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TECHNICAL MEMORANDUM FOR INTERIM RESULTS SITE 6 SUPPLEMENTAL
INVESTIGATION MCB CAMP LEJEUNE NC
2/1/2012
CH2M HILL

Technical Memorandum
Site 6 Supplemental Investigation - Interim Results

Marine Corps Base Camp Lejeune
Jacksonville, North Carolina



Prepared for

Department of the Navy

**Naval Facilities Engineering Command
Mid-Atlantic**

Contract No.
N62470-08-D-1000
CTO-WE35

February 2012

Prepared by

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Contract Task Order WE-35

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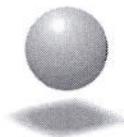
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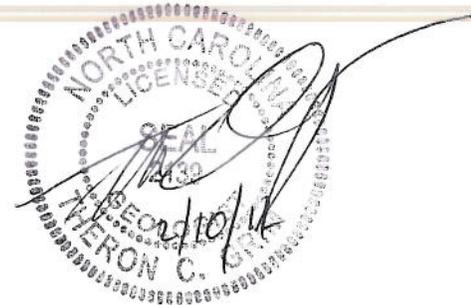
**NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000**

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Site 6 Supplemental Investigation - Interim Results

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DATE: February 2012

1. Introduction

This technical memorandum (TM) provides interim results for data collected between January and May of 2011 as part of an ongoing Supplemental Investigation (SI) at Site 6, Operable Unit 2 (OU2), located at Marine Corps Base Camp Lejeune (MCB CamLej), as shown in **Figure 1**.

The objectives of the Site 6 SI are to:

- Investigate the source of chlorobenzene detected in groundwater samples collected from the surficial and upper Castle Hayne aquifers
- Assess the vertical and horizontal extents of dissolved-phase chlorobenzene
- Evaluate the protectiveness of the Remedy-in-Place for OU2

The following activities were completed during this phase of the SI:

- Excavation of test pits to investigate the nature of geophysical anomalies identified during the 2009 geophysical investigation
- Investigation of the distribution of dissolved-phase chlorobenzene within the deeper portion of the upper Castle Hayne Aquifer
- Laboratory analysis of soil and groundwater samples collected from test pits, and all existing and newly installed monitoring wells, respectively

2. Field Activities

Field activities were completed in accordance with the Site 6 Uniform Federal Policy Sampling and Analysis Plan (UFP-SAP) (CH2M HILL, 2011a). Because of the discovery of munitions and explosives of concern during a previous investigation, a portion of Site 6 has been incorporated into the Munitions Response Program as Unexploded Ordnance Site 22 (UXO-22). Any activities conducted within the boundary of UXO-22 were completed in accordance with the *Final Site-specific Work Plan Addendum, Test Pit Excavations at Site 6 within Site UXO-22* (CH2M HILL, 2011b). Site boundaries are shown on **Figure 1**.

2.1 Test Pit Investigation and Soil Sampling

In January 2011, USA Environmental, under the supervision of CH2M HILL, excavated 12 test pits to investigate the geophysical anomalies reported in the 2009 geophysical investigation (**Figure 2**).

Soil samples collected from the spoils, base, and sidewalls of the excavations were screened for the presence of volatile organic compounds (VOCs) using a photo-ionization detector (PID) equipped with a 10.6 electron Volt (eV)

bulb. Debris uncovered during test pit activities included: communication wire, dry cell communication batteries, metal debris, metal roofing material, material potentially presenting an explosive hazard (MPPEH), small containers (5-gallon-capacity or less) with unknown contents, a wooden crate containing an unknown white powder, and two intact 55-gallon steel drums. A summary of the debris found in each test pit is provided in **Table 1**.

During the excavation of Test Pit 10, two unmarked 55-gallon steel drums containing an unknown liquid were encountered and observed to be leaking. Ambient air monitoring conducted at the edge of the excavation, following the discovery of the drums measured PID readings ranging from 5 to 130 parts per million (ppm). Work was halted because PID readings exceeded the 20 ppm action level for personal protective equipment (PPE) upgrade to Level B (supplied air). The project scope did not include recovering unknown drums in Level B PPE, consequently; the test pit was backfilled and secured with temporary chain link fencing to prevent further exposure.

Soil samples were collected from the base of the test pit if material was homogeneous and screening results were not elevated in any specific location of the test pit. If material was heterogeneous, representative samples were biased toward areas of elevated PID readings, staining, or the area with the greatest density of debris within the excavation. If debris types in multiple test pits were similar, only one sample was collected for each represented debris type. Samples were sent under chain-of-custody control to Katahdin Analytical Services for the following analyses:

- VOCs by U.S. Environmental Protection Agency (EPA) Method 8260B
- Semivolatile organic compounds (SVOCs) by EPA Method 8270C
- Polychlorinated biphenyls by EPA Method 8082
- Organophosphorus pesticides by EPA Method 8141A
- Organochlorine pesticides (OCPs) by EPA Method 8081A
- Target analyte list metals by EPA Method 6010B
- Hexavalent chromium by EPA Method 7196A

Soil Analytical Results

Soil analytical results were compared to the soil background concentrations for metals only (CH2M HILL, 2011c), the North Carolina Soil Screening Levels (NC SSLs) (North Carolina Department of Environment and Natural Resources [NCDENR], 2010), and the adjusted residential and industrial Regional Screening Levels (RSLs) (EPA, 2011). Analytes that exceeded background concentrations (metals only) and one or more screening criteria were retained as target analytes for groundwater sampling.

Chlorobenzene, four SVOCs, three pesticides, and six metals exceeded screening criteria and were identified as target analytes for the groundwater investigation. Analytical results are provided in **Table 2** and summarized as follows:

Soil Analytical Results Summary

Chemical Name	Frequency of Detection	Frequency of Exceedance	Maximum Concentration	Location of Maximum Concentration	Screening Criteria			
					Soil Background	NC SSL	Adjusted Industrial Soil RSLs	Adjusted Residential Soil RSLs
VOCs (µg/kg)								
Chlorobenzene	4/11	1/11	70,000,000	IR06-TP10	--	450	140,000	29,000
SVOCs (µg/kg)								
Benzo(a)pyrene	3/11	3/11	20 J	IR06-TP04	--	59	210	15
2-methylnaphthalene	1/11	1/11	2,800	IR06-TP10	--	1,600	370,000	31,000
Naphthalene	1/11	1/11	5,700	IR06-TP10	--	210	18,000	3,600
Pentachlorophenol	1/11	1/11	1,600	IR06-TP10	--	31	2,700	890
Pesticides (µg/kg)								
4,4'-DDD	6/11	2/11	320	IR06-TP01	--	240	7,200	2,000
beta-BHC	1/11	1/11	220	IR06-TP10	--	1.2	960	270
Dieldrin	8/11	8/11	51 J	IR06-TP04	--	0.81	110	30
Metals (mg/kg)^a								
Antimony	3/11	3/11	13.5 J	IR06-TP01	1.79	--	41	3.1
Chromium	11/11	1/11	596	IR06-TP09	32.7	3.8	5.6	0.29
Chromium (hexavalent)	7/11	1/11	490	IR06-TP09	6.15	3.8	5.6	0.29
Cobalt	10/11	1/11	4.8 J	IR06-TP09	1	--	30	2.3
Lead	11/11	1/11	2,800	IR06-TP09	14.4	270	800	400
Manganese	11/11	1/11	360	IR06-TP09	16.9	65	2,300	180

µg/kg - micrograms per kilogram

BHC - benzene hexachloride

DDD - dichlorodiphenyldichloroethane

mg/kg - milligrams per kilogram

^aMetals exceedances are defined as an exceedance of background and at least one additional criterion

Dieldrin was detected in the majority of samples at concentrations exceeding screening criteria; however, the maximum concentration was below the adjusted industrial RSL and within the same order of magnitude as the adjusted residential RSL. Metals were frequently detected, but exceedances were generally limited to the samples collected from Test Pit 9. SVOCs and VOCs were generally limited to the samples collected in Test Pit 10.

Time-critical Removal Action

Based on the results of the test pit investigation, the leaking drums in Test Pit 10 and the area immediately adjacent to it was considered a source of chlorobenzene requiring immediate removal. In May 2011, a time-critical removal action (TCRA) was conducted to re-open Test Pit 10 and resulted in the removal of three intact 55-gallon steel drums containing liquid and a partial, crushed drum with residual liquid, along with approximately 42 cubic yards of contaminated soil and debris. Confirmation samples were collected from the base and sidewalls of the excavation to assess residual chlorobenzene concentrations. The chlorobenzene concentrations ranged from an estimated concentration of 170 µg/kg in the soil sample collected from the east sidewall to a concentration of 2,600,000 µg/kg in the soil sample collected from the west sidewall. A detailed summary of the TCRA activities and results are provided in the *Final Time-Critical Removal Action Summary, Site 6 – Storage Lots 201 and 203, Technical Memorandum* (CH2M HILL, 2011d).

2.2 Groundwater Sampling

In February 2011, 12 groundwater monitoring wells were installed within the upper Castle Hayne Aquifer using rotary sonic (rotosonic) drilling methods. Six monitoring wells were screened from 45 to 50 feet below ground surface (bgs), and six monitoring wells were screened from 85 to 90 feet bgs. One monitoring well was installed in the surficial aquifer (screened from 10 to 20 feet bgs) to replace former monitoring well IR06-MW53, which had been destroyed by Base activities. The monitoring wells were installed and developed in accordance with the UFP-SAP. Monitoring well construction information is provided in **Table 3**.

In March 2011, groundwater samples were collected from 43 monitoring wells, shown on **Figure 3**, using low-flow sampling techniques or by purging a minimum of three well volumes before sampling. Groundwater samples were shipped under chain-of-custody to Katahdin Analytical Services for the following analyses:

- Chlorobenzene by EPA Method 8260B
- Benzo(a)pyrene, 2-methylnaphthalene, naphthalene, and pentachlorophenol by EPA Method 8270C
- OCPs by EPA Method 8081A
- Antimony, cobalt, chromium, lead, and manganese by EPA Method 6010B
- Hexavalent chromium by EPA Method 7196A

Analytical results for groundwater were compared to the North Carolina Groundwater Quality Standards (NCGWQS) (NCDENR, 2010), and adjusted tap water RSLs where the NCGWQS were not available (EPA, 2011). Analytical results for metals in groundwater were also compared to twice the mean Base background concentrations (Baker, 2002). Groundwater analytical results are provided in **Tables 4** through **6** and are discussed for each aquifer in the following sections.

Surficial Aquifer

Groundwater samples were collected from 26 monitoring wells screened in the surficial aquifer. Of the target analytes, chlorobenzene, dieldrin, and four metals were reported at concentrations exceeding comparison criteria. A summary of surficial aquifer detections is provided as follows:

Analytical Results Summary - Surficial Aquifer

Chemical Name	Frequency of Detection	Frequency of Exceedance	Maximum Concentration	Location of Maximum Concentration	Comparison Criteria	
					MCB CamLej Background GW 2X Mean	NCGWQS
VOCs (µg/L)						
Chlorobenzene	9/26	4/26	8,500	IR06-GW47	--	50
Pesticides (µg/L)						
Dieldrin	4/26	4/26	0.012 J	IR06-MW55 IR06-MW57	--	0.002
Total Metals (µg/L)						
Antimony	6/26	5/26	24.2	IR06-GW11	3.28	1.5a
Cobalt	9/26	1/26	9.3 J	IR06-MW55	3.4	1.1a
Manganese	20/26	10/26	1,010	IR06-MW55	214	50

µg/L - micrograms per liter

^aEPA Adjusted Tap Water RSL

Chlorobenzene concentrations have historically fluctuated from below the NCGWQS to a maximum of 57,000 µg/L (in 2000) in groundwater samples collected from monitoring well IR06-GW16, located near the source area. Historical data from the previous three sampling events (2008, 2010, and 2011) and a trend chart of recent historical data from 2005 are provided on **Figure 4** with the current distribution of chlorobenzene in the surficial aquifer. The plume has been laterally defined in the surficial aquifer.

Antimony, cobalt and manganese were the only metals detected above the applicable comparison criteria. Cobalt was detected at concentrations within the same order of magnitude of Base background concentrations. The highest concentrations of antimony and manganese were one order of magnitude above Base background concentrations, but the majority of detections were within the same order of magnitude as the Base background concentrations. Groundwater quality parameters for samples collected within the surficial aquifer, where many of the metals exceedances were reported, exhibited elevated turbidity (greater than 50 nephelometric turbidity units), which may contribute to metals concentrations.

Upper Castle Hayne Aquifer - 45 to 50 feet below ground surface (bgs)

Groundwater samples were collected from 11 monitoring wells screened from 45 to 50 feet bgs in the upper Castle Hayne Aquifer. Chlorobenzene, dieldrin, and chromium exceeded NCGWQS. A summary of exceedances reported in this depth interval is provided as follows:

Analytical Results Summary - Upper Castle Hayne Aquifer (45 to 50 feet bgs)

Chemical Name	Frequency of Detection	Frequency of Exceedance	Maximum Concentration	Location of Maximum Concentration	Comparison Criteria	
					MCB CamLej Background GW 2X Mean	NCGWQS
VOCs (µg/L)						
Chlorobenzene	4/11	3/11	1,100	IR06-MW57IW	--	50
Pesticides (µg/L)						
Dieldrin	1/11	1/11	0.023 J	IR06-MW59IW	--	0.002
Total Metals (µg/L)						
Chromium	11/11	2/11	12.6 J	IR06-MW54IW	3.13	10

The distribution of chlorobenzene in the upper Castle Hayne Aquifer is depicted on **Figure 5**. The plume has been laterally defined within this portion of the upper Castle Hayne Aquifer.

Chromium was detected in all samples collected from the upper Castle Hayne aquifer, with two values exceeding the NCGWQS. Although total chromium exceeded the NCGWQS, hexavalent chromium was not detected in the samples collected for hexavalent chromium analysis (IR06-MW54IW, IR06-MW56IW, and IR06-MW60IW).

Upper Castle Hayne Aquifer - 85 to 90 feet bgs

Groundwater samples were collected from eight monitoring wells screened from 85 to 90 feet bgs in the upper Castle Hayne Aquifer. Chlorobenzene was detected in four samples and exceeded the NCGWQS in one sample (IR06-MW31DW) with a concentration of 100 µg/L. The estimated distribution of chlorobenzene in the 85- to 90-foot bgs zone of the upper Castle Hayne Aquifer is depicted on **Figure 6**. The plume is not delineated downgradient or vertically in the vicinity of monitoring well IR06-MW31DW.

3. Summary

This phase of investigation has identified a source of chlorobenzene in groundwater that was subsequently removed during the TCRA and also provided additional data related to the nature and extent of target analytes in groundwater. However, the extent of the chlorobenzene plume has not been completely defined horizontally or vertically within the Castle Hayne Aquifer in the vicinity of monitoring well IR06-MW31DW. The current information indicates that the downgradient extent of the chlorobenzene plume appears to be within 500 feet of the aquifer use control boundary (**Figure 7**).

In addition to chlorobenzene, several OCPs and metals were detected in both soil and groundwater at concentrations greater than the applicable comparison criteria, identified in Section 2. However, their frequency of detection and ranges of concentrations are generally consistent with previously reported data collected within Site 6.

The in-place remedies for soil and groundwater at OU2 are currently protective of human health and the environment in the short term because exposure pathways that could result in unacceptable risks are being controlled and LUCs preventing exposure to soil and groundwater are in place. The LUCs are intended to prohibit groundwater intrusive activities and aquifer use until remediation goals are achieved.

Recommendations for future work at Site 6 are as follows:

- Reassess site-specific constituents of concern in soil and groundwater
- Delineate the distribution of chlorobenzene in groundwater
- Delineate the distribution of chlorobenzene in vadose zone soil potentially impacting groundwater
- Update LUCs, as necessary, based on the distribution of chlorobenzene in soil and groundwater

4. References

Baker. 2002. *Draft Base Background Groundwater Study, Marine Corps Base, Camp Lejeune, North Carolina*. August.

CH2M HILL. 2010. *Final Site 6 Chlorobenzene Investigation Summary Report, Marine Corps Base Camp Lejeune, North Carolina*. July.

CH2M HILL. 2011a. *Final Sampling and Analysis Plan Site 6 Supplemental Investigation, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina*. February.

CH2M HILL. 2011b. *Final Site-specific Work Plan Addendum, Test Pit Excavations at Site 6 within Site UXO-22, Marine Corps Base Camp Lejeune, North Carolina*. January.

CH2M HILL. 2011c. *Draft Expanded Soil Background Study Report, Marine Corps Base Camp Lejeune, North Carolina*. May.

CH2M HILL. 2011d. *Final, Time-Critical Removal Action Summary, Site 6 – Storage Lots 201 and 203, Technical Memorandum*. August.

EPA. 2011. *Regional Screening Levels for Chemicals at Superfund Sites*. June.

NCDENR. 2010. *Subchapter 2L, Classifications and Water Quality Standards Applicable to the Groundwater's of North Carolina*. Title 15A, Department of Environment and Natural Resources, Division of Water Quality. December.

TABLE 1

Test Pit Summary Table

Site 6 Supplemental Investigation

MCB CamLej, North Carolina

Test Pit ID	Dimensions (ft)			Lithology	Materials Uncovered
	Depth	Length	Width		
IR06-TP01	5	5	5	0-0.75 ft-Gravel 0.75-5 ft-Gray, fine grained sand	Metal roofing and dry cell batteries
IR06-TP02	5	5	5	0-2 ft-Gray, fine grained sand 2-5 ft- Tan, fine grained sand	Communication batteries (approximately 30) and projectile cartridge case
IR06-TP03	4	5	5	0-2 ft-Dark brown fine grained sand 2-4 ft- Light tan fine grained sand, groundwater at 4 ft bgs	Spools of communication wire
IR06-TP04	4	5	5	0-1 ft-Gravel 1-2 ft Gray, fine grained sand 2-4 ft- Tan and light gray, fine grained sand, groundwater at 4 ft bgs	Loose communication wire and two spools of communication wire
IR06-TP05	2	5	5	0-1 ft-Dark gray fine grained sand 1-2 ft-Tan/light gray, fine grained sand	Metallic debris and small batteries
IR06-TP06	3	5	5	0-1.5 ft-Light gray, fine grained sand 1.5-3 ft-Brown, fine grained sand	Cultural debris
IR06-TP07	4	5	5	0-2 ft-Tan fine grained sand 2-4 ft-Light tan fine grained sand	Communication wire spools
IR06-TP08	4	5	5	0-1.5 ft-Dark brown, fine grained sand 1.5-4 ft- Tan, fine grained sand	Cultural debris and three 3.5-inch rocket motors
IR06-TP09	2.5	5	5	0-1.5 ft-Brown, fine grained sand 1.5-2.5 ft-Tan, fine grained sand	Cultural debris (screws, metal rods, nails, hinges, etc.)
IR06-TP10	5	5	5	0-1 ft- Silty, fine to very fine grained sand 1-5 ft- Tan fine to very fine grained sand	Two 55-gallon drums, 5-gallon bucket, and crate with unknown (non-hazardous) powder.
IR06-TP11	4	5	5	None recorded	Cultural debris and communication wire
IR06-TP12	3	5	5	None recorded	Cultural debris, communication wire, and rusted 5-gallon buckets

TABLE 2

Test Pit Investigation Soil Analytical Results

Site 6 Supplemental Investigation

MCB CamLej, North Carolina

Station ID	DRAFT MCB CamLej Background (CH2M HILL, 2011)	NCSs (January, 2010)	Adjusted Industrial Soil RSLs (Nov, 2010)	Adjusted Residential Soil RSLs (Nov, 2010)	Project Action Limits*	IR06-TP01		IR06-TP02	IR06-TP03	IR06-TP04		IR06-TP06	IR06-TP07	IR06-TP08	IR06-TP09
						IR06-TP01-N-4-5-11A 01/19/11	IR06-TP01-S-4-5-11A 01/19/11	IR06-TP02-W-4-5-11A 01/18/11	IR06-TP03-N-3-4-11A 01/21/11	IR06-TP04D-N-3-4-11A 01/19/11	IR06-TP04-N-3-4-11A 01/19/11	IR06-TP06-N-2-3-11A 01/20/11	IR06-TP07-S-3-4-11A 01/20/11	IR06-TP08-N-3-4-11A 01/21/11	IR06-TP09-2-3-11A 01/21/11
Chemical Name															
Volatile Organic Compounds (µg/kg)															
Chlorobenzene	--	450	140,000	29,000	450	2.4 UJ	2.8 UJ	2.5 U	4.4 J	2.8 UJ	2.5 UJ	2.8 UJ	2.8 UJ	6.5 J	10 J
Dichlorodifluoromethane (Freon-12)	--	29,000	78,000	18,000	18,000	4.9 UJ	5.5 UJ	5 U	5 UJ	32 J	59 J	5.5 UJ	5.5 UJ	5 UJ	5.5 UJ
Tetrachloroethene	--	5	2,600	550	5	2.4 UJ	2.8 UJ	2.5 U	2.5 U	3.3 J	2.7 J	2.8 UJ	2.8 UJ	2.5 UJ	2.8 UJ
Trichloroethene	--	18	14,000	2,800	18	2.4 UJ	2.8 UJ	2.5 U	2.5 U	0.91 J	0.65 J	2.8 UJ	2.8 UJ	2.5 UJ	2.8 UJ
Semivolatile Organic Compounds (µg/kg)															
2-Chloronaphthalene	--	--	180,000	180,000	180,000	260 U	270 U	290 U	290 U	290 U	300 U	290 U	300 U	270 U	280 U
2-Methylnaphthalene	--	1,600	370,000	31,000	1,600	260 U	270 U	290 U	290 U	290 U	300 U	290 U	300 U	270 U	280 U
Acenaphthene	--	8,400	3,300,000	340,000	8,400	2.9 J	2.2 J	12 UJ	12 U	12 UJ	12 UJ	12 UJ	12 UJ	11 U	11 U
Anthracene	--	660,000	17,000,000	1,700,000	660,000	2.5 J	11 U	12 U	12 U	12 U	12 U	12 U	12 U	11 U	11 U
Benzaldehyde	--	--	1,200,000	780,000	780,000	260 UJ	270 UJ	290 UJ	290 UJ	290 UJ	300 UJ	290 UJ	520 UJ	270 UJ	280 UJ
Benzo(a)anthracene	--	180	2,100	150	150	15 J	12 J	3.4 J	12 U	3.8 J	4.6 J	2.5 J	12 U	3 J	11 U
Benzo(a)pyrene	--	59	210	15	15	17 J	9.7 J	12 U	12 U	7.4 J	20 J	12 U	12 U	11 U	11 U
Benzo(b)fluoranthene	--	600	2,100	150	150	28 J	14 J	12 U	12 U	12 U	12 U	12 U	12 U	11 U	11 U
Benzo(g,h,i)perylene	--	360,000	1,700,000	170,000	170,000	32 J	5.4 J	12 U	12 U	51	110	12 U	12 U	11 U	11 U
Chrysene	--	18,000	210,000	15,000	15,000	11 J	3.6 J	12 U	12 U	12 U	12 U	12 U	12 U	11 UJ	11 U
Dibenz(a,h)anthracene	--	190	210	15	15	15 J	2 J	12 U	12 U	12 U	12 U	12 U	12 U	11 U	11 U
Fluoranthene	--	330,000	2,200,000	230,000	230,000	27	22 J	12 U	12 U	12 U	12 U	12 U	12 U	11 U	11 U
Indeno(1,2,3-cd)pyrene	--	2,000	2,100	150	150	27 J	10 J	12 U	12 U	22 J	42	12 U	12 U	11 U	11 U
Naphthalene	--	210	18,000	3,600	210	11 UJ	11 UJ	12 UJ	12 U	12 UJ	12 UJ	12 UJ	12 UJ	11 U	11 U
Pentachlorophenol	--	31	2,700	890	31	650 U	680 U	720 U	710 U	720 U	750 U	710 U	740 U	670 U	690 U
Phenanthrene	--	57,000	17,000,000	1,700,000	57,000	21 J	16 J	12 U	12 U	12 U	12 U	12 U	12 U	11 U	2.4 J
Pyrene	--	220,000	1,700,000	170,000	170,000	21 J	15 J	12 U	12 U	12 U	2.8 J	12 U	12 U	11 U	11 U
Pesticide/Polychlorinated Biphenyls (µg/kg)															
4,4'-DDD	--	240	7,200	2,000	240	320	3.8 J	0.94 J	1.8 U	200 J	3 J	2 U	2 U	1.8 U	0.59 J
4,4'-DDE	--	--	5,100	1,400	1,400	120	1.4 J	0.73 J	1.8 U	71 J	1.5 J	2 U	2 UJ	1.8 U	15
4,4'-DDT	--	340	7,000	1,700	340	290	4 J	1 J	1.8 U	130 J	6.3 J	2 U	2 U	1.8 U	2.7 J
Aldrin	--	--	100	29	29	0.9 U	0.96 U	0.96 UJ	0.92 U	0.93 U	0.81 J	1 U	1 U	0.92 U	0.94 U
alpha-Chlordane	--	68	6,500	1,600	68	0.9 U	0.96 U	0.49 J	0.92 U	0.93 U	1 U	1 U	1 UJ	0.92 U	0.43 J
Aroclor-1260	--	--	740	220	220	9.1 U	26	10 U	9.2 U	9.3 U	10 U	10 U	10 U	9.2 U	9.4 U
beta-BHC	--	1.2	960	270	270	0.9 U	0.96 U	0.96 UJ	0.92 U	0.93 U	1 U	1 U	1 UJ	0.92 U	0.94 U
Dieldrin	--	0.81	110	30	0.81	49 J	1.4 J	1.1 J	1.8 U	51 J	11 J	0.9 J	0.97 J	1.8 U	0.9 J
Endrin	--	810	18,000	1,800	810	1.7 U	1.9 U	1.9 UJ	1.8 U	1.8 U	1.5 J	2 U	2 UJ	1.8 U	1.8 U
Endrin ketone	--	810	18,000	1,800	810	1.7 U	1.9 U	1.9 UJ	1.8 U	1.8 U	1.1 J	2 U	2 UJ	1.8 U	1.8 U
gamma-Chlordane	--	68	6,500	1,600	68	0.9 U	0.96 U	0.68 J	0.92 U	0.93 U	1 U	1 U	1 UJ	0.92 U	0.56 J
Heptachlor epoxide	--	0.82	190	53	0.82	0.45 J	0.96 U	0.96 UJ	0.92 U	0.93 U	1 U	1 U	1 UJ	0.92 U	0.94 U
Total Metals (mg/kg)															
Aluminum	26,600	--	99,000	7,700	7,700	4,180	3,660	1,990	3,140	3,900	3,570	5,140	3,120	8,840	3,940
Antimony	1.79	--	41	3.1	1.79	5.3 J	13.5 J	0.48 UJ	0.46 U	0.4 UJ	0.42 UJ	0.43 UJ	0.45 UJ	0.43 U	7.1
Arsenic	14.7	5.8	1.6	0.39	0.39	2.7	7	0.08 J	0.46 U	0.18 J	0.3 J	0.27 J	0.1 J	0.45 U	3.4
Barium	53.2	580	19,000	1,500	53.2	11.2	10.6	2.2	3	6	5.6	3	3.2	8.3	117
Beryllium	--	--	200	16	16	0.04 J	0.04 J	0.01 J	0.01 J	0.02 J	0.02 J	0.02 J	0.02 J	0.05 J	0.08 J
Cadmium	1.3	3	80	7	1,300	0.14 J	0.09 J	0.38 J	0.03 J	0.04 J	0.08 J	0.26 U	0.27 U	0.03 J	2.7
Calcium	720	--	720	--	720	51,400	19,800	146	36.3	2,190	3,880	109	30.4 U	33.5	2,200
Chromium	32.7	3.8	5.6	0.29	0.29	6.2	6.4	2.8	3.1	3.8	4.4	4	3.1	8.2	596
Chromium (hexavalent) (mg/kg)	6.15	3.8	5.6	0.29	0.29	0.84 J	0.43 UJ	0.43 J	0.49 J	0.51 J	0.42 UJ	0.95 UJ	1.7 J	0.44 U	490
Cobalt	1	--	30	2.3	1	6.2	0.49 J	0.39 U	0.14 J	0.22 J	0.23 J	0.1 J	0.13 J	0.62 J	4.8 J
Copper	6.61	700	4,100	310	6.61	5.1	4.2	9.6	0.5 J	2.2	5.2	0.31 J	0.27 J	0.71 J	180
Iron	33,600	150	72,000	5,500	150	2,110	6,330	2,740	314	839	2,390	358	403	1,060	22,000
Lead	14.4	270	800	400	14.40	17.9	23.6	31.7	2.8	16	17.4	3.5	2.2	4.6	2,800
Magnesium	732	--	--	--	732	734	1,160	59.5	65.6	106	146	75.8	80.4	228	164
Manganese	16.9	65	2,300	180	16.90	64.3	21.6	13.9	2.9	5	6.5	1.6	2.3	4.1	360
Mercury	0.148	1	31	2.3	0.148	0.01 J	0.03	0.23	0.008 J	0.02 J	0.07 J	0.02 J	0.02 J	0.018 U	0.03 J
Nickel	8.86	130	2,000	150	8.86	8.3	7.8	0.48 J	0.8 J	2.5 J	2.1 J	1.1 J	1.2 J	3.5	14.7
Potassium	1,020	--	--	--	1,020	182	142	62.5 J	62.5 J	75.3 J	89.7	84.7 J	96.5	232	90.5
Selenium	0.948	2.1	510	39	0.948	0.54 U	0.71 U	0.68 U	0.64 U	0.56 U	0.39 J	0.6 U	0.63 U	0.6 U	1.1 U
Silver	--	3.4	510	39	3.4	0.02 J	0.1 J	0.09 J	0.37 U	0.32 U	0.04 J	0.34 U	0.36 U	0.34 U	0.9 J
Sodium	81.1	--	--	--	81.1	71.8 J	56.7 J	48 U	46 U	40 U	42 U	43 U	45 U	23.8 J	41.2 J
Thallium	--	--	--	--	--	0.24 J	0.51 U	0.48 U	0.46 U	0.4 U	0.42 U	0.43 U	0.45 U	0.43 U	0.8 U
Vanadium	76.10	--	520	39	39	5.7	4.3	2.9	2.8	3.3	3.6	2.8	2.7	7.7	4.4
Zinc	16.6	1,200	31,000	2,300	16.6	44.9	35.2	92.1	3.3 U	57.1 J	183 J	0.92 U	5.3	2.9 U	537

Shading indicates exceedance of background concentration for subsurface soil

Bold box indicates exceedance of NC SSLs

Bold text indicates exceedance of Adjusted Industrial Soil RSLs

Underline indicates exceedance of Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

* - Project Action Limits represent the most conservative value among Base Background, RSL, and NCSsL. The criteria has been included for reference and no formatting has been added to the table to indicate exceedances of the PAL.

TABLE 2

Test Pit Investigation Soil Analytical Results

Site 6 Supplemental Investigation

MCB CamLej, North Carolina

Station ID	DRAFT MCB CamLej Background (CH2M HILL, 2011)	NCSSLS (January, 2010)	Adjusted Industrial Soil RSLs (Nov, 2010)	Adjusted Residential Soil RSLs (Nov, 2010)	Project Action Limits*	IR06-TP10	IR06-TP12
Sample ID						IR06-TP10-4-5-11A	IR06-TP12-N-2-3-11A
Sample Date						01/24/11	01/24/11
Chemical Name							
Volatile Organic Compounds (µg/kg)							
Chlorobenzene	--	450	140,000	29,000	450	70,000,000	5.4 J
Dichlorodifluoromethane (Freon-12)	--	29,000	78,000	18,000	18,000	3,200,000 U	4.7 UJ
Tetrachloroethene	--	5	2,600	550	5	1,600,000 U	2.4 UJ
Trichloroethene	--	18	14,000	2,800	18	1,600,000 U	2.4 UJ
Semivolatile Organic Compounds (µg/kg)							
2-Chloronaphthalene	--	--	180,000	180,000	180,000	2,200	280 U
2-Methylnaphthalene	--	1,600	370,000	31,000	1,600	2,800	280 U
Acenaphthene	--	8,400	3,300,000	340,000	8,400	36 U	11 U
Anthracene	--	660,000	17,000,000	1,700,000	660,000	36 U	11 U
Benzaldehyde	--	--	1,200,000	780,000	780,000	900 UJ	280 UJ
Benzo(a)anthracene	--	180	2,100	150	150	36 U	7.2 J
Benzo(a)pyrene	--	59	210	15	15	17 J	11 U
Benzo(b)fluoranthene	--	600	2,100	150	150	22 J	11 U
Benzo(g,h,i)perylene	--	360,000	1,700,000	170,000	170,000	36 U	11 U
Chrysene	--	18,000	210,000	15,000	15,000	36 U	11 U
Dibenz(a,h)anthracene	--	190	210	15	15	36 U	11 U
Fluoranthene	--	330,000	2,200,000	230,000	230,000	36 U	3.6 J
Indeno(1,2,3-cd)pyrene	--	2,000	2,100	150	150	36 U	11 U
Naphthalene	--	210	18,000	3,600	210	5,700	11 U
Pentachlorophenol	--	31	2,700	890	31	1,600 J	690 U
Phenanthrene	--	57,000	17,000,000	1,700,000	57,000	20 J	5.1 J
Pyrene	--	220,000	1,700,000	170,000	170,000	36 U	3.1 J
Pesticide/Polychlorinated Biphenyls (µg/kg)							
4,4'-DDD	--	240	7,200	2,000	240	280	1.9 U
4,4'-DDE	--	--	5,100	1,400	1,400	45 J	1.9 U
4,4'-DDT	--	340	7,000	1,700	340	20 U	1.9 U
Aldrin	--	--	100	29	29	10 U	0.99 U
alpha-Chlordane	--	68	6,500	1,600	68	10 U	0.99 U
Aroclor-1260	--	--	740	220	220	10 U	9.9 U
beta-BHC	--	1.2	960	270	270	220	0.99 U
Dieldrin	--	0.81	110	30	0.81	40	1.9 U
Endrin	--	810	18,000	1,800	810	20 U	1.9 U
Endrin ketone	--	810	18,000	1,800	810	20 U	1.9 U
gamma-Chlordane	--	68	6,500	1,600	68	10 U	0.99 U
Heptachlor epoxide	--	0.82	190	53	0.82	10 U	0.99 U
Total Metals (mg/kg)							
Aluminum	26,600	--	99,000	7,700	7,700	1,530	3,700
Antimony	1.79	--	41	3.1	1.79	0.35 U	0.45 U
Arsenic	14.7	5.8	1.6	0.39	0.39	0.35 U	0.45 U
Barium	53.2	580	19,000	1,500	53.2	1.8	3.6
Beryllium	--	--	200	16	16	0.01 J	0.01 J
Cadmium	1.3	3	80	7	1.300	0.01 J	0.02 J
Calcium	720	--	--	--	720	35.2	188
Chromium	32.7	3.8	5.6	0.29	0.29	2.8	2.8
Chromium (hexavalent) (mg/kg)	6.15	3.8	5.6	0.29	0.29	0.46 U	0.88
Cobalt	1	--	30	2.3	1	0.09 J	0.64 J
Copper	6.61	700	4,100	310	6.61	0.75 J	0.89 U
Iron	33,600	150	72,000	5,500	150	413	878
Lead	14.4	270	800	400	14.40	6.4	4.4
Magnesium	732	--	--	--	732	47.7	66
Manganese	16.9	65	2,300	180	16.90	1.9	6
Mercury	0.148	1	31	2.3	0.148	0.08	0.03 J
Nickel	8.86	130	2,000	150	8.86	0.46 J	1.5 J
Potassium	1,020	--	--	--	1,020	50.6 J	62.7 J
Selenium	0.948	2.1	510	39	0.948	0.49 U	0.62 U
Silver	--	3.4	510	39	3.4	0.28 U	0.36 U
Sodium	81.1	--	--	--	81.1	17.4 J	45 U
Thallium	--	--	--	--	--	0.35 U	0.45 U
Vanadium	76.10	--	520	39	39	1.6 J	3.4
Zinc	16.6	1,200	31,000	2,300	16.6	42.2	7.5

Shading indicates exceedance of background concentration for subsurface soil

Bold text indicates exceedance of NC SSLs

Bold text indicates exceedance of Adjusted Industrial Soil RSLs

Underline indicates exceedance of Adjusted Residential Soil RSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

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mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

* - Project Action Limits represent the most conservative value among Base Background, RSL, and NCSSL. The criteria has been included for reference and no formatting has been added to the table to indicate exceedances of the PAL.

TABLE 3

Monitoring Well Construction Details

*Site 6 Supplemental Investigation**MCB CamLej, North Carolina*

Well Identification	Date Installed	Casing Diameter (inches)	Top of Casing Elevation (feet msl)	Ground Surface Elevation (feet msl)	Boring Depth (feet bgs)	Well Depth (feet bgs)
IR06-MW31IW	02/05/11	2	27.02	27.30	50	50
IR06-MW31DW	02/03/11	2	26.76	27.05	90	90
IR06-MW53R	02/02/11	2	NS	NS	21	21
IR06-MW54DW	02/04/11	2	23.51	23.89	90	90
IR06-MW57DW	02/08/11	2	23.56	23.99	90	90
IR06-MW59IW	02/08/11	2	26.58	27.06	50	50
IR06-MW59DW	02/07/11	2	26.63	27.04	90	90
IR06-MW60IW	02/02/11	2	23.08	23.47	50	50
IR06-MW61IW	02/04/11	2	24.23	24.57	48	48
IR06-MW62IW	02/23/11	2	25.96	26.32	50	50
IR06-MW62DW	02/22/11	2	25.80	26.35	90	90
IR06-MW63IW	02/23/11	2	29.06	29.53	55	50
IR06-MW63DW	02/24/11	2	29.62	29.95	90	90

Notes:

NS = not surveyed

msl = mean sea level

All wells were completed as flush mount.

TABLE 4

Surficial Aquifer Groundwater Analytical Results

Site 6 Supplemental Investigation

MCB CamLej, North Carolina

Station ID	Camp Lejeune Background GW 2X Mean	NCGWQS (January, 2010)*	IR06-GW05	IR06-GW06	IR06-GW07S	IR06-GW08	IR06-GW09		IR06-GW11	IR06-GW12	IR06-GW13	IR06-GW16		IR06-GW18		IR06-GW19	IR06-GW21
Sample ID			IR06-GW05-11A	IR06-GW06-11A	IR06-GW07S-11A	IR06-GW08-11A	IR06-GW09-11A	IR06-GW09D-11A	IR06-GW11-11A	IR06-GW12-11A	IR06-GW13-11A	IR06-GW16-11A	IR06-GW16D-11A	IR06-GW18-11A	IR06-GW18D-11A	IR06-GW19-11A	IR06-GW21-11A
Sample Date			03/03/11	03/05/11	03/05/11	03/05/11	03/05/11	03/05/11	03/03/11	03/05/11	03/05/11	03/02/11	03/02/11	03/05/11	03/05/11	03/05/11	03/04/11
Chemical Name																	
Volatile Organic Compounds (µg/L)																	
Chlorobenzene	--	50	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	570	580	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatile Organic Compounds (µg/L)																	
No Detections																	
Pesticides (µg/L)																	
4,4'-DDD	--	0.1	0.047 U	0.047 UJ	0.054 U	0.047 U	0.05 U	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.05 U	0.047 U	0.047 UJ	0.047 U
Dieldrin	--	0.002	0.047 U	0.047 UJ	0.054 U	0.047 U	0.05 U	0.047 U	0.047 U	0.047 U	0.048 U	0.047 U	0.047 U	0.05 U	0.047 U	0.047 UJ	0.047 U
gamma-BHC (Lindane)	--	0.03	0.024 U	0.024 UJ	0.027 U	0.024 U	0.025 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.025 U	0.024 U	0.024 UJ	0.024 U
Total Metals (µg/L)																	
Antimony	3.28	1.5**	1.3 J	5 U	5 U	5 U	12.6	12.2	24.2	5 U	5.6 J	5 U	5 U	5 U	5 U	5 U	5 U
Chromium	3.13	10	1.8 J	6.9 J	4 U	2.4 J	4.5 J	4.7 J	1.1 J	4 U	4 U	3 J	2.5 J	4 U	4 U	4 U	3 J
Chromium, hexavalent	3.13	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	3.4	1.1**	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	0.63 J	0.86 J	4 U	4 U	4 U	4 U
Lead	2.8	15	4 U	3.3 J	4 U	4 U	1.4 J	1.2 J	1.7 J	4 U	4 U	1.2 J	1.6 J	1.8 J	4 U	1.6 J	1.7 J
Manganese	214	50	1.6 J	4 U	20.2	14.4	4.6 U	4.5 U	8.2	4 U	4 U	225	228	7.5	6.9	15.3	4 U

Notes:

Shading indicates exceedance of two times the mean base background concentration for Groundwater

Bold box indicates exceedance of NCGWQS or the more conservative maximum contaminant level (MCL)

NA - Not analyzed

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

** - Adjusted Tap Water RSL, used when NCGWQS or MCL does not exist

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/L - Micrograms per liter

TABLE 4

Surficial Aquifer Groundwater Analytical Results

Site 6 Supplemental Investigation

MCB CamLej, North Carolina

Station ID	Camp Lejeune Background GW 2X Mean	NCGWQS (January, 2010)*	IR06-GW23	IR06-GW25	IR06-GW31	IR06-GW44	IR06-GW46	IR06-GW47	IR06-MW03	IR06-MW04	IR06-MW53R	IR06-MW54		IR06-MW55	IR06-MW56	IR06-MW57	IR06-MW58
Sample ID			IR06-GW23-11A	IR06-GW25-11A	IR06-GW31-11A	IR06-GW44-11A	IR06-GW46-11A	IR06-GW47-11A	IR06-GW03-11A	IR06-GW04-11A	IR06-GW53R-11A	IR06-GW54-11A	IR06-GW54D-11A	IR06-GW55-11A	IR06-GW56-11A	IR06-GW57-11A	IR06-GW58-11A
Sample Date			03/02/11	03/04/11	03/04/11	03/02/11	03/12/11	03/01/11	03/01/11	03/03/11	03/03/11	03/02/11	03/02/11	03/01/11	03/02/11	03/03/11	03/03/11
Chemical Name																	
Volatile Organic Compounds (µg/L)																	
Chlorobenzene	--	50	0.5 U	0.5 U	0.8 J	0.5 U	0.38 J	8,500	0.5 U	0.5 U	100	0.27 J	0.5 U	0.5 U	0.5 U	21	2.7
Semivolatile Organic Compounds (µg/L)																	
No Detections																	
Pesticides (µg/L)																	
4,4'-DDD	--	0.1	0.048 U	0.047 U	0.014 J	0.015 J	0.049 U	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U	0.047 UJ	0.047 UJ	0.047 U	0.047 U	0.047 U
Dieldrin	--	0.002	0.048 U	0.047 U	0.011 J	0.048 U	0.01 J	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U	0.047 UJ	0.012 J	0.047 U	0.012 J	0.047 U
gamma-BHC (Lindane)	--	0.03	0.024 U	0.024 U	0.024 U	0.024 U	0.015 J	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 UJ	0.024 UJ	0.024 U	0.024 U	0.024 U
Total Metals (µg/L)																	
Antimony	3.28	1.5**	5 U	5 U	5 U	5 U	5 U	5 U	7.5 J	5 U	5 U	5 U	5 U	5 U	5 U	7.8 J	5 U
Chromium	3.13	10	6.2 J	4 U	0.66 J	1.2 J	1.7 J	2.5 J	1.6 J	1.3 J	1.4 J	3.4 J	3.2 J	2.8 J	1.7 J	3 J	2.2 J
Chromium, hexavalent	3.13	10	0.025 U	NA	0.0125 U	0.0125 U	0.0125 U	0.0125 U	NA	NA							
Cobalt	3.4	1.1**	0.43 J	4 U	4 U	0.95 J	0.33 J	0.85 J	0.32 J	4 U	4 U	0.45 J	0.31 J	9.3 J	4 U	4 U	1.4 J
Lead	2.8	15	2.5 J	4 U	4 U	4 U	4 U	4 U	4 U	1.6 J	4 U	4 U	4 U	4 U	4 U	2 J	1.5 J
Manganese	214	50	4 J	4.4 U	108	263	234	349	1.4 J	5	399	426	478	1,010	229	272	625

Notes:

Shading indicates exceedance of two times the mean base background concentration for Groundwater

Bold box indicates exceedance of NCGWQS or the more conservative maximum contaminant level (MCL)

NA - Not analyzed

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

** - Adjusted Tap Water RSL, used when NCGWQS or MCL does not exist

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/L - Micrograms per liter

TABLE 5

Upper Castle Hayne Aquifer (45 to 50 feet bgs) Groundwater Analytical Results

Site 6 Supplemental Investigation

MCB CamLej, North Carolina

Station ID	Camp Lejeune Background GW 2X Mean	NCGWQS (January, 2010)*	IR06-GW16IW	IR06-MW31IW	IR06-MW54IW	IR06-MW56IW	IR06-MW57IW	IR06-MW58IW		IR06-MW59IW	IR06-MW60IW	IR06-MW61IW	IR06-MW62IW	IR06-MW63IW
Sample ID			IR06-GW16IW-11A	IR06-GW31IW-11A	IR06-GW54IW-11A	IR06-GW56IW-11A	IR06-GW57IW-11A	IR06-GW58IW-11A	IR06-GW58IWD-11A	IR06-GW59IW-11A	IR06-GW60IW-11A	IR06-GW61IW-11A	IR06-GW62IW-11A	IR06-GW63IW-11A
Sample Date			03/01/11	03/04/11	03/02/11	03/02/11	03/03/11	03/03/11	03/03/11	03/01/11	03/01/11	03/03/11	03/04/11	03/04/11
Chemical Name														
Volatile Organic Compounds (µg/L)														
Chlorobenzene	--	50	0.5 U	0.32 J	1,000	0.5 U	1,100	260 J	300	0.5 U				
Semivolatile Organic Compounds (µg/L)														
No Detections														
Pesticides (µg/L)														
Dieldrin	--	0.002	0.047 U	0.048 U	0.023 J	0.047 U	0.047 U	0.047 U	0.05 U					
Total Metals (µg/L)														
Chromium	3.13	10	2.2 J	0.6 J	12.6 J	3 J	2.9 J	0.56 J	0.7 J	10.5 J	5.1 J	1.4 J	2.2 J	2 J
Chromium, hexavalent	3.13	10	NA	NA	0.0624 U	0.0125 U	NA	NA	NA	NA	0.062 U	NA	NA	NA
Cobalt	3.4	1.1**	4 U	4 U	1.1 J	0.47 J	4 U	4 U	4 U	1.7 J	1.1 J	4 U	0.49 J	2 J
Lead	2.8	15	4 U	4 U	4 U	4 U	1.1 J	4 U	4 U	4 U	4 U	4 U	1.6 J	4 U
Manganese	214	50	12.2	76.9	24.2	8.9	11	38.4	36.7	99.4	18.7	38.5	27.9	40

Notes:

Shading indicates exceedance of two times the mean base background concentration for Groundwater

Bold box indicates exceedance of NCGWQS or the more conservative maximum contaminant level (MCL)

NA - Not analyzed

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value

** - Adjusted Tap Water RSL, used when NCGWQS or MCL does not exist

J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/L - Micrograms per liter

TABLE 6

Upper Castle Hayne Aquifer (85 to 90 feet bgs) Groundwater Analytical Results

Site 6 Supplemental Investigation

MCB CamLej, North Carolina

Station ID	Camp Lejeune Background GW 2X Mean	NCGWQS (January, 2010)*	IR06-GW07DW	IR06-GW15D	IR06-MW31DW	IR06-MW54DW	IR06-MW57DW	IR06-MW59DW	IR06-MW62DW	IR06-MW63DW
Sample ID			IR06-GW07DW-11A	IR06-GW15D-11A	IR06-GW31DW-11A	IR06-GW54DW-11A	IR06-GW57DW-11A	IR06-GW59DW-11A	IR06-GW62DW-11A	IR06-GW63DW-11A
Sample Date			03/05/11	03/12/11	03/04/11	03/02/11	03/03/11	03/01/11	03/12/11	03/04/11
Chemical Name										
Volatile Organic Compounds (µg/L)										
Chlorobenzene	--	50	0.5 U	0.5 U	100 J	0.32 J	0.51 J	0.5 U	27	0.5 U
Semivolatile Organic Compounds (µg/L)										
No Detections										
Pesticides (µg/L)										
4,4'-DDE	--	0.2**	0.048 U	0.05 U	0.012 J	0.052 U	0.047 U	0.048 U	0.056 UJ	0.047 U
4,4'-DDT	--	0.1	0.048 U	0.05 U	0.012 J	0.052 U	0.047 U	0.048 U	0.015 J	0.047 U
gamma-BHC (Lindane)	--	0.03	0.014 J	0.025 U	0.024 U	0.026 U	0.024 U	0.024 U	0.028 UJ	0.024 U
Total Metals (µg/L)										
Chromium	3.13	10	4 U	0.98 J	1.3 J	7 J	2.9 J	1.4 J	NA	1.6 J
Cobalt	3.4	1.1**	4 U	4 U	4 U	4 U	4 U	0.27 J	NA	4 U
Lead	2.8	15	4 U	4 U	4 U	1.2 J	4 U	4 U	NA	4 U
Manganese	214	50	45.4	9.9	61.3	32.6	44.1	28.9	NA	38.9

Notes:

Shading indicates exceedance of two times the mean base background concentration for Groundwater

Bold box indicates exceedance of NCGWQS or the more conservative maximum contaminant level (MCL)

NA - Not analyzed

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

** - Adjusted Tap Water RSL, used when NCGWQS or MCL does not exist

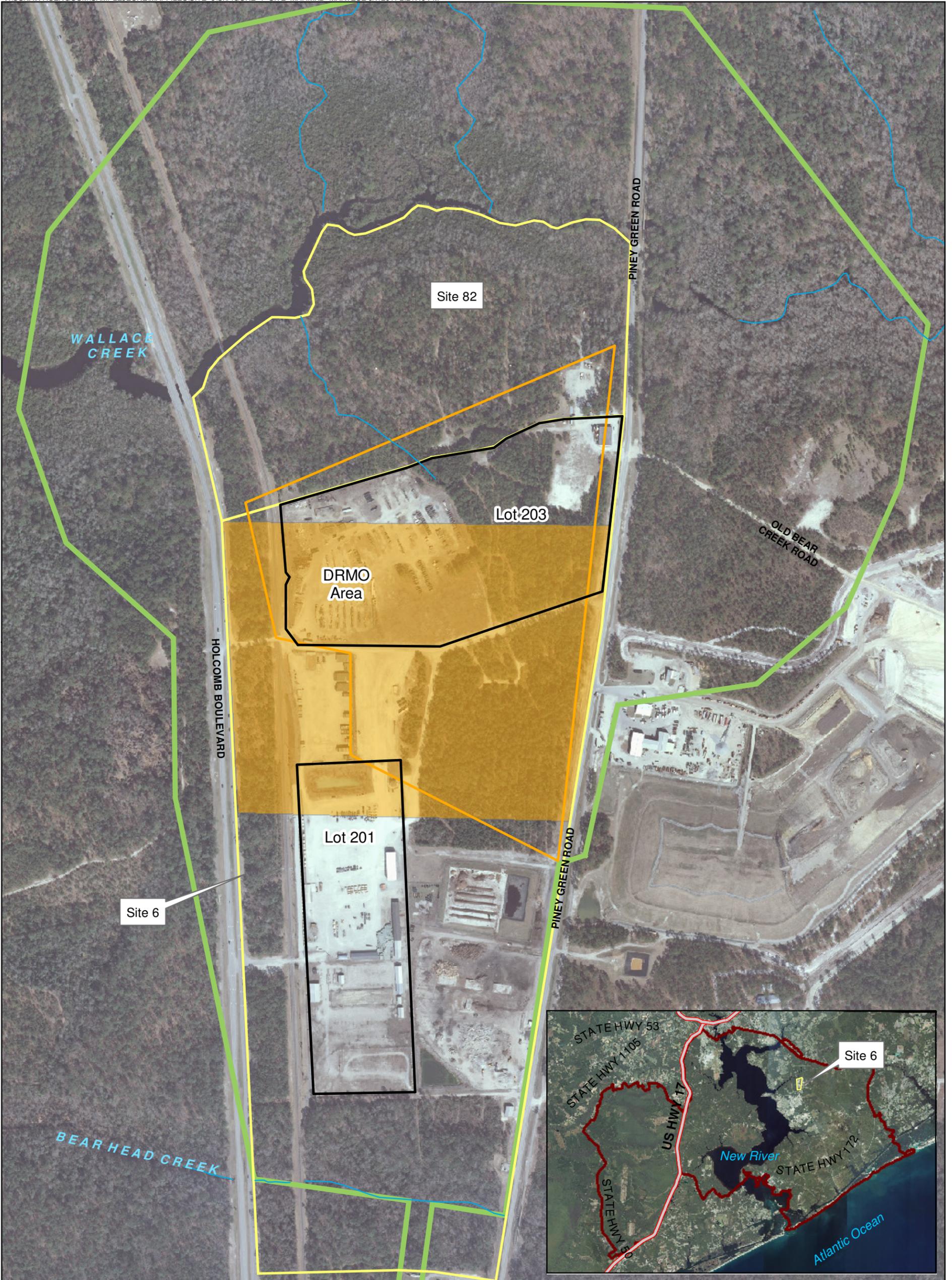
J - Analyte present, value may or may not be accurate or precise

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

µg/L - Micrograms per liter

Figures



Legend

- Surface Water Centerline
- Lots 201 and 203
- UXO-22 Boundary
- Site Boundary
- Operable Unit 2
- Area of Investigation

DRMO - Defense Reutilization and Marketing Office

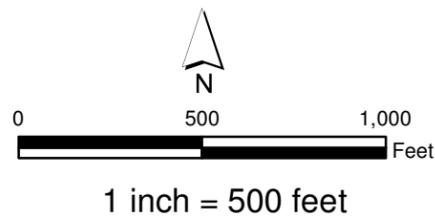
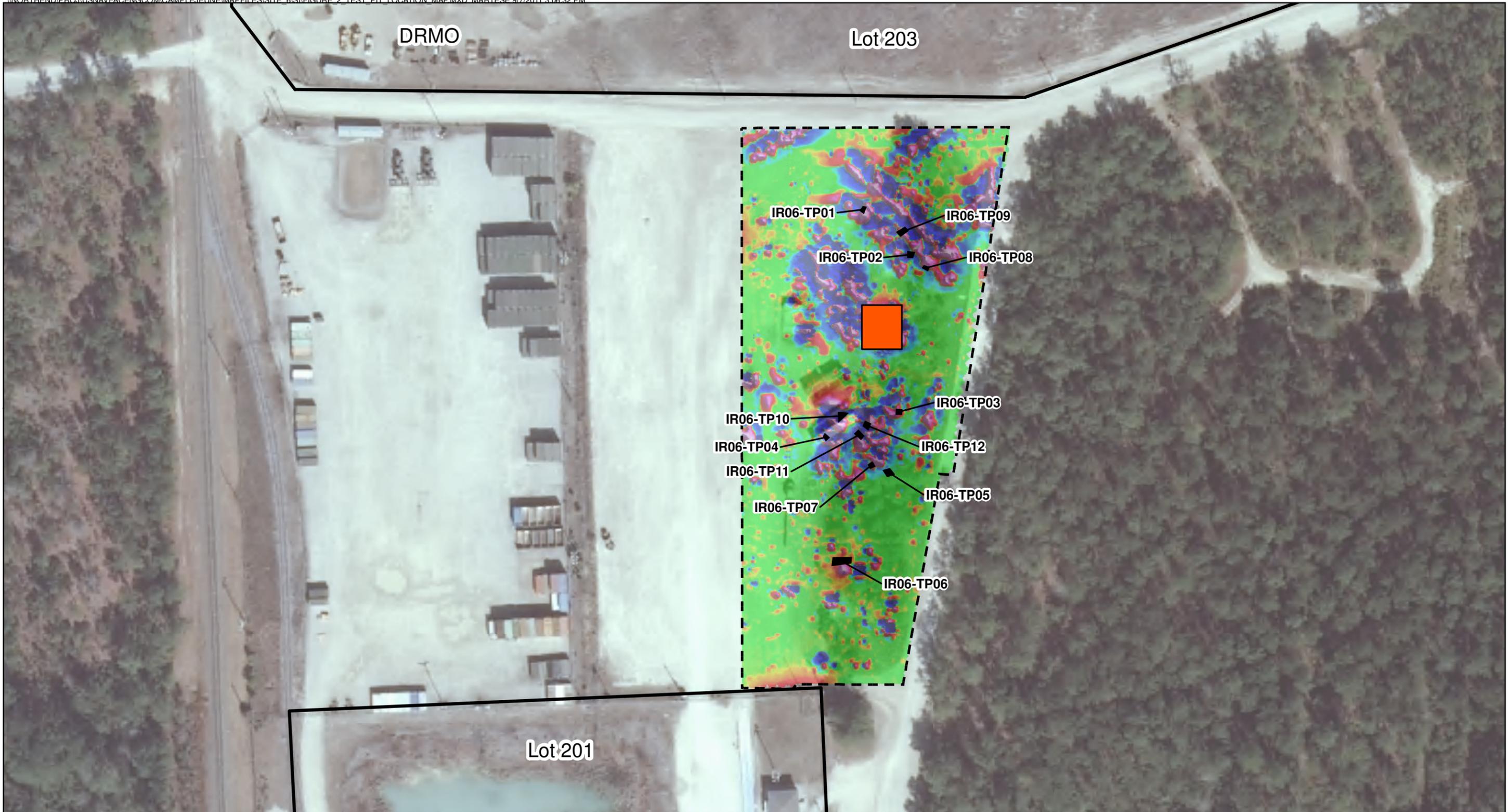
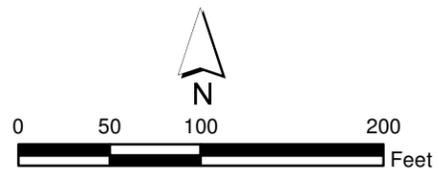
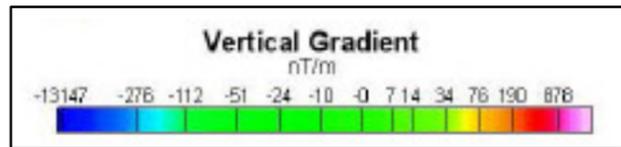


Figure 1
Site Map
Site 6 Supplemental Investigation
MCB CamLej
North Carolina



- Legend**
- Limit of Geophysical Investigation Area
 - Test Pit Locations
 - Site Boundary
 - MPPEH Disposal Pit
 - Lots 201 and 203



1 inch = 100 feet

Note:
Geophysical Survey Instrument Geometrics G-858 Magnetometer
DRMO - Defense Reutilization and Marketing Office

Figure 2
Test Pit Location Map
Site 6 Supplemental Investigation
MCB CamLej
North Carolina



Legend

Monitoring Wells

- Surficial
- Upper Castle Hayne Aquifer (45 to 50 feet bgs)
- Upper Castle Hayne Aquifer (85 to 90 feet bgs)
- Site Boundary
- Lots 201 and 203

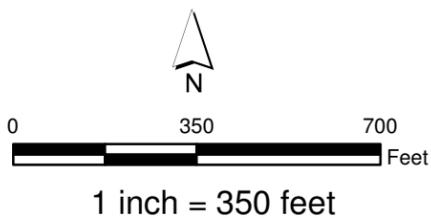
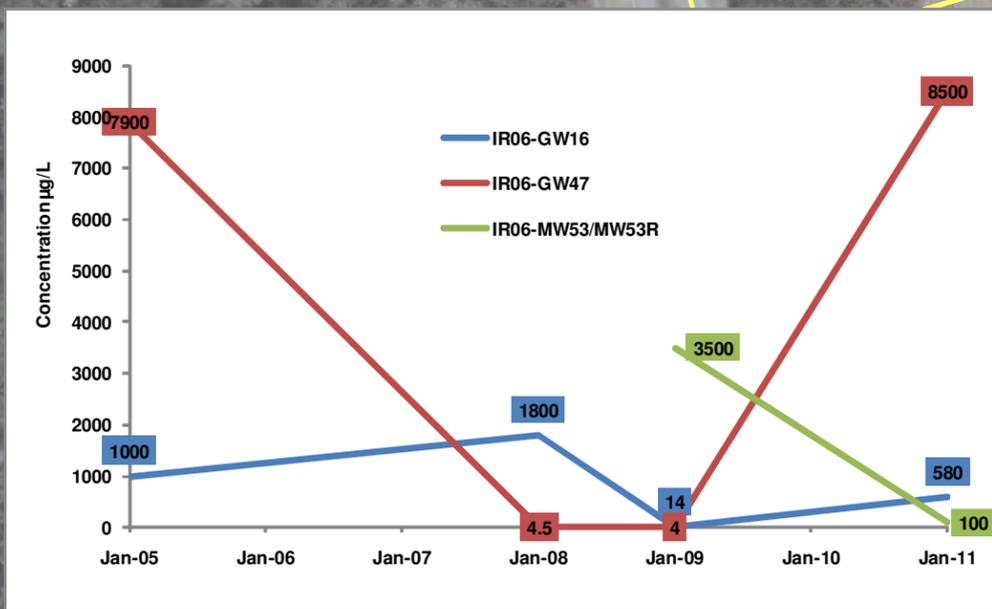


Figure 3
Groundwater Sample Location Map
Site 6 Supplemental Investigation
MCB CamLej
North Carolina



Location	Chlorobenzene (µg/L)		
	October-08	December-09	March-11
NCGWQS	50		
IR06-GW16	1800	14	580
IR06-GW31	NS	NS	0.8 J
IR06-GW46	2.8	12 J	0.38 J
IR06-GW47	4.5	4	8500
IR06-MW53R	NS	3500	100
IR06-GW54	NS	0.2 J	0.27 J
IR06-MW57	NS	2 J	21
IR06-MW58	NS	1 U	2.7

Legend

- Surficial Aquifer Monitoring Well
- Site Boundary
- Lots 201 and 203

Chlorobenzene Concentration

- >50 µg/L
- >500 µg/L
- >5,000 µg/L

Notes:

- NS - Not Sampled
- J - Analyte present, value may or may not be accurate or precise
- U - The material was analyzed for, but not detected
- NCGWQS - North Carolina Groundwater Quality Standard
- Shading indicated exceedance of NCGWQS
- Contours have been interpolated between monitoring well locations, actual conditions may differ from these shown on this figure

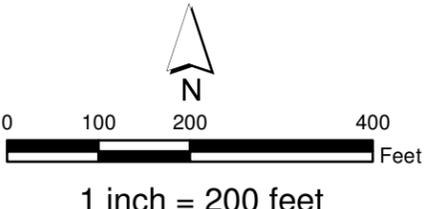
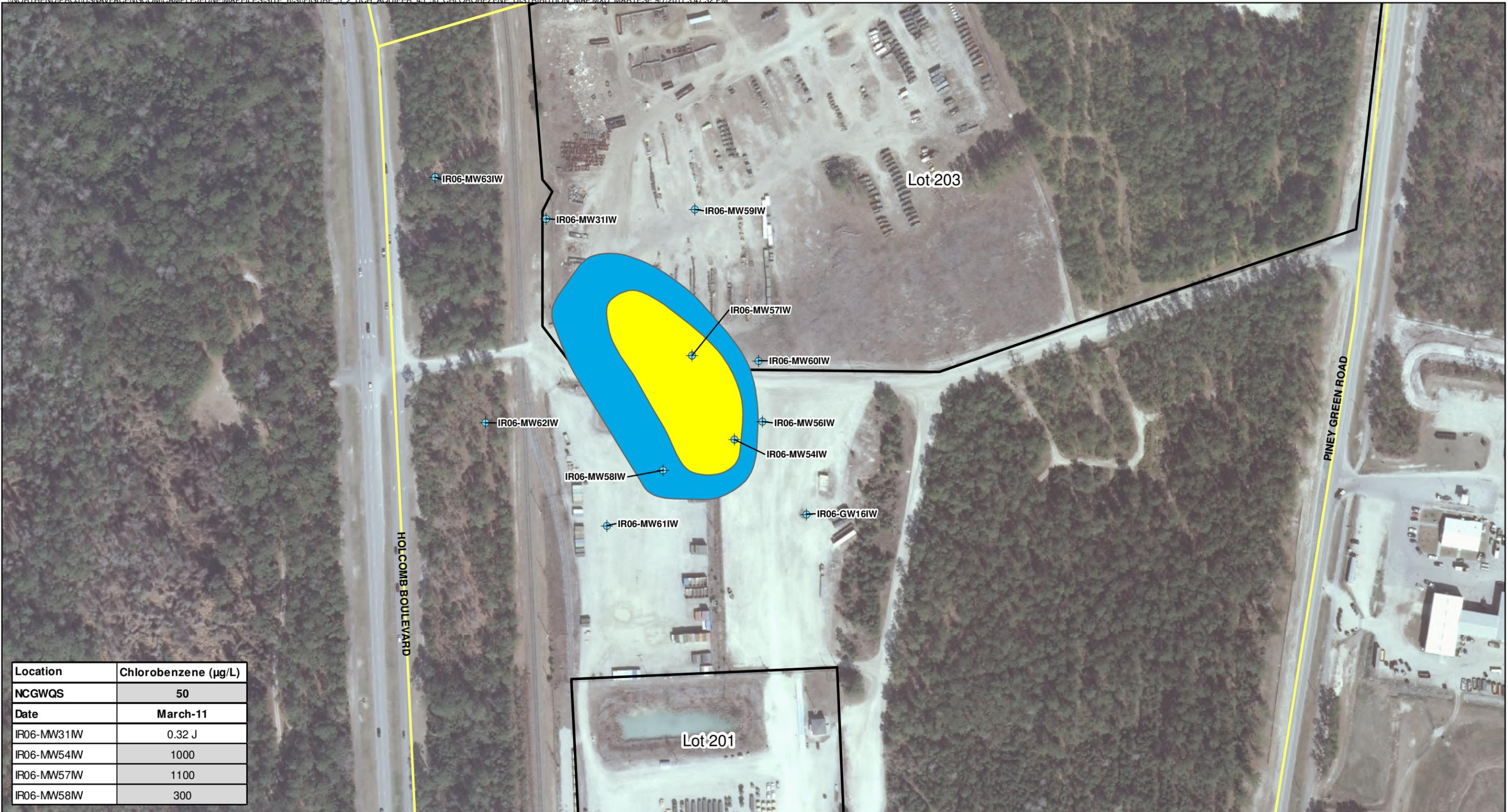


Figure 4
 Surficial Aquifer Chlorobenzene Distribution
 Site 6 Supplemental Investigation
 MCB CamLej
 North Carolina



Location	Chlorobenzene (µg/L)
NCGWQS	50
Date	March-11
IR06-MW311W	0.32 J
IR06-MW541W	1000
IR06-MW571W	1100
IR06-MW581W	300

- Legend**
- Upper Castle Hayne (45 to 50 feet bgs) Aquifer Monitoring Well
 - Site Boundary
 - Lots 201 and 203
- Chlorobenzene Concentration**
- >50 µg/L
 - >500 µg/L

Notes:
 J - Analyte present, value may or may not be accurate or precise
 NCGWQS - North Carolina Groundwater Quality Standard
 - Shading indicates exceedance of NCGWQS
 - Contours have been interpolated between monitoring well locations, actual conditions may differ from these shown on this figure

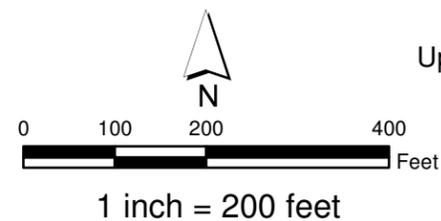


Figure 5
 Upper Castle Hayne Aquifer (45 to 50 feet bgs) Chlorobenzene Distribution
 Site 6 Supplemental Investigation
 MCB CamLej
 North Carolina



Location	Chlorobenzene (µg/L)
NCGWQS	50
Date	March-11
IR06-MW31DW	100 J
IR06-MW54DW	0.32 J
IR06-MW57DW	0.51 J
IR06-MW62DW	27

Legend
 ● Upper Castle Hayne (85 to 90 feet bgs) Aquifer Monitoring Well
 Site Boundary
 Lots 201 and 203
Chlorobenzene Concentration
 >50 µg/L

Notes:
 J - Analyte present, value may or may not be accurate or precise
 NCGWQS - North Carolina Groundwater Quality Standard
 - Contours have been interpolated between monitoring well locations, actual conditions may differ from these shown on this figure

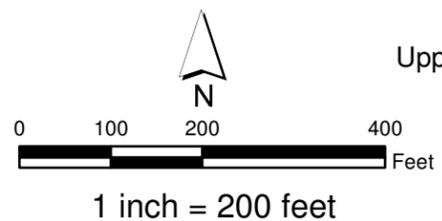
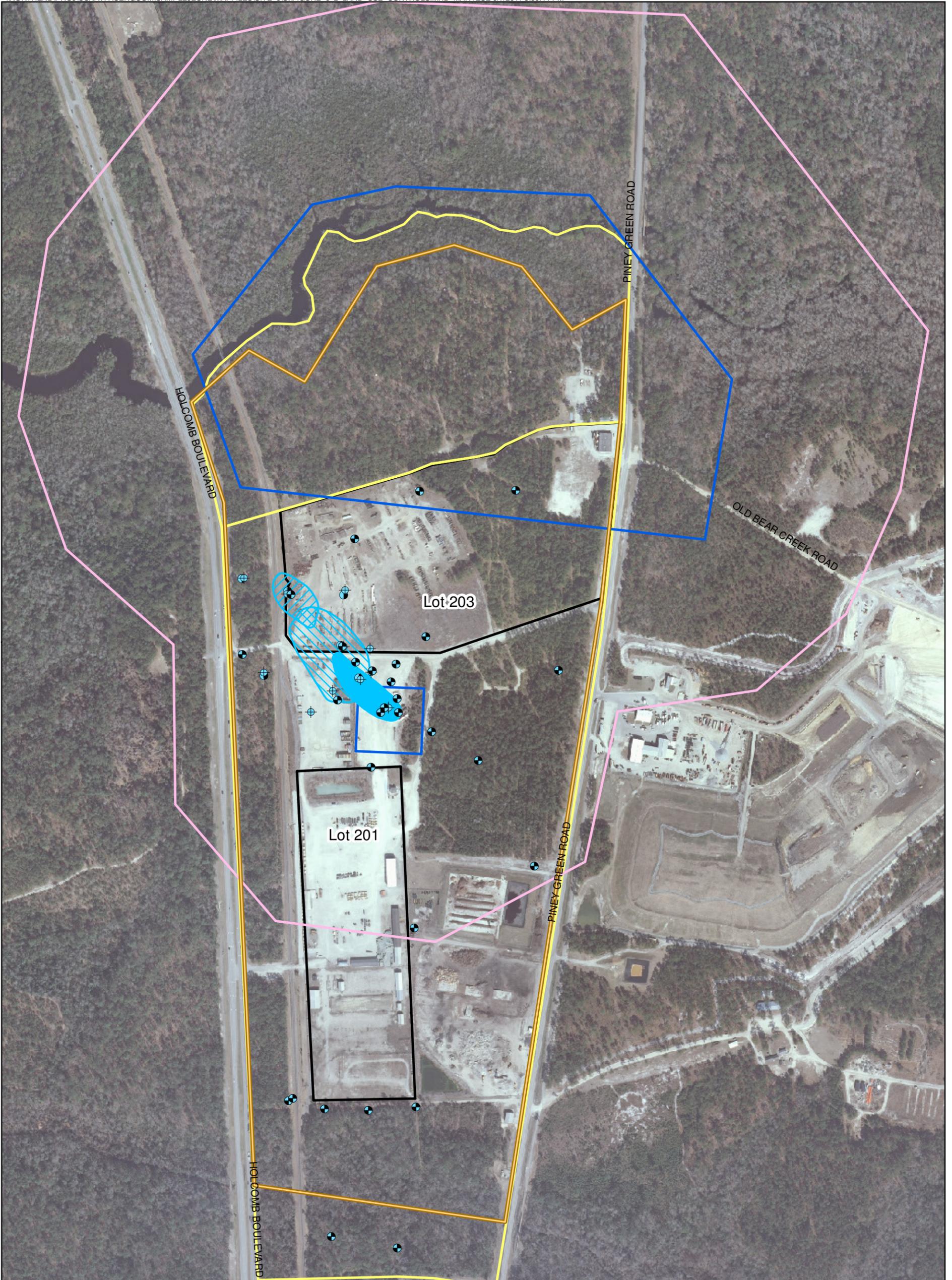


Figure 6
 Upper Castle Hayne Aquifer (85 to 90 feet bgs) Chlorobenzene Distribution
 Site 6 Supplemental Investigation
 MCB CamLej
 North Carolina



Legend

Monitoring Wells

- Surficial
- ⊕ Upper Castle Hayne Aquifer (45 to 50 feet bgs)
- Upper Castle Hayne Aquifer (85 to 90 feet bgs)
- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Soil)
- Intrusive Activities Control Boundary (Groundwater)
- Site Boundary
- Lots 201 and 203

- Surficial Aquifer Chlorobenzene Plume > 50 µg/L
- ▨ Upper Castle Hayne Aquifer Chlorobenzene Plume (45-50 feet)
- ▨ Upper Castle Hayne Aquifer Chlorobenzene Plume (85-90 Feet)



1 inch = 500 feet

Figure 7
Land Use Controls
Site 6 Supplemental Investigation
MCB CamLej
North Carolina