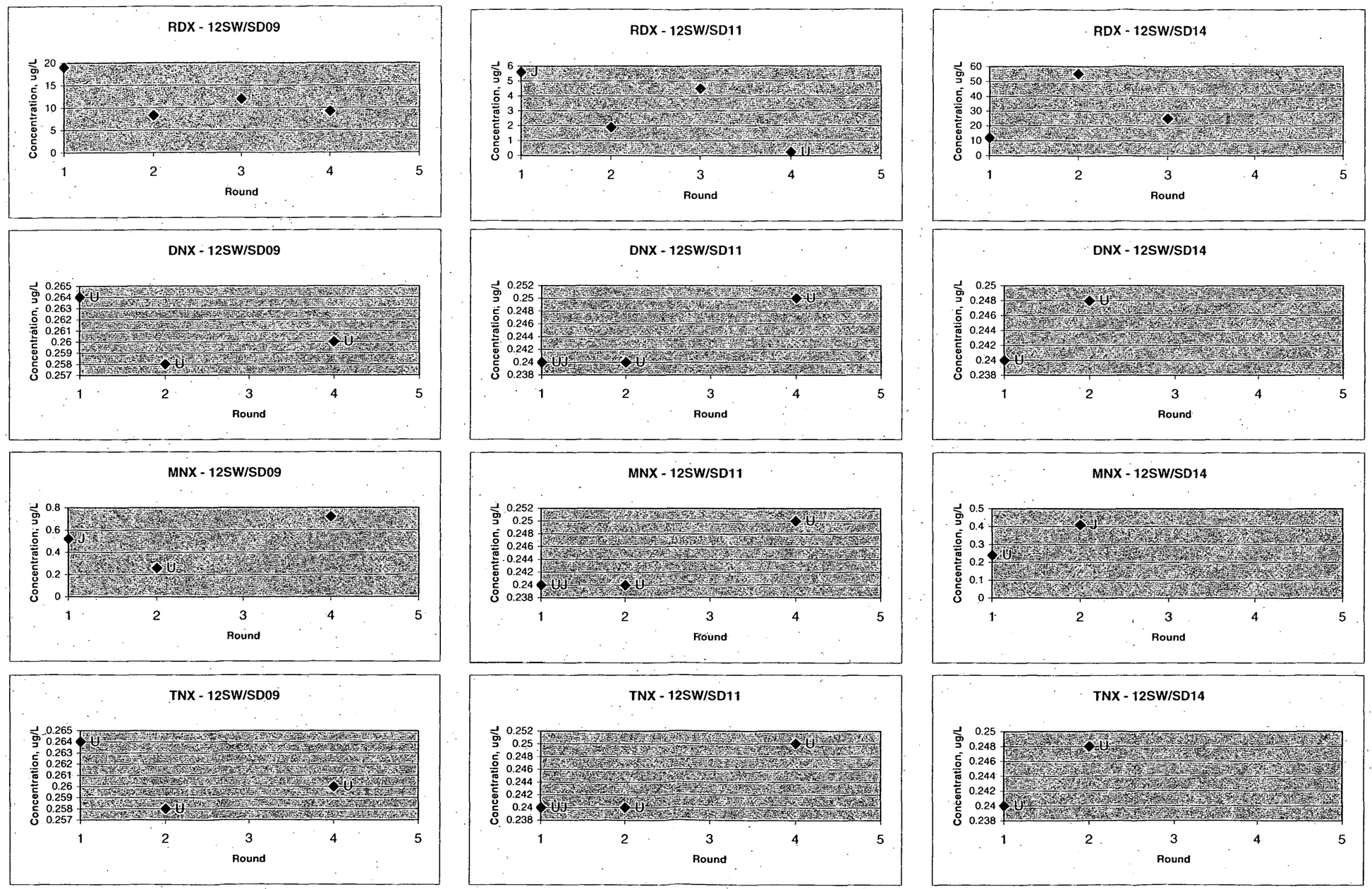


FIGURE 4-7

TEMPORAL PLOTS OF RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 2 OF 3

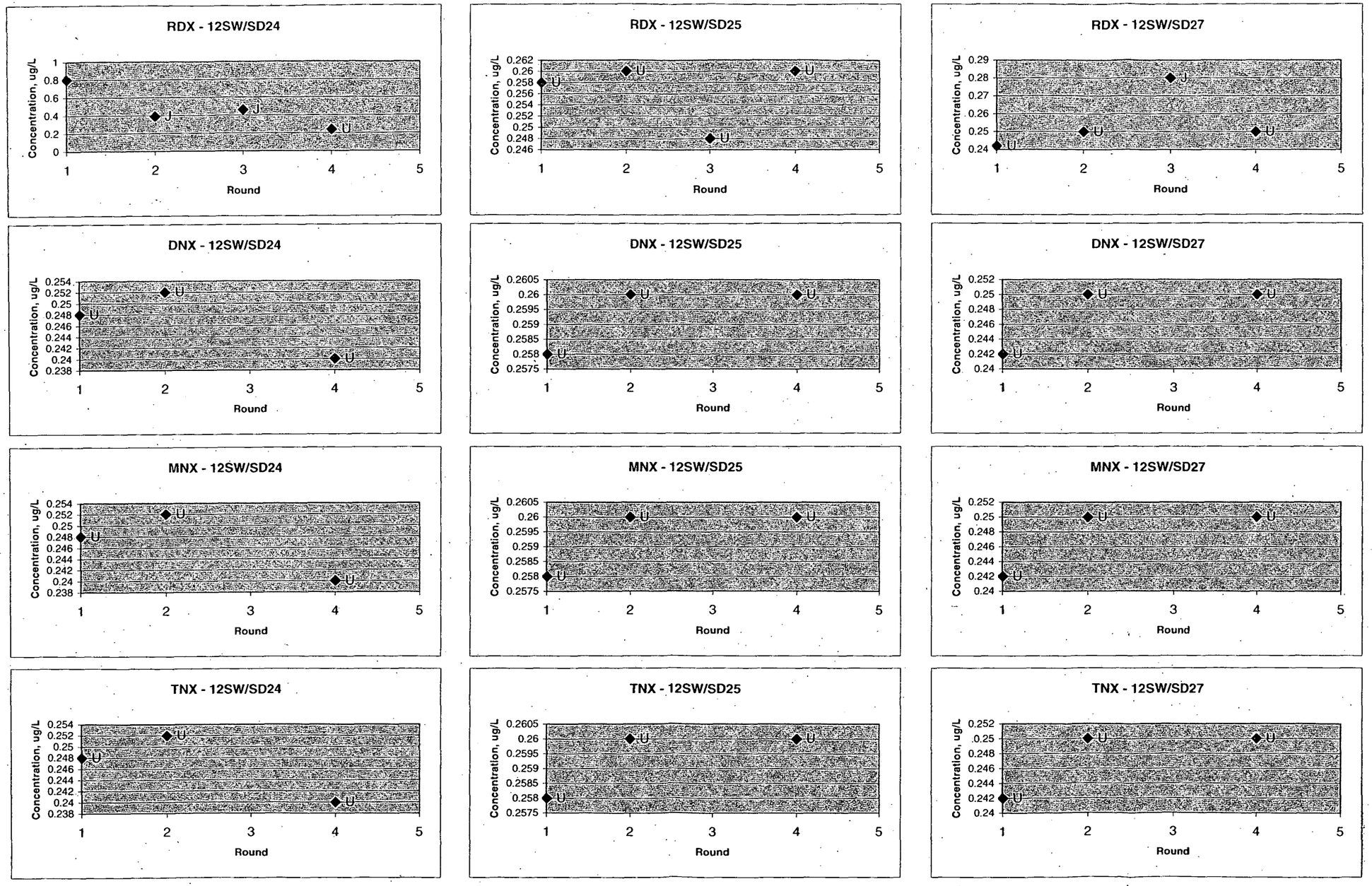
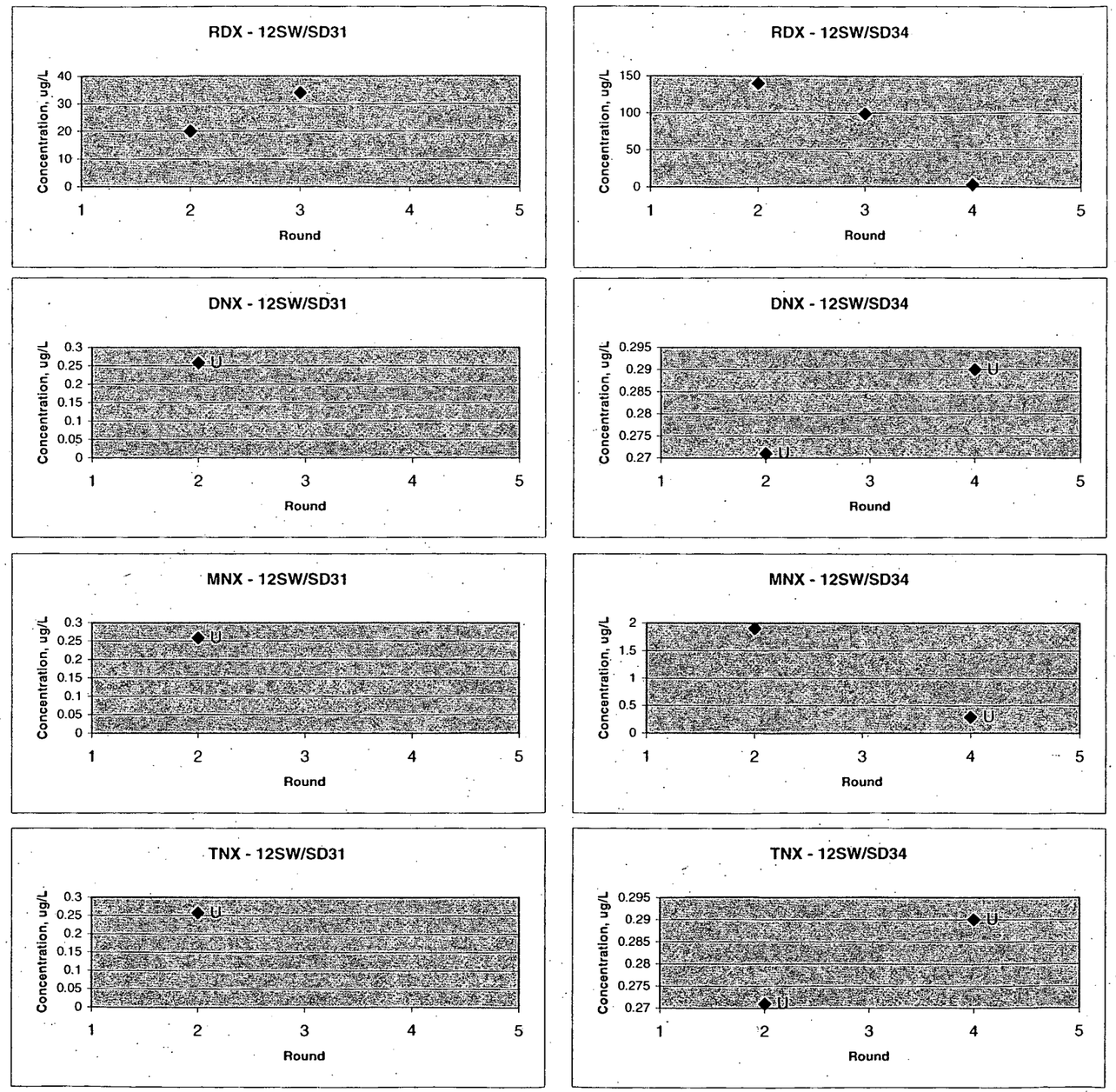


FIGURE 4-7

TEMPORAL PLOTS OF RDX AND DEGRADATION BY-PRODUCT CONCENTRATIONS
IN SURFACE WATER AT SWMU 12
NSWC CRANE
CRANE, INDIANA
PAGE 3 OF 3



REFERENCES

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

TtNUS, 2005a. Resource Conservation and Recovery Act Facility Investigation Report for Mine Fill A (SWMU 12), Tetra Tech NUS, Inc., August.

TtNUS, 2005b. Monitored Natural Attenuation Report for Mine Fill A (SWMU 12), Round No. 3, NSWC Crane, Crane, Indiana, December.

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

APPENDIX A

SWMU 12

ROUND 4

SAMPLE LOG SHEETS AND OTHER FIELD FORMS

APPENDIX A.1.1

SWMU 12

ROUND 4

GROUNDWATER SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	Michael Quaill	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	2/27/06	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT0304
TtNUS Project #	112GN6878	**Well ID**	12MWT03
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	-Select-

Well and Sample Data

Date	8/29/05	**Static Water Level (ft.)**	15.87	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	28.05	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**	1		
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/29/05	08:55	15.87	80	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/29/05	09:05	17.47	50	Clear	5.70	1.127	1.73	37	16.72	492.8	NA	NA	500
8/29/05	09:15	17.52	50	Clear	5.70	1.159	1.52	22	17.93	509.0	NA	NA	500
8/29/05	09:25	17.68	50	Clear	5.69	1.207	1.38	12	18.45	508.9	NA	NA	500
8/29/05	09:35	17.79	50	Clear	5.68	1.180	1.41	9.8	18.80	508.1	NA	NA	500
8/29/05	09:45	17.91	50	Clear	5.66	1.165	1.36	8.6	19,98	481.7	NA	NA	500
8/29/05	10:25	18.73	30	Clear	5.61	1.261	1.27	5.1	20.57	479.9	NA	NA	1200
8/29/05	10:35	18.91	50	Clear	5.29	1.129	1.11	2.1	17.26	494.0	NA	NA	500

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/29/05	10:45	19.22	50	Clear	5.35	1.104	0.96	1.9	16.99	493.4	NA	NA	500
8/29/05	10:55	19.45	50	Clear	5.46	1.090	0.90	1.8	16.71	452.7	NA	NA	500
8/29/05	11:05	19.68	50	Clear	5.55	1.065	0.90	1.8	16.71	398.6	NA	NA	500
8/29/05	11:15	19.74	50	Clear	5.62	1.060	0.98	2.4	17.62	422.3	NA	NA	500
8/29/05	11:25	20.01	50	Clear	5.63	1.058	1.08	5.7	17.58	451.8	NA	NA	500
8/29/05	11:35	20.35	50	Clear	5.63	1.058	1.14	12	17.41	473.2	NA	NA	500
8/29/05	11:45	21.14	50	Clear	5.65	1.056	1.21	15	17.32	487.9	NA	NA	500
8/29/05	11:55	21.25	50	Clear	5.65	1.055	1.28	16	17.18	505.8	NA	NA	500
8/29/05	12:05	21.30	50	Clear	5.70	1.061	1.26	27	17.09	501.1	NA	NA	500
8/29/05	12:15	21.34	50	Clear	5.66	1.068	1.24	22	17.23	495.5	NA	NA	500
8/29/05	12:25	21.38	50	Clear	5.60	1.085	1.19	18	17.77	493.1	NA	NA	500
8/29/05	12:35	21.42	50	Clear	5.35	1.116	1.13	15	18.82	524.7	NA	NA	500
8/29/05	12:45	21.47	50	Clear	5.38	1.137	1.04	17	19.23	542.7	NA	NA	500
8/29/05	12:55	21.58	50	Clear	5.42	1.151	0.98	18	19.34	553.6	NA	NA	500

Final Purge / Sample Data

One Casing Volume	7.3	**Method**	1	**Dissolved Oxygen (mg/L)**	0.98
Total Vo. Purge (L)	11.2	**Waterlevel (ft.)**	21.58	**Turbidity (NTUs)**	18
Start Purge (hrs.)	8:55:00 AM	**Flowrate (mL/min)**	50	**Temp (C)**	19.34
End Purge (hrs.)	12:55:00 PM	**Color**	Clear	**ORP (mV)**	553.6
Total Purge Time (min.)	240	**pH (S.U.)**	5.42	**Salinity**	NA
		Conductivity (mS/cm)	1.151	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/29/05	13:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8292005-3
✓	8/29/05	13:00	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8292005-3
✓	8/29/05	13:00	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8292005-3
✓	8/29/05	13:00	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8292005-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT0604
TtNUS Project #	112GN6878	**Well ID**	12MWT06
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/26/05	**Static Water Level (ft.)**	9.41	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	25.80	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	Y	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/26/05	08:40	9.41	120	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/26/05	08:50	9.79	120	Clear	5.05	310	1.81	1.1	16.68	320.5	NA	NA	1200
8/26/05	09:00	9.84	120	Clear	5.00	309	1.26	0.80	16.64	360.0	NA	NA	1200
8/26/05	09:10	9.89	120	Clear	4.96	308	0.94	0.80	16.73	392.7	NA	NA	1200
8/26/05	09:20	9.95	120	Clear	4.94	308	0.83	1.0	16.77	407.5	NA	NA	1200
8/26/05	09:30	10.11	120	Clear	4.92	306	0.74	0.80	16.81	420.9	NA	NA	1200
8/26/05	09:40	10.11	120	Clear	4.91	306	0.70	0.60	16.76	426.9	NA	NA	1200
8/26/05	09:50	10.11	120	Clear	4.91	305	0.66	0.80	16.71	432.2	NA	NA	1200

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/26/05	10:00	10.12	120	Clear	4.92	304	0.64	0.60	16.63	434.1	NA	NA	1200
8/26/05	10:05	10.11	120	Clear	4.91	.303	0.63	0.60	16.66	435.5	NA	NA	600

Final Purge / Sample Data

One Casing Volume	9.9	**Method**		**Dissolved Oxygen (mg/L)**	0.63
Total Vo. Purge (L)	10.2	**Waterlevel (ft.)**	10.11	**Turbidity (NTUs)**	0.60
Start Purge (hrs.)	8/26/05	**Flowrate (mL/min)**	120	**Temp (C)**	16.66
End Purge (hrs.)	8/26/05	**Color**	Clear	**ORP (mV)**	435.5
Total Purge Time (min.)	0	**pH (S.U.)**	4.91	**Salinity**	NA
		Conductivity (mS/cm)	.303	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/05	10:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/26/05	10:10	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/26/05	10:10	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2
✓	8/26/05	10:10	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT0904
TtNUS Project #	112GN6878	**Well ID**	12MWT09
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/26/05	**Static Water Level (ft.)**	12.47	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	26.27	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/26/05	08:40	12.47	0	Clear	NA	NA	NA	NA	NA	NA			0
8/26/05	08:50	14.75	140	Clear	5.0*	0.297	3.30	7.5	17.16	164			1400
8/26/05	09:00	15.32	110	Clear	5.0*	0.282	2.83	2.0	17.89	165			1100
8/26/05	09:10	14.14	80	Clear	5.0*	0.262	2.75	3.1	18.17	162			800
8/26/05	09:20	13.80	80	Clear	5.0*	0.233	2.61	8.6	18.22	159			800
8/26/05	09:30	13.64	90	Clear	5.0*	0.233	2.49	34	18.27	157			900
8/26/05	09:40	13.45	70	Clear	5.0*	0.240	2.41	50	18.97	157			700
8/26/05	09:50	13.35	60	Slightly Turbid	5.0*	0.244	2.40	70	18.97	157			600

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/26/05	10:00	13.37	70	Slightly Turbid	4.5*	0.246	2.40	70	18.50	158			700
8/26/05	10:10	13.37	70	Slightly Turbid	4.5*	0.253	3.21	75	18.58	160			700
8/26/05	10:20	13.34	60	Clear	4.5*	0.254	2.54	50	18.49	158			600
8/26/05	10:30	13.37	70	Clear	4.5*	0.254	2.48	45	18.29	158			700
8/26/05	10:40	13.37	70	Clear	4.5*	0.254	2.42	38	18.34	157			700
8/26/05	10:50	13.37	80	Clear	4.5*	0.254	2.42	31	18.29	157			800
8/26/05	11:00	13.37	70	Clear	4.5*	0.255	2.42	28	18.30	158			700
8/26/05	11:10	13.37	70	Clear	4.5*	0.256	2.41	22	18.27	158			700
8/26/05	11:20	13.37	70	Clear	4.5*	0.257	2.40	18	18.27	158			700
8/26/05	11:30	13.40	80	Clear	4.5*	0.259	2.38	14	18.49	160			800
8/26/05	11:40	13.41	80	Clear	4.5*	0.264	2.40	12	19.14	162			800
8/26/05	11:50	13.40	80	Clear	4.5*	0.264	2.38	9.7	18.97163	163			800

Final Purge / Sample Data

One Casing Volume	8.5	**Method**		**Dissolved Oxygen (mg/L)**	2.38
Total Vo. Purge (L)	15.0	**Waterlevel (ft.)**	13.40	**Turbidity (NTUs)**	9.7
Start Purge (hrs.)	8/26/05	**Flowrate (mL/min)**	80	**Temp (C)**	18.97163
End Purge (hrs.)	8/26/05	**Color**	Clear	**ORP (mV)**	163
Total Purge Time (min.)	0	**pH (S.U.)**	4.5*	**Salinity**	
		Conductivity (mS/cm)	0.264	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/05	11:55	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/26/05	11:55	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/26/05	11:55	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2
✓	8/26/05	11:55	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT1004
TtNUS Project #	112GN6878	**Well ID**	12MWT10
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/26/05	**Static Water Level (ft.)**	14.32	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	25.0	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/26/05	13:05	14.42	30	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/26/05	13:15	14.92	30	Clear	3.66	537	3.38	28	19.82	414.5	NA	NA	0
8/26/05	13:25	15.42	30	Clear	3.51	547	1.62	15	19.79	444.2	NA	NA	300
8/26/05	13:35	15.58	30	Clear	3.54	557	1.60	12	20.52	451.2	NA	NA	300
8/26/05	13:45	15.74	30	Clear	3.54	554	1.67	10	20.49	451.9	NA	NA	300
8/26/05	13:55	15.82	30	Clear	3.53	554	1.88	8.7	20.91	456.6	NA	NA	300
8/26/05	14:05	15.89	60	Clear	3.49	553	2.13	6.3	21.48	464.9	NA	NA	600
8/26/05	14:15	15.99	60	Clear	3.15	504	2.20	6.0	17.90	484.9	NA	NA	600

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/26/05	14:25	16.32	60	Clear	3.08	500	2.25	5.8	17.64	492.5	NA	NA	600
8/26/05	14:35	16.64	60	Clear	3.09	504	2.24	5.3	17.86	495.1	NA	NA	600
8/26/05	14:45	17.01	60	Clear	3.07	505	2.14	5.5	17.89	498.3	NA	NA	-3600
8/26/05	14:55	17.42	90	Clear	3.04	509	2.01	5.2	17.94	500.7	NA	NA	1800
8/26/05	15:05	17.63	90	Clear	3.06	515	1.88	7.5	18.01	500.6	NA	NA	900
8/26/05	15:15	17.81	90	Clear	3.05	521	1.69	11	17.94	501.0	NA	NA	900
8/26/05	15:25	18.10	90	Clear	3.09	523	1.54	12	17.65	500.0	NA	NA	900
8/26/05	15:35	18.22	90	Clear	3.14	528	1.40	12	17.74	498.0	NA	NA	900
8/26/05	15:45	18.37	90	Clear	3.14	531	1.32	14	17.69	497.6	NA	NA	900
8/26/05	15:55	18.49	90	Clear	3.13	536	1.23	16	17.75	500.2	NA	NA	900
8/26/05	16:05	18.72	90	Clear	3.14	539	1.13	18	17.81	499.9	NA	NA	900
8/26/05	16:15	18.80	90	Clear	3.16	543	1.02	18	17.48	497.3	NA	NA	900
8/26/05	16:25	19.07	90	Clear	3.20	545	0.96	20	17.48	495.7	NA	NA	900
[illegible]/05	16:35	19.21	90	Clear	3.21	547	0.90	21	17.35	494.3	NA	NA	900
8/26/05	16:45	19.37	90	Clear	3.23	547	0.85	25	17.13	493.2	NA	NA	900
8/26/05	16:55	19.46	90	Clear	3.26	548	0.82	32	17.01	491.1	NA	NA	900
8/26/05	17:05	19.55	90	Clear	3.29	550	0.81	36	16.87	488.7	NA	NA	900

Final Purge / Sample Data

One Casing Volume	6.4	**Method**		**Dissolved Oxygen (mg/L)**	0.81
Total Vo. Purge (L)	16.8	**Waterlevel (ft.)**	19.55	**Turbidity (NTUs)**	36
Start Purge (hrs.)	8/26/05	**Flowrate (mL/min)**	90	**Temp (C)**	16.87
End Purge (hrs.)	8/26/05	**Color**	Clear	**ORP (mV)**	488.7
Total Purge Time (min.)	0	**pH (S.U.)**	3.29	**Salinity**	NA
		Conductivity (mS/cm)	550	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/05	17:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8292005-3
✓	8/26/05	17:10	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8292005-3
✓	8/26/05	17:10	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8292005-3
✓	8/26/05	17:10	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8292005-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**		**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**		**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT1104
TtNUS Project #	112GN6878	**Well ID**	12MWT11
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/23/05	**Static Water Level (ft.)**	14.80	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	26.40	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/23/05	13:00	14.80	110	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/23/05	13:10	15.53	110	Clear	4.22	350	1.85	16	17.43	279.9	NA	NA	1100
8/23/05	13:20	15.62	110	Clear	3.44	277	1.34	12	17.77	543.3	NA	NA	1100
8/23/05	13:30	15.78	110	Clear	3.20	265	1.27	7.8	17.80	598.5	NA	NA	1100
8/23/05	13:40	15.81	110	Clear	3.06	246	1.44	5.8	17.62	651.9	NA	NA	0
8/23/05	13:50	15.85	110	Clear	3.09	254	1.34	6.3	17.85	636.8	NA	NA	2200
8/23/05	14:00	16.04	110	Clear	2.98	253	1.42	3.0	17.93	667.0	NA	NA	2200
8/23/05	14:10	16.05	110	Clear	2.90	257	1.26	1.8	18.19	679.1	NA	NA	1100

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/23/05	14:20	16.07	110	Clear	3.07	258	1.26	0.7	17.75	674.0	NA	NA	1100
8/23/05	14:30	16.07	110	Clear	3.05	261	1.22	0.0	17.83	678.7	NA	NA	1100
8/23/05	14:40	16.09	110	Clear	3.01	264	1.19	0.0	18.07	688.7	NA	NA	1100
8/23/05	14:50	16.09	110	Clear	2.97	266	1.12	0.0	18.50	692.2	NA	NA	1100
8/23/05	15:00	16.08	110	Clear	2.93	.270	1.15	0.0	18.73	696.7	NA	NA	1100

Final Purge / Sample Data

One Casing Volume	7.0	**Method**		**Dissolved Oxygen (mg/L)**	1.15
Total Vo. Purge (L)	13.2	**Waterlevel (ft.)**	16.08	**Turbidity (NTUs)**	0.0
Start Purge (hrs.)	8/23/05	**Flowrate (mL/min)**	110	**Temp (C)**	18.73
End Purge (hrs.)	8/23/05	**Color**	Clear	**ORP (mV)**	696.7
Total Purge Time (min.)	0	**pH (S.U.)**	2.93	**Salinity**	NA
		Conductivity (mS/cm)	.270	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/23/05	15:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8242005-1
✓	8/23/05	15:05	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8242005-1
✓	8/23/05	15:05	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8242005-1
✓	8/23/05	15:05	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8242005-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT1204
TtNUS Project #	112GN6878	**Well ID**	12MWT12
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/23/05	**Static Water Level (ft.)**	11.66	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	26.40	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655.3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/23/05	15:30	11.66	170	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/23/05	15:40	11.91	170	Clear	5.31	674	1.35	6.2	16.74	591.6	NA	NA	1700
8/23/05	15:50	11.87	170	Clear	5.25	677	1.05	4.7	16.99	614.3	NA	NA	1700
8/23/05	16:00	11.89	170	Clear	5.23	675	0.98	3.3	16.95	623.4	NA	NA	1700
8/23/05	16:10	11.87	170	Clear	5.20	677	0.69	2.8	16.87	626.9	NA	NA	1700
8/23/05	16:20	11.90	170	Clear	5.31	653	0.57	0.1	16.71	625.4	NA	NA	1700
8/23/05	16:30	11.89	170	Clear	5.37	636	0.53	0.1	16.87	620.5	NA	NA	1700
8/23/05	16:40	11.88	170	Clear	5.35	.630	0.52	0.0	16.98	624.5	NA	NA	1700

Final Purge / Sample Data

One Casing Volume	8.9	**Method**		**Dissolved Oxygen (mg/L)**	0.52
Total Vo. Purge (L)	11.9	**Waterlevel (ft.)**	11.88	**Turbidity (NTUs)**	0.0
Start Purge (hrs.)	8/23/05	**Flowrate (mL/min)**	170	**Temp (C)**	16.98
End Purge (hrs.)	8/23/05	**Color**	Clear	**ORP (mV)**	624.5
Total Purge Time (min.)	0	**pH (S.U.)**	5.35	**Salinity**	NA
		Conductivity (mS/cm)	.630	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/23/05	16:45	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8242005-1
✓	8/23/05	16:45	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8242005-1
✓	8/23/05	16:45	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8242005-1
✓	8/23/05	16:45	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8242005-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT1604
TtNUS Project #	112GN6878	**Well ID**	12MWT16
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/23/05	**Static Water Level (ft.)**	21.33	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	26.85	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/23/05	13:01	22.23	140	Clear	2.55	0.357	*	45	18.09	163			0
8/23/05	13:11	22.43	40	Clear	2.24	0.384	*	40	20.93	183			400
8/23/05	13:21	22.61	40	Clear	2.09	0.396	*	40	22.03	194			400
8/23/05	13:31	22.68	40	Clear	2.03	0.408	*	40	23.54	205			400
8/23/05	13:41	22.76	30	Clear	1.89	0.414	*	40	23.03	217			300
8/23/05	13:51	22.95	45	Slightly Turbid	1.81	0.391	*	55	21.42	220			450
8/23/05	14:01	23.15	40	Slightly Turbid	1.73	0.391	*	55	21.48	211			400
8/23/05	14:11	23.45	60	Clear	1.62	0.360	*	40	17.79	206			600

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/23/05	14:21	23.95	100	Slightly Turbid	1.60	0.352	*	70	17.46	201			1000
8/23/05	14:31	**	100	Cloudy	1.54	0.348	*	160	17.17	203			1000
8/23/05	14:41	**	100	Cloudy	1.52	0.354	*	200	17.78	205			1000
8/23/05	14:51	* *	80	Cloudy	1.50	0.356	*	250	18.39	203			800
8/23/05	15:01	* *	80	Cloudy	1.87	0.372	*	260	18.68	191			800
8/23/05	15:07	dry	80	Cloudy	1.49	0.374	*	280	18.34	186			480

Final Purge / Sample Data

One Casing Volume	3.4	**Method**		**Dissolved Oxygen (mg/L)**	*
Total Vo. Purge (L)	10.5	**Waterlevel (ft.)**	dry	**Turbidity (NTUs)**	280
Start Purge (hrs.)	8/23/05	**Flowrate (mL/min)**	80	**Temp (C)**	18.34
End Purge (hrs.)	8/23/05	**Color**	Cloudy	**ORP (mV)**	186
Total Purge Time (min.)	0	**pH (S.U.)**	1.49	**Salinity**	
		Conductivity (mS/cm)	0.374	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/05	11:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8242005-1
✓	8/24/05	11:00	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8242005-1
✓	8/24/05	11:00	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8242005-1
✓	8/24/05	11:00	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8242005-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT1704
TtNUS Project #	112GN6878	**Well ID**	12MWT17
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/23/05	**Static Water Level (ft.)**	22.96	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	27.70	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/23/05	15:32			Clear									0
8/23/05	15:42	*	150	Slightly Turbid	1.46	0.672	**	85	18.42	178			1500
8/23/05	15:52	*	100	Slightly Turbid	1.45	0.678	**	160	18.73	174			1000
8/23/05	16:02	* DRY	60	Slightly Turbid	1.52	0.702	**	130	18.94	170			600

Final Purge / Sample Data

One Casing Volume	3.1	**Method**		**Dissolved Oxygen (mg/L)**	**
Total Vo. Purge (L)	3.1	**Waterlevel (ft.)**	* DRY	**Turbidity (NTUs)**	130
Start Purge (hrs.)	8/23/05	**Flowrate (mL/min)**	60	**Temp (C)**	18.94
End Purge (hrs.)	8/23/05	**Color**	Slightly Turbid	**ORP (mV)**	170
Total Purge Time (min.)	0	**pH (S.U.)**	1.52	**Salinity**	
		Conductivity (mS/cm)	0.702	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/05	11:45	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	1	Glass	1L Amber		112GN6878-8242005-1
✓	8/24/05	11:45	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8242005-1
✓	8/24/05	11:45	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8242005-1
✓	8/24/05	11:45	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8242005-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT1804
TtNUS Project #	112GN6878	**Well ID**	12MWT18
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/24/05	**Static Water Level (ft.)**	21.81	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	28.00	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/24/05	08:53	21.81	0	Clear	NA	NA	NA	NA	NA	NA			0
8/24/05	09:03	22.58	140	Clear	6.0*	0.913	6.52	3.3	16.71	362			1400
8/24/05	09:13	23.13	110	Clear	5.5*	0.913	6.48	7.1	16.83	366			1100
8/24/05	09:23	23.48	100	Clear	5.5*	0.971	6.36	4.8	17.20	369			1000
8/24/05	09:33	23.88	100	Clear	5.5*	1.056	6.11	5.0	17.45	376			1000
8/24/05	09:43	24.48	180	Clear	5.5*	1.200	5.66	9.5	17.22	390			1800
8/24/05	09:53	25.10	180	Clear	5.5*	1.224	5.27	23	17.30	403			1800
8/24/05	10:03	**	180	Slightly Turbid	5.5*	1.186	5.41	60	17.69	396			1800

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/24/05	10:13	**	180	Slightly Turbid	5.5*	1.200	5.45	80	18.48	395			1800
8/24/05	10:23	**	180	Slightly Turbid	5.5*	1.270	5.41	70	19.69	401			1800
8/24/05	10:29	DRY	100	Slightly Turbid	5.5*	1.384	5.11	70	20.02	408			600

Final Purge / Sample Data

One Casing Volume	4.0	**Method**		**Dissolved Oxygen (mg/L)**	5.11
Total Vo. Purge (L)	15.1	**Waterlevel (ft.)**	DRY	**Turbidity (NTUs)**	70
Start Purge (hrs.)	8/24/05	**Flowrate (mL/min)**	100	**Temp (C)**	20.02
End Purge (hrs.)	8/24/05	**Color**	Slightly Turbid	**ORP (mV)**	408
Total Purge Time (min.)	0	**pH (S.U.)**	5.5*	**Salinity**	
		Conductivity (mS/cm)	1.384	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/05	08:20	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	08:20	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	08:20	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2
✓	8/25/05	08:20	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT2004
TtNUS Project #	112GN6878	**Well ID**	12MWT20
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/28/05	**Static Water Level (ft.)**	24.13	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	27.85	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/28/05	13:40	24.13	0	Clear	NA	NA	NA	NA	NA	NA			0
8/28/05	13:50	24.25	100	Clear	5.5*	1.620	4.69	70	20.79	172			1000
8/28/05	14:00	24.25	70	Clear	5.5*	1.360	5.28	40	20.93	179			700
8/28/05	14:10	24.25	70	Clear	5.5*	1.310	5.27	22	20.65	182			700
8/28/05	14:20	24.25	70	Clear	5.5*	1.316	5.23	8.6	21.11	183			700
8/28/05	14:30	24.25	70	Clear	5.5*	1.327	5.18	5.2	21.32	185			700

Final Purge / Sample Data

One Casing Volume	2.3	**Method**		**Dissolved Oxygen (mg/L)**	5.18
Total Vo. Purge (L)	3.8	**Waterlevel (ft.)**	24.25	**Turbidity (NTUs)**	5.2
Start Purge (hrs.)	8/28/05	**Flowrate (mL/min)**	70	**Temp (C)**	21.32
End Purge (hrs.)	8/28/05	**Color**	Clear	**ORP (mV)**	185
Total Purge Time (min.)	0	**pH (S.U.)**	5.5*	**Salinity**	
		Conductivity (mS/cm)	1.327	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/28/05	14:35	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8292005-3
✓	8/28/05	14:35	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8292005-3
✓	8/28/05	14:35	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8292005-3
✓	8/28/05	14:35	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8292005-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**		**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**		**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT2204
TtNUS Project #	112GN6878	**Well ID**	12MWT22
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/25/05	**Static Water Level (ft.)**	16.77	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	26.70	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/25/05	14:20	16.77	0	Clear	NA	NA	NA	NA	NA	NA			0
8/25/05	14:30	17.14	50	Clear	5.5*	0.228	7.19	18	19.18	161			500
8/25/05	14:40	17.56	80	Clear	5.5*	0.190	5.60	15	19.53	171			800
8/25/05	14:50	17.70	40	Clear	5.5*	0.198	5.49	11	21.51	176			400
8/25/05	15:00	17.92	50	Clear	5.5*	0.194	5.40	10	20.88	173			500
8/25/05	15:10	18.12	50	Clear	5.5*	0.192	5.25	13	20.67	172			500
8/25/05	15:20	18.34	50	Clear	5.5*	0.191	5.07	18	20.60	171			500
8/25/05	15:30	18.53	50	Clear	5.5*	0.192	4.90	19	20.50	171			500

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/25/05	15:40	18.72	50	Clear	5.5*	0.194	4.71	21	20.71	180			500
8/25/05	15:50	18.90	50	Clear	5.5*	0.194	4.62	24	20.37	179			500
8/25/05	16:00	19.05	50	Clear	5.5*	0.197	4.50	27	20.87				500
8/25/05	16:10	19.20	50	Clear	5.5*	0.196	4.50	23	20.33	180			500
8/25/05	16:20	19.35	50	Clear	5.5*	0.194	4.51	28	20.23	178			500
8/25/05	16:30	19.59	50	Clear	5.5*	0.193	4.48	33	19.88	178			500
8/25/05	16:40	19.79	50	Clear	5.5*	0.191	4.48	37	19.76	178			500
8/25/05	16:50	19.95	60	Clear	5.5*	0.193	4.53	40	20.14	178			600
8/25/05	17:00	20.03	50	Clear	5.5*	0.197	4.44	45	20.75	178			500
8/25/05	17:10	20.21	50	Clear	5.5*	0.192	4.51	50	19.85	177			500
8/25/05	17:20	20.32	50	Clear	5.5*	0.189	4.63	50	19.47	176			500
8/25/05	17:30	20.49	60	Slightly Turbid	5.5*	0.185	4.61	55	18.79	170			600
8/25/05	17:40	20.60	50	Slightly Turbid	5.5*	0.183	4.52	60	18.41	165			500
8/25/05	17:50	20.83	50	Slightly Turbid	5.5*	0.180	4.50	65	17.74	163			500
8/25/05	18:00	20.98	50	Slightly Turbid	5.5*	0.178	4.49	60	17.61	162			500
8/25/05	18:10	21.18	50	Clear	5.5*	0.177	4.50	50	17.48	160			500
8/25/05	18:20	21.32	50	Clear	5.5*	0.175	4.54	50	17.49	159			500

Final Purge / Sample Data

One Casing Volume	6.1	**Method**		**Dissolved Oxygen (mg/L)**	4.54
Total Vo. Purge (L)	12.4	**Waterlevel (ft.)**	21.32	**Turbidity (NTUs)**	50
Start Purge (hrs.)	8/25/05	**Flowrate (mL/min)**	50	**Temp (C)**	17.49
End Purge (hrs.)	8/25/05	**Color**	Clear	**ORP (mV)**	159
Total Purge Time (min.)	0	**pH (S.U.)**	5.5*	**Salinity**	
		Conductivity (mS/cm)	0.175	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/05	18:25	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	18:25	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	18:25	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2
✓	8/25/05	18:25	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT2304
TtNUS Project #	112GN6878	**Well ID**	12MWT23
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/26/05	**Static Water Level (ft.)**	27.39	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	32.48	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/26/05	13:25	27.39	0	Clear	NA	NA	NA	NA	NA	NA			0
8/26/05	13:35	28.8	200	Clear	4.0*	4.087	5.70	33	17.35	416			2000
8/26/05	13:45	29.38	150	Slightly Turbid	4.0*	4.137	6.30	100	17.62	432			1500
8/26/05	13:55	30.00	150	Clear	4.0*	4.268	5.23	100	18.23	450			1500
8/26/05	14:05	**	150	Cloudy	4.0*	4.405	4.17	260	19.02	466			1500
8/26/05	14:15	**	100	Clear	4.0*	4.460	3.31	220	19.52	480			1000
8/26/05	14:24	dry	100	Slightly Turbid	4.0*	4.549	2.82	150	20.57	493			900

Final Purge / Sample Data

One Casing Volume	3.1	**Method**		**Dissolved Oxygen (mg/L)**	2.82
Total Vo. Purge (L)	8.4	**Waterlevel (ft.)**	dry	**Turbidity (NTUs)**	150
Start Purge (hrs.)	8/26/05	**Flowrate (mL/min)**	100	**Temp (C)**	20.57
End Purge (hrs.)	8/26/05	**Color**	Slightly Turbid	**ORP (mV)**	493
Total Purge Time (min.)	0	**pH (S.U.)**	4.0*	**Salinity**	
		Conductivity (mS/cm)	4.549	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/27/05	08:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8292005-3
✓	8/27/05	08:50	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8292005-3
✓	8/27/05	08:50	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8292005-3
✓	8/27/05	08:50	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8292005-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**		**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**		**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT2804
TtNUS Project #	112GN6878	**Well ID**	12MWT28
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/28/05	**Static Water Level (ft.)**	12.10	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	28.0	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?		**Well Volumes Req.**			
Duplicate Sample Collected?					
Corresponding Duplicate Sample ID		**Monitor Reading (ppm)**	NA		

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/28/05	13:30	12.10	100	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/28/05	13:40	13.25	100	Clear	4.67	1.003	2.29	24	19.12	560.8	NA	NA	1000
8/28/05	13:50	14.79	100	Clear	4.00	.986	2.15	14	19.08	593.6	NA	NA	1000
8/28/05	14:00	15.45	100	Clear	3.45	.983	2.11	12	19.25	619.5	NA	NA	1000
8/28/05	14:10	16.23	100	Clear	3.29	.976	2.12	7.3	19.09	626.1	NA	NA	1000
8/28/05	14:20	16.94	100	Clear	2.80	.986	2.10	6.5	19.69	643.3	NA	NA	1000
8/28/05	14:30	17.35	100	Clear	2.57	.993	2.03	7.9	20.10	656.3	NA	NA	1000
8/28/05	14:40	17.87	100	Clear	2.46	.998	1.97	12	20.60	661.8	NA	NA	1000

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/28/05	14:50	18.20	100	Clear	2.89	.992	1.90	14	20.99	656.5	NA	NA	1000
8/28/05	15:00	18.48	100	Clear	3.67	.883	1.86	15	18.90	602.9	NA	NA	1000
8/28/05	15:10	18.89	100	Clear	3.95	.874	1.71	13	17.40	576.0	NA	NA	1000
8/28/05	15:20	19.13	100	Clear	4.16	.866	1.70	17	17.23	557.1	NA	NA	1000
8/28/05	15:30	19.54	100	Clear	4.23	.856	1.84	21	17.10	534.1	NA	NA	1000
8/28/05	15:40		100	Clear	3.38	.865	1.87		17.04	597.3	NA	NA	1000
8/28/05	15:50	20.61	100	Slightly Turbid	2.34	.896	2.04	95	17.90	669.0	NA	NA	1000
8/28/05	16:00	20.72	60	Slightly Turbid	2.17	.932	1.94	101	18.90	684.7	NA	NA	600
8/28/05	16:10	20.85	60	Slightly Turbid	2.54	.961	1.99	110	19.80	689.7	NA	NA	600
8/28/05	16:20	20.92	60	Slightly Turbid	2.86	.986	1.89	97	19.71	655.7	NA	NA	600
8/28/05	16:30	21.23	60	Slightly Turbid	2.40	.996	1.86	93	19.92	657.8	NA	NA	600
8/28/05	16:40	21.43	60	Slightly Turbid	2.03	1.006	1.85	90	20.11	658.7	NA	NA	600
8/28/05	16:50	21.60	60	Slightly Turbid	2.45	.989	1.82	84	19.33	594.8	NA	NA	600
8/28/05	17:00	21.64	60	Slightly Turbid	1.59	1.012	1.86	79	19.95	683.0	NA	NA	600
8/28/05	17:10	21.89	60	Slightly Turbid	1.40	1.008	1.86	73	19.66	684.3	NA	NA	600
8/28/05	17:20	21.97	60	Slightly Turbid	1.38	1.011	1.84	69	19.66	692.4	NA	NA	600
8/28/05	17:30	22.10	60	Slightly Turbid	1.32	1.021	1.83	60	19.73	704.3	NA	NA	600

Final Purge / Sample Data

One Casing Volume	9.6	**Method**		**Dissolved Oxygen (mg/L)**	1.83
Total Vo. Purge (L)	20	**Waterlevel (ft.)**	22.10	**Turbidity (NTUs)**	60
Start Purge (hrs.)	8/28/05	**Flowrate (mL/min)**	60	**Temp (C)**	19.73
End Purge (hrs.)	8/28/05	**Color**	Slightly Turbid	**ORP (mV)**	704.3
Total Purge Time (min.)	0	**pH (S.U.)**	1.32	**Salinity**	NA
		Conductivity (mS/cm)	1.021	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/28/05	17:35	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8292005-3
✓	8/28/05	17:35	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8292005-3
✓	8/28/05	17:35	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8292005-3
✓	8/28/05	17:35	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8292005-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT3002
TtNUS Project #	112GN6878	**Well ID**	12MWT30
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/26/05	**Static Water Level (ft.)**	DRY	**Water Quality Meter**	No Data
Purge Method	Other	**Total Well Depth (ft.)**	DRY	**Pump Control Box**	No Data
Sampling Method	Other	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	No Data
MS/MSD Collected?		**Well Volumes Req.**			
Duplicate Sample Collected?					
Corresponding Duplicate Sample ID		**Monitor Reading (ppm)**	NA		

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/26/05	12:39			Other									0
8/26/05	12:43			Other									0

Final Purge / Sample Data

One Casing Volume	DRY	**Method**		**Dissolved Oxygen (mg/L)**	
Total Vo. Purge (L)	DRY	**Waterlevel (ft.)**		**Turbidity (NTUs)**	
[illegible] Purge (hrs.)	8/26/05	**Flowrate (mL/min)**		**Temp (C)**	
End Purge (hrs.)	8/26/05	**Color**	error	**ORP (mV)**	
Total Purge Time (min.)	0	**pH (S.U.)**		**Salinity**	
		Conductivity (mS/cm)		**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
X			SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		
X			Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		
X			EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		
X			SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT3104
TtNUS Project #	112GN6878	**Well ID**	12MWT31
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/24/05	**Static Water Level (ft.)**	68.21	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	91.25	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2"	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/24/05	13:15	68.21	120	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/24/05	13:25	69.20	120	Clear	7.30	384	5.42	3.6	20.11	477.6	NA	NA	1200
8/24/05	13:35	70.02	90	Clear	6.87	365	1.70	2.1	19.38	530.4	NA	NA	900
8/24/05	13:45	70.73	90	Clear	6.70	364	1.18	3.4	19.56	559.7	NA	NA	1620
8/24/05	13:55	71.19	90	Clear	6.82	365	1.00	4.0	20.01	566.7	NA	NA	900
8/24/05	14:05		90	Clear	6.80	369	0.92		20.54	577.6	NA	NA	900
8/24/05	14:15		90	Clear	6.74	369	0.89		20.67	583.7	NA	NA	900
8/24/05	14:25		90	Clear	6.72	367	0.86		20.57	588.1	NA	NA	900

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/24/05	14:35		90	Clear	6.69	368	0.83	2.2	20.61		NA	NA	900
8/24/05	14:45	72.69	90	Clear	6.65	367	0.80	1.7	20.71	599.0	NA	NA	900
8/24/05	14:55		90	Clear	6.90	368	0.75		20.73	590.9	NA	NA	900
8/24/05	15:05	73.10	90	Clear	6.78	363	0.70	1.5	20.38	596.1	NA	NA	900
8/24/05	15:15		90	Clear	6.77	364	0.67		20.44	600.1	NA	NA	900
8/24/05	15:25		90	Clear	6.66	362	0.65		20.52	609.3	NA	NA	900
8/24/05	15:35		90	Clear	6.73	360	0.66		20.51	608.7	NA	NA	900
8/24/05	15:45	74.30	90	Clear	6.80	353	0.71	3.3	19.98	602.3	NA	NA	900
8/24/05	15:55		90	Clear	6.96	366	0.71		21.32	601.0	NA	NA	900
8/24/05	16:05	74.39	90	Clear	7.24	393	0.70		24.78	581.7	NA	NA	900
8/24/05	16:15	75.03	100	Clear	6.67	344	0.92	7.3	18.86	606.6	NA	NA	1000
8/24/05	16:25		100	Clear	6.64	338	0.83		18.01	609.7	NA	NA	1000
8/24/05	16:35		100	Clear	6.57	334	0.74		17.58	612.4	NA	NA	1000
8/24/05	16:45		100	Clear	6.57	335	0.70		17.21	611.9	NA	NA	100[illegible]
8/24/05	16:55		100	Clear	6.57	336	0.64		17.00	612.1	NA	NA	1000
8/24/05	17:05		100	Clear	6.66	336	0.58		16.95	603.6	NA	NA	1000
8/24/05	17:15	77.98	100	Clear	6.93	337	0.54	9.8	16.95	576.0	NA	NA	1000

Final Purge / Sample Data

One Casing Volume	13.9	**Method**		**Dissolved Oxygen (mg/L)**	0.54
Total Vo. Purge (L)	22.6	**Waterlevel (ft.)**	77.98	**Turbidity (NTUs)**	9.8
Start Purge (hrs.)	8/24/05	**Flowrate (mL/min)**	100	**Temp (C)**	16.95
End Purge (hrs.)	8/24/05	**Color**	Clear	**ORP (mV)**	576.0
Total Purge Time (min.)	0	**pH (S.U.)**	6.93	**Salinity**	NA
		Conductivity (mS/cm)	337	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/05	17:20	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/24/05	17:20	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/24/05	17:20	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2
✓	8/24/05	17:20	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**		**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**		**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT3204
TtNUS Project #	112GN6878	**Well ID**	12MWT32
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/25/05	**Static Water Level (ft.)**	85.18	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	100.60	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?		**Well Volumes Req.**			
Duplicate Sample Collected?		**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/25/05	08:50	85.18	0	Clear	NA	NA	NA	NA	NA	NA			0
8/25/05	09:00	85.78	80	Clear	6.0*	1.203	2.51	19	18.63	130			800
8/25/05	09:10	86.07	70	Clear	6.0*	1.204	1.90	13	18.73	132			700
8/25/05	09:20	86.41	70	Clear	6.0*	1.201	1.49	8.8	18.21	138			700
8/25/05	09:30	86.75	70	Clear	6.0*	1.203	1.27	8.4	18.58	141			700
8/25/05	09:40	87.08	70	Clear	6.0*	1.202	1.14	5.6	18.45	146			700
8/25/05	09:50	87.42	70	Clear	6.0*	1.205	1.09	4.7	18.48	149			700
8/25/05	10:00	87.75	70	Clear	6.0*	1.208	1.06	4.2	18.55	152			700

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/25/05	10:10	88.05	70	Clear	6.0*	1.228	1.04	3.5	19.57	152			700
8/25/05	10:20	88.33	70	Clear	6.0*	1.210	1.01	3.7	18.99				700
8/25/05	10:30	88.58	70	Clear	6.0*	1.199	1.00	3.3	18.83	155			700
8/25/05	10:40	88.88	70	Clear	6.0*	1.200	0.97	3.5	19.05	154			700
8/25/05	10:50	89.12	70	Clear	6.0*	1.223	0.95	3.3	19.80	150			700
8/25/05	11:00	89.36	70	Clear	6.0*	1.230	0.93	4.0	19.97	148			700
8/25/05	11:10	89.60	60	Clear	6.1*	1.215	0.88	3.2	19.52	147			600
8/25/05	11:22	89.80	60	Clear	6.1*	1.219	0.86	3.4	19.64	149			720
8/25/05	11:30	90.05	60	Clear	6.1*	1.234	0.85	3.8	20.10	148			480
8/25/05	11:40	90.31	70	Clear	6.2*	1.222	0.82	6.4	19.58	145			700
8/25/05	11:50	90.60	70	Clear	6.2*	1.227	0.79	5.2	19.66	141			700
8/25/05	12:00	90.81	70	Clear	6.2*	1.228	0.76	6.5	19.77	143			700
8/25/05	12:10	91.09	70	Clear	6.2*	1.229	0.73	9.0	19.79	142			700
[illegible]/05	12:20	91.38	70	Clear	6.2*	1.227	0.68	9.6	19.56	141			700
8/25/05	12:30	91.65	70	Clear	6.2*	1.224	0.68	11	19.31	145			700
8/25/05	12:40	92.00	60	Clear	6.2*	1.232	0.66	9.8	19.55	148			600
8/25/05	12:50	92.23	60	Clear	6.2*	1.230	0.64	9.4	19.49	150			600

Final Purge / Sample Data

One Casing Volume	9.5	**Method**		**Dissolved Oxygen (mg/L)**	0.64
Total Vo. Purge (L)	16.4	**Waterlevel (ft.)**	92.23	**Turbidity (NTUs)**	9.4
Start Purge (hrs.)	8/25/05	**Flowrate (mL/min)**	60	**Temp (C)**	19.49
End Purge (hrs.)	8/25/05	**Color**	Clear	**ORP (mV)**	150
Total Purge Time (min.)	0	**pH (S.U.)**	6.2*	**Salinity**	
		Conductivity (mS/cm)	1.230	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/05	12:55	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	12:55	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	12:55	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2
✓	8/25/05	12:55	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT3604
TtNUS Project #	112GN6878	**Well ID**	12MWT36
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/24/05	**Static Water Level (ft.)**	13.24	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	27.56	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/24/05	08:25	13.24	90	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/24/05	08:35	13.88	90	Clear	5.98	.436	4.08	5.6	18.62	452.9	NA	NA	900
8/24/05	08:45	14.31	90	Clear	5.94	.435	3.38	3.8	18.82	488.0	NA	NA	900
8/24/05	08:55	14.61	90	Clear	5.76	437	2.91	1.8	18.99	542.5	NA	NA	900
8/24/05	09:05	14.76	90	Clear	5.64	441	2.72	0.8	19.40	580.3	NA	NA	900
8/24/05	09:15	14.53	50	Clear	5.71	466	2.80	2.3	21.92	601.0	NA	NA	500
8/24/05	09:25	14.58	50	Clear	5.69	464	2.87	0.45	21.06	603.3	NA	NA	500
8/24/05	09:35	14.62	50	Clear	5.70	458	2.80	0.34	20.89	609.7	NA	NA	500

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/24/05	09:45	14.53	50	Clear	5.77	468	2.76	0.29	22.18	611.7	NA	NA	500
8/24/05	09:55	14.42	50	Clear	5.78	486	2.72	0.0	23.99	613.2	NA	NA	500
8/24/05	10:05	14.44	50	Clear	5.82	476	2.69	0.0	24.22	618.9	NA	NA	500
8/24/05	10:15	14.43	50	Clear	5.84	483	2.65	0.0	25.75	622.9	NA	NA	500
8/24/05	10:25	14.45	50	Clear	5.88	487	2.62	0.0	25.90	628	NA	NA	500
8/24/05	10:35	14.44	50	Clear	5.90	492	2.57	0.0	25.97	631.4	NA	NA	500
8/24/05	10:45	14.43	50	Clear	5.90	.494	2.54	0.0	26.34	636.8	NA	NA	500

Final Purge / Sample Data

One Casing Volume	8.6	**Method**		**Dissolved Oxygen (mg/L)**	2.54
Total Vo. Purge (L)	8.6	**Waterlevel (ft.)**	14.43	**Turbidity (NTUs)**	0.0
Start Purge (hrs.)	8/24/05	**Flowrate (mL/min)**	50	**Temp (C)**	26.34
End Purge (hrs.)	8/24/05	**Color**	Clear	**ORP (mV)**	636.8
Total Purge Time (min.)	0	**pH (S.U.)**	5.90	**Salinity**	NA
		Conductivity (mS/cm)	.494	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/24/05	10:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8242005-1
✓	8/24/05	10:50	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8242005-1
✓	8/24/05	10:50	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8242005-1
✓	8/24/05	10:50	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8242005-1

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**		**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**		**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT3804
TtNUS Project #	112GN6878	**Well ID**	12MWT38
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/28/05	**Static Water Level (ft.)**	9.46	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	27.0	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/28/05	08:45	9.46	200	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/28/05	08:55	10.56	200	Clear	3.52	.295	6.18	22	18.06	466.7	NA	NA	2000
8/28/05	09:05	11.37	150	Clear	3.46	.291	6.17	17	18.27	503.9	NA	NA	1500
8/28/05	09:15	11.45	60	Clear	3.39	.292	5.72	11	19.24	548.9	NA	NA	600
8/28/05	09:25	11.58	60	Clear	3.32	.295	5.39	9.8	19.61	579.8	NA	NA	600
8/28/05	09:35	11.71	60	Clear	3.29	.297	5.14	9.6	20.11	600.3	NA	NA	600
8/28/05	09:45	11.86	60	Clear	3.26	.300	4.63	9.2	19.80	617.5	NA	NA	600
8/28/05	09:55	12.06	90	Clear	3.21	.298	4.55	8.7	19.41	621.3	NA	NA	900

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/28/05	10:05	12.19	90	Clear	3.12	.294	4.23	8.3	19.20	631.5	NA	NA	900
8/28/05	10:15	12.34	90	Clear	3.06	.296	4.03	8.1	19.42	640.3	NA	NA	900
8/28/05	10:25	12.41	90	Clear	3.08	.298	3.87	7.4	19.55	643.2	NA	NA	-900
8/28/05	10:35	12.57	90	Clear	3.10	.299	3.78	6.3	19.64	647.4	NA	NA	1800
8/28/05	10:45	12.87	90	Clear	3.12	.299	3.73	4.2	19.62	648.5	NA	NA	900
8/28/05	10:55	13.07	90	Clear	3.10	.300	3.69	2.4	19.74	652.2	NA	NA	900
8/28/05	11:05	13.37	90	Clear	3.07	.304	3.62	2.1	20.43	667.4	NA	NA	-1800
8/28/05	11:15	13.98	90	Clear	2.99	.307	3.59	1.8	21.17	672.8	NA	NA	-900
8/28/05	11:25	14.36	90	Clear	2.88	.309	3.58	1.0	21.26	683.3	NA	NA	2700
8/28/05	11:35	14.36	90	Clear	2.89	.312	3.54	0.8	21.63	683.6	NA	NA	900
8/28/05	11:45	14.38	90	Clear	2.92	.318	3.52	0.6	22.21	688.3	NA	NA	900
8/28/05	11:55	14.36	90	Clear	2.97	.321	3.46	0.4	22.36	688.6	NA	NA	900

Purge / Sample Data

One Casing Volume	10.6	**Method**		**Dissolved Oxygen (mg/L)**	3.46
Total Vo. Purge (L)	17.6	**Waterlevel (ft.)**	14.36	**Turbidity (NTUs)**	0.4
Start Purge (hrs.)	8/28/05	**Flowrate (mL/min)**	90	**Temp (C)**	22.36
End Purge (hrs.)	8/28/05	**Color**	Clear	**ORP (mV)**	688.6
Total Purge Time (min.)	0	**pH (S.U.)**	2.97	**Salinity**	NA
		Conductivity (mS/cm)	.321	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/28/05	12:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8292005-3
✓	8/28/05	12:00	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8292005-3
✓	8/28/05	12:00	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8292005-3
✓	8/28/05	12:00	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8292005-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**		**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**		**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT4104
TtNUS Project #	112GN6878	**Well ID**	12MWT41
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/25/05	**Static Water Level (ft.)**	19.85	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	36.60	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/25/05	09:45	19.85	50	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/25/05	09:55	20.52	50	Clear	6.26	506	1.80	90	15.14	176.2	NA	NA	500
8/25/05	10:05	21.09	90	Clear	6.19	501	1.11	70	14.83	192.1	NA	NA	900
8/25/05	10:15	21.45	90	Clear	6.15	501	0.87	75	14.90	222.5	NA	NA	900
8/25/05	10:25	21.69	90	Clear	6.08	503	0.78	90	15.00	277.0	NA	NA	900
8/25/05	10:35	21.94	90	Clear	6.05	503	0.72	87	15.06	325.0	NA	NA	900
8/25/05	10:45	22.18	90	Clear	5.98	507	0.67	92	15.24	383.8	NA	NA	900
8/25/05	10:55	22.26	70	Clear	5.94	509	0.65	84	15.26	419.9	NA	NA	700

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/25/05	11:05	22.41	70	Clear	5.86	514	0.63	80	15.51	467.4	NA	NA	700
8/25/05	11:15	22.73	70	Clear	5.80	518	0.65	75	15.56	488.2	NA	NA	700
8/25/05	11:25	22.84	70	Clear	5.54	540	0.68	75	16.97	532.8	NA	NA	700
8/25/05	11:35	23.14	70	Clear	5.18	577	0.73	73	19.38	579.5	NA	NA	700
8/25/05	11:45	22.30	40	Clear	5.13	609	0.75	68	21.53	597.0	NA	NA	400
8/25/05	11:55	22.15	80	Clear	4.65	616	0.89	59	19.50	627.2	NA	NA	800
8/25/05	12:05	22.38	80	Clear	3.58	556	0.81	80	17.28	668.5	NA	NA	800
8/25/05	12:15	22.47	80	Clear	3.34	645	0.75	78	17.70	683.2	NA	NA	800
8/25/05	12:25	22.61	80	Clear	3.48	565	0.69	69	18.17	694.7	NA	NA	800
8/25/05	12:35	22.72	80	Clear	3.45	566	0.67	65	17.36	703.8	NA	NA	800
8/25/05	12:45	23.07	80	Clear	2.73	533	0.63	61	15.72	722.6	NA	NA	800
8/25/05	12:55	23.88	80	Clear	2.25	541	0.57	50	15.77	737.8	NA	NA	800
8/25/05	13:05	24.20	130	Clear	2.31	546	0.55	42	15.85	743.0	NA	NA	1300
8/25/05	13:15	24.31	130	Clear	2.22	548	0.53	38	15.89	753.5	NA	NA	1300
8/25/05	13:25	24.48	130	Clear	2.12	548	0.52	35	15.87	762.5	NA	NA	1300
8/25/05	13:35	24.61	130	Clear	2.36	550	0.54	35	15.75	769.7	NA	NA	1300
8/25/05	13:45	24.76	130	Clear	2.81	.544	0.54	34	15.50	767.6	NA	NA	1300

Final Purge / Sample Data

One Casing Volume	10.1	**Method**		**Dissolved Oxygen (mg/L)**	0.54
Total Vo. Purge (L)	21	**Waterlevel (ft.)**	24.76	**Turbidity (NTUs)**	34
Start Purge (hrs.)	8/25/05	**Flowrate (mL/min)**	130	**Temp (C)**	15.50
End Purge (hrs.)	8/25/05	**Color**	Clear	**ORP (mV)**	767.6
Total Purge Time (min.)	0	**pH (S.U.)**	2.81	**Salinity**	NA
		Conductivity (mS/cm)	.544	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/05	13:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	13:50	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	13:50	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2
✓	8/25/05	13:50	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**	**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**	**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT4204
TtNUS Project #	112GN6878	**Well ID**	12MWT42
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	J. Goerdt
		Concentration	Low Concentration

Well and Sample Data

Date	8/25/05	**Static Water Level (ft.)**	14.14	**Water Quality Meter**	99K1014 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	30.45	**Pump Control Box**	MP10 1588
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	3655-3802
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/25/05	14:45	14.14	100	Clear	NA	NA	NA	NA	NA	NA	NA	NA	0
8/25/05	14:55		100	Clear	3.95	330	4.43	22	18.51	589.1	NA	NA	1000
8/25/05	15:05	15.65	100	Clear	3.24	308	1.35	15	15.80	741.9	NA	NA	1000
8/25/05	15:15	15.98	100	Clear	3.18	287	1.21	13	16.09	744.9	NA	NA	-1000
8/25/05	15:25	16.31	100	Clear	3.10	265	1.14	12	16.13	750.6	NA	NA	2000
8/25/05	15:35	16.54	100	Clear	3.12	253	1.11	4.8	16.12	757.7	NA	NA	1000
8/25/05	15:45	16.97	100	Clear	3.13	237	1.11	3.5	16.09	768.0	NA	NA	0
8/25/05	15:55	17.25	100	Clear	3.17	222	1.22	6.6	16.03	776.9	NA	NA	2000

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/25/05	16:05	17.63	100	Clear	3.15	214	1.34	8.0	15.33	783.6	NA	NA	2000
8/25/05	16:15	17.81	100	Clear	3.21	215	1.34	11	15.94	787.1	NA	NA	1000
8/25/05	16:25	18.22	100	Clear	3.17	217	1.31	14	15.66	794.0	NA	NA	1000
8/25/05	16:35	18.56	120	Clear	3.22	224	1.26	14	15.83	796.9	NA	NA	1200
8/25/05	16:45	18.83	120	Clear	3.20	231	1.21	18	15.84	800.8	NA	NA	1200
8/25/05	16:55	19.04	120	Clear	3.11	239	1.17	21	15.49	807.9	NA	NA	1200
8/25/05	17:05	19.55	120	Clear	3.13	246	1.10	20	15.68	810.6	NA	NA	1200
8/25/05	17:15	19.73	120	Clear	3.16	251	1.06	22	15.67	811.2	NA	NA	1200
8/25/05	17:25	20.18	120	Clear	3.17	254	1.00	24	15.46	8.12.6	NA	NA	1200
8/25/05	17:35	20.46	120	Clear	3.16	259	0.96	25	15.34	814.6	NA	NA	1200
8/25/05	17:45	20.79	120	Clear	3.18	266	0.92	25	15.18	815.5	NA	NA	1200
8/25/05	17:55	20.95	120	Clear	3.22	271	0.91	24	15.23	814.2	NA	NA	1200
8/25/05	18:05	21.30	120	Clear	3.26	279	0.89	21	14.80	813.6	NA	NA	1200
[illegible]/05	18:15	21.64	120	Clear	3.36	284	0.89	17	14.96	808.3	NA	NA	1200
8/25/05	18:25	21.83	120	Clear	3.35	290	0.86	11	14.93	809.8	NA	NA	1200
8/25/05	18:35	22.19	120	Clear	3.41	.296	0.84	9.2	14.93	807.9	NA	NA	1200
8/25/05	18:45	22.42	120	Clear	3.43	.299	0.82	7.8	14.86	806.6	NA	NA	1200

Final Purge / Sample Data

One Casing Volume	9.8	**Method**		**Dissolved Oxygen (mg/L)**	0.82
Total Vo. Purge (L)	26.8	**Waterlevel (ft.)**	22.42	**Turbidity (NTUs)**	7.8
Start Purge (hrs.)	8/25/05	**Flowrate (mL/min)**	120	**Temp (C)**	14.86
End Purge (hrs.)	8/25/05	**Color**	Clear	**ORP (mV)**	806.6
Total Purge Time (min.)	0	**pH (S.U.)**	3.43	**Salinity**	NA
		Conductivity (mS/cm)	.299	**Other**	NA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/25/05	18:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	18:50	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/25/05	18:50	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2
✓	8/25/05	18:50	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	John Wright	**Modified By**		**Printed By**	David Hickey
Created Date	8/22/05	**Modified Date**		**Printed Date**	5/1/06

Project Information

SMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12GWT4704
TtNUS Project #	112GN6878	**Well ID**	12MWT47
Task/Contract #	CTO 0357	**Well Type**	Monitoring Well
WBS Code #	NA	**Sampled By**	T. Rojahn
		Concentration	Low Concentration

Well and Sample Data

Date	8/28/05	**Static Water Level (ft.)**	16.18	**Water Quality Meter**	98F0478 AB
Purge Method	Low flow - Bladder	**Total Well Depth (ft.)**	26.80	**Pump Control Box**	MP10-1088
Sampling Method	Low flow - Bladder	**Well Riser Diameter (in.)**	2	**Turbidity Meter**	4557-3303
MS/MSD Collected?	Y	**Well Volumes Req.**			
Duplicate Sample Collected?	N	**Monitor Reading (ppm)**	NA		
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)
8/28/05	09:10	16.18	0	Clear	NA	NA	NA	NA	NA	NA			0
8/28/05	09:20	16.18	150	Clear	6.0*	0.590	6.13	22	15.61	141			1500
8/28/05	09:30	16.18	150	Clear	6.0*	0.560	5.05	20	15.32	142			1500
8/28/05	09:40	16.18	150	Clear	6.0*	0.555	4.87	16	15.42	142			1500
8/28/05	09:50	16.20	150	Clear	6.0*	0.553	4.75	7.4	15.38	144			1500
8/28/05	10:00	16.20	150	Clear	6.0*	0.554	4.75	6.7	15.37	146			1500

Final Purge / Sample Data

One Casing Volume	6.6	**Method**		**Dissolved Oxygen (mg/L)**	4.75
Total Vo. Purge (L)	7.5	**Waterlevel (ft.)**	16.20	**Turbidity (NTUs)**	6.7
Start Purge (hrs.)	8/28/05	**Flowrate (mL/min)**	150	**Temp (C)**	15.37
End Purge (hrs.)	8/28/05	**Color**	Clear	**ORP (mV)**	146
Total Purge Time (min.)	0	**pH (S.U.)**	6.0*	**Salinity**	
		Conductivity (mS/cm)	0.554	**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/28/05	10:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	6	Glass	1L Amber		112GN6878-8292005-3
✓	8/28/05	10:05	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	3	Glass	1L Amber		112GN6878-8292005-3
✓	8/28/05	10:05	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	3	Plastic	1L HDPE		112GN6878-8292005-3
✓	8/28/05	10:05	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	6	Glass	40ml vials		112GN6878-8292005-3

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

Created By	James Goerdt	**Modified By**		**Printed By**	David Hickey
Created Date	8/26/05	**Modified Date**		**Printed Date**	5/1/06

Project Information

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Facility Name	CRANE NSWC	**Sample ID #**	12FD08260501
TtNUS Project #	112GN6878	**Well ID**	
Task/Contract #	CTO 0357	**Well Type**	Other Well Type
WBS Code #	NA	**Sampled By**	James Goerdt
		Concentration	-Select-

Well and Sample Data

Date		**Static Water Level (ft.)**		**Water Quality Meter**	
Purge Method	-Select-	**Total Well Depth (ft.)**		**Pump Control Box**	
Sampling Method		**Well Riser Diameter (in.)**		**Turbidity Meter**	
MS/MSD Collected?	N	**Well Volumes Req.**			
Duplicate Sample Collected?	Y	**Monitor Reading (ppm)**			
Corresponding Duplicate Sample ID					

Purge Entries

Date	Time	Water Level (ft.)	Flow Rate (mL/min)	Color	pH (S.U.)	S.C. (mS/cm)	DO (mg/L)	Turbidity (NTUs)	Temp °C	ORP (mV)	Salinity (%)	Other	Incremental Volume (mL)

Final Purge / Sample Data

One Casing Volume		**Method**		**Dissolved Oxygen (mg/L)**	
Total Vo. Purge (L)		**Waterlevel (ft.)**		**Turbidity (NTUs)**	
[illegible]t Purge (hrs.)		**Flowrate (mL/min)**		**Temp (C)**	
End Purge (hrs.)		**Color**	error	**ORP (mV)**	
Total Purge Time (min.)	0	**pH (S.U.)**		**Salinity**	
		Conductivity (mS/cm)		**Other**	

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Preservative	Count	Type	Requirements	Comments	Chain#
✓	8/26/05	00:00	Modified SW-846-8330	Explosives RDX Degradation Products	4 ° C	1	Glass	1L Amber		112GN6878-8262005-2
✓	8/26/05	00:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	4 ° C	2	Glass	1L Amber		112GN6878-8262005-2
✓	8/26/05	00:00	SW-846 9060	Total Organic Carbon	4 ° C / H3PO4	2	Glass	40ml vials		112GN6878-8262005-2
✓	8/26/05	00:00	EPA 353.2	Nitrate + Nitrite (as N)	4 ° C / H2SO4	1	Plastic	1L HDPE		112GN6878-8262005-2

General Observations and Notes

No Notes

- End of Report -

APPENDIX A.1.2

SWMU 12

ROUND 4

SURFACE WATER SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

MU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**	CLEAR	**Temp (C)**	21.78
Time	13:19	**pH (S.U.)**	7.27	**ORP (mV)**	157
Depth (ft.)	Surface	**S.C. (mS/cm)**	0.184	**Salinity (%)**	NA
Method	Direct Bottle	**DO (mg/L)**	6.77		
MS/MSD Collected	N	**Turbidity (NTUs)**	21		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	8/27/05	13:19	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4 ° C		112GN6878-8292005-3
✓	8/27/05	13:19	Explosives RDX Degradation Products	Modified SW-846-8330	1	Glass	1L Amber	4 ° C	Pool 2' X 12' X .1' No Flow	112GN6878-8292005-3
✓	8/27/05	13:19	Nitrate + Nitrite (as N)	EPA 353.2	1	Plastic	1L HDPE	4 ° C / H2SO4		112GN6878-8292005-3
✗			Total Organic Carbon	SW-846 9060	2	Glass	40ml vials	4 ° C / H3PO4		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**	Clear	**Temp (C)**	20.43
Time	10:40	**pH (S.U.)**	6.83	**ORP (mV)**	209
Depth (ft.)	Surface	**S.C. (mS/cm)**	0.110	**Salinity (%)**	NA
Method	Direct Bottle	**DO (mg/L)**	7.02		
MS/MSD Collected	N	**Turbidity (NTUs)**	27		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	8/27/05	10:40	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4 ° C		112GN6878-8292005-3
✓	8/27/05	10:40	Explosives RDX Degradation Products	Modified SW-846-8330	1	Glass	1L Amber	4 ° C		112GN6878-8292005-3
✓	8/27/05	10:40	Nitrate + Nitrite (as N)	EPA 353.2	1	Plastic	1L HDPE	4 ° C / H2SO4	POOL 3' X 9' X 0.75' No Flow	112GN6878-8292005-3
✗			Total Organic Carbon	SW-846 9060	2	Glass	40ml vials	4 ° C / H3PO4		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**	DRY	**Temp (C)**	DRY
Time	13:30	**pH (S.U.)**	DRY	**ORP (mV)**	
Depth (ft.)	Dry	**S.C. (mS/cm)**	DRY	**Salinity (%)**	DRY
Method	Other	**DO (mg/L)**	DRY		
MS/MSD Collected		**Turbidity (NTUs)**	DRY		
Duplicate Collected					
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
X			Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4 ° C		
X			Explosives RDX Degradation Products	Modified SW-846-8330	1	Glass	1L Amber	4 ° C		
X			Nitrate + Nitrite (as N)	EPA 353.2	1	Plastic	1L HDPE	4 ° C / H2SO4		
X			Total Organic Carbon	SW-846 9060	2	Glass	40ml vials	4 ° C / H3PO4		

General Observations and Notes

Location dry - No sample collected

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**	clear	**Temp (C)**	18.33
Time	12:00	**pH (S.U.)**	6.16	**ORP (mV)**	390
Depth (ft.)	Surface	**S.C. (mS/cm)**	0.218	**Salinity (%)**	NA
Method	Direct Bottle	**DO (mg/L)**	2.60		
MS/MSD Collected	N	**Turbidity (NTUs)**	0.0		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	8/27/05	12:00	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4 ° C	Pool 9' X 12' X 0.8'(Zero Flow)	112GN6878-8292005-3
✓	8/27/05	12:00	Explosives RDX Degradation Products	Modified SW-846-8330	1	Glass	1L Amber	4 ° C		112GN6878-8292005-3
✓	8/27/05	12:00	Nitrate + Nitrite (as N)	EPA 353.2	1	Plastic	1L HDPE	4 ° C / H2SO4		112GN6878-8292005-3
✗			Total Organic Carbon	SW-846 9060	2	Glass	40ml vials	4 ° C / H3PO4		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**	Clear	**Temp (C)**	21.75
Time	11:21	**pH (S.U.)**	7.40	**ORP (mV)**	246
Depth (ft.)	Surface	**S.C. (mS/cm)**	0.224	**Salinity (%)**	NA
Method	Direct Bottle	**DO (mg/L)**	7.15		
MS/MSD Collected	Y	**Turbidity (NTUs)**	0.0		
Duplicate Collected	Y				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	8/27/05	11:21	Explosives Nitroaromatics and Nitramines	SW-846-8330	6	Glass	1L Amber	4 ° C	DO MS/MSD	112GN6878-8292005-3
✓	8/27/05	11:21	Explosives RDX Degradation Products	Modified SW-846-8330	3	Glass	1L Amber	4 ° C	DO MS/MSD	112GN6878-8292005-3
✓	8/27/05	11:21	Nitrate + Nitrite (as N)	EPA 353.2	3	Plastic	1L HDPE	4 ° C / H2SO4	Very large pool (under road) 2' X 27' X ~200' (0 flow)	112GN6878-8292005-3
✗			Total Organic Carbon	SW-846 9060	2	Glass	40ml vials	4 ° C / H3PO4		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**	Clear	**Temp (C)**	22.74
Time	10:38	**pH (S.U.)**	7.47	**ORP (mV)**	242
Depth (ft.)	Surface	**S.C. (mS/cm)**	0.221	**Salinity (%)**	NA
Method	Direct Bottle	**DO (mg/L)**	7.27		
MS/MSD Collected	N	**Turbidity (NTUs)**	14		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	8/27/05	10:38	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4 ° C		112GN6878-8292005-3
✓	8/27/05	10:38	Explosives RDX Degradation Products	Modified SW-846-8330	1	Glass	1L Amber	4 ° C	0.05' x 15'	112GN6878-8292005-3
✓	8/27/05	10:38	Nitrate + Nitrite (as N)	EPA 353.2	1	Plastic	1L HDPE	4 ° C / H2SO4		112GN6878-8292005-3
✗			Total Organic Carbon	SW-846 9060	2	Glass	40ml vials	4 ° C / H3PO4		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**	DRY	**Temp (C)**	DRY
Time	14:08	**pH (S.U.)**	DRY	**ORP (mV)**	
Depth (ft.)	Dry	**S.C. (mS/cm)**	DRY	**Salinity (%)**	DRY
Method	1	**DO (mg/L)**	DRY		
MS/MSD Collected	N	**Turbidity (NTUs)**	DRY		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
X			Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4 ° C		
X			Explosives RDX Degradation Products	Modified SW-846-8330	1	Glass	1L Amber	4 ° C		
X			Nitrate + Nitrite (as N)	EPA 353.2	1	Plastic	1L HDPE	4 ° C / H2SO4		
X			Total Organic Carbon	SW-846 9060	2	Glass	40ml vials	4 ° C / H3PO4		

General Observations and Notes

Location Dry - no sample collected.

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**	Clear	**Temp (C)**	20.56
Time	13:36	**pH (S.U.)**	7.46	**ORP (mV)**	116
Depth (ft.)	Surface	**S.C. (mS/cm)**	0.456	**Salinity (%)**	NA
Method	Direct Bottle	**DO (mg/L)**	2.75		
MS/MSD Collected	N	**Turbidity (NTUs)**	8.7		
Duplicate Collected	N				
Duplicate ID					

Laboratory Analysis Records

Collected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	8/27/05	13:36	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4 ° C		112GN6878-8292005-3
✓	8/27/05	13:36	Explosives RDX Degradation Products	Modified SW-846-8330	1	Glass	1L Amber	4 ° C		112GN6878-8292005-3
✓	8/27/05	13:36	Nitrate + Nitrite (as N)	EPA 353.2	1	Plastic	1L HDPE	4 ° C / H2SO4	Pool 3' x 4' x .1' No Flow	112GN6878-8292005-3
✗			Total Organic Carbon	SW-846 9060	2	Glass	40ml vials	4 ° C / H3PO4		

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLING LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/27/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Sample Collection Records

Date	8/27/05	**Color**		**Temp (C)**	
Time	00:00	**pH (S.U.)**		**ORP (mV)**	
Depth (ft.)	Surface	**S.C. (mS/cm)**		**Salinity (%)**	
Method	Direct Bottle	**DO (mg/L)**			
MS/MSD Collected		**Turbidity (NTUs)**			
Duplicate Collected	Y				
Duplicate ID					

Laboratory Analysis Records

Selected	Date	Time	Analysis / Method	Description of Analysis	Count	Type	Requirements	Preservative	Comments	Chain of Custody #
✓	8/27/05	00:00	Explosives RDX Degradation Products	Modified SW-846-8330	1	Glass	1L Amber	4 ° C	DUP	112GN6878-8292005-3
✓	8/27/05	00:00	Nitrate + Nitrite (as N)	EPA 353.2	1	Plastic	1L HDPE	4 ° C / H2SO4	DUP	112GN6878-8292005-3
✓	8/27/05	00:00	Explosives Nitroaromatics and Nitramines	SW-846-8330	2	Glass	1L Amber	4 ° C	DUP	112GN6878-8292005-3

General Observations and Notes

No Notes

- End of Report -

APPENDIX A.2

SWMU 12

ROUND 4

CHAIN OF CUSTODY RECORDS

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/24/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112GN6878-8242005-1	**Carrier**	Fedex	**Printed By**	David Hickey
		Carrier/Waybill No.	8447 8135 6564	**Printed Date**	5/1/06

Chain of Custody Information

Chain of Custody #	**112GN6878-8242005-1**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Fedex	**Address**	940 South Harney Street	**Date**	8/24/05
Carrier/Waybill No.	8447 8135 6564	**City, State, Zip**	Seattle, WA 98108	**Time**	18:00
		Lab Contact	Hugh Prentice	**Received By:**	Fedex
		Lab Telephone	206-767-5060 x1028	**Date**	8/24/05
				Time	18:00

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/23/05	12GWT1104	15:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT11	GW	4 ° C	2	Glass	1L Amber	
8/23/05	12GWT1104	15:05	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT11	GW	4 ° C	1	Glass	1L Amber	
8/23/05	12GWT1104	15:05	EPA 353.2	Nitrate + Nitrite (as N)	12MWT11	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/23/05	12GWT1104	15:05	SW-846 9060	Total Organic Carbon	12MWT11	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/23/05	12GWT1204	16:45	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT12	GW	4 ° C	2	Glass	1L Amber	
8/23/05	12GWT1204	16:45	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT12	GW	4 ° C	1	Glass	1L Amber	
8/23/05	12GWT1204	16:45	EPA 353.2	Nitrate + Nitrite (as N)	12MWT12	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/23/05	12GWT1204	16:45	SW-846 9060	Total Organic Carbon	12MWT12	GW	4 ° C / H3PO4	2	Glass	40ml vials	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/24/05	12GWT1604	11:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT16	GW	4 ° C	2	Glass	1L Amber	
8/24/05	12GWT1604	11:00	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT16	GW	4 ° C	1	Glass	1L Amber	
8/24/05	12GWT1604	11:00	EPA 353.2	Nitrate + Nitrite (as N)	12MWT16	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/24/05	12GWT1604	11:00	SW-846 9060	Total Organic Carbon	12MWT16	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/24/05	12GWT1704	11:45	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT17	GW	4 ° C	1	Glass	1L Amber	Min. vol.
8/24/05	12GWT1704	11:45	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT17	GW	4 ° C	1	Glass	1L Amber	
8/24/05	12GWT1704	11:45	EPA 353.2	Nitrate + Nitrite (as N)	12MWT17	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/24/05	12GWT1704	11:45	SW-846 9060	Total Organic Carbon	12MWT17	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/24/05	12GWT3604	10:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT36	GW	4 ° C	2	Glass	1L Amber	
8/24/05	12GWT3604	10:50	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT36	GW	4 ° C	1	Glass	1L Amber	
8/24/05	12GWT3604	10:50	EPA 353.2	Nitrate + Nitrite (as N)	12MWT36	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/24/05	12GWT3604	10:50	SW-846 9060	Total Organic Carbon	12MWT36	GW	4 ° C / H3PO4	2	Glass	40ml vials	

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/26/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112GN6878-8262005-2	**Carrier**	Federal Express	**Printed By**	David Hickey
		Carrier/Waybill No.	8447 8135 6553	**Printed Date**	5/1/06

Chain of Custody Information

Chain of Custody #	**112GN6878-8262005-2**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Federal Express	**Address**	940 South Harney Street	**Date**	8/26/05
Carrier/Waybill No.	8447 8135 6553	**City, State, Zip**	Seattle, WA 98108	**Time**	
		Lab Contact	Hugh Prentice	**Received By:**	Federal Express
		Lab Telephone	206-767-5060 x1028	**Date**	8/26/05
				Time	

Sample Records

[illegible]	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/24/05	12GWT3104	17:20	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT31	GW	4 ° C	2	Glass	1L Amber	
8/24/05	12GWT3104	17:20	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT31	GW	4 ° C	1	Glass	1L Amber	
8/24/05	12GWT3104	17:20	EPA 353.2	Nitrate + Nitrite (as N)	12MWT31	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/24/05	12GWT3104	17:20	SW-846 9060	Total Organic Carbon	12MWT31	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/25/05	12GWT1804	08:20	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT18	GW	4 ° C	2	Glass	1L Amber	WL prior to sampling on 8/25/05 = 21.92
8/25/05	12GWT1804	08:20	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT18	GW	4 ° C	1	Glass	1L Amber	
8/25/05	12GWT1804	08:20	EPA 353.2	Nitrate + Nitrite (as N)	12MWT18	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
[illegible]/05	12GWT1804	08:20	SW-846 9060	Total Organic Carbon	12MWT18	GW	4 ° C / H3PO4	2	Glass	40ml vials	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/25/05	12GWT2204	18:25	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT22	GW	4 ° C	2	Glass	1L Amber	
8/25/05	12GWT2204	18:25	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT22	GW	4 ° C	1	Glass	1L Amber	
8/25/05	12GWT2204	18:25	EPA 353.2	Nitrate + Nitrite (as N)	12MWT22	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/25/05	12GWT2204	18:25	SW-846 9060	Total Organic Carbon	12MWT22	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/25/05	12GWT3204	12:55	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT32	GW	4 ° C	2	Glass	1L Amber	
8/25/05	12GWT3204	12:55	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT32	GW	4 ° C	1	Glass	1L Amber	
8/25/05	12GWT3204	12:55	EPA 353.2	Nitrate + Nitrite (as N)	12MWT32	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/25/05	12GWT3204	12:55	SW-846 9060	Total Organic Carbon	12MWT32	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/25/05	12GWT4104	13:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT41	GW	4 ° C	2	Glass	1L Amber	
8/25/05	12GWT4104	13:50	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT41	GW	4 ° C	1	Glass	1L Amber	
8/25/05	12GWT4104	13:50	EPA 353.2	Nitrate + Nitrite (as N)	12MWT41	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/25/05	12GWT4104	13:50	SW-846 9060	Total Organic Carbon	12MWT41	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/25/05	12GWT4204	18:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT42	GW	4 ° C	2	Glass	1L Amber	
8/25/05	12GWT4204	18:50	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT42	GW	4 ° C	1	Glass	1L Amber	
8/25/05	12GWT4204	18:50	EPA 353.2	Nitrate + Nitrite (as N)	12MWT42	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/25/05	12GWT4204	18:50	SW-846 9060	Total Organic Carbon	12MWT42	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/26/05	12FD08260501	00:00	Modified SW-846-8330	Explosives RDX Degradation Products	NA	GW	4 ° C	1	Glass	1L Amber	
8/26/05	12FD08260501	00:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	NA	GW	4 ° C	2	Glass	1L Amber	
8/26/05	12FD08260501	00:00	SW-846 9060	Total Organic Carbon	NA	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/26/05	12FD08260501	00:00	EPA 353.2	Nitrate + Nitrite (as N)	NA	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/26/05	12GWT0604	10:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT06	GW	4 ° C	2	Glass	1L Amber	
8/26/05	12GWT0604	10:10	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT06	GW	4 ° C	1	Glass	1L Amber	
8/26/05	12GWT0604	10:10	EPA 353.2	Nitrate + Nitrite (as N)	12MWT06	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/26/05	12GWT0604	10:10	SW-846 9060	Total Organic Carbon	12MWT06	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/26/05	12GWT0904	11:55	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT09	GW	4 ° C	2	Glass	1L Amber	
8/26/05	12GWT0904	11:55	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT09	GW	4 ° C	1	Glass	1L Amber	
8/26/05	12GWT0904	11:55	EPA 353.2	Nitrate + Nitrite (as N)	12MWT09	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/26/05	12GWT0904	11:55	SW-846 9060	Total Organic Carbon	12MWT09	GW	4 ° C / H3PO4	2	Glass	40ml vials	

General Observations and Notes

No Notes

- End of Report -

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/29/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID	112GN6878-8292005-3	**Carrier**	Federal Express	**Printed By**	David Hickey
		Carrier/Waybill No.	8447 8135 6542	**Printed Date**	5/1/06

Chain of Custody Information

Chain of Custody #	**112GN6878-8292005-3**	**Lab Name**	Laucks Testing Laboratories	**Relenquished By**	Terry Rojahn
Carrier	Federal Express	**Address**	940 South Harney Street	**Date**	8/29/05
Carrier/Waybill No.	8447 8135 6542	**City, State, Zip**	Seattle, WA 98108	**Time**	
		Lab Contact	Hugh Prentice	**Received By:**	Federal Express
		Lab Telephone	206-767-5060 x1028	**Date**	8/29/05
				Time	

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/26/05	12GWT1004	17:10	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT10	GW	4 ° C	2	Glass	1L Amber	
8/26/05	12GWT1004	17:10	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT10	GW	4 ° C	1	Glass	1L Amber	
8/26/05	12GWT1004	17:10	EPA 353.2	Nitrate + Nitrite (as N)	12MWT10	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/26/05	12GWT1004	17:10	SW-846 9060	Total Organic Carbon	12MWT10	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/27/05	12FD08270501	00:00	Modified SW-846-8330	Explosives RDX Degradation Products	QC	SW	4 ° C	1	Glass	1L Amber	DUP
8/27/05	12FD08270501	00:00	EPA 353.2	Nitrate + Nitrite (as N)	QC	SW	4 ° C / H2SO4	1	Plastic	1L HDPE	DUP
8/27/05	12FD08270501	00:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	QC	SW	4 ° C	2	Glass	1L Amber	DUP
8/27/05	12GWT2304	08:50	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT23	GW	4 ° C	2	Glass	1L Amber	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/27/05	12GWT2304	08:50	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT23	GW	4 ° C	1	Glass	1L Amber	WL=28.82
8/27/05	12GWT2304	08:50	EPA 353.2	Nitrate + Nitrite (as N)	12MWT23	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/27/05	12GWT2304	08:50	SW-846 9060	Total Organic Carbon	12MWT23	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/27/05	12SW0904	13:19	SW-846-8330	Explosives Nitroaromatics and Nitramines	12SW/SD09	SW	4 ° C	2	Glass	1L Amber	
8/27/05	12SW0904	13:19	Modified SW-846-8330	Explosives RDX Degradation Products	12SW/SD09	SW	4 ° C	1	Glass	1L Amber	Pool 2' X 12' X .1' No Flow
8/27/05	12SW0904	13:19	EPA 353.2	Nitrate + Nitrite (as N)	12SW/SD09	SW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/27/05	12SW1104	10:40	SW-846-8330	Explosives Nitroaromatics and Nitramines	12SW/SD11	SW	4 ° C	2	Glass	1L Amber	
8/27/05	12SW1104	10:40	Modified SW-846-8330	Explosives RDX Degradation Products	12SW/SD11	SW	4 ° C	1	Glass	1L Amber	
8/27/05	12SW1104	10:40	EPA 353.2	Nitrate + Nitrite (as N)	12SW/SD11	SW	4 ° C / H2SO4	1	Plastic	1L HDPE	POOL 3' X 9' X 0.75' No Flow
8/27/05	12SW2404	12:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	12SW/SD24	SW	4 ° C	2	Glass	1L Amber	Pool 9' X 12' X 0.8'(Zero Flow)
8/27/05	12SW2404	12:00	Modified SW-846-8330	Explosives RDX Degradation Products	12SW/SD24	SW	4 ° C	1	Glass	1L Amber	
8/27/05	12SW2404	12:00	EPA 353.2	Nitrate + Nitrite (as N)	12SW/SD24	SW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/27/05	12SW2504	11:21	SW-846-8330	Explosives Nitroaromatics and Nitramines	12SW/SD25	SW	4 ° C	6	Glass	1L Amber	DO MS/MSD
8/27/05	12SW2504	11:21	Modified SW-846-8330	Explosives RDX Degradation Products	12SW/SD25	SW	4 ° C	3	Glass	1L Amber	DO MS/MSD
8/27/05	12SW2504	11:21	EPA 353.2	Nitrate + Nitrite (as N)	12SW/SD25	SW	4 ° C / H2SO4	3	Plastic	1L HDPE	Very large pool (under road) 2' X 27' X ~200' (0 flow)
8/[illegible]05	12SW2704	10:38	SW-846-8330	Explosives Nitroaromatics and Nitramines	12SW/SD27	SW	4 ° C	2	Glass	1L Amber	
8/27/05	12SW2704	10:38	Modified SW-846-8330	Explosives RDX Degradation Products	12SW/SD27	SW	4 ° C	1	Glass	1L Amber	0.05' x 15'

8/27/05	12SW2704	10:38	EPA 353.2	Nitrate + Nitrite (as N)	12SW/SD27	SW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/27/05	12SW3403	13:36	SW-846-8330	Explosives Nitroaromatics and Nitramines	12SW/SD34	SW	4 ° C	2	Glass	1L Amber	
8/27/05	12SW3403	13:36	Modified SW-846-8330	Explosives RDX Degradation Products	12SW/SD34	SW	4 ° C	1	Glass	1L Amber	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/27/05	12SW3403	13:36	EPA 353.2	Nitrate + Nitrite (as N)	12SW/SD34	SW	4 ° C / H2SO4	1	Plastic	1L HDPE	Pool 3' x 4' x .1' No Flow
8/28/05	12GWT2004	14:35	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT20	GW	4 ° C	2	Glass	1L Amber	
8/28/05	12GWT2004	14:35	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT20	GW	4 ° C	1	Glass	1L Amber	
8/28/05	12GWT2004	14:35	EPA 353.2	Nitrate + Nitrite (as N)	12MWT20	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/28/05	12GWT2004	14:35	SW-846 9060	Total Organic Carbon	12MWT20	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/28/05	12GWT2804	17:35	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT28	GW	4 ° C	2	Glass	1L Amber	
8/28/05	12GWT2804	17:35	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT28	GW	4 ° C	1	Glass	1L Amber	
8/28/05	12GWT2804	17:35	EPA 353.2	Nitrate + Nitrite (as N)	12MWT28	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/28/05	12GWT2804	17:35	SW-846 9060	Total Organic Carbon	12MWT28	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/28/05	12GWT3804	12:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT38	GW	4 ° C	2	Glass	1L Amber	
8/28/05	12GWT3804	12:00	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT38	GW	4 ° C	1	Glass	1L Amber	
8/28/05	12GWT3804	12:00	EPA 353.2	Nitrate + Nitrite (as N)	12MWT38	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	
8/28/05	12GWT3804	12:00	SW-846 9060	Total Organic Carbon	12MWT38	GW	4 ° C / H3PO4	2	Glass	40ml vials	
8/28/05	12GWT4704	10:05	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT47	GW	4 ° C	6	Glass	1L Amber	DO MS/MSD
8/28/05	12GWT4704	10:05	Modified SW-846-8330	Explosives RDX Degradation Products	12MWT47	GW	4 ° C	3	Glass	1L Amber	DO MS/MSD
8/28/05	12GWT4704	10:05	EPA 353.2	Nitrate + Nitrite (as N)	12MWT47	GW	4 ° C / H2SO4	3	Plastic	1L HDPE	DO MS/MSD
[illegible]/05	12GWT4704	10:05	SW-846 9060	Total Organic Carbon	12MWT47	GW	4 ° C / H3PO4	6	Glass	40ml vials	DO MS/MSD
8/29/05	12GWT0304	13:00	SW-846-8330	Explosives Nitroaromatics and Nitramines	12MWT03	GW	4 ° C	2	Glass	1L Amber	
			Modified	Explosives RDX						1L	

8/29/05	12GWT0304	13:00	SW-846-8330	Degradation Products	12MWT03	GW	4 ° C	1	Glass	Amber	
8/29/05	12GWT0304	13:00	EPA 353.2	Nitrate + Nitrite (as N)	12MWT03	GW	4 ° C / H2SO4	1	Plastic	1L HDPE	

Tetra Tech NUS, Inc.

CHAIN OF CUSTODY LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Sample Records

Date	Sample ID#	Time	Analysis	Description	Loc ID	Matrix	Preservative	No.	Type	Requirements	Comments
8/29/05	12GWT0304	13:00	SW-846 9060	Total Organic Carbon	12MWT03	GW	4 ° C / H3PO4	2	Glass	40ml vials	

General Observations and Notes

No Notes

- End of Report -

APPENDIX A.3

SWMU 12

ROUND 4

WATER LEVEL MEASUREMENTS

Tetra Tech NUS, Inc.

SURFACE WATER MEASUREMENT LOG

MU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Project Manager (PM)**	Ralph Basinski	**Created By**	John Wright
TtNUS Project #	112GN6878	**PM Telephone**	412-921-8308	**Created Date**	8/16/05
Task/Contract #	CTO 0357	**Field Op Leader (FOL)**	Terry Rojahn	**Modified By**	
WBS Code #	NA	**FOL Phone**	412-921-8857	**Modified Date**	
Chain of Custody ID		**Carrier**		**Printed By**	David Hickey
		Carrier/Waybill No.		**Printed Date**	5/1/06

Surface Water Measurements

Location ID	Date	Time	Flow Rate (est.)	Type	Measurement	Flow Width	Flow Depth	Flow Velocity
12SG01	8/10/05	13:49	Dry	Dry				
12SG02	8/10/05	14:07	Dry	Dry				
12SG03	8/10/05	14:10	Dry	Dry				
12SG04	8/10/05	14:23	Dry	Dry				
12SG05	8/10/05	14:40	Dry	Dry				
12SG06	8/10/05	14:59	Dry	Dry				
12SG07	8/10/05	15:22	Dry	Dry	Dry			
12SG08	8/10/05	13:01	Dry	Dry				

Tetra Tech NUS, Inc.

SURFACE WATER MEASUREMENT LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Surface Water Measurements

Location ID	Date	Time	Flow Rate (est.)	Type	Measurement	Flow Width	Flow Depth	Flow Velocity
12SG09	8/10/05	13:25	<5 GPM	Estimated	17.55	NA	NA	NA
12SG10	8/10/05	13:10	0.0 GPM	Stagnant	15.05	21	1.85	No flow
12SG11	8/10/05	13:18	<10 GPM	Estimated	20.05	1.3	0.25	1
12SG12	8/10/05	13:30	Dry	Dry				

General Observations and Notes

No Notes

- End of Report -

APPENDIX A.4

SWMU 12

ROUND 4

EQUIPMENT CALIBRATION FORMS

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	YSI 600	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Manufacturer**	YSI	**Created Date**	8/17/05
Task/Contract #	CTO 0357	**Serial Number**	99K1014 AB	**Modified By**	
WBS Code #	NA			**Modified Date**	
Client				**Printed By**	David Hickey
				Printed Date	5/1/06

Calibration Records

Date	Calibrator	pH - 7 SU	pH - 4 SU	Conductivity	ORP	DO	Comments
8/22/05	James Goerdt	Pre: 7.00 Post: 7.00 Std: 4319 Exp: 12/18/05	Pre: 3.98 Post: 4.00 Std: 4439 Exp: 2/23/06	Pre: 1053 Post: 1000 Std: 4885 Exp: 4/16/06	Pre: 232.3 Post: 237.5 Std: 03L1234 Exp: 12/05 ORP: 24.89	Pre: 8.49 Post: 8.11 Std: Exp:	Beginning of shift for SWMU 12.
8/24/05	James Goerdt	Pre: 7.10 Post: 7.00 Std: 4319 Exp: 12/18/05	Pre: 3.95 Post: 4.00 Std: 4439 Exp: 2/23/04	Pre: 1149 Post: 999 Std: 4885 Exp: 4/16/06	Pre: 244.0 Post: 237.5 Std: 03L1234 Exp: 12/05 ORP: 20.15	Pre: 8.94 Post: 8.83 Std: Exp:	
8/25/05	James Goerdt	Pre: 7.04 Post: 7.00 Std: 4319 Exp: 12/18/05	Pre: 4.04 Post: 4.00 Std: 4439 Exp: 2/23/06	Pre: 981 Post: 1000 Std: 4885 Exp: 4/16/06	Pre: 236.4 Post: 237.5 Std: 03L1234 Exp: 12/05 ORP: 20.92	Pre: 8.89 Post: 8.67 Std: Exp:	
8/26/05	James Goerdt	Pre: 6.94 Post: 7.00 Std: 4319 Exp: 12/18/05	Pre: 3.99 Post: 4.00 Std: 4439 Exp: 2/23/06	Pre: 1002 Post: 1000 Std: 4885 Exp: 4/16/06	Pre: 393.8 Post: 237.7 Std: 03L1234 Exp: 12/05 ORP: 23.36	Pre: 7.33 Post: 8.23 Std: Exp:	
8/27/05	James Goerdt	Pre: 7.00 Post: 7.00 Std: 4319 Exp: 12/18/05	Pre: 4.03 Post: 4.00 Std: 4439 Exp: 2/23/06	Pre: 1021 Post: 999 Std: 4885 Exp: 4/16/06	Pre: 233.2 Post: 237.6 Std: 03L1234 Exp: 12/05 ORP: 23.28	Pre: 8.08 Post: 8.34 Std: Exp:	
8/28/05	James Goerdt	Pre: 7.00 Post: 7.00 Std: 4319 Exp: 12/18/05	Pre: 3.98 Post: 4.00 Std: 4439 Exp: 2/23/06	Pre: 977 Post: 999 Std: 4885 Exp: 4/16/06	Pre: 204.2 Post: 237.8 Std: 03L1234 Exp: 12/05 ORP: 22.15	Pre: 8.65 Post: 8.45 Std: Exp:	
8/29/05	James Goerdt	Pre: 6.98 Post: 7.00 Std: 4319 Exp: 12/18/05	Pre: 4.03 Post: 4.00 Std: 4439 Exp: 2/23/06	Pre: 1018 Post: 1000 Std: 4885 Exp: 4/16/06	Pre: 177.9 Post: 237.2 Std: 03L1234 Exp: 12/05 ORP: 22.82	Pre: 9.49 Post: 8.39 Std: Exp:	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	YSI 600	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Manufacturer**	YSI	**Created Date**	8/22/05
Task/Contract #	CTO 0357	**Serial Number**	98F0478 AB	**Modified By**	
WBS Code #	NA			**Modified Date**	
Client				**Printed By**	David Hickey
				Printed Date	5/1/06

Calibration Records

Date	Calibrator	pH - 7 SU	pH - 4 SU	Conductivity	ORP	DO	Comments
8/22/05	James Goerdt	Pre: 7.63 Post: 7.00 Std: 4319 Exp: 12/18/05	Pre: 3.38 Post: 4.00 Std: 4439 Exp: 2/23/06	Pre: 1003 Post: 1000 Std: 4885 Exp: 4/16/05	Pre: 228.3 Post: 237.5 Std: 03L1234 Exp: 12/05 ORP: 22.60	Pre: 8.32 Post: 8.02 Std: Exp:	Beginning of new shift at SWMU 12.
8/24/05	James Goerdt	Pre: 1123 Post: 1000 Std: 4885 Exp: 4/16/06	Pre: 244.2 Post: 237.5 Std: 03L1234 Exp: 12/05 ORP: 20.41	Pre: 8.49 Post: 8.81 Std: Exp:			pH bulb on meter is broken. DO mem[illegible]e replaced.
8/25/05	James Goerdt	Pre: 1040 Post: 1000 Std: 4885 Exp: 4/16/06	Pre: 234.4 Post: 237.5 Std: 03L1234 Exp: 12/05 ORP: 21.12	Pre: 8.54 Post: 8.69 Std: Exp:			pH bulb is broken on meter.
8/26/05	James Goerdt	Pre: 968 Post: 1000 Std: 4885 Exp: 4/16/16	Pre: 234.1 Post: 237.5 Std: 03L1234 Exp: 12/05 ORP: 23.43	Pre: 8.34 Post: 8.23 Std: Exp:			
8/28/05	James Goerdt	Pre: 1068 Post: 1000 Std: 4885 Exp: 4/16/06	Pre: 239.1 Post: 237.5 Std: 03L1234 Exp: 12/05 ORP: 22.78	Pre: 8.53 Post: 8.40 Std: Exp:			
8/29/05	James Goerdt	Pre: 982 Post: 1000 Std: 4885 Exp: 4/16/06	Pre: 235.4 Post: 237.5 Std: 03l1234 Exp: 12/05 ORP: 23.20	Pre: 8.43 Post: 8.28 Std: Exp:			pH bulb broken on meter.,

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	Turbidity Meter	**Created By**	James Goerdt
TtNUS Project #	112GN6878	**Manufacturer**	LaMotte 2020	**Created Date**	8/23/05
Task/Contract #	CTO 0357	**Serial Number**	3655-3802	**Modified By**	
WBS Code #	NA			**Modified Date**	
Client				**Printed By**	David Hickey
				Printed Date	5/1/06

Calibration Records

Date	Calibrator	Turbidity - 0 NTU	Turbidity - 10 NTU	Comments
8/23/05	James Goerdt	Pre: 0.0 Post: 0.0 Std: NA Exp: NA	Pre: 9.7 Post: 10.0 Std: NA Exp: NA	
8/24/05	James Goerdt	Pre: 0 Post: 0 Std: Exp:	Pre: 10 Post: 10 Std: Exp:	
8/25/05	James Goerdt	Pre: 0.0 Post: 0.0 Std: NA Exp: NA	Pre: 10.0 Post: 10.0 Std: NA Exp: NA	
8/26/05	James Goerdt	Pre: 0.0 Post: 0.0 Std: Exp:	Pre: 9.8 Post: 10.0 Std: Exp:	
8/27/05	James Goerdt	Pre: 0.0 Post: 0.0 Std: Exp:	Pre: 9.5 Post: 10.0 Std: Exp:	
8/28/05	James Goerdt	Pre: 0.0 Post: 0.0 Std: Exp:	Pre: 10.0 Post: 10.0 Std: Exp:	
8/29/05	James Goerdt	Pre: 0.0 Post: 0.0 Std: Exp:	Pre: 9.8 Post: 10.0 Std: Exp:	

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

SWMU 12 Routine Sampling - August 2005 Round 4 - CRANE NSWC

Project Information

Facility Name	CRANE NSWC	**Instrument**	Turbidity Meter	**Created By**	Terry Rojahn
TtNUS Project #	112GN6878	**Manufacturer**	LaMotte 2020	**Created Date**	8/23/05
Task/Contract #	CTO 0357	**Serial Number**	4557-3303	**Modified By**	
WBS Code #	NA			**Modified Date**	
Client				**Printed By**	David Hickey
				Printed Date	5/1/06

Calibration Records

Date	Calibrator	Turbidity - 0 NTU	Turbidity - 10 NTU	Comments
8/23/05	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 9.94 Post: 10.0 Std: NA Exp: NA	
8/24/05	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 10.02 Post: 10.00 Std: NA Exp: NA	
8/25/05	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 10.07 Post: 10.00 Std: NA Exp: NA	
8/26/05	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 10.20 Post: 10.00 Std: NA Exp: NA	
8/27/05	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 10.18 Post: 10.00 Std: NA Exp: NA	
8/28/05	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 10.10 Post: 10.00 Std: NA Exp: NA	
8/29/05	Terry Rojahn	Pre: 0.00 Post: 0.00 Std: NA Exp: NA	Pre: 9.85 Post: 10.00 Std: NA Exp: NA	

APPENDIX B

SMWU 12

ROUND 4

MISCELLANEOUS FIELD DOCUMENTATION

APPENDIX B.1

SWMU 12

ROUND 4

SITE LOGBOOK ROUND 4

Daily Activity
Entered by Terry Rojahn on 08/22/2005

Date	08/22/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	NA
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Mostly sunny & 80s
TtNUS Personnel	T. Rojahn J. Goerdt
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
12:15:00	Terry Rojahn	Obtain new gate pass
12:20:00	Terry Rojahn	Arrive at B-3245:,Check in w/ Mr Tom Brent.,Sync Toughbook.,Check for Nitrate + Nitrite bottle shipment - hasn't come!
13:09:00	Terry Rojahn	Called E. Sedlmyer regarding nitrate bottle shipment - he is going to check with Laucks.
14:37:00	Terry Rojahn	E. Sedlmyer said that there should have been two shipments of nitrate bottles -one from the lab (500ml HDPE bottles in 3 coolers) and five cases from the labs vender (1L HDPE bottles). Went through all coolers in garage - no nitrate bottles found,rolled up all bubble wrap found in coolers. Unloaded 20 cases of 1L ambers in 7 large cardboard boxes (cut up and disposed of the cardboard boxes).
14:48:00	Terry Rojahn	J. Goerdt arrived at B-3245.
15:06:00	Terry Rojahn	JG & TR check pressure in nitrogen gas cylinders - 5 of 10 cylinders were empty - will order 3 full cylinders to complete the groundwater sampling at SWMUs 13 & 12.
15:16:00	Terry Rojahn	Ordered 3 nitrogen cylinders from IN Oxygen - they will pick up 5 empty cylinders on Tuesday (8/23) and drop off the 3 full cylinders.
15:46:00	Terry Rojahn	Checked in w/J. Wright and resync toughbook to pick up the 8 new surface water and 21 new groundwater logs that JW entered into the system.
15:53:00	Terry Rojahn	JG completed calibration of both YSIs.
16:06:00	Terry Rojahn	Prep to leave B-3245 for hardware

		store.
17:05:00	Terry Rojahn	Purchased strapping tape at Menards.

Daily Activity
Entered by Terry Rojahn on 08/23/2005

Date	08/23/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	NA
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Mostly sunny, Temp 80s
TtNUS Personnel	J. Goerdt T. Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
07:10:00	Terry Rojahn	Arrive at B-3245:,Prep to install bladder pumps at SWMU 12,JG and TR connected the air line and water discharge line to the 2" caps to complete the assembly of the 20 QED bladder pumps for installation at SWMU 12.
09:15:00	Terry Rojahn	Arrive at SWMU 12: ,Checked in with Mr Mike Roach - OK to install bladder pumps and sample groundwater (not much going on). Proceeded to install bladder pumps.
11:00:00	Terry Rojahn	Finish installation of bladder pumps at SWMU 12.
11:15:00	Terry Rojahn	Arrive at B-3245:,Talked to J. Wright about getting TOC info on Ground Water Logs.,Check in w/ Ed Sedlmyer - gave TR info on 3 sample container shipments from Laucks.,Tracked down the 5 missing cases of 1L HDPE bottles w/H2SO4.,Prep SUVs for groundwater sampling.,Received TOC containers just before leaving B-3245 for lunch.
12:00:00	Terry Rojahn	Break for lunch.
12:35:00	Terry Rojahn	Arrive at SWMU 12:,TR purged only monitoring wells 12MWT16 & 17 (both wells went dry).,JG worked on monitoring wells 12MWT11 & 12.
16:15:00	Terry Rojahn	TR finished purging monitoring wells 12MWT16 & 17.,TR checked in with JG prior to leaving SWMU 12. JG was purging 12MWT12.
16:35:00	Terry Rojahn	Arrived at B-3245:,Dropped off meters and equipment inside B-3245.,Noticed receipt of 2 of the 3 coolers shipped w/500ml HDPE bottles preserved w/H2SO4 - cooler 2 of 3 was missing. Indiana Oxygen dropped off 5 full nitrogen cylinders and picked up the 5 empty

		cylinders.
17:30:00	Terry Rojahn	JG arrived at B-3245 - secured samples from 12MWT11 & 12 in frig.
17:40:00	Terry Rojahn	Leave B-3245 for Bloomington.,SAMPLING SUMMARY THIS DATE:,Installed 18 of 20 bladder pumps. Purged and sampled 12MWT11 & 12 and purged only monitoring wells 12MWT16 & 17 (will sample tomorrow).

Daily Activity
Entered by Terry Rojahn on 08/24/2005

Date	08/24/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Mostly sunny, Temp 80s
TtNUS Personnel	J. Goerdt T. Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
06:50:00	Terry Rojahn	Arrive at B-3245:,Mr Brent printed out SWMU 8 dig permit figures.,Checked in with Mr Roach - for the remainder of week at SWMU 12 access is cleared.,Synic toughbook.,Select wells to be purged and/or sampled this date.,Prep to sample ground water at SWMU 12.
08:40:00	Terry Rojahn	Arrive at SWMU 12:,TR purged monitoring well 12MWT18 and sampled monitoring wells 12MWT16 & 17.,JG to purge and sample 12MWT31 & 36.
14:02:00	Terry Rojahn	TR returned to B-3245:,Check in w/ R. Basinski and J. Wright.,Generated COC# 112GN6878-8242005-1 for shipment to Lauck Testing Laboratories on Fed EX AB# 8447 8135 6564.,Packaged samples on above COC.,Faxed Mr. Hugh Prentice of Laucks copy of the above COC.,Organize office and up date this log.
17:00:00	Terry Rojahn	Left B-3245 for Fed EX
17:35:00	Terry Rojahn	Drop off samples at Fed EX. ,SAMPLE SUMMARY THIS DATE: Purged and samples monitoring wells 12MWT31 & 36,sampled 12MWT16 & 17 (purged 8/23) and purged 12MWT18.

Daily Activity
Entered by Terry Rojahn on 08/25/2005

Date	08/25/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Mostly sunny and 80s
TtNUS Personnel	J. Goerdt T. Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
07:05:00	Terry Rojahn	Arrive at B-3245:,Select wells to sample this date: ,Assigned JG 12MWT41 & 42 to purge and sample and 12MWT18 (purged on 8/24) to sample.,TR will purge and sample 12MWT22 & 32.,Prep to sample groundwater.
08:30:00	Terry Rojahn	Arrive at SWMU 12:,TR purged and sampled monitoring wells 12MWT22 & 32 (see respective groundwater logs for additional detail).,JG purged and sampled monitoring wells 12MWT41 & 42 and sampled 12MWT18 (purged on 8/24).
19:40:00	Terry Rojahn	JG & TR leave SWMU 12 for B-3245.
19:45:00	Terry Rojahn	Arrive at B-3245:,Secure samples in frig and drop off meters and nitroben gas cylinders.
20:00:00	Terry Rojahn	Leave B-3245 for Bloomington.,SAMPLE SUMMARY: Completed the collection of ground water samples at monitoring wells 12MWT18,22,32,41 & 42.

Daily Activity
Entered by Terry Rojahn on 08/26/2005

Date	08/26/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Mostly cloudy, Temp 80s
TtNUS Personnel	J. Goerdt T. Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
07:00:00	Terry Rojahn	Arrive at B-3245:,Select wells for sampling - assigned JG monitoring wells 12MWT 06 & 10: TR to purge and/or sample monitoring wells 12MWT09,23 & 30.,Prep to sample groundwater.
08:20:00	Terry Rojahn	Arrive at SWMU 12:,Purge and sampled monitoring well 12MWT09,purged 12MWT23 (will sample tomorrow - 8/27),and checked monitoring well 12MWT30 (well dry - yielded <50ml)
14:45:00	Terry Rojahn	Return to B-3245:,Unload sampling equipment out of SUV to make room for sample shipment,Sync Toughbook: Generate COC# 112GN6878-8262005-2,Prep samples for shipment (3 coolers) via Fed. Ex. AB# 8447 8135 6557. Check in w/R. Basinski and J. Wright. Fax Mr. Hugh Prentice above COC.
17:00:00	Terry Rojahn	Left B-3245 for Fed. Ex.
17:30:00	Terry Rojahn	Drop off samples at Fed. Ex.,SAMPLE SUMMARY FOR THIS DATE: Sampled monitoring wells 12MWT06,09 and 10,also,purged 12MWT23 (will sample on 8/27) and checked 12MWT30 (dry well).

Daily Activity
Entered by Terry Rojahn on 08/27/2005

Date	08/27/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	NA
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Mostly Cloudy, humid & 80s
TtNUS Personnel	J. Goerdt T. Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
07:05:00	Terry Rojahn	Arrive at B-3245:,Talked to R. Clark regarding drilling and/or DPT location lay out at SWMUs 9 and 17. TR prep to sample surface water at SWMUs i6 and 12. JG prep to sample 12MWT23 (purged on 8/26).
09:00:00	Terry Rojahn	Surface water location 16SW/SD30 - DRY.
09:20:00	Terry Rojahn	Surface water location 16SW/SD13 - DRY.
09:25:00	Terry Rojahn	Surface water location 16SW/SD12 - DRY.
09:35:00	Terry Rojahn	Surface water location 16SW/SD10 - DRY.
09:50:00	Terry Rojahn	Return to B-3245:,Wait for JG to return from sampling monitoring well 12MWT23.,Complete surface water logs from SWMU 16.
10:07:00	Terry Rojahn	TR and JG leave B-3245 for SWMU 12.
10:38:00	Terry Rojahn	Sample surface water location 12SW/SD27.
10:40:00	Terry Rojahn	Sample surface water location 16SW/SD11.
11:21:00	Terry Rojahn	Sample surface water location 16SW/SD25.
12:00:00	Terry Rojahn	Sample surface water location 16SW/SD24.
12:30:00	Terry Rojahn	Lunch break to 12:50 at B-3245 - refrigerate samples collected in the AM.
13:19:00	Terry Rojahn	Sample surface water location 16SW/SD09.
13:30:00	Terry Rojahn	Surface water location 16SW/SD14 - DRY.

13:36:00	Terry Rojahn	Sample surface water location 16SW/SD34.
14:08:00	Terry Rojahn	Surface water location 16SW/SD31 - DRY.
14:35:00	Terry Rojahn	Return to B-3245: Processed all surface water samples collected this date.
16:00:00	Terry Rojahn	JG left B-3245 for SWMU 13 to sample monitoring well 13MWT09.,TR completed all surface water logs and up dated this form (daily log).,General office clean up.
17:50:00	Terry Rojahn	Arrive at SWMU 13 to check on JG. JG almost done sampling monitoring well 13MWT09.
18:00:00	Terry Rojahn	JG finished sampling at 13MWT09.
18:15:00	Terry Rojahn	Leave base for Bloomington. ,SAMPLE SUMMARY THIS DATE: Collected surface water samples at 12SW/SD09,11,24,25,27 and 34,Dry surface water locations included 12SW/SD14 and 31.

Daily Activity
Entered by Terry Rojahn on 08/28/2005

Date	08/28/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	NA
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Mostly sunny, humid & 80s
TtNUS Personnel	J. Goerdt T. Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
07:00:00	Terry Rojahn	Arrive at B-3245:,Prep and load pull cart in SUV to sample monitoring well 12MWT47 along the RR tracks (600 Hill). Load SUV with sample containers, meters and equipment - including a new dedicated bladder pump to be installed in monitoring well 12MWT47. Select wells to be sampled this date: Assigned and provided historic paper work and labels for JG to sample monitoring wells 12MWT28 and 38. TR to sample 12MWT20 and 47.
08:05:00	Terry Rojahn	Arrive at SWMU 12: proceed to monitoring well via 600 Hill RR tracks
08:25:00	Terry Rojahn	Arrive at monitoring well 12MWT47 - install new dedicated bladder pump and proceed to purge and sample well.
12:00:00	Terry Rojahn	Finish sampling @ monitoring well 12MWT47 (collected MS/MSD)- see ground water log.
12:30:00	Terry Rojahn	Mob sample and sampling equipment back to SUV via RR tracks utilizing pull cart.
12:45:00	Terry Rojahn	Return to B-3245: refrigerate sample from monitoring well 12MWT47 and take lunch break.
13:05:00	Terry Rojahn	Unload pull cart from SUV and prep to sample monitoring well 12MWT20.
13:25:00	Terry Rojahn	Arrive at SWMU 12 to purge and sample monitoring well 12MWT20 - see ground water log.
16:00:00	Terry Rojahn	Finish sampling monitoring well 12MWT20 and check on JG at monitoring well 12MWT28.

16:15:00	Terry Rojahn	Return to B-3245:,Process samples and up date daily log. Clean office and break down cardboard boxes for recycling.
18:00:00	Terry Rojahn	Leave B-3245 for Bloomington. SAMPLE SUMMARY THIS DATE: Purged and sampled monitoring wells 12MWT20,28,38 and 47.

Daily Activity
Entered by Terry Rojahn on 08/29/2005

Date	08/29/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	NA
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Mostly cloudy, humid & 80s
TtNUS Personnel	J. Goerdt T. Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
07:00:00	Terry Rojahn	Arrive at B-3245:,Assign wells for sampling: JG 12MWT03 and TR 13MWT31.,Prep to sample ground water.
08:15:00	Terry Rojahn	Arrive at SWMU 13 to purge and sample monitoring well 13MWT31
13:00:00	Terry Rojahn	Finish sampling and clean up at monitoring well 13MWT31.
13:15:00	Terry Rojahn	Pick up sub at Subway.
13:30:00	Terry Rojahn	Arrive at B-3245: Take brief lunch break. ,Unload SUV in prep to take sample coolers to Fed. Ex. ,Generate COC# 112G00041-8292005-4 for SWMU 13 samples and COC# 112GN6878-8292005-3 for SWMU 12 samples. Prep samples for shipment to Laucks Labs via Fed. Ex. AB# 8447 8135 6542. Fax COCs to Mr. Prentice of Laucks Labs.
16:30:00	Terry Rojahn	Leave B-3245 for Fed. Ex.
17:00:00	Terry Rojahn	Drop off samples at Fed. Ex.
17:33:00	Terry Rojahn	Purchase wooden stakes and permanent markers at Lowe's,SAMPLE SUMMARY THIS DATE: Collected ground water samples at monitoring wells 12MWT03 and 13MWT31. Ship samples on COCs 112GN6878-8292005-3 and 112G00041-8292005-4 to Laucks Labs via Fed Ex AB# 8447 8135 6542.

Daily Activity
Entered by Terry Rojahn on 08/31/2005

Date	08/30/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	NA
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Rain & 70s
TtNUS Personnel	Goerdt Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
07:00:00	Terry Rojahn	Arrive at B-3245:,Prep. to lay out drilling and DPT locations at SWMUs 8,9 & 17.
07:30:00	Terry Rojahn	Arrive at SWMU 9: Lay out/check all drilling and DPT locations.
11:00:00	Terry Rojahn	Lay out all DPT locations at SWMU 17.
12:00:00	Terry Rojahn	Lunch break
12:30:00	Terry Rojahn	Lay out all DPT locations at SWMU 8 - both outside and inside of buildings 106 & 107. Check stakes at drilling locations 08MWT12 - 14.
16:30:00	Terry Rojahn	Return to B-3245:,Clean out SUVs. Prep sampling equipment for shipment to U S Environmental via Fed. Ex. AB# 8447 8135 7906 - 4 packages.
17:15:00	Terry Rojahn	JG left B-3245 for Fed. Ex.,TR remained to organize office and perform general clean up.
18:00:00	Terry Rojahn	Leave B-3245 for Bloomington.

Daily Activity
Entered by Terry Rojahn on 08/31/2005

Date	08/31/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	NA
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	NA
TtNUS Personnel	Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
07:00:00	Terry Rojahn	Arrive at B-3245:,Conduct general inventory and inventory MNA supplies. Sweep and mop office, lab, hallways and rest room.
09:30:00	Terry Rojahn	Leave B-3245 for Indy airport. REMAINDER OF DAY - TRAVEL.

Daily Activity
Entered by Terry Rojahn on 10/12/2005

Date	10/11/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	NA
WBS Code	NA
Client:	SOUTHDIV

Weather/Temp:	Cloudy & 60s
TtNUS Personnel	Terry Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
19:59:00	Terry Rojahn	10:00:00 Terry Rojahn Arrive at SWMU 12: Mike Roach's office closed - got his cell phone # off the door (295-8272). 10:25:00 Terry Rojahn Returned to B3245 - called Mr Roach - OK to access SWMU 12. 10:38:00 Terry Rojahn Return to SWMU 12 - Begin Eco Study for Eco Checklist. 12:10:00 Terry Rojahn Lunch break 12:35:00 Terry Rojahn Return to SWMU 12 - Continue Eco Study for Eco Checklist. 16:40:00 Terry Rojahn Complete Eco Study at SWMU 12.

Daily Activity
Entered by Terry Rojahn on 10/12/2005

Date	10/11/2005
Facility Name:	CRANE NSWC
TtNUS Project No.:	112GN6878
Task/Contract No.	
WBS Code	
Client:	SOUTHDIV

Weather/Temp:	Cloudy & 60s
TtNUS Personnel	T. Rojahn
Subcontractor Personnel	
Visitors On-site	

Time	Author	Notes
20:02:00	Terry Rojahn	10:00:00 Terry Rojahn Arrive at SWMU 12: Mike Roach's office closed - got his cell phone # off the door (295-8272). 10:25:00 Terry Rojahn Returned to B3245 - called Mr Roach - OK to access SWMU 12. 10:38:00 Terry Rojahn Return to SWMU 12 - Begin Eco Study for Eco Checklist. 12:10:00 Terry Rojahn Lunch break 12:35:00 Terry Rojahn Return to SWMU 12 - Continue Eco Study for Eco Checklist. 16:40:00 Terry Rojahn Complete Eco Study at SWMU 12.

APPENDIX C

SWMU 12

ROUND 4

HEALTH AND SAFETY DOCUMENTATION

APPENDIX C.1

SWMU 12

ROUND 4

HEALTH AND SAFETY DOCUMENTATION ROUND 4

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

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

Basinski, Ralph

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

Ralph:

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

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

If there are any questions, let me know.

Matt

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

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WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination

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

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

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

STATUS

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

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

3. ☐ **NOT QUALIFIED**

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

COMMENTS:

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

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

Signature: Peter P Greaney MD

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

A PLIED EDUCATIONAL SERIES

James D. Goerdt

APPLIED ASSOCIATES INTERNATIONAL INC.

CERTIFICATE

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

ISSUE DATE: December 13, 1991

EXPIRATION: December 13, 1992

CERTIFICATE: HAZ9112001058

STEVEN L. WILLIAMS
President

THOMAS O. MURRAY
Certified Industrial Hygenist

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

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

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

APPENDIX D

SWMU 12

ROUND 4

ANALYTICAL DATA

APPENDIX D.1

SWMU 12

ROUND 4

SUMMARY OF GROUNDWATER WATER ANALYTICAL RESULTS

APPENDIX D.1

NSWC CRANE
SUMMARY OF ROUND 4 ANALYTIC RESULTS FOR GROUNDWATER
SWMU 12 (MINE FILL A)

LOCATION	12MWT28	12MWT03	12MWT06	12MWT06	12MWT09	12MWT10
NSAMPLE	12GWT2804	12GWT0304	12GWT0604	12GWT0604-D	12GWT0904	12GWT1004
NORTHING	1313506.96	1312747.34	1311833.5	1311833.5	1311595.76	1311456.81
EASTING	3026352.09	3026026.9	3026562.65	3026562.65	3026580.09	3026649.95
MATRIX	GW	GW	GW	GW	GW	GW
submatrix	GW	GW	GW	GW	GW	GW
SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
AOC	PUZ-UPGRAD	PUZ	PUZ	PUZ	PUZ	PUZ
SWMU	12	12	12	12	12	12
ROUND	200508	200508	200508	200508	200508	200508
PHASE	04	04	04	04	04	04
SAMPLE DATE	8/28/2005	8/29/2005	8/26/2005	8/26/2005	8/26/2005	8/26/2005
SACODE	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
EXPLOSIVES (UG/L)						
1,3,5-TRINITROBENZENE	0.26 U	0.27 U	23 J	20	0.25 U	0.26 U
1,3-DINITROBENZENE	0.26 U	0.27 U	10 J	9	0.25 U	0.26 U
2,4,6-TRINITROTOLUENE	0.26 UJ	0.27 UJ	210 J	190	0.31 R	0.26 U
2,4-DIAMINO-6-NITROTOLUENE	0.26 U	0.27 U	7.5 J	7 R	0.25 U	0.26 U
2,4-DINITROTOLUENE	0.26 U	0.27 U	5.4 J	5	0.25 U	0.26 U
2,6-DIAMINO-4-NITROTOLUENE	0.26 U	0.27 U	0.26 U	0.24 U	0.25 U	0.26 U
2,6-DINITROTOLUENE	0.26 U	0.27 U	15 J	16 J	0.29 J	0.26 U
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.27 U	82 J	46 J	5.2 J	0.26 U
2-NITROTOLUENE	0.26 U	0.27 U	0.26 U	0.24 U	0.25 U	0.26 U
3,5-DINITROANILINE	0.26 U	0.27 U	9.7 J	7.9	0.25 U	0.26 U
3-NITROTOLUENE	0.26 U	0.27 U	0.26 U	0.24 U	0.25 U	0.26 U
4,4'-TN-AZOXY	0.52 U	0.53 U	0.52 U	0.48 U	0.5 U	0.52 U
4-AMINO-2,6-DINITROTOLUENE	0.26 U	0.27 U	71 J	64 J	5.8	0.26 U
4-NITROTOLUENE	0.26 U	0.27 U	6.7 J	6 R	0.25 U	0.26 U
DNX	0.26 U	0.27 U	1.7 J	1.4 R	0.25 UJ	0.26 U
HMX	0.26 U	0.27 U	520 J	480	61	6.8
MNX	0.26 U	0.27 U	21 J	19	0.82 J	0.35 J
NITROBENZENE	0.26 U	0.27 U	0.26 U	0.24 U	0.25 U	0.26 U
RDX	0.29 J	0.27 U	5400 J	5200	460	37
TETRYL	0.26 U	0.27 U	17 R	0.24 U	0.25 U	0.26 U
TNX	0.26 U	0.27 U	0.26 U	0.24 U	0.25 U	0.26 U
FIELD TESTED PARAMETERS						
DISSOLVED OXYGEN - METER (MG/L)	1.83	0.98	0.63	0.63	2.38	0.81
OXIDATION REDUCTION POTENTIAL (MV)	704.3	553.6	435.5		163	488.7
PH (S.U.)	1.32	5.42	4.91	4.91	4.5	3.29
SPECIFIC CONDUCTANCE (MS/CM)	1.021	1.151	0.303	0.303	0.264	550
TEMPERATURE (C)	19.73	19.34	16.66	16.66	18.97163	16.87
TURBIDITY (NTU)	60	18	0.6	0.6	9.7	36
MISCELLANEOUS PARAMETERS (MG/L)						
NITRITE/NITRATE-N (MG/L)	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
TOTAL ORGANIC CARBON (MG/L)	1.1	1.9	5.9	5.8	2.1	5.2

APPENDIX D.1

NSWC CRANE
SUMMARY OF ROUND 4 ANALYTIC RESULTS FOR GROUNDWATER
SWMU 12 (MINE FILL A)

LOCATION	12MWT11	12MWT12	12MWT16	12MWT17	12MWT18	12MWT20
NSAMPLE	12GWT1104	12GWT1204	12GWT1604	12GWT1704	12GWT1804	12GWT2004
NORTHING	1313014.33	1312972.3	1312096.13	1312047.38	1312114.82	1311919.4
EASTING	3026776.15	3026791.19	3027182.94	3027205.14	3027253.63	3027337.61
MATRIX	GW	GW	GW	GW	GW	GW
submatrix	GW	GW	GW	GW	GW	GW
SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
AOC	PUZ	PUZ	PUZ	PUZ	PUZ	PUZ
SWMU	12	12	12	12	12	12
ROUND	200508	200508	200508	200508	200508	200508
PHASE	04	04	04	04	04	04
SAMPLE DATE	8/23/2005	8/23/2005	8/23/2005	8/23/2005	8/24/2005	8/28/2005
SACODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
EXPLOSIVES (UG/L)						
1,3,5-TRINITROBENZENE	130	0.27 U	3.1 J	0.92 J	0.27 U	0.26 U
1,3-DINITROBENZENE	9.4	0.27 U	0.27 U	0.27 U	0.27 U	0.26 U
2,4,6-TRINITROTOLUENE	160	6.1	0.27 U	0.27 U	0.27 U	0.26 U
2,4-DIAMINO-6-NITROTOLUENE	77 R	0.27 U	2.1 R	1.2 R	0.27 U	0.26 U
2,4-DINITROTOLUENE	4.4 R	0.27 U	0.27 U	0.27 U	0.27 U	0.26 U
2,6-DIAMINO-4-NITROTOLUENE	0.26 U	0.27 U	0.27 U	0.27 U	0.27 U	0.26 U
2,6-DINITROTOLUENE	0.26 U	0.27 U	2	1.1	0.27 U	0.26 U
2-AMINO-4,6-DINITROTOLUENE	34 J	7.7 J	160 J	32 J	0.27 U	0.26 U
2-NITROTOLUENE	0.26 U	0.27 U	0.27 U	0.27 U	0.27 U	0.26 U
3,5-DINITROANILINE	13	1.7	0.27 U	0.27 U	0.27 U	0.26 U
3-NITROTOLUENE	0.26 U	0.27 U	0.34 R	0.27 U	0.27 U	0.26 U
4,4'-TN-AZOXY	0.53 U	0.53 U	0.53 U	0.54 U	0.54 U	0.52 U
4-AMINO-2,6-DINITROTOLUENE	50 J	11	260	47	0.27 U	0.26 U
4-NITROTOLUENE	0.26 U	0.27 U	0.27 U	0.27 U	0.27 U	0.26 U
DNX	0.26 U	0.39 R	21 J	5.1	0.27 U	0.26 U
HMX	560	74	650	150	0.67	0.26 U
MNX	14 J	4.2	260	67	0.27 U	0.26 U
NITROBENZENE	0.26 U	0.27 U	0.27 U	0.27 U	0.27 U	0.26 U
RDX	5000	270	8500	2600	14	1.2
TETRYL	0.26 U	0.27 U	0.27 U	0.27 U	0.27 U	0.26 U
TNX	0.26 U	0.27 U	8.9	2.3	0.27 U	0.26 U
FIELD TESTED PARAMETERS						
DISSOLVED OXYGEN - METER (MG/L)	1.15	0.52			5.11	5.18
OXIDATION REDUCTION POTENTIAL (MV)	696.7	624.5	186	170	408	185
PH (S.U.)	2.93	5.35	1.49	1.52	5.5	5.5
SPECIFIC CONDUCTANCE (MS/CM)	0.27	0.63	0.374	0.702	1.384	1.327
TEMPERATURE (C)	18.73	16.98	18.34	18.94	20.02	21.32
TURBIDITY (NTU)	0	0	280	130	70	5.2
MISCELLANEOUS PARAMETERS (MG/L)						
NITRITE/NITRATE-N (MG/L)	2.4	1.4	0.23	0.06	0.025 U	0.025 U
TOTAL ORGANIC CARBON (MG/L)	3.1	11	5.2	3.7	3.1	4.2

NSWC CRANE
SUMMARY OF ROUND 4 ANALYTIC RESULTS FOR GROUNDWATER
SWMU 12 (MINE FILL A)

LOCATION	12MWT22	12MWT23	12MWT36	12MWT38	12MWT42	12MWT31
NSAMPLE	12GWT2204	12GWT2304	12GWT3604	12GWT3804	12GWT4204	12GWT3104
NORTHING	1311937.84	1311150.87	1312466.54	1312353.89	1312364.7	1312970.99
EASTING	3026901.94	3027466.57	3027186.16	3026531.17	3026127.28	3026872.87
MATRIX	GW	GW	GW	GW	GW	GW
submatrix	GW	GW	GW	GW	GW	GW
SITE	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A	MINE FILL A
AOC	PUZ	PUZ	PUZ	PUZ	PUZ	PMZ
SWMU	12	12	12	12	12	12
ROUND	200508	200508	200508	200508	200508	200508
PHASE	04	04	04	04	04	04
SAMPLE DATE	8/25/2005	8/26/2005	8/24/2005	8/28/2005	8/25/2005	8/24/2005
SACODE	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
EXPLOSIVES (UG/L)						
1,3,5-TRINITROBENZENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
1,3-DINITROBENZENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
2,4,6-TRINITROTOLUENE	0.54 R	0.26 U	0.24 U	0.26 UJ	0.26 U	0.27 U
2,4-DIAMINO-6-NITROTOLUENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
2,4-DINITROTOLUENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
2,6-DIAMINO-4-NITROTOLUENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
2,6-DINITROTOLUENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
2-NITROTOLUENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
3,5-DINITROANILINE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
3-NITROTOLUENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
4,4'-TN-AZOXY	0.53 U	0.51 U	0.49 U	0.52 U	0.52 U	0.54 U
4-AMINO-2,6-DINITROTOLUENE	0.74	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
4-NITROTOLUENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
DNX	0.27 U	0.26 U	0.34 R	0.26 U	0.26 U	0.27 U
HMX	5.2	0.26 U	7.2	0.79	29	0.27 U
MNX	0.35 J	0.26 U	1.1	0.28 J	0.26 U	0.27 U
NITROBENZENE	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
RDX	61	0.26 U	42	57	17	0.27 U
TETRYL	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
TNX	0.27 U	0.26 U	0.24 U	0.26 U	0.26 U	0.27 U
FIELD TESTED PARAMETERS						
DISSOLVED OXYGEN - METER (MG/L)	4.54	2.82	2.54	3.46	0.82	0.54
OXIDATION REDUCTION POTENTIAL (MV)	159	493	636.8	688.6	806.6	576
PH (S.U.)	5.5	4	5.9	2.97	3.43	6.93
SPECIFIC CONDUCTANCE (MS/CM)	0.175	4.549	0.494	0.321	0.299	337
TEMPERATURE (C)	17.49	20.57	26.34	22.36	14.86	16.95
TURBIDITY (NTU)	50	150	0	0.4	7.8	9.8
MISCELLANEOUS PARAMETERS (MG/L)						
NITRITE/NITRATE-N (MG/L)	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	1
TOTAL ORGANIC CARBON (MG/L)	2.4	12	2.5	2.6	2.4	1 U

APPENDIX D.1

NSWC CRANE
SUMMARY OF ROUND 4 ANALYTIC RESULTS FOR GROUNDWATER
SWMU 12 (MINE FILL A)

LOCATION	12MWT32	12MWT41	12MWT47
NSAMPLE	12GWT3204	12GWT4104	12GWT4704
NORTHING	1312015.49	1310642	1312455.99
EASTING	3027297.24	3026376.75	3028025
MATRIX	GW	GW	GW
submatrix	GW	GW	GW
SITE	MINE FILL A	MINE FILL A	MINE FILL A
AOC	PMZ	PLZMGD	PMZ
SWMU	12	12	12
ROUND	200508	200508	200508
PHASE	04	04	04
SAMPLE DATE	8/25/2005	8/25/2005	8/28/2005
SACODE	NORMAL	NORMAL	NORMAL
EXPLOSIVES (UG/L)			
1,3,5-TRINITROBENZENE	0.27 U	0.26 U	0.24 U
1,3-DINITROBENZENE	0.27 U	0.26 U	0.24 U
2,4,6-TRINITROTOLUENE	0.27 U	0.26 U	0.24 U
2,4-DIAMINO-6-NITROTOLUENE	0.27 U	0.26 U	0.24 U
2,4-DINITROTOLUENE	0.27 U	0.26 U	0.24 U
2,6-DIAMINO-4-NITROTOLUENE	0.27 U	0.26 U	0.24 U
2,6-DINITROTOLUENE	0.27 U	0.26 U	0.24 U
2-AMINO-4,6-DINITROTOLUENE	0.27 U	0.26 U	0.24 U
2-NITROTOLUENE	0.27 U	0.26 U	0.24 U
3,5-DINITROANILINE	0.27 U	0.26 U	0.24 U
3-NITROTOLUENE	0.27 U	0.26 U	0.24 U
4,4'-TN-AZOXY	0.53 U	0.53 U	0.49 U
4-AMINO-2,6-DINITROTOLUENE	0.27 U	0.26 U	0.24 U
4-NITROTOLUENE	0.27 U	0.26 U	0.24 U
DNX	0.27 U	0.26 U	0.24 U
HMX	0.27 U	0.26 U	0.24 U
MNX	0.27 U	0.26 U	0.24 U
NITROBENZENE	0.27 U	0.26 U	0.24 U
RDX	0.27 U	0.26 U	0.56
TETRYL	0.27 U	0.26 U	0.24 U
TNX	0.27 U	0.26 U	0.24 U
FIELD TESTED PARAMETERS			
DISSOLVED OXYGEN - METER (MG/L)	0.64	0.54	4.75
OXIDATION REDUCTION POTENTIAL (MV)	150	767.6	146
PH (S.U.)	6.2	2.81	6
SPECIFIC CONDUCTANCE (MS/CM)	1.23	0.544	0.554
TEMPERATURE (C)	19.49	15.5	15.37
TURBIDITY (NTU)	9.4	34	6.7
MISCELLANEOUS PARAMETERS (MG/L)			
NITRITE/NITRATE-N (MG/L)	0.025 U	0.025 U	0.025 U
TOTAL ORGANIC CARBON (MG/L)	1 U	1 U	1.4

APPENDIX D.2

SWMU 12

ROUND 4

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS

APPENDIX D.2

NSWC CRANE
SUMMARY OF ROUND 4 ANALYTIC RESULTS FOR SURFACE WATER
SWMU 12 (MINE FILL A)

LOCATION	12SW/SD09	12SW/SD11	12SW/SD24	12SW/SD25	12SW/SD25	12SW/SD27	12SW/SD34
NSAMPLE	12SW0904	12SW1104	12SW2404	12SW2504	12SW2504-D	12SW2704	12SW3403
SAMPLE	12SW0904	12SW1104	12SW2404	12SW2504	12FD08270501	12SW2704	12SW3403
MATRIX	SW	SW	SW	SW	SW	SW	SW
AOC	GULLY	GULLY	ET	TC-UPGRAD	TC-UPGRAD	TC	GULLY
PHASE	04	04	04	04	04	04	04
SAMPLE DATE	8/27/2005	8/27/2005	8/27/2005	8/27/2005	8/27/2005	8/27/2005	8/27/2005
SACODE	NORMAL	NORMAL	NORMAL	ORIG	DUP	NORMAL	NORMAL
EXPLOSIVES (UG/L)							
1,3,5-TRINITROBENZENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
1,3-DINITROBENZENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
2,4,6-TRINITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
2,4-DIAMINO-6-NITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
2,4-DINITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
2,6-DIAMINO-4-NITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
2,6-DINITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
2-AMINO-4,6-DINITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
2-NITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
3,5-DINITROANILINE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
3-NITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
4,4'-TN-AZOXY	0.52 U	0.5 U	0.48 U	0.51 U	0.5 U	0.5 U	0.59 U
4-AMINO-2,6-DINITROTOLUENE	0.43 J	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
4-NITROTOLUENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
DNX	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
HMX	7.4	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	11
MNX	0.72	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
NITROBENZENE	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
RDX	9.2	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	3.1
TETRYL	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
TNX	0.26 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.29 U
FIELD TESTED PARAMETERS							
DISSOLVED OXYGEN - METER (MG/L)	6.77	7.02	2.6	7.15	7.15	7.27	2.75
OXIDATION REDUCTION POTENTIAL (MV)	157	209	390	246		242	116
PH (S.U.)	7.27	6.83	6.16	7.4	7.4	7.47	7.46
SPECIFIC CONDUCTANCE (MS/CM)	0.184	0.11	0.218	0.224	0.224	0.221	0.456
TEMPERATURE (C)	21.78	20.43	18.33	21.75	21.75	22.74	20.56
TURBIDITY (NTU)	21	27	0	0	0	14	8.7
MISCELLANEOUS PARAMETERS (MG/L)							
NITRITE/NITRATE-N	0.2	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U

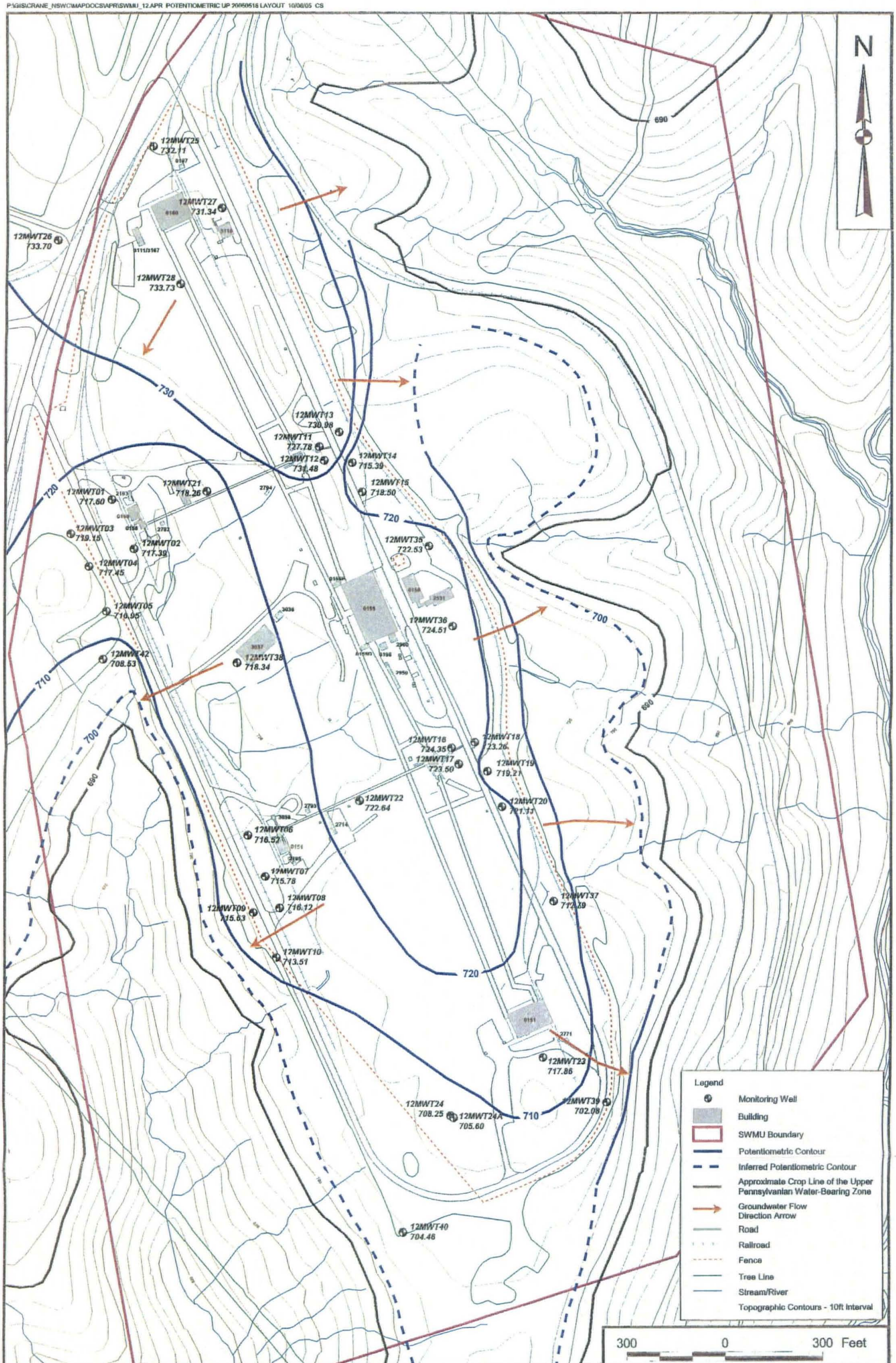
APPENDIX E

SWMU 12

ROUND 3

POTENTIOMETRIC SURFACE MAPS

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU_12.APR POTENTIOMETRIC UP 20050516 LAYOUT 10/06/05 CS



DRAWN BY	DATE
C. FOSTER	10/03/05
CHECKED BY	DATE
J. LUCAS	10/03/05
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

NAVFAC

POTENTIOMETRIC SURFACE MAP FOR THE UPPER PENNSYLVANIAN WATER-BEARING ZONE - MAY 18, 2005

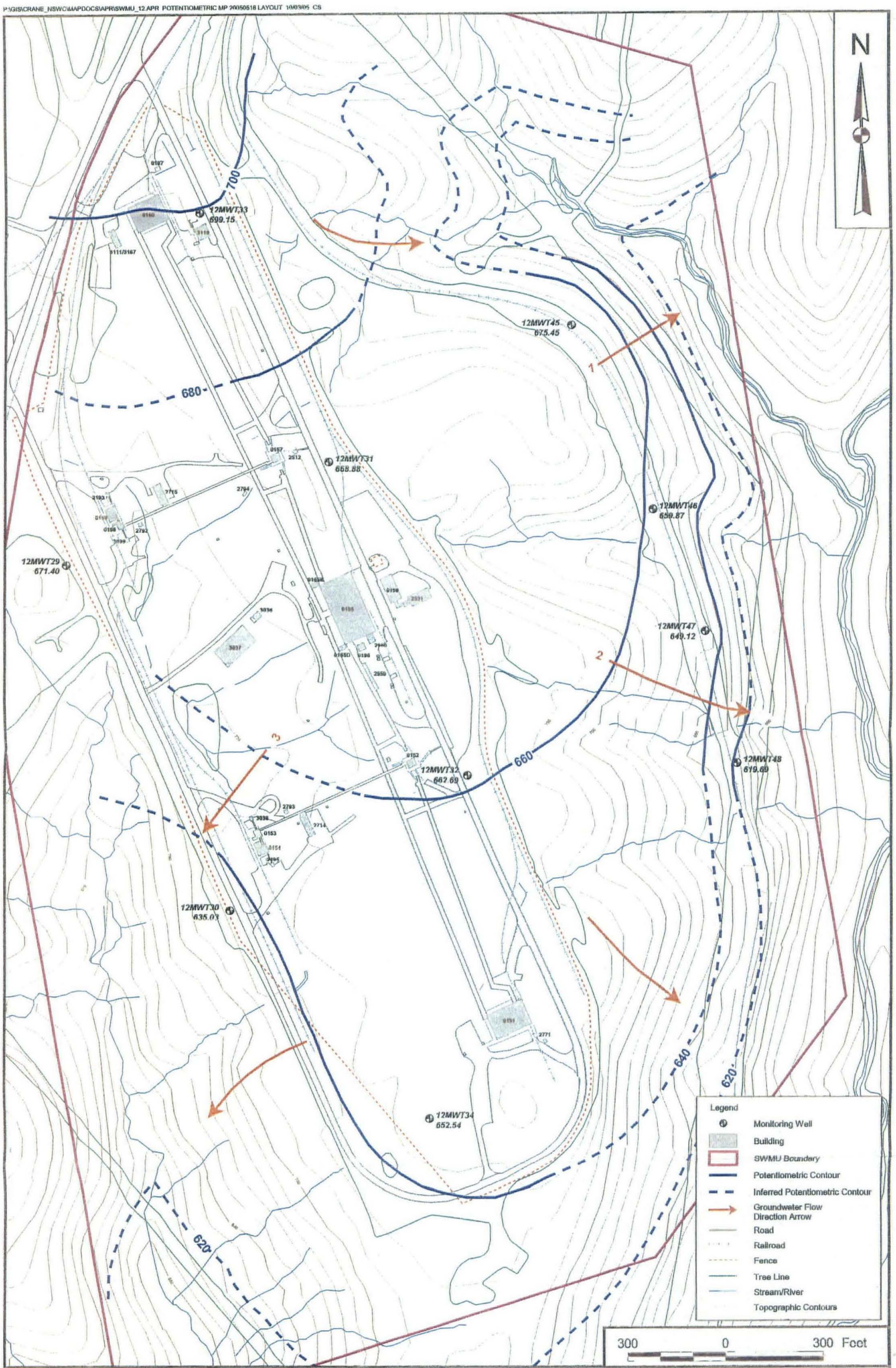
SWMU 12 MINE FILL A

NSWC CRANE

CRANE, INDIANA

CONTRACT NUMBER	
6878	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV
FIGURE 4 - 1	0

P:\GIS\CRANE_NSWC\MAPDOCS\APR\SWMU_12.APR POTENTIOMETRIC MP 20050518 LAYOUT 10/03/05 CS



DRAWN BY C. FOSTER	DATE 10/03/05	POTENTIOMETRIC SURFACE MAP FOR THE MIDDLE PENNSYLVANIAN WATER-BEARING ZONE - MAY 18, 2005 SWMU 12 MINE FILL A NSWC CRANE CRANE, INDIANA	CONTRACT NUMBER 6878
CHECKED BY J. LUCAS	DATE 10/03/05		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 4 - 2 REV 0

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CONTRACT NO. 6878

APPROVED BY DATE

APPROVED BY DATE

DRAWING NO. FIGURE 4 - 3

REV 0

POTENTIOMETRIC SURFACE MAP FOR THE GLEN DEAN LIMESTONE (MISSISSIPPIAN) AQUIFER ON MAY 18, 2005
SWMU 12 MINE FILL A
NSWC CRANE
CRANE, INDIANA

NAVFAC

DRAWN BY C. FOSTER DATE 10/03/05

CHECKED BY J. LUCAS DATE 10/03/05

COST/SCHED-AREA

SCALE AS NOTED