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FINAL DECISION DOCUMENT FOR POINT OF MARSH BOMBING TARGET 11 SITE 87
MCAS CHERRY POINT NC
8/1/2012
CH2M HILL

Final

Decision Document for Point of Marsh Bombing Target 11, Site 87

Marine Corps Air Station Cherry Point Cherry Point, North Carolina

Contract Task Order 0093

August 2012

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic**

Under the:

**NAVFAC CLEAN 1000 Program
Contract No. N62470-08-D-1000**

Prepared by



**Virginia Beach, Virginia
NC Engineering License No. F-0699**

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CONCURRENCE FOR REMEDIAL ACTION SIGNATURE PAGE

Point of Marsh BT-11, Site 87 Marine Corps Air Station Cherry Point, Cherry Point, North Carolina

In 2009, the Navy and Marine Corps Air Station (MCAS) Cherry Point, in partnership with the North Carolina Department of Environment and Natural Resources (NCDENR), conducted Site Investigation (SI) activities for MCAS Cherry Point. A description of the SI activities and the investigation results, conclusions, and recommendations are provided in the CH2M HILL, Inc. document entitled *Final Site Investigation Report, Point of Marsh BT-11, Site 87, Marine Corps Air Station, Cherry Point, North Carolina*, dated March 2011. This report is included as Appendix A of this Decision Document. Based on the findings and recommendations in the SI report, a Corrective Action Plan (CAP) was prepared to determine the appropriate remedial action for Site 87. This CH2M HILL, Inc. document, entitled *Final Corrective Action Plan, Point of Marsh BT-11, Site 87*, is dated February 2012 and included as Appendix B of this Decision Document.

The major conclusions and recommendations of the Final SI Report for Point of Marsh Bombing Target 11 (BT-11), Site 87, form the basis for the remedial action described in the CAP and implemented via this Concurrence for Remedial Action:

Conclusions

- 4-Methylphenol was not detected in any of the surface soil or groundwater samples.
- Lead detected at surface soil sample location 87SS05 (653 milligrams per kilogram [mg/kg]) exceeded the North Carolina Soil Screening Level (NC SSL) (270 mg/kg) and the Regional Screening Level (RSL) for Residential Soil (400 mg/kg), but is below the RSL for Industrial Soil (800 mg/kg). The concentrations of lead detected in the remaining three surface soil samples at Site 87 were below the screening criteria.
- Lead was not detected above screening criteria in any of the groundwater samples during all four quarterly sampling rounds.

Recommendations

- The Final SI Report recommended the preparation of a CAP to address lead in soil at Site 87, using land use controls (LUCs) to eliminate or reduce pathways of exposure to soil and sediment at Site 87. The proposed LUCs would involve site access and usage controls.

Selected Remedy

The CAP was finalized in February 2012 and documented that the preferred alternative to address lead in soil at Site 87 is implementation of LUCs to eliminate or reduce pathways of exposure to soil and sediment at Site 87. Specifically, the LUCs for Site 87 consist of the following:

- Land use at Site 87 is restricted to industrial uses only. The restricted area surrounding Site 87 has been delineated in a plat map (Appendix B in the Final CAP [Appendix B]) that has been incorporated into the BT-11 Site-Wide Plan and will be enforced by range personnel. If BT-11 is ever closed, NCDENR (or the appropriate state agency at the time) will be notified.
- No intrusive activities (such as excavation of ground surface or insertion of objects into the ground surface, except for monitoring purposes) are allowed at Site 87 unless prior written approval has been obtained from NCDENR.
- No wells may be installed except for monitoring wells constructed pursuant to 15A North Carolina Administrative Code (NCAC) 2C.0108, or as approved by NCDENR.

In order to maintain and enforce the previously listed LUCs, the Navy will ensure that the following specific actions are taken:

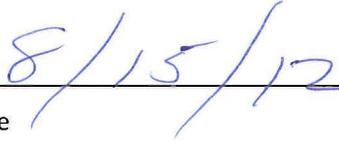
- The Navy Remedial Project Manager (RPM) will provide electronic coverages of LUCs at Site 87 to the Installation Restoration (IR) Program Manager for MCAS Cherry Point. The coverages will be included in MCAS Cherry Point's geographic information system (GIS) and the environmental GIS. The plat map that delineates the restricted area surrounding Site 87 will be incorporated into the BT-11 Site Wide Plan and enforced by range personnel. Range personnel will have the ability to locate the site, either through handheld GPS, or through the Station's GIS system, which also covers BT-11. The Range Management Supervisor has also been informed of the restricted site, and its location/description has been included in the Range Master Plan. The installation environmental review process, as prescribed in Air Station Order 5090.11, *Environmental Impact Review Procedures*, will ensure that all land use restrictions for Site 87 are adhered to by a requesting party.
- MCAS Cherry Point will provide notification of any proposed change to NCDENR at least 60 days prior to implementation of any proposed changes in land usage at Site 87 that are inconsistent with the LUC objectives. No major land use change can be implemented until concurrence is obtained from NCDENR.
- Any activity discovered at Site 87 that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs, will be addressed by MCAS Cherry Point as soon as practicable, but in no case will the process be initiated later than 10 days after MCAS Cherry Point becomes aware of the activity or action.
- MCAS Cherry Point will conduct annual visual inspections of the site and annual reviews of the applicable Air Station master planning process and GIS data. Any noted deficiencies will be reported to NCDENR within 10 days, and within 10 days following this notification, the Navy will inform NCDENR how MCAS Cherry Point has addressed or will address the deficiency.
- Any activity that would violate or disrupt the effectiveness of the implemented LUC (such as excavation in contaminated areas, construction, and so forth) constitutes a major land use change and requires notification of the appropriate parties.

Authorizing Signature

The undersigned representative of the North Carolina Department of Environmental Resources (NCDENR) authorizes the selected remedy for BT-11, Site 87, which consists of the LUCs listed in this document.



Date



Mr. George Lane
Remedial Project Manager
Superfund Section, Federal Remediation Branch
NCDENR

Authorizing Signature

The undersigned representative of Department of the Navy authorizes the selected remedy for BT-11, Site 87, which consists of the LUCs listed in this document.

Nicole Cowand 8/15/2012

Ms. Nicole Cowand

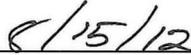
Date

Naval Facilities Engineering Command

Mid-Atlantic Division

Authorizing Signature

The undersigned representative of Marine Corps Air Station (MCAS) Cherry Point authorizes the selected remedy for BT-11, Site 87, which consists of the LUCs listed in this document.



Mr. William Potter

Date

Environmental Affairs Department

MCAS Cherry Point, North Carolina

Appendix A
Final Site Investigation Report, Point of Marsh
BT-11, Site 87, March 2011

Final

**Site Investigation Report
Point of Marsh BT-11, Site 87**

**Marine Corps Air Station Cherry Point
Cherry Point, North Carolina**

Contract Task Order 0207

March 2011

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic**

Under the

**NAVFAC CLEAN III Program
Contract No. N62470-02-D-3052**

Prepared by



Virginia Beach, Virginia

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Acronyms and Abbreviations

ATV	all-terrain vehicle
bgs	below ground surface
BT-11	Bombing Target 11
CAP	Corrective Action Plan
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	constituent of concern
DO	dissolved oxygen
DPT	direct-push technology
EE/CA	Engineering Evaluation/Cost Analysis
GPS	global positioning system
ICP	inductively coupled plasma
ID	inside diameter
IDW	investigation-derived waste
IWTP	Industrial Wastewater Treatment Plant
LCS	laboratory control sample
LTM	long-term monitoring
LUC	land use control
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
MDL	method detection limit
MEC	material and explosives of concern
MEK	methyl ethyl ketone
MPPEH	material potentially presenting an explosives hazard
mg/kg	milligrams per kilogram
NAVFAC	Naval Facilities Engineering Command
NC 2L	North Carolina Administrative Code Subchapter 2L Groundwater Quality Standard
NCDENR	North Carolina Department of Environment and Natural Resources
NC SSL	North Carolina Soil Screening Level
NFA	no further action
ORP	oxidation-reduction potential
OTS	Office of Technical Services
PAL	project action limit
PCB	polychlorinated biphenyl

POL	petroleum, oil, and lubricant
PRG	Preliminary Remediation Goal
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
QL	quantitation limit
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SI	Site Investigation
SOP	standard operating procedure
SVOC	semivolatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TOC	top of casing
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

SECTION 1

Introduction

This report presents the results of the Site Investigation (SI) conducted in 2009 at Point of Marsh Bombing Target 11 (BT-11), Site 87, which is affiliated with Marine Corps Air Station (MCAS) Cherry Point, North Carolina. As applicable, this report also includes historical data from previous investigations for the purposes of holistic data evaluation and to make site-specific determinations.

Site 87 is one of four sites at BT-11 where the disposal of non-ordnance wastes may have occurred. This SI was conducted to address potential lead and 4-methylphenol contamination found during the previous BT-11 SI conducted in 1999-2000 that included Site 87. **Figure 1-1** shows the geographic location of BT-11 in relation to MCAS Cherry Point. The locations of Site 87 and the other BT-11 non-ordnance sites are shown on **Figure 1-2**.

This SI report was prepared by CH2M HILL under Navy Contract N62470-02-D-3052, Comprehensive Long-term Environmental Action – Navy (CLEAN) III, Contract Task Order 0207, for submittal to Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic Division, MCAS Cherry Point, and the North Carolina Department of Environment and Natural Resources (NCDENR).

1.1 Objectives and Approach

The primary objective of this SI was to address potential lead and 4-methylphenol contamination found in soil and sediment during the previous BT-11 SI that included Site 87. The site characterization data collected during the recent Site 87 SI field activities were evaluated with respect to various regulatory screening criteria to assess potential threats to human health and the environment from site contaminants. Other objectives of the SI were to determine whether or not corrective action is necessary for Site 87 and to support the preparation of a Corrective Action Plan (CAP).

To achieve the above objectives, a series of evaluations were conducted using the historical information and recent SI sampling data for Site 87. The series of evaluations is depicted in the SI decision analysis diagram that was included in the *Final Sampling and Analysis Plan, BT-11 Site 87 Site Investigation, Marine Corps Air Station Cherry Point, Cherry Point, North Carolina* (CH2M HILL, 2008) and is provided as **Figure 1-3**.

1.2 Report Organization

The SI report is organized as follows:

- **Section 1 – Introduction**, provides the objectives and decision analysis process of the SI, provides a timeline of previous investigations conducted at Site 87 that are relevant to the current SI Report, describes the physical characteristics of BT-11, and summarizes the investigation activities to date at Site 87
- **Section 2 – Investigation Methodology**, summarizes the SI investigation data collection activities
- **Section 3 – Sampling Results**, summarizes the decision analysis for Site 87
- **Section 4 – Conclusions and Recommendations**
- **Section 5 – References**

Tables and figures are presented at the end of each section, as applicable.

1.3 Previous Investigations and Site Documentation

A previous SI was conducted for BT-11 during 1999-2000 that included Site 87 (CH2M HILL, 2007a). Additionally, a Draft CAP was prepared for Site 87 in April 2007 (CH2M HILL, 2007b). A summary of this prior investigation and these documents is provided below.

1.3.1 1999-2000 BT-11, Site 87 Site Investigation

A SI was conducted for BT-11 in 1999-2000, which included investigation activities at Site 87, and was documented in the *Final Site Investigation Report, Point of Marsh BT-11 (Sites I-32, 87, 88, and 89), Marine Corps Air Station, Cherry Point, North Carolina* (CH2M HILL, 2007a). During the SI, two surface soil samples (87SS01 and 87SS02) and one sediment sample (87SD01) were collected and analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), TCL pesticides and polychlorinated biphenyls (PCBs) and Target Analyte List (TAL) metals and cyanide. Additionally, three temporary monitoring wells (87TW01, 87TW02 and 87TW03) were installed at Site 87 and groundwater samples were collected from these wells and analyzed for TCL VOCs, TCL SVOCs, TCL pesticides and PCBs, TAL metals (total) and cyanide (total). The 1999-2000 soil, sediment and groundwater sampling locations are shown on **Figure 1-4**. The 'soil and sediment' and 'groundwater' regulatory screening criteria exceedance results are listed in **Tables 1-1 and 1-2**, respectively.

Based on the findings of this SI, it was determined that lead in one of two soil samples (498 milligrams per kilogram [mg/kg]) and from the sediment sample collected beneath the standing water of the site depression (292 mg/kg) exceeded the North Carolina Soil Screening Level (NC SSL) (270 mg/kg) for the protection of groundwater (**Figure 1-5**). No lead was detected in any groundwater samples collected from temporary monitoring wells at Site 87. In addition, one SVOC, 4-methylphenol, exceeded the NC SSL (17.4 micrograms per kilogram [$\mu\text{g}/\text{kg}$]) in the two collected soil samples (both 330 $\mu\text{g}/\text{kg}$). No 4-methylphenol or any SVOCs were detected in any of the groundwater samples.

Inorganic constituents in groundwater exceeding screening criteria in 1999 at Site 87 during the BT-11 SI are shown in **Figure 1-6**. The maximum detected concentration of aluminum in groundwater (1,070 micrograms per liter [$\mu\text{g}/\text{L}$]) was within the range of MCAS Cherry Point background concentrations, and was therefore considered to be representative of naturally occurring background concentrations.

One or more detected concentrations of iron and manganese in groundwater exceeded the range of MCAS Cherry Point background concentrations, federal secondary maximum contaminant levels (MCLs), and the North Carolina Administrative Code Subchapter 2L Groundwater Quality Standards (NC 2Ls). However, none of the detected iron and manganese concentrations exceeded the human health risk-based United States Environmental Protection Agency (USEPA) Region 9 Preliminary Remediation Goals (PRGs).

With regard to thallium, concentrations in groundwater at Site 87 exceeded the USEPA Region 9 Tapwater PRG and the federal MCL in all three samples. Thallium was not detected in any of the Site 87 soil samples.

In 2001, the USEPA Region 4 Office of Technical Services (OTS) issued an alert stating that a number of cases involving some low-level detections of arsenic, lead, and thallium in drinking water samples at Region 4 sites indicated that analyses by trace inductively coupled plasma (ICP) for metals had produced false positives (USEPA, 2001). Furthermore, a 2002 investigation report for various sites at MCAS Cherry Point noted that “thallium did not appear at levels above regulatory criteria in samples from other areas of Cherry Point until 1998 (when the use of the trace ICP method started)” (Tetra Tech NUS, 2002). Based on this information and coupled with the fact that thallium was not detected in any of the Site 87 soil samples, the detections of thallium in the three groundwater samples from Site 87 analyzed in 1999 using trace ICP for metals were attributed to represent false positives.

Lead, which was found in one Site 87 soil sample in exceedance of the NC SSL and USEPA Region 9 Residential PRG, was not detected in any of the Site 87 groundwater samples.

It was concluded in the BT-11 SI report that the only constituent of concern (COC) at Site 87 was lead in soil and sediment. While 4-methylphenol exceeded the NC SSL in two soil samples, the concentrations did not exceed the applicable residential or industrial human health risk-based screening criteria (USEPA Region 9 PRGs), and no 4-methylphenol was detected in any of the groundwater samples, despite the very shallow water table at the site. The recommendation listed in the SI report with respect to Site 87 was that a CAP be prepared to address lead contamination in soil. The BT-11 SI Report was finalized in January 2007 and approved by NCDENR.

1.3.2 Draft Corrective Action Plan, April 2007

In April 2007, a Draft CAP was submitted to NCDENR that proposed a preferred alternative to address lead contamination in soil at Site 87 using land use controls (LUCs) to eliminate or reduce pathways of exposure to soil and sediment at Site 87 (CH2M HILL, 2007b). The proposed LUCs included restricting land use at Site 87 to industrial uses only and prohibiting intrusive activities (e.g., excavation of the ground surface) except for monitoring purposes without prior approval from NCDENR.

In late April 2007, NCDENR submitted comments on the Draft CAP indicating that NCDENR was not comfortable with a remedy that did not include long-term monitoring (LTM) for lead and 4-methylphenol. On May 10, 2007, the Navy and NCDENR met to discuss NCDENR comments on the Draft CAP and to determine a path forward. During this meeting, NCDENR reiterated a lack of comfort with a remedy for Site 87 that did not incorporate LTM for lead and 4-methylphenol. In addition, both the Navy and NCDENR indicated that they felt there was a strong possibility that additional soil and groundwater sampling at Site 87 would result in samples with COC concentrations below regulatory standards. Consequently, the Navy and NCDENR agreed to proceed with a supplemental investigation to collect additional soil and groundwater samples at Site 87.

The Navy and NCDENR agreed that the supplemental investigation would include the collection of 4 soil samples to be analyzed for lead and 4-methylphenol (one sample in the center of the site and 3 samples around the periphery). In addition, three permanent monitoring wells were to be installed and sampled during 4 consecutive quarterly rounds of groundwater sampling for lead and 4-methylphenol. It was also agreed that the results of this supplemental investigation would be reported in a SI addendum report rather than only a revised draft of the CAP that incorporated the supplemental sampling results.

The Navy and NCDENR agreed that if the soil sample analytical results from the supplemental investigation were below NC SSLs and the four quarterly rounds of groundwater analytical results were below the State groundwater quality standards, the Navy could proceed to prepare a CAP proposing no further action (NFA) for Site 87. If the analytical results indicated exceedances of regulatory standards in either medium, the Navy would proceed to prepare a CAP that took into account the new data in the proposed remedy selection for Site 87. Based on an evaluation of the data exceeding regulatory criteria, potential recommendations to be considered would include: initiation of long-term groundwater monitoring; conducting a Remedial Investigation; preparation of an Engineering Evaluation/Cost Analysis (EE/CA) and potential interim remedial action; and/or imposing land use restrictions. The decision analysis diagram that the Navy and NCDENR developed for the supplemental sampling data is presented in **Figure 1-3**.

1.4 Physical Characteristics of BT-11 and Site 87

This subsection summarizes the regional environmental setting of BT-11, including location, history and land use, topography, geology, soils, and hydrology. The information in this section was largely obtained from discussions with personnel in the Environmental Affairs Department at MCAS Cherry Point and from site visits to BT-11 conducted by CH2M HILL in 1999, 2000, and 2009.

1.4.1 Location of BT-11

Point of Marsh BT-11 is located on Piney Island, a marshy island in Pamlico Sound approximately 30 miles east of MCAS Cherry Point (**Figure 1-1**).

1.4.2 Location of Site 87

Site 87 refers to a dump site located at BT-11 approximately ¼-mile northwest of Building 9037, on the northeast side of an unpaved access road referred to as Main Road (**Figure 1-2**). This site is approximately 20 feet by 20 feet in area, and is predominately marshy, except for an area immediately adjacent to Main Road.

1.4.3 BT-11 History

Several waste disposal sites have been identified at BT-11. According to facility personnel, most disposal activities at BT-11 occurred in the mid-1970s. Wastes disposed of at the various sites included stripped aircraft, aircraft parts, machinery, construction debris, batteries, glass, and various paints, motor oil, detergents and solvents (including toluene and methyl ethyl ketone [MEK]). With respect to the disposal of solvents, facility personnel reported that cans of MEK and toluene were disposed of after allowing the materials to evaporate.

Based on site observations that became the basis of the BT-11 SI Work Plan (CH2M HILL, 1999), four areas at BT-11 were investigated in the previous BT-11 SI (CH2M HILL, 2007a):

- Site I-32 (Dump near tower)
- Site 87 (Dump ¼-mile northwest of Building 9037)
- Site 88 (Dump at intersection of Main Road and Tower #3 Road)
- Site 89 (Target storage area at east end of mock landing strip)

1.4.4 Site 87 History

According to facility personnel, Site 87 originated when a bulldozer attempted to excavate a pit for a dump site. Instead, the bulldozer sank into the marsh, became stuck, and had to be pulled out with heavy equipment. The depression formed by the stuck bulldozer was then used as a disposal pit. The waste materials reported to have been disposed of in this depression included batteries and motor oils.

1.4.5 Land Use

BT-11 access is restricted to authorized personnel and is secured and patrolled by military personnel. BT-11 is affiliated with MCAS Cherry Point, and is presently used by the military for aerial target practice and certain areas of the facility are known to contain munitions and explosives of concern (MEC) and/or material potentially presenting an explosives hazard (MPPEH). There are four sites at BT-11 where the disposal of non-ordnance wastes may have occurred: Site I-32, Site 87, Site 88, and Site 89.

Potential human receptors at Site 87 are BT-11 employees; specifically, the occupants of the buildings located on the eastern end of BT-11 near Jacks Bay. However, these human receptors have no direct contact with the soil at Site 87 during normal occupational activities.

No water supply wells are located within the impacted area of Site 87. Groundwater use within a 4-mile radius of BT-11 is limited to a single, onsite water supply well (PW01) for use by military personnel and staff at BT-11. The water supply well is screened at a depth of 400 to 430 feet below ground surface (Wm. F. Freeman Associates, 1987).

1.4.6 Topography

Site features at BT-11 are limited to unpaved roads, a mock landing strip, and a few structures. The landscape at BT-11 primarily consists of marsh vegetation. Tidal wetlands are prominent across BT-11. Upland areas are limited and are primarily adjacent to the gravel roadbeds present at the site. The upland areas are generally vegetated with grasses and undergrowth.

1.4.7 Site 87 Soils and Hydrology

Based on information gathered during the 1999–2000 BT-11 SI, shallow soils beneath Site 87 were found to be generally silt to 4 feet below ground surface (bgs), and then underlain by saturated, silty sand to medium sand to 8 feet bgs (CH2M HILL, 2007a). The first encountered groundwater occurs at or within a few feet below the ground surface. No permanent groundwater monitoring wells were installed at Site 87 during initial SI activities. Based on inference from the Site 87 topography, the general direction of shallow groundwater flow is estimated to be to the southeast towards Jacks Bay of the Pamlico Sound.

TABLE 1-1
 1999-2000 Site 87 Surface Soil and Sediment Exceedances of Screening Criteria
 BT-11 Site Investigation, CTO-093
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID Sample ID Sample Date	2 Times Average BT-11 Background Concentration ¹ (1)	NCSSL (May 2005) (2)	Region 9 PRGs - Industrial Soil (3)	Region 9 PRGs - Residential Soil (4)	87SD01			87SS01		87SS02	
					87SD01 10/28/99	87SD01-10/99 10/28/99	87SD01-03/00 03/22/00	87SS01-10/99 10/28/99	87SS01 03/22/00	87SS02-10/99 10/28/99	87SS02 03/22/00
Chemical Name											
Volatile Organic Compounds (UG/KG)											
Methylene chloride	--	20.2	21,000	9,100	NA	NA	2.1 J	NA	1.7 J	NA	2.5 J
Semi-volatile Organic Compounds (UG/KG)											
4-Methylphenol	--	17.4	3,100,000	310,000	12,000 U	NA	NA	330 (2) J	NA	330 (2)	NA
Phenol	--	1,750	100,000,000	18,000,000	12,000 U	NA	NA	330	NA	1,500 J	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)											
No Detections											
Total Metals (MG/KG)											
Aluminum	6,267	--	100,000	76,000	NA	1,310	NA	11,100 (1)	NA	3,680	NA
Arsenic	4.67	5.24	1.6	0.39	NA	6.3 U	NA	8.3 (1,2,3,4)	NA	6.2 U	NA
Beryllium	0.593	3.38	1,900	150	NA	0.2 U	NA	0.18 J	NA	0.38 U	NA
Cadmium	0.34	0.95	450	37	NA	5.4 (1,2)	NA	7.9 (1,2)	NA	0.48 U	NA
Calcium	40,833.33	--	--	--	NA	9,530 U	NA	18,800	NA	6,190 U	NA
Chromium	16.7	27.2	64	30	NA	12.4	NA	22 (1)	NA	8.3 J	NA
Cobalt	6.33	--	1,900	900	NA	2.6 J	NA	7.6 (1) J	NA	2.4 J	NA
Copper	--	704	41,000	3,100	NA	105	NA	428	NA	9.1 U	NA
Iron	7,527	151	100,000	23,000	NA	22,200 (1,2)	NA	21,500 (1,2)	NA	3,300 (2)	NA
Lead	7.27	270	800	400	NA	292 (1,2)	NA	498 (1,2,4)	NA	8.7 (1)	NA
Magnesium	--	--	--	--	NA	3,290 U	NA	2,290	NA	6,430 U	NA
Manganese	72.3	65.2	19,000	1,800	NA	92.4 (1,2)	NA	368 (1,2)	NA	31.3	NA
Nickel	9.73	56.4	20,000	1,600	NA	3.1 J	NA	132 (1,2)	NA	4.2 J	NA
Vanadium	14.7	--	1,000	78	NA	1.1 J	NA	6.6 J	NA	12.1 J	NA
Zinc	19.6	550	100,000	23,000	NA	782 (1,2)	NA	2,280 (1,2)	NA	36.9 U	NA

NOTES:

Detections of a chemical are indicated in bold font

Detected concentrations that exceed one or more screening criteria are indicated in red font.

Detected concentrations that exceed NC SSL and/or other screening criteria are indicated in blue font.

Each screening criterion has been assigned a reference number listed in parentheses in the column header.

The reference number is used to identify specific criteria exceeded in a particular sample.

Data entries consist of the concentration, followed by the reference number(s) of any exceeded screening criteria (if any) followed by the data qualifier (if any).

U = Compound not detected above the indicated concentration

J = Estimated concentration below the quantitation limit

NA - Not analyzed

-- = No screening criterion available.

¹Two times average background concentration was calculated by multiplying the average concentration of sample BT11SS01, BT11SS02 and BT11SS03 by 2.

Where duplicate samples were collected, the maximum of the original or duplicate sample concentration was used in the calculation

TABLE 1-2
 1999-2000 Site 87 Groundwater Exceedances of Screening Criteria
 BT-11 Site Investigation, CTO-093
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID	NC 2L GW (May 2005)	MCL- Groundwater	Secondary MCLs	Region 9 PRGs - Tapwater	87TW01	87TW02	87TW03
Sample ID					87TW01-1099	87TW02-1099	87TW03-1199
Sample Date	(1)	(2)	(3)	(4)	10/28/99	10/28/99	11/03/99
Chemical Name							
Volatile Organic Compounds (UG/L)							
Carbon disulfide	700	--	--	1,000	1 UJ	1 UJ	0.8 J
Semi-volatile Organic Compounds (UG/L)							
No Detections							
Pesticide/Polychlorinated Biphenyls (UG/L)							
No Detections							
Total Metals (UG/L)							
Aluminum	--	--	50	36,000	496 (3)	94.6 (3) J	1,070 (3)
Calcium	--	--	--	--	75,400	176,000	206,000
Cobalt	--	--	--	730	1.2 J	1.4 J	2.9 J
Iron	300	--	300	11,000	10,200 (1,3)	141	408 (1,3)
Magnesium	--	--	--	--	519,000	435,000	656,000
Manganese	50	--	50	880	400 (1,3)	258 (1,3)	11.4 U
Potassium	--	--	--	--	191,000	137,000	165,000
Sodium	--	--	--	--	3,820,000 J	3,030,000 J	3,940,000 J
Thallium	--	2	--	2.4	3.2 (2,4) J	10.1 (2,4)	10.5 (2,4)

NOTES:

Detections of a chemical are indicated in bold font

Detected concentrations that exceed one or more screening criteria are indicated in red font.

Detected concentrations that exceed NC 2L GW and/ or other screening criteria are indicated in blue font.

Each screening criterion has been assigned a reference number listed in parentheses in the column header

The reference number is used to identify specific criteria exceeded in a particular sample.

Data entries consist of the concentration, followed by the reference number(s) of any exceeded screening criteria (if any), followed by the data qualifier (if any).

U = Compound not detected above the indicated concentration

J = Estimated concentration below the quantitation limit

UJ = Not detected, quantitation limit may be inaccurate or imprecise

"--" = No screening criterion available.



Legend

- Cities
- Rivers and Streams
- BT-11
- Military Installation
- County Boundary



Figure 1-1
BT-11 Location Map
MCAS Cherry Point, North Carolina



- Legend**
-  Site Locations
 -  Paved Road
 -  Unpaved Road
 -  Installation Boundary

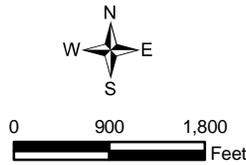


Figure 1-2
Site Location Map
BT-11 Site 87
MCAS Cherry Point, North Carolina

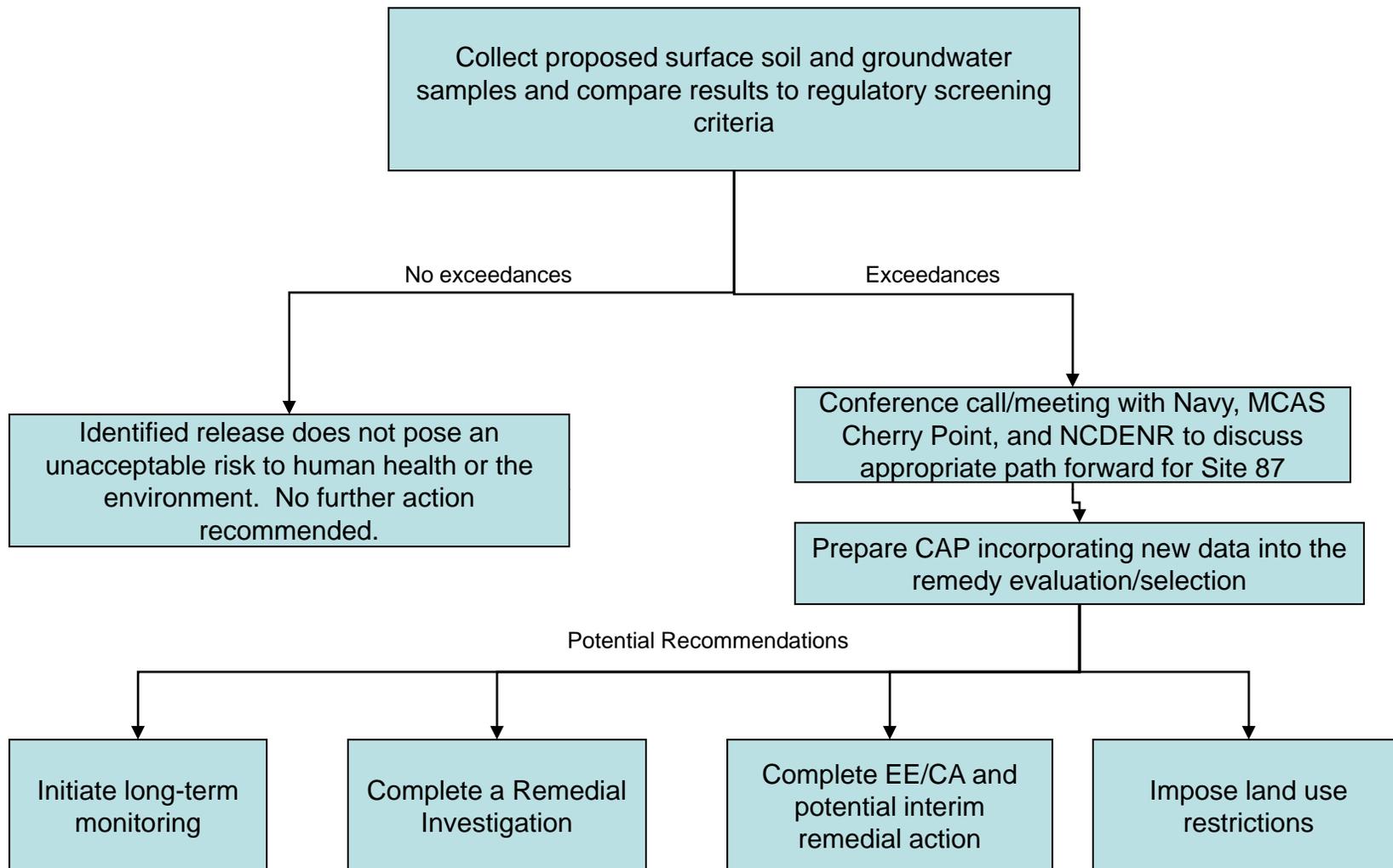
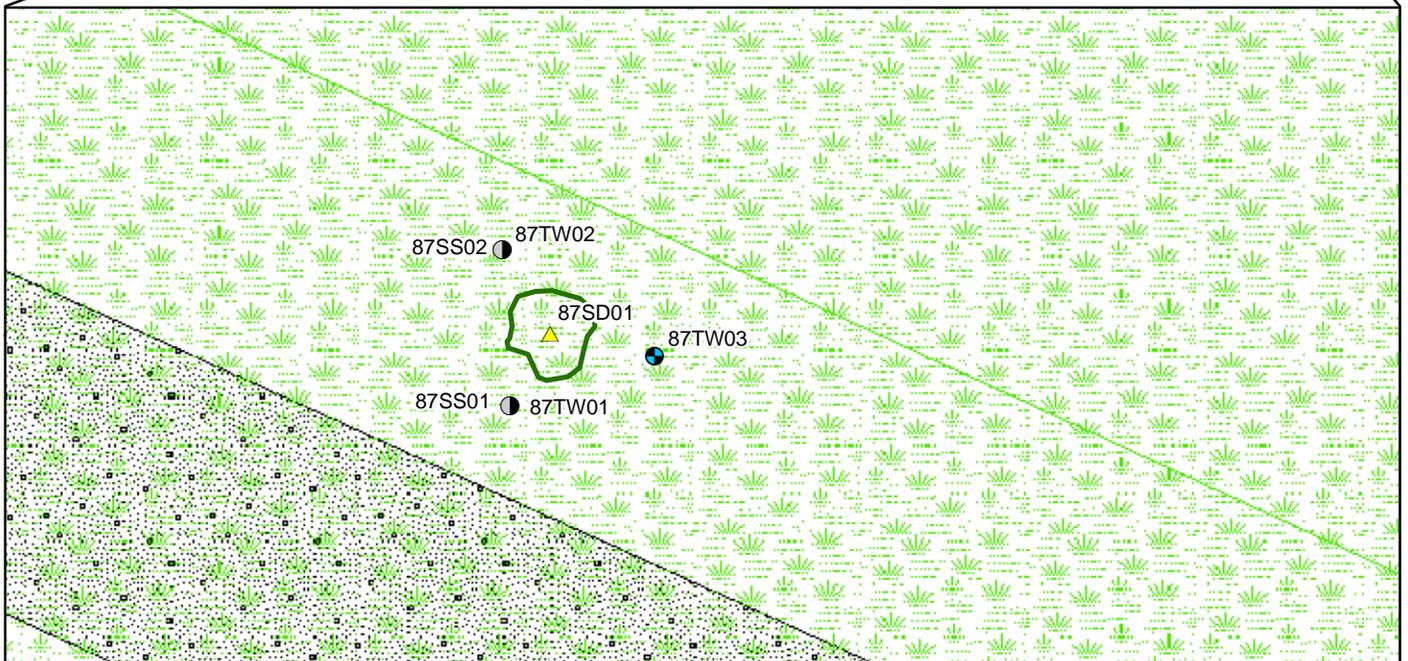


Figure 1-3
 Decision Diagram
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point, North Carolina



Legend

-  Site Location
-  Sediment Sampling Location
-  Soil and Groundwater Sampling Location
-  Groundwater Only Sampling Location
-  Estimated Limits of Waste
-  Emergent Persistent - Mesohaline Wetland

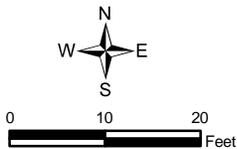
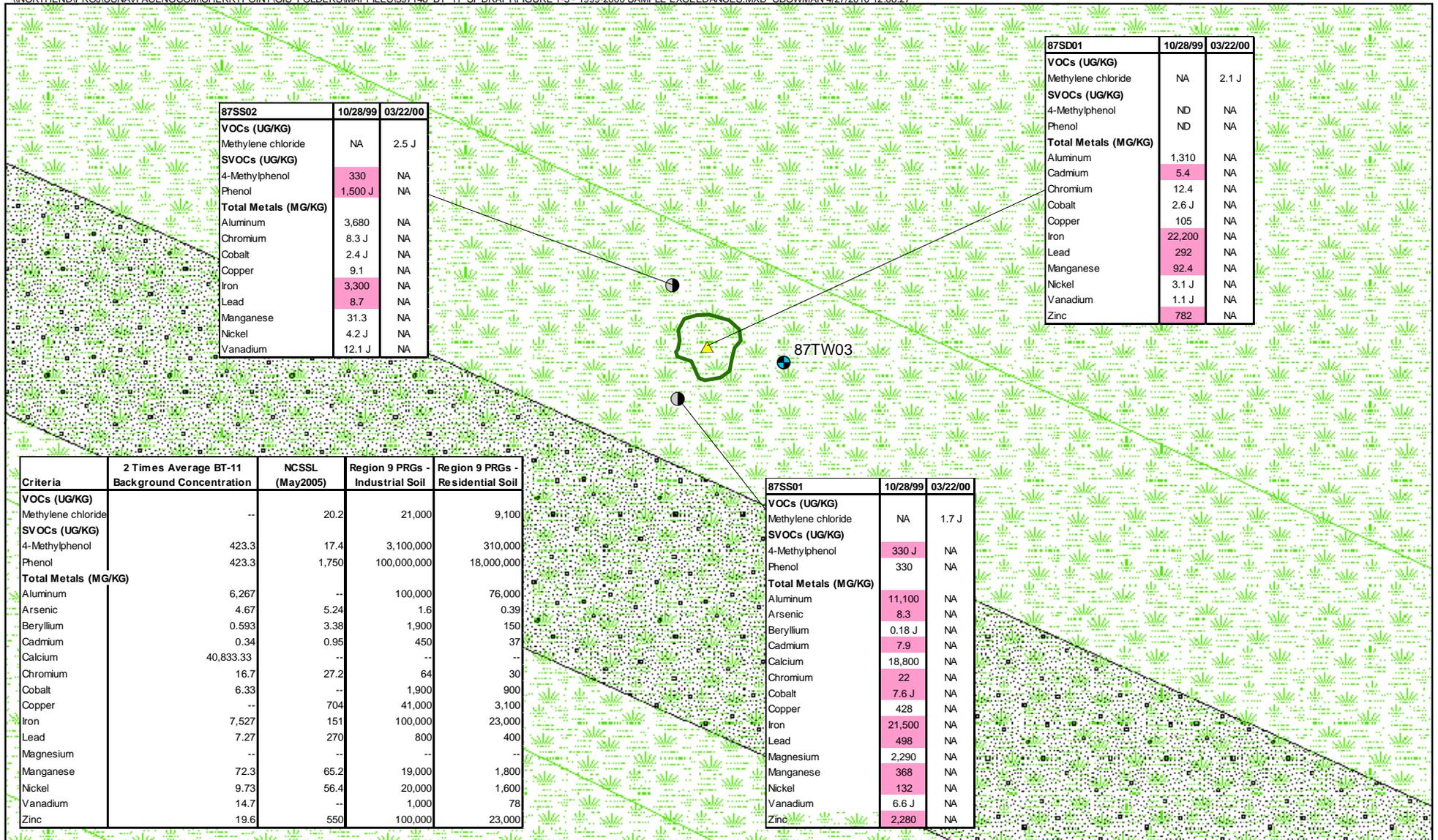


Figure 1-4
1999-2000 Site 87 Sample Locations
BT-11 Site Investigation
MCAS Cherry Point, North Carolina



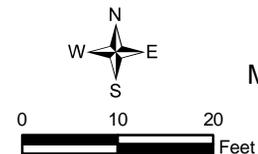
Legend

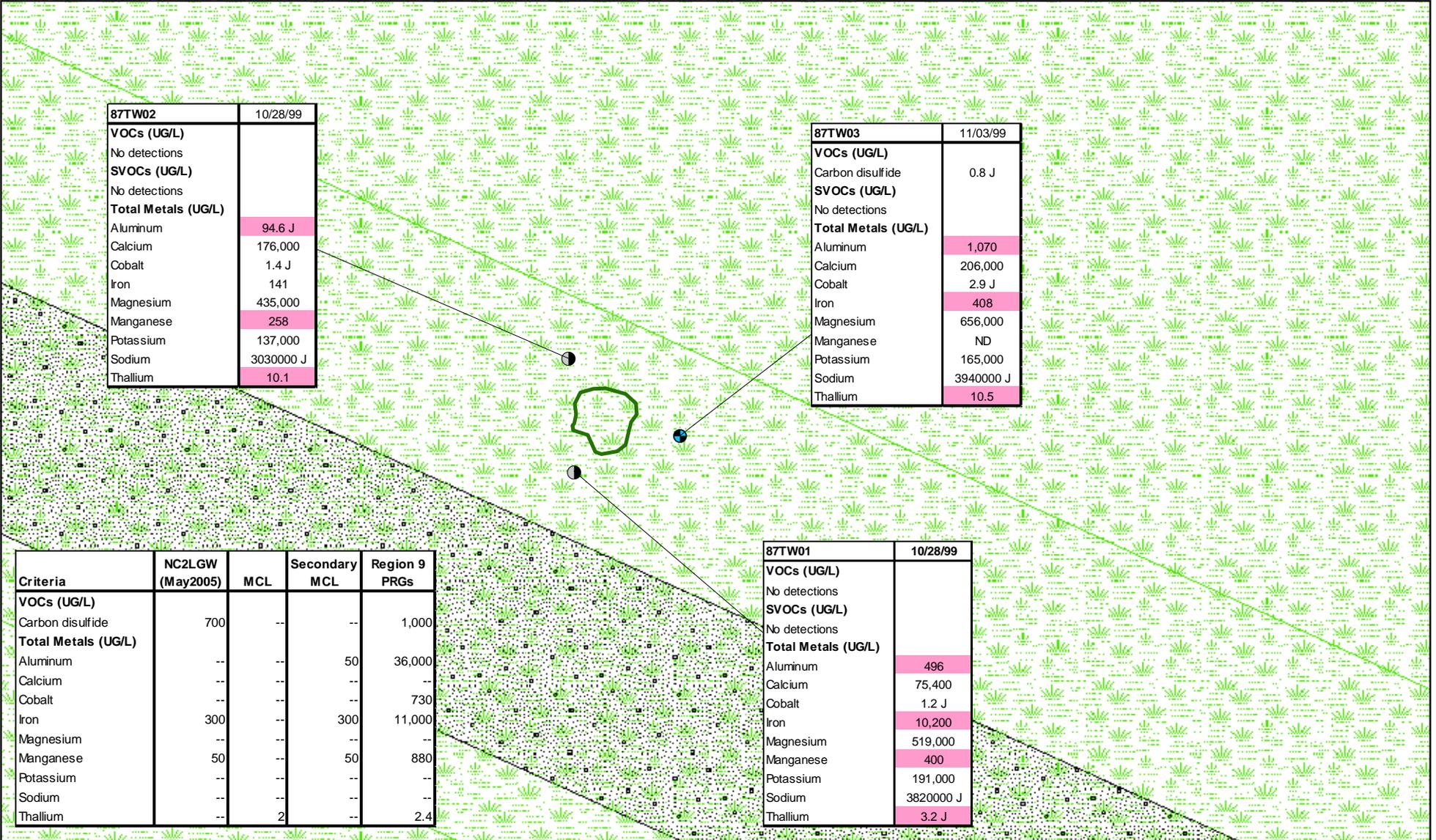
- ▲ Sediment Sampling Location
- Soil and Groundwater Sampling Location
- Groundwater Only Sampling Location
- ▭ Estimated Limits of Waste
- ▭ Paved Road
- ▭ Unpaved Road

Emergent Persistent - Mesohaline Wetland

Notes:
 J - Estimated concentration below the quantitation limit
 NA - Not analyzed
 ND - Not detected
 exceeds one or more screening criteria

Figure 1-5
 1999-2000 Site 87 Surface Soil and Sediment Samples
 Exceeding Screening Criteria
 BT-11 Site Investigation
 MCAS Cherry Point, North Carolina





Legend

- Soil and Groundwater Sampling Location
 - Groundwater Only Sampling Location
 - ▭ Emergent Persistent - Mesohaline Wetland
 - ▭ Estimated Limits of Waste
 - ▭ Paved Road
 - ▭ Unpaved Road
- Notes:
 J - Estimated concentration below the quantitation limit
 ND - Not detected
 exceeds one or more screening criteria



Figure 1-6
 1999 Site 87 Groundwater Samples
 Exceeding Screening Criteria
 BT-11 Site Investigation
 MCAS Cherry Point, North Carolina

Investigation Methodology

This section summarizes the field investigation procedures of the supplemental SI conducted for Site 87 from February 2009 to November 2009. Investigation activities included utility clearance, MEC/MPPEH avoidance support, collection of soil samples, installation and development of permanent monitoring wells, 4 quarterly rounds of groundwater sampling, surveying for horizontal and vertical control, and investigation-derived waste (IDW) management. The investigation methodology from the previous SI investigation is not summarized in this report and can be found in the SI Report (CH2M HILL, 2007a).

The 2009 investigation activities were conducted in accordance with the Site 87 SI Sampling and Analysis Plan (SAP) (CH2M HILL, 2008).

2.1 Utility Clearance

Prior to commencing SI field investigation activities, underground utility clearance was conducted at Site 87 on January 18, 2009, by Accumark of Ashland, Virginia, under the supervision of CH2M HILL. Concurrently, MidAtlantic Electronic Range personnel, contracted by the Navy, were also present to perform utility markings of underground cables.

2.2 MEC/MPPEH Avoidance Support

CH2M HILL personnel provided MEC/MPPEH avoidance support during the initial, intrusive field activities in January 2009. Specifically, MEC/MPPEH avoidance support was conducted during soil sampling and installation of the temporary monitoring wells. MEC/MPPEH was not identified during the intrusive activities.

MEC/MPPEH avoidance support was not necessary during the subsequent quarterly groundwater sampling events since no intrusive activities were conducted.

2.3 Soil Sampling

Four surface soil samples and associated quality assurance/quality control (QA/QC) samples were collected in accordance with the Site 87 SI SAP (CH2M HILL, 2008) immediately preceding installation of the temporary monitoring wells. At the time of sample collection, saturated soil conditions were observed at Site 87 and all soils collected were classified as organic (OL) marsh soil. The surface soil samples were collected on February 10, 2009, from 0 to 6 inches bgs using a hand auger. A summary of the collected surface soil samples and associated analyses is provided in **Table 2-1**. The 2009 surface soil sample locations are shown on **Figure 2-1** along with the earlier 1999–2000 sample locations for reference purposes.

All soil samples were analyzed for the following constituents:

- Lead by USEPA Method SW-846 6010B
- 4-Methylphenol by USEPA Method SW-846 8270C

2.4 Groundwater Sampling

2.4.1 Monitoring Well Installation

As documented in the Site 87 SI SAP (CH2M HILL, 2008), three permanent monitoring wells were to be installed at Site 87. However, due to the marsh and saturated ground surface conditions present at Site 87 during SI field activities, an alternate approach consisting of the installation of 1-inch inside diameter (ID) monitoring wells with pre-packed well screens utilizing a tripod-mounted direct-push technology (DPT) drill rig was proposed. This proposed method of installation deviated from the Site 87 SI SAP (CH2M HILL, 2008), which had called for the installation of three 2-inch ID monitoring wells via the hollow stem auger drilling technique using an all-terrain vehicle (ATV) rig. The proposed smaller ID wells would not impact the representativeness of the sample or compromise the integrity of the data, and the ability to purge and develop the well remained the same for the smaller ID wells. As such, NCDENR and NAFVAC Mid-Atlantic provided their approval to commence with the installation of the 1-inch ID monitoring wells at Site 87 via email correspondence dated December 31, 2008 and January 2, 2009 (**Appendix A**).

On February 10, 2009, three monitoring wells (87MW01, 87MW02, and 87MW03) were installed at Site 87 by Parratt Wolff of Hillsborough, North Carolina. Each monitoring well was installed into a boring created by a hand auger by pushing the well into the saturated subsurface. Each well was constructed of 1-inch ID polyvinyl chloride (PVC) riser pipe and screen. Each well screen was 5 feet in length with 0.01-inch-wide machined slots. Sand filter “pre-packs” were permanently installed on each well screen prior to installation; these consisted of very fine stainless steel wire mesh holding a layer of clean silica sand in place over the entire screened interval. The top of each well screen was set at a depth of approximately 3 feet bgs. The remaining annular space around each well was sealed in place by the surrounding marsh formation that collapsed around the well screen. The remaining top 1 foot or less of annular space was backfilled with bentonite chips. Since the formation was saturated to the ground surface, the bentonite was hydrated naturally upon placement. The PVC riser at each monitoring well extended approximately four feet above grade and each well was completed with a locking cap. The 2009 monitoring well locations are shown on **Figure 2-1** along with the 1999 temporary well locations for reference purposes.

Appendix B contains the well completion diagrams for the three monitoring wells installed in February 2009.

Following installation, each monitoring well was developed by adding distilled water to the well followed by surging with a 1-inch ID bailer. Three well volumes were then removed from each well using a peristaltic pump and purging continued until the discharge water became visibly clear.

2.4.2 Groundwater Sampling

During each of the quarterly groundwater sampling events in February, May, August, and November, 2009, new, dedicated Teflon® tubing was used for sampling each monitoring well. Measurements of temperature, conductivity, salinity, oxidation-reduction potential (ORP), dissolved oxygen (DO), pH, turbidity, and depth to water were collected during purging. A summary of the field parameter measurements taken just prior to groundwater sample collection is provided in **Appendix C**.

During each of the quarterly groundwater sampling events, three groundwater samples and associated QA/QC samples were collected in accordance with the Site 87 SI SAP (CH2M HILL, 2008) immediately following the stabilization of the parameters measured during purging. The groundwater samples were collected on February 17, May 18, August 18, and November 20, 2009 and are summarized in **Table 2-1**.

All groundwater samples were analyzed for the following constituents:

- Lead (total and dissolved) by USEPA Method SW-846 6010B
- 4-Methylphenol by USEPA Method SW-846 8270C

2.4.3 Groundwater Elevation Measurement

All groundwater elevation measurements were collected in accordance with the Site 87 SI SAP (CH2M HILL, 2008). An electronic water level meter was used to measure the depth to water from the top of casing (TOC) of each monitoring well. Groundwater elevations were determined by measuring the depth to water relative to the surveyed TOC elevations (Section 2.5). Monitoring well construction details and water-level measurements are presented in **Table 2-2** and **Table 2-3**, respectively. Measurements of depth to groundwater were inadvertently not collected during the first LTM groundwater sampling event on February 17, 2009, and at monitoring well BT11-87MW03 on November 20, 2009.

A synoptic round of depth to water measurements from monitoring wells at Site 87 were obtained prior to monitoring well development on May 18, 2009, and again prior to groundwater sampling on August 18, 2009. Based on the August 18, 2009 water measurements, the potentiometric surface contours are presented in **Figure 2-2**; the general direction of groundwater flow at Site 87 is to southeast.

2.5 Surveying

Upon collection of the soil samples, soil sample locations were surveyed for horizontal control by CH2M HILL personnel using a hand held global positioning system (GPS) device. The Site 87 monitoring wells were surveyed for horizontal and vertical control by Lanier Surveying Company of Jacksonville, North Carolina, on June 24, 2009. Survey data for the Site 87 monitoring well locations are located in **Appendix D** and the TOC (water-level measuring point) elevations are presented in **Table 2-3**.

2.6 Decontamination and Waste Management

Decontamination and waste management procedures followed applicable standard operating procedures (SOPs) listed in the Site 87 SI SAP (CH2M HILL, 2008). All downhole and non-disposable sampling equipment was decontaminated immediately after each use. Tubing used for low-flow sampling was disposed of following use at each monitoring well.

Limited soil IDW (approximately 5 gallons of soil cuttings) was generated during installation of the monitoring wells. A composite soil sample was collected and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) analysis, ignitability, reactive cyanide, reactive sulfide, and corrosivity. Laboratory data for the IDW samples are included in **Appendix E**. The IDW was properly disposed of by Potomac Environmental of Stafford, Virginia, as nonhazardous waste at the Giant Resource Recovery Landfill in Sumter, South Carolina.

Based on the groundwater analytical results of the previous BT-11 SI at Site 87 and the absence of detected petroleum, oil, and lubricant (POL), the aqueous IDW was temporarily contained in 5-gallon containers and transported to MCAS Cherry Point immediately following each field event and discharged to the MCAS Cherry Point Industrial Wastewater Treatment Plant (IWTP).

2.7 Laboratory and Field Sampling Protocol

Surface soil, solid IDW, and groundwater samples collected for analyses were placed on ice and shipped via overnight courier to Empirical Laboratories in Nashville, Tennessee for analysis. Empirical Laboratories fulfilled the requirements of the U.S. Navy's QA/QC Program Manual and followed procedures outlined in the Site 87 SI SAP (CH2M HILL, 2008).

2.8 Sample Analysis and Quality Assurance/Quality Control

Surface soil and groundwater samples were collected and analyzed for the constituents shown in **Table 2-1**. All raw laboratory data are included in **Appendix E**. Tables of detected constituents and screening value exceedances are included in Section 3.

2.9 Data Validation and Evaluation

Analytical results were validated by an independent, third-party data validator, Environmental Data Services, Inc., of Williamsburg, Virginia. Typical areas of review (as applicable to each individual method) included holding time compliance, calibration verification, QA/QC blank results, matrix spike precision and accuracy, accuracy as demonstrated by laboratory control samples (LCSs), field duplicate results, surrogate recoveries, internal standard performance, and interference checks. Any non-conformance was documented and qualifiers were applied to the data if necessary. This data review and validation process is independent of the laboratory's checks and focuses on the usability of the data to support the project data interpretation and decision-making processes.

The validation of data was completed as described by Worksheet 35 of the Site 87 SI SAP (CH2M HILL, 2008). The data validation reports are provided in **Appendix F**.

TABLE 2-1
 Summary of Samples Collected at Site 87
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

Media/Sample ID	Solid		Aqueous		
	SVOC (4-methylphenol)	Metal (lead)	SVOC (4-methylphenol)	Metal (lead - total)	Metal (lead - dissolved)
Soil					
BT11-87SS03-0-1-0209	X	X			
BT11-87SS04-0-1-0209	X	X			
BT11-87SS04P-0-1-0209 ¹	X	X			
BT11-87SS05-0-1-0209	X	X			
BT11-87SS06-0-1-0209	X	X			
Groundwater					
BT11-87MW01-0209			X	X	X
BT11-87MW01-0509			X	X	X
BT11-87MW01-0809			X	X	X
BT11-87MW01-1109			X	X	X
BT11-87MW02-0209			X	X	X
BT11-87MW02-0509			X	X	X
BT11-87MW02-0809			X	X	X
BT11-87MW02-1109			X	X	X
BT11-87MW03-0209			X	X	X
BT11-87MW03P-0209 ²			X	X	X
BT11-87MW03-0509			X	X	X
BT11-87MW03P-0509 ³			X	X	X
BT11-87MW03-0809			X	X	X
BT11-87MW03P-0809 ⁴			X	X	X
BT11-87MW03-1109			X	X	X
BT11-87MW03P-1109 ⁵			X	X	X
QA/QC Samples					
Water					
BT11-87-EB021009 (equipment blank)			X	X	NA
BT11-87-FB021009 (field blank)			X	X	NA
BT11-87-EB170209 (equipment blank)			X	NA	X
BT11-87-FB170209 (field blank)			X	X	NA
BT11-87-EB051809 (equipment blank)			X	X	X
BT11-87-FB051809 (field blank)			X	X	X
BT11-87EB-081809 (equipment blank)			X	X	X
BT11-87FB-081809 (field blank)			X	X	NA
BT11-87FB112009 (field blank)			X	X	X
BT11-87FB112009 (field blank)			X	X	NA

Notes:

¹Duplicate of sample BT11-87SS04-0-1-0209

²Duplicate of sample BT11-87MW03-0209

³Duplicate of sample BT11-87MW03-0509

⁴Duplicate of sample BT11-87MW03-0809

⁵Duplicate of sample BT11-87MW03-1109

QA/QC - quality assurance/quality control

NA - Not analyzed

4-methylphenol by USEPA Method SW-846 8270C

Lead (total) by USEPA Method SW-846 6010B

Lead (dissolved) by USEPA Method SW-846 6010B

TABLE 2-2
 Site 87 Monitoring Well Construction Details
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

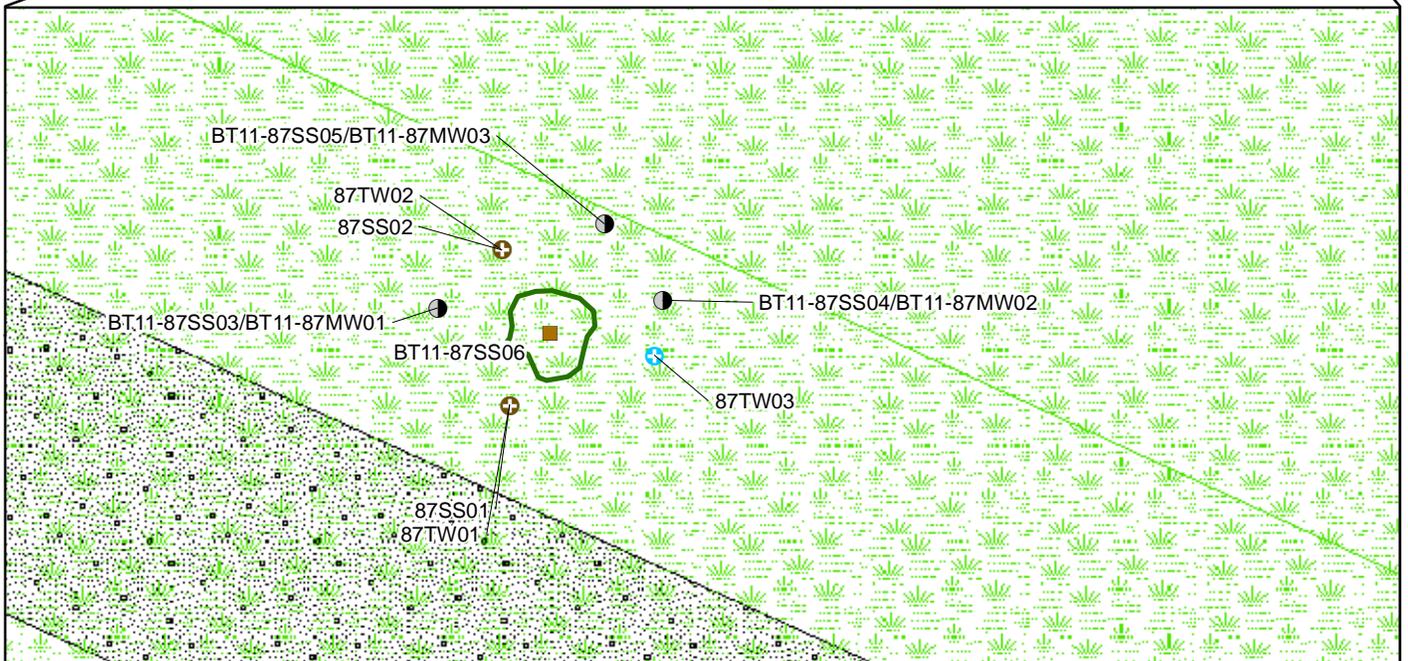
Well	Well Diameter (in)	Total Depth (ft bgs)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Ground Elevation (ft above msl)	Measuring Point Elevation (ft above msl)
BT11-87MW01	1	8	3	8	0.5	4.66
BT11-87MW02	1	8	3	8	0.5	4.67
BT11-87MW03	1	8	3	8	0.5	4.97

Notes:
 ft – feet
 msl – mean sea level

TABLE 2-3
 Site 87 Water Level Measurements
BT-11 Site 87 Site Investigation
MCAS Cherry Point
Cherry Point, North Carolina

Well	February 17, 2009 (ft above msl)	May 18, 2009 (ft above msl)	August 18, 2009 (ft above msl)	November 20, 2009 (ft above msl)
BT11-87MW01	(not measured)	0.58	0.41	0.87
BT11-87MW02	(not measured)	0.59	0.07	0.75
BT11-87MW03	(not measured)	0.89	0.67	(not measured)

Notes:
 ft – feet
 msl – mean sea level



Legend

-  Site Location
-  2009 Soil and Groundwater Sample Location
-  2009 Soil Sample Location
-  1999 Groundwater Sample Location
-  1999 Soil and Groundwater Sample Location
-  Estimated Limits of Waste
-  Emergent Persistent - Mesohaline Wetland

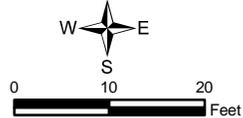
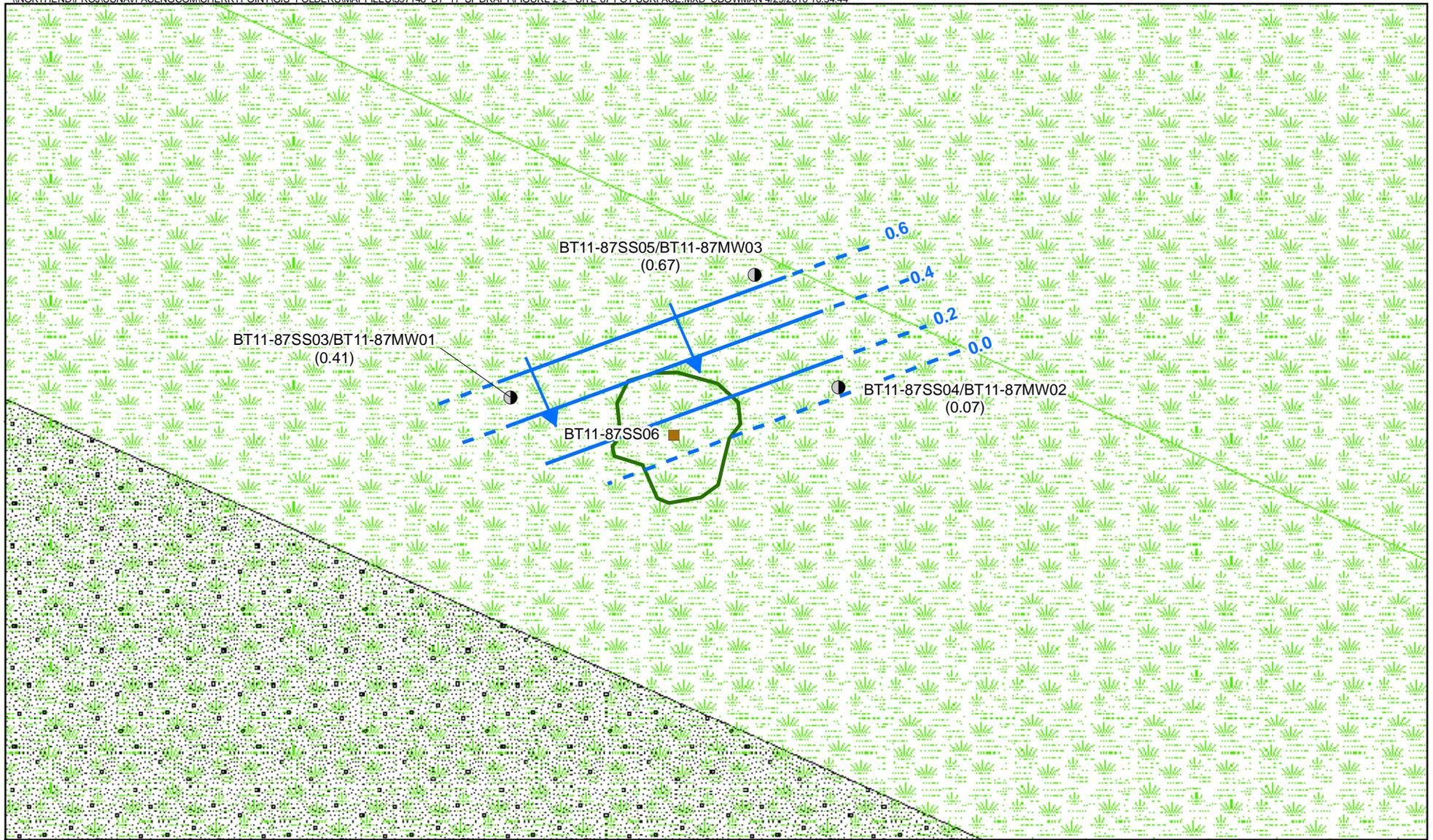


Figure 2-1
 Site 87 Sample Locations
 Site 87 Site Investigation
 MCAS Cherry Point, North Carolina



Legend

- 2009 Soil and Groundwater Sample Location
- 2009 Soil Sample Location
- ▭ Estimated Limits of Waste
- ▨ Emergent Persistent - Mesohaline Wetland
- ➔ Groundwater Flow Direction
- Potentiometric Surface Contours (dashed where inferred)
- (0.41) - Groundwater elevation (feet above mean sea level)

Surficial Aquifer Potentiometric Surface Contours
 August 2009
 Site 87 Site Investigation
 MCAS Cherry Point, North Carolina



Figure 2-2

August 2009

Site 87 Site Investigation

MCAS Cherry Point, North Carolina

Sampling Results

This section discusses the laboratory analytical results from the sampling of surface soil and groundwater at Site 87. The complete laboratory analytical results of the SI are presented in **Appendix E**. A detailed discussion of sampling procedures employed during the SI was presented in Section 2.

3.1 Regulatory and Health-Based Screening Levels

Analytical results for all media were compared against a variety of regulatory and human health risk-based standards and criteria. The screening levels, as listed in the Site 87 SI SAP (CH2M HILL, 2008) are identified below, according to each medium.

- Surface Soil
 - NC SSLs
 - USEPA Region 9 PRGs for residential and industrial soils
- Groundwater
 - NC 2Ls
 - Federal MCLs
 - USEPA Region 9 Tapwater PRGs

Since production of the Site 87 SI SAP, the Region 9 PRGs have been retired and harmonized with similar risk-based screening levels used by Regions 3 and 6 into a single table of screening levels: *Regional Screening Levels for Chemical Contaminants at Superfund Sites*. These updated screening levels are located at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/pdf/master_sl_table_run_DECEMBER2009.pdf. The current Regional Screening Levels (RSLs) were used for screening the 2009 SI data and are listed in the tables presented in Section 3.2.

3.2 Analytical Results

3.2.1 Surface Soil

Table 3-1 lists all detected constituents in the Site 87 surface soil samples, and indicates all results exceeding regulatory screening criteria for 4-methylphenol and/or lead. Surface soil sampling data exceeding one or more screening criteria are also depicted on **Figure 3-1**.

4-Methylphenol was not detected in any of the surface soil samples.

The inorganic constituent lead was detected in each surface soil sample. Of these detected concentrations, only the concentration of lead in sample BT11-87SS05-0-1-0209 (653 mg/kg) exceeded the NC SSL (270 mg/kg) and the RSL for Residential Soil (400 mg/kg) (**Figure 3-1**).

3.2.2 Groundwater

Table 3-2 lists all detected constituents in the three Site 87 groundwater samples.

4-methylphenol was not detected in any groundwater samples at Site 87 during any of the 2009 quarterly LTM groundwater sampling events.

Lead (total) was detected only at monitoring well 87MW01 (4.4 micrograms per liter [$\mu\text{g}/\text{L}$]) in May 2009, at a concentration below the screening criteria.

It should be noted that during the February 2009 laboratory analyses, the laboratory had to run dilutions on the groundwater samples, causing the quantitation limits (QLs) to be elevated. These dilutions were necessary due to magnesium interference; in order to have a reportable value for lead, the samples needed to be diluted enough to bring the magnesium within its linear range. Even though the QLs were above the project action limits (PALs) for lead, the method detection limits (MDLs) were well below the PALs. From this fact it can be inferred that if a lead detection was found at or above the PAL, it would have been reported. As stated previously, lead (total) was detected only in the May 2009 groundwater sample collected at 87MW01.

3.2.3 Field-Related QA/QC Samples

The QA/QC samples collected during the SI included field blanks and equipment rinsate blanks. All QA/QC blanks were analyzed for 4-methylphenol and lead. Field duplicate results were included with the regular sample results in **Tables 3-1 and 3-2**. **Appendix E** includes a complete list of the QA/QC sample results.

Field and equipment blanks were collected during each of the SI field sampling events. The field blanks were ambient blanks consisting of laboratory certified-pure water poured into sample containers during field activities at Site 87. Lead (total) was detected in field blank BT11-87FB112009 at an estimated concentration of 2.91 $\mu\text{g}/\text{L}$. Neither lead nor 4-methylphenol was detected in any of the remaining field blanks.

Lead was also detected in equipment rinsate blank BT11-EB112009 at concentrations of 3.67 $\mu\text{g}/\text{L}$ (total lead) and 4.54 $\mu\text{g}/\text{L}$ (dissolved lead). Neither lead nor 4-methylphenol was detected in any of the remaining equipment blanks.

TABLE 3-1

Site 87 Surface Soil Sampling Results and Screening Criteria Comparison

BT-11 Site 87 Site Investigation

MCAS Cherry Point

Cherry Point, North Carolina

Station ID	NC SSL (January 2010)	RSL - Residential Soil (December 2009)	RSL - Industrial Soil (December 2009)	BT11-87SS03	BT11-87SS04	BT11-87SS04 ¹	BT11-87SS05	BT11-87SS06
Sample ID				BT11-87SS03-0-1-0209	BT11-87SS04-0-1-0209	BT11-87SS04P-0-1-0209	BT11-87SS05-0-1-0209	BT11-87SS06-0-1-0209
Sample Date				2/10/09	2/10/09	2/10/09	2/10/09	2/10/09
Chemical Name								
4-Methylphenol (p-Cresol) (MG/KG)								
No Detections	0.4	310	3,100					
Lead (MG/KG)								
Lead	270	400	800	8.4	28.3	157	653	86.8

Notes:**Detected concentrations are indicated in bold font**

MG/KG - Milligrams per kilogram

NC SSL - North Carolina Soil Screening Level

RSL - USEPA Regional Screening Level

Shading indicates exceedance of NC SSL and RSL
(Residential Soil)¹Duplicate of sample BT11-87SS04-0-1-0209

TABLE 3-2

Site 87 Groundwater Sampling Results and Screening Criteria Comparison
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID	NC2L GW (January 2010)	MCL (May 2009)	RSL - Tapwater (December 2009)	87MW01				87MW02			
				BT11-87MW01-0209 02/17/09	BT11-87MW01-0509 05/18/09	BT11-87MW01-0809 08/18/09	BT11-87MW01-1109 11/20/09	BT11-87MW02-0209 02/17/09	BT11-87MW02-0509 05/18/09	BT11-87MW02-0809 08/18/09	BT11-87MW02-1109 11/20/09
Chemical Name											
4-Methylphenol (p-Cresol) (UG/L)											
No Detections	40	--	180								
Total Lead (UG/L)											
Lead	15	15	--	20 U	4.4	8 U	6 U	20 U	3 U	6 U	6 U
Dissolved Lead (UG/L)											
No Detections											

Notes:
 Detected concentrations are indicated in bold font
 UG/L - Micrograms per liter
 U - The material was analyzed for, but not detected
 -- Screening criteria not available
 NC2L GW - North Carolina 2L Groundwater
 MCL - Federal Maximum Contaminant Level
 RSL - USEPA Regional Screening Level
¹Duplicate of sample BT11-87MW03-0209
²Duplicate of sample BT11-87MW03-0509
³Duplicate of sample BT11-87MW03-0809
⁴Duplicate of sample BT11-87MW03-1109

TABLE 3-2

Site 87 Groundwater Sampling Results and Screening Criteria Comparison
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID	NC2L GW (January 2010)	MCL (May 2009)	RSL - Tapwater (December 2009)	87MW03							
				BT11-87MW03-0209 02/17/09	BT11-87MW03P-0209 ¹ 02/17/09	BT11-87MW03-0509 05/18/09	BT11-87MW03P-0509 ² 05/18/09	BT11-87MW03-0809 08/18/09	BT11-87MW03P-0809 ³ 08/18/09	BT11-87MW03-1109 11/20/09	BT11-87MW03P-1109 ⁴ 11/20/09
Chemical Name											
4-Methylphenol (p-Cresol) (UG/L)											
No Detections	40	--	180								
Total Lead (UG/L)											
Lead	15	15	--	20 U	20 U	3 U	3 U	7.2 U	7.7 U	6 U	6 U
Dissolved Lead (UG/L)											
No Detections											

Notes:

Detected concentrations are indicated in bold font

UG/L - Micrograms per liter

U - The material was analyzed for, but not detected

-- Screening criteria not available

NC2L GW - North Carolina 2L Groundwater

MCL - Federal Maximum Contaminant Level

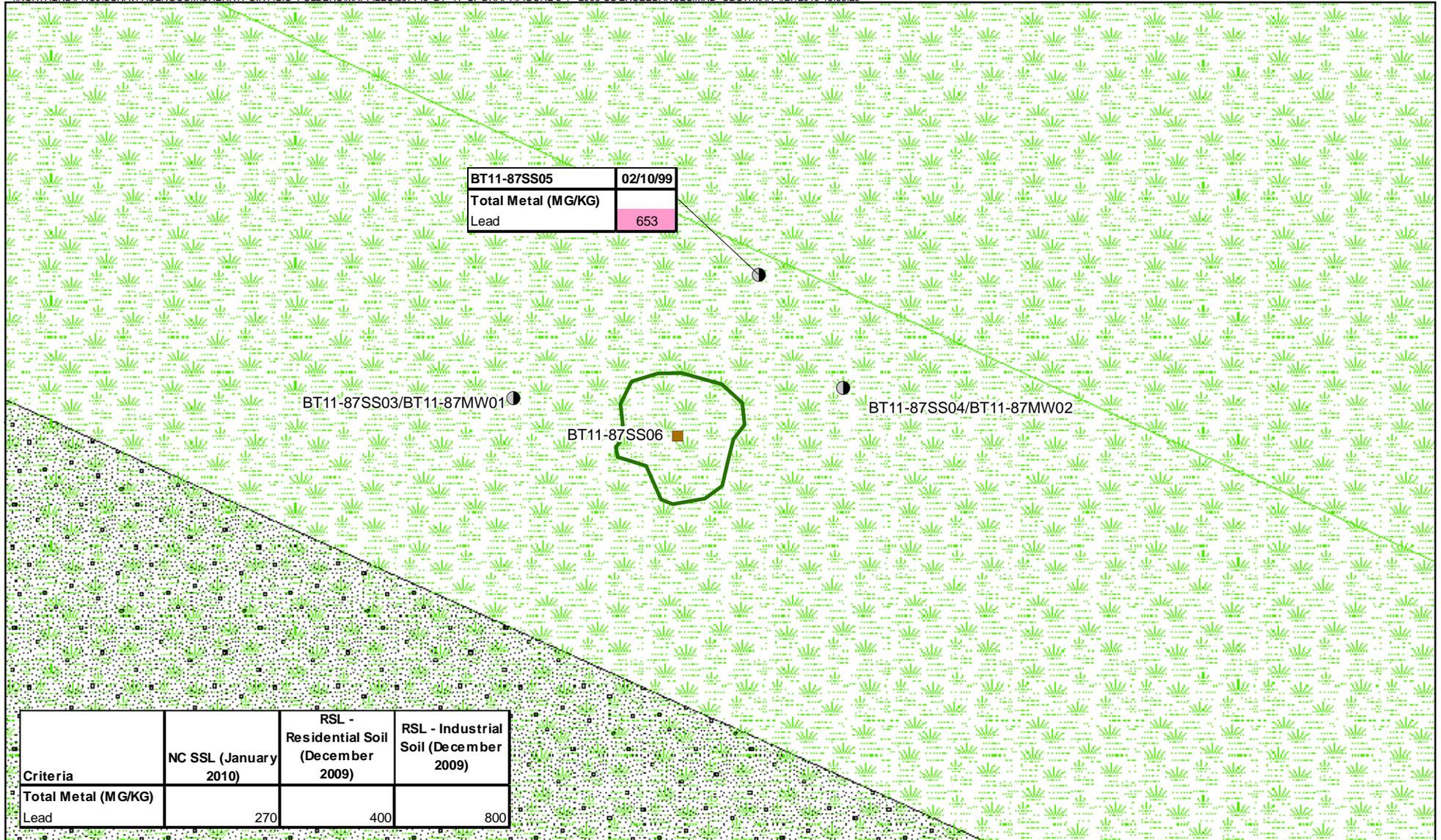
RSL - USEPA Regional Screening Level

¹Duplicate of sample BT11-87MW03-0209

²Duplicate of sample BT11-87MW03-0509

³Duplicate of sample BT11-87MW03-0809

⁴Duplicate of sample BT11-87MW03-1109



- Legend**
- 2009 Soil and Groundwater Sample Location
 - 2009 Soil Sample Location
 - Estimated Limits of Waste
 - ▨ Emergent Persistent - Mesohaline Wetland

Notes:
 Shading indicates exceedance of one or more screening criteria



Figure 3-1
 2009 Surface Soil Samples
 Exceeding Screening Criteria
 Site 87 Site Investigation
 MCAS Cherry Point, North Carolina

Conclusions and Recommendations

4.1 Conclusions

The following conclusions regarding the SI sampling results have been derived from analyzing the data collected at Site 87.

4.1.1 Site 87

- 4-Methylphenol was not detected in any of the surface soil or groundwater samples.
- Lead detected at surface soil sample location 87SS05 (653 mg/kg) exceeded the NC SSL (270 mg/kg) and the RSL for Residential Soil (400 mg/kg), but is below the RSL for Industrial Soil (800 mg/kg). The concentrations of lead detected in the remaining three surface soil samples at Site 87 were below the screening criteria.
- Lead was not detected above screening criteria in any of the groundwater samples during all 4 quarterly sampling rounds.

4.2 Recommendations

Based on the results of the Site 87 SI, it is recommended that the Draft CAP be finalized to address lead in soil at Site 87 using LUCs to eliminate or reduce pathways of exposure to soil and sediment at Site 87. The proposed LUCs would involve site use controls. Specifically, the following LUCs are proposed:

- Restrict land use at Site 87 to industrial uses only. The restricted area surrounding Site 87 will be delineated in a plat map that will be incorporated into the BT-11 Site Wide Plan and enforced by range personnel. If BT-11 is ever closed, NCDENR (or the then appropriate State Agency) will be notified.
- Require prior written approval from NCDENR for any intrusive activities (e.g., excavation below the ground surface, insertion of objects into the ground).
- No wells may be installed except for monitoring wells constructed pursuant to 15A NCAC 2C.0108 or as determined by NCDENR.

Finally, no additional environmental monitoring at Site 87 is proposed at this time, and it is recommended that the site monitoring wells be properly abandoned.

SECTION 5

References

CH2M HILL. 1999. *Final Work Plan, Site Investigation at Point of Marsh BT-11 (Sites I-32, 86, 87, 88 and 89), Marine Corps Air Station Cherry Point, North Carolina*. July.

CH2M HILL. 2007a. *Final Site Investigation Report, Point of Marsh BT-11 (Sites I-32, 87, 88, and 89), Marine Corps Air Station, Cherry Point, North Carolina*. January.

CH2M HILL. 2007b. *Draft Corrective Action Plan, Point of March BT-11, Marine Corps Air Station, Cherry Point, North Carolina*. April.

CH2M HILL. 2008. *Final Sampling and Analysis Plan, BT-11 Site 87 Site Investigation, Marine Corps Air Station Cherry Point, Cherry Point, North Carolina*. November.

United States Environmental Protection Agency (USEPA). 2001. *OTS Alert #2, U.S. EPA Region 4 Office of Technical Service*. January 31, 2001.

Tetra Tech NUS. 2002. *Final Remedial Investigation Report for Operable Unit I, Marine Corps Air Station, Cherry Point, North Carolina*. November.

Wm. F. Freeman Associates. 1987. Letter from Keith V. Broderick to Rick Shriver (Division of Environmental Management, Groundwater Section, Wilmington Regional Office) RE: Application for Permit to Construct a Well, Piney Island BT-11, October 22, 1987.

Appendix A
Project Correspondence

Correspondence1_123108.txt

From: Nielsen, Janice L CIV NAVFAC MidLant
[janice.nielsen@navy.mil]
Sent: Wednesday, December 31, 2008 10:33 AM
To: Bitterman, Doug/VBO; george.lane@ncmail.net;
GeorgeL100@aol.com
Cc: jeffrey.christopher@usmc.mil; Lampshire, Laura/WDC
Subject: RE: BT-11

George: Happy New Year. Just wanted you to know Doug ran this past me and Jeff before sending it out. I had no concerns with the approach and my understanding was that Jeff was ok with this approach also. Let us know if you have any concerns or questions. Thanks, Jan

**Jan Nielsen
NAVFAC Mid-Atlantic
Remedial Project Manager, Cherry Point
Marine Corps North Carolina IPT
(757)322-8339**

-----Original Message-----

From: Doug.Bitterman@CH2M.com [mailto:Doug.Bitterman@CH2M.com]
Sent: Wednesday, December 31, 2008 10:24
To: george.lane@ncmail.net; GeorgeL100@aol.com
Cc: Nielsen, Janice L CIV NAVFAC MidLant; jeffrey.christopher@usmc.mil;
Laura.Lampshire@CH2M.com
Subject: BT-11

Hi George:

I hope you and your family had a very nice Christmas holiday.

We've been working hard to get things set up for the BT-11 field event early in the new year. Other than for the utility clearance at Site 87 (January 8), we don't yet have firm dates for the drilling and sampling (will follow 1

Correspondence1_123108.txt

week

after the drilling). It's looking like it will be late in the month of January or early in February.

We sent scopes of work and bid requests to several drilling firms in early December in order to procure the subcontractor for the work. We received what

I think is very good advice from one of the drilling firms

- the one that did the work at BT-11 last time. They suggested a slightly different approach to the well installation that I wanted to run by you. Their approach doesn't materially change the quality or representativeness of any of

the samples we had planned to collect, but there would be a couple of slight

changes that would technically be deviations from the SAP, so we wanted to

seek your approval. During previous well installation work at BT-11 (Site I-32), we used hollow stem auger drilling using a ATV rig to install conventional 2-inch PVC wells. However, Site 87 is located in a more marshy

area than Site I-32.

If you recall, Site 87 came to be when a bulldozer apparently strayed from the

gravel roadbed and sank into the marsh. After being winched out, the resulting

depression formed by the bulldozer was used as a convenient disposal pit. Even

with an ATV rig, there is still a considerable risk of the rig getting stuck or making a royal mess in the marsh. The driller suggests installing the wells

using a tripod set up (essentially a manual DPT drilling technique - we used

it inside Building 133 at OU1 when overhead clearance was particularly low).

We only have to drill to about 10 feet, so this is a very feasible technique at Site 87. The driller also suggests using well screens with pre-installed filter packs ("pre-packs") so that we will be guaranteed to get a good, consistent filter pack around each of the screens. The subsurface at BT-11

Correspondence1_123108.txt

is

essentially watery mud, and the driller reported considerable difficulty installing a conventional filter pack using loose sand poured from the surface

to fill the annular space around the well screen given the viscous mud.

Where

this suggested approach breaks from what was specified in the SAP (in addition

to the pre-packed well

screens) is that the well diameters would be smaller - 1-inch instead of 2-inch. The tripod setup cannot easily make a borehole large enough for a 2-inch

diameter well and a 2-inch pre-packed well screen would have to be custom-

ordered. The smaller well diameter would not impact the representativeness of

the sample or compromise the integrity of the data in any way - our sampling

equipment and the ability to purge and develop the well is the same for the smaller diameter well.

Please let me know if you are comfortable with the revised approach described

above for the installation of the 3 monitoring wells at Site 87. If you have any questions or concerns, please do not hesitate to contact me. If you are okay with the change, we will utilize the change/variance process built into the UFP-SAP - it won't be necessary to prepare a revised SAP. In the meantime,

we are continuing the process of procuring the driller. We are expanding the

scope requirements to include the ability to perform tripod work, so the selected contractor will have the ability to perform the work under both the original and revised approaches. We are hoping to have the driller procured

and the date set for the drilling by the time of the partnering meeting. As I said above, it is looking like the last week of January would be the earliest potential timeframe for the drilling to occur.

Correspondence1_123108.txt

Happy New Year!

Doug

Douglas H. Bitterman

**Sr. Project Manager/Hydrogeologist/Area Manager Virginia Beach Office
5700**

Cleveland St., Suite 101 Virginia Beach, VA 23462

Email: doug.bitterman@ch2m.com <mailto:doug.bitterman@ch2m.com>

Direct -

**757.671.6209 Fax - 757.497.6885 Mobile - 703.627.3291 www.ch2mhill.com
<<http://www.ch2mhill.com/>>**

Solutions Without Boundaries

Correspondence2_010209.txt

From: Nielsen, Janice L CIV NAVFAC MidLant
[janice.nielsen@navy.mil]
Sent: Friday, January 02, 2009 11:36 AM
To: george.lane@ncmail.net
Cc: jeffrey.christopher@usmc.mil; Lampshire, Laura/WDC;
Bitterman,
Doug/VBO
Subject: RE: BT-11

**Thanks George for the quick response. We will keep you posted as we
move
forward. Jan**

**Jan Nielsen
NAVFAC Mid-Atlantic
Remedial Project Manager, Cherry Point
Marine Corps North Carolina IPT
(757)322-8339**

-----Original Message-----

From: george.lane@ncmail.net [mailto:george.lane@ncmail.net]
Sent: Wednesday, December 31, 2008 13:26
To: Doug.Bitterman@CH2M.com; GeorgeL100@aol.com
Cc: Nielsen, Janice L CIV NAVFAC MidLant; jeffrey.christopher@usmc.mil;
Laura.Lampshire@CH2M.com
Subject: Re: BT-11

Hi Doug,

**Due to the difficulty with drilling in the marsh, the new approach is
approved.**

Happy New Year,

**George Lane
NCDENR**

Appendix B
Well Completion Diagrams



PROJECT NUMBER

364500.SI.FQ

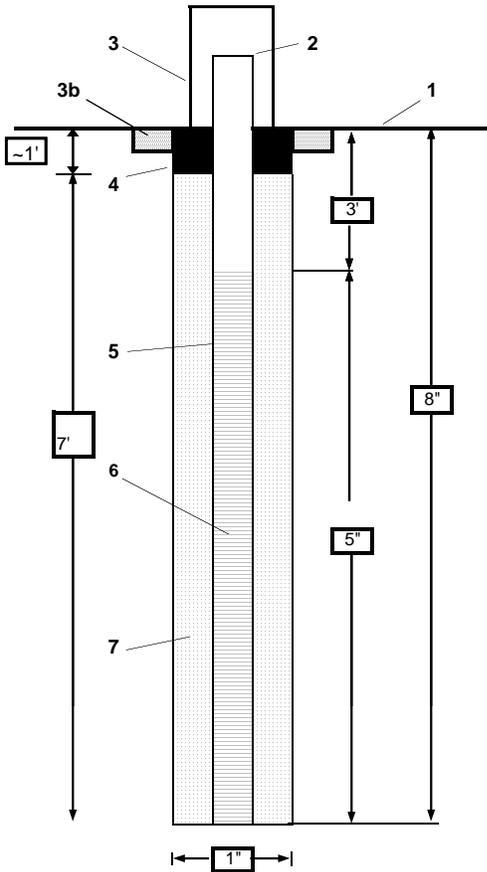
WELL NUMBER

BT11-87MW01

WELL COMPLETION DIAGRAM

SHEET 1 OF 1

PROJECT : MCAS Cherry Point, BT-11 Site 87 Site Investigation LOCATION : BT-11 Site 87
 DRILLING CONTRACTOR : Parratt Wolff NORTHING: 458101.95 EASTING: 2769201.02
 DRILLING METHOD AND EQUIPMENT USED : Hand auger
 WATER LEVELS : at surface (marshy area) START : February 2, 2009, 09:44 END : 10:00 LOGGER : Laura Lampshire



1- Ground elevation at well	0.5 ft amsl (soft mud)
2- Top of casing elevation (ft AMSL)	4.66 ft amsl
a) vent hole?	N/A
3- Wellhead protection cover type	Stand-alone PVC riser with locking cap
a) weep hole?	N/A
b) concrete pad dimensions?	N/A
4- Type of seal	Bentonite, 3/8" chips (pellets)
a) Quantity used	~1/4 bag (10 lbs)
5- Dia./type of well casing	1" I.D. PVC Sch. 40
6- Type/slot size of screen	Pre-Packed machine slotted (0.01-inch slot size) stainless steel
7- Type screen filter	#1 DSI Filter Sand (within the pre-packed filter)
a) Quantity used	N/A
Development method	Purged by adding distilled water to well, surged with 1" I.D. bailer, then purged 3 well volumes with peristaltic pump
Development time	12 Min.
Estimated purge volume	1.7 gallons
Comments	



PROJECT NUMBER

364500.SI.FQ

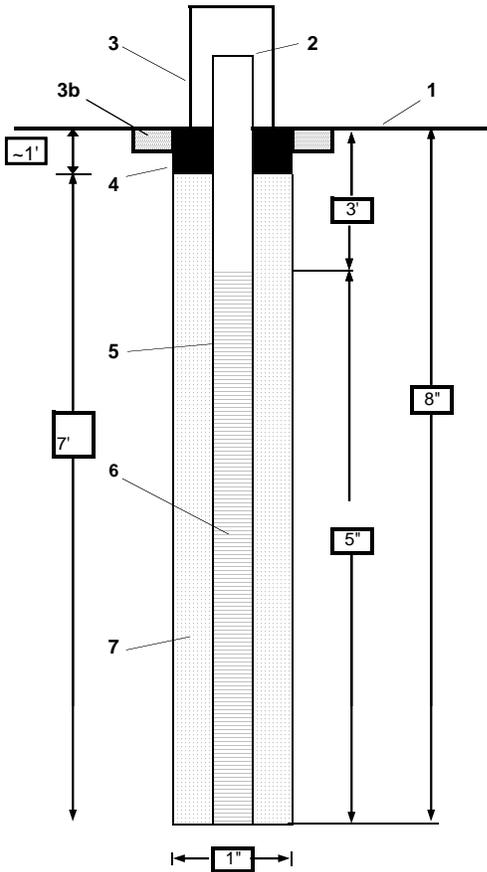
WELL NUMBER

BT11-87MW02

WELL COMPLETION DIAGRAM

SHEET 1 OF 1

PROJECT : MCAS Cherry Point, BT-11 Site 87 Site Investigation LOCATION : BT-11 Site 87
 DRILLING CONTRACTOR : Parratt Wolff NORTHING: 458192.35 EASTING: 2769224.58
 DRILLING METHOD AND EQUIPMENT USED : Hand auger
 WATER LEVELS : at surface (marshy area) START : February 2, 2009, 10:13 END : 10:21 LOGGER : Laura Lampshire



1- Ground elevation at well	0.5 ft amsl (soft mud)
2- Top of casing elevation (ft AMSL)	4.67 ft amsl
a) vent hole?	N/A
3- Wellhead protection cover type	Stand-alone PVC riser with locking cap
a) weep hole?	N/A
b) concrete pad dimensions?	N/A
4- Type of seal	Bentonite, 3/8" chips (pellets)
a) Quantity used	~1/4 bag (10 lbs)
5- Dia./type of well casing	1" I.D. PVC Sch. 40
6- Type/slot size of screen	Pre-Packed machine slotted (0.01-inch slot size) stainless steel
7- Type screen filter	#1 DSI Filter Sand (within the pre-packed filter)
a) Quantity used	N/A
Development method	Purged by adding distilled water to well, surged with 1" I.D. bailer, then purged 3 well volumes with peristaltic pump
Development time	12 Min.
Estimated purge volume	1.7 gallons
Comments	



PROJECT NUMBER

364500.SI.FQ

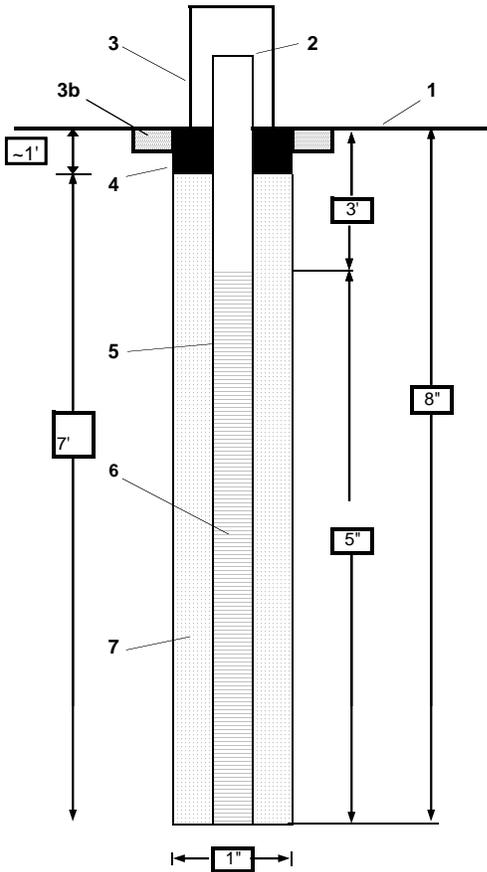
WELL NUMBER

BT11-87MW03

WELL COMPLETION DIAGRAM

SHEET 1 OF 1

PROJECT : MCAS Cherry Point, BT-11 Site 87 Site Investigation LOCATION : BT-11 Site 87
 DRILLING CONTRACTOR : Parratt Wolff NORTHING: 458110.46 EASTING: 2769218.53
 DRILLING METHOD AND EQUIPMENT USED : Hand auger
 WATER LEVELS : at surface (marshy area) START : February 2, 2009, 10:22 END : 10:31 LOGGER : Laura Lampshire



1- Ground elevation at well	0.5 ft amsl (soft mud)
2- Top of casing elevation (ft AMSL)	4.97 ft amsl
a) vent hole?	N/A
3- Wellhead protection cover type	Stand-alone PVC riser with locking cap
a) weep hole?	N/A
b) concrete pad dimensions?	N/A
4- Type of seal	Bentonite, 3/8" chips (pellets)
a) Quantity used	~1/4 bag (10 lbs)
5- Dia./type of well casing	1" I.D. PVC Sch. 40
6- Type/slot size of screen	Pre-Packed machine slotted (0.01-inch slot size) stainless steel
7- Type screen filter	#1 DSI Filter Sand (within the pre-packed filter)
a) Quantity used	N/A
Development method	Surged by adding distilled water to well, surged with 1" I.D. bailer, then purged 3 well volumes with peristaltic pump
Development time	12 Min.
Estimated purge volume	1.7 gallons
Comments	

Appendix C
Field Indicator Parameters from
2009 Groundwater Sampling



PROJECT NUMBER
364500.SI.FQ

MONITORING WELL
BT11-87MW01

MONITORING WELL GROUNDWATER PARAMETERS

PROJECT : MCAS Cherry Point, BT-11 Site 87 SI

LOCATION : BT11-87MW01

		Conductivity	Temperature	Dissolved Oxygen	Salinity	Redox Potential	Turbidity	Depth to Water
Date and Time	pH	(mS/cm)	(°C)	(mg/L)	(%)	(mV)	(NTU)	(ft)
2/17/09, 09:00	5.91	36.4	10.46	7.51	2.3	-281	82.2	(not measured)
5/18/09, 09:11	6.54	34.5	12.63	0.89	2.2	-135	91.4	4.08
8/18/09, 09:00	7.15	28.4	26.90	6.24	1.8	-287	2.0	4.25
11/20/09, 09:15	6.94	40.0	19.49	5.87	2.6	-300	8.7	3.79

Notes:

top of casing elevation = 4.66 ft above mean sea level

mS/cm – milliSiemens per centimeter

°C – degrees Celsius

mg/L – milligrams per liter

mV – millivolts

NTU - nephelometric turbidity units

ft - feet



PROJECT NUMBER
364500.SI.FQ

MONITORING WELL
BT11-87MW02

MONITORING WELL GROUNDWATER PARAMETERS

PROJECT : MCAS Cherry Point, BT-11 Site 87 SI

LOCATION : BT11-87MW02

		Conductivity	Temperature	Dissolved Oxygen	Salinity	Redox Potential	Turbidity	Depth to Water
Date and Time	pH	(mS/cm)	(°C)	(mg/L)	(%)	(mV)	(NTU)	(ft)
2/17/09, 10:55	6.06	36.2	10.83	5.41	2.2	-297	101.0	(not measured)
5/18/09 ¹ , 12:03	6.63	33.0	16.51	7.15	2.1	-3.34	377	4.08
8/18/09 ² , 10:20	7.12	27.7	31.30	7.28	1.7	-311	35.0	4.60
11/20/09 ³ , 09:10	6.44	29.0	21.68	5.30	1.8	-319	81.5	3.92

Notes:

top of casing elevation = 4.67 ft above mean sea level

¹Well went dry upon purging ~0.5 gallon.

²Well went dry upon purging 0.7 gallon.

³Well went dry after purging for 2 min.

mS/cm – milliSiemens per centimeter

°C – degrees Celsius

mg/L – milligrams per liter

mV – millivolts

NTU - nephelometric turbidity units

ft - feet



PROJECT NUMBER
364500.SI.FQ

MONITORING WELL
BT11-87MW03

MONITORING WELL GROUNDWATER PARAMETERS

PROJECT : MCAS Cherry Point, BT-11 Site 87 SI

LOCATION : BT11-87MW03

		Conductivity	Temperature	Dissolved Oxygen	Salinity	Redox Potential	Turbidity	Depth to Water
Date and Time	pH	(mS/cm)	(°C)	(mg/L)	(%)	(mV)	(NTU)	(ft)
2/17/09, 12:15	6.36	35.9	11.40	2.30	1.3	-318	90	(not measured)
5/18/09 ¹ , 10:35	6.43	36.4	16.76	0.94	2.3	-337	38.8	4.08
8/18/09 ² , 10:40	6.99	29.8	27.6	7.54	1.9	-300	54.3	4.30
11/20/09 ³ , 09:18	6.67	26.7	21.36	5.8	1.6	-307	0.0	(not measured)

Notes:

top of casing elevation = 4.97 ft above mean sea level

¹Well went dry upon purging ~0.3 gallon.

²Well went dry upon purging 0.25 gallon.

³Well went dry after purging for 2 min.

mS/cm – milliSiemens per centimeter

°C – degrees Celsius

mg/L – milligrams per liter

mV – millivolts

NTU - nephelometric turbidity units

ft - feet

Appendix D Survey Data



134 Cedar Point Boulevard
Cedar Point NC, 28584

Date: 06-30-2009
Reference: CTO-207, BT-11
Cherry Point, NC

Datum: NC STATE PLANE 3200 NAD 83 (NSRS 2007) FEET
Control Reference: North Carolina Geodetic Network
Cedar Island CORS
Swanquarter CORS
Beaufort CORS

WELL ID	NORTHING	EASTING	PVC	GROUND
87MW01	458101.95	2769201.02	4.66	0.5 SOFT MUD
87MW03	458110.46	2769218.53	4.97	0.5 SOFT MUD
87MW02	458102.35	2769224.58	4.67	0.5 SOFT MUD



Brent A. Lanier
6-30-09

Appendix E
Laboratory Analytical Data

Appendix E

Laboratory Analytical Data
Surface Soil, February 2009
BT-11 Site 87 Site Investigation
MCAS Cherry Point
Havelock, North Carolina

Station ID	BT11-87SS03	BT11-87SS04		BT11-87SS05	BT11-87SS06
Sample ID	BT11-87SS03-0-1-0209	BT11-87SS04-0-1-0209	BT11-87SS04P-0-1-0209	BT11-87SS05-0-1-0209	BT11-87SS06-0-1-0209
Sample Date	2/10/09	2/10/09	2/10/09	2/10/09	2/10/09
Chemical Name					
Semivolatile Organic Compound (UG/KG)					
4-Methylphenol	220 U	430 U	820 U	540 U	640 U
Inorganic Compound (MG/KG)					
Lead	8.4	28.3	157	653	86.8

Notes:

Detections indicated in bold font

U - The material was analyzed for, but not detected

MG/KG - Milligrams per kilogram

UG/KG - Micrograms per kilogram

Appendix E

Laboratory Analytical Data
 Groundwater LTM February, May, August, and November 2009
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Havelock, North Carolina

Station ID	BT11-87MW01				BT11-87MW02			
Sample ID	BT11-87MW01-0209	BT11-87MW01-0509	BT11-87MW01-0809	BT11-87MW01-1109	BT11-87MW02-0209	BT11-87MW02-0509	BT11-87MW02-0809	BT11-87MW02-1109
Sample Date	02/17/09	05/18/09	08/18/09	11/20/09	02/17/09	05/18/09	08/18/09	11/20/09
Chemical Name								
Semi-volatile Organic Compound (UG/L)								
4-Methylphenol	2 U	2 U	2 U	2 U	2.4 U	2 U	2.2 U	2 U
Total Inorganic (UG/L)								
Lead	20 U	4.4	8 U	6 U	20 U	3 U	6 U	6 U
Dissolved Inorganic (UG/L)								
Lead	20 U	3 U	6 U	6 U	20 U	3 U	6.2 U	6 U

Notes:

Detections indicated in bold font.

U - The material was analyzed for, but not detected

UG/L - Micrograms per liter

¹Duplicate of sample BT11-87MW03-0209

²Duplicate of sample BT11-87MW03-0509

³Duplicate of sample BT11-87MW03-0809

⁴Duplicate of sample BT11-87MW03-1109

Appendix E

Laboratory Analytical Data
 Groundwater LTM February, May, August, and November 2009
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Havelock, North Carolina

Station ID	BT11-87MW03							
Sample ID	BT11-87MW03-0209	BT11-87MW03P-0209 ¹	BT11-87MW03-0509	BT11-87MW03P-0509 ²	BT11-87MW03-0809	BT11-87MW03P-0809 ³	BT11-87MW03-1109	BT11-87MW03P-1109 ⁴
Sample Date	02/17/09	02/17/09	05/18/09	05/18/09	08/18/09	08/18/09	11/20/09	11/20/09
Chemical Name								
Semi-volatile Organic Compound (UG/L)								
4-Methylphenol	2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.0 U	2.1 U	2 U
Total Inorganic (UG/L)								
Lead	20 U	20 U	3 U	3 U	7.2 U	7.7 U	6 U	6 U
Dissolved Inorganic (UG/L)								
Lead	20 U	20 U	3 U	3 U	9.2 U	6.4 U	6 U	6 U

Notes:

Detections indicated in bold font.

U - The material was analyzed for, but not detected

UG/L - Micrograms per liter

¹Duplicate of sample BT11-87MW03-0209

²Duplicate of sample BT11-87MW03-0509

³Duplicate of sample BT11-87MW03-0809

⁴Duplicate of sample BT11-87MW03-1109

Appendix E

Laboratory Analytical Data
 QA/QC Samples, 2009
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Havelock, North Carolina

Station ID	87-QC								87-QC	
Sample ID	BT11-87-EB021009	BT11-87-FB021009	BT11-87-EB170209	BT11-87-FB170209	BT11-87-EB051809	BT11-87-FB051809	BT11-87EB-081809	BT11-87FB-081809	BT11-87EB112009	BT11-87FB112009
Sample Date	02/10/09	02/10/09	02/17/09	02/17/09	05/18/09	05/18/09	08/18/09	08/18/09	11/20/09	11/20/09
Chemical Name										
Semivolatile Organic Compounds (UG/L)										
4-Methylphenol	2 U	2.2 U	1.9 U	1.9 U	1.9 U	1.8 U	2 U	1.9 U	1.9 U	2 U
Total Metals (UG/L)										
Lead	3 U	3 U	NA	10 U	3 U	3 U	3 UJ	3 UJ	3.67	2.91 J
Dissolved Metals (UG/L)										
Lead, Dissolved	NA	NA	10 U	NA	3 U	3 U	3 U	NA	4.54	NA

Notes:

- Bold indicates detections
- NA - Not analyzed
- 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
- UG/L - Micrograms per liter

Appendix F

Data Validation Reports

February 2009

LEAD
USEPA Region III - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry001

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: April 19, 2009

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	BT11-87SS03-0-1-0209	0902122-01	Soil
1MS	BT11-87SS03-0-1-0209MS	0902122-01MS	Soil
1MSD	BT11-87SS03-0-1-0209MSD	0902122-01MSD	Soil
2	BT11-87SS04-0-1-0209	0902122-02	Soil
3*	BT11-87SS04P-0-1-0209	0902122-03	Soil
4	BT11-87SS05-0-1-0209	0902122-04	Soil
5	BT11-87SS06-0-1-0209	0902122-05	Soil
6	BT11-EB021009	0902122-06	Water
7	BT11-FB021009	0902122-07	Water

* Sample ID was incorrect on Form I. The reviewer amended the Form I from "BT11-87SS04D-0-1-0209" to read "BT11-87SS04P-0-1-0209".

The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 180 days for lead.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-EB021009	None - ND	-	-	-	-
BT11-FB021009	None - ND	-	-	-	-

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike - The matrix spike sample exhibited acceptable %R values.

Matrix Duplicate - The matrix duplicate sample exhibited acceptable RPD values.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87SS04-0-1-0209 ug/kg	BT11-87SS04P-0-1-0209 ug/kg	RPD	Qualifier
Lead	28.3	157	139%	None

Compound Quantitation - No discrepancies were identified.

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87SS03-0-1-0209

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry001
Matrix (soil/water) SEDIMENT Lab Sample ID: 0902122-01
Level (low/med): LOW Date Received: 2/12/2009
Solids: 59.8
Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	8.4			P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

2

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87SS04-0-1-0209

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry001
Matrix (soil/water) SEDIMENT Lab Sample ID: 0902122-02
Level (low/med): LOW Date Received: 2/12/2009
Solids: 30.9
Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	28.3			P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

3

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO. *P* *M*

BT11-87SS041-0-1-020
9
END 3/17/09

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry001
Matrix (soil/water) SEDIMENT Lab Sample ID: 0902122-03
Level (low/med): LOW Date Received: 2/12/2009
Solids: 16.3
Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	157			P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

4

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87SS05-0-1-0209

Lab Name: Empirical Laboratories Contract: CH2M Hill
 Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry001
 Matrix (soil/water) SEDIMENT Lab Sample ID: 0902122-04
 Level (low/med): LOW Date Received: 2/12/2009
 Solids: 24.7
 Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	653			P

Color Before: _____ Clarity Before: _____ Texture: _____
 Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87SS06-0-1-0209

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry001

Matrix (soil/water) SEDIMENT Lab Sample ID: 0902122-05

Level (low/med): LOW Date Received: 2/12/2009

Solids: 20.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	86.8			P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

6

USEPA - CLP
IA-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-EB021009

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry001
Matrix (soil/water) WATER Lab Sample ID: 0902122-06
Level (low/med): LOW Date Received: 2/12/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP
IA-IN
INORGANIC ANALYSIS DATA SHEET

7

EPA SAMPLE NO.

BT11-FB021009

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry001
Matrix (soil/water) WATER Lab Sample ID: 0902122-07
Level (low/med): LOW Date Received: 2/12/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

4-METHYLPHENOL
USEPA Region III - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry001

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: April 19, 2009

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	BT11-87SS03-0-1-0209	0902122-01	Soil
1MS	BT11-87SS03-0-1-0209MS	0902122-01MS	Soil
1MSD	BT11-87SS03-0-1-0209MSD	0902122-01MSD	Soil
2	BT11-87SS04-0-1-0209	0902122-02	Soil
3*	BT11-87SS04P-0-1-0209	0902122-03	Soil
4	BT11-87SS05-0-1-0209	0902122-04	Soil
5	BT11-87SS06-0-1-0209	0902122-05	Soil
6	BT11-EB021009	0902122-06	Water
7	BT11-FB021009	0902122-07	Water

* Sample ID was incorrect on Form I. The reviewer amended the Form I from "BT11-87SS04D-0-1-0209" to read "BT11-87SS04P-0-1-0209".

The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 7 days for water samples and 14 days for soil samples and analyzed within 40 days for all samples.

GC/MS Tuning - All of the DFTPP tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD sample exhibited acceptable %R and RPD values.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-EB021009	None - ND	-	-	-	-
BT11-FB021009	None - ND	-	-	-	-

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87SS04-0-1-0209 ug/kg	BT11-87SS04P-0-1-0209 ug/kg	RPD	Qualifier
None	ND	ND	-	-

Tentatively Identified Compounds (TICs) - TICs were not reported.

Compound Quantitation - No discrepancies were identified.

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87S
S03-0-1-0209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY001

Matrix: (soil/water) SOIL Lab Sample ID: 0902122-01

Sample wt/vol: 15.0 (g/mL) G Lab File ID: 0212201

% Moisture: 40 decanted: (Y/N) N Date Sampled: 02/10/09 09:45

Extraction: (SepF/Cont/Sonc/Soxh) SOXH Date Extracted: 02/16/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 02/17/09 09:26

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		
		MDL	(ug/L or ug/Kg) RL CONC	UG/KG Q
106-44-5-----	4-Methylphenol	44	220	U

FORM I SV

lew
4/19/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 2

BT11-87SS
04-0-1-0209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY001

Matrix: (soil/water) SOIL Lab Sample ID: 0902122-02

Sample wt/vol: 15.0 (g/mL) G Lab File ID: 0212202

% Moisture: 69 decanted: (Y/N) N Date Sampled: 02/10/09 10:10

Extraction: (SepF/Cont/Sonc/Soxh) SOXH Date Extracted: 02/16/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 02/17/09 10:06

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		
		MDL	(ug/L or ug/Kg) RL CONC	UG/KG Q
106-44-5-----	4-Methylphenol	86	430	U

aw
4/19/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

3

BT11-87SS
04P-0-1-0209
P

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY001

Matrix: (soil/water) SOIL Lab Sample ID: 0902122-03

Sample wt/vol: 15.0 (g/mL) G Lab File ID: 0212203

% Moisture: 84 decanted: (Y/N) N Date Sampled: 02/10/09 10:12

Extraction: (SepF/Cont/Sonc/Soxh) SOXH Date Extracted: 02/16/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 02/17/09 10:46

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/KG Q
		MDL	(ug/L or ug/Kg) RL CONC	
106-44-5-----4-Methylphenol		160	820	U

uw
4/19/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 4

BT11-87SS 05-0-1-0209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY001

Matrix: (soil/water) SOIL Lab Sample ID: 0902122-04

Sample wt/vol: 15.0 (g/mL) G Lab File ID: 0212204

% Moisture: 75 decanted: (Y/N) N Date Sampled: 02/10/09 10:20

Extraction: (SepF/Cont/Sonc/Soxh) SOXH Date Extracted: 02/16/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 02/17/09 11:26

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG		
		MDL	RL CONC	Q
106-44-5-----4-Methylphenol		110	540	U

luw
4/19/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

5

BT11-87SS 06-0-1-0209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY001

Matrix: (soil/water) SOIL Lab Sample ID: 0902122-05

Sample wt/vol: 15.0 (g/mL) G Lab File ID: 0212205

% Moisture: 79 decanted: (Y/N) N Date Sampled: 02/10/09 10:33

Extraction: (SepF/Cont/Sonc/Soxh) SOXH Date Extracted: 02/16/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 02/17/09 12:06

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		
		MDL	(ug/L or ug/Kg) RL CONC	UG/KG Q
106-44-5-----4-Methylphenol		130	640	U

bw
4/19/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-EB021009

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY001

Matrix: (soil/water) WATER Lab Sample ID: 0902122-06

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 0212206

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 02/10/09 12:00

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 02/17/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 02/17/09 19:00

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	(ug/L or RL	ug/Kg) CONC	
106-44-5-----4-Methylphenol		0.77	2.0		U

FORM I SV

lew
4/19/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 7

BT11-FB021009

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY001

Matrix: (soil/water) WATER Lab Sample ID: 0902122-07

Sample wt/vol: 900.0 (g/mL) ML Lab File ID: 0212207

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 02/10/09 12:20

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 02/17/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 02/17/09 19:39

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L		
		MDL	RL	CONC Q
106-44-5-----4-Methylphenol		0.86	2.2	U

mw
4/19/09

LEAD
(TOTAL & DISSOLVED)
USEPA Region III - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry002

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: April 18, 2009

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1T	BT11-87MW01-0209T	0902180-01T	Water
1D	BT11-87MW01-0209D	0902180-01D	Water
2T	BT11-87MW02-0209T	0902180-02T	Water
2D	BT11-87MW02-0209D	0902180-02D	Water
3T	BT11-87MW03-0209T	0902180-03T	Water
3D	BT11-87MW03-0209D	0902180-03D	Water
4T*	BT11-87MW03P-0209T	0902180-04T	Water
4D*	BT11-87MW03P-0209D	0902180-04D	Water
5T	BT11-87FB170209T	0902180-05T	Water
6D	BT11-87EB170209D	0902180-06D	Water

* Sample ID was incorrect on Form I. The reviewer amended the Form I from "BT11-87MW03C-0209" to read "BT11-87MW03P-0209".

The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 180 days.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited the following contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-87FB170209T	None - ND	-	-	-	-
BT11-87EB17209D	None - ND	-	-	-	-

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike - The matrix spike sample exhibited acceptable %R values.

Matrix Duplicate - The matrix duplicate sample exhibited acceptable RPD values.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87MW03-0209T ug/L	BT11-87MW03P-0209T ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound	BT11-87MW03-0209D ug/L	BT11-87MW03P-0209D ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound Quantitation - No discrepancies were identified.

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USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW01-0209

Lab Name: Empirical Laboratories Contract: CH2M Hill
 Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002
 Matrix (soil/water): WATER Lab Sample ID: 0902180-01
 Level (low/med): LOW Date Received: 2/19/2009
 Solids: 0.0
 Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	20.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
 Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW01-0209Solub
die

SMO 3/25/09

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002

Matrix (soil/water): WATER Lab Sample ID: 0902180-01Soluble

Level (low/med): LOW Date Received: 2/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	20.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW02-0209

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002

Matrix (soil/water): WATER Lab Sample ID: 0902180-02

Level (low/med): LOW Date Received: 2/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	20.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW02-0209Soluble
ble

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002

Matrix (soil/water): WATER Lab Sample ID: 0902180-02Soluble

Level (low/med): LOW Date Received: 2/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	20.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03-0209

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002

Matrix (soil/water): WATER Lab Sample ID: 0902180-03

Level (low/med): LOW Date Received: 2/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	20.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

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EPA SAMPLE NO.

BT11-87MW03-0209Soluble
5/12/09

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002
Matrix (soil/water): WATER Lab Sample ID: 0902180-03Soluble
Level (low/med): LOW Date Received: 2/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	20.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW030-0209
P

Lab Name: Empirical Laboratories Contract: CH2M Hill (M)

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002

Matrix (soil/water): WATER Lab Sample ID: 0902180-04

Level (low/med): LOW Date Received: 2/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	20.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03-0209Sol
uble

5/20/2009 (M)

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002
Matrix (soil/water): WATER Lab Sample ID: 0902180-04Soluble
Level (low/med): LOW Date Received: 2/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	20.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87FB170209

Lab Name: Empirical Laboratories Contract: CH2M Hill
 Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002
 Matrix (soil/water): WATER Lab Sample ID: 0902180-05
 Level (low/med): LOW Date Received: 2/19/2009
 Solids: 0.0
 Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	10.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
 Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87EB170209Solub
le

one 3/25/09

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry002

Matrix (soil/water): WATER Lab Sample ID: 0902180-06Soluble

Level (low/med): LOW Date Received: 2/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	10.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

4-METHYLPHENOL
USEPA Region III - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry002

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: April 18, 2009

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	BT11-87MW01-0209	0902180-01	Water
1MS	BT11-87MW01-0209MS	0902180-01MS	Water
1MSD	BT11-87MW01-0209MSD	0902180-01MSD	Water
2	BT11-87MW02-0209	0902180-02	Water
3	BT11-87MW03-0209	0902180-03	Water
4*	BT11-87MW03P-0209	0902180-04	Water
5	BT11-87FB170209	0902180-05	Water
6	BT11-87EB170209	0902180-06	Water

* Sample ID was incorrect on Form I. The reviewer amended the Form I from "BT11-87MW03C-0209" to read "BT11-87MW03P-0209".

The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 7 days for water samples and 14 days for soil samples and analyzed within 40 days for all samples.

GC/MS Tuning - All of the DFTPP tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values.

Surrogates - All samples exhibited acceptable surrogate recoveries except the following.

Sample ID	Surrogate	%R	Qualifier
3	Phenol-d6	12%	None for 1 out
5	2,4,6-Tribromophenol	37%	None for 1 out

MS/MSD - The MS/MSD sample exhibited acceptable %R and RPD values.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-87FB170209	None - ND	-	-	-	-
BT11-87EB170209	None - ND	-	-	-	-

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87MW03-0209 ug/L	BT11-87MW03P-0209 ug/L	RPD	Qualifier
None	ND	ND	-	-

Tentatively Identified Compounds (TICs) - TICs were not reported.

Compound Quantitation - No discrepancies were identified.

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W01-0209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY002

Matrix: (soil/water) WATER Lab Sample ID: 0902180-01

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 0218001

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 02/17/09 09:05

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 02/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 03/07/09 02:00

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
106-44-5-----	4-Methylphenol	0.77	2.0		U

FORM I SV

low
4/18/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 2

BT11-87M W02-0209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY002

Matrix: (soil/water) WATER Lab Sample ID: 0902180-02

Sample wt/vol: 850.0 (g/mL) ML Lab File ID: 0218002

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 02/17/09 11:00

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 02/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 03/07/09 02:37

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L CONC	UG/L Q
		MDL	(ug/L or ug/Kg) RL		

106-44-5-----4-Methylphenol		0.90	2.4		U
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FORM I SV

lv
4/18/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W03-0209

3

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY002

Matrix: (soil/water) WATER Lab Sample ID: 0902180-03

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 0218003

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 02/17/09 12:20

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 02/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 03/07/09 03:15

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L CONC	UG/L Q
		MDL	(ug/L or ug/Kg) RL		
106-44-5-----	4-Methylphenol	0.77	2.0		U

FORM I SV

low
4/18/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

4

BT11-87M
W030-0209
e
M

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY002

Matrix: (soil/water) WATER Lab Sample ID: 0902180-04

Sample wt/vol: 900.0 (g/mL) ML Lab File ID: 0218004

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 02/17/09 12:30

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 02/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 03/07/09 03:53

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	(ug/L or ug/Kg) RL CONC		
106-44-5-----	4-Methylphenol	0.86	2.2		U

luw
4/18/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 5

BT11-87FB170209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY002

Matrix: (soil/water) WATER Lab Sample ID: 0902180-05

Sample wt/vol: 1065 (g/mL) ML Lab File ID: 0218005

% Moisture: _____ decanted: (Y/N) ___ Date Sampled: 02/17/09 13:30

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 02/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 03/07/09 04:31

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	(ug/L or ug/Kg) RL CONC	UG/L	
106-44-5-----	4-Methylphenol	0.72	1.9		U

FORM I SV

lw
4/18/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 6

BT11-87EB170209

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY002

Matrix: (soil/water) WATER Lab Sample ID: 0902180-06

Sample wt/vol: 1060 (g/mL) ML Lab File ID: 0218006

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 02/17/09 13:45

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 02/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 03/07/09 05:10

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
106-44-5-----4-Methylphenol		0.73	1.9		U

aw
4/18/09

May 2009

LEAD
(TOTAL & DISSOLVED)
USEPA Region IV - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry003

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: July 1, 2009

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1T	BT11-87MW01-0509T	0905165-01T	Water
1TMS	BT11-87MW01-0509TMS	0905165-01TMS	Water
1TMSD	BT11-87MW01-0509TMSD	0905165-01TMSD	Water
1D	BT11-87MW01-0509D	0905165-01D	Water
1DMS	BT11-87MW01-0509DMS	0905165-01DMS	Water
1DMSD	BT11-87MW01-0509DMSD	0905165-01DMSD	Water
2T	BT11-87MW03-0509T	0905165-02T	Water
2D	BT11-87MW03-0509D	0905165-02D	Water
3T	BT11-87MW02-0509T	0905165-03T	Water
3D	BT11-87MW02-0509D	0905165-03D	Water
4T	BT11-87-FB051809T	0905165-04T	Water
4D	BT11-87-FB051809D	0905165-04D	Water
5T	BT11-87-EB051809T	0905165-05T	Water
5D	BT11-87-EB051809D	0905165-05D	Water
6T	BT11-87MW03P-0509T	0905165-06T	Water
6D	BT11-87MW03P-0509D	0905165-06D	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 180 days.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks were non-detect.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-87-EB051809 (T&D)	None - ND	-	-	-	-
BT11-87-FB051809 (T&D)	None - ND	-	-	-	-

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike - The matrix spike sample exhibited acceptable %R values.

Matrix Duplicate - The matrix duplicate sample exhibited acceptable RPD values.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87MW03-0509T ug/L	BT11-87MW03P-0509T ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound	BT11-87MW03-0509D ug/L	BT11-87MW03P-0509D ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound Quantitation - No discrepancies were identified.

17

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW01-0509

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): GROUND WATER Lab Sample ID: 0905165-01

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	4.4			P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

1D

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW01-0509Solu
b1~

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): GROUND WATER Lab Sample ID: 0905165-01Soluble

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

2T

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03-0509

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): GROUND WATER Lab Sample ID: 0905165-02

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

Form IA-IN *lew*
7/1/09

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03-0509Solub
L1 -

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): GROUND WATER Lab Sample ID: 0905165-02Soluble

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

3+

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW02-0509

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): GROUND WATER Lab Sample ID: 0905165-03

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW02-0509Solu

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): GROUND WATER Lab Sample ID: 0905165-03Soluble

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

4T

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87-FB051809

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): WATER Lab Sample ID: 0905165-04

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

lew
7/1/09

40

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87-FB051809Solu
b1-

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): WATER Lab Sample ID: 0905165-04Soluble

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

5T

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87-EB051809

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): WATER Lab Sample ID: 0905165-05

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

5D

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87-EB051809Solub
11-

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003
Matrix (soil/water): WATER Lab Sample ID: 0905165-05Soluble
Level (low/med): LOW Date Received: 5/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

6T

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03P-0509

Lab Name: Empirical Laboratories Contract: CH2M Hill

Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003

Matrix (soil/water): GROUND WATER Lab Sample ID: 0905165-06

Level (low/med): LOW Date Received: 5/19/2009

Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

6D

EPA SAMPLE NO.

BT11-87MW03P-0509Sol

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry003
Matrix (soil/water): GROUND WATER Lab Sample ID: 0905165-06Soluble
Level (low/med): LOW Date Received: 5/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

mw
7/1/09

4-METHYLPHENOL
USEPA Region IV - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry003

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: July 1, 2009

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	BT11-87MW01-0509	0905165-01	Water
1MS	BT11-87MW01-0509MS	0905165-01MS	Water
1MSD	BT11-87MW01-0509MSD	0905165-01MSD	Water
2	BT11-87MW03-0509	0905165-02	Water
3	BT11-87MW02-0509	0905165-03	Water
4	BT11-87-FB051809	0905165-04	Water
5	BT11-87-EB051809	0905165-05	Water
6	BT11-87MW03P-0509	0905165-06	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Organic Data Review," October 1999, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days for all samples.

GC/MS Tuning - All of the DFTPP tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values.

Surrogates - All samples exhibited acceptable surrogate recoveries except the following.

Sample ID	Surrogate	%R	Qualifier
3	Phenol-d6	14%	None for 1 out

MS/MSD - The MS/MSD sample exhibited acceptable %R and RPD values.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-87FB051809	None - ND	-	-	-	-
BT11-87EB051809	None - ND	-	-	-	-

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87MW03-0509 ug/L	BT11-87MW03P-0509 ug/L	RPD	Qualifier
None	ND	ND	-	-

Tentatively Identified Compounds (TICs) - TICs were not reported.

Compound Quantitation - No discrepancies were identified.

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M W01-0509

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: Cherry003

Matrix: (soil/water) WATER Lab Sample ID: 0905165-01

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 0516501

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 05/18/09 09:15

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 05/20/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 05/23/09 04:37

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
106-44-5-----4-Methylphenol		0.77	2.0		U

uw
7/1/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

2

BT11-87M W03-0509

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: Cherry003

Matrix: (soil/water) WATER Lab Sample ID: 0905165-02

Sample wt/vol: 900.0 (g/mL) ML Lab File ID: 0516502

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 05/18/09 10:45

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 05/20/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 05/23/09 05:18

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L		
		MDL	RL	CONC Q

106-44-5-----4-Methylphenol	0.86	2.2		U
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FORM I SV

MW
7/1/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

3

BT11-87M
W02-0509

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: Cherry003

Matrix: (soil/water) WATER Lab Sample ID: 0905165-03

Sample wt/vol: 1020 (g/mL) ML Lab File ID: 0516503

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 05/18/09 12:10

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 05/20/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 05/23/09 05:58

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO. COMPOUND CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L
MDL RL CONC Q

CAS NO.	COMPOUND	MDL	RL	CONC	Q
106-44-5-----	4-Methylphenol	0.75	2.0		U

FORM I SV

Low
7/1/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

4

BT11-87- FB051809

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: Cherry003

Matrix: (soil/water) WATER Lab Sample ID: 0905165-04

Sample wt/vol: 1080 (g/mL) ML Lab File ID: 0516504

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 05/18/09 14:00

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 05/20/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 05/23/09 08:56

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L CONC	UG/L Q
		MDL	(ug/L or ug/Kg) RL		

106-44-5-----4-Methylphenol		0.71	1.8		U
-----------------------------	--	------	-----	--	---

rw
7/1/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO. 5

BT11-87-
EB051809

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: Cherry003

Matrix: (soil/water) WATER Lab Sample ID: 0905165-05

Sample wt/vol: 1070 (g/mL) ML Lab File ID: 0516505

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 05/18/09 14:15

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 05/20/09

Concentrated Extract Volume: 1000.0(uL) Date Analyzed: 05/23/09 09:36

Injection Volume: 0.5(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO. COMPOUND CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L
MDL RL CONC Q

CAS NO.	COMPOUND	MDL	RL	CONC	Q
106-44-5-----	4-Methylphenol	0.72	1.9		U

FORM I SV

uw
7/1/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

6

BT11-87M W03P-0509

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: Cherry003

Matrix: (soil/water) WATER Lab Sample ID: 0905165-06

Sample wt/vol: 900.0 (g/mL) ML Lab File ID: 0516506

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 05/18/09 10:50

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 05/20/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 05/23/09 10:17

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	(ug/L or ug/Kg) RL CONC	UG/L	
106-44-5-----4-Methylphenol		0.86	2.2		U

lew
7/1/09

August 2009

LEAD
(TOTAL & DISSOLVED)
USEPA Region IV - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry004

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: October 15, 2009

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1T	BT11-87MW01-0809T	0908136-01T	Water
1D	BT11-87MW01-0809D	0908136-01D	Water
2T	BT11-87MW02-0809T	0908136-02T	Water
2D	BT11-87MW02-0809D	0908136-02D	Water
3T	BT11-87MW03-0809T	0908136-03T	Water
3D	BT11-87MW03-0809D	0908136-03D	Water
4T	BT11-87MW03P-1809T	0908136-04T	Water
4D	BT11-87MW03P-1809D	0908136-04D	Water
5T	BT11-87FB-081809T	0908136-05T	Water
6T	BT11-87EB-081809T	0908136-06T	Water
6D	BT11-87EB-081809D	0908136-06D	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 180 days.

Calibration - The ICV and CCV %R values were acceptable except the following.

CCAL	Compound	%RSD/RRF	Qualifier	Affected Samples
CCV	Lead	86.4%/87.1%	J/UJ	5, 6

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks were non-detect.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-87EB-081809 (T&D)	None - ND	-	-	-	-
BT11-87EB-081809T	None - ND	-	-	-	-

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike - Matrix spike samples were not included in this data package.

Matrix Duplicate - Matrix duplicate samples were not included in this data package.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87MW03-0809T ug/L	BT11-87MW03P-0809T ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound	BT11-87MW03-0809D ug/L	BT11-87MW03P-0809D ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound Quantitation - No discrepancies were identified.

USEPA - CLP
IA-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW01-0809

Lab Name: Empirical Laboratories Contract: CH2M Hill
 Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
 Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-01
 Level (low/med): LOW Date Received: 8/19/2009
 Solids: 0.0
 Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	8.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
 Color After: _____ Clarity After: _____ Artifacts: _____

Comments: MDL and RL increased due to negative bias.

IF

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW01-0809Solu
b12

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-01Soluble
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	6.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: MDL increased due to negative bias.

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW02-0809

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-02
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	6.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: MDL increased due to negative bias.

MW
10/15/09

USEPA - CLP
IA-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW02-0809Solub
412

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATE Lab Sample ID: 0908136-02Soluble
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	6.2	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: MDL and RL increased due to negative bias.

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03-0809

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-03
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	7.2	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: MDL and RL increased due to negative bias.

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03-0809Solub
L1-

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-03Soluble
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	9.2	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: MDL and RL increased due to negative bias.

4

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03P-0809

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-04
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	7.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: MDL and RL increased due to negative bias.

4F

USEPA - CLP
IA-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87MW03P-0809Sol
..L..

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATE Lab Sample ID: 0908136-04Soluble
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	6.4	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: MDL and RL increased due to negative bias.

5

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87FB-081809

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-05
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	<input checked="" type="checkbox"/>	<u>UJ</u>	<u>P</u>

ech

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

6

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87EB-081809

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-06
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	P	<u>UJ</u>	P

CCH

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

6F

USEPA - CLP
1A-IN
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

BT11-87EB-081809Solu
L1-

Lab Name: Empirical Laboratories Contract: CH2M Hill
Lab Code: _____ Case No.: _____ NRAS No.: _____ SDG NO.: Cherry004
Matrix (soil/water): GROUND WATER Lab Sample ID: 0908136-06Soluble
Level (low/med): LOW Date Received: 8/19/2009
Solids: 0.0
Concentration Units (ug/L or mg/kg dry weight): _____ UG/L

CAS No.	Analyte	Concentration	C	Q	M
7439-92-1	Lead	3.0	U		P

Color Before: _____ Clarity Before: _____ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

4-METHYLPHENOL
USEPA Region IV - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry004

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: October 15, 2009

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	BT11-87MW01-0809	0908136-01	Water
1MS	BT11-87MW01-0809MS	0908136-01MS	Water
1MSD	BT11-87MW01-0809MSD	0908136-01MSD	Water
2	BT11-87MW02-0809	0908136-02	Water
3	BT11-87MW03-0809	0908136-03	Water
4	BT11-87MW03P-0809	0908136-04	Water
5	BT11-87FB-081809	0908136-05	Water
6	BT11-87EB-081809	0908136-06	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Organic Data Review," October 1999, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days for all samples.

GC/MS Tuning - All of the DFTPP tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD sample exhibited acceptable %R and RPD values.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-87FB-081809	None - ND	-	-	-	-
BT11-87EB-081809	None - ND	-	-	-	-

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87MW03-0809 ug/L	BT11-87MW03P-0809 ug/L	RPD	Qualifier
None	ND	ND	-	-

Tentatively Identified Compounds (TICs) - TICs were not reported.

Compound Quantitation - No discrepancies were identified.

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W01-0809

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY004

Matrix: (soil/water) WATER Lab Sample ID: 0908136-01

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 0813601

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 08/18/09 09:05

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 08/21/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 08/25/09 02:19

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	(ug/L or RL	ug/Kg) CONC	
106-44-5-----	4-Methylphenol	0.77	2.0		U

FORM I SV

lew
10/15/09

2

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W02-0809

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY004

Matrix: (soil/water) WATER Lab Sample ID: 0908136-02

Sample wt/vol: 900.0 (g/mL) ML Lab File ID: 0813602

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 08/18/09 10:30

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 08/21/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 08/25/09 02:55

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L Q
		MDL	(ug/L or ug/Kg) RL CONC	
106-44-5-----	4-Methylphenol	0.86	2.2	U

FORM I SV

NW
10/15/09

3

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W03-0809

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY004

Matrix: (soil/water) WATER Lab Sample ID: 0908136-03

Sample wt/vol: 900.0 (g/mL) ML Lab File ID: 0813603

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 08/18/09 10:50

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 08/21/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 08/25/09 03:31

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L Q
		MDL	(ug/L or ug/Kg) RL CONC	
106-44-5-----	4-Methylphenol	0.86	2.2	U

FORM I SV

hw
10/15/09

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W03P-0809

Lab Name: EMPIRICAL LABS Contract: CH2MHILL
 Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY004
 Matrix: (soil/water) WATER Lab Sample ID: 0908136-04
 Sample wt/vol: 1000 (g/mL) ML Lab File ID: 0813604
 % Moisture: _____ decanted: (Y/N) _____ Date Sampled: 08/18/09 10:55
 Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 08/21/09
 Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 08/25/09 04:08
 Injection Volume: 0.5 (uL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	(ug/L or ug/Kg) RL	CONC	
106-44-5-----	4-Methylphenol	0.77	2.0		U

FORM I SV

hw
10/15/09

5

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87F
B-081809

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY004

Matrix: (soil/water) WATER Lab Sample ID: 0908136-05

Sample wt/vol: 1060 (g/mL) ML Lab File ID: 0813605

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 08/18/09 11:10

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 08/21/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 08/25/09 04:44

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L Q
		MDL	(ug/L or ug/Kg) RL CONC	
106-44-5-----	4-Methylphenol	0.73	1.9	U

FORM I SV

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10/15/09

6

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87E
B-081809

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY004

Matrix: (soil/water) WATER Lab Sample ID: 0908136-06

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 0813606

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 08/18/09 13:30

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 08/21/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 08/25/09 05:21

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
106-44-5-----	4-Methylphenol	0.77	2.0		U

FORM I SV

llw
10/15/09

November 2009

TOTAL & DISSOLVED LEAD
USEPA Region IV - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry005

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 14, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1T	BT11-87MW01-1109	0911197-01	Water
1D	BT11-87MW01-1109	0911197-02	Water
2T	BT11-87MW02-1109	0911197-03	Water
2D	BT11-87MW02-1109	0911197-04	Water
3T	BT11-87MW03-1109	0911197-05	Water
3D	BT11-87MW03-1109	0911197-06	Water
4T	BT11-87MW03P-1109	0911197-07	Water
4D	BT11-87MW03P-1109	0911197-08	Water
5T	BT11-87EB112009	0911197-09	Water
5D	BT11-87EB112009	0911197-10	Water
6T	BT11-87FB112009	0911197-11	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," October 2004, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were prepared and analyzed within 180 days.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values.

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited the following contamination.

Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
Lead	1.77	8.85	None	See EBs

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-87EB112009T	Lead	3.67	18.35	U	2T
BT11-87EB112009D	Lead	4.54	22.70	None	See EB
BT11-87FB112009T	Lead	2.91	14.55	None	See EBs

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike/Matrix Spike Duplicate - According to the case narrative, matrix spikes were not reportable due to high concentrations of salts in the matrix which caused interference.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilution - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87MW03-1109T ug/L	BT11-87MW03P-1109T ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound	BT11-87MW03-1109D ug/L	BT11-87MW03P-1109D ug/L	RPD	Qualifier
None	ND	ND	-	-

Compound Quantitation - No discrepancies were identified.

ANALYSIS DATA SHEET

BT11-87MW01-1109

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Ground Water
 Sampled: 11/20/09 09:35
 % Solids: 0.00

SDG: CHERRY005
 Project: Cherry Point CTO-207
 Laboratory ID: 0911197-01
 Received: 11/21/09 10:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead		3.00	6.00	2	U	SW6010B	9L01001	12/03/09 13:58

ANALYSIS DATA SHEET

10

BT11-87MW01-1109

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Ground Water
 Sampled: 11/20/09 09:35
 % Solids: 0.00

SDG: CHERRY005
 Project: Cherry Point CTO-207
 Laboratory ID: 0911197-02
 Received: 11/21/09 10:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead (dissolved)		3.00	6.00	2	U	SW6010B	9L01001	12/03/09 14:08

*Let
2/14/10*

ANALYSIS DATA SHEET

2T

BT11-87MW02-1109

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Ground Water
 Sampled: 11/20/09 09:40
 % Solids: 0.00

SDG: CHERRY005
 Project: Cherry Point CTO-207
 Laboratory ID: 0911197-03
 Received: 11/21/09 10:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead	3.15 0.05	3.00	6.00	2	3.15 0.05	SW6010B	9L01001	12/03/09 14:17

EFL

W
2/14/10

20

ANALYSIS DATA SHEET

BT11-87MW02-1109

Laboratory: Empirical Laboratories, LLC

SDG: CHERRY005

Client: CH2M Hill, Inc.

Project: Cherry Point CTO-207

Matrix: Ground Water

Laboratory ID: 0911197-04

Sampled: 11/20/09 09:40

Received: 11/21/09 10:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead (dissolved)		3.00	6.00	2	U	SW6010B	9L01001	12/03/09 14:22

Handwritten signature and date: 2/14/10

3T

ANALYSIS DATA SHEET

BT11-87MW03-1109

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Ground Water
 Sampled: 11/20/09 09:45
 % Solids: 0.00

SDG: CHERRY005
 Project: Cherry Point CTO-207
 Laboratory ID: 0911197-05
 Received: 11/21/09 10:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead		3.00	6.00	2	U	SW6010B	9L01001	12/03/09 14:27

llw
2/14/10

3D

ANALYSIS DATA SHEET

BT11-87MW03-1109

Laboratory: Empirical Laboratories, LLC

SDG: CHERRY005

Client: CH2M Hill, Inc.

Project: Cherry Point CTO-207

Matrix: Ground Water

Laboratory ID: 0911197-06

Sampled: 11/20/09 09:45

Received: 11/21/09 10:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead (dissolved)		3.00	6.00	2	U	SW6010B	9L01001	12/03/09 14:31

4x

ANALYSIS DATA SHEET

BT11-87MW03P-1109

Laboratory: Empirical Laboratories, LLC

SDG: CHERRY005

Client: CH2M Hill, Inc.

Project: Cherry Point CTO-207

Matrix: Ground Water

Laboratory ID: 0911197-07

Sampled: 11/20/09 09:50

Received: 11/21/09 10:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead		6.00	6.00	2	U	SW6010B	9L01001	12/03/09 14:36

Lead
2/14/10

40

ANALYSIS DATA SHEET

BT11-87MW03P-1109

Laboratory: Empirical Laboratories, LLC

SDG: CHERRY005

Client: CH2M Hill, Inc.

Project: Cherry Point CTO-207

Matrix: Ground Water

Laboratory ID: 0911197-08

Sampled: 11/20/09 09:50

Received: 11/21/09 10:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead (dissolved)		3.00	6.00	2	U	SW6010B	9L01001	12/03/09 14:41

5r

ANALYSIS DATA SHEET

BT11-87EB112009

Laboratory: Empirical Laboratories, LLC

SDG: CHERRY005

Client: CH2M Hill, Inc.

Project: Cherry Point CTO-207

Matrix: Water

Laboratory ID: 0911197-09

Sampled: 11/20/09 10:30

Received: 11/21/09 10:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead	3.67	1.50	3.00	1		SW6010B	9L01001	12/02/09 18:08

5D

ANALYSIS DATA SHEET

BT11-87EB112009

Laboratory: Empirical Laboratories, LLC

SDG: CHERRY005

Client: CH2M Hill, Inc.

Project: Cherry Point CTO-207

Matrix: Water

Laboratory ID: 0911197-10

Sampled: 11/20/09 10:30

Received: 11/21/09 10:45

% Solids: 0.00

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead (dissolved)	4.54	1.50	3.00	1		SW6010B	9L01001	12/02/09 18:12

lew
2/14/10

ANALYSIS DATA SHEET

6T

BT11-87FB112009

Laboratory: Empirical Laboratories, LLC
 Client: CH2M Hill, Inc.
 Matrix: Water
 Sampled: 11/20/09 11:00
 % Solids: 0.00

SDG: CHERRY005
 Project: Cherry Point CTO-207
 Laboratory ID: 0911197-11
 Received: 11/21/09 10:45

CAS NO.	Analyte	Concentration (ug/L)	MDL	RL	Dilution Factor	Q	Method	Batch	Analyzed
7439-92-1	Lead	2.91	1.50	3.00	1	J	SW6010B	9L01001	12/02/09 18:31

4-METHYLPHENOL
USEPA Region IV - Level IV Review

Site: MCAS Cherry Point, CTO-207 SDG #: Cherry005

Client: CH2M HILL, Inc., Virginia Beach, Virginia Date: February 14, 2010

Laboratory: Empirical Laboratories, Nashville, Tennessee Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	BT11-87MW01-1109	0911197-01	Water
1MS	BT11-87MW01-1109MS	0911197-01MS	Water
1MSD	BT11-87MW01-1109MSD	0911197-01MSD	Water
2	BT11-87MW02-1109	0911197-03	Water
3	BT11-87MW03-1109	0911197-05	Water
4	BT11-87MW03P-1109	0911197-07	Water
5	BT11-87EB112009	0911197-09	Water
6	BT11-87FB112009	0911197-11	Water

The USEPA "Contract Laboratory Program National Functional Guidelines for Organic Data Review," October 1999, and professional judgement were used in evaluating the data in this summary report.

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days for all samples.

GC/MS Tuning - All of the DFTPP tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values.

Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD sample exhibited acceptable %R and RPD values.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks were free of contamination.

Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
BT11-87FB112009	None - ND	-	-	-	-
BT11-87EB112009	None - ND	-	-	-	-

Field Duplicates - Field duplicate results are summarized below.

Compound	BT11-87MW03-1109 ug/L	BT11-87MW03P-1109 ug/L	RPD	Qualifier
None	ND	ND	-	-

Tentatively Identified Compounds (TICs) - TICs were not reported.

Compound Quantitation - No discrepancies were identified.

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W01-1109

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY005

Matrix: (soil/water) WATER Lab Sample ID: 0911197-01

Sample wt/vol: 1020 (g/mL) ML Lab File ID: 1119701

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/20/09 09:35

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 11/30/09 10:31

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
106-44-5-----	4-Methylphenol	0.75	2.0		U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W02-1109

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY005

Matrix: (soil/water) WATER Lab Sample ID: 0911197-03

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 1119703

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/20/09 09:40

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 11/30/09 11:07

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
106-44-5-----	4-Methylphenol_____	0.77	2.0		U

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FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W03-1109

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY005

Matrix: (soil/water) WATER Lab Sample ID: 0911197-05

Sample wt/vol: 950.0 (g/mL) ML Lab File ID: 1119705

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/20/09 09:45

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 11/30/09 11:42

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L Q
		MDL	(ug/L or ug/Kg) RL CONC	
106-44-5-----	4-Methylphenol	0.81	2.1	U

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4

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87M
W03P-1109

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY005

Matrix: (soil/water) WATER Lab Sample ID: 0911197-07

Sample wt/vol: 1000 (g/mL) ML Lab File ID: 1119707

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/20/09 09:50

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 11/30/09 12:18

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)			UG/L Q
		MDL	RL	CONC	
106-44-5-----4-Methylphenol		0.77	2.0		U

FORM I SV

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5

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87EB112009

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY005

Matrix: (soil/water) WATER Lab Sample ID: 0911197-09

Sample wt/vol: 1040 (g/mL) ML Lab File ID: 1119709

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/20/09 10:30

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 11/30/09 12:54

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:			UG/L Q
		MDL	(ug/L or ug/Kg) RL	CONC	
106-44-5-----4-Methylphenol		0.74	1.9		U

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2/14/10

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

BT11-87FB112009

Lab Name: EMPIRICAL LABS Contract: CH2MHILL

Lab Code: NA Case No.: NA SAS No.: NA SDG No.: CHERRY005

Matrix: (soil/water) WATER Lab Sample ID: 0911197-11

Sample wt/vol: 1020 (g/mL) ML Lab File ID: 1119711

% Moisture: _____ decanted: (Y/N) _____ Date Sampled: 11/20/09 11:00

Extraction: (SepF/Cont/Sonc/Soxh) SEPF Date Extracted: 11/24/09

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 11/30/09 13:29

Injection Volume: 0.5 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: NA

CAS NO.	COMPOUND	CONCENTRATION UNITS:		UG/L Q
		MDL	(ug/L or ug/Kg) RL CONC	
106-44-5-----4-Methylphenol		0.75	2.0	U

FORM I SV

llw
2/14/10

Appendix B
Final Corrective Action Plan, Point of Marsh
BT-11, Site 87, February 2012

Final

**Corrective Action Plan
Point of Marsh BT-11, Site 87**

**Marine Corps Air Station
Cherry Point, North Carolina**

Contract Task Order 0207

February 2012

Prepared for

**Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic**

Under the

**NAVFAC CLEAN III Program
Contract N62470-02-D-3052**

Prepared by



CH2MHILL

Virginia Beach, Virginia

Executive Summary

This Corrective Action Plan (CAP) for Site 87, Point of Marsh Bombing Target 11 (BT-11) was prepared by CH2M HILL under the Naval Facilities Engineering Command (NAVFAC), Atlantic Division, Comprehensive Long-term Environmental Action Navy (CLEAN) III Contract N62470-02-D-3052, Contract Task Order 0207. A Site Investigation (SI) was completed for BT-11 (CH2M HILL, 2007a), which determined that no further action was required at BT-11 Sites I-32 and 88 because no contaminants of concern (COCs) were identified for these sites. No further action was also warranted for Site 89 because the site is currently an active range. Analytical results of the BT-11 SI at Site 87 indicated that lead and 4-methylphenol in soil exceeded screening criteria. In order to address the potential lead and 4-methylphenol contamination found at Site 87, a site-specific SI was conducted at Site 87. Results of the Site 87 SI indicated that lead in only one surface soil sample exceeded screening criteria. In the Site 87 SI Report, it was recommended that the Draft CAP (prepared previously in April 2007 following the BT-11 SI) be finalized for Site 87, to address lead found in soil at the site (CH2M HILL, 2011). Therefore, this CAP focuses on Site 87 at BT-11.

Source Information

Site 87 refers to a waste disposal area located approximately ¼-mile northwest of Building 9037, on the northeast side of Main Road. This site is approximately 20 feet (ft) by 20 ft in area and is predominately marshy, except for an area immediately adjacent to the Main Road, which is slightly elevated relative to the Site.

According to facility personnel, Site 87 originated when a bulldozer attempted to excavate a pit for a dump site. Instead, the bulldozer sank into the marsh and had to be pulled out. The depression formed by the stuck bulldozer was then used as a disposal pit. The waste materials reported to have been disposed of in this depression included batteries and motor oils.

Previous Investigations

An SI was conducted at BT-11 in 1999-2000 that included investigation activities at Sites I-32, 87, 88 and 89. At each of the four sites, the investigation activities consisted of:

- Collection of soil or sediment samples for chemical analysis and lithologic description
- Installation of temporary monitoring wells
- Collection of groundwater samples from temporary monitoring wells

Based on the results from the initial BT-11 SI activities, additional investigations were conducted in April 2004, September 2005, and October 2006. Analytical results of the BT-11 SI indicated that no constituents of concern (COCs) exist at Sites I-32 and 88, and no further action was warranted. While results of the BT-11 SI indicated that several compounds were detected at Site 89 that may require action under a CAP (chromium, lead, and vanadium), this site is part of an active range and does not require action at the current time.

Analytical results of the BT-11 SI at Site 87 indicated that lead in one of two soil samples (498 milligrams per kilogram [mg/kg]) and from the sediment sample collected beneath the standing water of the site depression (292 mg/kg) exceeded the North Carolina Soil Screening Level (NC SSL) (270 mg/kg) for the protection of groundwater. No lead was detected in any groundwater samples collected from temporary monitoring wells at Site 87. In addition, one SVOC, 4-methylphenol, exceeded the NC SSL (17.4 micrograms per kilogram [$\mu\text{g}/\text{kg}$]) in the two collected soil samples (both 330 $\mu\text{g}/\text{kg}$). No 4-methylphenol or any other SVOCs were detected in any of the groundwater samples.

In order to address potential lead and 4-methylphenol contamination found at Site 87 during the BT-11 SI, a site-specific SI was conducted at Site 87 in 2009 that included the collection of surface soil samples and periodic monitoring of groundwater for lead and 4-methylphenol. The conclusions from the Site 87 SI, as documented in the Final SI Report for Site 87 (CH2M HILL, 2011), were as follows:

- 4-Methylphenol was not detected in any of the surface soil or groundwater samples.
- Lead detected at surface soil sample location 87SS05 (653 mg/kg) exceeded the NC SSL (270 mg/kg) and the RSL for Residential Soil (400 mg/kg), but was below the RSL for Industrial Soil (800 mg/kg). The concentrations of lead detected in the remaining three surface soil samples at Site 87 were below the screening criteria.
- Lead was not detected above screening criteria in any of the groundwater samples during all 4 quarterly sampling rounds.

Based on these conclusions, it was recommended that the Draft CAP (prepared previously in April 2007) be finalized to address lead in soil at Site 87 using land use controls (LUCs) to eliminate or reduce pathways of exposure to soil and sediment at Site 87.

Proposed Corrective Action

Based on current site conditions, the proposed corrective action for Site 87 is implementation of LUCs.

The proposed schedule for implementation of the proposed corrective action is provided in Appendix A.

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A	Proposed Corrective Action Schedule
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Acronyms and Abbreviations

bgs	below ground surface
BT-11	Bombing Target 11
CAP	Corrective Action Plan
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	constituent of concern
EPA	United States Environmental Protection Agency
ft	feet/foot
ICP	inductively coupled plasma
IR	Installation Restoration
LUC	land use control
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
mg/kg	milligram per kilogram
NAVFAC	Naval Facilities Engineering Command
NC 2L	North Carolina groundwater quality standard
NC SSL	North Carolina soil screening level
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
RPM	Remedial Program Manager
SI	Site Investigation
SVOC	semivolatile organic compound
2xAB	two times the average background (concentration)
USGS	United States Geological Survey
VOC	volatile organic compound

SECTION 1

Introduction

This Corrective Action Plan (CAP) for Site 87, Point of Marsh Bombing Target 11 (BT-11) was prepared by CH2M HILL under the Naval Facilities Engineering Command (NAVFAC), Atlantic Division, Comprehensive Long-term Environmental Action Navy (CLEAN) III Contract N62470-02-D-3052, Contract Task Order 0207. This CAP was prepared in accordance with the North Carolina Administrative Code (NCAC), Title 15 Department of Environment and Natural Resources, Division of Water Quality, Subchapter 2L, Section .0106, for submittal to NAVFAC Mid-Atlantic, Marine Corps Air Station (MCAS) Cherry Point, and the North Carolina Department of Environment and Natural Resources (NCDENR).

BT-11 is affiliated with MCAS Cherry Point, North Carolina and consists of four sites: Site I-32, Site 87, Site 88, and Site 89. BT-11 is located on Piney Island, east of MCAS Cherry Point (**Figure 1-1**). A Site Investigation (SI) was completed for BT-11 (CH2M HILL, 2007a), which determined that no further action was required at Sites I-32 and 88 because no contaminants of concern (COCs) were identified for these sites. While results of the BT-11 SI indicated that several compounds were detected at Site 89 that may require action under a CAP, this site is part of an active range and does not currently require action. The BT-11 SI recommended that a CAP be completed for Site 87, due to lead found in soil at the site.

In April 2007, a Draft CAP was submitted to NCDENR that proposed a preferred alternative to address lead contamination in soil at Site 87 using land use controls (LUCs) to eliminate or reduce pathways of exposure to soil and sediment at Site 87 (CH2M HILL, 2007b). However, based on comments submitted by the NCDENR, the Navy and NCDENR agreed to proceed with a supplemental investigation to collect additional soil and groundwater samples at Site 87.

A supplemental SI was conducted for Site 87 from February 2009 to November 2009 that included collection of additional surface soil samples and periodic groundwater monitoring for analysis of lead and 4-methylphenol. Based on the results Site 87 SI (CH2M HILL, 2011), it was recommended that the Draft CAP be finalized to address lead in soil at Site 87 using LUCs to eliminate or reduce pathways of exposure to soil and sediment at Site 87.

Therefore, this CAP focuses on Site 87 at BT-11. This CAP includes the following sections:

- Section 1—Introduction
- Section 2—Initial Remedial Action
- Section 3—Current Site Conditions
- Section 4—Proposed Corrective Action
- Section 5—References

1.1 Site Description

BT-11 is located on Piney Island, a marshy island in Pamlico Sound approximately 30 miles east of MCAS Cherry Point (**Figure 1-1**). Various areas of BT-11 are presently used by the military for aerial target practice. BT-11 access is restricted to authorized personnel and is secured and patrolled by military personnel. The nearest residences are approximately 5 miles from BT-11, across Turnagain Bay to the west and Long Bay to the south. These residential areas are of low density and are best described as rural.

Site features at BT-11 include unpaved roads, a mock landing strip, and a few structures (**Figure 1-2**). The landscape at BT-11 primarily consists of marsh vegetation. Tidal wetlands are prominent across BT-11. Upland areas are limited and primarily consist of, or are adjacent to, the raised gravel roadbeds present at the site. The upland areas are generally vegetated with grasses and undergrowth.

1.1.1 Site 87

Site 87 refers to a former waste disposal area located approximately ¼-mile northwest of Building 9037, on the northeast side of Main Road (**Figure 1-2**). This site is approximately 20 feet (ft) by 20 ft in area, and is predominately marshy, except for an area immediately adjacent to the raised roadbed of Main Road.

According to facility personnel, Site 87 originated when a bulldozer attempted to excavate a pit for a dump site. Instead, the bulldozer sank into the marsh and had to be pulled out. The depression formed by the stuck bulldozer was then used as a disposal pit. The waste materials reported to have been disposed of in this depression included batteries and motor oils.

1.2 Previous Investigations

1.2.1 1999-2000 BT-11, Site 87 Site Investigation

An SI was conducted for BT-11 in 1999-2000 that included investigation activities at Sites I-32, 87, 88 and 89. At each of the four sites, the initial investigation activities consisted of:

- Collection of soil/sediment samples for chemical analysis and lithologic description
- Installation of temporary monitoring wells
- Collection of groundwater samples from temporary monitoring wells

Based on the results from the BT-11 SI, supplemental investigations were conducted in April 2004, September 2005, and October 2006. The results of the BT-11 SI and associated supplemental investigations are detailed in the *Final Site Investigation Report, Point of Marsh BT-11 (Sites I-32, 87, 88, and 89), Marine Corps Air Station, Cherry Point, North Carolina* (CH2M HILL, 2007a). As documented in the BT-11 SI, no constituents of concern (COCs) were identified at Sites I-32 and 88, and no further action was warranted. While the results of the SI indicated that several compounds were detected at Site 89 that may require action under a CAP, this site is part of an active range and does not currently require action. Based on the Site 87 analytical results from the BT-11 SI and supplemental investigations, lead exceeded the North Carolina soil screening level (NC SSL) in one of the two soil samples as well as the sediment sample. The concentration in soil sample 87SS01 (498 milligrams per kilogram [mg/kg]) also exceeded the United States Environmental Protection Agency (USEPA) Region 9 residential preliminary remediation goal (PRG) for lead (400 mg/kg). No lead was detected in any groundwater samples from Site 87. The SI data results for Site 87 are summarized in **Tables 1-1 and 1-2**. The BT-11 SI sampling locations for Site 87 are shown in **Figure 1-3** and detections exceeding screening criteria at Site 87 are shown in **Figures 1-4 and 1-5**.

It was concluded in the BT-11 SI report that the only constituent of concern (COC) at Site 87 was lead in soil and sediment. While 4-methylphenol exceeded the NC SSL in two soil samples, the concentrations did not exceed the applicable residential or industrial human health risk-based screening criteria (USEPA Region 9 PRGs), and no 4-methylphenol was detected in any of the groundwater samples, despite the very shallow water table at the site. The recommendation in the BT-11 SI report with respect to Site 87 was that a CAP be prepared to address lead contamination in soil. The BT-11 SI Report was finalized in January 2007 and approved by NCDENR.

1.2.2 Draft Corrective Action Plan, April 2007

In April 2007, a Draft CAP was submitted to NCDENR that proposed a preferred alternative to address lead contamination in soil at Site 87 using land use controls (LUCs) to eliminate or reduce pathways of exposure to soil and sediment at Site 87 (CH2M HILL, 2007b). The proposed LUCs included restricting land use at Site 87 to industrial uses only and prohibiting intrusive activities (e.g., excavation of the ground surface) except for monitoring purposes without prior approval from NCDENR.

In late April 2007, NCDENR submitted comments on the Draft CAP requesting additional monitoring for lead and 4-methylphenol. On May 10, 2007, the Navy and NCDENR met to discuss NCDENR comments on the Draft CAP and to determine a path forward. The Navy and NCDENR agreed to proceed with a supplemental investigation to collect additional soil and groundwater samples at Site 87. Specifically, the supplemental investigation would

include the collection of 4 soil samples to be analyzed for lead and 4-methylphenol (one sample in the center of the site and 3 samples around the periphery). In addition, three permanent monitoring wells were to be installed and sampled during 4 consecutive quarterly rounds of groundwater sampling for lead and 4-methylphenol. It was also agreed that the results of this supplemental investigation would be reported in an SI addendum report rather than only a revised draft of the CAP that incorporated the supplemental sampling results.

The Navy and NCDENR agreed that if the soil sample analytical results from the supplemental investigation were below NC SSLs and the four quarterly rounds of groundwater analytical results were below the State groundwater quality standards, the Navy could proceed to prepare a CAP proposing no further action (NFA) for Site 87. If the analytical results indicated exceedances of regulatory standards in either medium, the Navy would proceed to prepare a CAP that took into account the new data in the proposed remedy selection for Site 87. Based on an evaluation of the data exceeding regulatory criteria, potential recommendations to be considered would include: initiation of long-term groundwater monitoring; conducting a Remedial Investigation; preparation of an Engineering Evaluation/Cost Analysis (EE/CA) and potential interim remedial action; and/or imposing land use restrictions.

1.2.3 Site 87 SI, February 2009–November 2009

A supplemental SI was conducted for Site 87 from February 2009 to November 2009 that included collection of additional soil samples, the installation of permanent monitoring wells, and 4 quarterly rounds of groundwater sampling. The supplemental SI sample locations are shown on **Figure 1-6**, and the surface soil exceedance results are shown on **Figure 1-7**. Upon analysis of the SI data collected at Site 87, the following conclusions were documented in the Final Site 87 SI report (CH2M HILL, 2011):

- 4-Methylphenol was not detected in any of the surface soil or groundwater samples.
- Lead detected at surface soil sample location 87SS05 (653 mg/kg) exceeded the NC SSL (270 mg/kg) and the RSL for Residential Soil (400 mg/kg), but was below the RSL for Industrial Soil (800 mg/kg). The concentrations of lead detected in the remaining three surface soil samples at Site 87 were below the screening criteria.
- Lead was not detected above screening criteria in any of the groundwater samples during all 4 quarterly sampling rounds.

Based on these conclusions, it was recommended that the Draft CAP be finalized to address lead in soil at Site 87 using LUCs to eliminate or reduce pathways of exposure to soil and sediment at Site 87.

1.3 Receptor Information

Site 87 is contained completely within the boundaries of BT-11. The closest human receptors are BT-11 employees; specifically, those occupants of the buildings located on the eastern end of BT-11. The human receptors have no direct contact with the contaminant (lead) present in the soil. In addition, there are no water supply wells within the impacted area of the site.

The nearest residential areas are approximately 5 miles from BT-11. Groundwater use within a 4-mile radius of BT-11 is limited to a single water supply well (PW01) for use by military personnel and staff at BT-11 located approximately ¼-mile east of Site 87. The water supply well is screened at a depth of 400 to 430 ft below ground surface (bgs) (Wm. F. Freeman Associates, 1987).

1.4 Geology

As described in the *Final Site Management Plan, Fiscal Year 2007, Marine Corps Air Station, Cherry Point, North Carolina* (CH2M HILL, 2006), the regional geologic and hydrogeologic (see Section 1.6 below) framework for North Carolina presented here is based principally on information compiled and developed as part of the United States Geological Survey's (USGS) Regional Aquifer-System Analysis. The Coastal Plain Province of North Carolina is underlain by an eastward-thickening wedge of unconsolidated gravel, sand, silt, and clay with scattered beds of shells and loosely consolidated beds of limestone, sandy limestone, and shell limestone (Winner and Coble, 1996).

The sedimentary sequence ranges in age from Quaternary to Cretaceous and reaches a thickness of 10,000 ft at the Atlantic coast. Near MCAS Cherry Point, the Coastal Plain Province sediments are estimated to be approximately 2,500 ft thick (Lloyd and Daniel, 1988). The lower sedimentary sequence is predominantly nonmarine deltaic in origin and consists of discontinuous and heterogeneous sand-and-clay sequences. The upper sequences are predominantly marine in origin and include near-shore and estuarine deposits. The sedimentary deposits overlie pre-Cretaceous crystalline basement rock. Historical Coastal Plain Province sedimentation and deposition were controlled by fluctuations in sea level on a subsiding continental margin.

The local surface geology of BT-11 is defined as “coastal plain, quaternary, surficial deposits consisting of sand, gravel, and peat deposited in marine, fluvial, eolian and lacustrine environments” (North Carolina Geological Survey, 1985). As noted previously in Section 1.2, tidal wetlands are prominent across BT-11, and groundwater was observed essentially at the ground surface of Site 87 during the 1999 and 2000 sampling events. Based on the Site 87 soil boring logged in 1999, the site specific lithology consists of saturated brown, organic silt and sandy silt from the surface to approximately 4 ft bgs. These silts are underlain by a saturated, green, silty to medium sand from 4 to 8 ft bgs.

1.5 Hydrogeology

BT-11 is underlain by 17 hydrostatic units: nine aquifers separated by eight confining units (Giese, Eimers, and Coble, 1997). Of these regional hydrostratigraphic units, the youngest four aquifers are most relevant to activities at Cherry Point. These aquifers and confining units, from the youngest to the oldest, are the surficial aquifer, the Yorktown Confining Unit, the Yorktown Aquifer, Pungo River Confining Unit, Pungo River Aquifer, Castle Hayne Confining Unit, and the Castle Hayne Confining Aquifer. A description of these four uppermost units is found in *Simulation of Ground-Water Flow in the Coastal Plain Aquifer System of North Carolina* (Giese, Eimers, and Coble, 1997).

TABLE 1-1
 1999-2000 Site 87 Surface Soil and Sediment Exceedances of Screening Criteria
 BT-11 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID	2 Times Average BT-11 Background Concentration ¹	NCSL (May 2005)	Region 9 PRGs - Industrial Soil	Region 9 PRGs - Residential Soil	87SD01			87SS01		87SS02	
					87SD01 10/28/99	87SD01-10/99 10/28/99	87SD01-03/00 03/22/00	87SS01-10/99 10/28/99	87SS01 03/22/00	87SS02-10/99 10/28/99	87SS02 03/22/00
Sample ID	(1)	(2)	(3)	(4)							
Sample Date	(1)	(2)	(3)	(4)							
Chemical Name											
Volatile Organic Compounds (UG/KG)											
Methylene chloride	--	20.2	21,000	9,100	NA	NA	2.1 J	NA	1.7 J	NA	2.5 J
Semi-volatile Organic Compounds (UG/KG)											
4-Methylphenol	--	17.4	3,100,000	310,000	12,000 U	NA	NA	330 (2) J	NA	330 (2)	NA
Phenol	--	1,750	100,000,000	18,000,000	12,000 U	NA	NA	330	NA	1,500 J	NA
Pesticide/Polychlorinated Biphenyls (UG/KG)											
No Detections											
Total Metals (MG/KG)											
Aluminum	6,267	--	100,000	76,000	NA	1,310	NA	11,100 (1)	NA	3,680	NA
Arsenic	4.67	5.24	1.6	0.39	NA	6.3 U	NA	8.3 (1,2,3,4)	NA	6.2 U	NA
Beryllium	0.593	3.38	1,900	150	NA	0.2 U	NA	0.18 J	NA	0.38 U	NA
Cadmium	0.34	0.95	450	37	NA	5.4 (1,2)	NA	7.9 (1,2)	NA	0.48 U	NA
Calcium	40,833.33	--	--	--	NA	9,530 U	NA	18,800	NA	6,190 U	NA
Chromium	16.7	27.2	64	30	NA	12.4	NA	22 (1)	NA	8.3 J	NA
Cobalt	6.33	--	1,900	900	NA	2.6 J	NA	7.6 (1) J	NA	2.4 J	NA
Copper	--	704	41,000	3,100	NA	105	NA	428	NA	9.1 U	NA
Iron	7,527	151	100,000	23,000	NA	22,200 (1,2)	NA	21,500 (1,2)	NA	3,300 (2)	NA
Lead	7.27	270	800	400	NA	292 (1,2)	NA	498 (1,2,4)	NA	8.7 (1)	NA
Magnesium	--	--	--	--	NA	3,290 U	NA	2,290	NA	6,430 U	NA
Manganese	72.3	65.2	19,000	1,800	NA	92.4 (1,2)	NA	368 (1,2)	NA	31.3	NA
Nickel	9.73	56.4	20,000	1,600	NA	3.1 J	NA	132 (1,2)	NA	4.2 J	NA
Vanadium	14.7	--	1,000	78	NA	1.1 J	NA	6.6 J	NA	12.1 J	NA
Zinc	19.6	550	100,000	23,000	NA	782 (1,2)	NA	2,280 (1,2)	NA	36.9 U	NA

NOTES:

Detections of a chemical are indicated in bold font

Detected concentrations that exceed one or more screening criteria are indicated in red font.

Detected concentrations that exceed NC SSL and/or other screening criteria are indicated in blue font.

Each screening criterion has been assigned a reference number listed in parentheses in the column header.

The reference number is used to identify specific criteria exceeded in a particular sample.

Data entries consist of the concentration, followed by the reference number(s) of any exceeded screening criteria (if any) followed by the data qualifier (if any).

U = Compound not detected above the indicated concentration

J = Estimated concentration below the quantitation limit

NA = Not analyzed

-- = No screening criterion available.

¹Two times average background concentration was calculated by multiplying the average concentration of sample BT11SS01, BT11SS02 and BT11SS03 by 2.

Where duplicate samples were collected, the maximum of the original or duplicate sample concentration was used in the calculation

TABLE 1-2
 1999-2000 Site 87 Groundwater Exceedances of Screening Criteria
 BT-11 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID	NC 2L GW	MCL-	Secondary	Region 9 PRGs	87TW01	87TW02	87TW03
Sample ID	(May 2005)	Groundwater	MCLs	- Tapwater	87TW01-1099	87TW02-1099	87TW03-1199
Sample Date	(1)	(2)	(3)	(4)	10/28/99	10/28/99	11/03/99
Chemical Name							
Volatile Organic Compounds (UG/L)							
Carbon disulfide	700	--	--	1,000	1 UJ	1 UJ	0.8 J
Semi-volatile Organic Compounds (UG/L)							
No Detections							
Pesticide/Polychlorinated Biphenyls (UG/L)							
No Detections							
Total Metals (UG/L)							
Aluminum	--	--	50	36,000	496 (3)	94.6 (3) J	1,070 (3)
Calcium	--	--	--	--	75,400	176,000	206,000
Cobalt	--	--	--	730	1.2 J	1.4 J	2.9 J
Iron	300	--	300	11,000	0,200 (1,3)	141	408 (1,3)
Magnesium	--	--	--	--	519,000	435,000	656,000
Manganese	50	--	50	880	400 (1,3)	258 (1,3)	11.4 U
Potassium	--	--	--	--	191,000	137,000	165,000
Sodium	--	--	--	--	3,820,000 J	3,030,000 J	3,940,000 J
Thallium	--	2	--	2.4	3.2 (2,4) J	10.1 (2,4)	10.5 (2,4)

Notes:

Detections of a chemical are indicated in bold font

Detected concentrations that exceed one or more screening criteria are indicated in red font.

Detected concentrations that exceed NC 2L GW and/ or other screening criteria are indicated in blue font.

Each screening criterion has been assigned a reference number listed in parentheses in the column header

The reference number is used to identify specific criteria exceeded in a particular sample.

Data entries consist of the concentration, followed by the reference number(s) of any exceeded screening criteria (if any), followed by the data qualifier (if any).

U = Compound not detected above the indicated concentration

J = Estimated concentration below the quantitation limit

UJ = Not detected, quantitation limit may be inaccurate or imprecise

"--" = No screening criterion available.



Legend

- Cities
- Rivers and Streams
- BT-11
- Military Installation
- County Boundary



Figure 1-1
BT-11 Location Map
MCAS Cherry Point, North Carolina



- Legend**
- Site Locations
 - ▬ Paved Road
 - - - Unpaved Road
 - Installation Boundary

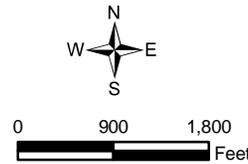
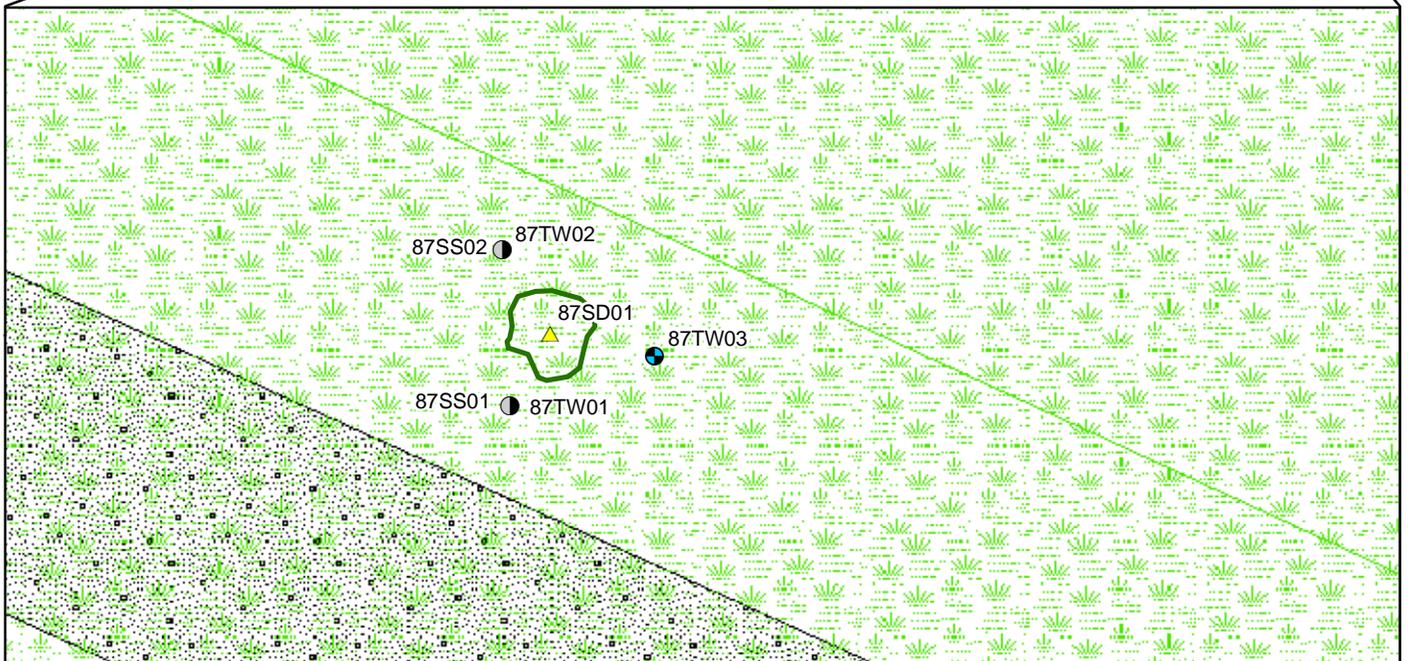


Figure 1-2
Site Location Map
BT-11 Site 87
MCAS Cherry Point, North Carolina



Legend

- Site Location
- ▲ Sediment Sampling Location
- Soil and Groundwater Sampling Location
- Groundwater Only Sampling Location
- Estimated Limits of Waste
- Emergent Persistent - Mesohaline Wetland

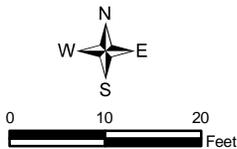
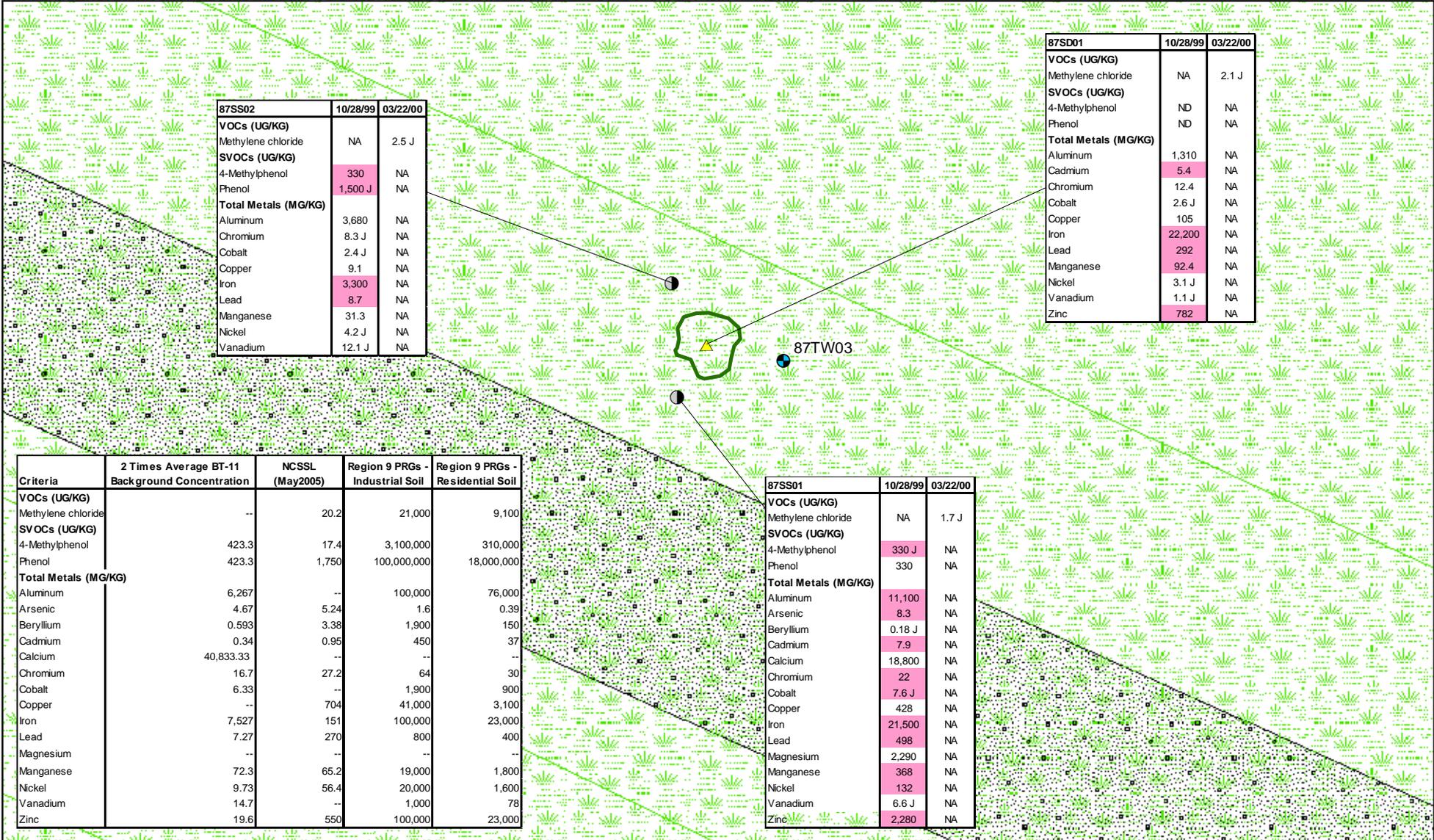


Figure 1-3
1999-2000 Site 87 Sample Locations
BT-11 Site Investigation
MCAS Cherry Point, North Carolina



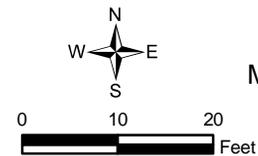
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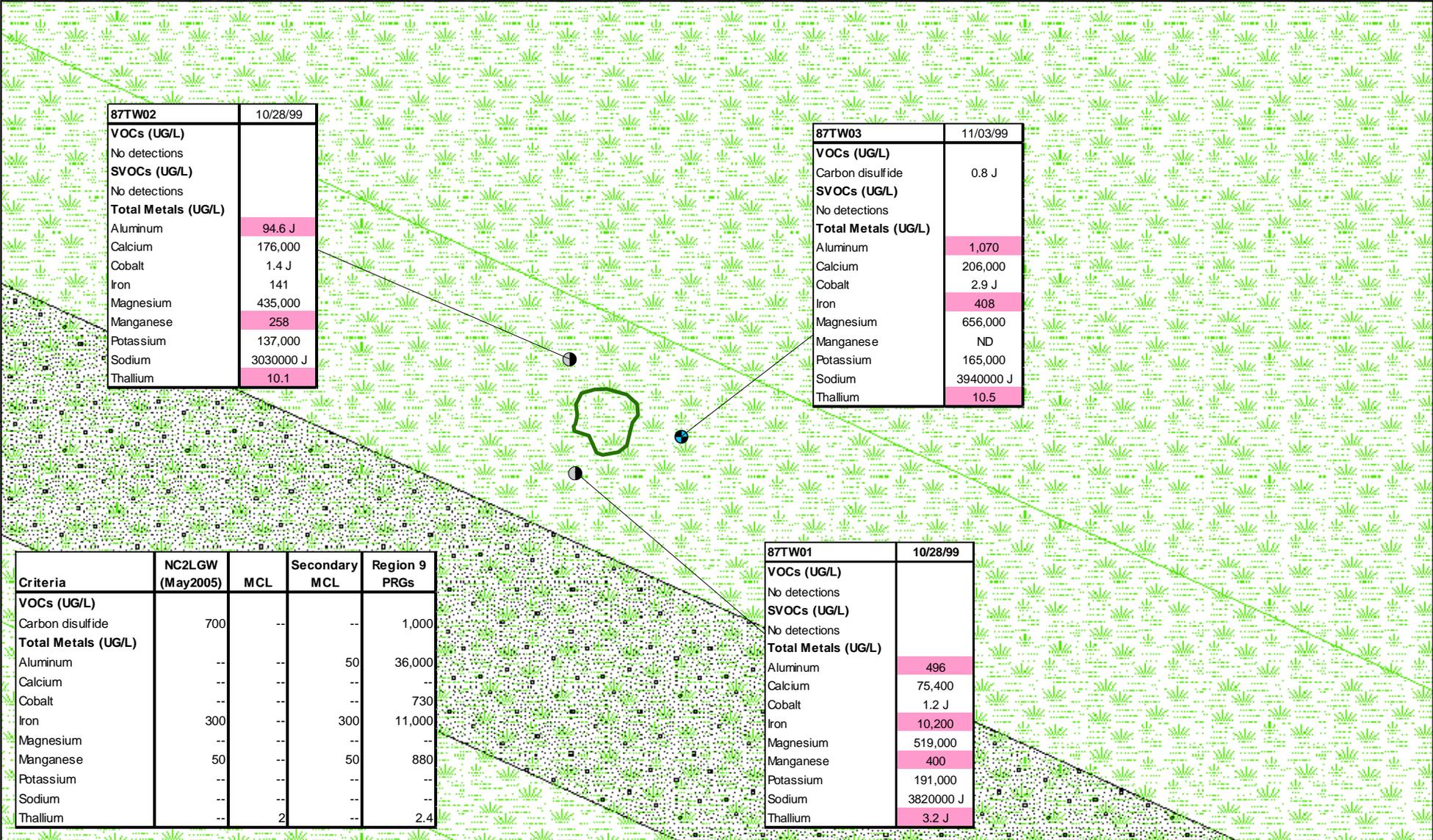
- Sediment Sampling Location
- Soil and Groundwater Sampling Location
- Groundwater Only Sampling Location
- Estimated Limits of Waste
- Paved Road
- Unpaved Road

Emergent Persistent - Mesohaline Wetland

Notes:
 J - Estimated concentration below the quantitation limit
 NA - Not analyzed
 ND - Not detected
 exceeds one or more screening criteria

Figure 1-4
 1999-2000 Site 87 Surface Soil and Sediment Samples
 Exceeding Screening Criteria
 BT-11 Site Investigation
 MCAS Cherry Point, North Carolina





87TW02	10/28/99
VOCs (UG/L)	
No detections	
SVOCs (UG/L)	
No detections	
Total Metals (UG/L)	
Aluminum	94.6 J
Calcium	176,000
Cobalt	1.4 J
Iron	141
Magnesium	435,000
Manganese	258
Potassium	137,000
Sodium	3030000 J
Thallium	10.1

87TW03	11/03/99
VOCs (UG/L)	
Carbon disulfide	0.8 J
SVOCs (UG/L)	
No detections	
Total Metals (UG/L)	
Aluminum	1,070
Calcium	206,000
Cobalt	2.9 J
Iron	408
Magnesium	656,000
Manganese	ND
Potassium	165,000
Sodium	3940000 J
Thallium	10.5

Criteria	NC2L GW (May2005)	MCL	Secondary MCL	Region 9 PRGs
VOCs (UG/L)				
Carbon disulfide	700	--	--	1,000
Total Metals (UG/L)				
Aluminum	--	--	50	36,000
Calcium	--	--	--	--
Cobalt	--	--	--	730
Iron	300	--	300	11,000
Magnesium	--	--	--	--
Manganese	50	--	50	880
Potassium	--	--	--	--
Sodium	--	--	--	--
Thallium	--	2	--	2.4

87TW01	10/28/99
VOCs (UG/L)	
No detections	
SVOCs (UG/L)	
No detections	
Total Metals (UG/L)	
Aluminum	496
Calcium	75,400
Cobalt	1.2 J
Iron	10,200
Magnesium	519,000
Manganese	400
Potassium	191,000
Sodium	3820000 J
Thallium	3.2 J

Legend

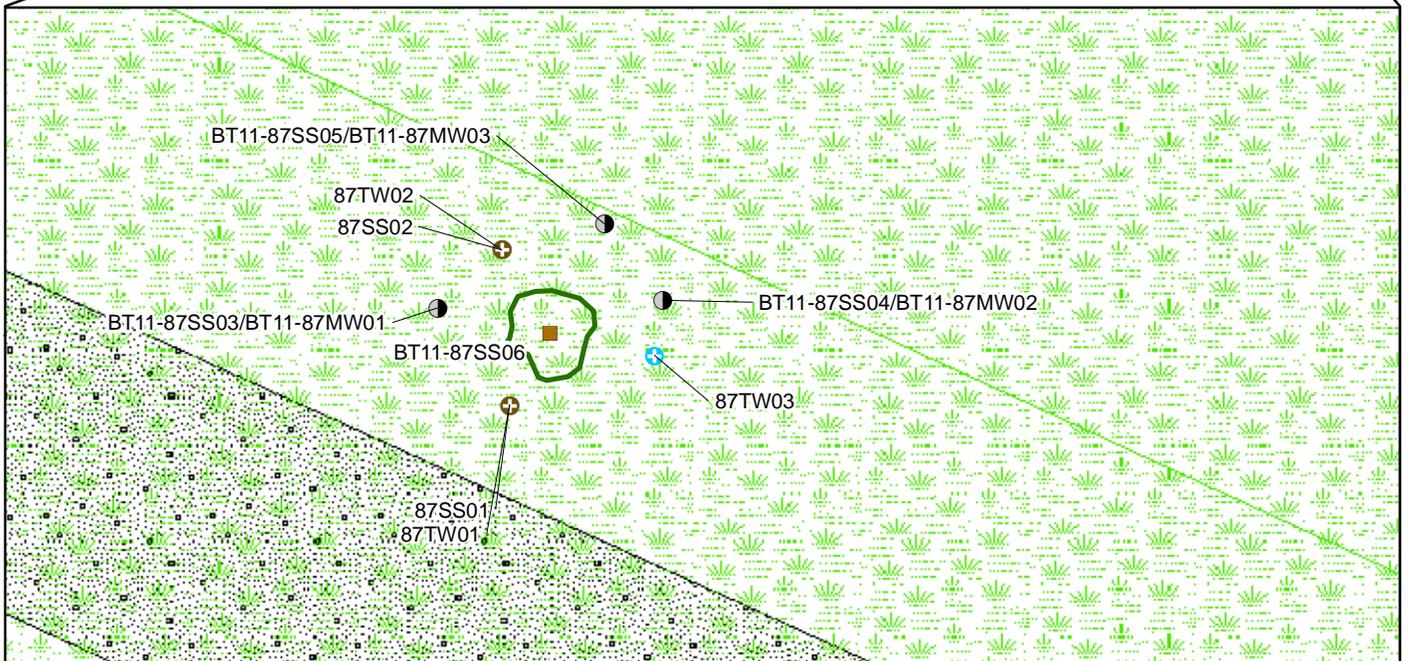
- Soil and Groundwater Sampling Location
- Groundwater Only Sampling Location
- ▭ Emergent Persistent - Mesohaline Wetland
- ▭ Estimated Limits of Waste
- ▭ Paved Road
- ▭ Unpaved Road

Notes:
 J - Estimated concentration below the quantitation limit
 ND - Not detected
 exceeds one or more screening criteria



0 10 20
 Feet

Figure 1-5
 1999 Site 87 Groundwater Samples
 Exceeding Screening Criteria
 BT-11 Site Investigation
 MCAS Cherry Point, North Carolina



Legend

- Site Location
- 2009 Soil and Groundwater Sample Location
- 2009 Soil Sample Location
- + 1999 Groundwater Sample Location
- + 1999 Soil and Groundwater Sample Location
- Estimated Limits of Waste
- Emergent Persistent - Mesohaline Wetland

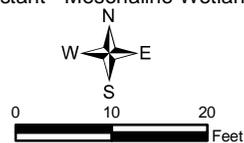
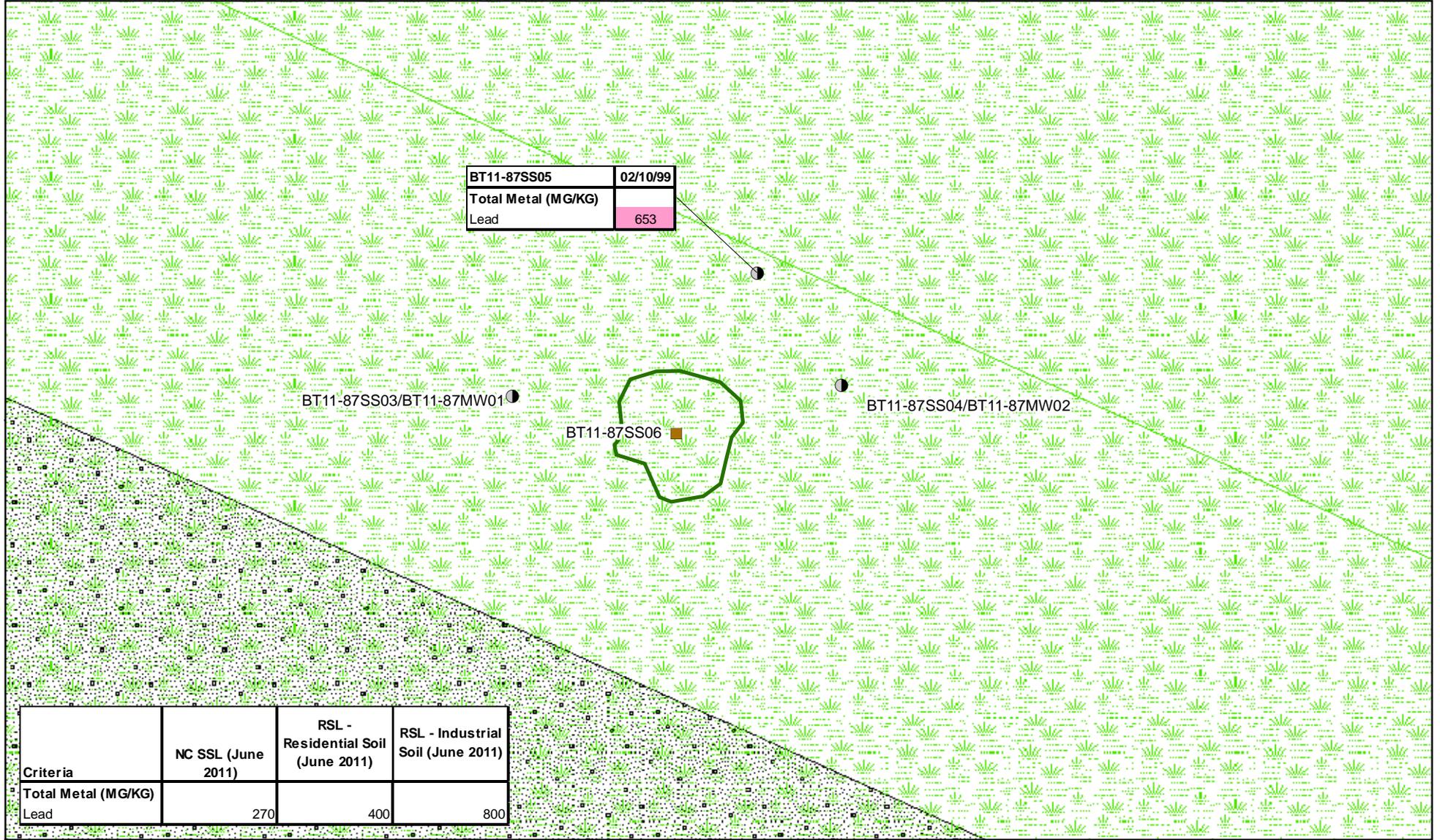


Figure 1-6
 2009 Site 87 Supplemental SI Sample Locations
 Site 87 Supplemental SI
 MCAS Cherry Point, North Carolina



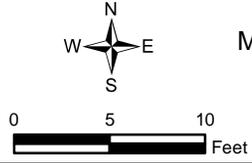
BT11-87SS05	02/10/99
Total Metal (MG/KG)	
Lead	653

Criteria	NC SSL (June 2011)	RSL - Residential Soil (June 2011)	RSL - Industrial Soil (June 2011)
Total Metal (MG/KG)			
Lead	270	400	800

- Legend**
- 2009 Soil and Groundwater Sample Location
 - 2009 Soil Sample Location
 - Estimated Limits of Waste
 - ▨ Emergent Persistent - Mesohaline Wetland

Notes:
 Shading indicates exceedance of NC SSL and RSL (Residential Soil)

Figure 1-7
 2009 Surface Soil Samples Exceeding Screening Criteria
 Site 87 Supplemental SI
 MCAS Cherry Point, North Carolina



SECTION 2

Current Site Conditions

The following conclusions regarding current site conditions were derived from analyzing the data collected at Site 87 during the recent SI. The analytical data are summarized in **Tables 2-1 and 2-2**.

- 4-Methylphenol was not detected in any of the surface soil or groundwater samples.
- Lead detected at surface soil sample location 87SS05 (653 mg/kg) exceeded the NC SSL (270 mg/kg) and the RSL for Residential Soil (400 mg/kg), but was below the RSL for Industrial Soil (800 mg/kg). The concentrations of lead detected in the remaining three surface soil samples at Site 87 were below the screening criteria.
- Lead was not detected above screening criteria in any of the groundwater samples during all 4 quarterly sampling rounds.

TABLE 2-1
 Site 87 SI Surface Soil Sampling Results and Screening Criteria Comparison
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID	NC SSL (June 2011)	RSL - Residential Soil (June 2011)	RSL - Industrial Soil (June 2011)	BT11-87SS03	BT11-87SS04	BT11-87SS04 ¹	BT11-87SS05	BT11-87SS06
Sample ID				BT11-87SS03-0-1-0209	BT11-87SS04-0-1-0209	BT11-87SS04P-0-1-0209	BT11-87SS05-0-1-0209	BT11-87SS06-0-1-0209
Sample Date				2/10/09	2/10/09	2/10/09	2/10/09	2/10/09
Chemical Name								
4-Methylphenol (p-Cresol) (MG/KG)								
No Detections	0.4	310	3,100					
Lead (MG/KG)								
Lead	270	400	800	8.4	28.3	157	653	86.8

Notes:
 Detected concentrations are indicated in bold font
 MG/KG - Milligrams per kilogram
 NC SSL - North Carolina Soil Screening Level
 RSL - USEPA Regional Screening Level
 Shading indicates exceedance of NC SSL and RSL (Residential Soil)
¹Duplicate of sample BT11-87SS04-0-1-0209

TABLE 2-2
 Site 87 SI Groundwater Sampling Results and Screening Criteria Comparison
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID	NC2L GW (June 2011)	MCL (June 2011)	RSL - Tapwater (June 2011)	87MW01				87MW02			
				BT11-87MW01-0209	BT11-87MW01-0509	BT11-87MW01-0809	BT11-87MW01-1109	BT11-87MW02-0209	BT11-87MW02-0509	BT11-87MW02-0809	BT11-87MW02-1109
Sample ID				02/17/09	05/18/09	08/18/09	11/20/09	02/17/09	05/18/09	08/18/09	11/20/09
Sample Date											
Chemical Name											
4-Methylphenol (p-Cresol) (UG/L)											
No Detections	40	--	180								
Total Lead (UG/L)											
Lead	15	15	--	20 U	4.4	8 U	6 U	20 U	3 U	6 U	6 U
Dissolved Lead (UG/L)											
No Detections											

Notes:
 Detected concentrations are indicated in bold font
 UG/L - Micrograms per liter
 U - The material was analyzed for, but not detected
 - - Screening criteria not available
 NC2L GW - North Carolina 2L Groundwater
 MCL - Federal Maximum Contaminant Level
 RSL - USEPA Regional Screening Level
¹Duplicate of sample BT11-87MW03-0209
²Duplicate of sample BT11-87MW03-0509
³Duplicate of sample BT11-87MW03-0809
⁴Duplicate of sample BT11-87MW03-1109

TABLE 2-2
 Site 87 SI Groundwater Sampling Results and Screening Criteria Comparison
 BT-11 Site 87 Site Investigation
 MCAS Cherry Point
 Cherry Point, North Carolina

Station ID	NC2L GW (June 2011)	MCL (June 2011)	RSL - Tapwater (June 2011)	87MW03							
				BT11-87MW03-0209	BT11-87MW03P-0209	BT11-87MW03-0509	BT11-87MW03P-0509	BT11-87MW03-0809	BT11-87MW03P-0809 ³	BT11-87MW03-1109	BT11-87MW03P-1109 ⁴
Sample ID											
Sample Date				02/17/09	02/17/09	05/18/09	05/18/09	08/18/09	08/18/09	11/20/09	11/20/09
Chemical Name											
4-Methylphenol (p-Cresol) (UG/L)											
No Detections	40	--	180								
Total Lead (UG/L)											
Lead	15	15	--	20 U	20 U	3 U	3 U	7.2 U	7.7 U	6 U	6 U
Dissolved Lead (UG/L)											
No Detections											

Notes:
Detected concentrations are indicated in bold font
 UG/L - Micrograms per liter
 U - The material was analyzed for, but not detected
 - - Screening criteria not available
 NC2L GW - North Carolina 2L Groundwater
 MCL - Federal Maximum Contaminant Level
 RSL - USEPA Regional Screening Level
¹Duplicate of sample BT11-87MW03-0209
²Duplicate of sample BT11-87MW03-0509
³Duplicate of sample BT11-87MW03-0809
⁴Duplicate of sample BT11-87MW03-1109

SECTION 3

Proposed Corrective Action

Based on the results of the BT-11 SI and recent Site 87 SI, the only COC at Site 87 is lead.

During the BT-11 SI, lead was detected in 1999 in soil and sediment. The concentration of lead in soil sample 87SS01 (498 mg/kg) exceeded the NC SSL and EPA Region 9 residential PRG (270 mg/kg and 400 mg/kg, respectively) and the concentration of lead in sediment sample 87SD01-10/99 (292 mg/kg) exceeded the NC SSL (270 mg/kg). Lead was not detected in any site groundwater samples.

Prior to the subsequent Site 87 SI, the EPA Region 9 residential PRG screening criterion was replaced by the RSL for Residential Soil. Based on the 2009 analytical results of the Site 87 SI, the concentration of lead detected in one surface soil sample, BT11-87SS05-0-1-0209 (653 mg/kg), exceeded the NC SSL and RSL for Residential Soil (270 mg/kg and 400 mg/kg, respectively). Lead was not detected above screening criteria in any of the groundwater samples during all four quarterly sampling rounds.

The preferred alternative to address lead in soil at Site 87 is implementation of land use controls (LUCs) to eliminate or reduce pathways of exposure to soil and sediment at Site 87. The LUCs would involve site use controls. Specifically, the land use at Site 87 would be restricted to industrial uses only. The restricted area surrounding Site 87 will be delineated in a plat map that will be incorporated into the BT-11 Site Wide Plan and enforced by range personnel. If BT-11 is ever closed, NCDENR (or the then appropriate State Agency) will be notified. No intrusive activities (e.g., excavation of ground surface or insertion of objects into the ground surface, except for monitoring purposes) would be allowed at Site 87 unless prior written approval has been obtained from NCDENR. The land at Site 87 would be restricted from any use other than for environmental monitoring purposes. No wells would be installed except for monitoring wells constructed pursuant to 15A NCAC 2C.0108 or as approved by NCDENR.

As part of this CAP, the Navy will ensure that the following objectives are met:

- The Navy Remedial Project Manager (RPM) will provide electronic coverages of LUCs at Site 87 to the Installation Restoration (IR) Program Manager for MCAS Cherry Point. The coverages will be included in MCAS Cherry Point's geographic information system (GIS) and the environmental GIS. The restricted area surrounding Site 87 will also be delineated in a plat map that will be incorporated into the BT-11 Site Wide Plan and enforced by range personnel. The installation environmental review process as prescribed in Air Station Order 5090.11, *Environmental Impact Review Procedures*, will ensure that all land use restrictions for Site 87 are adhered to by a requesting party. If BT-11 is ever closed, NCDENR (or the then appropriate State Agency) will be notified.
- At least 60 days prior to implementation of any proposed change in land usage at Site 87 that are inconsistent with the LUC objectives or the selected remedy, MCAS Cherry Point must provide notification of any proposed change to NCDENR. No major land use change can be implemented until concurrence is obtained from NCDENR.
- Any activity at Site 87 that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs will be addressed by the Navy as soon as practicable, but in no case will the process be initiated later than 10 days after the Navy becomes aware of the breach.
- MCAS Cherry Point will conduct annual visual inspections of the site and annual reviews of the applicable Air Station master planning process and GIS data. Any deficiencies noted must be reported to the NCDENR within 10 days, and within 10 days following this notification, the Navy will inform NCDENR regarding how the Navy has addressed or will address the breach.
- Any activity that would violate or that may disrupt the effectiveness of the implemented LUC (e.g., excavation in contaminated areas, construction, etc.) constitutes a major land use change and requires notification to the appropriate parties.

The cost estimate and schedule for implementing the CAP are provided in Appendix A and the Land Use Control Boundary Map for BT-11, Site 87, is provided in Appendix B.

SECTION 4

References

- CH2M HILL. 2006. *Final Site Management Plan, Fiscal Year 2007, Marine Corps Air Station, Cherry Point, North Carolina*.
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- North Carolina Geological Survey. 1985. *Geologic Map of North Carolina*. http://gis.enr.state.nc.us/sid/bin/index.plx?client=zGeologic_Maps&site=9AM
- Wm. F. Freeman Associates. 1987. Letter from Keith V. Broderick to Rick Shriver (Division of Environmental Management, Groundwater Section, Wilmington Regional Office) RE: Application for Permit to Construct a Well, Piney Island BT-11, October 22.
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Appendix A
Proposed Corrective Action Schedule

Cost and Schedule for Proposed Corrective Action Plan BT-11, Site 87, MCAS Cherry Point, North Carolina

Cost

A Land Surveyor registered in the State of North Carolina, in conjunction with work being conducted for the Naval Facilities Engineering Command (NAVFAC), Atlantic under the Comprehensive Long-term Environmental Action Navy (CLEAN) 1000 Contract, Contract Task Order (CTO) 0093 will survey the land use control (LUC) boundary for Bombing Target (BT)-11, Site 87, Marine Corps Air Station (MCAS) Cherry Point, North Carolina. This survey will also incorporate field verified site boundaries, if available.

The **Surveyor** shall provide coordinates in the appropriate State Plane Coordinate System (SPCS) and zone (latest adjustment) for the area. The horizontal and vertical datum(s) shall be the NAD 83 for horizontal and NGVD 29 or NAVD 88 for the vertical. Exceptions to this will be survey ties to acceptable defined project site coordinate systems. In the case of dual horizontal and vertical control system the **Surveyor** will provide coordinate and elevation conversion method to accommodate conversion between systems. All coordinate systems shall be pre-approved by CH2M HILL prior to the commencement of the survey.

The **Surveyor** shall provide a Survey Plat for BT-11 Site 87 based on field determined boundaries **and developed in conformance with Platting laws in Craven County** and comply with all state and local laws regulating to plats. Additionally, the Survey Plats will be developed for the Site under the direction of the Professional Land Surveyor to delineate the specific LUC implemented in accordance with NCGS 143B-279.9 & 179.10 and including the language "NOTICE OF CONTAMINATED SITE". The survey plat shall be signed, sealed, dated and certified by the Professional Land Surveyor responsible for the work and certify that the work was completed in compliance with the specification.

Once the map is reviewed and approved by the Engineer, the Plat Map will be incorporated into the BT-11 Site Wide Plan. **The estimated cost for completing this survey is \$3,500.**

Schedule

Finalization of the LUC boundary survey map for BT-11, Site 87, shall be completed using the following schedule:

- Draft plat maps shall be submitted to the Engineer for review within fifteen (15) business days of completion of the survey.
- Final survey map shall be submitted to the Engineer for final review within five (5) business days of receipt of comments on the draft final.

Appendix B
Land Use Control Boundary Map, BT-11, Site 87
