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FIELD TASK MODIFICATION REQUEST FORM TO SAMPLING AND ANALYSIS PLAN FACILITY INVESTIGATION SOLID WASTE MANAGEMENT UNIT 18 (SWMU 18) LOAD AND FILL AREA SUBAREA E B104 AREA NSA CRANE IN
2/15/2013
TETRA TECH

TETRA TECH

FIELD TASK MODIFICATION REQUEST FORM

Project/Installation Name SWMU 18 – Load and Fill Area, NSA Crane, IN	CTO & Project Number CTO F201; 112G01851	Task Modification Number E001
Modification to: Sampling and Analysis Plan, RCRA Facility Investigation, SWMU 18-Load and Fill Area	**Site Location** Subarea E – B104 Area	**Date of Request** February 15, 2013

Background. Tetra Tech performed RCRA Facility Investigation (RFI) sampling at Subarea E – B104 Area – from October 2011 through January 2012 that included the collection of surface and subsurface soil samples, composite soil samples, surface water and sediment samples, and groundwater samples. Samples were collected in four areas of Subarea E: Building 104 area, Building 189 area, and two areas in the western portion of Subarea E. Analyses included explosives and metals for all media. Volatile organic compounds (VOCs) were also analyzed from surface and subsurface soil samples, sediment samples, and groundwater samples around Building 104. Polychlorinated biphenyls were analyzed from three composite soil samples around Building 104, and fuel oil parameters were analyzed from soil samples from the UST near Building 104. Explosives, metals, ammonia and perchlorate were analyzed from groundwater samples from the three monitoring wells around Building 189. The distribution of constituents in the site media are illustrated on Figures E-2a-c and E-3.

Based on the human risk assessment, unacceptable risks from were estimated for:

- Hypothetical future construction worker for manganese in subsurface soil
- Hypothetical future residents for chlorinated VOCS, explosives, and metals in groundwater.
- Hypothetical future residents for polynuclear aromatic hydrocarbons (PAHs) (related fuel oil) and metals in surface and surface soil.
- Ecological receptors for metals in surface soil.

Table E-1 summarizes the results of the risk assessment for Subarea E based on the data collected to date. To characterize the nature and extent of contamination in site media at Subarea E, additional characterization activities are proposed. Metals in groundwater are being evaluated separately as part of a desktop study for the RFI to determine if concentrations represent background conditions (either naturally occurring or area-wide anthropogenic conditions). Potential ecological risks associated related to metals in surface soil will be further evaluated in the RFI.

Purpose of FTMR. The purpose of this FTMR form is to present the supplemental sampling to: 1) collect surface soil samples along drainage swales at Subarea E to assess residual explosives contamination that may be contributing the groundwater contamination, and 2) collect surface and subsurface soil samples for chlorinated VOCs to assess potential sources areas that may be contributing to groundwater contamination.

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

The approximate locations of the proposed supplemental surface soil samples and soil borings are shown on Figure E-5; the supplemental sampling and analysis is presented on attached Table E-4 and described as follows:

- **Surface Soil:** Three surface soil samples will be collected from Subarea E and analyzed for explosives. Two samples (18ESS018 and 18ESS019) will be from the drainage swales northwest of Building 104, and one sample will be from the drainage swale southwest of Building 189 (18ESS020). 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.

  In addition, a surface soil sample from the previously sampled location of 18ESS005 will also be analyzed for chromium speciation. The analysis method for the chromium speciation will be SW-846 Method 7199.

- **Soil Boring:** Six soil borings will be advanced to collect subsurface soil samples in the areas of in and around the area of Building 0104 to assess potential source areas of the chlorinated VOCs contamination. Three soil borings (18SB013 through 18ESB015) will be collected just outside of Building 104 to the northwest of each degreaser, along sewer lines. Three soil boring locations (18ESB016 through 18ESB018) will be located in Building 104 at the approximate location of former the degreasers. Surface soil samples and subsurface soil samples will be collected at two-foot intervals down to bedrock. The subsurface soil samples will be collected in accordance with SOP-08, SOP-09, and SOP-10 of the September 2011 SAP.

- **Groundwater**: A groundwater sample will be collected from monitoring well 18EMWT005 and analyzed for chromium speciation. Monitoring well 18EMWT005 will be purged and sampled in accordance with SOP-16 and SOP-17 of the September 2011 SAP. The analysis method for the chromium speciation will be EPA Method 218.6.

Attachments to this FTMR include:

Figures
Figure E-1a – 2011 Sample Locations
Figure E-1b – 2011 Area Sampling Locations
Figure E-2a – Exceedances of Analytes in Soil
Figure E-2b –Exceedances of Analytes in Soil
Figure E-2c – Exceedances of Analytes in Soil
Figure E-3 – Exceedances of Analytes in Groundwater
Figure E-4 – Groundwater Potentiometric Map
Figure E-5 – Proposed Sample Locations

Table
Table E-1 Summary of Receptor-Specific Human Risks and Hazards an Ecological Risks
Table E-2 Proposed Supplemental Sampling and Analysis

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

Person Requesting Change/Modification:
2/15/13
Tim Evans, Project Manager / Date

Approvals:
2/15/13
Ralph Basinski, Tetra Tech Activity Coordinator / Date

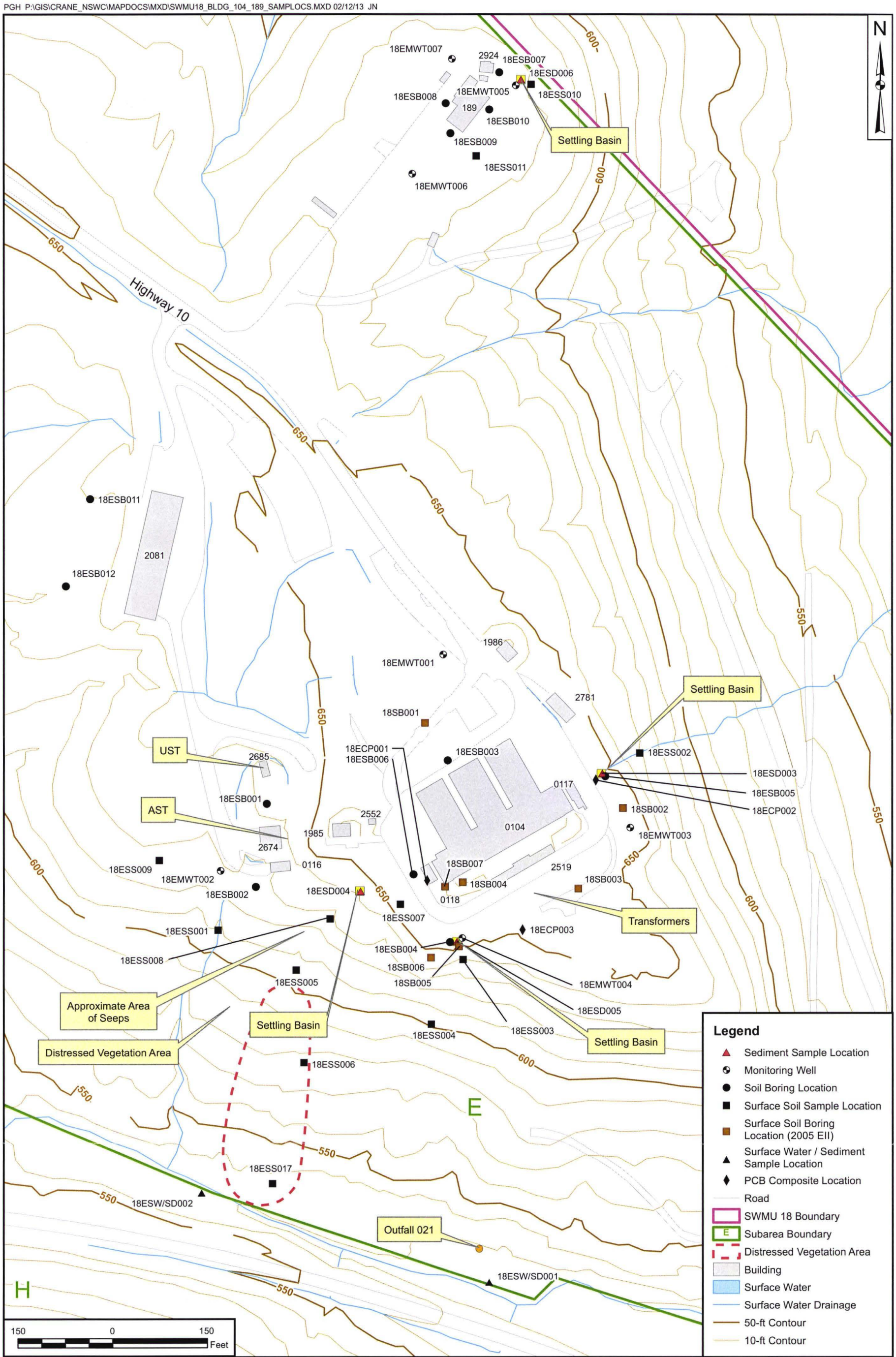
Modifications to the HASP required based on this change? ☐ Yes ☒ No ☐ NA

N/A
Health Safety Manager (Signature)

N/A
Date

FIGURES

PGH P:\GIS\CRANE_NSWC\MAPDOCS\MXD\SWMU18_BLDG_104_189_SAMPLOCS.MXD 02/12/13 JN



DRAWN BY	DATE
J. NOVAK	08/17/12
CHECKED BY	DATE
T. EVANS	02/12/13
REVISED BY	DATE
D. COUCH	02/12/13
SCALE	
AS NOTED	

NAVFAC

SUBAREA E - BUILDING 104 & 189 AREA
SAMPLE LOCATIONS
SWMU 18 - LOAD & FILL AREA
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
1851	F201
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
FIGURE NO. FIGURE E-1a	REV 0

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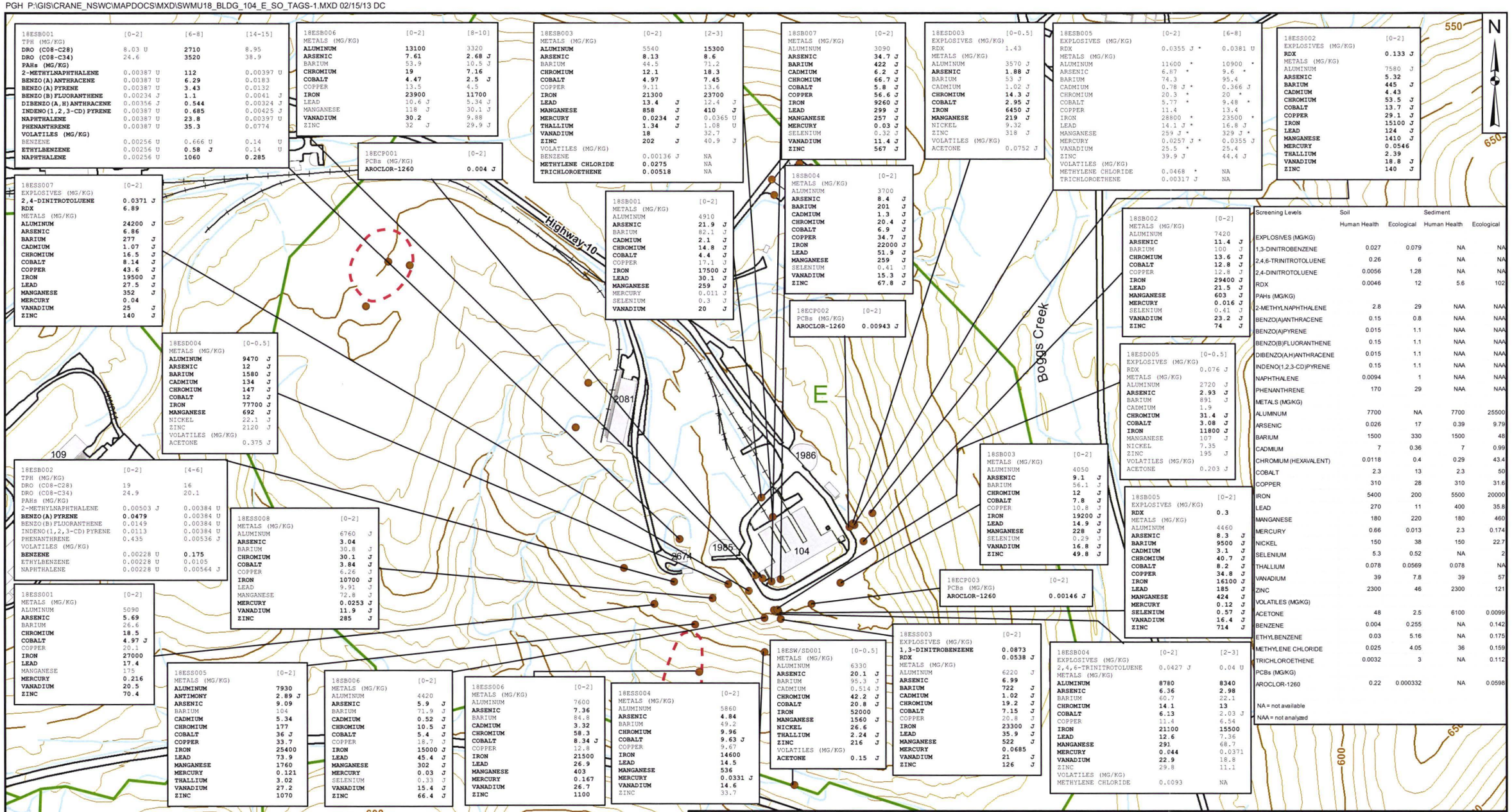

18ESB001	[0-2]	[6-8]	[14-15]
TPH (MG/KG)			
DRO (C08-C28)	8.03 U	2710	8.95
DRO (C08-C34)	24.6	3520	38.9
PAHs (MG/KG)			
2-METHYLNAPHTHALENE	0.00387 U	112	0.00397 U
BENZO(A)ANTHRACENE	0.00387 U	6.29	0.0183
BENZO(A)PYRENE	0.00387 U	3.43	0.0132
BENZO(B)FLUORANTHENE	0.00234 J	1.1	0.0041 J
DIBENZO(A,H)ANTHRACENE	0.00356 J	0.544	0.00324 J
INDENO(1,2,3-CD)PYRENE	0.00387 U	0.685	0.00425 J
NAPHTHALENE	0.00387 U	23.8	0.00397 U
PHENANTHRENE	0.00387 U	35.3	0.0774
VOLATILES (MG/KG)			
BENZENE	0.00256 U	0.666 U	0.14 U
ETHYLBENZENE	0.00256 U	0.58 J	0.14 U
NAPHTHALENE	0.00256 U	1060	0.285

18ESB006	[0-2]	[8-10]
METALS (MG/KG)		
ALUMINUM	13100	3320
ARSENIC	7.61	2.68 J
BARIUM	53.9	10.5 J
CHROMIUM	19	7.16
COBALT	4.47	2.5 J
COPPER	13.5	4.5
IRON	23900	11700
LEAD	10.6 J	5.34 J
MANGANESE	118 J	30.1 J
VANADIUM	30.2	9.88
ZINC	32 J	29.9 J

18ECP001	[0-2]
PCBs (MG/KG)	
AROCLOR-1260	0.004 J

18ESB003	[0-2]	[2-3]
METALS (MG/KG)		
ALUMINUM	5540	15300
ARSENIC	8.13	8.6
BARIUM	44.5	71.2
CHROMIUM	12.1	18.3
COBALT	4.97	7.45
COPPER	9.11	13.6
IRON	21300	23700
LEAD	13.4 J	12.4 J
MANGANESE	858 J	410 J
MERCURY	0.0234 J	0.0365 U
THALLIUM	1.34 J	1.08 U
VANADIUM	18	32.7
ZINC	202 J	40.9 J
VOLATILES (MG/KG)		
BENZENE	0.00136 J	NA
METHYLENE CHLORIDE	0.0275	NA
TRICHLOROETHENE	0.00518	NA

18SB007	[0-2]
METALS (MG/KG)	
ALUMINUM	3090
ARSENIC	34.7 J
BARIUM	422 J
CADMIUM	6.2 J
CHROMIUM	66.7 J
COBALT	5.8 J
COPPER	56.6 J
IRON	9260 J
LEAD	299 J
MANGANESE	257 J
MERCURY	0.03 J
SELENIUM	0.32 J
VANADIUM	11.4 J
ZINC	567 J

18ESD003	[0-0.5]
EXPLOSIVES (MG/KG)	
RDX	1.43
METALS (MG/KG)	
ALUMINUM	3570 J
ARSENIC	1.88 J
BARIUM	53 J
CADMIUM	1.02 J
CHROMIUM	14.3 J
COBALT	2.95 J
IRON	6450 J
MANGANESE	219 J
NICKEL	9.32
ZINC	318 J
VOLATILES (MG/KG)	
ACETONE	0.0752 J

18ESB005	[0-2]	[6-8]
EXPLOSIVES (MG/KG)		
RDX	0.0355 J *	0.0381 U
METALS (MG/KG)		
ALUMINUM	11600 *	10900 *
ARSENIC	6.87 *	9.6 *
BARIUM	74.3	95.4
CADMIUM	0.78 J *	0.366 J
CHROMIUM	20.3 *	20 *
COBALT	5.77 *	9.48 *
COPPER	11.4	13.4
IRON	28800 *	23500 *
LEAD	14.1 J *	16.8 J
MANGANESE	259 J *	329 J *
MERCURY	0.0257 J *	0.0355 J
VANADIUM	25.5 *	25.4
ZINC	39.9 J	44.4 J
VOLATILES (MG/KG)		
METHYLENE CHLORIDE	0.0468 *	NA
TRICHLOROETHENE	0.00317 J	NA

18ESS002	[0-2]
EXPLOSIVES (MG/KG)	
RDX	0.133 J
METALS (MG/KG)	
ALUMINUM	7580 J
ARSENIC	5.32
BARIUM	445 J
CADMIUM	4.43
CHROMIUM	53.5 J
COBALT	13.7 J
COPPER	29.1 J
IRON	15100 J
LEAD	124 J
MANGANESE	1410 J
MERCURY	0.0546
THALLIUM	2.39
VANADIUM	18.8 J
ZINC	140 J

18ESS007	[0-2]
EXPLOSIVES (MG/KG)	
2,4-DINITROTOLUENE	0.0371 J
RDX	6.89
METALS (MG/KG)	
ALUMINUM	24200 J
ARSENIC	6.86
BARIUM	277 J
CADMIUM	1.07 J
CHROMIUM	16.5 J
COBALT	8.14 J
COPPER	43.6 J
IRON	19500 J
LEAD	27.5 J
MANGANESE	352 J
MERCURY	0.04
VANADIUM	25 J
ZINC	140 J

18ESB001	[0-2]
METALS (MG/KG)	
ALUMINUM	4910
ARSENIC	21.9 J
BARIUM	82.1 J
CADMIUM	2.1 J
CHROMIUM	14.8 J
COBALT	4.4 J
COPPER	17.1 J
IRON	17500 J
LEAD	30.1 J
MANGANESE	259 J
MERCURY	0.011 J
SELENIUM	0.3 J
VANADIUM	20 J

18SB004	[0-2]
METALS (MG/KG)	
ALUMINUM	3700
ARSENIC	8.4 J
BARIUM	201 J
CADMIUM	1.3 J
CHROMIUM	20.4 J
COBALT	6.9 J
COPPER	34.7 J
IRON	22000 J
LEAD	51.9 J
MANGANESE	259 J
SELENIUM	0.41 J
VANADIUM	15.3 J
ZINC	67.8 J

18ECP002	[0-2]
PCBs (MG/KG)	
AROCLOR-1260	0.00943 J

18SB002	[0-2]
METALS (MG/KG)	
ALUMINUM	7420
ARSENIC	11.4 J
BARIUM	100 J
CHROMIUM	13.6 J
COBALT	12.8 J
COPPER	12.8 J
IRON	29400 J
LEAD	21.5 J
MANGANESE	603 J
MERCURY	0.016 J
SELENIUM	0.41 J
VANADIUM	23.2 J
ZINC	74 J

18ESD004	[0-0.5]
METALS (MG/KG)	
ALUMINUM	9470 J
ARSENIC	12 J
BARIUM	1580 J
CADMIUM	134 J
CHROMIUM	147 J
COBALT	12 J
IRON	77700 J
MANGANESE	692 J
NICKEL	22.1 J
ZINC	2120 J
VOLATILES (MG/KG)	
ACETONE	0.375 J

18ESD005	[0-0.5]
EXPLOSIVES (MG/KG)	
RDX	0.076 J
METALS (MG/KG)	
ALUMINUM	2720 J
ARSENIC	2.93 J
BARIUM	891 J
CADMIUM	1.9
CHROMIUM	31.4 J
COBALT	3.08 J
IRON	11800 J
MANGANESE	107 J
NICKEL	7.35
ZINC	195 J
VOLATILES (MG/KG)	
ACETONE	0.203 J

18ESB002	[0-2]	[4-6]
TPH (MG/KG)		
DRO (C08-C28)	19	16
DRO (C08-C34)	24.9	20.1
PAHs (MG/KG)		
2-METHYLNAPHTHALENE	0.00503 J	0.00384 U
BENZO(A)PYRENE	0.0479	0.00384 U
BENZO(B)FLUORANTHENE	0.0149	0.00384 U
INDENO(1,2,3-CD)PYRENE	0.0113	0.00384 U
PHENANTHRENE	0.435	0.00536 J
VOLATILES (MG/KG)		
BENZENE	0.00228 U	0.175
ETHYLBENZENE	0.00228 U	0.0105
NAPHTHALENE	0.00228 U	0.00564 J

18ESB008	[0-2]
METALS (MG/KG)	
ALUMINUM	6760 J
ARSENIC	3.04
BARIUM	30.8 J
CHROMIUM	30.1 J
COBALT	3.84 J
COPPER	6.26 J
IRON	10700 J
LEAD	9.91 J
MANGANESE	72.8 J
MERCURY	0.0253 J
VANADIUM	11.9 J
ZINC	285 J

18SB003	[0-2]
METALS (MG/KG)	
ALUMINUM	4050
ARSENIC	9.1 J
BARIUM	56.1 J
CHROMIUM	12 J
COBALT	7.8 J
COPPER	10.8 J
IRON	19200 J
LEAD	14.9 J
MANGANESE	228 J
SELENIUM	0.29 J
VANADIUM	16.8 J
ZINC	49.8 J

18ESB005	[0-2]
EXPLOSIVES (MG/KG)	
RDX	0.3
METALS (MG/KG)	
ALUMINUM	4460
ARSENIC	8.3 J
BARIUM	9500 J
CADMIUM	3.1 J
CHROMIUM	40.7 J
COBALT	8.2 J
COPPER	34.8 J
IRON	16100 J
LEAD	185 J
MANGANESE	424 J
MERCURY	0.12 J
SELENIUM	0.57 J
VANADIUM	16.4 J
ZINC	714 J

18ECP003	[0-2]
PCBs (MG/KG)	
AROCLOR-1260	0.00146 J

18ESS001	[0-2]
METALS (MG/KG)	
ALUMINUM	5090
ARSENIC	5.69
BARIUM	26.6
CHROMIUM	18.5
COBALT	4.97 J
COPPER	20.1
IRON	27000
LEAD	17.4
MANGANESE	175
MERCURY	0.216
VANADIUM	20.5
ZINC	70.4

18ESS005	[0-2]
METALS (MG/KG)	
ALUMINUM	7930
ANTIMONY	2.89 J
ARSENIC	9.09
BARIUM	104
CADMIUM	5.34
CHROMIUM	177
COBALT	36 J
COPPER	33.7
IRON	25400
LEAD	73.9
MANGANESE	1760
MERCURY	0.121
THALLIUM	3.02
VANADIUM	27.2
ZINC	1070

18SB006	[0-2]
METALS (MG/KG)	
ALUMINUM	4420
ARSENIC	5.9 J
BARIUM	71.9 J
CADMIUM	0.52 J
CHROMIUM	10.5 J
COBALT	5.4 J
COPPER	18.7 J
IRON	15000 J
LEAD	45.4 J
MANGANESE	302 J
MERCURY	0.03 J
SELENIUM	0.33 J
VANADIUM	15.4 J
ZINC	66.4 J

18ESS006	[0-2]
METALS (MG/KG)	
ALUMINUM	7600
ARSENIC	7.36
BARIUM	84.8
CADMIUM	3.32
CHROMIUM	58.3
COBALT	8.34 J
COPPER	12.8
IRON	21500
LEAD	26.9
MANGANESE	403
MERCURY	0.167
VANADIUM	26.7
ZINC	1100

18ESS004	[0-2]
METALS (MG/KG)	
ALUMINUM	5860
ARSENIC	4.84
BARIUM	49.2
CHROMIUM	9.96
COBALT	9.63 J
COPPER	9.67
IRON	14600
LEAD	14.5
MANGANESE	536
MERCURY	0.0331 J
VANADIUM	14.6
ZINC	33.7

18ESW/SD001	[0-0.5]
METALS (MG/KG)	
ALUMINUM	6330
ARSENIC	20.1 J
BARIUM	95.3 J
CADMIUM	0.514 J
CHROMIUM	42.2 J
COBALT	20.8 J
IRON	52000
MANGANESE	1560 J
NICKEL	26.6
THALLIUM	2.24 J
ZINC	216 J
VOLATILES (MG/KG)	
ACETONE	0.15 J

18ESS003	[0-2]
EXPLOSIVES (MG/KG)	
1,3-DINITROBENZENE	0.0873
RDX	0.0538 J
METALS (MG/KG)	
ALUMINUM	6220 J
ARSENIC	6.99
BARIUM	722 J
CADMIUM	1.02 J
CHROMIUM	19.2 J
COBALT	7.15 J
COPPER	20.8 J
IRON	23300 J
LEAD	35.9 J
MANGANESE	522 J
MERCURY	0.0685
VANADIUM	21 J
ZINC	126 J

18ESB004	[0-2]	[2-3]
EXPLOSIVES (MG/KG)		
2,4,6-TRINITROTOLUENE	0.0427 J	0.04 U
METALS (MG/KG)		
ALUMINUM	8780	8340
ARSENIC	6.36	2.98
BARIUM	60.7	22.1
CHROMIUM	14.1	13
COBALT	6.13	2.03 J
COPPER	11.4	6.54
IRON	21100	15500
LEAD	12.6	7.36
MANGANESE	291	68.7
MERCURY	0.044	0.0371
VANADIUM	22.9	18.8
ZINC	29.8	11.1
VOLATILES (MG/KG)		
METHYLENE CHLORIDE	0.0093	NA

Screening Levels	Soil		Sediment	
	Human Health	Ecological	Human Health	Ecological
EXPLOSIVES (MG/KG)				
1,3-DINITROBENZENE	0.027	0.079	NA	NA
2,4,6-TRINITROTOLUENE	0.26	6	NA	NA
2,4-DINITROTOLUENE	0.0056	1.28	NA	NA
RDX	0.0046	12	5.6	102
PAHs (MG/KG)				
2-METHYLNAPHTHALENE	2.8	29	NAA	NAA
BENZO(A)ANTHRACENE	0.15	0.8	NAA	NAA
BENZO(A)PYRENE	0.015	1.1	NAA	NAA
BENZO(B)FLUORANTHENE	0.15	1.1	NAA	NAA
DIBENZO(A,H)ANTHRACENE	0.015	1.1	NAA	NAA
INDENO(1,2,3-CD)PYRENE	0.15	1.1	NAA	NAA
NAPHTHALENE	0.0094	1	NAA	NAA
PHENANTHRENE	170	29	NAA	NAA
METALS (MG/KG)				
ALUMINUM	7700	NA	7700	25500
ARSENIC	0.026	17	0.39	9.79
BARIUM	1500	330	1500	48
CADMIUM	7	0.36	7	0.99
CHROMIUM (HEXAVALENT)	0.0118	0.4	0.29	43.4
COBALT	2.3	13	2.3	50
COPPER	310	28	310	31.6
IRON	5400	200	5500	20000
LEAD	270	11	400	35.8
MANGANESE	180	220	180	460
MERCURY	0.66	0.013	2.3	0.174
NICKEL	150	38	150	22.7
SELENIUM	5.3	0.52	NA	2
THALLIUM	0.078	0.0569	0.078	NA
VANADIUM	39	7.8	39	57
ZINC	2300	46	2300	121
VOLATILES (MG/KG)				
ACETONE	48	2.5	6100	0.0099
BENZENE	0.004	0.255	NA	0.142
ETHYLBENZENE	0.03	5.16	NA	0.175
METHYLENE CHLORIDE	0.025	4.05	36	0.159
TRICHLOROETHENE	0.0032	3	NA	0.112
PCBs (MG/KG)				
AROCLOR-1260	0.22	0.000332	NA	0.0598

NA = not available

NAA = not analyzed

Legend

- Soil Sample Locations
- Distressed Vegetation Area
- Subarea Boundary
- AOC 01 Site Boundary
- Existing Building
- Railroad
- Roads
- Surface Water Drainage

Note: Bolded values represent exceedances of Human Health or Ecological Screening Levels.

300 0 300 Feet

DRAWN BY	DATE
J. NOVAK	09/17/12
CHECKED BY	DATE
T. EVANS	02/15/13
REVISED BY	DATE
D. COUCH	02/13/13
SCALE	
AS NOTED	

NAVFAC

SUBAREA E - BUILDING 104 AREA
EXCEEDANCES OF ANALYTES IN SOIL
SWMU 18 - LOAD & FILL AREA
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
1851	F201
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO. FIGURE E-2a	REV 0

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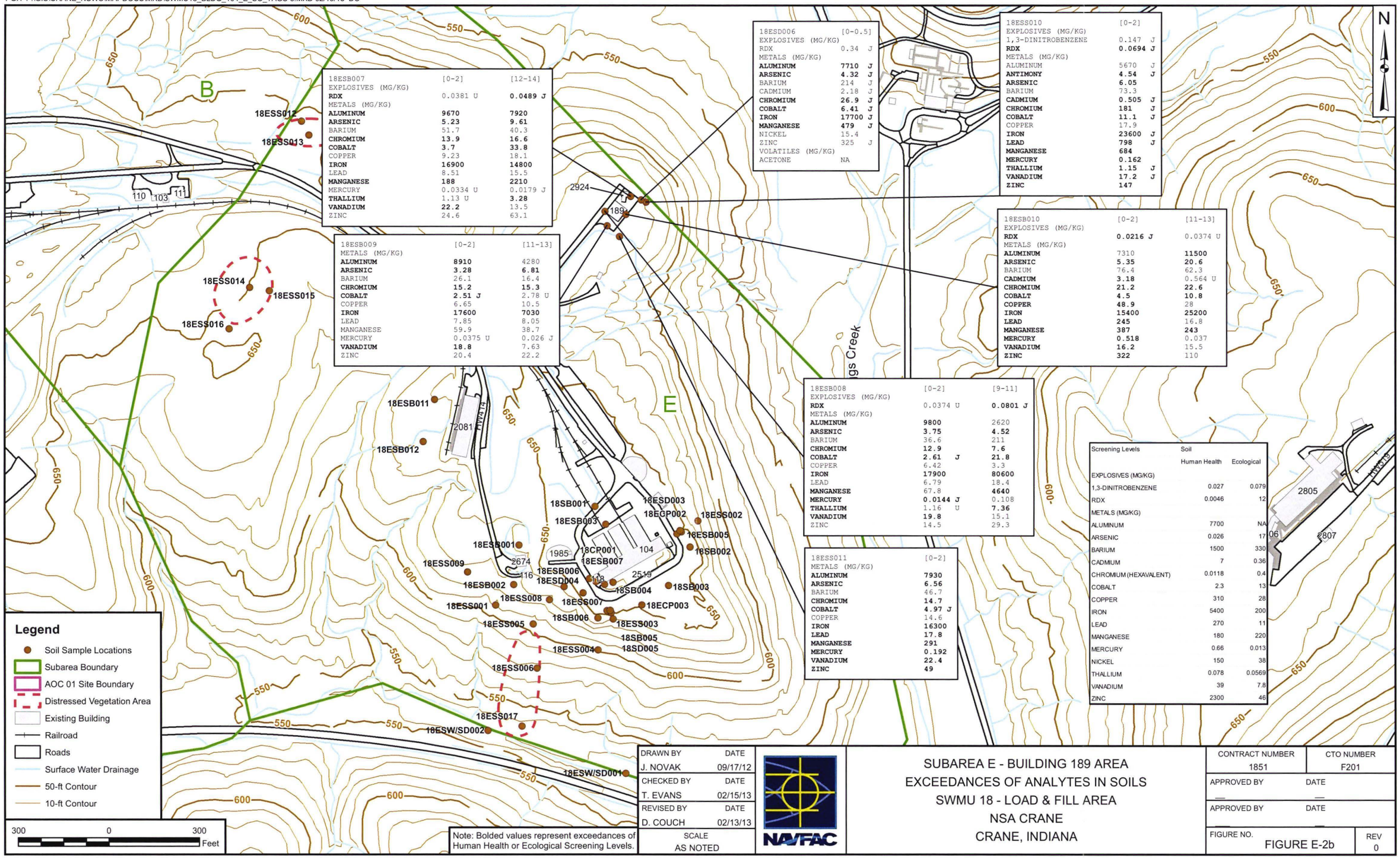

18ESB007	[0-2]	[12-14]
EXPLOSIVES (MG/KG)		
RDX	0.0381 U	**0.0489 J**
METALS (MG/KG)		
ALUMINUM	**9670**	**7920**
ARSENIC	**5.23**	**9.61**
BARIUM	51.7	40.3
CHROMIUM	**13.9**	**16.6**
COBALT	**3.7**	**33.8**
COPPER	9.23	18.1
IRON	**16900**	**14800**
LEAD	8.51	15.5
MANGANESE	**188**	**2210**
MERCURY	0.0334 U	0.0179 J
THALLIUM	1.13 U	**3.28**
VANADIUM	**22.2**	13.5
ZINC	24.6	63.1

18ESB009	[0-2]	[11-13]
METALS (MG/KG)		
ALUMINUM	**8910**	4280
ARSENIC	**3.28**	**6.81**
BARIUM	26.1	16.4
CHROMIUM	**15.2**	**15.3**
COBALT	**2.51 J**	2.78 U
COPPER	6.65	10.5
IRON	**17600**	**7030**
LEAD	7.85	8.05
MANGANESE	59.9	38.7
MERCURY	0.0375 U	0.026 J
VANADIUM	**18.8**	7.63
ZINC	20.4	22.2

18ESD006	[0-0.5]
EXPLOSIVES (MG/KG)	
RDX	0.34 J
METALS (MG/KG)	
ALUMINUM	**7710 J**
ARSENIC	**4.32 J**
BARIUM	214 J
CADMIUM	2.18 J
CHROMIUM	**26.9 J**
COBALT	**6.41 J**
IRON	**17700 J**
MANGANESE	**479 J**
NICKEL	15.4
ZINC	325 J
VOLATILES (MG/KG)	
ACETONE	NA

18ESS010	[0-2]
EXPLOSIVES (MG/KG)	
1,3-DINITROBENZENE	0.147 J
RDX	**0.0694 J**
METALS (MG/KG)	
ALUMINUM	5670 J
ANTIMONY	**4.54 J**
ARSENIC	**6.05**
BARIUM	73.3
CADMIUM	**0.505 J**
CHROMIUM	**181 J**
COBALT	**11.1 J**
COPPER	17.9
IRON	**23600 J**
LEAD	**798 J**
MANGANESE	**684**
MERCURY	**0.162**
THALLIUM	**1.15 J**
VANADIUM	**17.2 J**
ZINC	**147**

18ESB010	[0-2]	[11-13]
EXPLOSIVES (MG/KG)		
RDX	**0.0216 J**	0.0374 U
METALS (MG/KG)		
ALUMINUM	7310	**11500**
ARSENIC	**5.35**	**20.6**
BARIUM	76.4	62.3
CADMIUM	**3.18**	0.564 U
CHROMIUM	**21.2**	**22.6**
COBALT	**4.5**	**10.8**
COPPER	**48.9**	28
IRON	**15400**	**25200**
LEAD	**245**	16.8
MANGANESE	**387**	**243**
MERCURY	**0.518**	0.037
VANADIUM	**16.2**	15.5
ZINC	**322**	110

18ESB008	[0-2]	[9-11]
EXPLOSIVES (MG/KG)		
RDX	0.0374 U	**0.0801 J**
METALS (MG/KG)		
ALUMINUM	**9800**	2620
ARSENIC	**3.75**	**4.52**
BARIUM	36.6	211
CHROMIUM	**12.9**	**7.6**
COBALT	**2.61 J**	**21.8**
COPPER	6.42	3.3
IRON	**17900**	**80600**
LEAD	6.79	18.4
MANGANESE	67.8	**4640**
MERCURY	**0.0144 J**	0.108
THALLIUM	1.16 U	**7.36**
VANADIUM	**19.8**	15.1
ZINC	14.5	29.3

18ESS011	[0-2]
METALS (MG/KG)	
ALUMINUM	**7930**
ARSENIC	**6.56**
BARIUM	46.7
CHROMIUM	**14.7**
COBALT	**4.97 J**
COPPER	14.6
IRON	**16300**
LEAD	**17.8**
MANGANESE	**291**
MERCURY	**0.192**
VANADIUM	**22.4**
ZINC	**49**

Screening Levels	Soil	
	Human Health	Ecological
EXPLOSIVES (MG/KG)		
1,3-DINITROBENZENE	0.027	0.079
RDX	0.0046	12
METALS (MG/KG)		
ALUMINUM	7700	NA
ARSENIC	0.026	17
BARIUM	1500	330
CADMIUM	7	0.36
CHROMIUM (HEXAVALENT)	0.0118	0.4
COBALT	2.3	13
COPPER	310	28
IRON	5400	200
LEAD	270	11
MANGANESE	180	220
MERCURY	0.66	0.013
NICKEL	150	38
THALLIUM	0.078	0.0569
VANADIUM	39	7.8
ZINC	2300	46

Note: Bolded values represent exceedances of Human Health or Ecological Screening Levels.

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NAVFAC

SUBAREA E - BUILDING 189 AREA
EXCEEDANCES OF ANALYTES IN SOILS
SWMU 18 - LOAD & FILL AREA
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
1851	F201
APPROVED BY	DATE
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APPROVED BY	DATE
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FIGURE NO. FIGURE E-2b	REV 0

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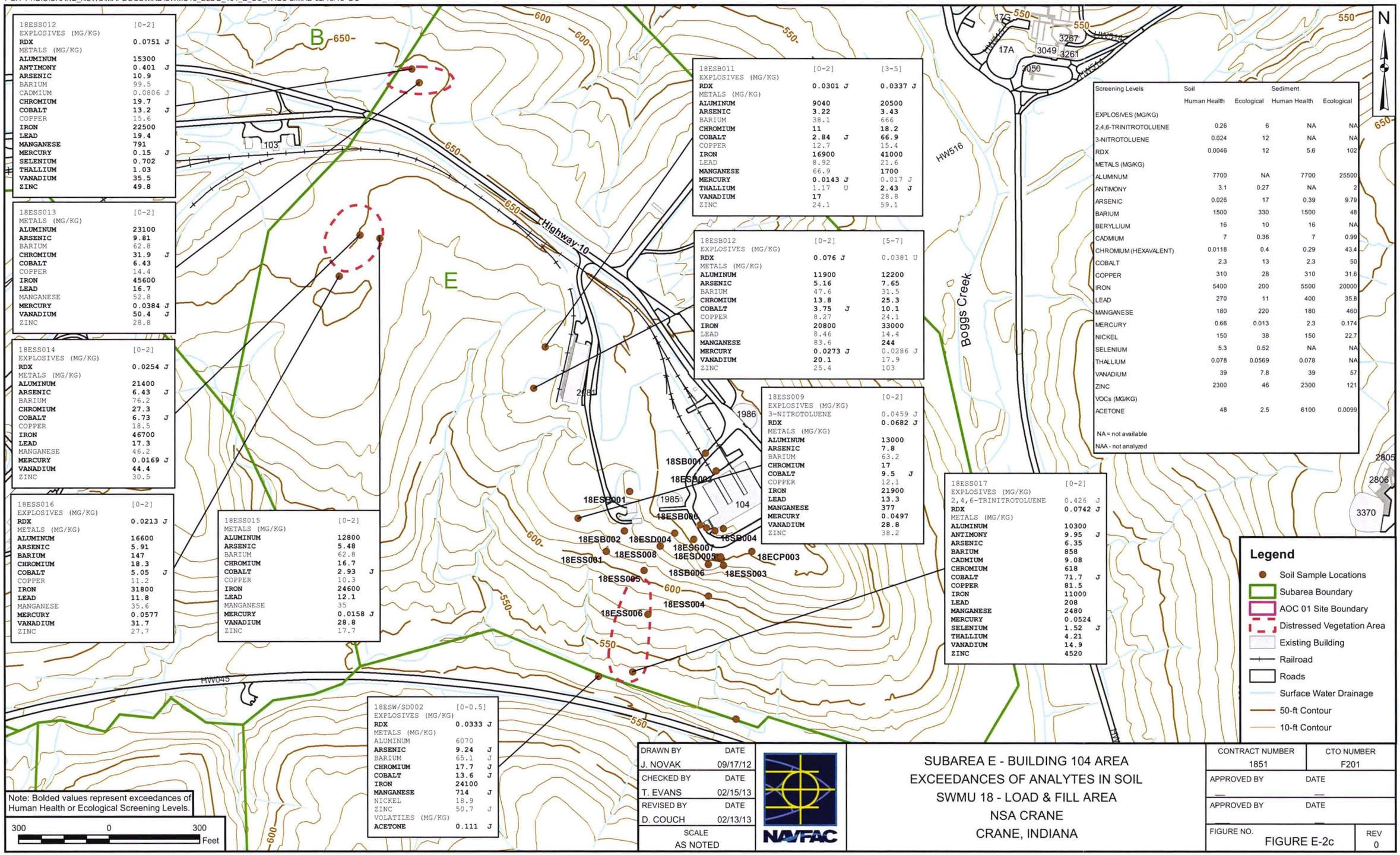

18ESS012	[0-2]
EXPLOSIVES (MG/KG)	
RDX	**0.0751 J**
METALS (MG/KG)	
ALUMINUM	**15300**
ANTIMONY	**0.401 J**
ARSENIC	**10.9**
BARIUM	99.5
CADMIUM	0.0806 J
CHROMIUM	**19.7**
COBALT	**13.2 J**
COPPER	15.6
IRON	**22500**
LEAD	**19.4**
MANGANESE	**791**
MERCURY	**0.15 J**
SELENIUM	**0.702**
THALLIUM	**1.03**
VANADIUM	**35.5**
ZINC	**49.8**

18ESS013	[0-2]
METALS (MG/KG)	
ALUMINUM	**23100**
ARSENIC	**9.81**
BARIUM	62.8
CHROMIUM	**31.9 J**
COBALT	**6.43**
COPPER	14.4
IRON	**45600**
LEAD	**16.7**
MANGANESE	52.8
MERCURY	**0.0384 J**
VANADIUM	**50.4 J**
ZINC	28.8

18ESS014	[0-2]
EXPLOSIVES (MG/KG)	
RDX	**0.0254 J**
METALS (MG/KG)	
ALUMINUM	**21400**
ARSENIC	**6.43 J**
BARIUM	76.2
CHROMIUM	**27.3**
COBALT	**6.73 J**
COPPER	18.5
IRON	**46700**
LEAD	**17.3**
MANGANESE	46.2
MERCURY	**0.0169 J**
VANADIUM	**44.4**
ZINC	30.5

18ESS016	[0-2]
EXPLOSIVES (MG/KG)	
RDX	**0.0213 J**
METALS (MG/KG)	
ALUMINUM	**16600**
ARSENIC	**5.91**
BARIUM	**147**
CHROMIUM	**18.3**
COBALT	**5.05 J**
COPPER	11.2
IRON	**31800**
LEAD	**11.8**
MANGANESE	35.6
MERCURY	**0.0577**
VANADIUM	**31.7**
ZINC	27.7

18ESS015	[0-2]
METALS (MG/KG)	
ALUMINUM	**12800**
ARSENIC	**5.48**
BARIUM	62.8
CHROMIUM	**16.7**
COBALT	**2.93 J**
COPPER	10.3
IRON	**24600**
LEAD	**12.1**
MANGANESE	35
MERCURY	**0.0158 J**
VANADIUM	**28.8**
ZINC	17.7

18ESB011	[0-2]	[3-5]
EXPLOSIVES (MG/KG)		
RDX	**0.0301 J**	**0.0337 J**
METALS (MG/KG)		
ALUMINUM	**9040**	**20500**
ARSENIC	**3.22**	**3.43**
BARIUM	38.1	666
CHROMIUM	**11**	**18.2**
COBALT	**2.84 J**	**66.9**
COPPER	12.7	15.4
IRON	**16900**	**41000**
LEAD	8.92	21.6
MANGANESE	66.9	**1700**
MERCURY	**0.0143 J**	0.017 J
THALLIUM	1.17 U	**2.43 J**
VANADIUM	**17**	28.8
ZINC	24.1	59.1

18ESB012	[0-2]	[5-7]
EXPLOSIVES (MG/KG)		
RDX	**0.076 J**	0.0381 U
METALS (MG/KG)		
ALUMINUM	**11900**	**12200**
ARSENIC	**5.16**	**7.65**
BARIUM	47.6	31.5
CHROMIUM	**13.8**	**25.3**
COBALT	**3.75 J**	**10.1**
COPPER	8.27	24.1
IRON	**20800**	**33000**
LEAD	8.46	14.4
MANGANESE	83.6	**244**
MERCURY	**0.0273 J**	0.0286 J
VANADIUM	**20.1**	17.9
ZINC	25.4	103

18ESS009	[0-2]
EXPLOSIVES (MG/KG)	
3-NITROTOLUENE	0.0459 J
RDX	**0.0682 J**
METALS (MG/KG)	
ALUMINUM	**13000**
ARSENIC	**7.8**
BARIUM	63.2
CHROMIUM	**17**
COBALT	**9.5 J**
COPPER	12.1
IRON	**21900**
LEAD	**13.3**
MANGANESE	**377**
MERCURY	**0.0497**
VANADIUM	**28.8**
ZINC	38.2

18ESS017	[0-2]
EXPLOSIVES (MG/KG)	
2,4,6-TRINITROTOLUENE	0.426 J
RDX	**0.0742 J**
METALS (MG/KG)	
ALUMINUM	**10300**
ANTIMONY	**9.95 J**
ARSENIC	**6.35**
BARIUM	**858**
CADMIUM	**9.08**
CHROMIUM	**618**
COBALT	**71.7 J**
COPPER	**81.5**
IRON	**11000**
LEAD	**208**
MANGANESE	**2480**
MERCURY	**0.0524**
SELENIUM	**1.52 J**
THALLIUM	**4.21**
VANADIUM	**14.9**
ZINC	**4520**

18ESW/SD002	[0-0.5]
EXPLOSIVES (MG/KG)	
RDX	**0.0333 J**
METALS (MG/KG)	
ALUMINUM	6070
ARSENIC	**9.24 J**
BARIUM	65.1 J
CHROMIUM	**17.7 J**
COBALT	**13.6 J**
IRON	**24100**
MANGANESE	**714 J**
NICKEL	18.9
ZINC	50.7 J
VOLATILES (MG/KG)	
ACETONE	**0.111 J**

Screening Levels	Soil		Sediment	
	Human Health	Ecological	Human Health	Ecological
EXPLOSIVES (MG/KG)				
2,4,6-TRINITROTOLUENE	0.26	6	NA	NA
3-NITROTOLUENE	0.024	12	NA	NA
RDX	0.0046	12	5.6	102
METALS (MG/KG)				
ALUMINUM	7700	NA	7700	25500
ANTIMONY	3.1	0.27	NA	2
ARSENIC	0.026	17	0.39	9.79
BARIUM	1500	330	1500	48
BERYLLIUM	16	10	16	NA
CADMIUM	7	0.36	7	0.99
CHROMIUM (HEXAVALENT)	0.0118	0.4	0.29	43.4
COBALT	2.3	13	2.3	50
COPPER	310	28	310	31.6
IRON	5400	200	5500	20000
LEAD	270	11	400	35.8
MANGANESE	180	220	180	460
MERCURY	0.66	0.013	2.3	0.174
NICKEL	150	38	150	22.7
SELENIUM	5.3	0.52	NA	NA
THALLIUM	0.078	0.0569	0.078	NA
VANADIUM	39	7.8	39	57
ZINC	2300	46	2300	121
VOCs (MG/KG)				
ACETONE	48	2.5	6100	0.0099

NA = not available

NAA - not analyzed

Note: Bolded values represent exceedances of Human Health or Ecological Screening Levels.

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AS NOTED	

NAVFAC

SUBAREA E - BUILDING 104 AREA
EXCEEDANCES OF ANALYTES IN SOIL
SWMU 18 - LOAD & FILL AREA
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
1851	F201
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO. FIGURE E-2c	REV 0

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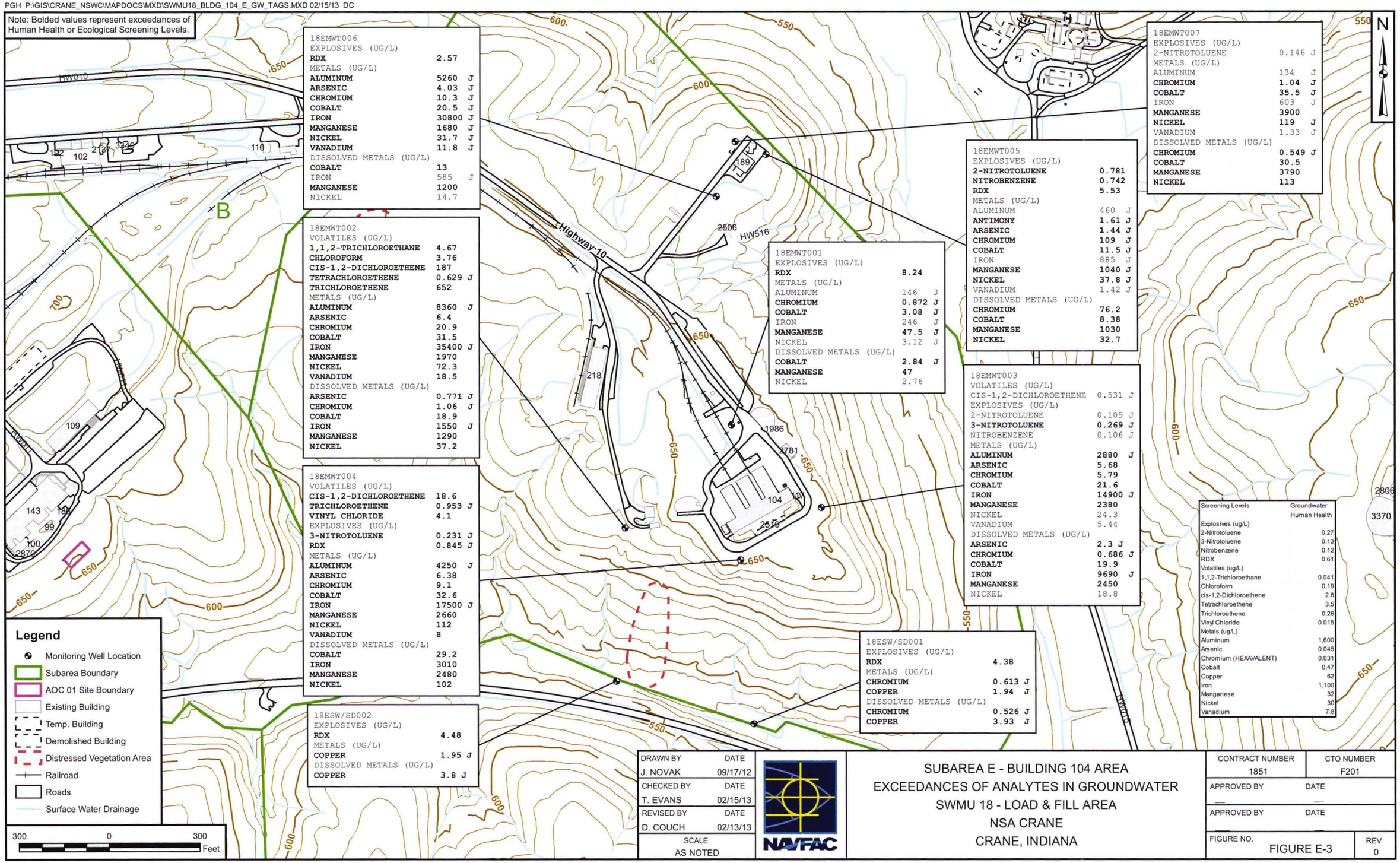
Note: Bolded values represent exceedances of Human Health or Ecological Screening Levels.



18EMWT006

EXPLOSIVES (UG/L)	
RDX	**2.57**
METALS (UG/L)	
ALUMINUM	**5260 J**
ARSENIC	**4.03 J**
CHROMIUM	**10.3 J**
COBALT	**20.5 J**
IRON	**30800 J**
MANGANESE	**1680 J**
NICKEL	**31.7 J**
VANADIUM	**11.8 J**
DISSOLVED METALS (UG/L)	
COBALT	**13**
IRON	585 J
MANGANESE	**1200**
NICKEL	14.7

18EMWT002

VOLATILES (UG/L)	
1,1,2-TRICHLOROETHANE	**4.67**
CHLOROFORM	**3.76**
CIS-1,2-DICHLOROETHENE	**187**
TETRACHLOROETHENE	**0.629 J**
TRICHLOROETHENE	**652**
METALS (UG/L)	
ALUMINUM	**8360 J**
ARSENIC	**6.4**
CHROMIUM	**20.9**
COBALT	**31.5**
IRON	**35400 J**
MANGANESE	**1970**
NICKEL	**72.3**
VANADIUM	**18.5**
DISSOLVED METALS (UG/L)	
ARSENIC	**0.771 J**
CHROMIUM	**1.06 J**
COBALT	**18.9**
IRON	**1550 J**
MANGANESE	**1290**
NICKEL	**37.2**

18EMWT004

VOLATILES (UG/L)	
CIS-1,2-DICHLOROETHENE	**18.6**
TRICHLOROETHENE	**0.953 J**
VINYL CHLORIDE	**4.1**
EXPLOSIVES (UG/L)	
3-NITROTOLUENE	**0.231 J**
RDX	**0.845 J**
METALS (UG/L)	
ALUMINUM	**4250 J**
ARSENIC	**6.38**
CHROMIUM	**9.1**
COBALT	**32.6**
IRON	**17500 J**
MANGANESE	**2660**
NICKEL	**112**
VANADIUM	**8**
DISSOLVED METALS (UG/L)	
COBALT	**29.2**
IRON	**3010**
MANGANESE	**2480**
NICKEL	**102**

18ESW/SD002

EXPLOSIVES (UG/L)	
RDX	**4.48**
METALS (UG/L)	
COPPER	**1.95 J**
DISSOLVED METALS (UG/L)	
COPPER	**3.8 J**

18EMWT001

EXPLOSIVES (UG/L)	
RDX	**8.24**
METALS (UG/L)	
ALUMINUM	146 J
CHROMIUM	**0.872 J**
COBALT	**3.08 J**
IRON	246 J
MANGANESE	**47.5 J**
NICKEL	3.12 J
DISSOLVED METALS (UG/L)	
COBALT	**2.84 J**
MANGANESE	**47**
NICKEL	2.76

18EMWT005

EXPLOSIVES (UG/L)	
2-NITROTOLUENE	**0.781**
NITROBENZENE	**0.742**
RDX	**5.53**
METALS (UG/L)	
ALUMINUM	460 J
ANTIMONY	**1.61 J**
ARSENIC	**1.44 J**
CHROMIUM	**109 J**
COBALT	**11.5 J**
IRON	885 J
MANGANESE	**1040 J**
NICKEL	**37.8 J**
VANADIUM	1.42 J
DISSOLVED METALS (UG/L)	
CHROMIUM	**76.2**
COBALT	**8.38**
MANGANESE	**1030**
NICKEL	**32.7**

18EMWT003

VOLATILES (UG/L)	
CIS-1,2-DICHLOROETHENE	0.531 J
EXPLOSIVES (UG/L)	
2-NITROTOLUENE	0.105 J
3-NITROTOLUENE	**0.269 J**
NITROBENZENE	0.106 J
METALS (UG/L)	
ALUMINUM	**2880 J**
ARSENIC	**5.68**
CHROMIUM	**5.79**
COBALT	**21.6**
IRON	**14900 J**
MANGANESE	**2380**
NICKEL	24.3
VANADIUM	5.44
DISSOLVED METALS (UG/L)	
ARSENIC	**2.3 J**
CHROMIUM	**0.686 J**
COBALT	**19.9**
IRON	**9690 J**
MANGANESE	**2450**
NICKEL	18.8

18EMWT007

EXPLOSIVES (UG/L)	
2-NITROTOLUENE	0.146 J
METALS (UG/L)	
ALUMINUM	134 J
CHROMIUM	**1.04 J**
COBALT	**35.5 J**
IRON	603 J
MANGANESE	**3900**
NICKEL	**119 J**
VANADIUM	1.33 J
DISSOLVED METALS (UG/L)	
CHROMIUM	**0.549 J**
COBALT	**30.5**
MANGANESE	**3790**
NICKEL	**113**

18ESW/SD001

EXPLOSIVES (UG/L)	
RDX	**4.38**
METALS (UG/L)	
CHROMIUM	**0.613 J**
COPPER	**1.94 J**
DISSOLVED METALS (UG/L)	
CHROMIUM	**0.526 J**
COPPER	**3.93 J**

Screening Levels	Groundwater Human Health
Explosives (ug/L)	
2-Nitrotoluene	0.27
3-Nitrotoluene	0.13
Nitrobenzene	0.12
RDX	0.61
Volatiles (ug/L)	
1,1,2-Trichloroethane	0.041
Chloroform	0.19
cis-1,2-Dichloroethene	2.8
Tetrachloroethene	3.5
Trichloroethene	0.26
Vinyl Chloride	0.015
Metals (ug/L)	
Aluminum	1,600
Arsenic	0.045
Chromium (HEXAVALENT)	0.031
Cobalt	0.47
Copper	62
Iron	1,100
Manganese	32
Nickel	30
Vanadium	7.8

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SCALE AS NOTED	

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SUBAREA E - BUILDING 104 AREA
EXCEEDANCES OF ANALYTES IN GROUNDWATER
SWMU 18 - LOAD & FILL AREA
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER 1851	CTO NUMBER F201
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FIGURE NO. FIGURE E-3	REV 0

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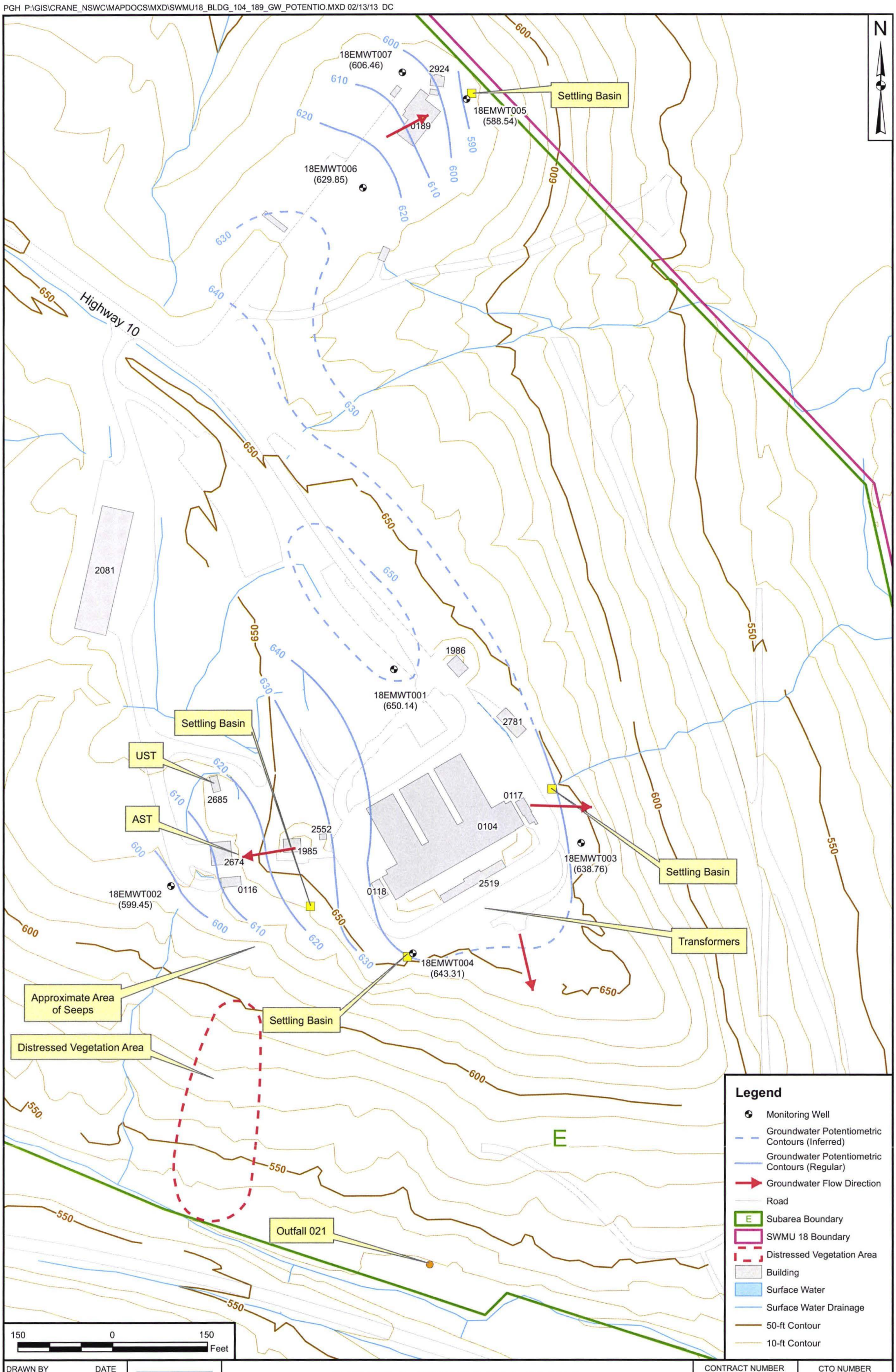

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SCALE	
AS NOTED	

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SUBAREA E - BUILDING 104 & 189 AREA
GROUNDWATER POTENTIOMETRIC MAP
SWMU 18 - LOAD AND FILL AREA
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
1851	F201
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FIGURE NO.	REV
FIGURE E-4	0

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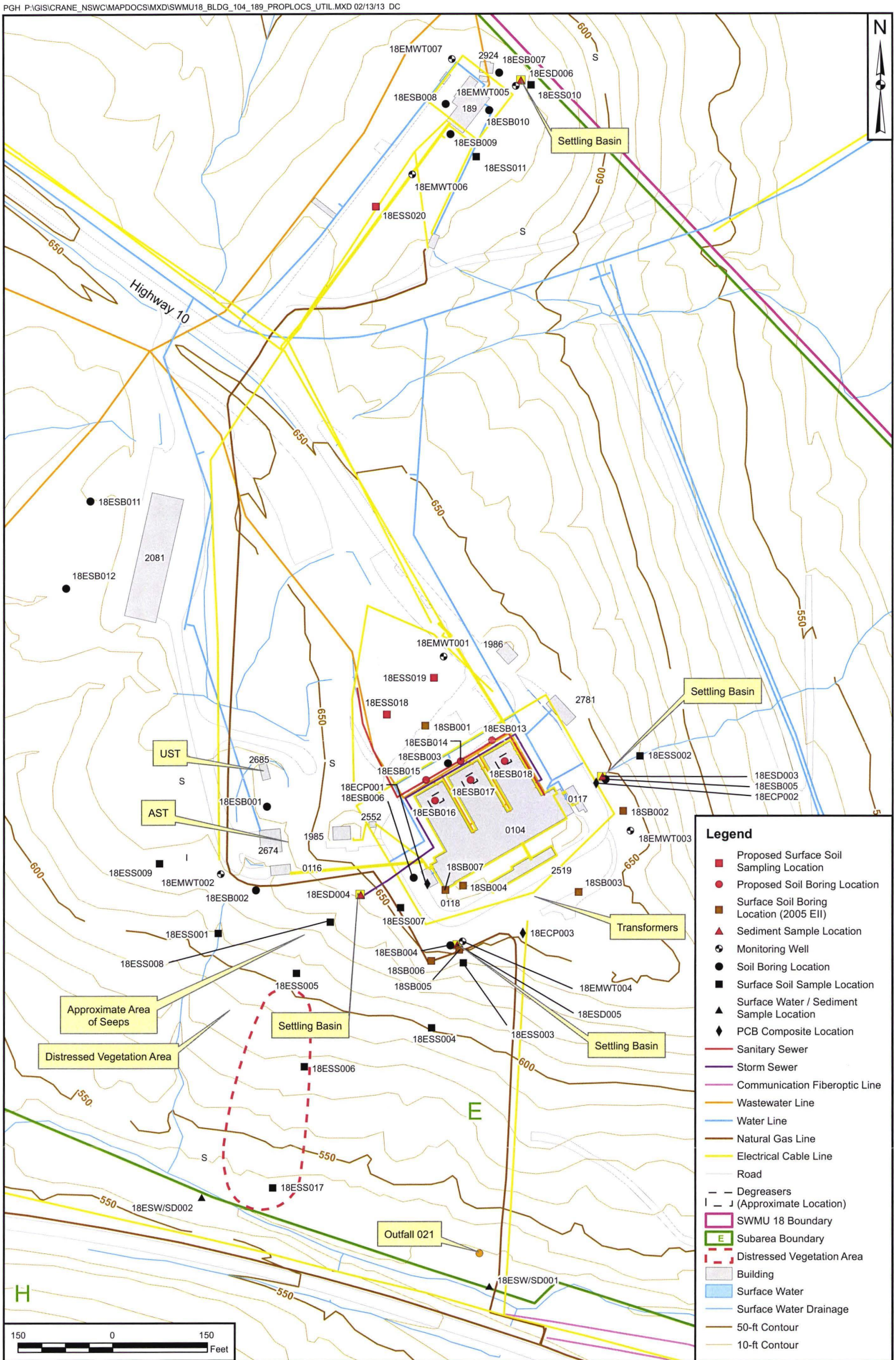

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J. ENGLISH	10/04/12
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REVISED BY	DATE
D. COUCH	02/13/13
SCALE	
AS NOTED	

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SUBAREA E - BUILDING 104 & 189 AREA
PROPOSED SAMPLE LOCATIONS
SWMU 18 - LOAD & FILL AREA
NSA CRANE
CRANE, INDIANA

CONTRACT NUMBER	CTO NUMBER
1851	F201
APPROVED BY	DATE
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APPROVED BY	DATE
—	—
FIGURE NO.	REV
FIGURE E-5	0

TABLES

TABLE E-1

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
NAVAL SUPPORT ACTIVITY
CRANE, INDIANA

Sample Location	Sample Identification	Sample Type	Date Sampled	Sample Depth Interval Sampled (feet bgs)	Energetics		Metals		VOCs	PCBs	Fuel Oil Parameters				Miscellaneous			Comments
					Nitroaromatics/ Nitramines	Perchlorate	TAL Metals (total)	TAL Metals (dissolved)			BTEX	PAHs	TPH-DRO/ ERO	Naphthalene	pH	TOC	Ammonia	
Subarea E - Building 104 Area																		
18ESS001	18ESS0010002	Surface Soil	23-Oct-11	0-2	X		X											
18ESS002	18ESS0020002	Surface Soil	24-Oct-11	0-2	X		X											
18ESS003	18ESS0030002	Surface Soil	24-Oct-11	0-2	X		X											
18ESS004	18ESS0040002	Surface Soil	23-Oct-11	0-2	X		X											
18ESS005	18ESS0050002	Surface Soil	23-Oct-11	0-2	X		X											
18ESS006	18ESS0060002	Surface Soil	23-Oct-11	0-2	X		X											
18ESS007	18ESS0070002	Surface Soil	24-Oct-11	0-2	X		X											
18ESS008	18ESS0080002	Surface Soil	24-Oct-11	0-2	X		X											
18ESS009	18ESS0090002	Surface Soil	23-Oct-11	0-2	X		X								X			
18ESS010	18ESS0100002	Surface Soil	23-Oct-11	0-2	X		X											Field Duplicate FD102311-01
18ESS011	18ESS0110002	Surface Soil	23-Oct-11	0-2	X		X								X			
18ESS012	18ESS0120002	Surface Soil	22-Oct-11	0-2	X		X											
18ESS013	18ESS0130002	Surface Soil	22-Oct-11	0-2	X		X											
18ESS014	18ESS0140002	Surface Soil	23-Oct-11	0-2	X		X											
18ESS015	18ESS0150002	Surface Soil	23-Oct-11	0-2	X		X											
18ESS016	18ESS0160002	Surface Soil	23-Oct-11	0-2	X		X											
18ESS017	18ESS0170002	Surface Soil	22-Oct-11	0-2	X		X											
18ESB001	18ESB0010002	Surface Soil	21-Oct-11	0-2							X	X	X	X				
	18ESB0010608	Subsurface Soil	21-Oct-11	6-8							X	X	X	X				
	18ESB0011415	Subsurface Soil	21-Oct-11	14-15							X	X	X	X				
18ESB002	18ESB0020002	Surface Soil	22-Oct-11	0-2							X	X	X	X				
	18ESB0020406	Subsurface Soil	22-Oct-11	4-6							X	X	X	X				
18ESB003	18ESB0030002	Surface Soil	21-Oct-11	0-2	X		X		X						X			
	18ESB0030203	Subsurface Soil	21-Oct-11	2-3	X		X											
18ESB004	18ESB0040002	Surface Soil	23-Oct-11	0-2	X		X		X									
	18ESB0040203	Subsurface Soil	23-Oct-11	2-3	X		X											
18ESB005	18ESB0050002	Surface Soil	21-Oct-11	0-2	X		X		X									
	18ESB0050608	Subsurface Soil	21-Oct-11	6-8	X		X											
18ESB006	18ESB0060002	Surface Soil	21-Oct-11	0-2	X		X		X									
	18ESB0060810	Subsurface Soil	21-Oct-11	8-10	X		X											
18ESB007	18ESB0070002	Surface Soil	23-Oct-11	0-2	X		X											
	18ESB0071214	Subsurface Soil	23-Oct-11	12-14	X		X											
18ESB008	18ESB0080002	Surface Soil	23-Oct-11	0-2	X		X											
	18ESB0080911	Subsurface Soil	23-Oct-11	9-11	X		X											
18ESB009	18ESB0090002	Surface Soil	23-Oct-11	0-2	X		X								X			
	18ESB0091113	Subsurface Soil	23-Oct-11	11-13	X		X											
18ESB010	18ESB0100002	Surface Soil	23-Oct-11	0-2	X		X											
	18ESB0101113	Subsurface Soil	23-Oct-11	11-13	X		X											
18ESB011	18ESB0110002	Surface Soil	23-Oct-11	0-2	X		X											
	18ESB0110305	Subsurface Soil	23-Oct-11	3-5	X		X								X			
18ESB012	18ESB0120002	Surface Soil	23-Oct-11	0-2	X		X											
	18ESB0120507	Subsurface Soil	23-Oct-11	5-7	X		X											
18ECP001	18ECP0010002	Composite Soil	24-Oct-11	0-2						X								
18ECP002	18ECP0020002	Composite Soil	24-Oct-11	0-2						X								
18ECP003	18ECP0030002	Composite Soil	24-Oct-11	0-2						X								
18ESD001	18ESD0010006	Sediment	21-Oct-11	0-.5	X		X		X							X		
18ESD002	18ESD0020006	Sediment	21-Oct-11	0-.5	X		X		X							X		
18ESD003	18ESD0030006	Sediment	24-Oct-11	0-.5	X		X		X									
18ESD004	18ESD0040006	Sediment	24-Oct-11	0-.5	X		X		X									

TABLE E-1

SUMMARY OF ENVIRONMENTAL SAMPLES AND LABORATORY ANALYSIS
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
NAVAL SUPPORT ACTIVITY
CRANE, INDIANA

Sample Location	Sample Identification	Sample Type	Date Sampled	Sample Depth Interval Sampled (feet bgs)	Energetics		Metals		VOCs	PCBs	Fuel Oil Parameters				Miscellaneous			Comments
					Nitroaromatics/ Nitramines	Perchlorate	TAL Metals (total)	TAL Metals (dissolved)			BTEX	PAHs	TPH-DRO/ ERO	Naphthalene	pH	TOC	Ammonia	
18ESD005	18ESD0050006	Sediment	24-Oct-11	0-.5	X		X		X									
18ESD006	18ESD0060006	Sediment	24-Oct-11	0-.5	X		X											
18ESW001	18ESW001	Surface Water	21-Oct-11	--	X		X	X									X	
18ESW002	18ESW002	Surface Water	21-Oct-11	--	X		X	X									X	
18EMWT001	18EGWT001	Groundwater	18-Jan-12	8.5-18.5	X		X	X	X								X	
18EMWT002	18EGWT002	Groundwater	22-Jan-12	25-35	X		X	X	X		X	X	X	X			X	
18EMWT003	18EGWT003	Groundwater	22-Jan-12	20.5-30.5	X		X	X	X								X	Field Duplicate FD012212-01
18EMWT004	18EGWT004	Groundwater	22-Jan-12	11-21	X		X	X	X								X	
18EMWT005	18EGWT005	Groundwater	19-Jan-12	29.5-49.5	X	X	X	X									X	
18EMWT006	18EGWT006	Groundwater	19-Jan-12	9-19	X	X	X	X									X	Field Duplicate FD011912-01
18EMWT007	18EGWT007	Groundwater	19-Jan-12	15-30	X	X	X	X									X	

TABLE E-2

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
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 Trespassers (Adolescent)	Surface Soil	5E-06	0.03	NA	NA
	Subsurface Soil	8E-06	0.07	NA	NA
	Surface Water	3E-07	0.0006	NA	NA
	Sediment	8E-07	0.02	NA	NA
Future Construction Worker (Adult)	Surface Soil	2E-05	0.6	NA	NA
	Subsurface Soil	3E-06	6	NA	Ingestion of soil **(manganese)**
	Groundwater (Direct Contact)	9E-07	0.2	NA	NA
Future Industrial Worker (Adult)	Surface Soil	3E-05	0.2	NA	NA
	Subsurface Soil	4E-05	0.4	NA	NA
Future Recreational User (Adult)	Surface Soil	5E-06	0.02	NA	NA
	Subsurface Soil	1E-05	0.04	NA	NA
	Surface Water	7E-07	0.0009	NA	NA
	Sediment	3E-06	0.03	NA	NA

TABLE E-2

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
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 (Child)	Surface Soil	3E-05	0.2	NA	NA
	Subsurface Soil	4E-05	0.4	NA	NA
	Surface Water	1E-06	0.002	NA	NA
	Sediment	1E-05	0.3	NA	NA
Future Recreational User (Lifelong)	Surface Soil	3E-05	NA	NA	NA
	Subsurface Soil	5E-05	NA	NA	NA
	Surface Water	2E-06	NA	NA	NA
	Sediment	1E-05	NA	NA	NA
Future Resident (Adult)	Surface Soil	7E-05	0.3	NA	NA
	Subsurface Soil	8E-05	0.7	NA	NA
	Groundwater (Direct Contact)	2E-03 (6E-04)[2]	75 (74)[2]	NA	Ingestion of groundwater (1,1,2-trichloroethane, chloroform, **cis-1,2-dichloroethene, trichloroethene**, vinyl chloride, RDX, arsenic, chromium, **cobalt,** and **manganese)**

TABLE E-2

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
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 Resident (Adult) (cont.)	Groundwater (Vapor Intrusion)	3E-05	8	NA	Inhalation of **trichloroethene**
	Surface Water	7E-07	0.0009	NA	NA
	Sediment	3E-06	0.03	NA	NA
Future Resident (Child)	Surface Soil	4E-04 (2E-05)[2]	2[1]	NA	Ingestion of soil (benzo(a)pyrene, **arsenic,** and chromium)
	Subsurface Soil	4E-04 (4E-04)[2]	5[1]	NA	Ingestion of soil (**benzo(a)pyrene,** benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and arsenic)
	Groundwater (Direct Contact)	3E-03 (7E-04)[2]	147 (144)[2]	NA	Ingestion of groundwater (1,1,2-trichloroethane, **cis-1,2-dichloroethene, trichloroethene, vinyl chloride,** RDX, aluminum, arsenic, chromium, **cobalt, iron, manganese,** and vanadium)

TABLE E-2

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
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 Resident (Child) (cont.)	Groundwater (Vapor Intrusion)	1E-05	8	NA	Inhalation of **trichloroethene**
	Surface Water	1E-06	0.002	NA	NA
	Sediment	1E-05	0.3	NA	NA
Future Resident (Lifelong)	Surface Soil	5E-04 (3E-05)[2]	NA	NA	Ingestion of soil (benzo(a)pyrene, arsenic, and chromium)
	Subsurface Soil	5E-04	NA	NA	Ingestion of soil **(benzo(a)pyrene,** benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, and arsenic)
	Groundwater (Direct Contact)	4E-03 (1E-03)[2]	NA	NA	Ingestion of groundwater (1,1,2-trichloroethane, 2-nitrotoluene, chloroform, **trichloroethene, vinyl chloride**, RDX, arsenic, and chromium)

TABLE E-2

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
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 Resident (Lifelong) (cont.)	Groundwater (Vapor Intrusion)	4E-05	NA	NA	NA
	Surface Water	2E-06	NA	NA	NA
	Sediment	1E-05	NA	NA	NA
Terrestrial Plants and Invertebrates	Surface Soil	NA	NA	Unacceptable	Terrestrial plants contacting soils (antimony, arsenic, barium, chromium, cobalt, copper, lead, thallium, selenium, and zinc). Terrestrial invertebrates contacting soils (arsenic, barium, chromium, thallium, and zinc).
Mammals and Birds	Surface Soil and Surface Water	NA	NA	Acceptable	NA
	Sediment and Surface Water	NA	NA	Acceptable	NA
Aquatic Organisms	Surface Water	NA	NA	Acceptable	NA
Sediment Invertebrates	Sediment	NA	NA	Acceptable	NA

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

TABLE E-2

SUMMARY OF RECEPTOR-SPECIFIC HUMAN RISKS AND HAZARDS AND ECOLOGICAL RISKS
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
NSA CRANE
CRANE, INDIANA

Receptor Population	Environmental Media	Overall Carcinogenic Risk (Human)	Overall Hazard Index (Human)	Overall Risk (Ecological)	Critical Pathways & Chemicals of Concern

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

(1) Target organs hazard index is less than 1.
(2) 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 E-3

GROUNDWATER QUALITY DATA
SUBAREA E - BUILDING 104 AREA
SWMU 18 - LOAD AND FILL AREA
NSA CRANE, IN

Well Number	Sample ID	Sample Date	pH	Spec Cond (mS/cm)	Temp (dC)	Turb (NTU)	Diss Oxygen (mg/L)	ORP (mV)	Comments
18EMWT001	18EGWT001	1/18/2012	5.95	0.291	12.25	58.7	3.25	545	Groundwater
18EMWT002	18EGWT002	1/22/2012	6.03	0.283	10.82	>999*	1.51	81	Groundwater
18EMWT003	18EGWT003	1/22/2012	6.03	0.336	10.18	221	0.81	-39	Groundwater
18EMWT004	18EGWT004	1/22/2012	5.83	0.609	8.84	518	0.87	69	Groundwater
18EMWT005	18EGWT005	1/19/2012	7.10	1.70	11.65	81*	5.26	251	Groundwater
18EMWT006	18EGWT006	1/19/2012	5.34	0.185	9.26	99.3	2.01	155	Groundwater
18EMWT007	18EGWT007	1/19/2012	6.37	0.974	12.44	9.8	5.50	337	Groundwater

* Sample collected with bailer due to low well volume.

18ESW001	18ESW001	10/21/2011	6.7	0.38	11.6	3.6	14.0	131	Surface Water
18ESW002	18ESW002	10/21/2011	6.9	0.38	11.40	9.7	11.70	126	Surface Water

TABLE E-4

PROPOSED SUPPLEMENTAL SAMPLING AND ANALYSIS
SWMU 18 - LOAD AND FILL AREA
SUBAREA E - BUILDING 104 AREA
NAVAL SUPPORT ACTIVITY, CRANE, INDIANA

Sampling Location	ID Number	Matrix	Depth (feet bgs)	Analysis	Number of Samples	Sampling SOP Reference[1]
18ESS005	18ESS0050002	Soil	0 - 2'	Chromium (III +IV)	1 + 1 FD	SOP-08, SOP-09, SOP-10
18ESS018	18ESS0180002	Soil	0 - 2'	Explosives	1 + 1 FD	SOP-08, SOP-09, SOP-10
18ESS019	18ESS0190002	Soil	0 - 2'	Explosives	1	SOP-08, SOP-09, SOP-10
18ESS020	18ESS0200002	Soil	0 - 2'	Explosives	1	SOP-08, SOP-09, SOP-10
18ESB013	18ESB0130002	Soil	0 - 2'	VOCs	1 + 1 FD	SOP-08, SOP-09, SOP-10
	18ESB013XXXX [2]		X - X'		1	
18ESB014	18ESB0140002	Soil	0 - 2'	VOCs	1	SOP-08, SOP-09, SOP-10
	18ESB014XXXX [2]		X - X'		1	
18ESB015	18ESB0150002	Soil	0 - 2'	VOCs	1	SOP-08, SOP-09, SOP-10
	18ESB015XXXX [2]		X - X'		1	
18ESB016	18ESB0160002	Soil	0 - 2'[3]	VOCs	1	SOP-08, SOP-09, SOP-10
	18ESB016XXXX [2]		X - X'		1	
18ESB017	18ESB0170002	Soil	0 - 2'[3]	VOCs	1	SOP-08, SOP-09, SOP-10
	18ESB017XXXX [2]		X - X'		1	

TABLE E-4

PROPOSED SUPPLEMENTAL SAMPLING AND ANALYSIS
SWMU 18 - LOAD AND FILL AREA
SUBAREA E - BUILDING 104 AREA
NAVAL SUPPORT ACTIVITY, CRANE, INDIANA

Sampling Location	ID Number	Matrix	Depth (feet bgs)	Analysis	Number of Samples	Sampling SOP Reference[1]
18ESB018	18ESB0180002	Soil	0 - 2'[3]	VOCs	1	SOP-08, SOP-09, SOP-10
	18ESB018XXXX [2]		X - X'		1	
18EMWT005	18EGWT005	Groundwater	NA	Chromium (III +IV)	1 + 1 FD	SOP-16, SOP-17

Note:

[1] Sampling SOP reference from SWMU 18 RFI UFP-SAP (Tetra Tech, September 2011)

[2] XXXX and X – X' represents the interval of the sample from below 2 feet bgs and above top of bedrock. Depth will be determined in the field based on visual and olfactory observations and where bedrock is encountered. For example, if sample is collected from 8 to 10 feet bgs, the depth will be recorded as 0810.

[3] Represents 0-to-2-foot interval of soil below floor and subgrade.

FD = Field Duplicate