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Final

**Five-Year Review Report**  
Marine Corps Air Station Cherry Point  
North Carolina



Prepared for

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

Contract No. N62470-02-D-3052  
CTO-156

**February 2008**

Prepared by

**CH2MHILL**

Final

# Five-Year Review Report

## Marine Corps Air Station Cherry Point North Carolina

Contract Task Order 156

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Prepared for

Department of the Navy  
Naval Facilities Engineering Command  
Atlantic

Under the

LANTDIV CLEAN III Program  
Contract N62470-02-D-3052

Prepared by



**CH2MHILL**

Virginia Beach, Virginia



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4

ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

MAR 27 2008

Colonel F.P. Bottorff  
Commanding Officer  
Marine Corps Air Station  
PSC Box 8003  
Cherry Point, N.C. 28533-0003

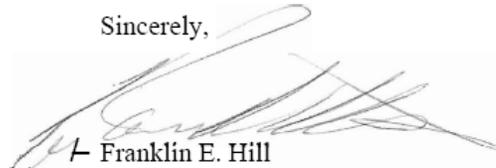
SUBJ: Five Year Review  
MCAS Cherry Point  
Havelock, North Carolina

Dear Colonel Bottorff:

The U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the above subject decision document and concurs that the remedies selected for the seven operable units, which comprises sixteen sites, remain protective of human health and the environment. The remedies are supported by the previously completed Remedial Investigation, Feasibility Study and Baseline Risk Assessment Reports. They are also supported by the review of the current applicable or relevant and appropriate requirements (ARARs). Discussions and recommendations are included in the text concerning ongoing remedial actions. These recommendations will undergo further review by my staff and will be documented by other reporting mechanisms.

EPA appreciates the coordination efforts of MCAS Cherry Point and the level of effort that was put forth in developing this "Five Year Review" report. EPA looks forward to continuing the exemplary working relationship with MCAS Cherry Point and Naval Facilities Engineering Command Mid-Atlantic Division as we move toward a final cleanup of the NPL site. If you have any questions, please contact Gena Townsend, of my staff, at (404) 562-8538.

Sincerely,



Franklin E. Hill  
Director, Superfund Division

cc: Jan Nielson, NAVFAC Mid-Atlantic  
George Lane, NCDENR  
Jeff Christopher, MCAS

FIVE-YEAR REVIEW REPORT

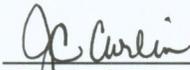
MARINE CORPS AIR STATION CHERRY POINT  
NORTH CAROLINA

LANTDIV CLEAN III PROGRAM  
CONTRACT N62470-02-D-3052  
CONTRACT TASK ORDER 0156

FEBRUARY 2008

This report documents completion of the Five-Year Review of MCAS Cherry Point, specifically Operable Units 1, 2, 3, 4, 5, 6, and 13, as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in accordance with CERCLA §121(c), as amended, and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR).

Approved by:



J.C. Curlin  
Environmental Affairs Officer  
By direction of the  
Commanding Officer

3/27/08  
Date

# Executive Summary

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The Department of the Navy conducted this Five-Year Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Review for Marine Corps Air Station (MCAS) Cherry Point, North Carolina, in accordance with the United States Environmental Protection Agency (USEPA) *Comprehensive Five-Year Review Guidance*, dated June 2001. This Five-Year Review document for MCAS Cherry Point addresses remedies and remedial actions (RAs) that have been implemented within all operable units (OUs) for which there is a USEPA Record of Decision (ROD) or action memorandum in place. A total of nine OUs have been identified at MCAS Cherry Point, of which RODs exist for eight: OU1, OU2, OU3, OU4, OU5, OU6, OU13, and OU15<sup>1</sup>.

The objective of this Five-Year Review is to evaluate current remedies at OU1, OU2, OU3, OU4, OU5, OU6 and OU13, and to determine whether the remedies are protective of human health and the environment in accordance with the requirements set forth in the ROD. The principal method used to evaluate the protectiveness of the remedies was a thorough review of various reports and documents pertaining to site activities and findings. The methods, findings, and conclusions from the document reviews are presented in this Five-Year Review report. In addition, the Five-Year Review report identifies any issues that may be preventing a particular remedy from functioning as designed or as appropriate and that could endanger the protection of human health and the environment. The overall evaluation of the effectiveness of each remedy is presented as a protectiveness statement that was developed for each OU and associated sites with RAs.

In general, the remedies are functioning as designed, with the exception of the Interim Remedy and Removal Action at OU1. The remaining remedies are expected to be protective when groundwater cleanup goals are achieved through monitored natural attenuation. The OU1 remedies will be amended and addressed in the Final ROD for OU1 which is scheduled to be completed by 2010. In the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls (ICs) are preventing exposure to, or the ingestion of, contaminated groundwater.

## OU1

### OU1 Groundwater Central Hotspot Area

An Interim Record of Decision was signed October 9, 1996. Sites 15, 40, 42, 47, 51, 52, tank farms, and underground storage tank (UST) sites have been identified as contributing to the OU1 Groundwater Central Hotspot Area, located at the Fleet Readiness Center – East (FRC) [formerly known as Naval Aviation Depot (NADEP)]. The interim remedy for the OU1 Groundwater Central Hotspot Area was a groundwater pump and treat system that became operational in December 1998. The system was designed to address volatile organic compound (VOC) contamination in groundwater in this portion of OU1. The objective of the

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<sup>1</sup> The selected remedy in the OU15 ROD is No Further Action, and the ROD stipulates that no Five-Year Review is required.

remediation system was to hydraulically contain groundwater to prevent the downward migration of contamination to underlying aquifers and to aid in reducing the total mass of the OU1 groundwater contamination. In 2003, a Remedial Action Operation Optimization report was completed that evaluated the effectiveness of the pump and treat system. The report recommended shutting down the pump and treat system based on the following conclusions: 1) the system was not creating a large capture zone, 2) the system was not effective in meeting its limited remedial objective of containing the migration of groundwater contamination and is not a suitable technology for restoring groundwater quality at OU1, 3) monitoring data have demonstrated a steady decline in contaminant removal efficiency, and 4) the operation of the pump and treat system would interfere with future investigation activities and treatability studies that would address the entire groundwater contamination plume area. The pump and treat system was shut down in 2005. The groundwater contamination for all of OU1 is undergoing re-evaluation, which includes the Central Hotspot Area. A final remedy to address the entire groundwater plume will be included in a Final ROD.

## Site 16

The interim remedial action (removal action) for Site 16 consisted of an air sparge/soil vapor extraction system (AS/SVE) that became operational in 1998. The system was designed to contain and treat the VOC plume migrating from the upgradient FRC area prior to the discharge of groundwater to surface water. In 2003, a Remedial Action Operation Optimization Report was completed that concluded that the AS/SVE system had reached asymptotic conditions with respect to the removal of contaminant mass. The groundwater monitoring data also indicated that the contamination was present at low levels that are amenable to natural attenuation. Based on the above facts, the AS/SVE system (removal action) was completed in February 2005.

## OU2

The selected remedy for OU2 was SVE and ICs for soil and Natural Attenuation and ICs for groundwater. Operation of the SVE system was discontinued in August 2003 because the system had reached its cleanup goals at three of the four Hotspots and was no longer removing significant contaminant mass at the fourth location. Variations to this system, along with other technologies, are being evaluated for future use. The land use controls (LUCs) associated with the OU2 remedy are protective of human health and the environment because the restrictions prevent intrusive activities, prohibit aquifer use, and limit land use to only industrial purposes.

Monitored Natural Attenuation (MNA) results indicate that this remedy is functioning as designed and it appears that declines in contaminant concentrations through reductive dechlorination are occurring.

## OU3

The remedial action for OU3 was AS to treat soil contaminated with VOCs, MNA and ICs. An AS system was installed in 2000 at Site 7, and covered an area of 200 by 70 feet to a depth

of 4 feet below ground surface. Based on monitoring results, it was determined that the AS system had effectively remediated the soil Hotspot and the system was shut down in mid-2003. The AS system was removed in May 2007 and an IRACR report was submitted in September 2007.

The LUCs associated with the OU3 remedy are protective of human health and the environment because the restrictions prevent future residential use at Sites 6 and 7, invasive construction activities at Site 7, and aquifer use.

MNA results indicate that this remedy is functioning as designed.

## OU4

The remedy selected for OU4 is MNA for VOCs in groundwater and LUCs. The remedy remains protective of human health and the environment because the restrictions prevent withdrawal and/or future use of groundwater from the surficial aquifer within the entire OU4 boundary and prohibit intrusive activities within the extent of the groundwater contamination plume. MNA data have characterized the groundwater as having reducing conditions that are suitable for anaerobic biodegradation.

## OU5

The remedy selected for OU5 is MNA for VOCs in groundwater and LUCs. The remedy remains protective of human health and the environment because the restrictions prevent withdrawal and/or future use of groundwater from the surficial aquifer and prohibit intrusive activities within the extent of the groundwater contamination plume within 250 feet (ft) of the impacted well at Site 2. The monitoring data indicate that the VOC concentrations are stable and the MNA results indicate mildly reducing conditions in groundwater that are suitable for anaerobic biodegradation of organic contaminants.

## OU6

The OU6 ROD addressed a tar-like layer identified in the subsurface soils as a potential source of groundwater contamination. The remedy consisted of surface and subsurface soil excavation with off site disposal, MNA and LUCs. The subsurface contamination was excavated from beneath the former location of Burn Pit E in March 2007.

MNA parameters from the voluntary groundwater monitoring (VGM) conducted prior to the March 2007 soil removal showed evidence that conditions for natural biodegradation of COCs are favorable. The LUCs associated with the OU6 remedy have been implemented. The remedy remains protective of human health and the environment because the restrictions prevent the withdrawal and/or future use of groundwater from the surficial aquifer and prohibit intrusive activities within the extent of the groundwater contamination plume. The contamination source has been removed and there is continuing evidence of natural attenuation.

## OU13

The remedy selected for OU13 is MNA for VOCs and bis(2-ethylhexyl)phthalate (BEHP) in groundwater and LUCs. The remedy remains protective of human health and the environment because the restrictions prevent withdrawal and/or future use of groundwater from the surficial aquifer and prohibit intrusive activities within the extent of current groundwater contamination plume. The monitoring data also indicate a steady decrease of contaminant concentrations. Since MNA was implemented, contaminant concentrations in six of seven groundwater monitoring wells have fallen to below detection limits.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site name (from CERCLIS):</b> Marine Corp Air Station Cherry Point		
<b>EPA ID (from CERCLIS):</b> <a href="#">NC1170027261</a>		
<b>Region:</b> 4	<b>State:</b> NC	<b>City/County:</b> Craven County
SITE STATUS		
<b>NPL status:</b> <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
<b>Remediation status</b> (choose all that apply): <input type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
<b>Multiple OUs?*</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<b>Construction completion date:</b> OU1: Pump and treat system - December 1998, AS/SVE system - September 1998 OU2: SVE system - February 1998 OU3: AS system – March 13, 2000	
<b>Has site been put into reuse?</b> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
<b>Lead agency:</b> <input type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input checked="" type="checkbox"/> Other Federal Agency: Department of the Navy		
<b>Author name:</b> Naval Facilities Engineering Command, Mid-Atlantic Division with support from the CLEAN III contractor CH2M HILL, Inc.		
<b>Review period:</b> 06 / 8 / 2003 to 01 / 30 / 2008		
<b>Date(s) of site inspection:</b> 03 / 27 / 2007		
<b>Type of review:</b> <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
<b>Review number:</b> <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
<b>Triggering action:</b> <input type="checkbox"/> Actual RA Onsite Construction <input checked="" type="checkbox"/> Actual RA Start at OU# 1 <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify)		
<b>Triggering action date (from CERCLIS):</b> March 1997		
<b>Due date (five years after triggering action date):</b> March 2008		

**Five-Year Review Summary Form (continued)****Issues:****OU1**

Several issues were identified:

- Based on evaluations of sample data and the AS/SVE system it was determined that the OU1 Site 16 AS/SVE system was not meeting its remedial objectives, was not providing significant protection to human health and the environment, and was not cost-effective. The system was shut down in February 2005.
- Based on evaluations of the pump and treat system's effectiveness it was determined that the system was no longer performing a vital role in protecting human health and the environment and the system's performance had declined since initiation. The system was shut down in February 2005.
- Results from treatability studies conducted at Buildings 133 and 137 determined that the lateral and vertical extent of the VOC plume was not well understood due to the lack of data available within the footprint of these buildings.

**OU2**

The SVE system has been ineffective at remediating Hotspot 2

**OU3, OU4, OU5, OU6, OU13**

There are no issues associated with the remedies implemented that threaten the protection of human health and the environment.

**Recommendations and Follow-Up Actions:****OU1**

A Remedial Investigation (RI) Addendum is currently underway and will include a delineation of the extent of groundwater contamination at OU1. Following the RI Addendum, a Feasibility Study (FS) will be conducted to evaluate viable remedial technologies to address contamination at OU1 and a Final ROD will be put in place.

**OU2**

- Evaluate other technologies that will remediate Hotspot 2
- Continue groundwater monitoring in accordance with the ROD for OU2.

**OU3**

Continue groundwater monitoring in accordance with the ROD for OU3.

**OU4**

Continue groundwater monitoring in accordance with the ROD for OU4.

**OU5**

Continue groundwater monitoring in accordance with the ROD for OU5. Specifically, monitoring well OU5-2GW04 should continue to be sampled for the COCs benzene, TCE, and vinyl chloride.

**OU6**

Continue groundwater monitoring in accordance with the ROD for OU6.

**OU13**

- Discontinue groundwater monitoring at wells 19GW07, 21GW02, 21GW08, 21GW09, 21GW11, and 21GW14 and properly abandon these monitoring wells in accordance with State well abandonment regulations.
- Continue groundwater monitoring at well 21GW10 in accordance with the ROD for OU13.

**Protectiveness Statement(s):****OU1**

- The pump and treat system at OU1 was an interim remedy and it was determined that the system for the Central Hotspot Area was not meeting Remedial Action Objectives (RAOs), so the system was shut down in 2005. The actions at OU 1 currently protect human health and the environment in the short term because exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to or the ingestion of contaminated groundwater. However, in order for the remedy to be protective in the long-term, a final remedy will be selected that encompasses the entire OU groundwater contamination area which includes the pump and treat and Site 16 areas to ensure long-term protectiveness.

**OU2**

- In 2003, an evaluation of the SVE system identified that three of the four Hotspots had reached the remedial goals. It was also determined that at Hotspot 2, significant contaminant mass was no longer being removed and the system was not performing as a cost-effective remedial approach. Other technologies to remediate Hotspot 2 are currently being evaluated and the implementation of the remedy is expected to be protective upon completion.
- The remedy at OU2 currently protects human health and the environment in the short term because exposure pathways to the soil and groundwater that could result in unacceptable risks are being controlled and ICs are preventing exposure to or the ingestion of contaminated groundwater.

**OU3**

- The soil remedy at OU3 is protective of human health and the environment because the AS system effectively remediated VOCs in soil. The system was shut down in 2003 and an Interim Remedial Action Completion Report was completed in September 2007.
- The groundwater remedy (MNA) at OU3 is expected to be protective, upon completion, of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to or the ingestion of contaminated groundwater. The protectiveness will continue to be verified through long-term monitoring (LTM).

**OU4**

- The remedy at OU4 is expected to be protective, upon completion, of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The ICs are preventing exposure to or ingestion of contaminated groundwater. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals, and the protectiveness will continue to be verified through LTM.

**OU5**

- The remedy at OU5 is expected to be protective, upon completion of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The ICs are preventing exposure to or ingestion of contaminated groundwater. Current monitoring data indicates that the remedy is functioning as required to achieve groundwater cleanup goals, and the protectiveness will continue to be verified through LTM.

**OU6**

- The soil remedy at OU6 is protective of human health and the environment, because the remedy effectively removed soil containing COCs and eliminated potential source for ongoing groundwater contamination.
- The groundwater remedy at OU6 is expected to be protective, upon completion, of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to or the ingestion of contaminated groundwater. The protectiveness will continue to be verified through LTM.

**OU13**

- The remedy at OU13 is expected to be protective, upon completion, of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The ICs are preventing exposure to or ingestion of contaminated groundwater. Current monitoring data indicates that the remedy is function as required to achieve groundwater cleanup goals, and the protectiveness will continue to be verified through LTM.

**Other Comments:**

None

# Contents

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<b>Executive Summary</b> .....	<b>v</b>
<b>Acronyms and Abbreviations</b> .....	<b>xvii</b>
<b>1 Introduction</b> .....	<b>1-1</b>
1.1 Facility Background.....	1-2
1.1.1 Site Operable Units .....	1-2
1.1.2 Physical Characteristics and Land Use .....	1-2
<b>2 Operable Unit 1</b> .....	<b>2-1</b>
2.1 Site History and Background .....	2-1
2.2 Site Chronology.....	2-2
2.3 Site Characterization.....	2-3
2.4 Initial Response Actions.....	2-4
2.5 Description of Remedial Actions .....	2-5
2.5.1 Remedy Implementation .....	2-6
2.5.2 Remedy Operation and Maintenance .....	2-6
2.5.3 Progress Since Last Review .....	2-7
2.6 Technical Assessment.....	2-10
2.7 Issues.....	2-10
2.8 Recommendations and Follow-up Actions .....	2-11
2.9 Protectiveness Statement .....	2-11
2.9.1 OU1 .....	2-11
2.9.1.1 OU1 Groundwater Central Hotspot Area Pump and Treat System.....	2-11
2.9.1.2 Site 16.....	2-11
<b>3 Operable Unit 2</b> .....	<b>3-1</b>
3.1 Site History and Background .....	3-1
3.2 Site Chronology.....	3-2
3.3 Site Characterization.....	3-3
3.4 Initial Response Actions.....	3-3
3.5 Description of Remedial Actions .....	3-4
3.5.1 Remedy Implementation .....	3-4
3.5.2 Remedy Operation and Maintenance .....	3-5
3.5.3 Progress Since Last Review .....	3-6
3.6 Technical Assessment.....	3-7
3.7 Issues.....	3-8
3.8 Recommendations and Follow-up Actions .....	3-8
3.9 Protectiveness Statement .....	3-8
Site 10 3-8	
<b>4 Operable Unit 3</b> .....	<b>4-1</b>
4.1 Site History and Background .....	4-1
4.2 Site Chronology.....	4-1
4.3 Site Characterization.....	4-2

4.4	Initial Response Actions .....	4-3
4.5	Description of Remedial Actions.....	4-3
4.5.1	Remedy Implementation.....	4-3
4.5.2	Remedy Operation and Maintenance.....	4-4
4.5.3	Progress Since Last Review.....	4-5
4.6	Technical Assessment .....	4-5
4.7	Issues .....	4-6
4.8	Recommendations and Follow-up Actions .....	4-6
4.9	Protectiveness Statement.....	4-6
	Site 7 .....	4-6
<b>5</b>	<b>Operable Unit 4 .....</b>	<b>5-1</b>
5.1	Site History and Background.....	5-1
5.2	Site Chronology .....	5-2
5.3	Site Characterization.....	5-2
5.4	Initial Response Actions .....	5-3
5.5	Description of Remedial Actions.....	5-3
5.5.1	Remedy Implementation.....	5-3
5.5.2	Remedy Operation and Maintenance.....	5-4
5.6	Progress Since Initiation of Remedial Action.....	5-4
5.7	Technical Assessment .....	5-5
5.8	Issues .....	5-5
5.9	Recommendations and Follow-up Actions .....	5-5
5.10	Protectiveness Statement.....	5-6
	Site 4 .....	5-6
<b>6</b>	<b>Operable Unit 5 .....</b>	<b>6-1</b>
6.1	Site History and Background.....	6-1
6.2	Site Chronology .....	6-1
6.3	Site Characterization.....	6-2
6.4	Initial Response Actions .....	6-2
6.5	Description of Remedial Actions.....	6-2
6.5.1	Remedy Implementation.....	6-3
6.5.2	Remedy Operation and Maintenance.....	6-3
6.5.3	Progress Since Last Review.....	6-4
6.6	Technical Assessment .....	6-4
6.7	Issues .....	6-5
6.8	Recommendations and Follow-up Actions .....	6-5
6.9	Protectiveness Statement.....	6-5
	Site 2 .....	6-5
<b>7</b>	<b>Operable Unit 6 .....</b>	<b>7-1</b>
7.1	Site History and Background.....	7-1
7.2	Site Chronology .....	7-1
7.3	Site Characterization.....	7-2
7.4	Initial Response Actions .....	7-2
7.5	Description of Remedial Actions.....	7-3
7.5.1	Remedy Implementation.....	7-3
7.5.2	Remedy Operation and Maintenance.....	7-4

7.5.3	Progress Since Last Review .....	7-5
7.6	Technical Assessment.....	7-5
7.7	Issues.....	7-6
7.8	Recommendations and Follow-up Actions.....	7-6
7.9	Protectiveness Statement .....	7-6
	OU6 7-6	
<b>8</b>	<b>Operable Unit 13.....</b>	<b>8-1</b>
8.1	History and Background.....	8-1
8.2	Site Chronology.....	8-2
8.3	Site Characterization.....	8-3
8.4	Initial Response Actions.....	8-3
8.5	Description of Remedial Actions .....	8-3
	8.5.1 Remedy Implementation .....	8-4
	8.5.2 Remedy Operation and Maintenance .....	8-4
	8.5.3 Progress Since Last Review .....	8-5
8.6	Technical Assessment.....	8-5
8.7	Issues.....	8-6
8.8	Recommendations and Follow-up Actions.....	8-6
	8.8.1 Site 19, 21 and 44B.....	8-6
8.9	Protectiveness Statement .....	8-6
	Sites 19, 21 and 44B.....	8-6
<b>9</b>	<b>Five-Year Review Process.....</b>	<b>9-1</b>
9.1	Administrative Components.....	9-1
	9.1.1 Administrative Components.....	9-1
	9.1.2 Community Involvement .....	9-1
	9.1.3 Document Review.....	9-1
	9.1.4 Site Inspection and Interviews.....	9-1
<b>10</b>	<b>Next Review.....</b>	<b>10-1</b>
<b>11</b>	<b>References .....</b>	<b>11-1</b>

**Appendix**

- A Site Inspection and Interview Checklist
- B Community Interview Questionnaires
- C Site Photographs

## Tables

- 1-1 Operable Unit Physical Setting
- 1-2 Operable Unit Investigation Summaries
- 1-3 Operable Unit Remedial Action Summary
  
- 2-1 O&M Costs for OU1
  
  
- 3-1 O&M Costs for OU2
- 4-1 O&M Costs for OU3
- 5-1 O&M Costs for OU4
- 6-1 O&M Costs for OU5
- 7-1 O&M Costs for OU6
- 8-1 O&M Costs for OU13
  
- 9-1 Data Review Details
- 9-2 Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Criteria (TBCs) Summary
- 9-3 Recommendations and Follow-Up Actions

## Figures

- 1-1 Operable Unit Location Map
- 2-1 Operable Unit 1 Location Map
- 3-1 Operable Unit 2 Location Map
- 4-1 Operable Unit 3 Location Map
- 5-1 Operable Unit 4 Location Map
- 6-1 Operable Unit 5 Location Map
- 7-1 Operable Unit 6 Location Map
- 8-1 Operable Unit 13 Location Map

# Acronyms and Abbreviations

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ARAR	applicable or relevant and appropriate requirements
amsl	above mean sea level
AS	air sparge
BEHP	bis(2-ethylhexyl)phthalate
BERA	Baseline Environmental Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action – Navy
COC	contaminant of concern
COPC	chemical of potential concern
DCE	dichloroethene
DNAPL	dense nonaqueous phase liquid
DO	dissolved oxygen
EAD	Environmental Affairs Department
ERA	Ecological Risk Assessment
Fe <sup>+2</sup>	ferrous iron
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
ft	foot/feet
ft <sup>2</sup>	square feet
FRC	Fleet Readiness Center – East
FS	Feasibility Study
GIS	Geographic Information System
HRC	Hydrogen Release Compound
IAS	Initial Assessment Study
IC	institutional control
IR	Installation Restoration
IRACR	Interim Remedial Action Completion Report
IRI	Interim Remedial Investigation
IROD	Interim Record of Decision
IWTP	Industrial Wastewater Treatment Plant
LTM	long-term monitoring
LTRA	Long-term Remedial Action
LUC	land use control
LUCAP	Land Use Control Assurance Plan
µg/L	micrograms per liter

MACS	Marine Air Control Squadron
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
mg/kg	milligram per kilogram
Mn <sup>2+</sup>	manganese
MNA	monitored natural attenuation
NADEP	Naval Aviation Depot
NC	North Carolina
NCDENR	North Carolina Department of Environment and Natural Resources
NCGS	North Carolina General Statutes
NCP	National Contingency Plan
NFA	no further action
NPL	National Priorities List
O&M	operation and maintenance
ORP	oxygen reduction potential
OU	operable unit
OWS	oil-water separator
PAH	polynuclear aromatic hydrocarbon
POL	petroleum, oil, and lubricants
PRAP	Proposed Remedial Action Plan
RA	Remedial Action
RAO	remedial action objective
RAR	Remedial Action Report
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SSL	Soil Screening Level
STP	Sewage treatment plant
SVE	Soil vapor extraction
SVOC	Semivolatile organic compound
SWMU	Site Waste Management Unit
TCA	trichloroethane
TCE	trichloroethene
TOC	total organic carbon
TPH	total petroleum hydrocarbon
USEPA	United States Environmental Protection Agency
UST	underground storage tank

VC	vinyl chloride
VGM	voluntary groundwater monitoring
VOC	volatile organic compound
VSI	visual site inspection
yd <sup>3</sup>	cubic yard

## SECTION 1

# Introduction

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The Department of Navy conducted a Five-Year Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Review under the Atlantic Division Comprehensive Long-term Environmental Action Navy (CLEAN) III Program, Contract No. N62470-02-D-3052, Contract Task Order 0156. The Five-Year Review was prepared for Marine Corps Air Station (MCAS) Cherry Point, located near Havelock, North Carolina, in accordance with the United States Environmental Protection Agency (USEPA) *Comprehensive Five-Year Review Guidance* (USEPA, 2001). This document addresses remedies and remedial actions (RAs) that have been implemented within all operable units (OUs) for which there is a USEPA Record of Decision (ROD) or action memorandum in place. A total of 9 OUs have been identified at MCAS Cherry Point, of which RODs exist for eight: OU1, OU2, OU3, OU4, OU5, OU6, OU13 and OU15. Of these eight OUs with RODs in place, a Five-Year Review is required for all but one. The selected remedy in the OU15 ROD is No Further Action, and the ROD stipulates that no Five-Year Review is required.

The objective of this Five-Year Review is to evaluate current remedies at OU1, OU2, OU3, OU4, OU5, OU6, and OU13 at MCAS Cherry Point and to determine whether the remedies remain protective of human health and the environment in accordance with the requirements outlined in the ROD for each OU. The principal method used to evaluate the protectiveness of the remedies was a thorough review of reports and documents pertaining to site activities and findings. The methods, findings, and conclusions from the document reviews are presented in this Five-Year Review report. In addition, the Five-Year Review report identifies any issues that may be preventing a particular remedy from functioning as designed or as appropriate, and that could endanger the protection of human health and the environment.

The Department of the Navy is preparing this Five-Year Review report pursuant to CERCLA 121 and the National Contingency Plan (NCP). CERCLA Section 121 states:

“If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.”

The USEPA interpreted this requirement further in the NCP as stated in 40 Code of Federal Regulations (CFR) 300.430 (f)(4)(ii):

“If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.”

This is the second Five-Year Review for MCAS Cherry Point. The first Five-Year Review for MCAS Cherry Point was conducted for OU1, OU2, and OU3 in 2002. The triggering action for this initial statutory review was the initiation of the RA at the OU1 Groundwater Central Hotspot Area in March 1997. The current Five-Year Review is required because hazardous contaminants remain at concentrations exceeding criteria that allow for unlimited use and unrestricted exposure at each of the seven OUs addressed in this document.

## 1.1 Facility Background

### 1.1.1 Site Operable Units

MCAS Cherry Point has nine OUs identified, of which seven OUs have RODs in place that include a RAs. OU15 has a ROD in place which stipulates no further action (NFA), and will not be discussed further in this document in accordance with the requirements set forth in the *Comprehensive Five-Year Review Guidance* (USEPA, 2001). Figure 1-1 presents the locations of all OUs within the Air Station.

The seven OUs and associated sites for which Five-Year Reviews are presented in this report are as follows:

- **OU1**—OU1 Groundwater Central Hotspot Area (Sites 15, 42, 47, 51, 52, 92 and 98) and Site 16
- **OU2**—Site 10
- **OU3**—Site 7
- **OU4**—Site 4
- **OU5**—Site 2
- **OU6**—Site 12
- **OU13**—Sites 19, 21, and 44B.

Figures 2-1, 3-1, 4-1, 5-1, 6-1, 7-1, and 8-1 show the locations of the sites within each OU.

### 1.1.2 Physical Characteristics and Land Use

MCAS Cherry Point was commissioned in 1942, and currently provides support facilities and services for the Second Marine Aircraft Wing, the Fleet Readiness Center – East (FRC, formerly Naval Aviation Depot [NADEP]), Service Support Detachment 21 of the Second

Force Service Support Group, the Naval Air Maintenance Training Group Detachment, and the Defense Reutilization and Marketing Office (CH2M HILL, 2006a). MCAS Cherry Point is located in the southeastern portion of Craven County, North Carolina. It covers approximately 13,164 acres on a peninsula north of Core and Bogue Sounds and south of the Neuse River. It is bounded on the east by Hancock Creek, on the south by North Carolina Highway 101, on the west by an irregular boundary line approximately 0.75 mile west of Slocum Creek, and on the north by the Neuse River (Figure 1-1).

MCAS Cherry Point is located in an environmentally sensitive area surrounded by natural surface water bodies, including Slocum Creek, Luke Rowe's Gut, and Sandy Branch (TetraTech NUS, 1999a). Several aquifers underlie MCAS Cherry Point, including the surficial aquifer, Yorktown Aquifer, Pungo River Aquifer, and Castle Hayne Aquifer. All groundwater at MCAS Cherry Point, including the surficial aquifer, is designated as Class GA water by the State of North Carolina. Such water is considered an existing or potential source of drinking water. Slocum Creek and Sandy Branch are Class C fresh water bodies suitable for fish and wildlife, propagation, secondary recreation, and other uses except primary recreation and as a source of water supply as designated by the State of North Carolina. Table 1-1 shows a summary of environmentally sensitive areas for each OU.

Environmental impacts that have occurred as a result of past practices at MCAS Cherry Point have been identified through remedial investigations (RIs). A summary of these environmental impacts relative to the location within each site and OU is summarized in Table 1-1. The investigation results and historical land use, the identified COPCs, and human health and ecological risk summary are presented in Table 1-2. Table 1-3 presents a summary of the current site status, the RAs, and RAOs for each OU.

TABLE 1-1  
Operable Unit Physical Setting  
MCAS Cherry Point

Physical Setting				
OU	Site	Site and Source Locations	Located in an Environmentally Sensitive Area?	Within a Populated Area? <sup>1</sup>
1	16 – Sandy Branch Landfill	Located near the western boundary of OU1 (Figure 2-1). Chlorinated VOCs in groundwater are migrating from upgradient sources through OU1 (TetraTech NUS, 1999b).	East Prong Slocum Creek and Sandy Branch located along the western and northern sides of OU1 are Class C fresh water bodies for fish and wildlife propagation, agriculture, and secondary recreation uses (OHM, 2000a).	No
	FRC central hot spot area	Located in the central region of OU1 (Figure 2-1). Surficial aquifer groundwater impacts resulted from activities at Sites 15, 40, 42 (IWTP), 47, 51, 52, 92, 98, and tank farms and USTs located within OU1 (B&R, 1996).	There are no ecological sensitive areas at FRC. Groundwater is the major source of water for the area. The Upper Castle Hayne aquifer is the principal water supply source for the area and underlies the Pungo River aquifer, which underlies the Yorktown aquifer. The closest Air Station supply wells are wells 15 (approximately 800 ft northwest of OU1) and well 14 (approximately 800 ft north of well 15).	No
2	10 – Old sanitary landfill	Site 10 is a 40-acre landfill area that served as the primary disposal site at the Air Station from 1955 until the mid-1980s. (Figure 3-1). The fire training area in the southern portion of Site 10, landfilling activities, and the former sludge disposal impoundments are potentially responsible for the soil and groundwater contamination in OU2 (B&R, 1997a).	Turkey Gut crosses through central part of Site 10 and discharges to Slocum Creek, which is immediately adjacent on the west side of OU2. Portions of Site 10 are classified as wetland areas (OHM, 1999d).	No
	44A – Former sludge application area	Site 44A is located south of Site 46, in the northern part of OU2 (Figure 3-1).	Turkey Gut crosses through the central part of Site 10 to Slocum Creek, which is immediately adjacent on the west side of OU2.	No
	46 – Polishing ponds	Site 46 is located in the northwest corner of OU2 (Figure 3-1).	Same as above.	No
	76 – Vehicle maintenance area	Site 76 is located in the south side of OU2 (Figure 3-1).	Same as above.	No

TABLE 1-2  
Operable Unit Investigation Summaries  
MCAS Cherry Point

OU	Historical Land Use <sup>a</sup>	Current/Future Land and Groundwater Use	COPC Categories				Human Health and Ecological Risk Summary <sup>a</sup>
			Soil	Groundwater	Surface Water	Sediments	
1	<p>Site 15 – Wastes (incl. petroleum, oil and lubricants, solvents, metals) stored from 1940s to 1975</p> <p>Site 40 – Hazardous wastes (including spent solvent, paint stripping solutions) stored from 1979 to 1986</p> <p>Site 42 – IWTP</p> <p>Site 47 – Industrial sewer system connecting industrial areas of the Air Station with the IWTP</p> <p>Sites 51 and 52 – Plating operations (incl. acid rinses, cadmium plating) from 1942 to 1990</p> <p>Tank farms and USTs to store petroleum products (incl. lubricants, jet fuel)</p> <p>Site 16 – Disposal site (including tanks, drums containing petroleum products) from 1946-1948 (OHM, 1997c)</p>	<p>OU1 encompasses the majority of Air Station industrial activities. Currently active for industrial activities, including IWTP and sewer system.</p> <p>Site 16 is currently used to store construction materials and automobiles.</p>	N/A	<p>CVOCs, petroleum VOCs, SVOCs, metals</p>	N/A	N/A	<p>Risks exist and are primarily related to the potential migration from the Central hot spot area to downgradient surface water bodies and the underlying Yorktown Aquifer.</p>
2	<p>Site 10 – Fire training, petroleum storage, sludge (incl. solvents, plating sludge), impoundments, unlined landfill for petroleum, oil and lubricants</p> <p>Site 44A – Sludge application from sewage treatment plant</p> <p>Site 46 – Sewage treatment plant polishing ponds</p> <p>Site 76 – Vehicle maintenance (CH2M HILL, 1999)</p>	<p>Site 76 is the only active site within OU2.</p> <p>Aquifer use is restricted except monitoring wells (CH2M HILL, 1999).</p>	<p>0 to 2 ft: PAHs, PCBs, metals</p> <p>0 to 10 ft: metals</p>	<p>Groundwater: Chlorinated and petroleum VOCs, PAHs, pesticides, aldehydes</p> <p>Leachate seep: petroleum and CVOCs, pesticides, metals</p>	<p>Turkey Gut: SVOCs, pesticides, metals</p> <p>Slocum Creek: pesticide</p>	<p>Turkey Gut: metals</p> <p>Slocum Creek: metals</p>	<p>Unacceptable risks exist for future site residents in surface soil and surficial aquifer.</p> <p>No critical habitats or endangered species affected by site contamination.</p> <p>No unacceptable risks exist for ecological receptors.</p>

Physical Setting

OU	Site	Site and Source Locations	Located in an Environmentally Sensitive Area?	Within a Populated Area? <sup>1</sup>
3	6 – Fly ash ponds	Site 6 is located in the northeast part of OU3 (Figure 4-1). Site 6 consisted of three unlined ponds (removed in 1996), which were used for fly ash and alum/lime sludge disposal (TetraTech NUS, 2000).	Nearest water supply wells are 1,400 feet downgradient from the Site 6 boundary (TetraTech NUS, 2000). Slocum Creek is immediately adjacent to OU3 (Figure 4-1).	No
	7 – Old incinerator and adjacent area	Site 7 is located in the south part of OU3 (Figure 4-1). The western portion of Site 7 was used for incinerator fly ash disposal and open burning, which is believed to be the possible source of the contamination (TetraTech NUS, 2000).	Same as above, including existing wetland immediately located in the north portion of Site 7 (Figure 4-1). Luke Rowe's Gut is immediately adjacent to Site 7 in the north (TetraTech NUS, 2000).	No
4	Area A – Site 4 - Borrow pit / Landfill	Area A – Site 4 is located north of Runway 14L, situated in the northeastern portion of OU4 (Figure 5-1). The deposition of demolition, asbestos, and other unknown wastes into borrow pits is the source of the contamination (TetraTech NUS, 2002).	OU4 is bounded by Mill Creek to the south and west. Wetland areas are located adjacent to Mill creek, and a small portion is located within the 100-year floodplain. A small pond is located adjacent to the western edge of the landfill (CH2M HILL, 2005e).	No
	Area B – Lined drum storage area	Area B is located in the northeast corner of OU4 (Figure 5-1). Potential leakage from the lined drum storage area is also a possible source of contamination at OU4 (TetraTech NUS, 2002).	Same as above, including a small wetland located near the drum storage area (CH2M HILL, 2005e).	No
5	Site 1 - Borrow pit / Landfill	Site 1 is located west of an access road near the Marine Air Control Squadron Unit-6 (MACS-6) (Figure 6-1). The fill and waste material associated with the borrow pits and landfill are believed to be the source of contamination at Site 1.	Site 1 currently consists of wooded land. A dammed pond is located within Site 1. The boundaries of Site 1 are approximately 100 feet from Reeds Gut to the north, along an unnamed tributary to the west (CH2M HILL, 2005b).	No
	Site 2 - Borrow pit / Landfill	Site 2 is located east of an access road in the northeastern portion of MCAS Cherry Point, directly opposite Site 1 (Figure 6-1). The fill and waste material associated with the borrow pits and landfill are believed to be the source of contamination at Site 2.	Site 2 currently consists of wooded land with significant amounts of underbrush. The boundaries of Site 2 include an unnamed tributary to Reeds Gut to the east and northeast (CH2M HILL, 2005b).	No

Physical Setting

OU	Site	Site and Source Locations	Located in an Environmentally Sensitive Area?	Within a Populated Area? <sup>1</sup>
6	Site 12 – Crash crew training area	Site 12 is located in the southeastern portion of MCAS Cherry Point, on the eastern portion and the south side of Runway 28 (Figure 7-1). A former burn pit is the primary source of subsurface contamination at Site 12.	Site 12 is located on Runway 28, which is bordered by grassy areas to the north, south, and east, with dense woods beyond the grass. Hancock Creek is located approximately 700 ft east of the eastern edge of the runway (CH2M HILL, 2005c).	No
13	19 – Borrow pit/landfill	Site 19 is located north of Runway 32L in OU13 (Figure 8-1). The area was used for incinerator fly ash disposal and landfilling activities, which is believed to be the source of the groundwater contamination (CH2M HILL, 2005f).	Shop Branch marks the southern boundary of Site 19 as it flows to Hancock Creek, which is immediately adjacent to the east. A small backwater exists where Shop Branch joins Hancock Creek (CH2M HILL, 2005f).	No
	21 – Borrow pit/landfill	Site 21 is located south of Runway 32L in OU13 (Figure 8-1). The area was used for incinerator fly ash disposal and landfilling activities, which is believed to be the source of the groundwater contamination (CH2M HILL, 2005f).	Shop Branch runs through Site 21 before crossing under the runway and emptying into Hancock Creek (CH2M HILL, 2005f).	No
	44B – Former sludge application area	Site 44B is located south of Site 21 in OU13 (Figure 8-1). The area was used for former sludge disposal and landfilling activities including asbestos pipe disposal, which is believed to be the source of the groundwater contamination (CH2M HILL, 2005f).	Shop Branch runs near the western boundary of Site 44B. Hancock Creek also runs along the eastern boundary of the site (CH2M HILL, 2005f).	No

<sup>1</sup> A populated area refers to areas which are inhabited.

OU	Historical Land Use <sup>a</sup>	Current/Future Land and Groundwater Use	COPC Categories				Human Health and Ecological Risk Summary <sup>a</sup>
			Soil	Groundwater	Surface Water	Sediments	
3	<p>Site 6 – Lime/alum sludge, and fly ash and cinder disposal ponds</p> <p>Site 7 – Fly ash disposal, open burning of waste (including petroleum oil and lubricants), and incinerator (TetraTech NUS, 2000)</p>	<p>OU3 is now vacant, unused land.</p> <p>OU3 is restricted for future industrial development only.</p> <p>The withdrawal and/or future use of groundwater, except for monitoring from the surficial aquifer is prohibited (TetraTech NUS, 2000).</p>	<p>0-1 foot: pesticides, PAHs, metals</p> <p>0 to 10 ft: petroleum VOCs, PAHs, metals, furan</p>	<p>Petroleum and CVOCs, pesticide, metals SVOCs, insecticide</p>	<p>CVOCs, SVOCs, metals</p>	<p>Metals<sup>b</sup></p>	<p>Unacceptable risks exist for future residents from surface soil and surficial aquifer.</p> <p>Unacceptable risks exist for future construction workers from surface soil.</p> <p>No unacceptable risks exist for ecological receptors.</p>
4	<p>Area A – IR Site 4, Several borrow pits used for waste disposal, construction debris and fly ash landfill, and asbestos disposal area.</p> <p>Area B – Lined drum storage area.</p>	<p>Area A is now an active land clearing and inert debris landfill (permit filed in 1997).</p> <p>Area B is used for the storage of raw material for the NADEP.</p> <p>The withdrawal and/or future use of groundwater, except for monitoring from the surficial aquifer is prohibited (CH2M HILL, 2005).</p>	N/A	<p>1,1,2,2-TCA<sup>c</sup> and Benzene</p>	N/A	N/A	<p>Unacceptable risks exist for potential future adult residents and future lifelong resident from ingestion of groundwater, future child resident and future adult resident from exposure to groundwater, and adult recreational users from ingestion of fish.</p> <p>No unacceptable risks exist for ecological receptors.</p>

OU	Historical Land Use <sup>a</sup>	Current/Future Land and Groundwater Use	COPC Categories				Human Health and Ecological Risk Summary <sup>a</sup>
			Soil	Groundwater	Surface Water	Sediments	
5	<p>Site 1 is a former borrow pit that was later used for waste disposal.</p> <p>Site 2 is also a former borrow pit that was later used for waste disposal.</p>	<p>Most of OU5 is wooded unused land.</p> <p>Sites 1 and 2 consist of wooded land that is not being used. There are no plans to develop these areas.</p> <p>Groundwater beneath OU5 is not used as a water supply.</p>	N/A	TCE, VC, and Benzene	N/A	N/A	<p>Cumulative hazards across media for residential child for Sites 1 and 2 with regards to arsenic</p> <p>Cumulative hazards across media exceed USEPA benchmark levels for residential adult and child, at Site 1 and for residential child at Site 2, with regards to arsenic. However, the arsenic concentrations at OU5 are consistent with background concentrations at MCAS Cherry Point and are not associated with site activities.</p> <p>No unacceptable risks exist for ecological receptors.</p>
6	<p>Site 12 consists of one active burn pit used for crash crew training and five former burn pit locations. It is a former borrow pit area that was later used for waste disposal.</p>	<p>Site 12 includes an active burn pit used for training of crash-crew fire and rescue personnel. There are no plans for land use changes at OU6.</p> <p>Groundwater beneath OU6 is not used as a water supply.</p>	Ethylbenzene, 2-methylnaphthalene, and naphthalene	Arsenic, Ethylbenzene, 2-methylnaphthalene, and naphthalene	N/A	N/A	<p>Unacceptable risks include cancer risks and non-cancer hazards for a future resident from exposure to surface soil and groundwater.</p> <p>No unacceptable risks exist for ecological receptors.</p>

OU	Historical Land Use <sup>a</sup>	Current/Future Land and Groundwater Use	COPC Categories				Human Health and Ecological Risk Summary <sup>a</sup>
			Soil	Groundwater	Surface Water	Sediments	
13	Site 19 – Landfill for fly ash and waste disposal	OU13 is vacant except for Runway 32L.	N/A	CVOCs, SVOCs	CVOCs, SVOCs	N/A	Unacceptable risks exist for future residents from groundwater.
	Site 21 – Landfill for fly ash and waste disposal	No plans for future land use with the exception of the currently active runway.					No unacceptable risks exist for ecological receptors.
	Site 44B – Landfill for waste disposal, including asbestos pipe and application of sludge from Air Station sewage treatment plant (CH2M HILL, 2005).	No plans to develop the aquifer for future water supply (CH2M HILL, 2005).					

<sup>a</sup> B & R, August 1996; CH2M HILL, April 1999 and 2000.

<sup>b</sup> Located in Luke Rowe's Gut and Slocum Creek.

<sup>c</sup> Stated as COC in ROD, removed as COC in May 2006.

<sup>d</sup> Arsenic concentrations at OU5 are consistent with background concentrations at MCAS Cherry Point and are not associated with site activities.

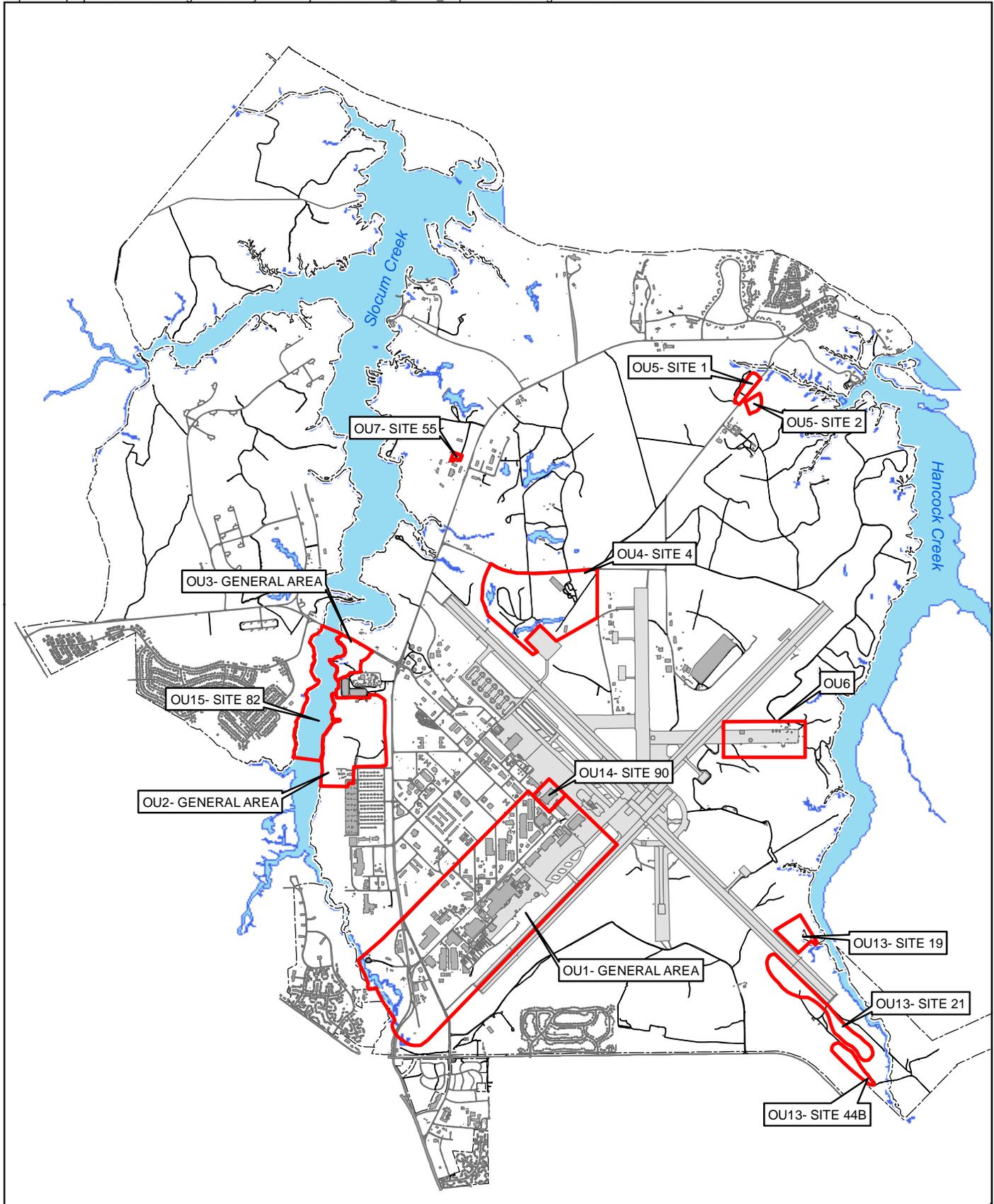
TABLE 1-3  
Operable Unit Remedial Action Summary  
MCAS Cherry Point

OU	Site	Site Status (Active/ Inactive)	Remedial Actions	Remedial Action Objectives	Documents Detailing RA and RAOs
1	16	Active (OHM, 1997c)	AS and SVE.	Remove VOCs from soil and groundwater to protect Slocum Creek from contaminated groundwater migration from NADEP central hot spot and localized contamination onsite.	O&M, 1999; Work Plan, 1997; LTRA, 2000; and SAP, 1997.
	NADEP central hotspot area	Active industrial activities at NADEP.	Groundwater pumping and treatment.	Protection of human receptors from adverse health effects that may result from dermal contact, ingestion, and inhalation for contaminants in the groundwater from the surficial aquifer beneath OU1.  Mitigation of surficial aquifer contamination into the underlying Yorktown aquifer and into downgradient surface water bodies.  Overall protection of the environment and human health.  Pretreatment of extracted groundwater to achieve optimum efficiency and economy when discharging flows through the existing IWTP.	LTRA, 2000; Interim ROD, 1996; and SAP, 1998.
	51 and 52		HRC® Injection	Assess effectiveness and implementability of treating CVOCs in the subsurface to enhance anaerobic biodegradation of CVOCs in the groundwater by indigenous microorganisms.	CH2M HILL, 2006d; Treatability Study Work Plan, 2001.
	Bldg 133/137		EHC Injection	Assess effectiveness of substrate to enhance in situ anaerobic biodegradation, mitigate CVOC migration, enhance downgradient natural attenuation, and collect additional technical information to support evaluation of natural attenuation in lower CVOC concentration areas.	CH2M HILL, 2006d; Treatability Study Work Plan, 2004.

<b>OU</b>	<b>Site</b>	<b>Site Status (Active/Inactive)</b>	<b>Remedial Actions</b>	<b>Remedial Action Objectives</b>	<b>Documents Detailing RA and RAOs</b>
2	10	Petroleum storage area is inactive  Sludge impoundments closed (CH2M HILL, 1999)	MNA of groundwater. SVE at the four identified hot spot soil areas containing organics. Institutional controls to limit possible exposure to contaminants.	Protect groundwater from leachable organics at areas identified in the ROD.  Remediate groundwater to achieve the performance standards listed in the ROD.	WP, 1997; SAP, 1997; O&M Plan, 1998; ROD, 1999; LTRA, 1999; and RAR, 1999.
	44A	Currently inactive (CH2M HILL, April 1999)	MNA of groundwater. Institutional controls to limit possible exposure to contaminants.	Remediate groundwater to achieve the performance standards listed in the ROD.	WP, 1997; SAP, 1997; O&M Plan, 1998; ROD, 1999; LTRA, 1999; and RAR, 1999.
	46	Currently inactive following RCRA site closure. (CH2M HILL, 1999)	MNA of groundwater. Institutional controls to limit possible exposure to contaminants.	Remediate groundwater to achieve the performance standards listed in the ROD.	WP, 1997; SAP, 1997; O&M Plan, 1998; ROD, 1999; LTRA, 1999; and RAR, 1999.
	76	Active (CH2M HILL, 1999)	MNA of groundwater. Institutional controls to limit possible exposure to contaminants.	Remediate groundwater to achieve the performance standards listed in the ROD.	WP, 1997; SAP, 1997; O&M Plan, 1998; ROD, 1999; LTRA, 1999; and RAR, 1999.
3	6	Currently inactive following RCRA site closure (TetraTech NUS, 2000)	Institutional controls limiting land use to industrial use only and prohibiting the use of groundwater for any purpose other than monitoring activities.	Protect future residents from exposure to contaminated groundwater.	WP, 1999; SAP, 1999; O&M Plan, 2000; ROD, 2000; LTRA, 2000; and RAR, 2000.
	7	Currently inactive (TetraTech NUS, 2000)	MNA of groundwater. AS for soil benzene contamination. Institutional controls limiting land use to vacant land and prohibiting the use of groundwater for any purpose other than monitoring activities.  Fence surrounding all of Site 7.	Protect future residents from exposure to contaminated soil and waste/fill material.  Protect future construction workers from exposure to waste/fill material and contaminated soil.  Protect future residents from exposure to contaminated groundwater.	WP, 1999; SAP, 1999; O&M Plan, 2000; ROD, 2000; LTRA, 2000; and RAR, 2000.

<b>OU</b>	<b>Site</b>	<b>Site Status (Active/ Inactive)</b>	<b>Remedial Actions</b>	<b>Remedial Action Objectives</b>	<b>Documents Detailing RA and RAOs</b>
4	4	Active for NADEP raw material storage (CH2M HILL, 2006b)  Inactive borrow pit/landfill	Institutional controls prohibiting the use of groundwater for any purpose other than monitoring activities.  MNA of groundwater.	Prevent human exposure to groundwater containing COCs in excess of NC Groundwater Quality standards.  Achieve suitability of OU4 groundwater for unlimited use with a reasonable approach and within a reasonable timeframe.  Reduce exceedances of COCs to meet the NC Groundwater Quality standards.  Reduce exceedances of COCs to meet the NC 2L standards (Table 2-1).	FFS, 2004; PRAP, 2005; ROD, 2005; RD, 2006; IRACR, 2006; LTMR, 2007
5	2	Inactive (CH2M HILL, 2006c)	Institutional controls prohibiting the use of groundwater for any purpose other than monitoring activities.  MNA of groundwater.	Prevent human exposure to groundwater containing COCs in excess of NC Groundwater Quality standards.  Achieve suitability of OU4 groundwater for unlimited use with a reasonable approach and within a reasonable timeframe.  Reduce exceedances of COCs to meet the NC 2L standards.	FFS, 2005; PRAP, 2005; ROD, 2006; RD, 2007; LTMR, 2007

<b>OU</b>	<b>Site</b>	<b>Site Status (Active/ Inactive)</b>	<b>Remedial Actions</b>	<b>Remedial Action Objectives</b>	<b>Documents Detailing RA and RAOs</b>
6	12	Active for crash crew training (CH2M HILL, 2006)	Excavation and offsite disposal of approximately 1,333 cubic yards of soil beneath former Burn Pit E location.  Institutional controls prohibiting the use of groundwater for any purpose other than monitoring activities.  MNA of groundwater.	Prevent human exposure to soil containing COCs in excess of NC SSL standards.  Prevent human exposure to groundwater containing COCs in excess of NC 2L standards.  Achieve suitability of OU4 groundwater for unlimited use with a reasonable approach and within a reasonable timeframe.  Reduce exceedances of COCs to meet the NC 2L standards.	RI, 2005; SRI, 2005; FS, 2006; ROD, 2006; VGMR, 2006
13	19	(CH2M HILL\ HILL, 2005)	MNA of groundwater.  Institutional controls to limit possible exposure to contaminants.	Remediate groundwater to achieve the performance standards listed in the ROD.	FS, 2004; PRAP, 2005; ROD, 2005; Remedial Design, 2006; and IRACR, 2006
	21	(CH2M HILL, 2005)	MNA of groundwater.  Institutional controls to limit possible exposure to contaminants.	Remediate groundwater to achieve the performance standards listed in the ROD.	FS, 2004; PRAP, 2005; ROD, 2005; RD, 2006; and IRACR, 2006
	44B	(CH2M HILL, 2005)	MNA of groundwater.  Institutional controls to limit possible exposure to contaminants.	Remediate groundwater to achieve the performance standards listed in the ROD.	FS, 2004; PRAP, 2005; ROD, 2005; RD, 2006; and IRACR, 2006



**Legend**

- Operable Unit (OU) Boundary
- Installation Boundary
- Existing Buildings
- Paved Road
- Unpaved Road
- Runway
- Intermittent Water Body
- Permanent Water Body

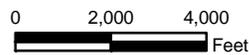


Figure 1-1  
Operable Units  
Five Year Review  
MCAS Cherry Point, North Carolina

# Operable Unit 1

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## 2.1 Site History and Background

OU1 is an industrial area consisting of 12 Federal Facility Agreement (FFA) sites, assigned on the basis of the proximity of these sites to each other within the industrialized section. The boundaries of OU1, the OU1 Groundwater Central Hotspot Area, and Site 16 are shown on Figure 2-1.

RI activities conducted by TetraTech NUS from the early 1990s through 2001 identified a volatile organic compound (VOC) plume that extended beneath the majority of the southeastern portion of OU1, and also beneath a small portion of Building 133. During subsequent groundwater sampling in 2004 in preparation for a treatability study beneath Building 133, high VOC concentrations were identified in an area that was previously thought to be outside the extent of the plume. Further investigation activities revealed that the highest VOC concentrations in the OU1 plume were located beneath Building 133.

Seven of the 12 FFA sites located within OU1 have been identified as contributing to the VOC groundwater plume beneath OU1. Because these sites make up only a portion of OU1, interim decisions will be completed for each isolated area.

- **Site 15 – Ditch and Area behind FRC** is located along the southeastern edge of OU1. The Initial Assessment Study (IAS), prepared by Water and Air Research, Inc. in 1983, indicated that wastes generated at FRC were historically washed down floor drains in Building 133 that discharged to a nearby drainage ditch (WAR, 1983). Some solid materials were also reportedly dumped along the edge of the ditch.
- **Site 42 – Industrial Wastewater Treatment Plant (IWTP)** is located near the center of OU1, north of A Street. Site 42 specifically consists of the soil and groundwater around the IWTP structure (Solid Waste Management Unit [SWMU] C-4). Waste streams in the Industrial Area Sewer System (Site 47) discharge to the IWTP, which currently discharges treated effluent to the Air Station Sewage Treatment Plant (STP).
- **Site 47 – Industrial Area Sewer System** is a system of underground pipes and aboveground drains that convey wastewater from various parts of the facility to the IWTP.
- **Site 51 – Building 137 Former Plating Shop** operated from 1942 to 1990, and included a 3-foot (ft) deep sump for containment of spillage and tank overflows.
- **Site 52 – Building 133 Former Plating Shop and Ditch** was located in FRC in the central portion of OU1. The plating shop operated from 1942 to 1990, and consisted of an area of approximately 2,000 square feet (ft<sup>2</sup>) that included a 2.5-ft deep sump for containment of spillage and tank overflows. The sump waste was likely discharged to a former ditch behind Building 133.

- **Site 92 – VOCs in Groundwater near the Stripper Barn** includes a portion of the chlorinated VOC plume near the Stripper Barn portion of Building 137, where paint is removed from aircraft.
- **Site 98 – VOCs in Groundwater near Building 4032** includes a portion of the OU1 VOC plume southeast of the IWTP in the central portion of OU1, near Building 4032. Site 98 was discovered by MCAS Cherry Point during an investigation of underground storage tanks (USTs) at Building 4032 in 1994, and was identified as a new site for inclusion in the FFA in 1999.

Site 16, the Sandy Branch Landfill, has also been identified as contributing to the VOC groundwater plume at OU1. However, these contributions are minimal and are not targeted as a source of VOC contamination at OU1.

## 2.2 Site Chronology

A site chronology of key events and documents for OU1 is presented below.

Date	Event
1975	Use of Site 15 area and ditch behind FRC discontinued (B & R, 1996).
1985-1995	OU1 Groundwater Central Hotspot Area was identified as one of the four Hotspot groundwater areas (B & R, 1996).
December 1994	MCAS Cherry Point placed on the National Priorities List (NPL) (TetraTech NUS, 1999a).
1996	Demolition of Plating Shop Sites 51 and 52 began (B & R, 1996).
February 1996	Focused RI/Feasibility Study (FS) Report became available.
June 1996	Interim Proposed Remedial Action Plan (PRAP) for OU1 Groundwater Central Hotspot Area groundwater released (B & R, 1996).
September 1996	Interim ROD signed for OU1 Groundwater Central Hotspot Area groundwater.
1997	Time-critical removal action performed at Site 16 to remove debris piles containing asbestos, steel condensate tanks, and soil containing petroleum hydrocarbons (TetraTech NUS, 1999a and OHM, 2000a).
March 1997	Extraction well drilling at OU1 Groundwater Central Hotspot Area started.
July 1997	An Interim PRAP presenting extraction and pretreatment of contaminated groundwater and discharge of treated water to the STP or IWTP as the preferred remedy for OU1 Groundwater Central Hotspot Area became available.
September 1997	Delivery order issued to install air sparging (AS) and soil vapor extraction (SVE) equipment at Site 16 (OHM, 2000a) for a non-time critical removal action.
December 1997	Sampling and Analysis Plan (SAP) prepared by OHM (OHM, 1997a).
December 1997	Work Plan for construction and operation of AS system prepared by OHM.
March 1998	AS and SVE wells installed (OHM, 2000a).
April, 1998, October 1998, and March 1999	Baseline groundwater sampling for the OU1 Groundwater Central Hotspot Area conducted (OHM, 2000a).
August 1998	SAP prepared by OHM Remediation Services.

Date	Event
September 1998	AS/SVE system at Site 16 started (OHM, 2000a).
October 1998	Baseline sampling at Site 16 (OHM, 2000a).
October 1998	Final inspection of the AS/SVE system at Site 16 (OHM, 2000a).
December 1998	Initial groundwater extraction system for the OU1 Groundwater Central Hotspot Area started (OHM, 2000b).
January 1999	Operation and Maintenance (O&M) Plan prepared by OHM.
November 1999	Responsibility of the IWTP was transferred from OHM to the Air Station (Site interview with Mr. Taylor Sword in October 2001).
2000	RI activities initiated by TetraTech NUS.
April 2000	Draft Long-term Remedial Action (LTRA) Work Plan prepared by OHM (OHM, 2000c).
March 2001	Condensate from Site 16 AS/SVE system allowed to directly discharge to ground (Consensus item # 0301-01-D).
May 2001	Annual O&M Status Report for IWTP prepared by OHM.
2001	Enhanced Bioremediation treatability study using Hydrogen Release Compound (HRC) at Site 51 initiated.
November 2002	OU1 Final RI report submitted by TetraTech NUS.
November 2002	First Five-Year Review Report finalized.
July 2003	OU1 Step 3A Addendum to Ecological Risk Assessment (ERA) prepared.
December 2004	Baseline groundwater sampling event conducted for a treatability study revealed higher VOC concentrations beneath Building 133 than previously known.
2005	Enhanced bioremediation treatability study using EHC (a proprietary injectate consisting of a controlled release carbon source and zero-valent iron; used to enhance reductive dechlorination and abiotic dechlorination) initiated at Sites 51 and 52 (Final monitoring event November 2005).
February 2005	Shut-down of the Central Hotspot Pump and Treat System.
February 2005	Shut-down of the Site 16 AS/SVE system.
August 2005	OU1 Baseline ERA (BERA) finalized.
March 2006	Post-BERA Ecological Investigation
2003-2006	Conducted several Voluntary Groundwater Monitoring (VGM) events at selected OU1 monitoring wells to further define groundwater contamination.
August 2007	Draft Engineer's Estimate/Cost Analysis for Tributary 2 Removal Action

## 2.3 Site Characterization

Findings for the OU1 investigations are summarized below:

- The investigation results identified the OU1 Groundwater Central Hotspot Area groundwater plume as an area where VOC concentrations have the greatest potential to endanger public health and the environment (B & R, 1996).
- The groundwater contamination that resulted from activities at the following sites triggered the interim RA for the OU1 Groundwater Central Hotspot Area (B & R, 1996):
  - **Site 15** – Area and ditch behind FRC
  - **Site 40** – FRC former drum storage area
  - **Site 42** – IWTP
  - **Site 47** – Industrial sewer system
  - **Site 51** – Building 137 plating shop
  - **Site 52** – Building 133 plating shop and drainage ditch
  - Tank farms and underground (UST) sites located within OU1
- The most prevalent contaminants of concern (COCs) detected in the OU1 Groundwater Central Hotspot Area groundwater plume include trichloroethene (TCE), vinyl chloride (VC), 1,2-dichloroethene (1,2-DCE), and benzene (B & R, 1996).
- Floating, free-product petroleum is present on the groundwater surface near Building 133 in the OU1 Groundwater Central Hotspot Area (B & R, 1996).
- The surficial aquifer at Site 16 has been impacted by chlorinated VOCs from upgradient sources (OHM, 1997b).
- Groundwater in the surficial aquifer generally flows to the west towards Slocum Creek (OHM, 1997b).
- Results from ecological risk assessments at OU1 indicate some risks are present from several inorganic and organic chemicals of potential concern (COPCs) for both terrestrial and aquatic receptors.
- The results of a baseline sampling event conducted for a treatability study involving the injection of EHC into groundwater in the surficial aquifer indicated that the VOC plume in the vicinity of Building 133 contained significantly higher COC concentrations than previously identified and extended beyond previously delineated boundaries (CH2M HILL, 2006a).
- Results from the treatability studies conducted at Buildings 133 and 137 determined that the lateral and vertical extent of VOCs beneath these buildings are not well understood due to the lack of data available within the footprints of these buildings.
- Performance evaluations of the OU1 Central Hotspot Pump and Treat System indicated a general decrease in VOC concentrations from the extraction wells since the startup of the system and concluded that the pump and treat system was not suitable to control plume migration. As a result, the pump and treat system was shut down in 2005.

## 2.4 Initial Response Actions

- Several pre-ROD response actions were implemented by MCAS Cherry Point to limit contaminant migration at several possible source areas within OU1. Those response

actions included (B & R, 1996): Modifying current operations at the FRC area to limit the use of chlorinated solvents.

- Closing or discontinuing use of Sites 15, 40, 51, and 52 with respect to historical industrial activities.
- Conducting or planning remedial activities for Sites 40, 47, 51, and 52.
- Repairing leaking underground industrial pipelines at the OU1 Groundwater Central Hotspot Area.
- Removing leaking USTs and remediating contaminated UST sites.
- A time-critical action performed at Site 16 to remove debris piles containing asbestos, steel condensate tanks, and soil containing petroleum hydrocarbons.

## 2.5 Description of Remedial Actions

Surficial aquifer groundwater contamination in the OU1 Groundwater Central Hotspot Area, following the general direction of groundwater flow (westerly and southwesterly), would eventually migrate to East Prong Slocum Creek and smaller surface water bodies near the western boundary of OU1. In addition, to a limited extent, some groundwater contamination has apparently migrated to the underlying Yorktown Aquifer. Although the surficial aquifer and underlying Yorktown Aquifer are not current drinking water sources for MCAS Cherry Point or surrounding communities, the deeper underlying Pungo River and Castle Hayne Aquifers are the primary drinking water sources for the Air Station and surrounding communities, and could eventually be impacted (B & R, 1996). As a result, the interim groundwater remedial action (pump and treat) was primarily implemented to provide some containment of the VOC plume in groundwater to protect the surface water where groundwater would eventually discharge as well as the underlying aquifers. A secondary objective was to reduce VOC concentrations to concentrations below Maximum Contaminant Levels (MCLs) and State groundwater standards.

VOC concentrations exceeding Federal or State standards were also detected in the surficial aquifer at Site 16. This contamination is believed to have originated both locally and from the upgradient FRC area. AS and SVE were implemented at Site 16 to contain the VOC plume and to prevent the discharge of VOCs to surface water (OHM, 2000a).

Refer to Table 1-1 and 1-2 for a summary of the areas and associated constituents of potential concern. The remedial components at the OU1 Groundwater Central Hotspot Area and Site 16 included the following:

- A groundwater extraction system covering three areas: Building 4224/Building 133 area; IWTP area; and Building 159 area.
- A groundwater treatment system at the IWTP that included the following components:
  - Equalization tank
  - Iron oxidation
  - Flash mixing/flocculation/clarification
  - Pressure sand filtration

- Air stripping
  - Discharge of treated effluent to the MCAS Cherry Point wastewater treatment plant
  - Off-gas emissions controlled by catalytic oxidation
  - Solids handling
- The monitoring program in the OU1 Groundwater Central Hotspot Area included:
    - Sampling effluent air at equalization tank vent and stripping tower vent
    - Sampling groundwater semiannually
    - Measuring monitoring well water levels and dissolved oxygen (DO); vacuum pressure at each extraction well; and organic vapors to balance, optimize, and evaluate the performance of the system
  - At Site 16, the RA consisted of an AS/SVE groundwater remedial system, which included 40 air injection and 44 SVE wells, operating in two treatment segments, or compounds.
  - The performance monitoring of the AS/SVE system at Site 16 included:
    - Measuring air influent between and after carbon cells, and at well heads
    - Measuring vacuum at well heads and monitoring wells, pressure at air injection wells, water levels in monitoring and air injection wells, and DO levels in wells
    - Sampling of air discharge from the stack
    - Sampling groundwater quarterly

### 2.5.1 Remedy Implementation

The interim ROD for OU1 was signed in September 1996 and a pump and treat system was installed in 1998. The AS/SVE system was installed in 1996 as part of a non-time critical removal action (NTCRA) to remove VOCs from surficial aquifer groundwater migrating from Site 16 and other upgradient sources at OU1. Remedial actions implemented at OU1 are summarized in Table 1-3.

### 2.5.2 Remedy Operation and Maintenance

There currently is no remedy operation and maintenance for OU1. The AS/SVE system began operation in September 1998; however, in January 2005, it was concluded that the OU1 Site 16 AS/SVE system was not meeting its remedial objectives, was not providing significant protection to human health and the environment, and was not cost-effective. It was recommended that the system be shut down, and that the resources and funds be reallocated to the development and implementation of a more effective and comprehensive remedy for OU1 groundwater (CH2M HILL, 2005a). The AS/SVE system was shut down in February 2005.

The pump and treat system for the OU1 Groundwater Central Hotspot Area began in December 1998; however, the system was shut down in February 2005. System effectiveness evaluations indicated that the pump and treat system was not performing a vital role in protecting human health and the environment and the system's performance had declined since initiation. Therefore, it was recommended that the pump and treat system be shut

down so that evaluations of more effective and comprehensive remedies for OU1 groundwater could be conducted.

Further evaluation is currently being conducted to identify other technologies to remediate VOC contamination at OU1.

Table 2-1 presents estimates of the annual O&M costs for OU1 from the previous 5-Year Review to the AS/SVE system shutdown (2002 until 2005).

TABLE 2-1  
Estimated O&M Costs for OU1  
*MCAS Cherry Point*

Year	Total Cost (rounded to the nearest \$100)
2002	\$251,000
2003	\$262,000
2004	\$272,500
2005*	\$47,400

\* The pump and treat system and AS/SVE system were shut down in February 2005; therefore, only 2 months of O&M costs were realized in 2005.

### 2.5.3 Progress Since Last Review

The objective of the Central Hotspot pump and treat system was to protect the underlying aquifers from groundwater contamination migrating vertically downward from the surficial aquifer as well as to provide some containment of groundwater contamination migrating laterally toward surface water bodies. During the 2002 Five-Year Review, the groundwater pump and treat system for the OU1 Groundwater Central Hotspot Area was determined to be operating as designed (CH2M HILL, 2002). However, it was recommended that the influent water quality to the air stripper tower be evaluated and the VOC mass removal rates versus the groundwater pumping rates be monitored at the Central Hotspot pump and treat system. In addition, to increase system performance, it was recommended that the accumulation of condensate and corrosion in the air-water separator be evaluated to at Site 16.

The OU1 RI report was completed in 2002, and an enhanced bioremediation treatability study was conducted in 2002 in the northern portion of OU1 to treat a small plume of chlorinated VOC contamination beneath Building 137. The treatability study involved the injection of HRC in late 2001 and six post-injection monitoring events conducted over a 1-year period. The treatability study showed decreased concentrations of total chlorinated VOCs by more than 90 percent in the center of the plume; however, individual constituents remained at concentrations that exceeded screening criteria (CH2M HILL, 2003). The study concluded that additional treatment would be required to further reduce residual concentrations, if necessary (CH2M HILL, 2007a).

The OU1 Central Hotspot pump and treat system was evaluated, as recommended in the 2002 Five-Year Review, and subsequently shut down in February 2005 based on a consensus

decision of the MCAS Cherry Point Partnering Team.<sup>2</sup> A memorandum summarizing the evaluation of the effectiveness and performance of the OU1 Central Hotspot pump and treat system and the rationale behind the system shutdown was finalized in June 2005 (CH2M HILL, 2005a). The evaluation concluded that:

- A decrease in VOC concentrations from the extraction wells had occurred since system startup.
- Biofouling and other operation problems created significant system shut downs and had substantially limited the effectiveness of the system. In addition, the extraction wells were not able to deliver the pumping rates called for in the design, likely due to declining well yields in addition to the frequent system shutdowns.
- A 2003 RA Operation Optimization Report concluded that the “suitability of the OU1 (Central Hotspot) IWTP pump and treat system for controlling plume migration is not apparent from the available data.” With regard to contaminant mass reduction, the report stated that pump and treat systems are generally not suitable for restoring groundwater to drinking water quality, and recommended that an alternate technology be employed as the final remedy for OU1 groundwater.
- The OU1 Central Hotspot pump and treat system was not performing a vital role in protecting human health and the environment, and system performance had declined since the system was installed.
- The operation of the pump and treat system may serve to interfere with ongoing attempts to further define the nature and extent of groundwater contamination beneath OU1 by altering local groundwater gradients.

The evaluation recommended the OU1 Central Hotspot pump and treat system be shut down and further investigations be conducted to more fully delineate the nature and extent of groundwater contamination near Building 133 (CH2M HILL, 2005d).

In 2005, an enhanced bioremediation treatability study was implemented at Building 137 and near the Central Hotspot Area at Building 133. The purpose of the treatability study was to determine the effectiveness of the technique to remediate what were believed to be relatively small Hotspots areas of chlorinated VOCs in the shallow groundwater beneath each site. A baseline sampling event was conducted prior to the EHC injection in December 2004. The treatability study included four post-injection monitoring events over an 8-month period. The final post-injection performance monitoring event was completed in November 2005. The results were evaluated to determine the effectiveness of the EHC injection and presented in the Draft Final Treatability Study Report (CH2M HILL, 2007a). The report concluded the following:

- The EHC injection was effective in initially reducing chlorinated VOC concentrations in wells located near the injection points

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<sup>2</sup> The MCAS Cherry Point Tier I Partnering Team consists of one representative each from the DoN (specifically NAVFAC Mid-Atlantic), the MCAS Cherry Point Environmental Affairs Department (EAD), the United States Environmental Protection Agency (USEPA) Region 4, and the North Carolina Department of Environment and Natural Resources (NCDENR).

- Anaerobic degradation and abiotic reduction were factors in reducing chlorinated VOCs in the plumes beneath Buildings 137 and 133
- The microbial analyses indicated that the composition, health, and diversity of the biomass in the aquifer could support anaerobic reductive dechlorination
- Concentrations rebounded with time
- Further investigation is needed to identify the presence and extent of chlorinated VOC sources throughout the aquifer.

An additional field investigation was conducted at Building 133 using direct-push technology and membrane interface probe technology to further determine the extent of the groundwater plume. Soil and groundwater samples were collected using direct-push methods, and the membrane interface probe was used to collect instantaneous readings to identify possible dense nonaqueous phase liquid (DNAPL) locations. In February and March 2006, 65 monitoring wells were installed in and around Building 133, and two monitoring wells were installed near Sandy Branch Tributary 2. In April and May 2006, groundwater samples were collected from 183 monitoring wells, including the newly installed wells, as part of the annual VGM (CH2M HILL, 2007b). Results from the VGM sampling will be used in the OU1 RI Addendum report, which is currently in progress.

The Site 16 AS/SVE system objective was to serve as a treatment zone for remediating groundwater contaminated by VOCs as it flowed toward the East Prong of Slocum Creek. The AS/SVE system was shut down in February 2005 based on a consensus decision of the MCAS Cherry Point Partnering Team. A system closure memorandum, completed in June 2005, summarized the evaluation of the system performance, the effectiveness of the system in contributing to the overall remediation of OU1 groundwater, and the rationale for the system shutdown (CH2M HILL, 2005b). The evaluation concluded the system was not meeting its remedial objectives, was not providing significant protection to human health and the environment, and was not cost-effective. The principal factors were:

- The rate of contaminant mass removal of the system had declined based on semi-annual and annual measurements of total VOC concentrations in extraction wells and cumulative flow measurements from each extraction well. The AS/SVE system had reached asymptotic conditions with respect to the removal of contaminant mass, which may signal a change in the system's ability to effectively remove contaminant mass.
- The system experienced decreasing contaminant concentrations at the SVE stack exhaust, with an average concentration of only 1.5 parts per billion. In addition, there was a low rate of mass removal of specific contaminants based on measurements of cis-1,2-DCE in the SVE stack exhaust.
- Groundwater monitoring data indicated contamination present beyond the area of influence of the AS/SVE system in both the upgradient and downgradient directions.
- The AS/SVE system location was not aligned with the areas containing the most contaminated groundwater.
- The system was not cost-effective, and was experiencing further diminishing cost-efficiency.

- Information suggested that the air sparging caused groundwater mounding and infiltration of groundwater into the unsaturated zone such that groundwater is captured in the SVE wells unless the air sparging is reduced to well below design rates.
- The injection of air into the surficial aquifer hinders natural biodegradation of chlorinated VOCs in OU1 groundwater.

The evaluation recommended that the OU1 Site 16 AS/SVE system be shut down and resources to maintain and operate the system be reallocated to evaluate and implement more efficient and cost-effective remedial alternatives to address OU1 groundwater (CH2M HILL, 2005a).

## 2.6 Technical Assessment

To evaluate whether the remedies in place at MCAS Cherry Point are operating properly and successfully, answers to three important questions were determined for the remedies in place at OU1:

### Is the remedy functioning as designed?

No. Both the AS/SVE system and the Central Hotspot Pump and Treatment system were shut down in 2005. Based on a comprehensive evaluation of both systems, it was concluded that neither system was providing significant protection to human health and the environment nor was operating in a cost-effective manner. In addition, it was concluded that continued operation of these systems could interfere with ongoing investigations to more fully delineate the nature and extent of groundwater contamination in portions of OU1.

### Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of selection still valid?

The exposure assumptions, toxicity data, and RAOs are still valid. The Interim ROD (IROD) identified the primary migration route for contaminated groundwater at the OU1 Groundwater Central Hotspot Area as being downward, to the underlying aquifers. The objective of the IROD to protect the underlying aquifers from groundwater contamination migrating from the surficial aquifer is still valid. The cleanup levels are still valid based on confirmation that the applicable State and Federal standards for the constituents of concern have not changed.

### Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. As stated above, a comprehensive evaluation of both systems called into question the effectiveness of both remedies and led to their shut down in 2005.

## 2.7 Issues

Because of the previously unknown suspected DNAPL area beneath Building 133 and the uncertainty of the vertical and horizontal extent of the VOC plume, additional remedial alternatives are being evaluated.

## 2.8 Recommendations and Follow-up Actions

An RI Addendum for OU1 is currently underway and will include the latest investigation results concerning the nature and extent of groundwater contamination at OU1. Following the RI Addendum, a FS will be conducted to evaluate viable remedial technologies to address contamination at OU1 and a Final ROD will be put in place.

## 2.9 Protectiveness Statement

### 2.9.1 OU1

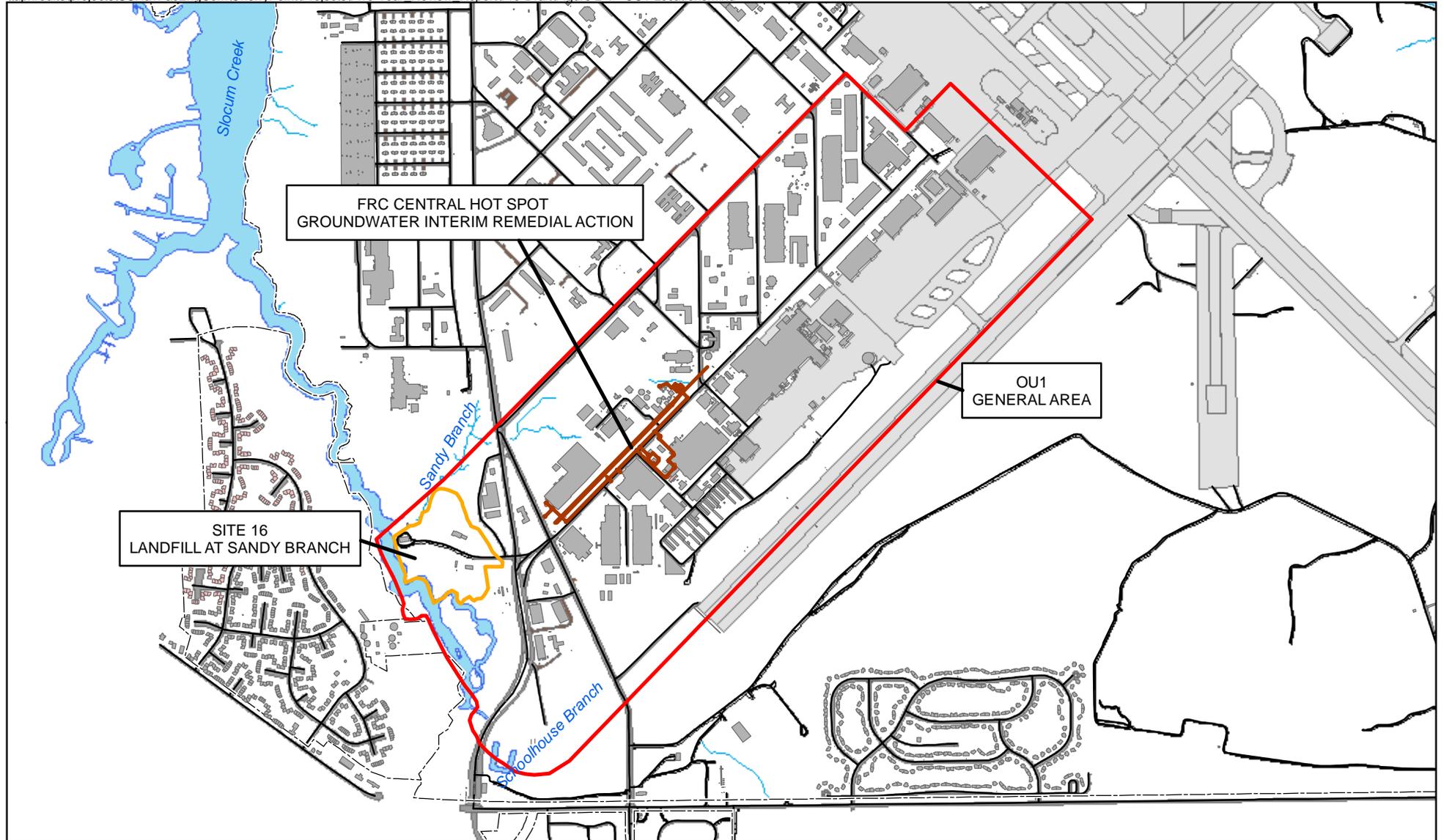
The actions at OU1 currently protect human health and the environment in the short term because exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to or the ingestion of contaminated groundwater. However, in order for the remedy to be protective in the long-term, a final remedy will be selected that encompasses the entire OU1 groundwater contamination area, which includes the pump and treat and Site 16 areas, to ensure long-term protectiveness.

#### 2.9.1.1 OU1 Groundwater Central Hotspot Area Pump and Treat System

The pump and treat system for the Central Hotspot Area at OU1 was an interim remedy and it was determined that the system was not meeting RAOs, so the system was shut down in 2005. Exposure pathways that could result in unacceptable risks are being controlled and institutional controls (ICs) are preventing exposure to or the ingestion of contaminated groundwater. The results of treatability studies for OU1 groundwater are being evaluated to determine their effectiveness and implementability. Also, additional remedial investigation activities are in progress to better define the nature and extent of previously unknown DNAPL contamination beneath Building 133 to support continuing efforts to evaluate remedial technologies and identify suitable remedies to address groundwater contamination. Currently there is no remediation system in operation for the Central Hotspot Area; however, a final remedy evaluation for the entire OU is currently underway.

#### 2.9.1.2 Site 16

In 2005, it was determined that the AS/SVE system at Site 16 had reached an asymptotic state with regard to contaminant removal, and as a result, was not providing significant reduction in contaminant concentrations. Consequently, the removal action was completed and the AS/SVE system was shut down. This will be included in the final remedy evaluation for OU1.



**Legend**

- |                                  |                         |
|----------------------------------|-------------------------|
| Operable Unit (OU) Boundary      | Remediation System      |
| Site Boundary                    | Road Centerline         |
| Installation Boundary            | Intermittent Water Body |
| Existing Buildings               | Permanent Water Body    |
| Buildings - Demolition Scheduled | Paved Road              |
| Runway                           | Unpaved Road            |

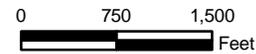


Figure 2-1  
Operable Unit 1  
Five Year Review  
MCAS Cherry Point, North Carolina

## Operable Unit 2

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### 3.1 Site History and Background

OU2 is located in the west-central portion of the Air Station, as shown on Figure 3-1. It is bounded by the MCAS Cherry Point STP to the north, Roosevelt Boulevard to the east, a residential area to the south, and Slocum Creek to the west (Figure 3-1). OU2 consists of four sites:

- **Site 10**—Old Sanitary Landfill (primary component of OU2)
- **Site 44A**—Former Sludge Application Area
- **Site 46**—Polishing Ponds No. 1 and No. 2
- **Site 76**—Vehicle Maintenance Area (Hobby Shop)

These sites have been grouped into one operable unit because of their proximity to each other. In addition, Site 44A and Site 46 both contain the same types of constituents derived from sewage treatment. Site 10 is located west of Roosevelt Boulevard and south of the STP, on the east side of Slocum Creek. The site consists of a sanitary landfill approximately 40 acres in size, which served as the primary disposal site at the Air Station from 1955 until the early to mid-1980s (CH2M HILL, 2001a). Contaminated material and petroleum, oil, and lubricants (POLs) were spread on the land, burned, stored in unlined pits, and buried at the landfill. The southern portion of Site 10 was used for fire-training exercises. Former sludge impoundments that were closed in the mid-1980s are also located at this site. These impoundments were closed in the mid-1980s and were used for disposal of metal filings, plating sludges, paints, organic solvents, oil and grease, and miscellaneous chemicals. Closure of the impoundments consisted of sludge excavation, backfilling of the excavations, and capping. The sludge impoundment area is included as a hazardous waste management unit in the Air Station's Resource Conservation Recovery Act (RCRA) Part B permit. A fenced, lined area formerly used for storage of petroleum products in drums is also located at Site 10. The area is no longer used for drum storage (TetraTech NUS, 1999b).

Site 44 consists of two areas where sludge from the sewage treatment plant was applied. Liquid sludge was removed from the digesters for land application every 30 days. Sludge removed between September and November 1987 was applied in two areas—Sites 44A and 44B. Site 44A is a relatively small area located within the boundaries of Site 10 (OU2) while Site 44B is located within OU13 in the southeastern portion of the Air Station (Figure 3-1). Site 44B is not discussed further, as it is not an OU2 site. The sludge contained organic material and other constituents that were not digested during the sewage treatment process. Site 44A is also included as a hazardous waste management unit in the Air Station's RCRA Part B permit (TetraTech NUS, 1999b).

Site 46 consists of two inactive unlined ponds that served as aeration basins for wastewater from the STP. The ponds are approximately 12 ft deep. The STP was upgraded and no longer requires the use of the ponds for aeration. Site 46 is being addressed under RCRA; however, portions of the groundwater are handled under CERCLA. A Closure Plan was

submitted to the state for this site in December 1988. The closure of the ponds will be addressed under the NCDENR solid waste management unit authority. Concurrence will be obtained from the USEPA and NCDENR prior to any changes to the current use of these inactive ponds. Site 46 is also included in the Air Station's RCRA Part B permit (TetraTech NUS, 1999a).

Site 76 consists of a building and parking lot where personal vehicles are repaired. General auto maintenance and auto body repair are typical work activities conducted at this facility. It is the only site at OU2 that is currently active.

## 3.2 Site Chronology

Historical land use and practices at OU2 resulted in contamination of the environment, which has been identified and characterized through various investigations. The list of significant events that have occurred at OU2 are as follows:

Date	Event
Mid-1980	Closure of the former sludge impoundments (TetraTech NUS, 1999b).
1981	OU2 Site Investigation initiated (TetraTech NUS, 1999b).
December 1988	Closure plan for Site 46 submitted to the State (TetraTech NUS, 1999b).
December 1989	OU2 sites (10, 44A, 46, and 76) included in a multi-task RCRA Section 3008(h) Administrative Order (TetraTech NUS, 1999b).
December 1994	MCAS Cherry Point placed on the NPL (TetraTech NUS, 1999b).
June 1996	RI Report, including a Human Health Risk Assessment and an Ecological Risk Assessment, prepared.
April 1997	SVE selected as the best available technology for soil remediation (OHM, 1999a) to be conducted as a pilot study.
April 1997	14 SVE wells installed at Hotspot 3 at Site 10 (B & R, 1997a).
June 1997	Several modifications to technical specifications made to the SVE system (OHM, 1997a).
July 1997	An RI/FS Report (B & R, 1997a), and PRAP (B & R, 1997b) documents for OU2 released to the public (TetraTech NUS, 1999b).
December 1997	Soil Hotspots 1 and 2 added to the pilot study. Additional SVE wells installed Hotspot(OHM, 1999a).
February 1998	SVE system started up (OHM, 1999a).
June 1998	O&M Plan for the SVE system prepared by OHM (OHM, 1999a).
August 28, 1999	ROD signed (TetraTech NUS, 1999b).
October 2001	Remedial Design (RD)/Remedial Action Report (RAR) for OU2 Groundwater approved (CH2M HILL, 2001a).
October 2002	Annual LTM program initiated.
July 2003	Technical Memorandum Proposal OU-2, Site 10 Soil Vapor Extraction System at Hotspot Areas 1, 2, 3, and 4 recommended the shutdown of Site 10 SVE system and the reevaluation of the remaining Hotspots (Shaw, 2003)

Date	Event
August 2003	Site 10 SVE System shut down.
May 2006	Final Technical Memorandum for SVE Hotspot Area Sampling (Rhea Engineers & Consultants and TMS Envirocon, Inc. [Rhea/TMS], 2006a).
July 2007	Final Sampling Strategy for OU2, Site 10, Hotspot No. 2 (Rhea, 2007a)
2007	LTM sampling was changed to a quarterly basis.

### 3.3 Site Characterization

Findings from OU2 investigations are summarized below (Tetra Tech NUS, 1999b).

- Contaminant concentrations in groundwater that exceed State groundwater standards were primarily VOCs (e.g., benzene, TCE, VC)
- Unacceptable ecological risks were not identified at OU2
- Unacceptable risks to human health from exposure to soil contaminants and surficial aquifer groundwater were identified for future residents
- Four soil Hotspot areas were identified based on the protection of groundwater regulatory standards
- Municipal waste, industrial waste, and construction debris were encountered during test pit excavation and soil boring activities
- Site groundwater eventually discharges to Turkey Gut and Slocum Creek, where investigation results identified COPC concentrations of VOCs (e.g., benzene, VC) that exceeded State surface water standards.

### 3.4 Initial Response Actions

Between 1984 and 1987, an Interim RI (IRI) was conducted to identify contaminated sites, and included the collection of soil, groundwater, surface water, sediment, and leachate seep samples and the performance of aquifer testing at Site 10. Contamination, primarily VOCs, was verified in the shallow groundwater, soil, and sediment at Site 10. In the early to mid-1980s the Site 10 – Old Sanitary Landfill was closed. In the mid-1980s, the sludge impoundments within Site 10 were closed via sludge excavation, backfilling of the excavations, and capping. In December 1988, the unlined Site 46 polishing ponds were no longer in use (TetraTech NUS, 1999b). The former petroleum storage area is currently inactive and no longer used to store drums of petroleum products. A SVE system was installed in 1997 as part of a final action planned for the operable unit to control and remediate the soil Hotspot areas (B & R, 1997c).

## 3.5 Description of Remedial Actions

The ROD for OU2 was signed in March 1999. The remedies at OU2 were selected to reduce unacceptable risks to human health and the environment. The remedial actions for OU2 address soil and groundwater conditions at various areas of concern within OU2. The areas needing remediation were determined by the presence of constituents in soil at concentrations exceeding risk-based levels and State 'protection of groundwater' standards, and constituents in groundwater exceeding regulatory criteria (e.g., MCLs, State groundwater standards). Refer to Table 1-3 for a summary of the areas and contaminants of potential concern.

Four alternatives for groundwater and six alternatives for soil were evaluated before the selection of a final remedy. The major components of the remedy for OU2 were (TetraTech NUS, 1999b):

- Monitored natural attenuation (MNA) of groundwater
- SVE at four soil Hotspot areas within Site 10 containing VOCs
- ICs implemented in conjunction with other remedies to eliminate exposure to contaminants (e.g., limiting land use to industrial use only, prohibiting intrusive activities and aquifer use)
- The objective of these remedy components was to reduce risks to human health and the environment associated with exposure to buried wastes, contaminated groundwater, and contaminated soil (TetraTech, 1999b)

The following performance monitoring programs have been instituted to assess the progress of natural attenuation and soil treatment, and to confirm that onsite contaminants are not migrating offsite and negatively impacting the environment:

- Sampling of groundwater in the surficial aquifer and Yorktown Aquifer
- Sampling of air emissions from the SVE system in the soil treatment areas
- Sampling of surface water and sediment in Slocum Creek and Turkey Gut

### 3.5.1 Remedy Implementation

SVE was selected as the technology for soil remediation in April 1997. The system was designed to remediate four areas of soil contamination and SVE construction began in April 1997. Operation began in March 1998. Baseline soil samples were collected in December 1997 and subsequent soil samples were collected in the Hotspot areas in February 2000. Baseline groundwater samples were collected in September and October 1999. System performance monitoring included weekly measurement of vacuum pressure at the extraction wells, vapor volumetric flow rate, and effluent vapor concentrations. In addition, the concentration of VC in the vapor from Hotspot 3 was measured weekly. Monthly monitoring and analysis was conducted for the off-gas from the SVE stack and soil gas from each header. In addition, water levels were measured quarterly (URS, 2003).

The RD for MNA at OU2 was finalized in October 2001 and annual LTM of groundwater was initiated in January 2002. In 2007, the frequency of groundwater sampling was changed to quarterly monitoring, so that the consistency of the concentrations seasonally and over

longer periods could be evaluated more rapidly. MNA activities are discussed further in the following section. LUCs were established which restrict site use to industrial use only, prohibit intrusive activities below the water table, and prohibit groundwater use (CH2M HILL, 2002). The LUC Assurance Plan (LUCAP) elements in place at OU2 are listed in Table 1-3.

### 3.5.2 Remedy Operation and Maintenance

During the fourth quarter of 2002, the SVE system was operational 77.7 percent of the time and removed 120,347 pounds of hydrocarbons. During the first quarter of 2003, the system was operational 80.8 percent of the time for Hotspots 1, 3, and 4 and 87.3 percent of the time for Hotspot 2. The system removed 152,199 pounds of hydrocarbons during the first quarter of 2003. Due to system shutdowns during the second quarter of 2003, data are only available through April 30, 2003. During the period of April 1 through April 30, 2003, 68,650 pounds of hydrocarbons were removed by the system. Hydrocarbon removal for the remaining period of the SVE system operations could not be calculated because field readings were not taken. In addition, operational percentages could not be calculated for the second and third quarters of 2003 due to unavailability of system operational data (AGVIQ/CH2M HILL, 2006a).

Monitoring activities at OU2 have consisted of the collection of groundwater and surface water and sediment from both Turkey Gut and Slocum Creek. Twenty-three monitoring wells are sampled at OU2 and analyzed for VOCs, pesticides, and metals. Indicator parameters to evaluate natural attenuation, sulfate and ferrous iron ( $\text{Fe}^{+2}$ ) are measured at nine wells. Water quality parameters (temperature, turbidity, pH, DO, oxygen reduction potential [ORP], and specific conductivity) are measured as well. Prior to the start of groundwater sampling, water levels are measured in all wells so that groundwater elevations can be calculated.

Surface water and sediment are collected from five locations. Water parameters (DO, pH, specific conductance, temperature, and turbidity) are measured at each sampling station.

The results of the monitoring activities at OU2 as well as recommendations are documented in an annual LTM report.

Monitoring of the LUCs are conducted quarterly by the Navy. Monitoring activities consist of visual site inspections (VSIs) of OU2 and reviews of the applicable Base Master Planning Process and Geographic Information System (GIS) data. Any deficiencies noted are reported to NCDENR and USEPA within 10 days. Monitoring results are included in a letter provided to USEPA and NCDENR.

Table 3-1 presents the estimated annual O&M costs for OU2 from the previous 5-Year Review to 2007.

TABLE 3-1  
Estimated O&M Costs for OU2  
*MCAS Cherry Point*

Year	Total Cost (rounded to the nearest \$100)
2002	\$172,400
2003	\$62,200
2004	\$41,500
2005	\$73,600
2006	\$67,100
2007	\$159,300

### 3.5.3 Progress Since Last Review

According to the 2002 Five-Year Review, the SVE remedy was operating as designed since March 1998. VOC mass removal had continued to increase at significant rates in soil Hotspots 1 and 3, while little to no removal had been observed at Hotspots 2 and 4. The 2002 Five-Year Review recommended the evaluation of the SVE system's ineffectiveness in removing VOCs from Hotspots 2 and 4 to determine whether alternative technologies or modifications to the system configuration were warranted. The SVE treatment of the soil Hotspots was discontinued in August 2003 after an evaluation of the SVE system indicated the system was no longer removing significant contaminant mass and was not performing as a cost-effective remedial approach (TetraTech NUS, 1999b). Variations to this system along with other technologies will be evaluated for future use.

Monitoring at OU2 has been implemented on an annual basis since 2002 and on a quarterly basis since 2007.

Confirmatory soil sampling activities were conducted in January 2003 at Hotspots 1, 2, and 3 (Soil samples from Hotspot 4 could not be collected due to the high water table during the sampling event). Soil samples were collected at designated locations to confirm the SVE system performance, evaluate the need for additional remedial measures, and to demonstrate whether or not successful cleanup had been established. The soil data indicated that the VOC concentrations were below cleanup levels at Hotspots 1 and 3 and near cleanup levels at Hotspot 2. At Hotspot 2, only methylene chloride concentrations were above the cleanup level of 21.9 µg/kg at a concentration of 22.5 µg/kg. Based on these results, a Technical Memorandum Proposal, OU-2 Site 10, Soil Vapor Extraction System at Hot Spot Areas 1, 2, 3, and 4 (Shaw, July 2003) was submitted. This Technical Memorandum Proposal recommended that the SVE system be shutdown and additional soil samples be collected after a six month period (Hotspot 4 would be included in this sampling event).

Soil samples were collected in January 2004 in accordance with the July 2003 Technical Memorandum Proposal. Soil analytical data indicated that the VOC concentrations at Hotspots 1 and 4 were below cleanup levels. However, the data indicated increased concentrations of chlorobenzene, cis-1,2-dichlorobenzene, naphthalene, toluene, and

trichloroethene at Hotspot 2 and chlorobenzene and ethylbenzene at Hotspot 3. Based on these results, a Technical Memorandum Report, *OU2 Site 10, SVE System, Hot Spot Areas 1, 2, 3, and 4* (Rhea, 2005) was submitted. The technical memorandum recommended collecting additional soil samples from Hotspots 2 and 3. The sampling of Hotspots 1 and 4 was discontinued.

Soil samples from Hotspots 2 and 3 were collected in April 2005. Soil analytical data indicated that the VOC concentrations at Hotspot 3 had decreased significantly, and were below cleanup levels. The sampling of Hotspot 3 was discontinued based on these results. VOC concentrations at Hotspot 2, however, continued to be above cleanup levels and additional soil samples were collected in January 2006. Sampling results showed decreasing VOC concentrations. However, it was recommended that another round of soil samples be collected from Hotspot 2. Additional soil samples were collected from Hotspot 2 in July 2007 and the data are currently being evaluated.

### 3.6 Technical Assessment

#### Is the remedy functioning as designed?

The results from the last annual LTM Report (2005), prepared by (Rhea/TIM), and the 2006 monitoring data (report not yet finalized) indicate that VOC concentrations appear to be decreasing, with little change in the semivolatile organic compounds (SVOCs) detected in groundwater samples from 1999 to 2005. Based on the sampling results, it appears that attenuation of the chlorinated VOCs through reductive dechlorination is occurring (Rhea/TMS, 2006a).

Data from surface water and sediment samples have been inconsistent and the evaluation of whether groundwater migration to surface water has impacted water quality in either Turkey Gut or Slocum Creek is inconclusive (Rhea/TMS, 2006a).

LUCs have been put in place to restrict site use to only industrial uses, to prohibit intrusive activities below the water table, to prohibit groundwater use, and fencing and warning signs were installed to control site access.

**Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of selection still valid?** The RAOs for OU2 are presented in the final ROD, signed in August 1999 (Tetra Tech NUS, 1999b). The NC 2L groundwater standards for the COCs chloroform, 1,2-DCE, ethylbenzene, BEHP, and cadmium were updated in December 1, 2005. Although there have been some changes in regulatory standards, these changes would not adversely affect the protectiveness of the selected remedy.

#### Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. The SVE system at Hotspot 2 did not meet its remediation goals and, therefore, the SVE system did not achieve protectiveness. However, the remedy currently protects human health and the environment in the short-term because exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to the contaminated soil area.

### 3.7 Issues

The ineffectiveness of the SVE system to remediate Hotspot 2 has initiated a re-evaluation of technologies.

### 3.8 Recommendations and Follow-up Actions

After review of the 2005 monitoring data presented in the LTM Report and the 2006 monitoring data, it is recommended that groundwater monitoring be continued in accordance with the ROD for OU2.

Evaluations of other technologies that will remediate Hotspot 2 to meet the remediation goals are currently underway.

### 3.9 Protectiveness Statement

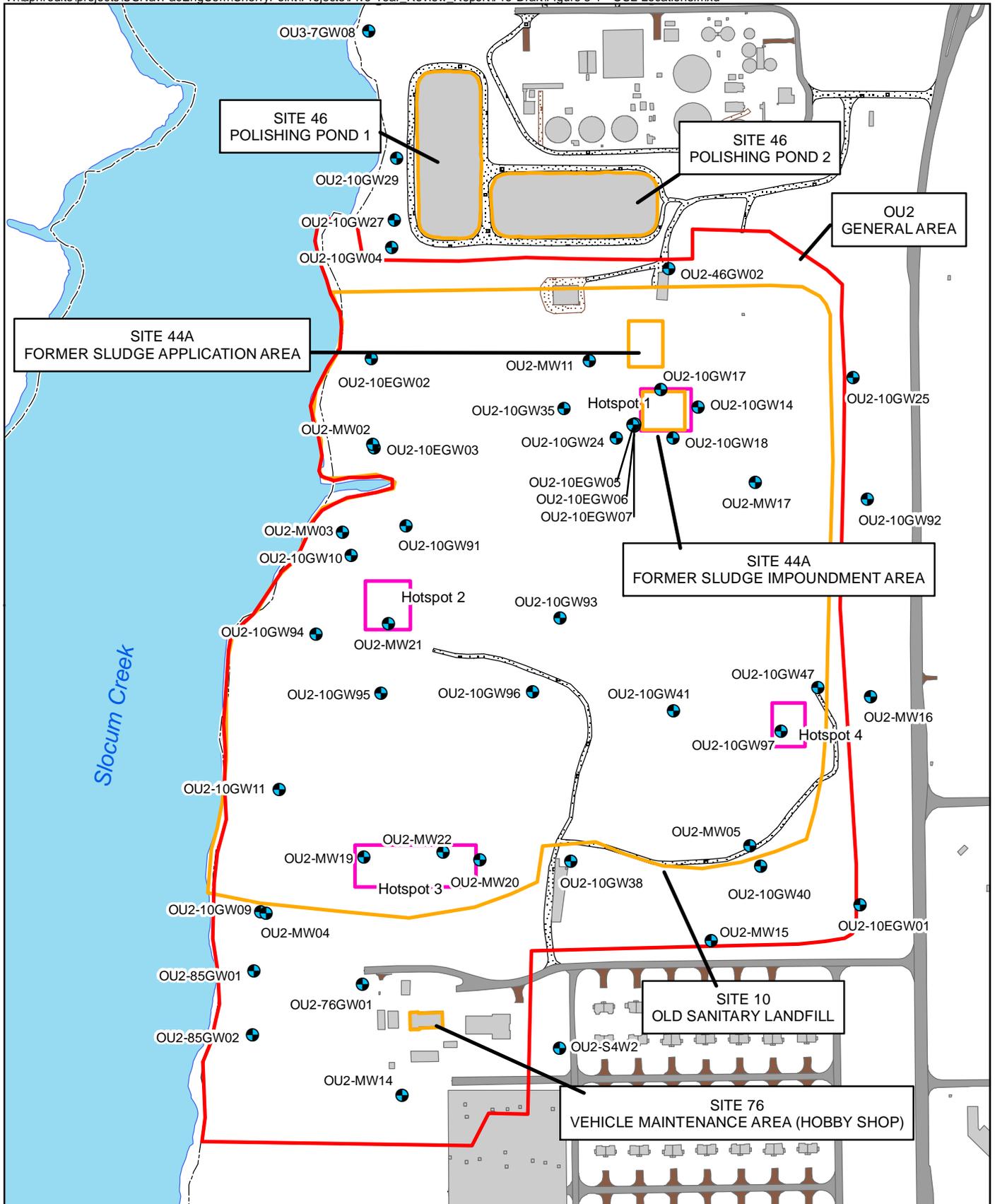
The remedy at OU2 currently protects human health and the environment in the short term because exposure pathways to the soil and groundwater that could result in unacceptable risks are being controlled and ICs are preventing exposure to or the ingestion of contaminated groundwater.

#### Site 10

In 2003, the SVE system evaluation had identified that three of the four Hotspots had reached the remedial goals. It was also determined that at Hotspot 2, significant contaminant mass was no longer being removed and the SVE system was not performing as a cost-effective remedial approach. This component of the soil remedy is no longer protective of human health and the environment. Other technologies to remediate Hotspot 2 are currently being evaluated.

The LUCs associated with the OU2 remedy have been effective in protecting human health and the environment by removing exposure pathways that could result in unacceptable risks to the contaminated soil.

The MNA remedy for groundwater is protective given current information and prevailing conditions and the protectiveness will continue to be verified through LTM. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.



**Legend**

- Monitoring Well Sampling Location
- Operable Unit (OU) Boundary
- Site Boundary
- Installation Boundary
- Existing Buildings
- Permanent Water Body
- Hotspot
- Paved Road
- Unpaved Road



Figure 3-1  
Operable Unit 2  
Five Year Review  
MCAS Cherry Point, North Carolina

# Operable Unit 3

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## 4.1 Site History and Background

OU3 occupies approximately 19 acres and is located in the west-central portion of MCAS Cherry Point (Figure 4-1). Site 6 formerly consisted of three unlined ponds covering approximately 2.5 acres that were approximately 10 to 15 ft deep. Fly ash and cinders from the former power plant were deposited in the ponds from the 1940s until about 1970, after which the ponds were reportedly used for disposal of lime/alum sludge generated by the potable water treatment plant from December 1980 to mid-1994, when the new water treatment plant became operational. Additionally, it was also reported that up to 5,000 gallons of waste POLs were disposed of in the ponds (WAR, 1983).

Site 7 consisted of a former incinerator and open-burning ground, covering approximately 5 acres. From the 1940s until approximately 1955, waste POLs, FRC wastes, and other wastes (including municipal refuse) were burned in the incinerator or on the adjacent open burning grounds. It is suspected fly ash disposal and open burning occurred in the western portion of Site 7. It is believed that the fly ash originated from the incinerator, and was reportedly mixed with other wastes.

## 4.2 Site Chronology

A site chronology of key events and documents for OU3 is presented below.

Date	Event
1984	OU3 site investigation initiated (TetraTech NUS, 2000).
December 1989	Sites 6 and 7 included in a multi-task RCRA Section 3008(h) Administrative Order (TetraTech NUS, 2000).
December 1994	MCAS Cherry Point placed on the NPL (TetraTech NUS, 2000).
August 1996	RI/FS Report and PRAP documents for OU3 released (TetraTech NUS, 2000).
1997	Site 6 Closure (TetraTech NUS, 2000).
January 1999	SAP prepared (OHM, 1999b).
May 1999	Final RD Work Plan prepared by CH2M HILL for LTM (CH2M HILL, 2001b).
July 1999	Surface water and sediments collected at Slocum Creek and Luke Rowe's Gut by Brown & Root Environmental (CH2M HILL, 2001b).
August 1999	CH2M HILL installed seven monitoring wells for LTM (CH2M HILL, 2001b).
October 1999	Baseline groundwater sampling conducted at OU3 by CH2M HILL (CH2M HILL, 2001b).
January 2000	Performed baseline groundwater and soil sampling related to the AS system (OHM, 2000d).

Date	Event
January 2000	41 AS wells installed (OHM, 2000e).
March 13, 2000	AS system start-up (OHM, 2000e).
March 15, 2000	Final inspection of the AS system (OHM, 2000e).
May 2000	O&M Plan prepared by OHM (OHM, 2000f).
June 2000	2-methylnaphthalene was no longer a COPC due to a revised State groundwater standard (OHM, 2000d).
June 2000	LTRA prepared by OHM (OHM, 2000d).
August 2000	RAR prepared by OHM (OHM, 2000e).
September 2000	ROD signed (Tetra Tech NUS, 2000).
March 2001	12 AS wells turned off.
April 2001	Final Annual O&M status report prepared by OHM (OHM, 2001).
October 2001	Final RD/RAR prepared for groundwater (CH2M HILL, 2001b).
October 2002	Annual groundwater LTM began.
Mid-2003	AS system shut down.
May 2007	AS system removed (CH2M HILL, 2007b)
September 2007	Interim Remedial Action Completion Report (IRACR) submitted (CH2M HILL, 2007b).
September 2007	Plat entitled "Notice of Inactive Hazardous Substance or Waste Disposal Site" approved by NCDENR and filed with the Craven County Register of Deeds (CH2M HILL, 2007b).

### 4.3 Site Characterization

OU3 investigation findings are summarized below (Tetra Tech NUS, 2000).

- The elevated chemical concentrations of VOCs, polycyclic aromatic hydrocarbons (PAHs), and metals detected in both surface and subsurface soil at Site 7 are also found in groundwater at concentrations exceeding State groundwater standards.
- Unacceptable risks exist for both future resident and construction worker scenarios from ingestion of groundwater at Sites 6 and 7 and exposure to contaminated soil at Site 7.
- In consensus with the State of North Carolina, it was determined that the area within Site 7 contained soil contamination consisting of fuel-related compounds requiring remedial action.
- Benzene and 2-methylnaphthalene were the COPCs identified in Site 7 soil that need remedial action to protect groundwater from secondary source contamination. 2-methylnaphthalene was later removed from the COPC list because it no longer exceeded a revised State groundwater standard.

## 4.4 Initial Response Actions

In 1996, the former fly ash ponds within Site 6 were closed as part of the water treatment plant closure. The closure effort included the excavation and removal of the lime-alum sludge, stabilization of the remaining material, re-grading the area, and planting of trees (TetraTech NUS, 2000).

## 4.5 Description of Remedial Actions

The OU3 ROD was signed in October 2000. The RAs for OU3 were instituted because of benzene concentrations in groundwater and soil concentrations of VOCs, PAHs, metals, and pesticides that could potentially be an ongoing source of groundwater contamination. The selected remedial actions are to prevent exposure to contaminated groundwater, prevent future potential use of groundwater, allow for natural attenuation of the groundwater, and prevent potential exposure to contaminated soil and waste/fill material.

The Navy, acting under CERCLA authority, has implemented a RA at OU3 Site 7 for soil with VOC concentrations exceeding groundwater protection standards (OHM, 2000e).

The major components of the selected remedy for OU3 include:

- MNA for groundwater
- *In situ* treatment using AS within an area of soil contamination at Site 7 (COC is benzene)

ICs were implemented in conjunction with the other remedies to eliminate exposure to contaminants and protect human health and the environment. Land use at Site 7 is limited to vacant land. Fencing and warning signs were installed to control site access. The following performance monitoring programs were instituted to assess the progress of natural attenuation and soil treatment, and to confirm that onsite contaminants are not migrating offsite and negatively impacting the environment (OHM, 2000d):

- Sampling of groundwater in the surficial aquifer and Yorktown Aquifer
- Sampling of soil in the AS area at Site 7 to monitor the progress of remediation
- Sampling surface water and sediments in Slocum Creek and Luke Rowe's Gut

### 4.5.1 Remedy Implementation

The RD for OU3 was finalized in October 2001 and annual LTM was initiated in October 2002. In 2007, the frequency of sampling changed from annual to quarterly monitoring, so that the consistency of the concentrations seasonally and over longer periods could be evaluated more rapidly. Groundwater samples are collected from 11 monitoring wells (OU3-6GW08, OU3-6GW09, OU3-7GW01, OU3-7GW02, OU3-7GW03, OU3-7GW04, OU3-7GW06, OU3-7GW07, OU3-7GW08, OU3-7GW09, OU3-7MW04).

In 2000, a AS system was installed at Site 7 for enhanced bioremediation. The system covered an area of 200 by 70 ft to a depth of 4 ft bgs (CH2M HILL, 2007b). Based on soil sampling results additional AS points were installed at Site 7 in June 2002.

LUCs were established to prevent future residential use at Sites 6 and 7 and invasive construction activities at Site 7. Aquifer use restrictions prevent the installation of wells

(other than for monitoring), and fencing and warning signs were installed as part of the ICs to control unauthorized uses of Site 7. A plat was submitted to NCDENR which includes the location and dimensions of the disposal areas and areas of potential environmental concern, the type, location, and quantity of hazardous substances known to exist on the site, and the ICs. In September 2007, the Notice was approved by NCDENR and filed with the Craven County Register of Deeds located in New Bern, NC (CH2M HILL, 2007b).

#### 4.5.2 Remedy Operation and Maintenance

Monitoring activities at OU3 have consisted of sampling groundwater from existing wells, and surface water and sediment sampling from Luke Row's Gut and Slocum Creek. Eleven monitoring wells are sampled at OU3 for VOCs and metals. Natural attenuation indicator parameters, sulfate, and Fe<sup>+2</sup> and the water quality parameters temperature, turbidity, pH, DO, ORP, and specific conductivity, are measured at five wells. Prior to the start of groundwater sampling, a complete round of water level measurements is obtained from the site monitoring wells to calculate groundwater elevations.

Four surface water samples are collected from Luke Rowe's Gut and Slocum Creek at OU3 and analyzed for VOCs, pesticides, and metals. Field parameters (pH, temperature, specific conductivity, DO, and turbidity) are also measured at each sample location.

Four sediment samples are collected from Luke Rowe's Gut and Slocum Creek at OU3 and analyzed for VOCs, pesticides, and metals. Analyses are screened against the USEPA Region IV Ecological Screening Values (Rhea/TMS, 2007b).

The results of the monitoring activities at OU3 as well as recommendations are documented in an annual LTM report. Analytical results indicate that VOC concentrations have decreased to below screening criteria (Rhea/TMS, 2007b).

Monitoring of the environmental use restrictions and LUCs are conducted quarterly by the Navy and/or MCAS Cherry Point. Monitoring activities consist of VSIs of OU3 and reviews of the applicable Base Master Planning Process and GIS data. Any deficiencies noted are reported to NCDENR and USEPA within 10 days. Monitoring results are included in a separate report or summarized in a letter, if appropriate, and provided to USEPA and NCDENR.

Table 4-1 presents the estimated annual O&M costs for OU3 from the previous 5-Year Review to 2007.

TABLE 4-1  
Estimated O&M Costs for OU3  
*MCAS Cherry Point*

Year	Total Cost (rounded to the nearest \$100)
2002	\$202,640
2003	\$108,300
2004	\$24,700
2005	\$35,100
2006	\$34,700
2007	\$80,800

### 4.5.3 Progress Since Last Review

The ROD initially called for sampling groundwater at 10 wells; however, based on groundwater results in 2002, monitoring well OU3-7MW07 was added to the annual sampling (CH2M HILL, 2007b).

As indicated in the 2002 Five-Year Review, the AS system was determined to be protective in the short term because it had been effective in reducing benzene concentrations within the Hotspot area (CH2M HILL, 2002). Twelve AS wells were shut down in March 2001 because the area impacted by these wells had achieved performance standards (CH2M HILL, 2002). Based on the February 2001 confirmatory soil samples, the remaining extent of benzene contamination in soil at Site 7 was determined to be beyond the radius of influence of the AS system; therefore, the 2002 Five-Year Review recommended the expansion of the AS system to ensure the RAOs were achieved. As a result, additional AS points were installed to remediate the extended area of contamination. Based on further monitoring results, it was determined that the AS system had effectively remediated the soil Hotspot. Subsequently, the MCAS Cherry Point Partnering Team agreed in October 2006 to remove the AS system at Site 7. The AS system was shut down in mid-2003 (Rhea/TMS, 2007b) and removed in May 2007. According to the IRACR report, signed in September 2007, the remedial goals for soil had been achieved (CH2M HILL, 2007b).

Monitoring activities have been implemented on an annual basis since 2002 and on a quarterly basis since 2007. In 2003, as agreed upon by the Navy, USEPA and NCDENR, pesticides were no longer included for groundwater analyses because concentrations did not exceed North Carolina (NC) Groundwater Quality standards over the course of four consecutive sampling events (Rhea/TMS, 2007b).

## 4.6 Technical Assessment

### Is the remedy functioning as designed?

Based on groundwater sampling results, benzene concentrations in groundwater within the area of influence of the AS system has diminished to below the NC 2L standard. In addition, the results did not indicate continued leaching of benzene from the soils at Site 7 and, therefore, it was concluded that the system had met its performance standards. Subsequently, the air sparge system was shut down in 2003.

MNA has been effective in reducing the concentrations of each well-specific COC towards its respective remediation goal. Analytical results indicate that VOC concentrations have decreased to below screening criteria (Rhea/TMS, 2007b).

LUCs put in place include prohibiting intrusive activities below the water table and prohibiting groundwater use, except for monitoring. The LUCs are functioning as planned in eliminating exposure to contaminants and protecting human health and the environment.

### Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of selection still valid?

The RAOs for OU3 are presented in the final ROD, signed in September 2000 (TetraTech NUS, 2000). The NC 2L groundwater standards for the COCs BEHP, 2-methylnaphthalene,

pentachlorophenol, and cadmium were updated in December 1, 2005. Subsequently, 2-methylnaphthalene was removed from the COPC list because concentrations no longer exceeded the revised NC 2L groundwater standard. Although there has been some changes in regulatory levels, these changes would not adversely affect the protectiveness of the selected remedy.

**Has any other information come to light that could call into question the protectiveness of the remedy?**

No additional information has been identified during this review that would raise concerns about the protectiveness of the remedy.

## 4.7 Issues

There are no issues associated with the remedies that have been implemented for OU3 that threaten the protection of human health and the environment.

## 4.8 Recommendations and Follow-up Actions

After review of the 2006 groundwater monitoring data presented in the Rhea (2007b) LTM Report, it is recommended that groundwater monitoring be continued in accordance with the ROD for OU3.

## 4.9 Protectiveness Statement

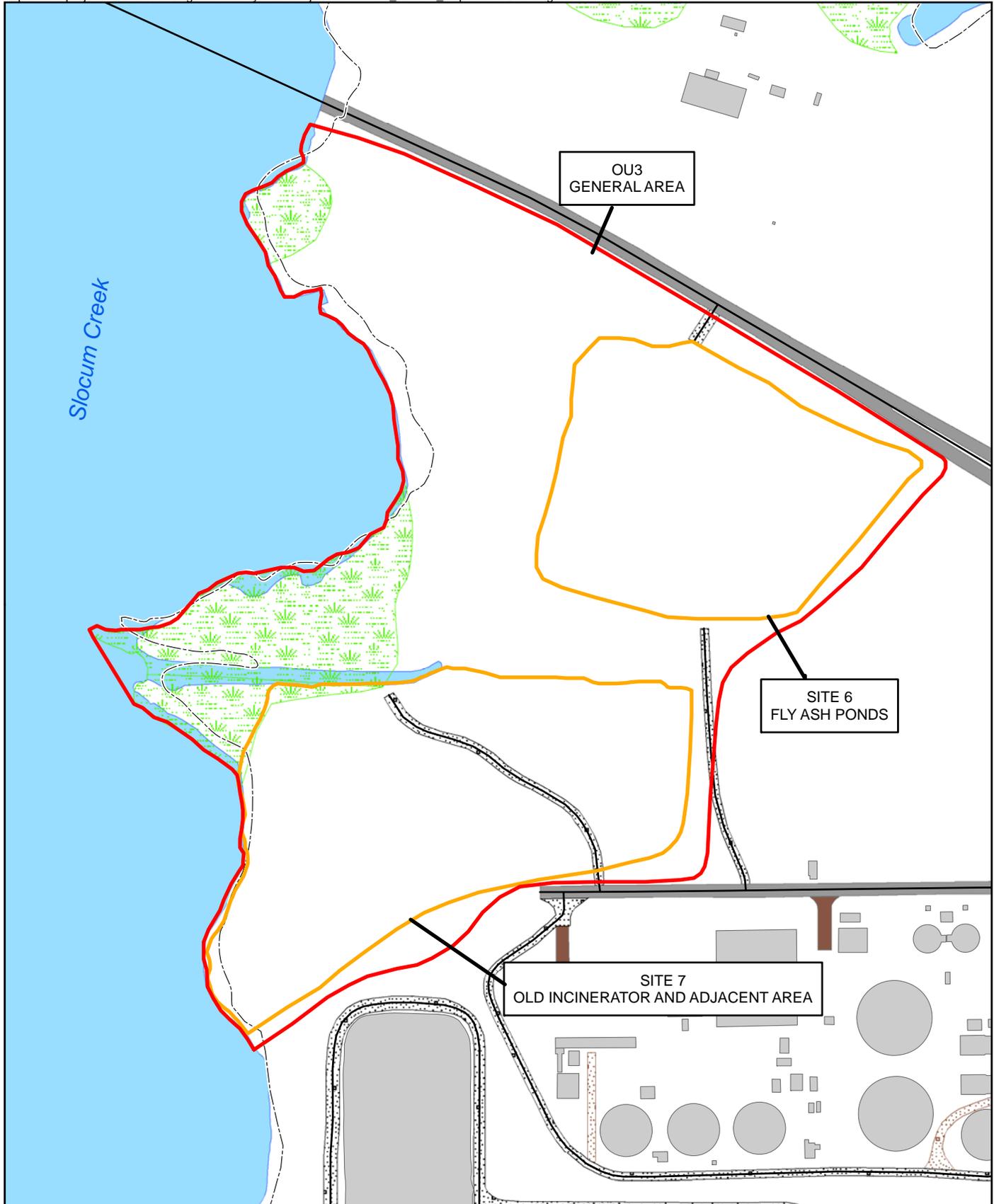
The remedy at OU3 is protective of human health and the environment, because the system effectively remediated VOCs in the soil and the LUCs are in place to prevent exposure to groundwater.

### Site 7

The AS system to treat OU3 soil was shut down in 2003 because monitoring results indicated that the system had effectively remediated VOCs in soil.

The LUCs associated with the OU3 remedy have been effective in protecting human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled and ICs are preventing exposure to or the ingestion of contaminated groundwater.

The MNA remedy for groundwater is protective given current information and prevailing conditions and the protectiveness will continue to be verified through LTM. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.



OU3  
GENERAL AREA

SITE 6  
FLY ASH PONDS

SITE 7  
OLD INCINERATOR AND ADJACENT AREA

**Legend**

- █ Operable Unit (OU) Boundary
- █ Site Boundary
- Installation Boundary
- Existing Buildings
- Wetlands
- Road Centerline
- Permanent Water Body
- Paved Road
- Unpaved Road

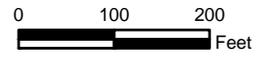


Figure 4-1  
Operable Unit 3  
Five Year Review  
MCAS Cherry Point, North Carolina

# Operable Unit 4

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## 5.1 Site History and Background

OU4 is located in the northwest-central portion of MCAS Cherry Point, and occupies an area of approximately 130 acres (Figure 5-1). OU4 consists of Area A, which includes IR Site 4 (Borrow Pit/Landfill north of Runway 14L), and Area B (a lined drum storage area), which were grouped together because of the close geographic proximity (CH2M HILL, 2006b).

Borrow pits are areas where soil has been excavated for use as fill material at another location. The disposal of construction and demolition debris and asbestos waste began in the 1950s. Other wastes, including wastes from the FRC, may also have been disposed at Site 4; however, no records were maintained on the types or amounts of wastes. The date that disposal activities ceased at the site is unknown. The majority of historical activities at Site 4 took place in the western portion of the site, where the borrow pits later used for waste disposal were located.

In 1982, the Air Station received a permit for a 10-acre landfill for construction debris within Area A. This landfill, also known as SWMU C-8, is not included in OU4, was constructed over the waste-filled borrow pits (Site 4). Area A is currently an active landfill for land clearing and inert debris (permit filed in 1997), and is used for disposal of unpainted/untreated wood, yard waste, and inert construction debris.

Area B is located in the northeast corner of OU4. This area was used for farming before construction of the Air Station began, and was later developed into a lined drum storage area. Minimal disturbances in this area have been noted on historical aerial photographs. This drum storage area is used for the storage of raw material for the FRC, not for the storage of waste material.

OU4 is bounded by Mill Creek to the south and west, Access Road to the north, and Duffy Road to the east. The ground surface elevation over much of the site is between 20 and 25 ft above mean sea level (amsl); however, elevations near Mill Creek are approximately 10 to 15 ft amsl. Wetland areas are located adjacent to Mill Creek, and a small portion of OU4 lies within the 100-year floodplain. A small wetland area is located near the drum storage area.

## 5.2 Site Chronology

A site chronology of key events and documents for OU4 is presented below.

Date	Event
1983-1988	Site 4 identified in the IAS and RCRA Facility Assessment (RFA) (TetraTech NUS, 2002a).
1997	Area permitted as an active land clearing and inert debris landfill (TetraTech NUS, 2002a).
September 2002	Final RI submitted by TetraTech NUS (TetraTech NUS, 2002a).
October 2003	Voluntary groundwater monitoring (VGM) for VOCs and SVOCs initiated.
June 2004	Focused Feasibility Study (FFS) completed
April 2005	PRAP finalized for public review and commenting.
September 2005	ROD signed (CH2M HILL, 2005c).
April 2006	RD finalized (CH2M HILL, 2006b).
May 2006	LTM program initiated.
October 2006	Final IRACR.
April 2007	2006 LTM Annual report submitted.

## 5.3 Site Characterization

OU4 investigation findings are summarized below (CH2M HILL, 2005c):

- Concentrations of detected constituents in the soil and sediment at OU4 were less than NC Groundwater Quality Standards or were consistent with background concentrations, and no COPCs were identified for these media.
- During the OU4 RI, arsenic, copper and manganese were retained as regulatory COPCs for surface water, though detections were sporadic and there were no increases in concentration observed in downstream surface water as compared to upstream concentrations. These constituents were not considered to be attributable to past waste disposal activities at OU4. As a result, the COPCs for surface water were eliminated during the FFS.
- Investigation results identified groundwater as the only medium with retained COCs, specifically, 1,1,2,2-tetrachloroethane (1,1,2,2-TCA) and benzene. These COCs were detected at concentrations exceeding NC Groundwater Quality Standards and were attributed to historic site-related activities at OU4.
- Five consecutive rounds of VGM results for 1,1,2,2-TCA revealed that the respective remediation goal was met; therefore, 1,1,2,2-TCA was removed as a COC. For LTM activities after May 2006, 1,1,2,2-TCA was no longer included in the sample analyses.

- Unacceptable risks exist for a future adult resident and future lifelong resident from ingestion of groundwater, future child resident and future adult resident from exposure to groundwater, and for adult recreational users from the ingestion of fish.

## 5.4 Initial Response Actions

VGM began in October 2003 to monitor VOC and SVOC concentrations on a semiannual basis. The monitoring results of each sampling event were documented in an annual VGM report. The May and November 2005 Annual VGM report recommended that groundwater monitoring be continued in accordance with the ROD.

## 5.5 Description of Remedial Actions

The ROD for OU4 was signed in September 2005. RAOs were developed based on data collected during the remedial investigation to develop and screen remedial alternatives to be considered for the ROD. The RAOs for OU4 state that the selected remedy must:

- Prevent human exposure to groundwater containing COCs in excess of NC Groundwater Quality standards
- Achieve suitability of OU4 groundwater for unlimited use with a reasonable approach and within a reasonable timeframe
- Reduce exceedances of COCs to meet the NC Groundwater Quality standards

The selected remedy for OU4 consists of the following components:

- Use of MNA to achieve groundwater cleanup levels and submission of an annual technical memorandum summarizing progress. MNA consists of periodic groundwater monitoring for COCs and natural attenuation indicator parameters to demonstrate if source removal results in the reduction in concentrations of COCs over time.
- Institution of LUCs for groundwater use and land development. The LUC objectives prohibit the withdrawal and/or future use of groundwater, except for monitoring, from the surficial aquifer within the entire OU4 boundary. Intrusive activities within the extent of current groundwater contamination are prohibited unless specifically approved by both NCDENR and USEPA. The Navy is not allowed to modify or terminate LUCs or LUC implementation actions, or cause or allow any land use inconsistent with the anticipated land use(s) previously identified, without obtaining prior approval from NCDENR and USEPA.

### 5.5.1 Remedy Implementation

The remedial design for OU4 was finalized in April 2006 and LTM related to the MNA of VOCs began in May 2006 and are discussed further in the following section. The Navy has included the LUCs in its master planning process and updated the Station's environmental GIS.

## 5.5.2 Remedy Operation and Maintenance

LTM activities have consisted of the collection and analysis of groundwater samples since May 2006 to document the progress of monitored natural attenuation. LTM activities at OU4 were initially conducted on a semiannual basis, during the 2nd and 4th quarters of 2006; however, in 2007, the sampling frequency changed to a quarterly basis (CH2M HILL, 2007c). The sampling frequency was changed to quarterly so that the consistency of the concentrations seasonally and over longer time periods could be evaluated more rapidly. Groundwater samples at OU4 are collected from two surficial aquifer monitoring wells. The final COCs were 1,1,2,2-TCA in one of the wells and benzene in the other per the ROD. However, after five consecutive rounds of monitoring, the results for 1,1,2,2-TCA revealed that its remediation goal was met and it was removed as a COC. The COCs are evaluated by sampling groundwater at each well and analyzing for the specific VOC associated with each well.

As part of the MNA study, dissolved gases, dissolved manganese, sulfate, chloride, nitrate, and total organic carbon (TOC) are also analyzed (CH2M HILL, 2006b). The results and recommendations are documented in an annual monitoring report.

The Navy will continue LTM on a quarterly basis to measure the effectiveness of the MNA until benzene is at or below its respective remediation goal for four consecutive sampling events.

Monitoring of the environmental use restrictions and LUCs are conducted quarterly by the Navy and/or MCAS Cherry Point. Monitoring activities consist of VSIs of OU4 and reviews of the applicable Base Master Planning Process and GIS data. Any deficiencies noted are reported to NCDENR and USEPA within 10 days. Monitoring results are included in a separate report or summarized in a letter, if appropriate, and provided to USEPA and NCDENR.

Table 5-1 presents the estimated annual O&M costs for OU3 from the previous 5-Year Review to 2007.

TABLE 5-1  
Estimated O&M Costs for OU4  
*MCAS Cherry Point*

Year	Total Cost (rounded to the nearest \$100)
2006	\$16,650
2007	\$10,450

## 5.6 Progress Since Initiation of Remedial Action

This is the first Five-Year Review completed for OU4.

Five consecutive rounds of monitoring results for 1,1,2,2-TCA revealed that the respective remediation goal was met; therefore, 1,1,2,2-TCA was removed as a COC.

## 5.7 Technical Assessment

### Is the remedy functioning as designed?

The results from the most recent annual LTM Report (2006) indicate that the remaining groundwater COC (benzene) continued to be detected in groundwater samples collected from one monitoring well at concentrations exceeding the remediation goal of 1 microgram per liter ( $\mu\text{g}/\text{L}$ ) (NC groundwater quality standard) during the May and November 2006 LTM events. Benzene was detected at 4.2  $\mu\text{g}/\text{L}$  in May 2006 and 6.0  $\mu\text{g}/\text{L}$  in November 2006. The historical benzene data exhibit considerable variability and do not show any trend of increasing or decreasing concentrations that would support a conclusion about whether the area of contamination is shrinking or expanding (AGVIQ/CH2M HILL, 2007a).

The MNA data indicate that site groundwater is characterized by mildly reducing conditions suitable for anaerobic biodegradation of organic contaminants. Benzene is biodegradable by both aerobic and anaerobic respiration processes. Anaerobic conditions are indicated by low DO, slightly negative ORP, negligible nitrate, elevated iron (indicative of dissolved  $\text{Fe}^{+2}$ ), and the presence of methane. The data suggest that biodegradation of organic contaminants in groundwater may be coupled with iron reduction and methanogenesis. The low concentrations of organic contaminants detected at the site would not be expected to cause substantial changes in groundwater geochemistry due to biodegradation (AGVIQ/CH2M HILL, 2007a).

### Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of selection still valid?

The exposure assumptions, toxicity data, cleanup levels, and RAOs are still valid based on the remedy evaluation of data in the LTM Reports and from confirmation that the State and Federal standards for the COCs have not changed.

### Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has been identified during this review that would call into question the protectiveness of the remedy.

## 5.8 Issues

There are no issues associated with the remedies that have been implemented for OU4 that threaten the protection of human health and the environment.

## 5.9 Recommendations and Follow-up Actions

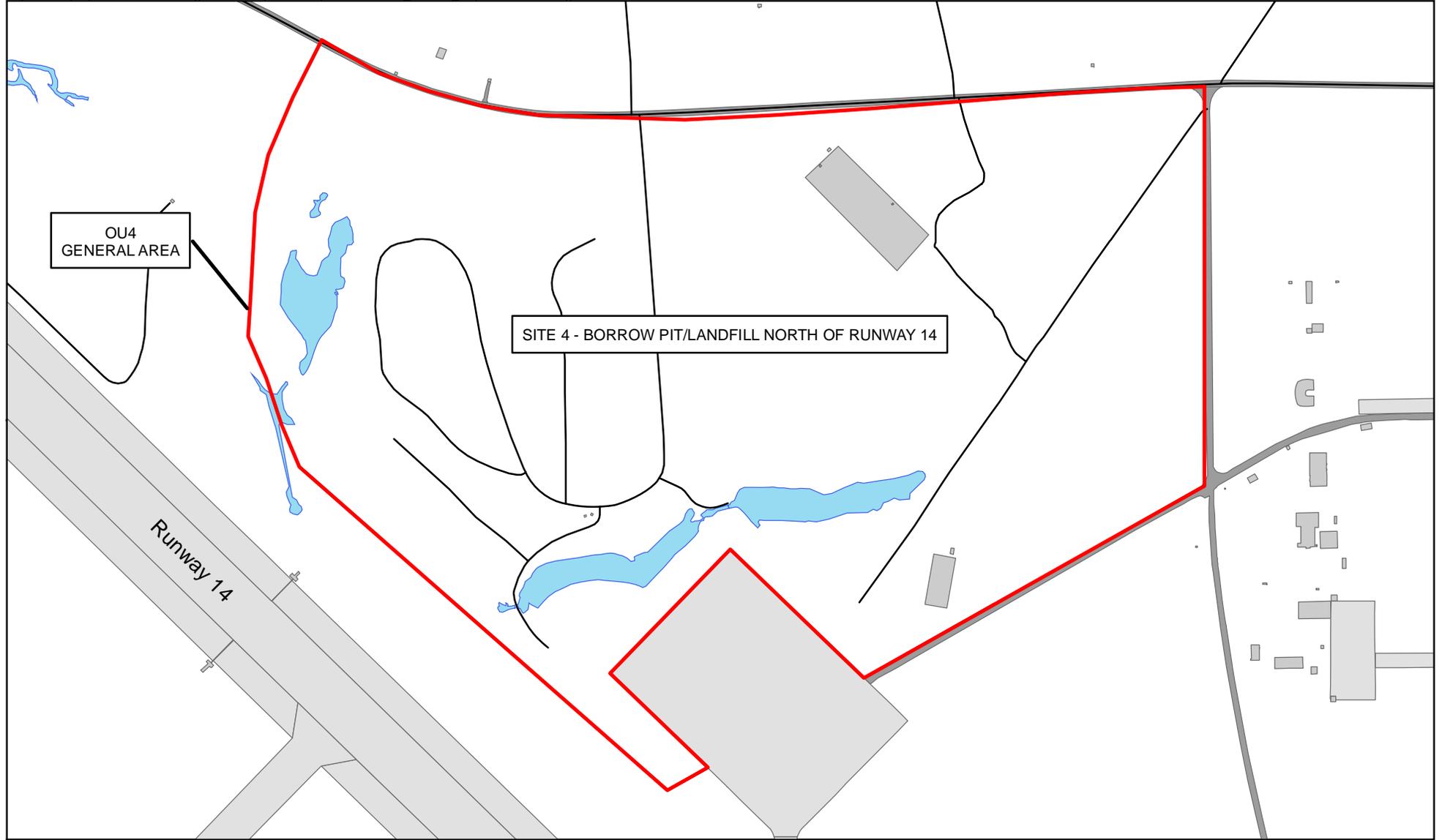
After review of the 2006 groundwater monitoring data presented in the LTM Report, it is recommended that groundwater monitoring be continued in accordance with the ROD for OU4.

## 5.10 Protectiveness Statement

### Site 4

The LUCs associated with the OU4 remedy are expected to be effective in protecting human health and the environment by eliminating the exposure pathways that could result in unacceptable risk. The ICs are preventing exposure to or ingestion of contaminated groundwater.

The MNA remedy for groundwater is protective given current information and prevailing conditions. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals and the protectiveness will continue to be verified through LTM.



**Legend**

-  Operable Unit (OU)/Site Boundary
-  Existing Buildings
-  Paved Road
-  Runway
-  Permanent Water Body
-  Road Centerline

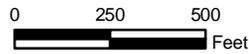


Figure 5-1  
Operable Unit 4  
Five Year Review  
MCAS Cherry Point, North Carolina

# Operable Unit 5

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## 6.1 Site History and Background

OU5 consists of Sites 1 and 2, former borrow pits/landfills that occupy approximately 4 acres each. Site 1 is located west of an access road near the Marine Air Control Squadron Unit (MACS)-6 (Figure 6-1). Some chemical waste is reported to have been disposed at OU5; however, no formal records were kept detailing the quantities or types of waste that were disposed at this site. There is no indication that this site was a main disposal area for the base or that it was regularly used for a significant period of time. Wastes found at Site 1 include rubble, trash, vehicle batteries, crushed 55-gallon drums, and construction debris. Site 1 currently consists of wooded land. The borrow and landfill areas extend to approximately 100 ft from Reeds Gut to the north, along an unnamed tributary to the west, approximately 200 ft from an unpaved road to the south, and bordering a paved access road to the east. Historical aerial photographs of OU5 from 1949, 1955, 1960, 1967, and 1974 showed that although site use reportedly begun in the mid-1950s, Site 1 may have operated as a borrow pit prior to 1949 (CH2M HILL, 2006c).

Site 2 is located on the east side of the access road, directly opposite Site 1. The borrow pit/landfill area of Site 2 contains wastes similar to that of Site 1. In addition to fill material containing construction debris, mixed wastes, and crushed 55-gallon drums, some chemical waste was reportedly disposed at Site 2. Site 2 currently consists of wooded land extending along an unnamed tributary of Reeds Gut to the east and northeast, along an unpaved road to the south and southwest, and the paved access road to the west and northwest. Historical aerial photographs from 1949, 1955, 1960, 1967, and 1974 indicate that Site 2 began operation as a borrow pit sometime between 1955 and 1960. The disposal history in the area of OU5 is based on information provided in the IAS conducted in 1983 and a review of historical aerial photographs (CH2M HILL, 2006c).

## 6.2 Site Chronology

A site chronology of key events and documents for OU5 is presented below.

Date	Event
1983 to 1988	Sites 1 and 2 identified in the IAS and RFA (CH2M HILL, 2005f).
1988	IRI recommends no further action for groundwater at Sites 1 and 2 (CH2M HILL, 2005f).
1991	Seepage observed during a 21 Unit RCRA Facility Investigation (RFI) and additional sampling is recommended (CH2M HILL, 2005f).
October 2003	VGM initiated to monitor VOC concentrations in groundwater (AGVIQ/CH2M HILL, 2007b).
August 2005	RI completed.

Date	Event
October 2005	FFS completed (CH2M HILL, 2005f)
November 2005	Final PRAP submitted for public review and commenting.
June 2006	ROD signed.

## 6.3 Site Characterization

OU5 investigation findings are summarized below.

- No environmental concerns associated with Site 1 were identified.
- TCE, VC, and benzene have been identified as COCs in groundwater at OU5.
- No distinct groundwater plume has been identified, as the contamination appears to be isolated to the location of a single monitoring well at Site 2.
- Cumulative hazards across media exceed target risk levels for a residential child at Site 2 with respect to arsenic. However, the arsenic concentrations at OU5 are consistent with background concentrations at MCAS Cherry Point and are not associated with site activities.
- The ecological risks do not warrant further ecological study or active remediation.

## 6.4 Initial Response Actions

VGM began in October 2003 to monitor VOC, SVOC, and metal concentrations on a semiannual basis, and the results were documented in a VGM report following the completion of each sampling event. VGM in 2003 and 2004 showed concentrations exceeding NC Groundwater Quality limits for benzene, TCE, and VC. As a result of TCE and VC were added to the list of regulatory COCs for OU5 (AGVIQ/CH2M HILL, 2007b). The May and November 2006 VGM report recommended that the voluntary groundwater monitoring activities be suspended in favor of quarterly LTM in accordance with the OU5 ROD, beginning in 2007.

## 6.5 Description of Remedial Actions

The ROD for OU5 was signed in June 2006. RAOs were developed based on data collected during the RI (CH2M HILL, 2005c) and an evaluation in the FFS (CH2M HILL, 2005g) to aid in the development and screening of remedial alternatives to be considered for the ROD. The RAOs for OU5 state that the selected remedy must:

- Prevent human exposure to groundwater containing COCs in excess of NC Groundwater Quality standards
- Achieve suitability of OU5 groundwater for unlimited use with a reasonable approach and within a reasonable timeframe
- Reduce exceedances of COCs to meet the NC Groundwater Quality standards

Five alternatives were screened, and the final selected remedy is summarized below:

Use of MNA to achieve groundwater cleanup levels and submission of an annual technical memorandum summarizing progress. MNA consists of periodic groundwater monitoring for COCs and natural attenuation indicator parameters to demonstrate if source removal results in the reduction in concentrations of COCs over time.

ICs were implemented to prohibit the withdrawal and/or future use of groundwater, except for monitoring, from the surficial aquifer, and intrusive activities within 250 ft of the impacted well at Site 2 unless concurrence is received from both NCDENR and USEPA. Specific types of ICs to be employed for these purposes will include: incorporating land use prohibitions into the MCAS Cherry Point master planning process.

### 6.5.1 Remedy Implementation

The RD for OU5 was finalized in August 2007; however, LTM began in May 2006. MNA activities are discussed further in the following section.

The Navy has included the LUCs in its master planning process and updated the Air Station GIS.

### 6.5.2 Remedy Operation and Maintenance

The objective of LTM at OU5 is to evaluate changes in concentrations of the COCs identified in the ROD for OU5. The ROD identified benzene, TCE, and VC as COCs at a single monitoring well location at Site 2.

LTM at OU5 was initially conducted on a semiannual basis, during the 2nd and 4th quarters of 2006. In 2007, the sampling frequency changed to a quarterly basis (CH2M HILL, 2007c). The sampling frequency was changed to quarterly so that the consistency of the concentrations seasonally and over longer time periods could be evaluated more rapidly. The Navy will continue LTM on a quarterly basis to measure the effectiveness of the MNA remedy until TCE, VC, and benzene are at or less than their respective remediation goals for four consecutive sampling events. When these goals have been achieved, procedures for site closure will be initiated.

The LUCs at OU5, Site 2 have the following objectives:

- Prohibit the withdrawal and any use of contaminated groundwater, except for environmental monitoring, from the surficial aquifer within 250 ft of the impacted monitoring well (OU5-2MW04)
- Prohibit intrusive activities within 250 feet of the impacted monitoring well (OU5-2MW04) unless specifically approved by both NCDENR and USEPA
- Maintain the integrity of any current or future remedial or monitoring system such as monitoring wells in order to continue LTM

Monitoring of the environmental use restrictions and LUCs will be conducted quarterly by the Navy and/or MCAS Cherry Point. The monitoring will consist of visual inspections of Site 2 and reviews of the applicable Base Master Planning Process and GIS data. Any deficiencies noted will be reported to NCDENR and USEPA within 10 days. The monitoring

results will be included in a separate report or summarized in a letter, if appropriate, and provided to USEPA and NCDENR.

Table 6-1 presents the estimated annual O&M costs for OU3 from 2006 to 2007.

TABLE 6-1  
Estimated O&M Costs for OU5  
*MCAS Cherry Point*

Year	Total Cost (rounded to the nearest \$100)
2006	\$20,600
2007	\$10,450

### 6.5.3 Progress Since Last Review

This is the first Five-Year Review completed for OU5.

## 6.6 Technical Assessment

### Is the remedy functioning as designed?

The results from the last annual LTM Report for 2006 indicate the COCs benzene, TCE, and VC were detected in the groundwater samples collected from monitoring well OU5-2MW04 during the May and November 2006 LTM events. VC exceeded the NC Groundwater Quality standard during the May and November 2006 sampling events. Concentrations of benzene and TCE exceeded the NC Groundwater Quality standards in May 2006, but dropped below the NC Groundwater Quality standards in November 2006 (AGVIQ/CH2M HILL, 2007b).

In general, concentrations of COCs observed at the site have been low (<10 µg/L), although historically the concentrations have slightly exceeded the respective MCLs and/or the NC Groundwater Quality standards. In the most recent round of monitoring (November 2006), concentrations of benzene and TCE were less than the action levels, and only VC exceeded action levels. Concentrations of all three COCs appear to be decreasing over time at OU5-2GW04, although benzene and TCE concentrations have been highly variable.

The MNA data suggest that site groundwater is characterized by mildly reducing conditions that are marginally suitable for anaerobic biodegradation of organic contaminants. Anaerobic conditions are indicated by low DO in May 2006 (although elevated in November 2006), slightly negative ORP, no detectable nitrate, elevated manganese and iron (indicative of dissolved manganese [Mn+2] and Fe+2), and trace levels of methane.

The available data suggest that biodegradation of benzene in groundwater may be coupled with manganese reduction, iron reduction, and/or reductive dechlorination of chlorinated VOCs. It should be kept in mind that the low concentrations of organic contaminants found at the site would not be expected to cause substantial changes in groundwater geochemistry due to biodegradation (AGVIQ/CH2M HILL, 2007b).

**Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of selection still valid?**

The exposure assumptions, toxicity data, cleanup levels, and RAOs for the remedy are still valid based evaluation of data presented in the LTM reports and confirmation that the State and Federal standards for the COCs have not changed.

**Has any other information come to light that could call into question the protectiveness of the remedy?**

No additional information has been identified during this review that would call into question the protectiveness of the remedy.

## 6.7 Issues

There are no issues associated with the remedies that have been implemented for OU5 that threaten the protection of human health and the environment.

## 6.8 Recommendations and Follow-up Actions

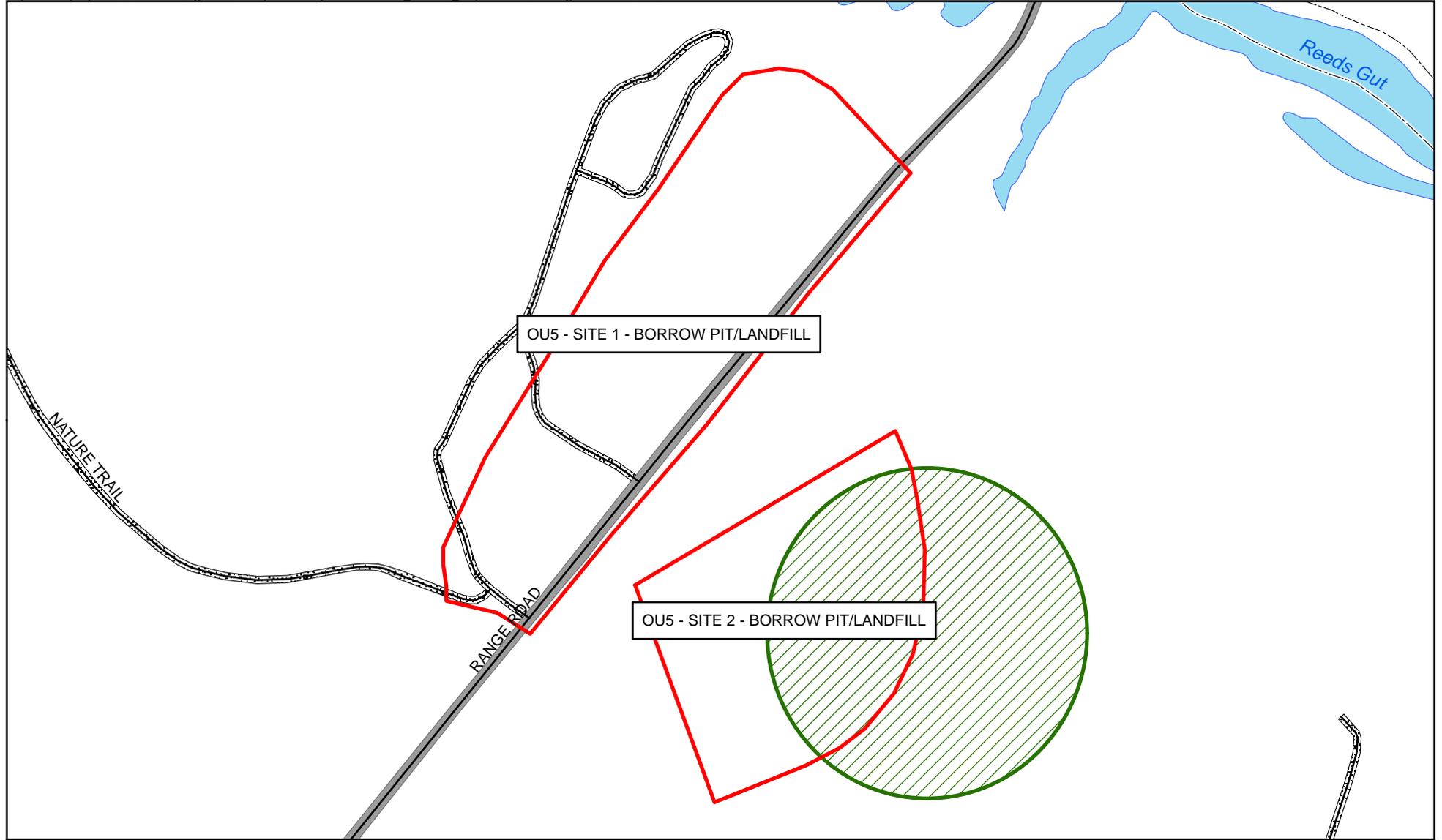
Based on a review of the 2006 groundwater monitoring data presented in the LTM report, it is recommended that groundwater monitoring be continued in accordance with the ROD for OU5 (AGVIQ/CH2M HILL, 2007b). Specifically, monitoring well OU5-2GW04 should continue to be sampled for the COCs benzene, TCE, and VC.

## 6.9 Protectiveness Statement

### Site 2

The LUCs associated with the OU5, Site 2 remedy are expected to be effective in protecting human health and the environment by eliminating the exposure pathways that could result in unacceptable risk. The ICs are preventing exposure to or ingestion of contaminated groundwater.

The MNA remedy for Site 2 groundwater is protective given current information and prevailing conditions and the protectiveness will continue to be verified through LTM.



**Legend**

- Operable Unit (OU)/Site Boundary
- Land Use Control Boundary
- Installation Boundary
- Permanent Water Body
- Paved Road
- Unpaved Road
- Surficial Groundwater Use Prohibited
- Road Centerline

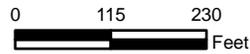


Figure 6-1  
Operable Unit 5  
Five Year Review  
MCAS Cherry Point, North Carolina

# Operable Unit 6

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## 7.1 Site History and Background

OU6 is located in the southeastern portion of the installation, in the eastern portion of Runway 28 (Figure 7-1). Runway 28 has not been active for aircraft take-off and landing activities since the late 1950s. Since that time, the OU6 area has been used for crash-crew training (fire fighting), engine run-up maintenance and testing activities, and aircraft long-term storage experimentation. OU6 includes one investigation area, Site 12. Two additional areas (Site 35 and Site 35a) are located within the boundary of OU6, but have been previously addressed under separate programs.

Site 12 is located along the south side of Runway 28 at approximately the midpoint of the runway length. The runway is bordered by grassy areas to the north, south, and east, with dense woods beyond the grass. Hancock Creek is located approximately 700 ft east of the eastern edge of Runway 28.

Site 12 currently consists of one active, modern burn pit with a concrete lining and drains to collect fire-fighting water used during training exercises. By examining historical aerial photographs of the Site 12 area, the former locations of five more primitive burn pits (Burn Pits A through E) were identified.

Waste POLs and waste burnable (i.e., likely non-chlorinated) solvents were historically burned in the former burn pits, which were constructed of dirt placed on top of the asphalt runway surface and shaped into circular berms. The active crash-crew burn pit was constructed in 1985 and consists of a circular concrete pad used to burn waste jet fuel (JP-5). The burn pit itself is drained through subsurface piping to a nearby oil-water separator (OWS). There is a trench drain surrounding the active burn pit that captures runoff from the concrete pad. Runoff in the trench drain is also directed to the OWS. Runoff outside of the trench drain flows southward across the asphalt into the grassy area south of the runway. An east-west trending drainage swale south of the runway eventually receives runoff entering the grassy area. A significant portion of this runoff flows into the grassy area and the drainage swale through a small runoff channel located southwest of the burn pit, immediately east of the OWS.

## 7.2 Site Chronology

A site chronology of key events and documents for OU6 is presented below.

Date	Event
1983	IAS identified Site 12 as a crash-crew training area (CH2M HILL, 2005g).
1988	RFA report completed (CH2M HILL, 2005g).
1990	Effluent pipe for the OWS previously leading to a nearby drainage swale is welded

Date	Event
	shut (CH2M HILL, 2005g).
1993	21-unit RFI (including Site 12) conducted (CH2M HILL, 2005g).
1993	10-unit Technical Direction Memorandum (including Site 12) completed (CH2M HILL, 2005g).
1995	6,000-gallon UST and 350 cubic yards (yd <sup>3</sup> ) of soil removed (CH2M HILL, 2005g).
1999	RI Work Plan completed and RI activities commence
October 2000	Draft RI Report submitted
May 2005	Supplemental Investigation report submitted (CH2M HILL, 2005e).
May 2005	VGM for VOCs initiated
December 2005	Final RI submitted
January 2006	FFS for Site 12 submitted
May 2006	PRAP submitted for public review and comment
October 2006	ROD signed (CH2M HILL, 2006e).
March to May 2007	Removal of contaminated soils at Site 12
June 2007	LTM begins
July 2007	Draft IRACR report submitted (AGVIQ/CH2M HILL, 2007c)

## 7.3 Site Characterization

OU6 investigation findings are summarized below (CH2M HILL, 2005e, g).

- 2-methylnaphthalene, naphthalene, and arsenic in groundwater and ethylbenzene, 2-methylnaphthalene, and naphthalene in soil beneath the former location of Burn Pit E are considered COCs.
- There is no definable plume of groundwater contamination at OU6.
- No unacceptable ecological risk has been identified at OU6.
- Unacceptable risks to human health include carcinogenic risks and non-carcinogenic hazards for a future resident from exposure to surface soil and groundwater.

## 7.4 Initial Response Actions

A former 6,000-gallon UST (No. 4182) was located approximately 20 ft south of the OWS associated with the active burn pit at Site 12. Base personnel reported that the tank contents were used in the past to fuel the burn pit. The UST was removed in November 1995, with no visual evidence of leaks or holes in the UST or related piping observed during closure, nor any evidence of soil staining or petroleum odors. However, based on concentrations of total petroleum hydrocarbons (TPHs) detected in soil samples from the excavation, a total of

approximately 350 yd<sup>3</sup> of soil were reportedly excavated and disposed offsite (R. E. Wright, 1996).

The Navy initiated VGM in May 2005 to monitor VOC concentrations found to exceed State groundwater quality standards identified in the FS (AGVIQ/CH2M HILL, 2006b). VGM is conducted on a semiannual basis, and will continue as LTM in 2007 in accordance with the ROD.

## 7.5 Description of Remedial Actions

The ROD for OU6 was signed in September 2006 (CH2M HILL, 2006e). RAOs were developed based on data collected during the RI and Supplemental Investigation to support development and screening of remedial alternatives to be considered for the ROD. The RAOs for OU6 state that the selected remedy must:

- Prevent human exposure to soil containing COCs in excess of NC SSL standards
- Prevent human exposure to groundwater containing COCs in excess of NC Groundwater Quality standards
- Achieve cleanup of OU6 soil and groundwater for unrestricted land use using a reasonable approach and within a reasonable timeframe
- Reduce COC concentrations to meet the NC SSL and NC Groundwater Quality standards.

The selected remedy for OU6 includes the following components:

- Excavation and offsite disposal of soil in excess of NC SSLs beneath the former location of Burn Pit E.
- Conducting groundwater monitoring of COCs and natural attenuation parameters and submitting an annual technical memorandum summarizing progress. Monitoring will consist of quarterly groundwater sampling of wells located within the source area, and monitoring will be documented in an annual technical memorandum. Upon completion of the first year of monitoring, the frequency will be evaluated by the MCAS Cherry Point Partnering Team and adjusted accordingly to meet site conditions.
- Institution of LUCs for groundwater use and land development with respect to the surficial aquifer. Specific types of LUCs consist of: incorporate land use prohibitions into the MCAS Cherry Point master planning process. The site will be inspected periodically, and the Navy will certify the effectiveness of the LUCs. The Navy will maintain the LUC boundaries until the concentrations of hazardous substances in the groundwater are at such levels as to allow for unrestricted land use and unlimited exposure.

### 7.5.1 Remedy Implementation

The Site 12 soil removal action was completed in May 2007 and LTM began in June 2007. MNA activities for groundwater are discussed in the following section.

## 7.5.2 Remedy Operation and Maintenance

Removal action activities consisted of excavation of the tar-like layer and impacted soils in the vicinity of Former Burn Pit E, backfill of the excavation, and site restoration. Excavation activities took place from February to May 2007. Soil removal was conducted using a hydraulic excavator. The top 3.5 ft of soil were removed and stockpiled as anticipated “clean” overburden. Soil excavated from 3.5 to 7 feet below ground surface was stockpiled as waste. Total volume excavated was approximately 2,859 yd<sup>3</sup> (including asphalt and overburden soil) (AGVIQ/CH2M HILL, 2007c).

The objective of LTM at OU6 is to evaluate changes in COC concentrations identified in the OU6 ROD. Five surficial monitoring wells, 12GW03, 12GW05, 12GW06, 12GW07, and 12GW08, are sampled as part of the LTM program. Monitoring wells 12GW05, 12GW06, 12GW07, and 12GW08 are sampled for naphthalene and 2-methylnaphthalene. 12GW03 is sampled for arsenic. In addition, as part of the MNA remedy, standard natural attenuation parameters are analyzed by an analytical laboratory. Water quality parameters consisting of temperature, turbidity, pH, DO, ORP, and specific conductivity are measured as well. Prior to the start of groundwater sampling, groundwater levels are measured in each monitoring well.

The Navy will continue LTM on a quarterly basis to measure the effectiveness of the MNA remedy until the COCs are at or below their respective remediation goals for four consecutive sampling events.

The LUCs to be implemented at OU6 Site 12, have the following objectives:

- Prohibit withdrawal and any use of contaminated groundwater from the surficial aquifer, except for environmental monitoring.
- Prohibit intrusive activities within the extent of the current groundwater contamination unless specifically approved by both NCDENR and USEPA.
- Maintain the integrity of any current or future remedial or monitoring system such as monitoring wells.

Monitoring of the environmental use restrictions and LUCs will be conducted quarterly by the Navy and/or MCAS Cherry Point. The monitoring will consist of visual inspections and reviews of the applicable Base Master Planning Process and GIS data. Any deficiencies noted will be reported to NCDENR and USEPA within 10 days. The monitoring results will be included in a separate report or summarized in a letter, if appropriate, and provided to USEPA and NCDENR.

Table 7-1 presents the estimated annual O&M costs for OU6 from the previous 5-Year Review to 2007.

TABLE 7-1  
Estimated O&M Costs for OU6  
*MCAS Cherry Point*

Year	Total Cost (rounded to the nearest \$100)
2006	\$2,200
2007*	\$43,500
2007**	\$425,000

\* Cost associated with LTM activities

\*\* Cost associated with soil removal and well installation activities.

### 7.5.3 Progress Since Last Review

This is the first Five-Year Review completed for OU6.

## 7.6 Technical Assessment

### Is the remedy functioning as designed?

LTM at OU6 began in June 2007 and groundwater analytical data will be evaluated semiannually.

Voluntary Groundwater Monitoring was initiated in May 2005. The latest Voluntary Groundwater Monitoring Report (AGVIQ/CH2M HILL, 2007c) presents conclusions and recommendations concerning natural attenuation of COCs based on 2006 groundwater data (collected prior to the soil removal action at Site 12 completed in May 2007). All COC concentrations were either below detection limits (naphthalene and 2-methylnaphthalene) or below remediation goals (ethylbenzene). The MNA indicator parameter data coupled with the decreasing COC concentrations over time indicate that natural degradation of the COCs is occurring at OU6 (AGVIQ/CH2M HILL, 2006c).

### Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of selection still valid?

The exposure assumptions, toxicity data, cleanup levels, and RAOs are still valid based on the remedy evaluation of data presented in the most recent Voluntary Groundwater Monitoring Report and confirmation that the State and Federal standards for the COCs have not changed.

### Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has been identified during this review that would call into question the protectiveness of the remedy.

## 7.7 Issues

There are no issues associated with the remedies that have been implemented for OU6 that threaten the protection of human health and the environment.

## 7.8 Recommendations and Follow-up Actions

Based on a review of the 2006 groundwater monitoring data presented in the most recent VGM report, it was recommended that further groundwater monitoring be conducted for OU6. The first round of groundwater LTM began in June 2007 and the data are currently being evaluated.

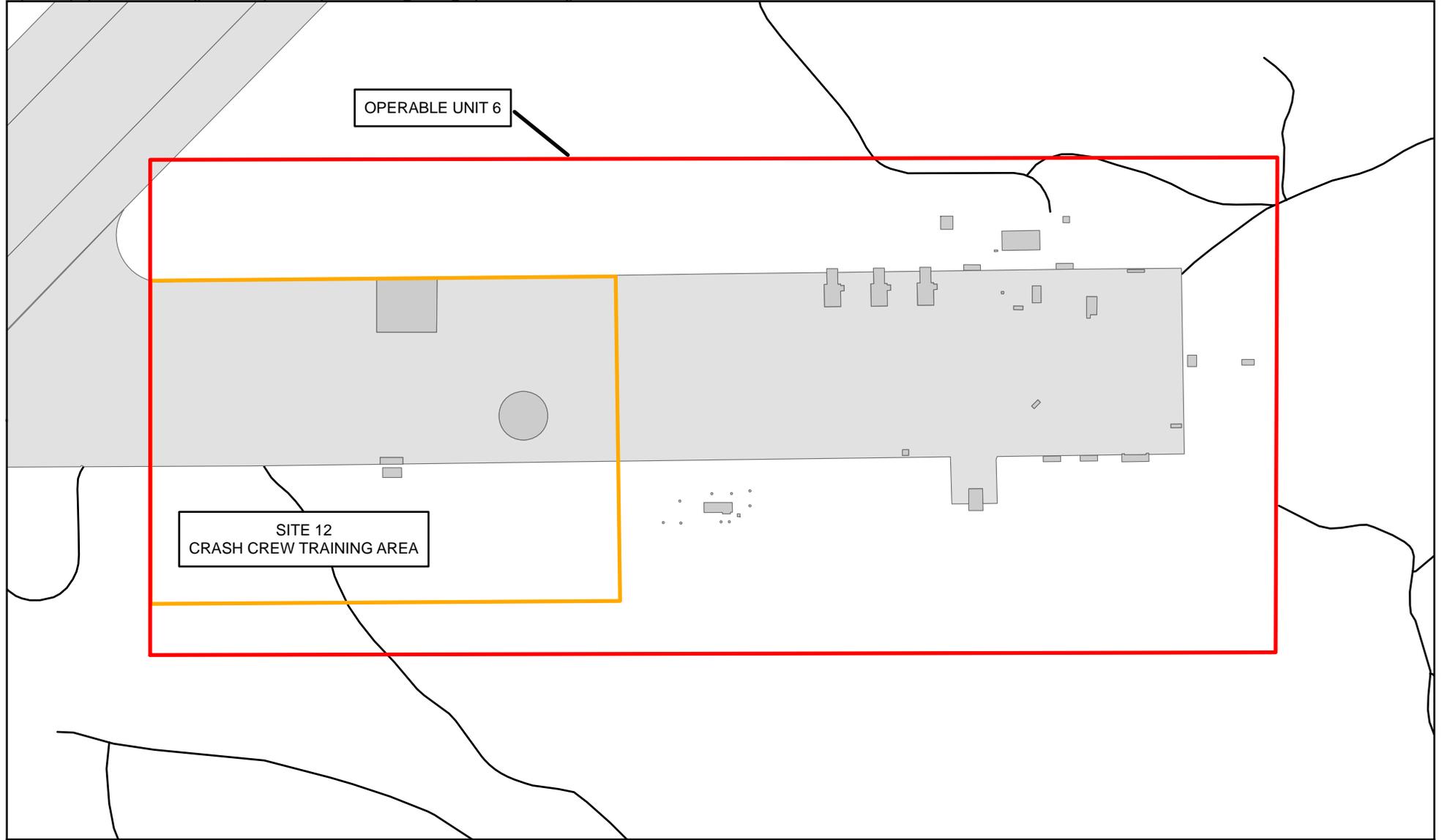
## 7.9 Protectiveness Statement

### OU6

In March 2007, the tar-like layer of contaminated soil from beneath the former location of Burn Pit E was excavated and disposed of offsite as part of the final remedial action at OU6.

The LUCs associated with the OU6 remedy are expected to be effective in protecting human health and the environment by eliminating the exposure pathways that could result in unacceptable risk. The ICs are preventing exposure to or ingestion of contaminated groundwater.

The MNA remedy for groundwater is protective given current information and prevailing conditions and the protectiveness will continue to be verified through LTM.



**Legend**

-  Operable Unit (OU) Boundary
-  Site Boundary
-  Runway
-  Existing Buildings
-  Road Centerline

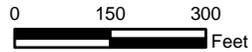


Figure 7-1  
Operable Unit 6  
Five Year Review  
MCAS Cherry Point, North Carolina

# Operable Unit 13

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## 8.1 History and Background

OU13 is located in the southeastern corner of MCAS Cherry Point, and includes three IR Program sites: Site 19, the borrow pit/landfill north of Runway 32L; Site 21, the borrow pit/landfill south of Runway 32L; and Site 44B, the former Sludge Application Area. The locations of these sites are shown in Figure 8-1.

Site 19, a borrow pit/landfill area north of Runway 32L, consists of several borrow pits used for waste disposal that cover an area of approximately 16 acres. Site 19 lies between Runway 32L, Hancock Creek, and Shop Branch (a tributary of Hancock Creek), and forms the northern boundary of OU13.

The borrow pits were initially excavated in the late 1940s, and were reportedly used in the 1950s and 1960s for waste disposal. Fly ash from the steam plant and wastes from the Air Station may have been disposed of at the site. Based on a review of historical aerial photographs, the first signs of activity at the site appear in 1949. Aerial photographs from 1949 and 1955 indicate that a major change in the drainage of the area occurred during that time period. This change in the drainage pattern is associated with the extension of Runway 32L over Shop Branch. A 1970 aerial photograph shows that the site had started to re-vegetate by that time. All subsequent photographs indicate that the only apparent activity in the area of Site 19 was the mowing of grassy areas adjacent to the runway.

Site 21 consists of several borrow pits that were used for waste disposal covering approximately 30 acres south of Runway 32L. Shop Branch runs through Site 21 before crossing under the runway and emptying into Hancock Creek. As with Site 19, the borrow pits at Site 21 were initially excavated in the late 1940s, and were reportedly used in the 1950s and 1960s for waste disposal. The wastes may have included fly ash and wastes from the Air Station. The first signs of activity at the site appear in a 1949 aerial photograph. All subsequent aerial photographs show some type of activity occurring at the site, most likely associated with extension of the runway or mowing of the areas adjacent to the runway.

Site 44B consists of a 12-acre area adjacent to Site 21 that was used for the application of sludge from the Air Station sewage treatment plant in the 1980s. Sludge removed from the digesters between September and November 1987 and placed at Site 44B may have contained organic compounds and other constituents that were not digested during the sewage treatment process. Prior to this period, the area is reported to have been used for waste disposal, including asbestos pipe disposal. As with Site 21, the first signs of activities at the site appear in a 1949 aerial photograph. All subsequent photographs indicated that the only apparent activity in the area of Site 44B was the mowing of grassy areas adjacent to the runway.

Four other areas within OU13, Area A through D, were not investigated prior to 1999, but were identified on aerial photographs as areas of disturbance where wastes may have been

disposed. Descriptions of these areas and their relationships to other OU13 sites are summarized below.

- **Area A:** Between Runway 32L and Hancock Creek. Area A is southeast of Site 19 and northeast of Site 21. The area receives surface water runoff from Site 19 and is downgradient of Site 19 with respect to groundwater flow.
- **Area B:** Adjacent to Site 21 at the southeastern end of Runway 32L and bounded by Hancock Creek to the north and east. Area B receives surface water runoff from Site 21 and is downgradient from Site 21 with respect to groundwater flow.
- **Area C:** South of Site 44B. This area does not appear to receive surface water runoff from any OU13 sites due to its location. It is hydraulically cross-gradient to Site 44B with respect to groundwater flow, meaning that groundwater beneath Area C is flowing parallel to and separate from the groundwater beneath Site 44B.
- **Area D:** Southeast of Site 44B and bounded to the east by Hancock Creek. The Area receives surface water flow from Site 44B, and part of the area is downgradient of Site 44B with respect to groundwater flow.

## 8.2 Site Chronology

Historical land use and practices at OU13 resulted in releases of COPCs to the environment that were identified through investigations. The list of significant events that have occurred at OU13 follows:

Date	Event
Late 1940s	Sites 19 and 21 initially excavated as borrow pits (CH2M HILL, 2007d).
1950s – 1960s	Sites 19 and 21 used as landfills (CH2M HILL, 2005h).
1981	Sites 19, 21 and 44B included in the IAS conducted as part of the Naval Assessment and Control of Installation Pollutants program. Further investigation was recommended for these two sites.
1988	Sites 19 and 21 and 44B identified in the RFA.
1994 – 2002	RI conducted at OU 13 included Sites 19, 21 and 44B.
December 1994	MCAS Cherry Point placed on the NPL (TetraTech NUS, 1999a).
March 2004	FS finalized.
April 2005	PRAP finalized and submitted for public review and commenting.
September 2005	ROD signed.
April 2006	Remedial Design finalized and includes Sites 19, 21, 44B and Areas A and B.
September 2006	IRACR finalized.

## 8.3 Site Characterization

OU13 investigation findings are summarized below (CH2M HILL, 2002).

- There is no definable plume of groundwater contamination at OU13. Furthermore, contamination is limited to the surficial aquifer and has not been detected in the deeper Yorktown Aquifer.
- No unacceptable ecological risk was identified at OU13.
- Unacceptable risks to human health include future child/adult resident exposure to groundwater and are associated with arsenic, iron, manganese and thallium, which are naturally occurring elements.
- Although no risk was associated with site-attributable constituents, the organic compounds 1,1-dichloroethene, methylene chloride, VC, BEHP and 4-methylphenol were identified as final COCs due to the exceedance of applicable NC Groundwater Quality standards.

## 8.4 Initial Response Actions

VGM was conducted on a semiannual basis from October 2003 through November 2005 to monitor VOC concentrations, and the results were presented in a VGM report following the completion of each sampling event. The May and November 2005 VGM report recommended that voluntary groundwater monitoring activities be suspended in favor of LTM in accordance with the OU13 ROD (AGVIQ/CH2M HILL, 2007d).

## 8.5 Description of Remedial Actions

The ROD for OU13 was signed in September 2005. RAOs were developed based on data collected during the RI/FS to support development and screening of remedial alternatives to be considered for the ROD. The RAOs for OU13 state that the selected remedy must:

- Prevent human exposure to groundwater containing COCs in excess of NC Groundwater Quality standards
- Achieve suitability of OU13 groundwater for unlimited use with a reasonable approach and within a reasonable timeframe
- Reduce concentrations of COCs to meet the NC Groundwater Quality standards

The selected remedy for OU13 presented in the ROD consists of the following components:

- Use of MNA to achieve groundwater cleanup levels and submission of an annual technical memorandum summarizing progress. MNA will be performed by collecting and analyzing groundwater samples to assess that no unacceptable contaminant migration is occurring and to evaluate reductions in contaminant concentrations.
- Institution of LUCs for groundwater use and land development with respect to the surficial aquifer. The LUC objectives are to prohibit the withdrawal and/or future use of

water from the surficial aquifer within 250 ft of impacted monitoring wells, and to prohibit intrusive activities within the extent of current groundwater contamination unless specifically approved by both NCDENR and USEPA.

### 8.5.1 Remedy Implementation

The RD for OU13 was finalized in April 2006. LTM began in May 2006. MNA activities are discussed further in the following section.

The Navy has included the LUCs in its master planning process and updated the Station GIS.

### 8.5.2 Remedy Operation and Maintenance

LTM activities at OU13 are conducted on a semiannual basis, during the 2nd and 4th quarters of the calendar year. Groundwater samples were initially collected from seven monitoring wells (OU13-21GW02, OU13-19GW07, OU13-21GW08, OU13-21GW09, OU13-21GW10, OU13-21GW11, and OU13-21GW14). After review of the 2006 LTM data, it was recommended in the document titled *Final Annual Long-term Monitoring Report, Operable Unit 13* (AGVIQ/CH2M HILL, 2007d) that sampling of three of the seven monitoring wells (OU13-19GW07, OU13-21GW11, and OU13-21GW14) be discontinued based on the lack of detections of specific COCs identified for these wells during four or more of the previous sampling events. In addition, based on review of 2007 LTM data, the MCAS Cherry Point Partnering Team agreed that the sampling of monitoring wells OU13-21GW02, OU13-21GW08, and OU13-21GW09 would be discontinued based specific COCs below the NC Groundwater Quality standards during four or more of the previous sampling events. Details on the six monitoring wells removed from the LTM program are provided below:

- **OU13-19GW07:** the COC for this well (BEHP) was not detected during five consecutive sampling events.
- **OU13-21GW02:** the COC for this well (methylene chloride) was not detected during four consecutive sampling events.
- **OU13-21GW08:** the COC for this well (BEHP) was not detected during five consecutive sampling events.
- **OU13-21GW09:** the COC for this well (vinyl chloride) was not detected during four consecutive sampling events.
- **OU13-21GW11:** the COC for this well (BEHP) was not detected during six consecutive sampling events.
- **OU13-21GW14:** there have been four consecutive non-detections of the COC identified for this well, 4-methylphenol. Therefore, it is recommended that sampling at this well be discontinued and that well OU13-21GW14 be properly abandoned in accordance with state well abandonment regulations.

The Navy will continue LTM to measure the effectiveness of the MNA until each single COC is at or below its respective remediation goal for four consecutive sampling events. MNA results will be presented in annual monitoring reports. When all COCs have achieved the respective goals for four consecutive sampling events, procedures for site closure will be initiated.

Monitoring of the environmental use restrictions and LUCs are conducted quarterly by the Navy and/or MCAS Cherry Point. Monitoring activities consist of VSIs of OU13 and reviews of the applicable Base Master Planning Process and GIS data. Any deficiencies noted are reported to NCDENR and USEPA within 10 days. Monitoring results are included in a separate report or summarized in a letter, if appropriate, and provided to USEPA and NCDENR.

Table 8-1 presents the estimated annual O&M costs for OU13 from 2006 to 2007.

TABLE 8-1  
Estimated O&M Costs for OU13  
*MCAS Cherry Point*

Year	Total Cost (rounded to the nearest \$100)
2006	\$45,550
2007	\$35,250

### 8.5.3 Progress Since Last Review

This is the first Five-Year Review being conducted for OU13.

## 8.6 Technical Assessment

### Is the remedy functioning as intended by the Decision Documents?

The implemented remedy has been effective in reducing the levels of each well-specific COC towards its respective remediation goal. Since MNA was implemented, six of the seven groundwater monitoring wells have had at least four consecutive sampling events for which the COC identified for each well was either not detected or below the NC Groundwater Quality standards. LUCs implemented for OU13 prohibit intrusive activities below the water table and prohibit groundwater use, except for monitoring. The LUCs are functioning as planned to eliminate exposure to contaminants and protect human health and the environment.

MNA has shown that the overall VOC concentrations in the groundwater have decreased since the remedy was implemented. This indicates natural attenuation is achieving degradation of the COCs for the site. The trends observed for concentrations of COCs in groundwater for several locations indicate that concentrations have decreased to below the NC Groundwater Quality regulatory standards identified in the RAO.

### Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of selection still valid?

The exposure pathways, toxicity data, and exposure assumptions used in the risk assessment have remained valid since MNA was implemented. However, during VGM, 4-methylphenol was detected in monitoring well OU13-21GW14 at a concentration exceeding NC Groundwater Quality standards. Due to this detection, 4-methylphenol was added to the list of regulatory COCs for OU13. Even though the presence of 4-methylphenol was not

considered in the selection of MNA as the best alternative technology for OU13, due to the low concentration of 4-methylphenol detected in the well, this compound is amenable to natural attenuation. Thus, the addition of 4-methylphenol as a COC does not affect the area needing remediation or the RA scope for OU13.

**Has any other information come to light that could call into question the protectiveness of the remedy?**

No additional information has been identified during this review that would call into question the protectiveness of the remedy.

## 8.7 Issues

There are no issues associated with the remedies that have been implemented for OU13 that threaten the protection of human health and the environment.

## 8.8 Recommendations and Follow-up Actions

### 8.8.1 Site 19, 21 and 44B

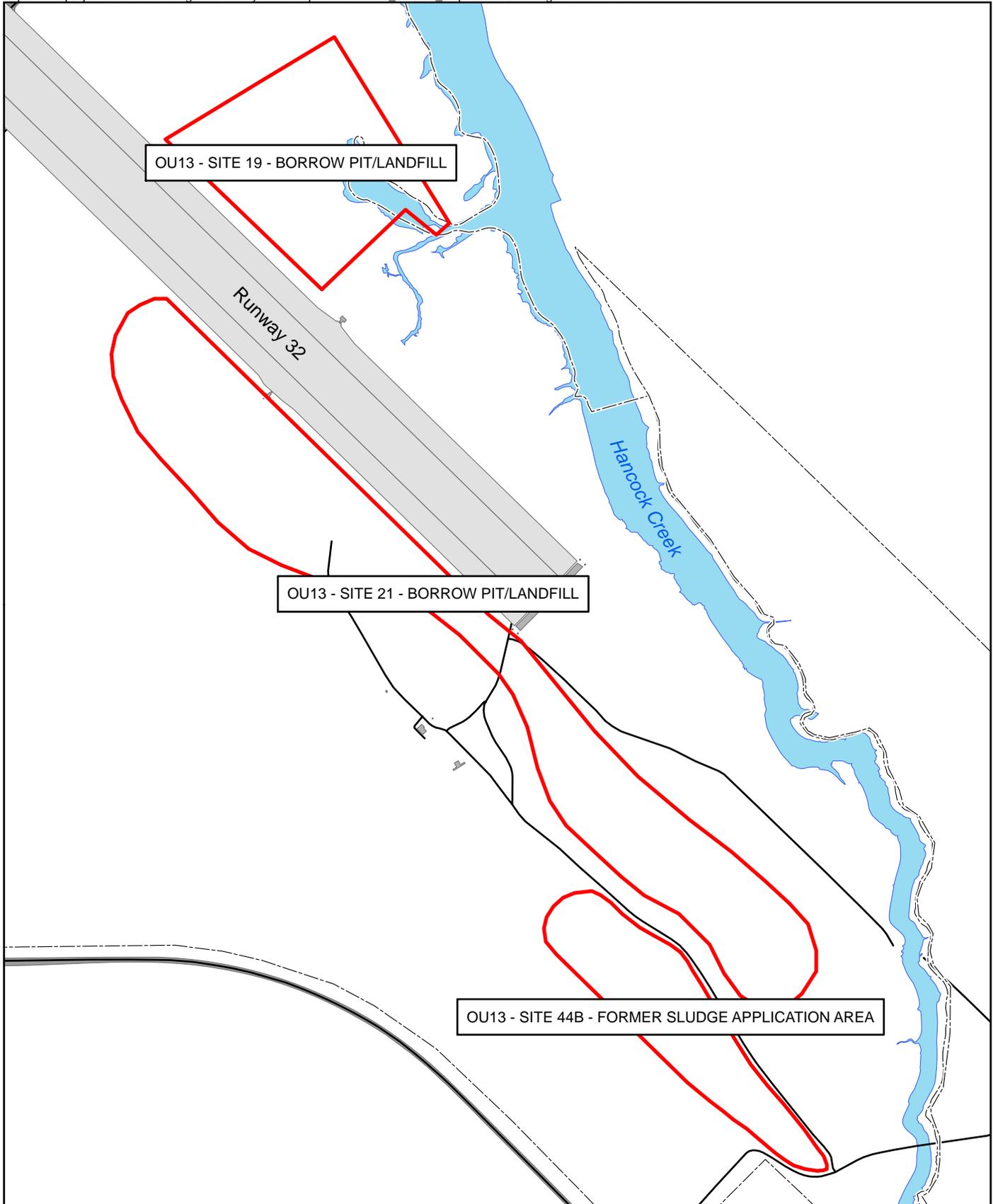
It is recommended that LTM be continued at the remaining monitoring well 21GW10 until the COC concentrations decrease to or less than the NC Groundwater Quality standards for four consecutive sampling rounds (AGVIQ/CH2M HILL, 2007d).

## 8.9 Protectiveness Statement

### Sites 19, 21 and 44B

The LUCs associated with the OU13 remedy are expected to be effective in protecting human health and the environment by eliminating the exposure pathways that could result in unacceptable risk. The ICs are preventing exposure to or ingestion of contaminated groundwater.

The MNA remedy for groundwater is protective given current information and prevailing conditions, and the protectiveness will continue to be verified through LTM.



**Legend**

- Operable Unit (OU)/Site Boundary
- Runway
- Existing Buildings
- Paved Road
- Installation Boundary
- Permanent Water Body

— Road Centerline



Figure 8-1  
Operable Unit 13  
Five Year Review  
MCAS Cherry Point, North Carolina

# Five-Year Review Process

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## 9.1 Administrative Components

### 9.1.1 Administrative Components

The MCAS Cherry Point Five-Year Review team is led by Ms. Janice Nielsen, Remedial Project Manager (RPM) for the IR Program Manager at MCAS Cherry Point. In addition to Ms. Nielsen, the Five-Year Review team consists of the following members:

- Mr. Jeff Christopher/IR Program for MCAS Cherry Point, EAD
- Mr. George Lane/RPM for NCDENR
- Ms. Gena Townsend/RPM for USEPA

### 9.1.2 Community Involvement

Activities to involve the community in the Five-Year Review process were initiated with a notification published in early July 2007 in four local newspapers (Sun Journal, Carteret County News Times, Havelock News, and Windsock) that announced that the Five-Year Review process was occurring at MCAS Cherry Point. When the Five-Year Review Report has been finalized, a notice will be sent to these newspapers indicating the results of the review and that the report is available to the public.

### 9.1.3 Document Review

The Five-Year Review consisted of a review of various documents (e.g., RI reports, FFSs, PRAPs, RODs, RDs, IRACRs, LTMs, SMPs). These documents are available to the public at the following IR Program website: <http://public.lantops-ir.org/sites/public/cherrypoint/default.aspx>. To access the Administrative Record, computer access is available to the public at the Havelock-Craven County Library located at 301 Cunningham Boulevard in Havelock, North Carolina.

To monitor the performance of the active remedies at each OU and to ensure that the RAOs specified in the RODs are attained to protect human health and the environment, monitoring activities have been performed since the remedies were implemented. The results of a review of the monitoring data are summarized in Table 9-1. A summary of the applicable or relevant and appropriate requirements (ARARs) applicable to each OU are listed in Table 9-2. Recommendations and follow-up actions are summarized in Table 9-3.

### 9.1.4 Site Inspection and Interviews

Representatives of the Navy, USEPA, NCDENR, and MCAS Cherry Point conducted an inspection of the five-year review sites on March 27, 2007. No issues concerning the protectiveness of remedies in place were noted during the site inspection. VSIs are

conducted by the EAD to verify that LUCs such as fencing and signs are still in place and ensure there are no issues with the GIS or master planning process.

An interview was conducted with Mr. Jeff Christopher, IR Program Manager, MCAS Cherry Point EAD, on June 18, 2007. Information generated by the interview did not identify any concerns regarding the protectiveness of the various RAs at OU2, OU3, OU4, and OU13. Site inspections have not been initiated for OU5 and OU6 because the RD reports have not been completed.

RAB members were interviewed and provided with a questionnaire during the October 10, 2007 RAB Meeting. In general, the overall impression of remedial actions at Cherry Point is positive. The RAB members made some suggestions for additional communication tools. Community interview questionnaires are presented in Appendix A.

Site inspection and interview information is presented in Appendix B. Photos of significant features at the sites are provided in Appendix C.

TABLE 9-1  
Data Review Details  
MCAS Cherry Point

OU	Data Reviewed	Review Conclusion *	Potential Actions Required to Attain RAOs or to Optimize the Operation
1	Data from voluntary groundwater monitoring and unpublished data from 2005 and 2006 investigations in the NADEP area (to be reported in the RI Addendum).	RI Addendum is currently in progress	Additional investigation and evaluation of remedial alternatives
2	LTM groundwater, surface water, and sediment sampling data	VOC concentrations are decreasing and data show evidence of reductive dechlorination occurring.	No actions required.
3	LTM groundwater, surface water, and sediment sampling data	VOC concentrations are decreasing and data show evidence of reductive dechlorination occurring.	No actions required.
4	LTM groundwater sampling data	The concentration of benzene in one monitoring well remains above NC Groundwater Quality standards. The historical benzene data exhibit considerable variability and do not show any trend of increasing or decreasing.	No actions required.
5	LTM groundwater sampling data	COCs benzene, TCE and VC were detected in groundwater during 2006. Concentrations have been low, however, these have exceeded NC 2L Groundwater Quality standards. The MNA data suggest there are reducing conditions in groundwater which are mildly suitable for anaerobic biodegradation of organic contaminants. MNA data suggest that site groundwater is likely characterized by mildly reducing conditions that are marginally suitable for anaerobic biodegradation of organic contaminants.	No actions required.
6	LTM groundwater sampling data	The first round of LTM began in June 2007 and the data are currently being evaluated. MNA data from VGM suggest that site groundwater is likely characterized by mildly reducing conditions that are marginally suitable for anaerobic biodegradation of organic contaminants.	No actions required.

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<b>OU</b>	<b>Data Reviewed</b>	<b>Review Conclusion *</b>	<b>Potential Actions Required to Attain RAOs or to Optimize the Operation</b>
13	LTM groundwater sampling data	MNA showed an overall decrease in VOC concentration since the remedy implementation. MNA has been able to promote degradation of the COCs for OU13. Sampling of 3 monitoring wells was discontinued based on non-detections of specific COCs.	No actions required.

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**Table 9-2**

Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Criteria (TBCs) Summary  
 MCAS Cherry Point

Medium/ Authority	ARAR*	Status	Requirement Synopsis	Action to be taken to Attain ARAR
<b>Operable Unit 1</b>				
Groundwater	NC 2L EPA Ambient Water Quality Criteria Clean Air Act NC Air Pollution Control Requirements. North Carolina Water Quality Standards NC Oil Pollution and Hazardous Substances Control Act NC Water Pollution Control Regulations NC Groundwater Quality Standards NC Hazardous Waste Management Regulations Threshold Limit Values	No longer relevant. New ARARs will be established as part of the Final ROD	Addressed discharge of treated groundwater and air emissions.  The Pump and Treat system and AS/SVE system has been shut down, therefore, the ARAR requirements are no longer valid.	No further action will be taken as part of the IROD. New ARARs will be established as part of the Final ROD.
Soil	NC S-3 Target Concentration for Protection of Groundwater	No longer relevant. New ARARs will be established as part of the Final ROD	The Pump and Treat system and AS/SVE system has been shut down, therefore, the ARAR requirements are no longer valid.	No further action will be taken as part of the IROD. New ARARs will be established as part of the Final ROD.
<b>Operable Unit 2</b>				
Groundwater	NC 2L  MCL  MCLG	Relevant and appropriate	NC requires chemical concentrations in groundwater to meet the promulgated groundwater cleanup standard, NC 2Ls (15A NCAC 02L.0202), for protection of groundwater potentially used for drinking.  Primary drinking water standards consist of federally enforceable MCLs at the tap. MCLs are the highest level of a contaminant that is allowed in drinking water.  Set at levels producing no known or anticipated adverse health effects.	Remedial goals have been achieved at hotspots 1, 3, and 4.

Medium/ Authority	ARAR*	Status	Requirement Synopsis	Action to be taken to Attain ARAR
	Clean Water Act	Relevant and appropriate	Establishes ambient standards for the protection of human health and aquatic life.	Soil hotspots 1, 3, and 4 have been remediated by the SVE system. Soil samples will continue to be collected at Hotspot 2 to determine if COC concentrations are decreasing to remedial goals and other remedial technologies will be evaluated.
	Clean Air Act	Relevant and appropriate	Establishes standards for ambient air quality to protect public health.	The groundwater aquifer will meet the standards through MNA.
	<b>NC regulations:</b>			
	Ambient Air Quality Standards	Relevant and appropriate	Standards for ambient air quality to protect human health	
	Surface Water Classifications and Standards	Applicable	Water quality standards for all waters of the state	
	Groundwater Quality Standards	Applicable	Establishes MCLs for drinking water.	
	(Draft) NC Risk Analysis Framework	TBC	Cleanup levels for contaminants in soil and groundwater.	

### Operable Unit 3

Groundwater	MCL and MCLGs	Relevant and appropriate	Health-based standards for public water systems.  Set at levels producing no known or anticipated adverse health effects.	The soil hotspot has been remediated by the AS system. The groundwater aquifer will meet the standards through MNA.
	Clean Water Act	Relevant and appropriate	Establishes ambient standards for the protection of human health and aquatic life.	

Medium/ Authority	ARAR*	Status	Requirement Synopsis	Action to be taken to Attain ARAR
<b>NC regulations:</b>				
	Ambient Air Quality Standards	Relevant and appropriate	Standards for ambient air quality to protect human health	
	Surface Water Classifications and Standards	Applicable	Water quality standards for all waters of the state	
	Groundwater Quality Standards	Applicable	Establishes MCLs for drinking water.	
Soil and Groundwater	(Draft) NC Risk Analysis Framework	TBC	Cleanup levels for contaminants in soil and groundwater.	

#### Operable Unit 4

Groundwater	NC 2L and MCLs	Relevant and appropriate	<p>NC requires chemical concentrations in groundwater to meet the promulgated groundwater cleanup standard, NC 2Ls (15A NCAC 02L.0202), for protection of groundwater potentially used for drinking.</p> <p>Primary drinking water standards consist of federally enforceable MCLs at the tap. MCLs are the highest level of a contaminant that is allowed in drinking water.</p>	The groundwater aquifer will meet the standards through MNA.
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#### Operable Unit 5

Groundwater	NC 2L	Relevant and appropriate	<p>NC requires chemical concentrations in groundwater to meet the promulgated groundwater cleanup standard, NC 2Ls (15A NCAC 02L.0202), for protection of groundwater potentially used for drinking.</p>	The groundwater aquifer will meet the standards through MNA.
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#### Operable Unit 6

Groundwater	NC 2L and MCLs	Relevant and appropriate	<p>NC requires chemical concentrations in groundwater to meet the promulgated groundwater cleanup standard, NC 2Ls (15A NCAC 02L.0202), for protection of groundwater potentially used for drinking.</p> <p>Primary drinking water standards consist of federally enforceable MCLs at the tap. MCLs are the highest level of a contaminant that is allowed in drinking water.</p>	The groundwater aquifer will meet the standards after completion of soil removal and MNA.
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Medium/ Authority	ARAR*	Status	Requirement Synopsis	Action to be taken to Attain ARAR
Soil	NC SSLs	TBC	NC has back-calculated SSLs that reflect the constituent concentration in soil that would result in a constituent concentration in groundwater below the NC 2L. The NC SSLs are TBC criteria for remedial actions to ensure the protection of groundwater potentially used for drinking.	Excavation and offsite disposal of soil in excess of NC SSLs beneath the former location of Burn Pit E.

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**Operable Unit 13**

Groundwater	NC 2L Groundwater Standard	Relevant and appropriate	NC requires chemical concentrations in groundwater to meet the promulgated groundwater cleanup standard, NC 2Ls (15A NCAC 02L.0202), for protection of groundwater potentially used for drinking.	The groundwater aquifer will meet the standards through MNA.
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NC – North Carolina, MCL – Maximum Contaminant Level, SSL – Soil Screening Level, TBC – To Be Considered

\*The standards identified as ARARs and TBCs for OU1 in the IROD are no longer applicable. New ARARs will be developed for OU1 when a final remedy has been selected.

**Table 9-3**  
 Recommendations and Follow-up Actions  
 MCAS Cherry Point

Issues	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)
<b>Operable Unit 1</b>					
Sample data results indicated the AS/SVE system at OU1Site 16 was not meeting its remedial objectives, was not providing significant protection to human health and the environment, and was not cost-effective. The system was shutdown in February 2005.	An RI Addendum is currently underway and following the RI, an FS will be conducted to evaluate remedial technologies to address contamination for the entire OU1.	Navy	USEPA/NCDENR	Date of RI Addendum and FS are forthcoming.	Y
Evaluations of the pump and treat systems' effectiveness determined the system was no longer performing a vital role in protecting human health and the environment, and the system's performance had declined since initiation, biofouling and other malfunctions had substantially limited effectiveness, extraction wells were not pumping at rates called for, and the systems suitability for controlling plume migration was not apparent from available data. The system was shutdown in February 2005.	An RI Addendum is currently underway and following the RI, an FS will be conducted to evaluate remedial technologies to address contamination for the entire OU1.	Navy	USEPA/NCDENR	Date of RI Addendum and FS are forthcoming.	Y
Analytical results from treatability studies conducted at Buildings 133 and 137 determined the VOC plume is larger than originally thought and not well understood.	An RI Addendum is currently underway and following the RI, an FS will be conducted to evaluate remedial technologies to address contamination for the entire OU1.	Navy	USEPA/NCDENR	Date of RI Addendum and FS are forthcoming.	Y
<b>Operable Unit 2</b>					
The SVE system has been ineffective at remediating hotspot 2. Benzene and vinyl chloride concentrations remain above the cleanup goals.	Soil sampling will continue at hotspot 2. In addition, evaluation of other technologies to remediate hotspot 2 is currently underway.	Navy	USEPA/NCDENR	Date of RI Addendum and FS are forthcoming.	Y

SECTION 10

# Next Review

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The completion of the next Five-Year Review for the MCAS Cherry Point OUs is required by March 2013.

## SECTION 11

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Appendix A  
Site Inspection and Interview Checklist

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# Site Inspection and Interview Checklist

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## Five-Year Review Site Inspection and Interview Checklist

### I. Site Information

Site Name: MCAS Cherry Point  
Location/Region: North Carolina/USEPA Region 4  
Interviews (Dates): Mr. Jeff Christopher (June 18, 2007)  
Installation Restoration Program  
Environmental Affairs Department  
MCAS Cherry Point  
PSC Code 8006  
Cherry Point, NC 28533-0006  
252-466-4421

Local regulatory authorities and response agencies:

Mr. George Lane  
NC Dept. of Environment and Natural Resources  
Superfund Section  
401 Oberlin Road, Suite 150  
Raleigh, NC 27605  
919-733-2801, x340

Ms. Gena Townsend  
US EPA  
61 Forsyth Street, SW  
Atlanta, Georgia 30303  
(404) 562-8538

Quarterly site inspections have been conducted at OU2, OU3, OU4, and OU13 to ensure the LUC remedy remains protective of human health and the environment. OU5 and OU6 will be included in the quarterly site inspections after the remedial design for each OU has been finalized.

### II. Interview—Mr. Jeff Christopher

#### Access and Institutional Controls

- Fencing is inspected by EAD in accordance with the Land Use Control Assurance Plan (LUCAP). Currently no inspection logs are maintained onsite. Annual reports are submitted to the State agency and USEPA by EAD. Verification of warning signs are included in the quarterly inspection.

- Verification of compliance with ICs is included in the quarterly inspections as noted above. EAD contacts the Facilities Development Department to ensure the Air Station's GIS and LUCAP is consulted during the master planning process. No issues with regard to the GIS or LUCAP have been noted. The ICs are adequate, effective, and necessary in maintaining the overall protectiveness of the remedies.
- Noted LUC upgrades and repairs since the last Five-Year Review were as follows: Fence line repairs and tree removal was conducted in November 2003 to repair damages caused by trees felled during Hurricane Isabelle. The fence line was surveyed in October 2003 using a global positioning system (GPS). The data were used to update the OU2 and OU3 fence line boundary layer in the Air Station's GIS. An effort to repair the entire fence line at OU2 and OU3 was completed in 2004. Fence maintenance included fixing barbed wire and brackets, realignment of gates, repairing gaps in the fence, and adding a 40-foot section of fencing to improve the OU3 perimeter.
- In general, there have been no public access issues.

Appendix B  
Community Interview Questionnaires

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CHERRY POINT 5-YEAR REVIEW INTERVIEW QUESTIONS

Interviewer Name: *Pat McChella-Due* Date: *10/10/07*

Location: \_\_\_\_\_

Interviewee Name: \_\_\_\_\_

Title: \_\_\_\_\_

Affiliation: \_\_\_\_\_

Summary of Discussion:

Questions (please use the back if necessary to completely answer a question) -

1) What is your overall impression of the remedial actions at MCAS Cherry Point?

*This group works very hard and I think they try to do their best.*

2) What effects have remediation operations had on the surrounding community?

*I think the RO have been positive but we have very little feedback from the general population.*

3) Are you aware of any community concerns regarding remediation activities at MCAS Cherry Point or the operation and administration of the remediation?

If so, please give details. *None.*

4) Do you feel well-informed about the remediation activities and progress?

*Yes, very informed*

5) Do you have any comments, suggestions, or recommendations regarding the management or operation of the remediation systems?

*Perhaps put short article in local papers regarding clean-ups - could act as "local" news.*

6) Can you note any problems or successes with implementation of the remedies (Land Use Controls and Monitored Natural Attenuation at OU2, OU3, OU4, OU5, OU6, and OU13 and the soil removal action at OU6).

*No problems, sometimes feel as if the contractors are glossing over the details.*

Suggestions or Comments:

## CHERRY POINT 5-YEAR REVIEW INTERVIEW QUESTIONS

Interviewer Name:

Date: 10/10/2007

Location:

Interviewee Name: Georgiana Bircher

Title:

Affiliation: Citizen

Summary of Discussion:

Questions (please use the back if necessary to completely answer a question) -

1) What is your overall impression of the remedial actions at MCAS Cherry Point?

Slow; broad; costly - but not extravagant; not as publicized as should be

2) What effects have remediation operations had on the surrounding community?

Provides comfort actions are being taken to address contamination

3) Are you aware of any community concerns regarding remediation activities at MCAS Cherry Point or the operation and administration of the remediation?

If so, please give details. Slocum Creek; groundwater in light of Camp Lejeune - my folks are more concerned with effort and not cost

4) Do you feel well-informed about the remediation activities and progress?

When I attend the meetings otherwise I feel ill-informed

5) Do you have any comments, suggestions, or recommendations regarding the management or operation of the remediation systems?

Greater communication tools - email newsletter - web-link  
Media Briefing Bi-annually

6) Can you note any problems or successes with implementation of the remedies (Land Use Controls and Monitored Natural Attenuation at OU2, OU3, OU4, OU5, OU6, and OU13 and the soil removal action at OU6).

No

Suggestions or Comments:

See #5 Really wish to assist / to work on increasing communications of these efforts

CHERRY POINT 5-YEAR REVIEW INTERVIEW QUESTIONS

Interviewer Name: Bill Smart Date: 10 Oct 07  
Location: MCAS Cherry Point (Harlock, NC)  
Interviewee Name: ?  
Title: Affiliation:

Summary of Discussion: I HAVE BEEN HERE aft to now  
SINCE 1943

Questions (please use the back if necessary to completely answer a question) -

1) What is your overall impression of the remedial actions at MCAS Cherry Point?

BEST I CAN TELL, THINGS ARE "IN ORDER"

2) What effects have remediation operations had on the surrounding community?

UNKNOWN

3) Are you aware of any community concerns regarding remediation activities at MCAS Cherry Point or the operation and administration of the remediation?

If so, please give details.

NONE KNOWN

4) Do you feel well-informed about the remediation activities and progress?

yes, I AM HOWEVER CONCERNED ABOUT  
THE EFFECT OF THE "PLANET" EFFECTS OF VENUS AS INDICATED

5) Do you have any comments, suggestions, or recommendations regarding the management or operation of the remediation systems?

APPEARS TO BE "IN ORDER"

ON "HISTORY"  
CHANNEL  
"AMAZING  
DISCOVERIES"

6) Can you note any problems or successes with implementation of the remedies (Land Use Controls and Monitored Natural Attenuation at OU2, OU3, OU4, OU5, OU6, and OU13 and the soil removal action at OU6).

NONE

Suggestions or Comments:

"C" # 4 ABOVE

## CHERRY POINT 5-YEAR REVIEW INTERVIEW QUESTIONS

Interviewer Name:

Date: 10/10/07

Location: Havelock Tourist Centre

Interviewee Name: Ray Silverthorne

Title:

Affiliation: Citizen of the Co.

Summary of Discussion:

Questions (please use the back if necessary to completely answer a question) -

1) What is your overall impression of the remedial actions at MCAS Cherry Point?

Remedial Activities Are addressing needed situations.

2) What effects have remediation operations had on the surrounding community?

- Positive effects - primarily reduction of potential sources of harmful health e

3) Are you aware of any community concerns regarding remediation activities at MCAS Cherry Point or the operation and administration of the remediation?

If so, please give details. I Am Aware of activities through the RAB meetings  
- Co-workers do not have this benefit. "Hot Spots" newsletter publishing should be resumed.

4) Do you feel well-informed about the remediation activities and progress?

yes

5) Do you have any comments, suggestions, or recommendations regarding the management or operation of the remediation systems? Not at this time.

- Monitoring wells need to be properly closed ~~status~~ Abandoned when no longer needed

6) Can you note any problems or successes with implementation of the remedies (Land Use Controls and Monitored Natural Attenuation at OU2, OU3, OU4, OU5, OU6, and OU13 and the soil removal action at OU6). - No problems - Successes

Are not publicized sufficiently - perhaps make tours routinely available for the public to advertise successes

Suggestions or Comments:

CHERRY POINT 5-YEAR REVIEW INTERVIEW QUESTIONS

Interviewer Name:

Date:

Location:

Interviewee Name: SCARBOROUGH

Title:

Affiliation:

Summary of Discussion:

Questions (please use the back if necessary to completely answer a question) -

1) What is your overall impression of the remedial actions at MCAS Cherry Point?

Interesting & good

2) What effects have remediation operations had on the surrounding community?

HARD TO TELL AT THIS POINT

3) Are you aware of any community concerns regarding remediation activities at MCAS Cherry Point or the operation and administration of the remediation?

If so, please give details.

NONE

4) Do you feel well-informed about the remediation activities and progress?

YES

5) Do you have any comments, suggestions, or recommendations regarding the management or operation of the remediation systems?

NONE

6) Can you note any problems or successes with implementation of the remedies (Land Use Controls and Monitored Natural Attenuation at OU2, OU3, OU4, OU5, OU6, and OU13 and the soil removal action at OU6).

Suggestions or Comments:

Public seems concerned with three items.

1. Cost

2. Length of remediation operation

3. Results

} Simply

Put!!

## Christopher GS12 Jeffrey K

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**From:** Berrysadventure@aol.com  
**Sent:** Wednesday, October 03, 2007 11:09 AM  
**To:** Christopher GS12 Jeffrey K  
**Subject:** Remediation questionnaire

you have any questions or comments, please do not hesitate to give me a call at 252-466-4421. Thank you, Jeff.

Questionnaire:

1) What is your overall impression of the remedial actions at MCAS Cherry Point?

The remedial actions appear to be well thought out and effectively monitored.

2) What effects have remediation operations had on the surrounding community?

Reduced their exposure to potential contaminants without causing disruptions.

3) Are you aware of any community concerns regarding remediation activities at MCAS Cherry Point or the operation and administration of the remediation? No. except for occasional comments on potential Neuse River contamination from water treatment plant.

If so, please give details.

4) Do you feel well-informed about the remediation activities and progress?

Yes

5) Do you have any comments, suggestions, or recommendations regarding the management or operation of the remediation systems?

No. It appears to function as designed.

6) Can you note any problems or successes with implementation of the remedies (Land Use Controls and Monitored Natural Attenuation at OU2, OU3, OU4, OU5, OU6, and OU13 and the soil removal action at OU6).

No.

7) Additional suggestions or comments you may have: None

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**Appendix C**  
**Site Photographs**

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Photograph No. 1

Description: Operable Unit 1 Industrial Wastewater Treatment Plant



Photograph No. 2

Description: Operable Unit 1, EHC Injections at Site 51, Building 137



Photograph No. 3

Description: Operable Unit 1, Site 16 Facing North



Photograph No. 4

Description: Operable Unit 1, Site 16 Facing West



Photograph No. 5

Description: Operable Unit 2, SVE System with Compressor



Photograph No. 6

Description: Operable Unit 2, SVE System Emission Stack



Photograph No. 7

Description: Operable Unit 2, Fencing and Warning Sign Restricting Site Access



Photograph No. 8

Description: Operable Unit 3, Fencing and Warning Sign Restricting Site Access



Photograph No. 9  
Description: Operable Unit 3, AS System



Photograph No. 10  
Description: Operable Unit 4, Monitoring Well Located at OU4



Photograph No. 11

Description: Operable Unit 4, Permitted LCID Landfill Sign at former borrow pit/landfill



Photograph No. 12

Description: Operable Unit 5, Borrow Pit / Landfill Area



Photograph No. 13

Description: Operable Unit 6, Excavation Activities Conducted in May 2007.



Photograph No. 14

Description: Operable Unit 13, Monitoring Wells at OU13

