N00164.AR.002241
NSA CRANE
5090.3a

FIELD TASK MODIFICATION REQUEST FORM TO SAMPLING AND ANALYSIS PLAN FACILITY INVESTIGATION SOLID WASTE MANAGEMENT UNIT 22 (SWMU 22) LEAD AZIDE POND NSA CRANE IN
12/20/2012
TETRA TECH

TETRA TECH

FIELD TASK MODIFICATION REQUEST FORM

Project/Installation Name SWMU 22 – Lead Azide Pond, NSA Crane, IN	CTO & Project Number CTO F279; 112G02362	Task Modification Number 002
Modification to: Sampling and Analysis Plan, RCRA Facility Investigation, SWMU 22-Lead Azide Pond	**Site Location** SWMU 22	**Date of Request** December 20, 2012

Background. Tetra Tech performed RCRA Facility Investigation (RFI) sampling at SWMU 22 in January and April 2011 and May 2012 that included the collection of surface and subsurface soil samples, surface water and sediment samples, and groundwater samples (Table 1 and Figure 1a and 1b). Analyses included energetics, metals, pH, and total organic carbon (Table 1). The distribution of constituents in the site media are illustrated on Figures 2 through 5. Water quality measurements for groundwater and surface water at SWMU 22 are summarized in Table 2a and 2b, respectively, and groundwater flow at SWMU 22 is presented on Figure 6.

Based on the human risk assessment, unacceptable risks from ingestion of groundwater contaminated with arsenic and RDX were estimated for hypothetical future residents. Table 3 summarizes the results of the risk assessment for SWMU 22 based on the data collected to date. To characterize the sources of RDX in groundwater at SWMU 22, additional activities are to be conducted. Historical discharges from the settling basin north of Building 138 may have contaminated soils along the drainages adjacent to it. These soils may be acting as secondary sources of contamination.

Purpose of FTMR. The purpose of this FTMR form is to present the supplemental RFI sampling activities to collect surface soil, surface water, sediment and groundwater samples to assess residual contamination in site media, which may be contributing to groundwater contamination in the area of 22MWT002.

Proposed Supplemental Activities. The supplemental sampling will be performed as described in this FTMR form and the approved September 2011 SAP. This FTMR form includes figures and tables and existing Standard Operating Procedure (SOP) to perform the proposed additional activities.

The approximate locations of the supplemental surface soil samples are shown on Figure 7; the supplemental sampling and analysis is presented on attached Table A-4 and described as follows:

- **Surface Soil:** Six surface soil samples will be collected in the area of Building 138 to characterize soil conditions for RDX to determine if residual contamination is present that may be acting as a source for groundwater contamination. Surface soil samples will be collected from one location (22SS003) adjacent to monitoring well 22MWT002 and from two locations (22SS004 and 22SS005) along the drainage north of well 22MWT002. One surface soil sample (22SS006) will be collected from the discharge of a corrugated metal pipe along the drainage. Two surface samples (22SS007 and 22SS007) will be collected from the drainage east of monitoring well 22MWT002 and south of the settling basin northwest of Building 138. The proposed surface soil sample locations are shown on Figure 7. The surface soil samples will be collected from 0 to 2 feet below ground surface (bgs) and in accordance with SOP-10 of the September 2011 SAP. The surface soil samples will be analyzed for RDX and TNT. (Analysis of TNT is to be performed due to detection of TNT in sediment in the settling basin north of Building 138.) In addition, the soil sample from the location of 22SS003 will also be analyzed for chromium speciation to confirm the presence of chromium as trivalent species at SWMU 22. The analysis method for the chromium speciation will be EPA Method 218.6.

- **Surface Water**: A surface water sample will be collected from location 22SD/SW025 (Figure 7). During the previous sampling events, no surface water was present. The surface water sample will be collected when sufficient water is present to collect a sample, which may be following a rain event or snow melt. The surface water sample will be collected according to SOP-05 and SOP-06 of the September 2011 SAP. The surface water sample will be analyzed for RDX and TNT.

- **Sediment**: A sediment sample will be collected from location 22SD017 to assess the sediment at that location for RDX and TNT. The sediment sample will be collected according to SOP-07 of the September 2011 SAP and analyzed for RDX and TNT.

- **Groundwater**: A groundwater sample will be collected from monitoring well 22MWT005 and analyzed for chromium speciation to confirm the presence of chromium as trivalent species at SWMU 22. Monitoring well 22MWT005 will be purged and sampled in accordance with SOP-18 and SOP-19 of the January 2011 SAP. The analysis method for the chromium speciation will be EPA Method 218.6.

Attachments to this FTMR include:

Figures
Figure 1a Sample Locations – January and April 2011 and May 2012
Figure 1b Sample Locations – January and April 2011
Figure 2 Soil Sample Results – January 2011 and May 2012
Figure 3 Surface Water Sample Results – January and April 2011 and May 2012
Figure 4 Sediment Sample Results – January 2011 and May 2012
Figure 5 Groundwater Sample Results – May 2012
Figure 6 Groundwater Potentiometric Surface Map
Figure 7 Proposed Sample Locations

Table
Table 1 Summary of Environmental Samples and Laboratory Analyses
Table 2a Groundwater Quality Data
Table 2b Surface Water Quality Data
Table 3 Summary of Receptor-Specific Human Risks and Hazards, Ecological Risks, and Recommendations
Table 4 Proposed Supplemental Sampling and Analysis

Standard Operating Procedures (SOPs)
SOP 05 – Surface Water Sampling
SOP 06 – Measurement of Water Quality Parameters
SOP 07 – Sediment Sampling
SOP 10 – Surface and Subsurface Soil Sampling
SOP 18 – Low-Flow Well Purging and Stabilization
SOP 19 – Groundwater Sampling

Reason for Change/Modification: Supplemental activities for characterization of nature and extent of constituents of concern, based on potential unacceptable risks.

Person Requesting Change/Modification:
12/20/12
Tim Evans, Project Manager / Date

Approvals:
12/20/12
Ralph Basinski, Tetra Tech Activity Coordinator / Date

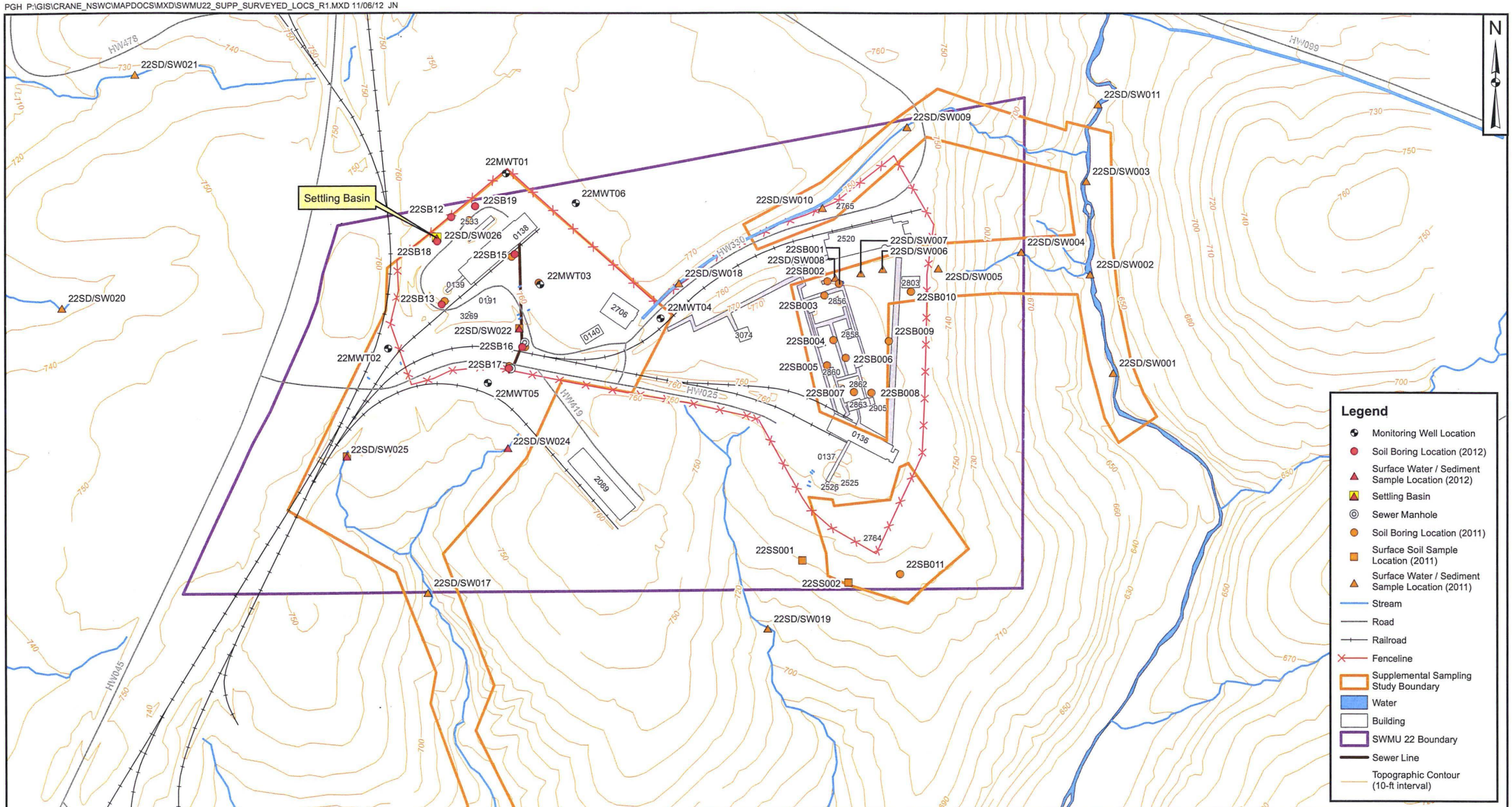
Modifications to the HASP required based on this change? ☐ Yes ☒ No ☐ NA

N/A — N/A

Health Safety Manager (Signature) — **Date**

FIGURES

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU22_SUPP_SURVEYED_LOCS_R1.MXD 11/06/12 JN



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J. ENGLISH	06/05/12
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T. EVANS	11/06/12
REVISED BY	DATE
J. NOVAK	11/06/12
SCALE	
AS NOTED	

NAVFAC

SAMPLE LOCATIONS - JANUARY & APRIL 2011 & MAY 2012
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
2362	—
APPROVED BY	DATE
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APPROVED BY	DATE
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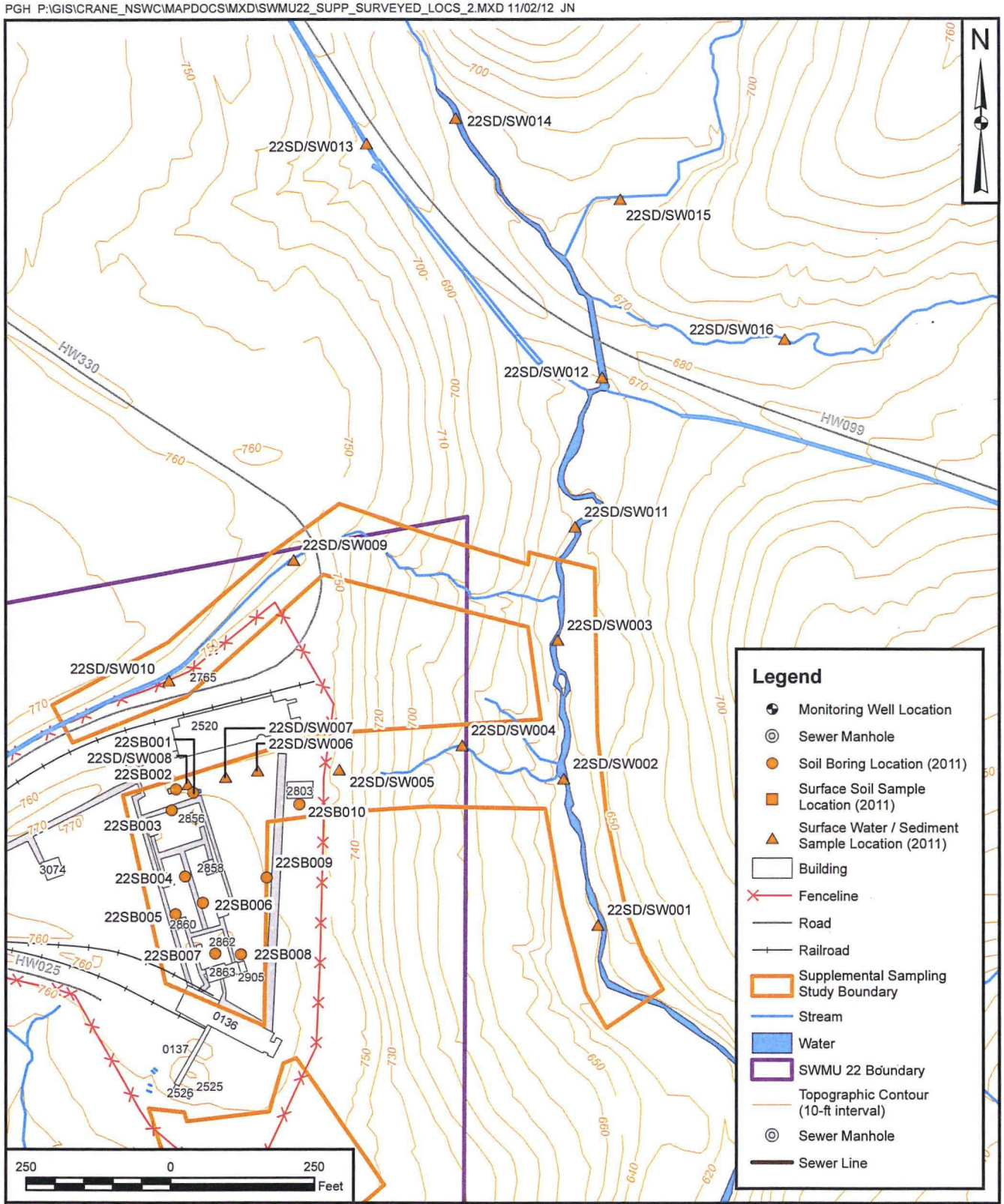
FIGURE NO.	REV
1A	0

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU22_SUPP_SURVEYED_LOCS_2.MXD 11/02/12 JN



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SCALE AS NOTED	

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SAMPLE LOCATIONS
JANUARY & APRIL 2011
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
2362	—
APPROVED BY	DATE
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APPROVED BY	DATE
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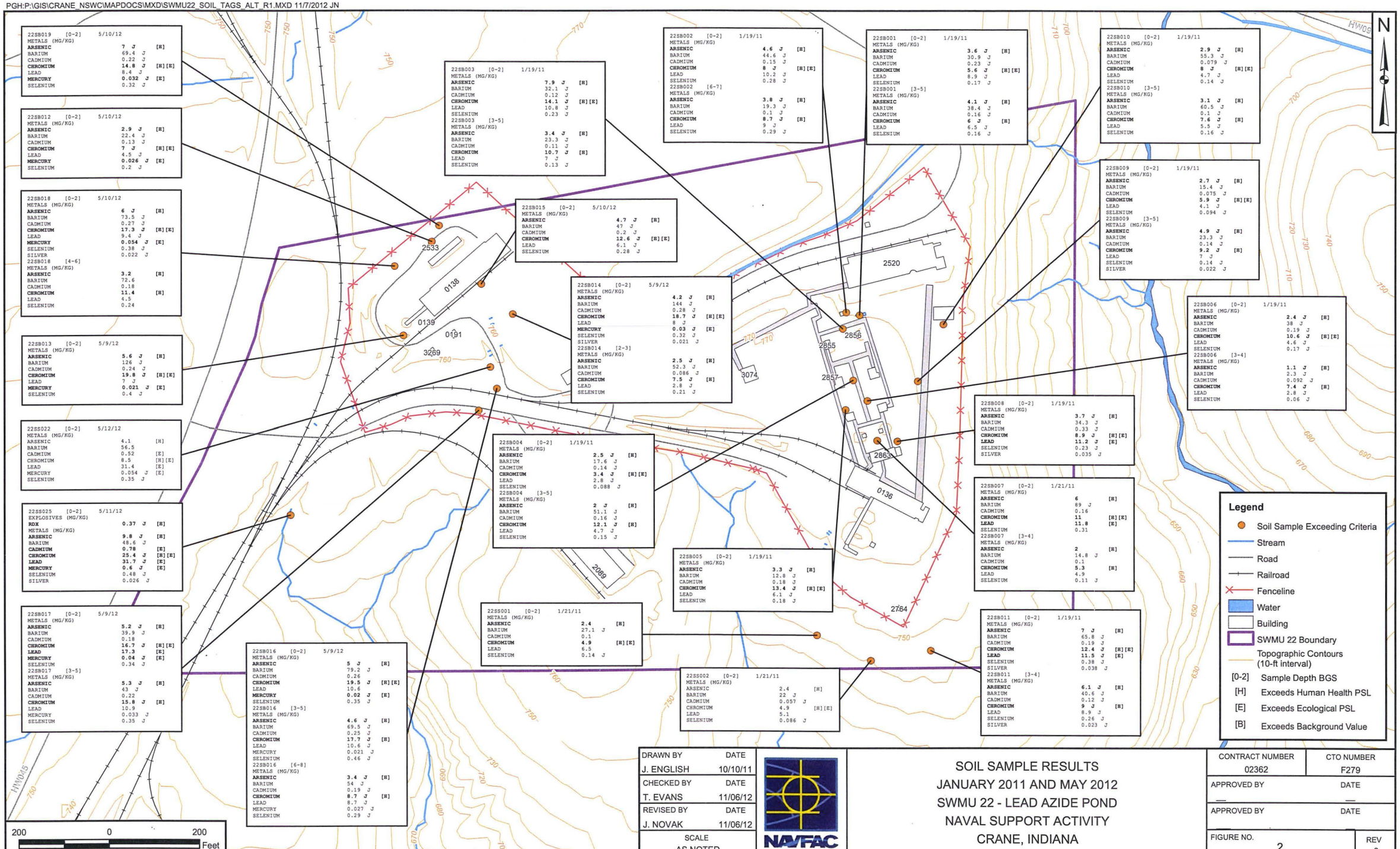
FIGURE NO.	REV
1B	0

PGH:P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU22_SOIL_TAGS_ALT_R1.MXD 11/7/2012 JN



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SOIL SAMPLE RESULTS
JANUARY 2011 AND MAY 2012
SWMU 22 - LEAD AZIDE POND
NAVAL SUPPORT ACTIVITY
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
02362	F279
APPROVED BY	DATE
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APPROVED BY	DATE
FIGURE NO. 2	REV 0

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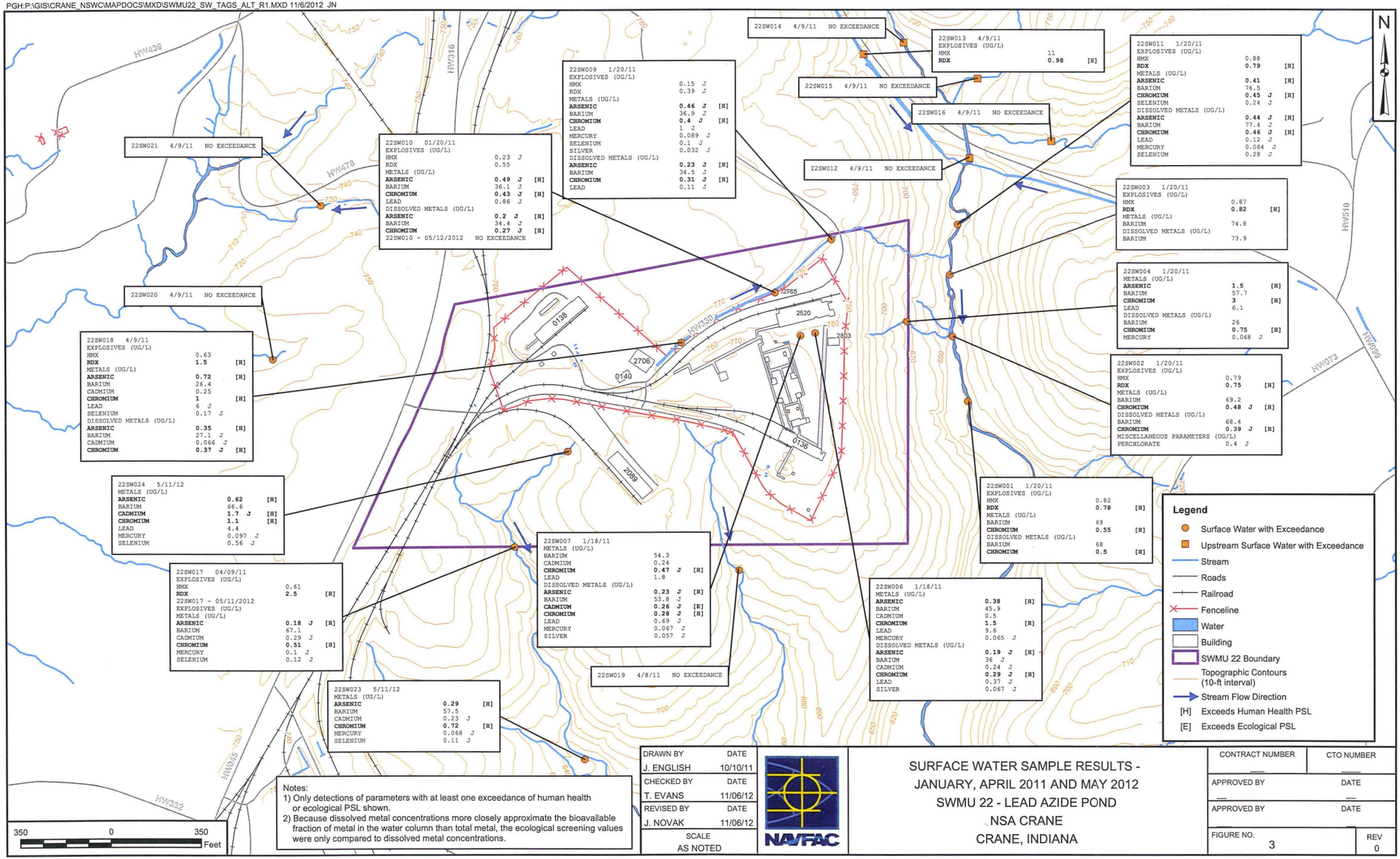

Notes:
1) Only detections of parameters with at least one exceedance of human health or ecological PSL shown.
2) Because dissolved metal concentrations more closely approximate the bioavailable fraction of metal in the water column than total metal, the ecological screening values were only compared to dissolved metal concentrations.

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SURFACE WATER SAMPLE RESULTS - JANUARY, APRIL 2011 AND MAY 2012
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
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APPROVED BY	DATE
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APPROVED BY	DATE
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FIGURE NO. 3	REV 0

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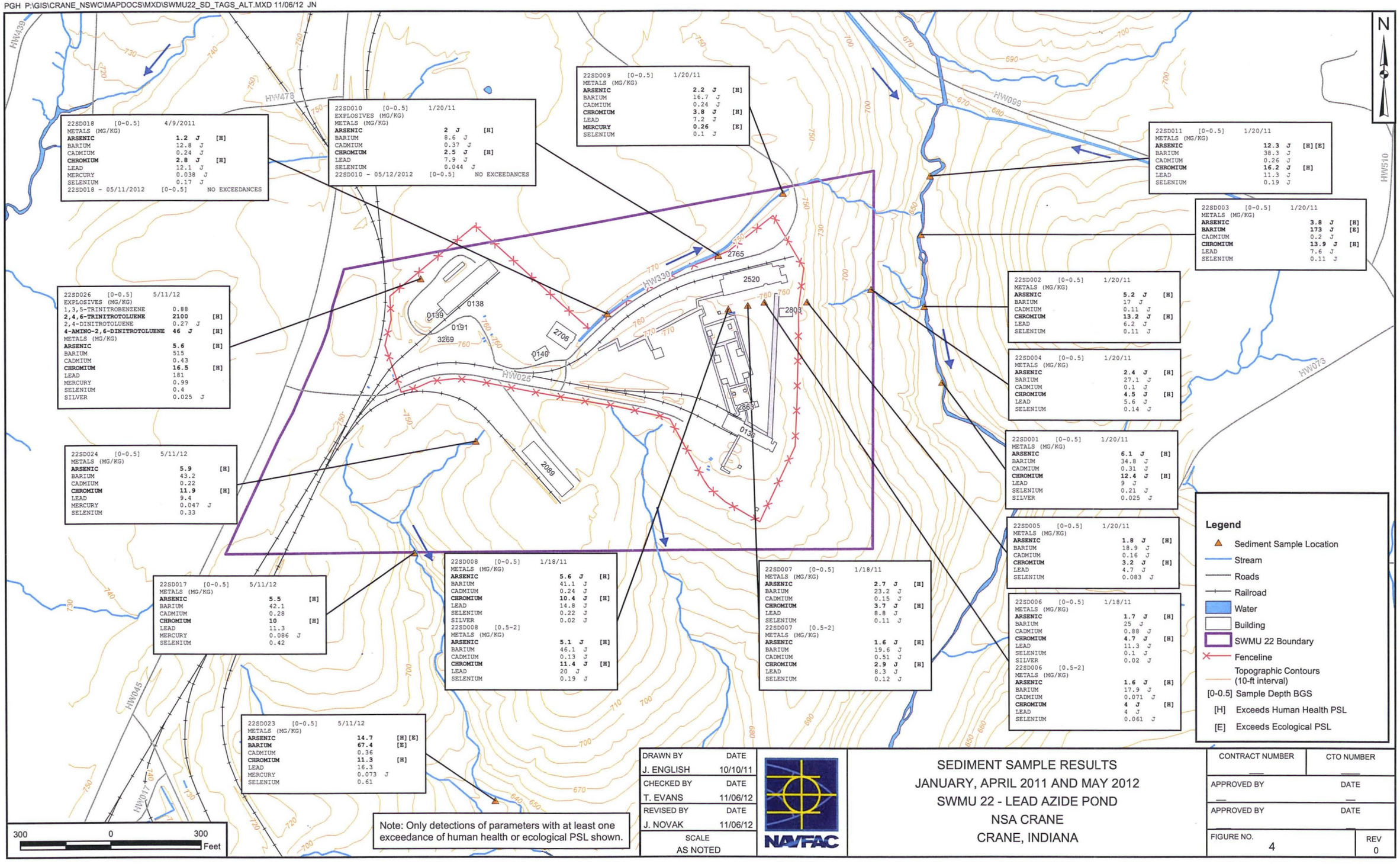

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SEDIMENT SAMPLE RESULTS
JANUARY, APRIL 2011 AND MAY 2012
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
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APPROVED BY	DATE
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FIGURE NO. 4	REV 0

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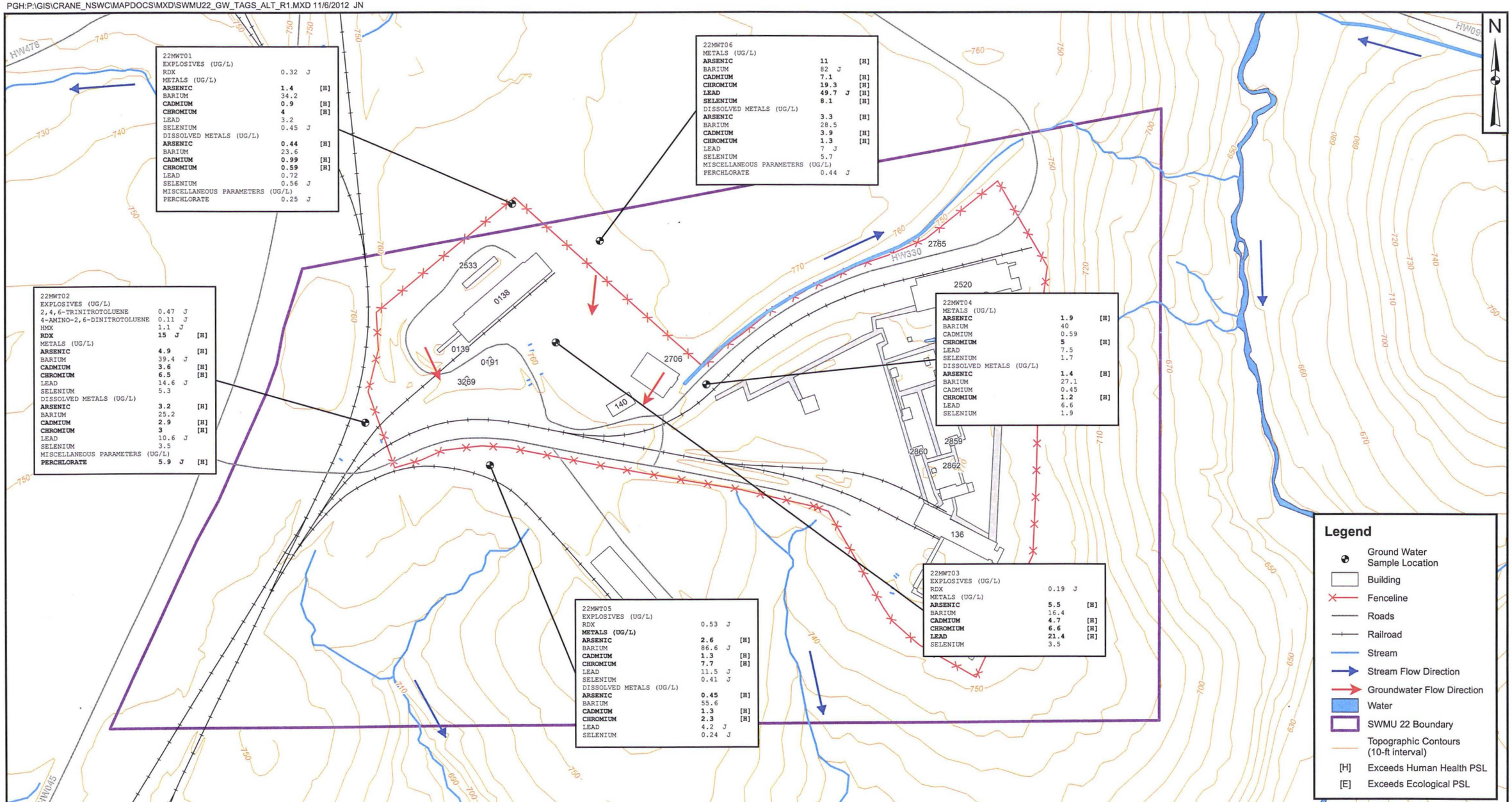

Note: Only detections of parameters with at least one exceedance of human health or ecological PSL shown.

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GROUND WATER SAMPLE RESULTS
MAY 2012
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
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APPROVED BY	DATE
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APPROVED BY	DATE
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FIGURE NO. 5	REV 0

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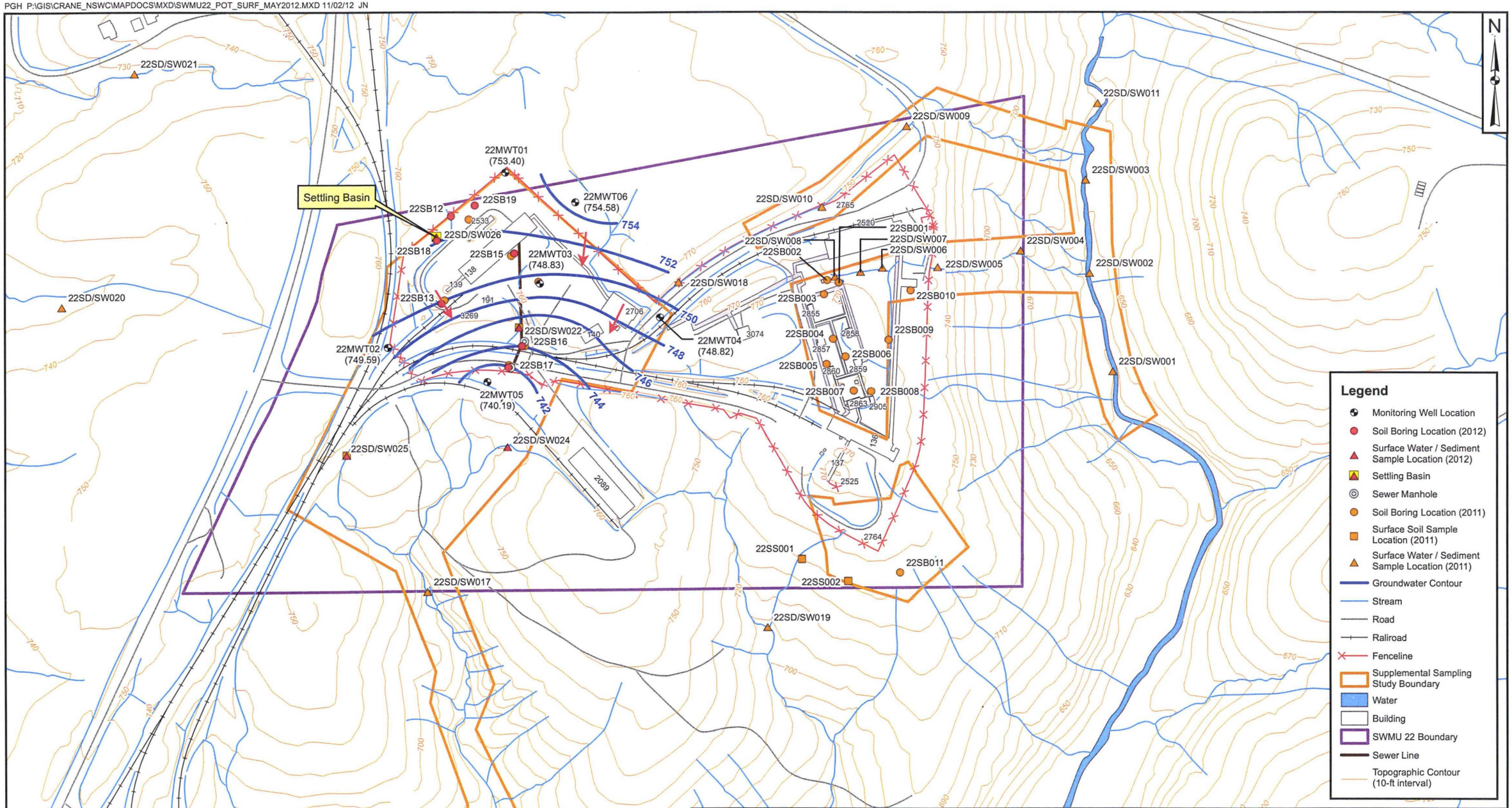

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J. NOVAK	11/02/12
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GROUNDWATER POTENTIOMETRIC SURFACE
MAY 21-22, 2012
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
2362	—
APPROVED BY	DATE
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APPROVED BY	DATE
FIGURE NO. 6	REV 0

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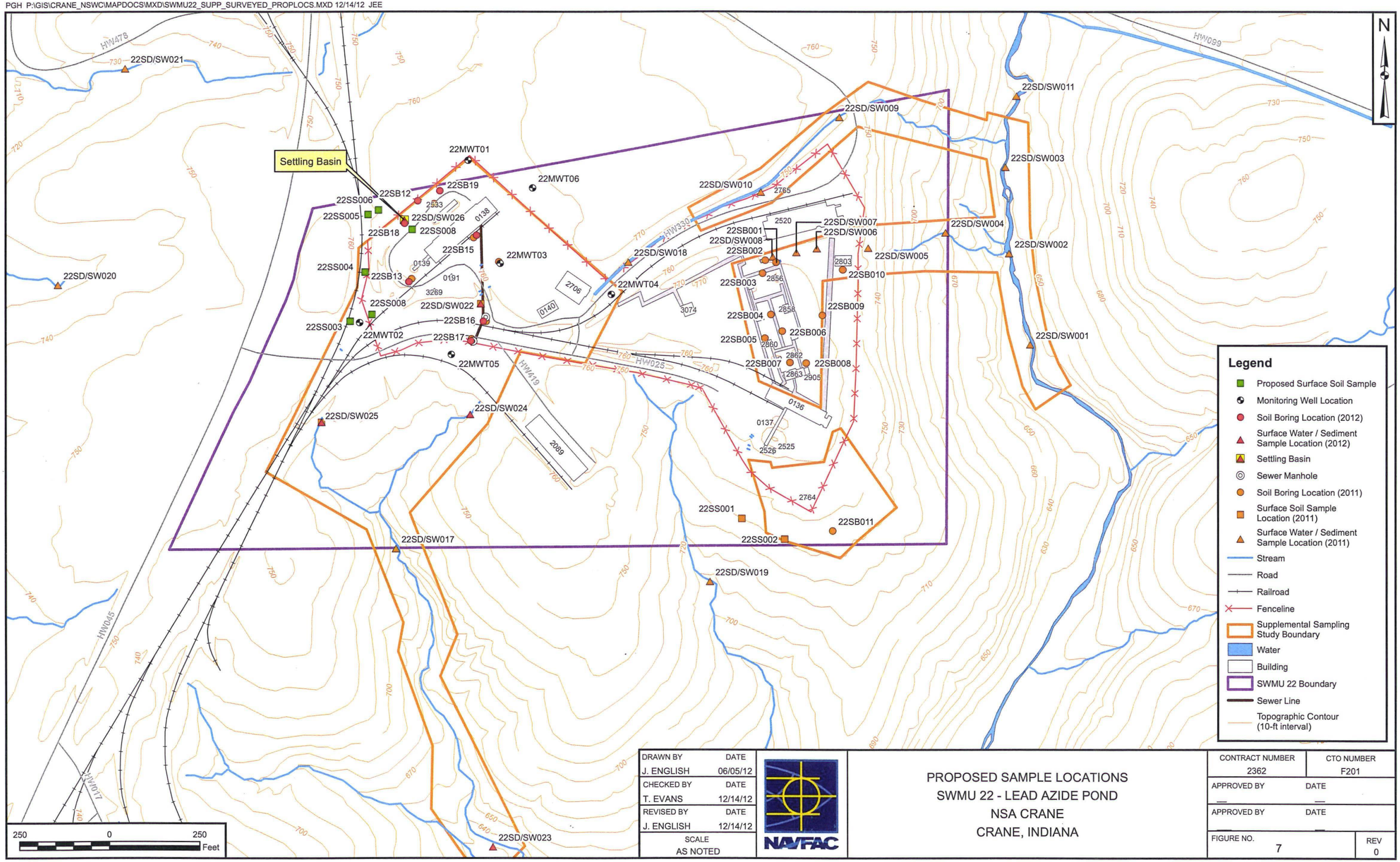

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PROPOSED SAMPLE LOCATIONS
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
2362	F201
APPROVED BY	DATE
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APPROVED BY	DATE
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FIGURE NO. 7	REV 0

TABLES

TABLE 1

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 22 - LEAD AZIDE POND
NSWC CRANE
CRANE, INDIANA

Sample Location	Sample Identification	Sample Type	Date Sampled	Sample Depth Interval Sampled (feet bgs)	Energetics				Metals		Miscellaneous		Comments
					Nitroaromatics / Nitramines	RDX/HMX	NG/PETN	Perchlorate	RCRA Metals	RCRA Metals (dissolved)	pH	TOC	
22SS001	22SS0010002	Surface Soil	21-Jan-11	0-2	X			X	X				Field Duplicate 22SSDUP01
22SS002	22SS0020002	Surface Soil	21-Jan-11	0-2	X			X	X				
22SS022	22SS0220002	Surface Soil	12-May-12	0-2	X		X		X			X	Listed as SD in SAP, no flow sampled as SS
22SS025	22SS0250002	Surface Soil	11-May-12	0-2	X		X		X			X	Field Duplicate 22SSDUP01. Listed as SD in SAP, no flow sampled as SS
22SB001	22SB0010002	Surface Soil	19-Jan-11	0-2	X			X	X		X		
	22SB0010305	Subsurface Soil	19-Jan-11	3-5	X			X	X		X		Field Duplicate 22SSDUP001
	22SB0010608	Subsurface Soil	NA	NA	–			–	–		–		Sample not collected due to boring refusal before sample depth
22SB002	22SB0020002	Surface Soil	19-Jan-11	0-2	X			X	X				
	22SB0020607	Subsurface Soil	19-Jan-11	6-7	X			X	X				
22SB003	22SB0030002	Surface Soil	19-Jan-11	0-2	X			X	X				
	22SB0030305	Subsurface Soil	19-Jan-11	3-5	X			X	X				
22SB004	22SB0040002	Surface Soil	19-Jan-11	0-2	X			X	X				
	22SB0040305	Subsurface Soil	19-Jan-11	3-5	X			X	X				
22SB005	22SB0050002	Surface Soil	19-Jan-11	0-2	X			X	X				
	22SB005XXXX	Subsurface Soil	NA	NA	–			–	–				Sample not collected due to boring refusal before sample depth
22SB006	22SB0060002	Surface Soil	19-Jan-11	0-2	X			X	X				
	22SB0060304	Subsurface Soil	19-Jan-11	3-4	X			X	X				
22SB007	22SB0070002	Surface Soil	21-Jan-11	0-2	X			X	X				
	22SB0070304	Subsurface Soil	21-Jan-11	3-4	X			X	X				
22SB008	22SB0080002	Surface Soil	19-Jan-11	0-2	X			X	X		X		
	22SB008XXXX	Subsurface Soil	NA	NA	–			–	–		–		Sample not collected due to boring refusal before sample depth
22SB009	22SB0090002	Surface Soil	19-Jan-11	0-2	X			X	X				
	22SB0090305	Subsurface Soil	19-Jan-11	3-5	X			X	X				
22SB010	22SB0100002	Surface Soil	19-Jan-11	0-2	X			X	X				
	22SB0100305	Subsurface Soil	19-Jan-11	3-5	X			X	X				
22SB011	22SB0110002	Surface Soil	19-Jan-11	0-2	X			X	X				
	22SB0110304	Subsurface Soil	19-Jan-11	3-4	X			X	X				
22SB012	22SB0120002	Surface Soil	10-May-12	0-2	X		X		X		X		Field Duplicate 22FD051212-01
	22SB012XXXX	Subsurface Soil	NA	NA	–		–		–		–		Sample not collected due to boring refusal before sample depth
22SB013	22SB0130002	Surface Soil	9-May-12	0-2	X		X		X				
	22SB013XXXX	Subsurface Soil	NA	NA	–		–		–				Sample not collected due to boring refusal before sample depth

TABLE 1

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 22 - LEAD AZIDE POND
NSWC CRANE
CRANE, INDIANA

Sample Location	Sample Identification	Sample Type	Date Sampled	Sample Depth Interval Sampled (feet bgs)	Energetics				Metals		Miscellaneous		Comments
					Nitroaromatics / Nitramines	RDX/HMX	NG/PETN	Perchlorate	RCRA Metals	RCRA Metals (dissolved)	pH	TOC	
22SB014	22SB0140002	Surface Soil	9-May-12	0-2	X		X		X				
	22SB0140203	Subsurface Soil	10-May-12	2-3	X		X		X				
22SB015	22SB0150002	Surface Soil	10-May-12	0-2	X		X		X				
	22SB015XXXX	Subsurface Soil	NA	NA	--		--		--				Sample not collected due to boring refusal before sample depth
	22SB015XXXX	Subsurface Soil	NA	NA	--		--		--				Sample not collected due to boring refusal before sample depth
22SB016	22SB0160002	Surface Soil	9-May-12	0-2	X		X		X				
	22SB0160305	Subsurface Soil	9-May-12	3-5	X		X		X				
	22SB0160608	Subsurface Soil	9-May-12	6-8	X		X		X				
22SB017	22SB0170002	Surface Soil	9-May-12	0-2	X		X		X				
	22SB0170305	Subsurface Soil	9-May-12	3-5	X		X		X				
	22SB017XXXX	Subsurface Soil	NA	NA	--		--		--				Sample not collected due to boring refusal before sample depth
22SB018	22SB0180002	Surface Soil	10-May-12	0-2	X		X		X				
	22SB0180406	Subsurface Soil	11-May-12	4-6									
22SB019	22SB0190002	Surface Soil	10-May-12	0-2	X		X		X				Sample added due to field observations
22SD001	22SD0010006	Sediment	20-Jan-11	0-0.5	X				X			X	
22SD002	22SD0020006	Sediment	20-Jan-11	0-0.5	X				X			X	
22SD003	22SD0030006	Sediment	20-Jan-11	0-0.5	X				X			X	
22SD004	22SD0040006	Sediment	20-Jan-11	0-0.5	X				X			X	
22SD005	22SD0050006	Sediment	20-Jan-11	0-0.5	X				X			X	
22SD006	22SD0060006	Sediment	18-Jan-11	0-0.5	X				X		X	X	
	22SD0060624	Sediment	18-Jan-11	0.5-2	X				X		X	X	
22SD007	22SD0070006	Sediment	18-Jan-11	0-0.5	X				X			X	
	22SD0070624	Sediment	18-Jan-11	0.5-2	X				X			X	
22SD008	22SD0080006	Sediment	18-Jan-11	0-0.5	X				X			X	
	22SD0080624	Sediment	18-Jan-11	0.5-2	X				X			X	
22SD009	22SD0090006	Sediment	20-Jan-11	0-0.5	X				X			X	Field Duplicate 22SDDUP01
22SD010	22SD0100006	Sediment	20-Jan-11	0-0.5	X				X			X	
22SD010	22SD0100006	Sediment	12-May-12	0-0.5			X					X	
22SD011	22SD0110006	Sediment	20-Jan-11	0-0.5	X				X			X	
22SD017	22SD0170006	Sediment	11-May-12	0-0.5			X		X			X	
22SD018	22SD0180006	Sediment	9-Apr-11	0-0.5	X				X			X	Field Duplicate 22FD04091102
22SD018	22SD0180006	Sediment	12-May-12	0-0.5			X					X	
22SD022	22SD0220006	Sediment	NA	NA	--		--		--			--	Listed as SD in SAP, no flow sampled as SS, see above 22SS022
22SD023	22SD0230006	Sediment	11-May-12	0-0.5	X		X		X		X	X	
22SD024	22SD0240006	Sediment	11-May-12	0-0.5	X		X		X			X	

TABLE 1

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SWMU 22 - LEAD AZIDE POND
NSWC CRANE
CRANE, INDIANA

Sample Location	Sample Identification	Sample Type	Date Sampled	Sample Depth Interval Sampled (feet bgs)	Energetics				Metals		Miscellaneous		Comments
					Nitroaromatics / Nitramines	RDX/HMX	NG/PETN	Perchlorate	RCRA Metals	RCRA Metals (dissolved)	pH	TOC	
22SD025	22SD0250006	Sediment	NA	NA	–		–		–			–	Listed as SD in SAP, no flow sampled as SS, see above 22SS022
22SD026	22SD0260006	Sediment	11-May-12	0-0.5	X		X		X			X	Sample added due to field observations
22SW001	22SW001	Surface Water	20-Jan-11	–	X			X	X	X			
22SW002	22SW002	Surface Water	20-Jan-11	–	X			X	X	X			
22SW003	22SW003	Surface Water	20-Jan-11	–	X			X	X	X			
22SW004	22SW004	Surface Water	20-Jan-11	–	X			X	X	X			
22SW005	22SW005	Surface Water	20-Jan-11	NA	–			–	–	–			Dry, not sampled
22SW006	22SW006	Surface Water	18-Jan-11	–	X			X	X	X			
22SW007	22SW007	Surface Water	18-Jan-11	–	X			X	X	X			
22SW008	22SW008	Surface Water	18-Jan-11	–	–			–	–	–			Dry, not sampled
22SW009	22SW009	Surface Water	20-Jan-11	–	X			X	X	X			Field Duplicate 22SWDUP01
22SW010	22SW010	Surface Water	20-Jan-11	–	X			X	X	X			
22SW010	22SW010	Surface Water	12-May-12	–			X						
22SW011	22SW011	Surface Water	20-Jan-11	–	X			X	X	X			
22SW012	22SW012	Surface Water	9-Apr-11	–		X							
22SW013	22SW013	Surface Water	9-Apr-11	–		X							
22SW014	22SW014	Surface Water	9-Apr-11	–		X							
22SW015	22SW015	Surface Water	9-Apr-11	–		X							
22SW016	22SW016	Surface Water	9-Apr-11	–		X							
22SW017	22SW017	Surface Water	9-Apr-11	–		X							
22SW017	22SW017	Surface Water	11-May-12	–			X		X				
22SW018	22SW018	Surface Water	9-Apr-11	–	X				X	X			Field Duplicate 22FD04091101
22SW018	22SW018	Surface Water	12-May-12	NA			–						Dry, not sampled
22SW019	22SW019	Surface Water	9-Apr-11	–		X							
22SW020	22SW020	Surface Water	9-Apr-11	–		X							
22SW021	22SW021	Surface Water	9-Apr-11	–		X							
22SW022	22SW022	Surface Water	12-May-12	NA									Dry, not sampled
22SW023	22SW023	Surface Water	11-May-12	–	X		X		X		X		
22SW024	22SW024	Surface Water	11-May-12	–	X		X		X				Field Duplicate 22SWDUP01
22SW025	22SW025	Surface Water	11-May-12	NA									Dry, not sampled
22MWT001	22GWT001	Groundwater	22-May-12	15-25	X		X	X	X	X			
22MWT002	22GWT002	Groundwater	22-May-12	11-21	X		X	X	X	X			Field Duplicate 22GWDUP01
22MWT003	22GWT003	Groundwater	23-May-12	13-23	X		X	X	X				
22MWT004	22GWT004	Groundwater	23-May-12	15-25	X		X	X	X	X			
22MWT005	22GWT005	Groundwater	21-May-12	9-19	X		X	X	X	X			
22MWT006	22GWT006	Groundwater	21-May-12	15-25	X		X	X	X	X			

TABLE 2a

GROUNDWATER QUALITY DATA
SWMU 22 - LEAD AZIDE POND
NSA CRANE, IN

Well Number	Sample ID	Sample Date	pH	Spec Cond (mS/cm)	Temp (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)
22MWT001	22GWT001	5/22/2012	5.90	0.592	18.84	140	6.20	126
22MWT002	22GWT002	5/22/2012	3.93	0.940	15.83	20	5.36	352
22MWT003	22GWT003	5/23/2012	3.74	1.89	18.93	9.3	3.70	350
22MWT004	22GWT004	5/23/2012	5.10	1.22	16.32	273	2.75	167
22MWT005	22GWT005	5/21/2012	3.84	0.400	17.64	13.0	9.10	327
22MWT006	22GWT006	5/21/2012	4.18	5.60	17.59	2.8	5.56	309

Notes
DO = dissolved oxygen
mg/L = milligram per liter
mS/cm = milliSiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity units
ORP = oxidation-reduction potential
Spec Cond = spoecific conductance
Temp = temperature

TABLE 2b

SURFACE WATER QUALITY DATA
SWMU 22 - LEAD AZIDE POND
NSA CRANE, IN

Location Number	Sample ID	Sample Date	pH	Spec Cond (mS/cm)	Temp (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)
22SW001	22SW001	1/20/2011	5.95	1.51	-0.5	0.0	15.50	250
22SW002	22SW002	1/20/2011	6.96	1.51	-0.23	0.8	14.82	189
22SW003	22SW003	1/20/2011	7.37	1.64	0.19	12.4	13.95	185
22SW004	22SW004	1/20/2011	7.39	0.233	-0.19	683	13.82	132
22SW006	22SW006	1/18/2011	6.07	0.229	5.3	11	9.27	233
22SW007	22SW007	1/18/2011	6.71	0.232	5.25	2.4	6.35	207
22SW009	22SW009	1/20/2011	7.84	0.523	-0.19	18.5	11.45	139
22SW010	22SW010	1/20/2011	7.66	0.555	0.57	25.6	13.21	23
		5/12/2012	7.17	0.495	18.67	6.1	3.47	1
22SW011	22SW011	1/20/2011	7.83	1.720	-0.08	8.0	14.15	150
22SW012	22SW012	4/9/2011	7.05	0.146	13.56	17.1	9.65	129
22SW013	22SW013	4/9/2011	7.16	0.38	16.32	13	9.85	123
22SW014	22SW014	4/9/2011	6.93	0.261	15.26	7.47	8.65	123
22SW015	22SW015	4/9/2011	5.22	0.102	13.12	10.35	9.52	255
22SW016	22SW016	4/9/2011	6.5	0.156	14.81	17.9	10.3	158
22SW017	22SW017	4/9/2011	6.19	0	14.6	14.50	13.23	146
		5/11/2012	6.65	0.459	17.65	0.6	6.77	46
22SW018	22SW018	4/9/2011	7.03	0.000	21.84	9.20	9.36	236
		5/12/2012	-- DRY --					
22SW019	22SW019	4/9/2011	7.15	0.119	12.89	11.4	11.33	137
22SW020	22SW020	4/9/2011	6.84	0.526	15.92	17.7	11.92	124
22SW021	22SW021	4/9/2011	6.85	0.258	18.28	32.80	9.2	135

TABLE 2b

SURFACE WATER QUALITY DATA
SWMU 22 - LEAD AZIDE POND
NSA CRANE, IN

Location Number	Sample ID	Sample Date	pH	Spec Cond (mS/cm)	Temp (°C)	Turbidity (NTU)	DO (mg/L)	ORP (mV)
22SW023	22SW023	5/11/2012	7.06	0.296	17.64	3.20	4.79	113
22SW024	22SW024	5/11/2012	7.29	0.942	16.90	4.9	6.53	61

Notes
DO = dissolved oxygen
mg/L = milligram per liter
mS/cm = milliSiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity units
ORP = oxidation-reduction potential
Spec Cond = spoecific conductance
Temp = temperature

TABLE 3

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

Receptor Population	Environmental Media	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Overall Risk (Ecological)	Critical Pathways & Chemicals of Concern
Current/Future Construction Worker (Adult)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Groundwater	7E-08	0.002	NA	NA
Current/Future Industrial Worker (Adult)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
Current/Future Trespassers (Adolescent)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Surface Water	1E-06	3E-03	NA	NA
	Sediment	3E-07	3E-03	NA	NA
Future Recreational User (Child)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Surface Water	4E-06	0.008	NA	NA
	Sediment	4E-06	0.02	NA	NA
Future Recreational User (Adult)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Surface Water	2E-06	0.003	NA	NA
	Sediment	8E-07	0.004	NA	NA

TABLE 3

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

Receptor Population	Environmental Media	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Overall Risk (Ecological)	Critical Pathways & Chemicals of Concern
Future Recreational User (Lifelong)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Surface Water	6E-06	NA	NA	NA
	Sediment	4E-06	NA	NA	NA
Hypothetical Resident (Child)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Groundwater	3E-04 (7E-05)(1)	3 (2)(1)	NA	Ingestion of groundwater (**arsenic**, chromium, RDX)
	Surface Water	2E-06	0.005	NA	NA
	Sediment	2E-06	0.01	NA	NA
Hypothetical Resident (Adult)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Groundwater	2E-04 (1E-04)(1)	1 (1)(1)	NA	Ingestion of groundwater (arsenic, chromium, RDX)
	Surface Water	2E-06	0.003	NA	NA
	Sediment	8E-07	0.004	NA	NA

TABLE 3

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SWMU 22 - LEAD AZIDE POND
NSA CRANE
CRANE, INDIANA

Receptor Population	Environmental Media	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Overall Risk (Ecological)	Critical Pathways & Chemicals of Concern
Hypothetical Resident (Lifelong)	Surface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Subsurface Soil	No carcinogenic COPCs	No noncarcinogenic COPCs	NA	NA
	Groundwater	5E-04 (2E-04)[1]	NA	NA	Ingestion of groundwater (**arsenic**, chromium, RDX)
	Surface Water	4E-06	NA	NA	NA
	Sediment	2E-06	NA	NA	NA
Mammals and Birds	Surface Soil	NA	NA	Acceptable	NA
Terrestrial Plants and Invertebrates	Surface Soil	NA	NA	Acceptable	NA

Notes
CMS = Corrective Measures Study
LTM = Long-Term Monitoring
LUC = Land Use Control
NFA = No further action

Shaded cells have unacceptable risk or hazard.
Bolded parameters represent significant contributor to overall risk or hazard.

[1] Chromium was evaluated in the human health risk assessment as hexavalent chromium.
Value in parenthesis is cancer risk or hazard index if chromium is evaluated as trivalent chromium

TABLE 4

SUPPLEMENTAL SAMPLING AND ANALYSIS
SWMU 22 - LEAD AZIDE POND
NAVAL SUPPORT ACTIVITY
CRANE, INDIANA

Sampling Location	ID Number	Matrix	Depth (feet or inches bgs)	Analysis	Number of Samples	Sampling SOP Reference[1]
22SS003	22SS0030002 and 22FDXXXXXX01[2]	Soil	0 - 2'	RDX, TNT Chromium (III +IV)	1 + 1 FD	SOP-10
22SS004	22SS0040002	Soil	0 - 2'	RDX, TNT	1	SOP-10
22SS005	22SS0050002	Soil	0 - 2'	RDX, TNT	1	SOP-10
22SS006	22SS0060002	Soil	0 - 2'	RDX, TNT	1	SOP-10
22SS007	22SS0070002	Soil	0 - 2'	RDX, TNT	1	SOP-10
22SS008	22SS0080002	Soil	0 - 2'	RDX, TNT	1	SOP-10
22SD017	22SW0170006	Sediment	0-6"	RDX, TNT	1	SOP-07
22SW025	22SW025 22SW025-F[3]	Surface Water	At water surface	RDX, TNT	1 + 1 FD	SOP-05, SOP-06
22MWT005	22GWT005 22GWT005-F[3]	Groundwater	NA	Chromium (III +IV)	1 + 1 FD	SOP-18, SOP-19

Notes:

(1) Sampling SOP reference from SWMU 22 RFI UFP-SAP (Tetra Tech, January 2011) and SAP Addednum (Tetra Tech, May 2012)

(2) Field duplicate (FD) locations may change in the field based on visual observations and field conditions. "XXXXXX" represents date collected.

(3) For a filtered groundawter and surface water samples, "-F" will be added to the end of the ID number (e.g. 22SW025-F).

NA - not applicable