Final Proposed Plan
Operable Unit 6, Site 12

Marine Corps Station
Cherry Point, North Carolina

July 2006

1 Introduction

This **Proposed Plan** identifies the Preferred Alternative and provides the rationale for addressing environmental contamination in soil and **groundwater** at **Operable Unit 6** (OU 6), Site 12 at Marine Corps Air Station (MCAS) Cherry Point. The Preferred Alternative is excavation and off-site disposal of soil and **Monitored Natural Attenuation (MNA)** and **Land Use Controls (LUCs)** for groundwater.

This document is issued by the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Atlantic and **U.S. Environmental Protection Agency (USEPA)** Region 4, in consultation with **North Carolina Department of Environment and Natural Resources (NCDENR)**. The Navy is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of **Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)** and Section 300.430(f)(2) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**.

The Navy and USEPA, in consultation with NCDENR, will make the final decision on the remedial approach for Site 12 after reviewing and considering all information submitted during the 45-day **public comment period**. Based on new information or public comments, the Preferred Alternative may be modified or another **remedial action** selected. Therefore, public comment on all of the alternatives presented is invited and encouraged. Information on how to participate in this decision-making process is presented in Section 10.

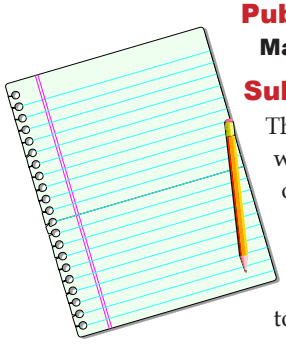
This Proposed Plan summarizes information that can be found in greater detail in the **Remedial Investigation (RI)** Report (December 2005), the **Feasibility Study (FS)** (January 2006), and other documents contained in the Administrative Record and Information Repository for MCAS Cherry Point (see Section 10 for access information). A glossary of key terms used in this document is attached; these key terms are identified in bold print the first time they appear.

2 Site Background

2.1 Site Description and Background

MCAS Cherry Point is a 13,164-acre military installation located in southeastern Craven County, North Carolina, just north of the town of Havelock. The Air Station is

Mark Your Calendar for the Public Comment Period



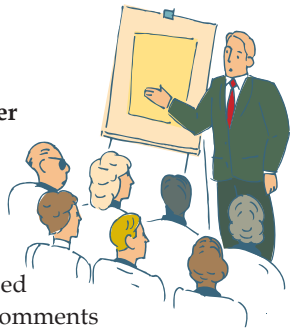
Public Comment Period
May 1 - June 15, 2006

Submit Written Comments

The Navy, USEPA, and NCDER will accept written comments on the Proposed Plan during the public comment period. To submit comments or obtain further information, please refer to the insert page.

Attend the Public Meeting
May 9, 2006

Time - 6:00 PM
Place - **Havelock Tourist and Event Center**
201 Tourist Center Drive
Havelock, North Carolina 28532
Phone: (252) 444-4348



The Navy and MCAS Cherry Point will hold a public meeting to explain the Proposed Remedial Action Plan. Verbal and written comments will also be accepted at this meeting.

Location of Information Repository

For more information about Site 12, check the Administrative Record at the following location:

Havelock-Craven County Library
301 Cunningham Blvd
Havelock, NC 28532
(252) 447-7509

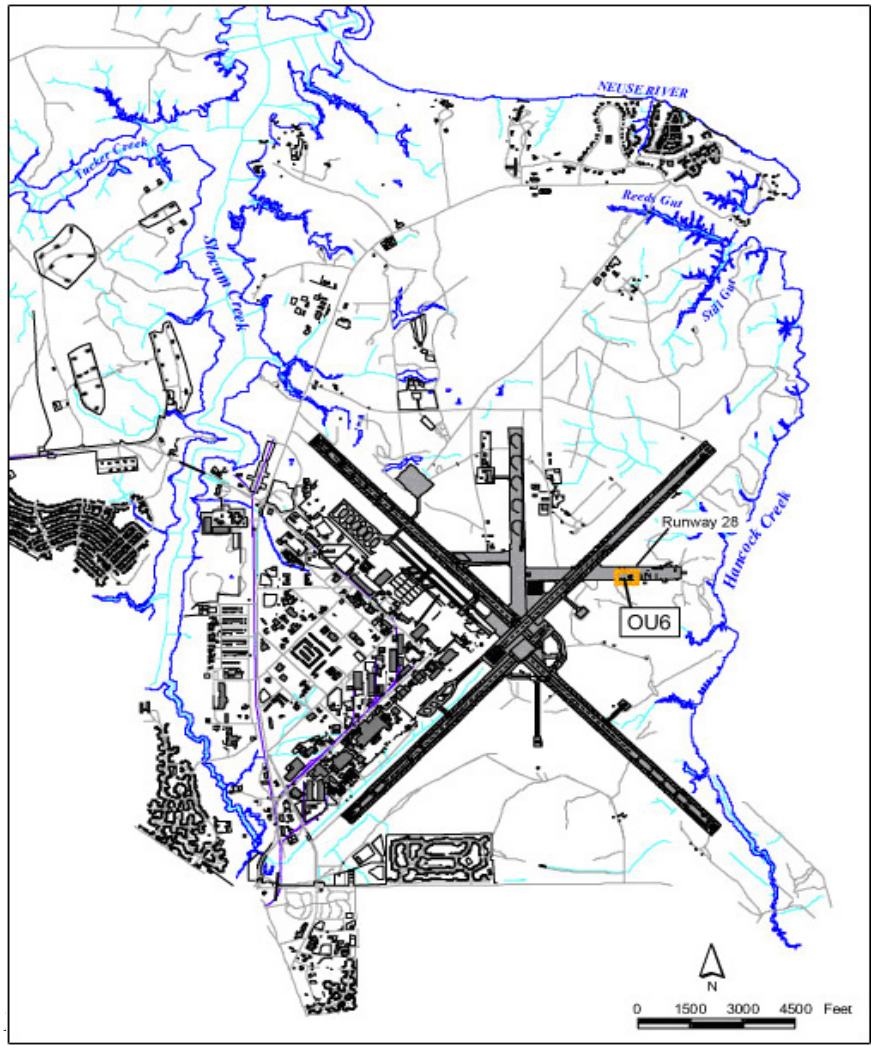
bounded on the north by the Neuse River, on the east by Hancock Creek, and on the south by North Carolina Highway 101 (Figure 1). The mission of MCAS Cherry Point is to maintain and support facilities, services, and material of a Marine Aircraft Wing. The Air Station has facilities for training and support of the Fleet Marine Force Atlantic aviation units, and is designated as a primary aviation supply point. Surrounding areas include primarily commercial and residential development and public land (Croatan National Forest). In 1994, MCAS Cherry Point was placed on USEPA's **National Priorities List (NPL)**, established under CERCLA §105(a) for sites contaminated by releases of hazardous substances.

OU 6 is located in the southeastern portion of the installation, in the eastern portion of Runway 28 (Figure 1). Runway 28 has not been active since the late 1950s. Since that time, the OU 6 area has been used for crash-crew training (fire fighting), engine run-up activities, and aircraft long-term storage experimentation.

OU 6 initially consisted of three sites; Site 12, Site 35, and Point of Environmental Interest [POEI] 35a (Figure 2). Site 35 was a Marine Aircraft Group (MAG)-14 Accumulation Area closed under **Resource Conservation and Recovery Act (RCRA)** in 1993 and POEI 35a was a High Power Run-Up Area and Test Cells closed as no further action (NFA) under a CERCLA Decision Document in 2004.

Site 12 is the crash-crew training area that consists of one active and five historical burn pits (Burn Pits A, B, C, D, and E) (Figure 2). Waste petroleum, oil, and lubricants and waste burnable solvents were historically burned in pits constructed of dirt placed on top of the asphalt runway surface and shaped into circular berms. Based on historical aerial photographs, it appears that from 1964 to 1981 at least one of these burn pits was actively being used. Contamination at Site 12 is the result of past practices at the burn pits. The current principal features of Site 12 include:

- Crash-Crew Burn Pit: A circular concrete pad used to burn waste jet fuel (JP-5) to train crash-crews to extinguish fires. The concrete burn pit was reportedly constructed in 1985, and is approximately 100 feet (ft) in diameter with a 5-inch curb around the circumference. There is a trench drain surrounding the burn pit that captures runoff from the concrete pad.
- Oil/Water Separator: An in-ground, rectangular concrete-and-steel oil/water separator constructed with the top surface at grade. The separator receives fire suppression water contained within the burn pit, runoff captured in the trench drain, and runoff contained within a concrete pad beneath the waste JP-5 fuel tank (described below). Liquids collected in the oil/water separator are pumped out and transported to the base industrial wastewater treatment plant.
- Drainage Swale: A broad, shallow, earthen swale trending east to west is located approximately 75 ft south of Runway 28. There is no outlet on the east side of the drainage swale, but flow from the western part of the drainage swale drains to a larger drainage ditch, which eventually discharges to Hancock Creek.
- Fuel Aboveground Storage Tank (AST): A 5,000-gallon AST, located approximately 200 ft west of the burn pit, is currently used to store waste JP-5 prior to use in the burn pit.



2.2 Summary of Previous Investigations

Several environmental investigations have been conducted at OU 6, beginning in 1983. The following paragraphs briefly summarize the purpose and scope of investigations completed to-date.

Initial Assessment Study (Water and Air

Research, Inc., March 1983)

In 1983, an Initial Assessment Study (IAS) was conducted to qualitatively identify and assess sites that posed a potential threat to human health or the environment resulting from past handling of and operations involving hazardous materials at MCAS Cherry Point. The IAS indicated that Site 12 had been used for crash crew training activities since the mid-1960s. Waste petroleum, oil, and lubricants and "waste burnable (i.e., probably non-chlorinated) solvents" were formerly burned in "one of two circular bermed areas" on Runway 28. The IAS also indicated that "spills and leaks" from the burn pits were evident at the time of the report, and that stained and oily soil was present in the drainage swale south of Runway 28. However, due to small residual quantities of contamination and minimal potential for migration, no additional investigation was recommended.

RCRA Facilities Investigation (Halliburton NUS, June 1993)

In 1993, a RCRA Facility Investigation (RFI) was completed to determine whether releases occurred from 21 solid waste management units at MCAS Cherry Point, including Site 12. Soil, groundwater, surface water, and sediment samples were collected at Site 12 and analyzed for petroleum-related constituents and metals. The results indicated elevated metals concentrations in groundwater and total petroleum hydrocarbons (TPHs) in soil. The RFI report recommended additional soil sampling to further delineate the elevated TPHs, an additional round of groundwater sampling for metals analysis, and if any contamination other than TPH was found, additional surface water and sediment sampling.

Technical Direction Memorandum (Halliburton NUS, August 1993)

Additional soil, groundwater, and sediment samples were collected to further delineate the extent of contamination at Site 12, as recommended by the RFI report. TPH contamination was found to be limited in area and depth; however, further investigation of metals in soil and groundwater was recommended.

GeoProbe Site Check, Former Underground Storage Tank (UST) Location 4182 (1996)

In 1995, a 6,000-gallon UST located southwest of the current burn pit was removed. Approximately 350 cubic

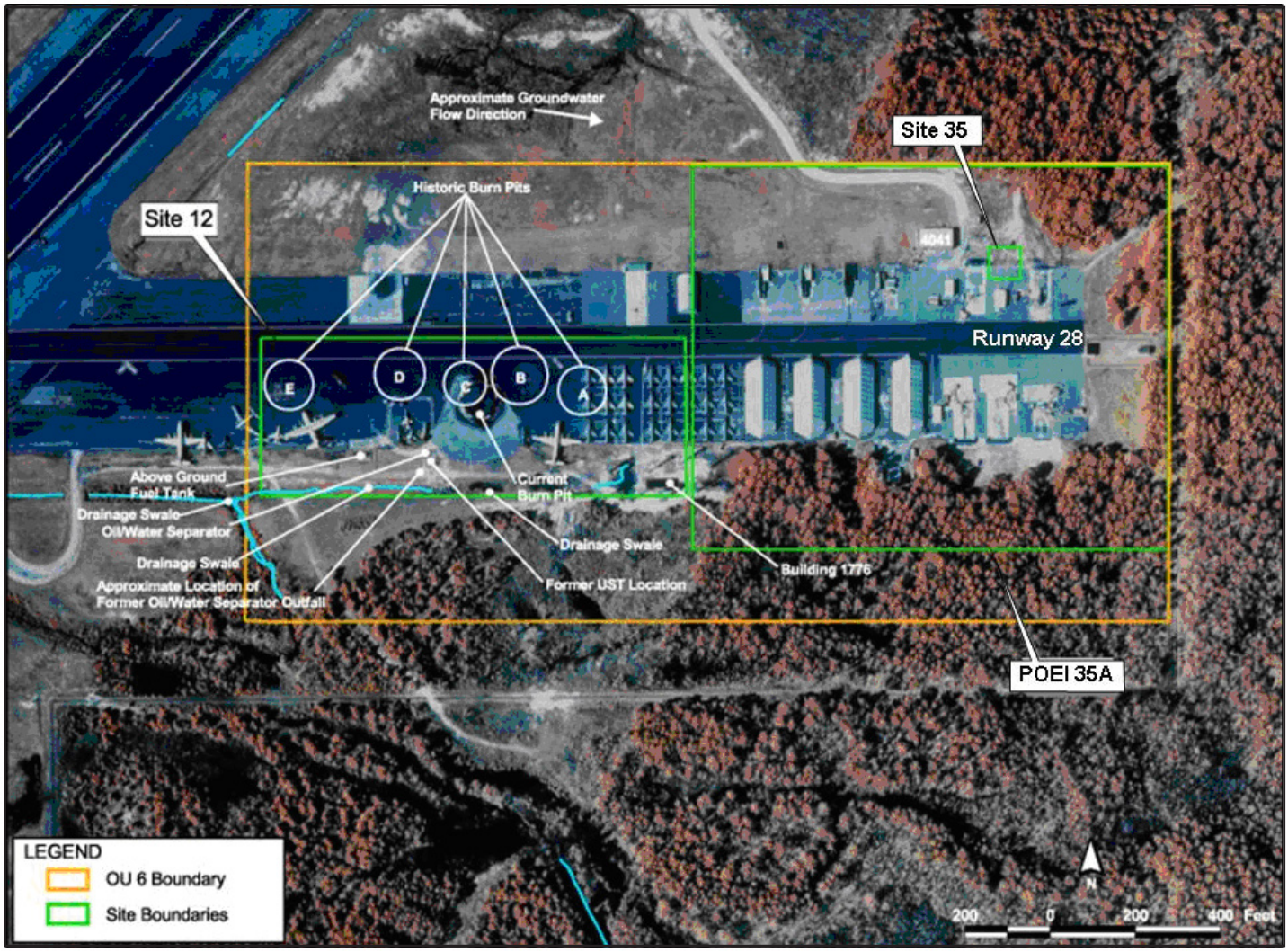


Figure 2 - Site 12

yards of soil were excavated and disposed of offsite based on limited TPH contamination in soil samples collected from the excavation. In 1996, subsurface soil and groundwater sampling were conducted as part of a follow-up investigation. TPH and oil and grease (O&G) were detected in several soil samples and lead was detected in groundwater.

Remedial Investigation Report (CH2M HILL, December 2005)

Field activities for the Site 12 RI were conducted in 1999, 2003, and 2004. In 1999, 16 surface soil (0 to 1 ft below ground surface [bgs]), 32 subsurface soil (1 to 11 ft bgs), 7 groundwater (Surficial Aquifer), 3 drainage surface water, and 3 drainage sediment (0 to 0.5 ft bgs) samples were collected for analysis of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, pesticides, polychlorinated biphenyls (PCBs), petroleum-related compounds, and/or dioxins/furans. Upon further review of historical site information and limited soil and groundwater data in the western portion of Site 12, additional investigation was conducted at former Burn Pit E in 2003 and 2004. At Burn Pit E, 2 surface soil (0 to 1 ft bgs), 28 subsurface soil (1 to 6 ft bgs), 16 groundwater (Surficial Aquifer) samples were collected. Based on the constituents detected in soil and groundwater at Site 12, VOCs, SVOCs, and PCBs were evaluated at Burn Pit E. The nature and extent of contamination is discussed in Section 3. To evaluate the potential risks to human health and the environment, a **Human Health Risk Assessment (HHRA)** and an **Ecological Risk Assessment (ERA)** were completed and the results are summarized in Section 5. The RI report recommended that an FS be prepared for Site 12, addressing the delineated areas of SVOC contamination in soil and groundwater beneath former Burn Pit E.

Feasibility Study (CH2M HILL, January 2006)

An FS was completed to develop and evaluate remedial alternatives for soil and groundwater associated with Burn Pit E at Site 12. Each remedial alternative was analyzed with respect to the nine evaluation criteria provided in the NCP. The alternatives were then compared to one another with respect to their rating under the NCP evaluation criteria. Based on the comparative analysis, excavation and off-site disposal for soil and MNA and LUCs for groundwater was selected as the Preferred Alternative.

3 Site Characteristics

Site 12 is characterized by a flat topography with elevations ranging from 20 to 24 ft above mean sea level. The majority of Site 12 is covered by the asphalt surface of the inactive runway. South of the runway is mowed grass, extending south to an area of dense woods. Surface runoff flows southward across the runway into the grassy area and drainage swale. The hydrogeologic setting at Site 12 consists of a water table aquifer **(Surficial Aquifer)** and several deeper aquifers and intervening confining units (Yorktown, Pungo River, and Castle Hayne Aquifers). The Surficial Aquifer is the only aquifer relevant to potential contamination from historical activities at Site 12 due to the depth and thickness of the underlying confining units. The Surficial Aquifer consists of interlayered clay, silt, and sand to depths of 20 to 30 ft bgs. Groundwater beneath Site 12 occurs at approximately 11 ft bgs and flows east towards Hancock Creek (Figure 2).

Contamination potentially attributable to activities at Site 12 is present in soil and groundwater at Burn Pit E. The nature and extent of contamination was defined in the RI report based on visual observations of a weathered petroleum-like substance during sampling and constituent concentrations in media exceeding regulatory screening values and background. Ethylbenzene, 2-methylnaphthalene, and naphthalene in soil and 2-methylnaphthalene and naphthalene in groundwater at Burn Pit E were considered reflective of a site-related release. The majority of the soil contamination was detected at various depths between 2 and 6 ft bgs. In groundwater, the presence of naphthalene and 2-methylnaphthalene is likely associated with the overlying soil contamination. There is no definable plume in groundwater and the contaminants have not migrated off-site, as they were not detected in downgradient groundwater.

Historic burning operations likely prevented accumulation of potentially hazardous source materials and concentrations of constituents of concern (COCs) in soil and groundwater are relatively low. The site history, nature and extent, fate and transport of contamination, and toxicity of COCs, indicate there are no hazardous high-concentration source materials present at Site 12.

4 Scope And Role of Response Action

OU 6 is one of several Installation Restoration (IR) Program OUs addressed under CERCLA at MCAS Cherry Point. OU 6 initially consisted of Site 12, Site 35, and POEI 35a (Figure 2). Site 35 was a MAG-14 Accumulation Area closed under RCRA in 1993 and POEI 35a was a High Power Run-Up Area and Test Cells closed as NFA under a CERCLA Decision Document in 2004. The role of the Preferred Alternative presented in this Proposed Plan is to address contaminated soil and groundwater at Site 12. This is the final remedial action for OU 6 and Site 12 and does not include or affect any other OUs or sites at the facility.

5 Summary Of Site Risks

The source of potential contamination at Site 12 is from

historical crash-crew burn pit training activities. The primary fate and transport mechanisms include infiltration of precipitation resulting in leaching of potential contaminants from Site 12 to soil and groundwater, migration of contaminants in groundwater, and historical surface water runoff from the burn pits to the adjacent drainage swale. A conceptual site model (CSM) for Site 12 is provided as Figure 3. Based on the risk assessment results and the comparison of constituent concentrations to North Carolina's risk-based maximum allowable concentrations, exposure to Site 12 groundwater and soil may pose unacceptable risks if the site were developed for residential use in the future. The Navy and USEPA, in consultation with the NCDENR agreed that low potential ecological risks were considered acceptable.

5.1 Human Health Risk Assessment

A HHRA was completed for Site 12 for exposure to surface soil, subsurface soil, groundwater, surface water, and sediment (Figure 3). The HHRA characterizes the "baseline" risk to potential current and future receptors. This is an estimate of the likelihood of health problems occurring if no cleanup action is taken at the site. The risks are estimated by a four-step process. Step 1 is to analyze the contamination by comparing site-specific concentrations to concentrations reported in previous studies to determine which contaminants are most likely to pose the greatest threat to human health. In Step 2, a CSM is developed to consider the concentrations that people may be exposed to, the potential frequency (how often) and length of exposure. Using this information, a reasonable maximum exposure (RME) is calculated that portrays the highest level of human exposure that could reasonable be expected to occur (Figure 3). In Step 3, potential human health risks are calculated using the RME scenario, a more realistic central tendency (CT) exposure scenario, and the toxicity of the contaminants. Potential **cancer risks** and **non-cancer hazards** are then calculated. Potential unacceptable cancer risks are expressed as the probability that a person has greater than a 1 in 10,000 (1 x 10-4) chance of developing cancer. The USEPA's acceptable risk range is 10-4 to 10-6. For non-cancer hazards, a hazard index (HI) is calculated to represent the ratio between the "reference dose", the dosage at which no adverse health effects are expected and either the RME and CT exposure scenarios. HIs greater than 1 indicate exposures may present an unacceptable non-cancer hazard. In Step 4, the results of the previous steps are combined and a total site risk is calculated.

Potential unacceptable risks identified at Site 12 include cancer risks and non-cancer hazards for a future resident from exposure to surface soil and groundwater. Although

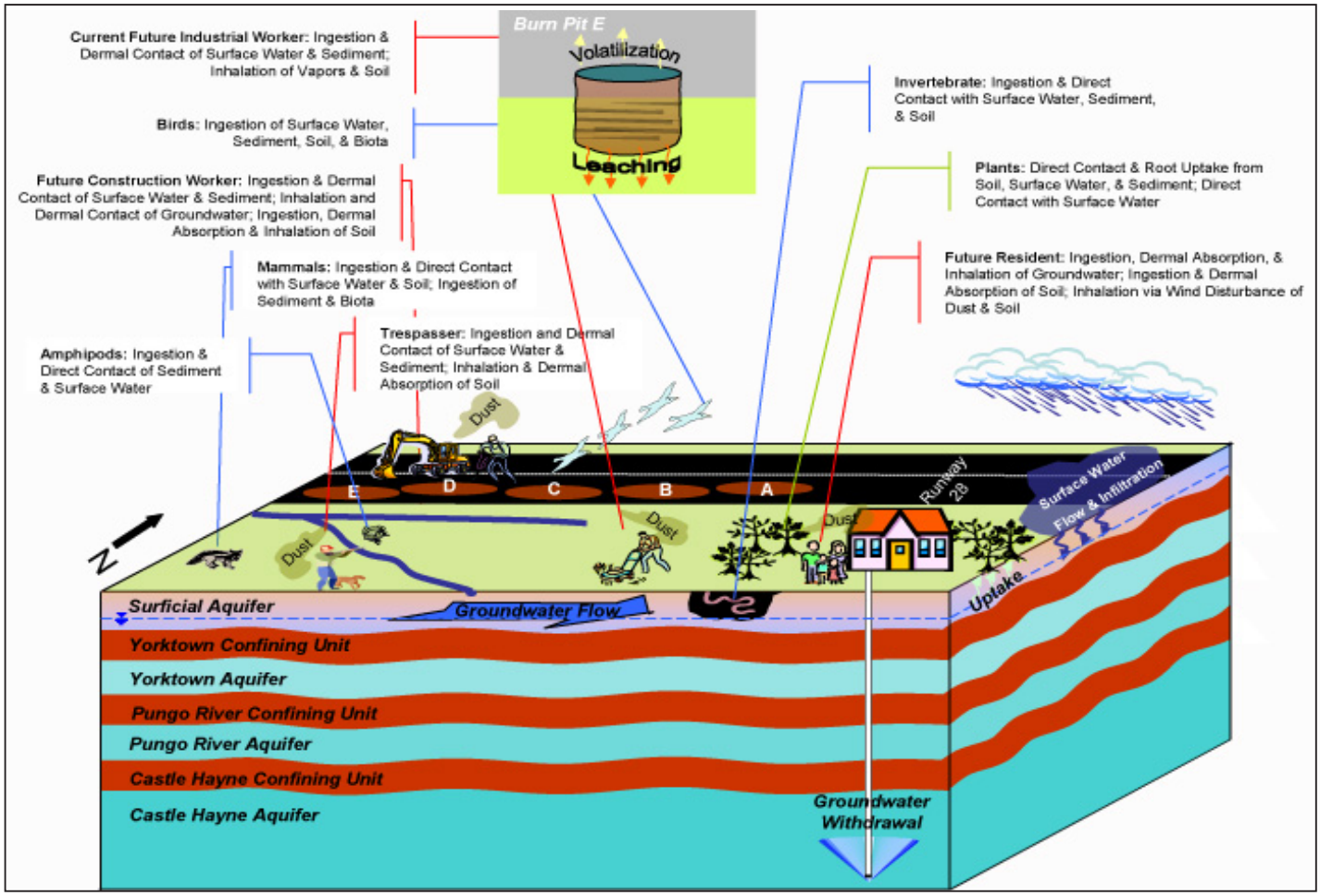


Figure 3 - Conceptual Site Model

the RME non-cancer hazard is greater than 1 for potential exposure to surface soil by a future child resident, there are no individual target organs/effects with HIs greater than 1, the CT exposure is below 1, and the RME cancer risk is within USEPA's acceptable risk range. All other pathways evaluated for soil pose no unacceptable risks to human health.

In groundwater, potential cancer risks due to aroclor-1248 and arsenic and non-cancer hazards due to arsenic and iron were identified. However, aroclor-1248 was detected in only one of five groundwater samples at an estimated concentration (0.89 J µg/L) below the analytical quantitation limit (1 µg/L). Additionally, CT calculations for potential cancer risks associated with arsenic in groundwater are within USEPA's acceptable risk range. For non-cancer risks, the RME HIs for arsenic (2) and iron (1.6) in groundwater only slightly exceeded 1 for the child resident, and HIs are well below 1 for CT exposures. Based on these results, the potential risks identified to human health from exposure to groundwater were considered acceptable.

Based on additional soil data collected from Burn Pit E, potential human health risks were further evaluated for the future construction worker. Only two constituents (2-methylnaphthalene and naphthalene) were carried through the risk assessment process. Potential risks to the future resident for soil and future resident and construction worker for groundwater were not quantified at Burn Pit E because site-related chemicals detected in soil and groundwater would require remediation based on North Carolina standards that are protective of human health. Because remediation involving potential exposure to 2-methylnaphthalene and naphthalene in site soil was anticipated, a focused risk assessment was performed for the future construction worker. Potential risks were calculated for 2-methylnaphthalene and naphthalene from incidental ingestion, dermal contact, and inhalation and the results demonstrated that there are no unacceptable risks.

5.2 Ecological Risk Assessment

An ERA was conducted for Site 12, consisting of Steps 1 through 3A of the Navy ERA process. In Step 1 (problem formulation), the environmental setting, chemical fate and transport, ecotoxicity and potential receptors, and complete exposure pathways were considered in order to develop an ecological CSM and assessment and measurement endpoints. Potentially complete exposure pathways were identified for both lower trophic-level (i.e, earthworms) and upper trophic-level (i.e., gray fox) terrestrial and aquatic receptor populations based on chemicals in surface soil, surface water, and sediment (Figure 3).

In Step 2, hazard quotients (HQs) were calculated to characterize the potential for chemicals to pose ecological risk using conservative exposure assumptions. HQs represent a ratio of the exposure level to an ecological effect level, and an estimate of potential risk. In Step 2, the exposure level for lower trophic-level receptors was the maximum detected chemical concentration in an exposure medium. For upper trophic-level receptors, the exposure level was the dietary dose estimated through food web modeling, but based on the maximum concentrations. For soil, sedi-

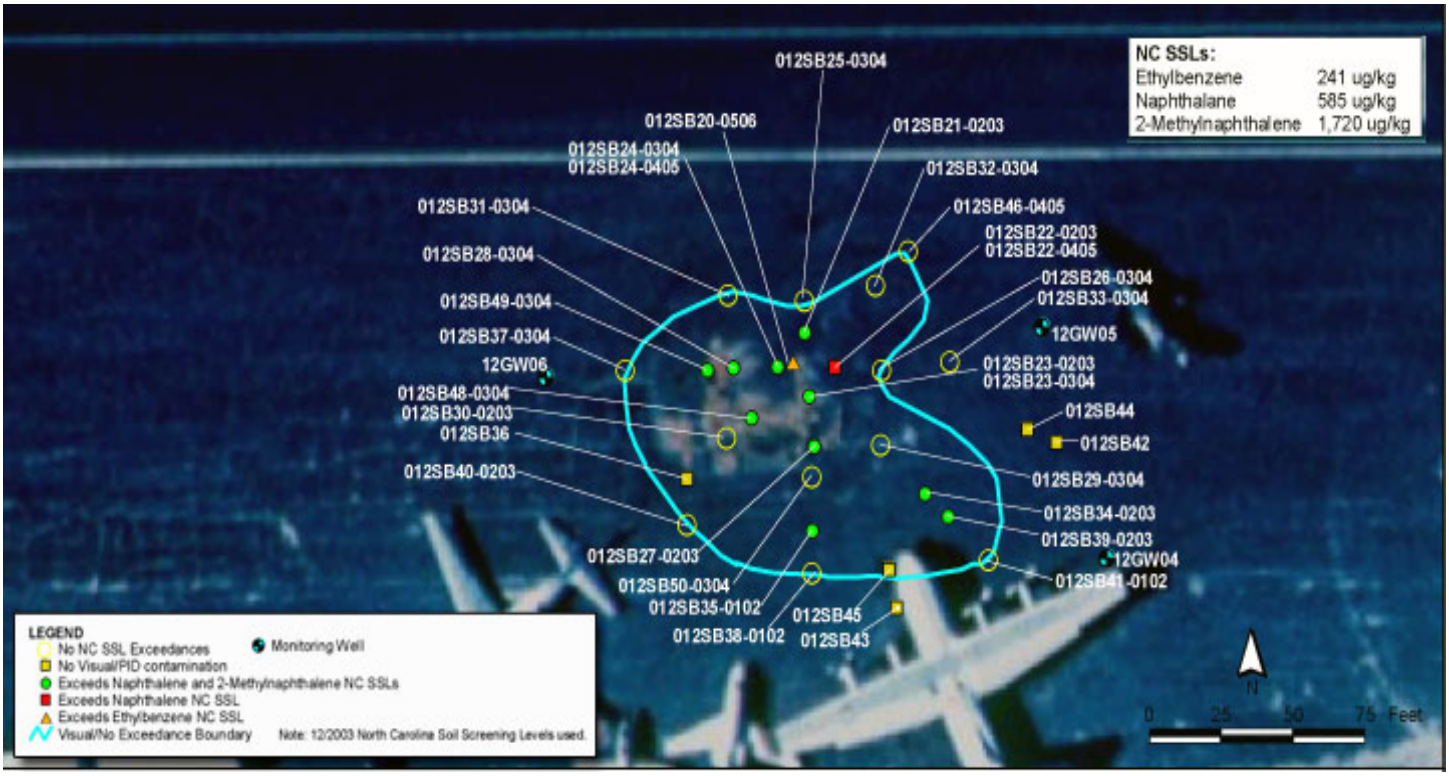


Figure 4 - Extent of Soil Contamination

ment, and surface water (lower trophic receptors), the effect levels were Region 4 Biological Technical Assistance Group (BTAG) screening values. Upper trophic receptor effect levels were the No Observed Adverse Effects Levels (NOAELs) for reference toxicity values obtained from the scientific literature.Chemicals with HQs in excess of 1 were identified for each receptor population and selected as constituents of potential concern (COPCs). Because COPCs were identified in Step 2, the ERA proceeded to Step 3A.

In Step 3A, the conservative exposure assumptions employed for Step 2 were refined and risk estimates (i.e., HQs) were recalculated using the same CSM and assessment/measurement endpoints. The primary refinement included using average, instead of maximum, chemical concentrations as the basis for exposure and estimating upper trophic-level doses. Following the refined risk calculations, few COPCs still exceeded 1. The potential for those COPCs yielding refined HQs that were greater than 1 to pose unacceptable risk was further characterized using multiple lines-of-evidence. The lines-of-evidence used to characterize remaining Step 3A COPCs included:

- Comparison of inorganic COPC concentrations in soil and sediment to MCAS Cherry Point background;
- Applying site use factors (SUF) to define a more realistic exposure scenario for upper trophic level receptors;
- Comparing COPC concentrations to other commonly used screening values from the scientific literature; and
- Consideration of the frequency of detection, frequency of screening value exceedance, magnitude of the HQs relative to 1, and spatial distribution of COPCs.

Based on consideration of these lines of evidence, it was determined that none of the COPCs were expected to pose unacceptable risk to ecological receptor populations at Site 12. Although there was some uncertainty associated with this conclusion, the scope and conservativeness of the assessment provided additional support that the risk evaluation was protective.

5.3 North Carolina Standards

North Carolina requires chemical concentrations in soil and groundwater to meet the **North Carolina Soil Screening Levels (SSLs)** and **North Carolina 2L Standards (NC 2Ls)**, respectively, for protection of human health. Only ethylbenzene, 2-methylnaphthalene, and naphthalene in soil and 2-methylnaphthalene and naphthalene in groundwater at Burn Pit E are considered reflective of a site-related release.

Based on all available data, the operational history of Site 12, human health and ecological risk assessment results, and risk management considerations presented herein, the Navy and Marine Corps, in partnership with USEPA and NCDENR, determined remedial action is necessary for site-related constituents in subsurface soil (ethylbenzene, 2-methylnaphthalene, and naphthalene) and groundwater (2-methylnaphthalene and naphthalene) at Burn Pit E to protect human health and the environment. The site-related constituents exceeding NC screening values that require a response action are shown on Figure 4.

6 Remedial Action Objectives

Remedial action objectives (RAOs) are established based on attainment of regulatory requirements, standards, and guidance; contaminated media; COCs; potential receptors and exposure scenarios; and human health and ecological risks. The RAOs for Site 12 are to:

- Prevent human exposure to soil and groundwater containing COCs in excess of NC SSL and NC 2L standards, respectively.
- Reduce concentrations of COCs in soil and groundwater to the NC SSL and NC 2L standards, respectively, to allow for unlimited use and unrestricted exposure (UU/UE).

Specific remediation goals to meet the RAOs are listed in Table 1.

Chemical of Concern	Soil Remediation Goal (NC SSL)	Groundwater Remediation Goal (NC 2L)
Ethylbenzene	241 µg/kg	N/A
Naphthalene	585 µg/kg	21 µg/L
2-Methylnaphthalene	1,720 µg/kg	14 µg/L

Table 1 - Remediation Goals

7 Summary of Remedial Action Objectives

Response actions are required to meet NC requirements; therefore, a preliminary screening of General Response Actions (GRAs) and remedial approaches was completed to refine the remedy selection process, as detailed in the FS. Six soil and five groundwater remedial approaches were retained as preliminary remedial alternatives and were evaluated with respect to implementability, effectiveness, and relative cost. The preliminary remedial alternatives excluded from further analysis are:

- LUCs for soil and groundwater because they do not reduce concentrations of COCs to the remediation goals.
- Soil fracturing and **soil vapor extraction (SVE)** because the COCs do not readily volatilize and ex-situ treatment systems interfere with airfield operations.

Alternative	Components	Details	Cost
Soil			
No Action No action for contaminated soil with no restriction on activities.	- Existing soil	- No action - Natural attenuation would potentially reduce chemical concentrations over time	No Cost
Biostimulation and Off-Site Disposal Excavation and stockpiling of contaminated soil for on-site ex-situ treatment followed by backfilling and site restoration.	- Excavation of soil - Site restoration - On-site ex-situ biostimulation followed by off-site disposal - Site controls	- Excavation of 1,333 yd3 of soil followed by segregation of contaminated and uncontaminated site soil based on visual inspection and photoionization detector (PID) readings (it is assumed that only 1/3 of excavated material is contaminated) - Collection of confirmation samples from the excavation for analysis of COCs to verify remediation goals are met - Mixing clean fill and uncontaminated site soil for backfill and site restoration (repaving) - Stockpiling of contaminated site soil and placement on a treatment pad with physical controls (fencing and signs) to prevent access and erosion and sediment controls (silt fencing) to prevent contaminant transport - Mixing stockpiled soil with amendments (i.e., commercial fertilizer) and bi-weekly aeration to stimulate biological degradation - Periodic sampling of stockpiled soil until remediation goals are met followed by off-site disposal	Capital Cost: $291,600 Annual Operations and Maintenance (O&M) Cost: $0 Present-Worth Cost: $291,600 Discount Rate: 3.5% Timeframe: 2 years
Excavation and Off-Site Disposal Excavation of contaminated soil followed by off-site disposal, backfilling, and site restoration.	- Excavation of soil - Site restoration - Off-site disposal - Site controls	- Excavation of 1,333 yd3 of soil followed by segregation of contaminated and uncontaminated site soil based on visual inspection and PID readings (it is assumed that only 1/3 of excavated material is contaminated) - Collection of confirmation samples from the excavation for analysis of COCs to verify remediation goals are met - Stockpiling of contaminated site soil with physical controls (signs) to prevent access and erosion and sediment controls (silt fencing) to prevent contaminant transport during waste characterization - Waste characterization testing to classify the contaminated soil for proper off-site disposal - Mixing clean fill and uncontaminated site soil for backfill and site restoration (repaving)	Capital Cost: $229,300 Annual O&M Cost: $0 Present-Worth Cost: $229,300 Discount Rate: 3.5% Timeframe: 1 month
Groundwater			
No Action No action for contaminated groundwater with no restriction on activities.	- Existing groundwater	- No action - Natural attenuation would potentially reduce chemical concentrations over time	No Cost
MNA and LUCs Groundwater monitoring to access concentrations of COCs until remediation goals have been achieved via natural attenuation	- MNA groundwater monitoring - LUCs	- Periodic groundwater monitoring (three existing wells and one newly installed well) for natural attenuation indicator parameters and reporting - LUCs to restrict access to the Surficial Aquifer so that the potential exposure pathway to contamination would remain incomplete until remediation goals have been achieved - O&M of monitoring wells	Capital Cost: $73,400 Annual O&M Cost: $24,900 Present-Worth Cost: $194,300 Discount Rate: 3.5% Timeframe: 5 years

Table 2 - Remedial Activities

- Thermal treatment for soil because it is not a cost effective remedy given the relatively low volume and concentrations of COCs.
- Groundwater pump and treat with air stripping and discharge to Hancock Creek because it is not a cost effective remedy given the lack of a defined contaminant plume and relatively low concentrations of COCs.

Although MNA for groundwater was evaluated further in the FS, it is not considered a stand-alone remedial alternative because it does not prevent human exposure to COCs in groundwater. Consistent with the NCP, a no action alternative was evaluated as a baseline for the comparative analysis. Three remedial alternatives for soil (no action, biostimulation and off-site disposal, and excavation and off-site disposal) and two remedial alternatives for groundwater (no action, and MNA and LUCs) were retained for a detailed comparative analysis in accordance with the NCP.

Table 2 provides the major components, details, and cost of each remedial alternative identified for soil and groundwater.

The distinguishing feature between the soil alternatives is on-site ex-situ treatment (biostimulation alternative) of contaminated soil prior to off-site disposal of clean material as compared to removal (excavation alternative) and off-site disposal of contaminated material.

8 Evaluation of Remedial Alternatives

A comparative analysis of alternatives with respect to the nine evaluation criteria was completed and is provided below. Table 3 depicts a relative ranking of the alternatives.

Threshold Criteria

Overall Protection of Human Health and the Environment. The no action alternatives for soil and groundwater do not achieve RAOs and; therefore, do not protect human health and the environment and are not considered further in this ROD. Both the biostimulation and off-site disposal and the excavation and off-site disposal alternatives for soil would provide adequate protection of human health by eliminating exposure to contaminated soil through removal. The biostimulation and off-site disposal alternative is slightly less protective than the excavation and off-site disposal alternative because stockpiled material would remain on-site longer during ex-situ treatment. For groundwater, the MNA and LUCs alternative would provide adequate protection of human health and the environment by controlling exposure to groundwater through LUCs while concentrations of COCs naturally attenuate.

Compliance with Applicable or Relevant and Appropriate Requirements. The soil and groundwater alternatives would comply with the **Applicable or Relevant and Appropriate Requirements (ARARs)**.

		Soil Alternatives		Groundwater Alternatives	
CERCLA Criteria	No Action (1)	Bio-stimulation and Off-Site Disposal	Excavation and Off-Site Disposal	No Action	MNA and LUCs
Threshold Criteria					
Protection of Human Health and the Environment	❍	◉	●	❍	●
Compliance with ARARs	❍	●	●	❍	●
Primary Balancing Criteria					
Long-term Effectiveness and Permanence	❍	●	●	❍	◉
Reduction in Toxicity, Mobility, or Volume	❍	●	N/A	N/A	●
Short-Term Effectiveness	❍	◉	●	❍	◉
Present-Worth Cost	$0	$291, 600	$229,300	$0	$194,300

Ranking: ● High ◉ Moderate ❍ Low

Rankings are provided as qualitative descriptions of the relative compliance of each alternative with the criteria

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. The biostimulation alternative and excavation alternative for soil would remove contaminated soil resulting in UU/UE; thereby providing long-term effectiveness and permanence. Once remediation goals have been met, through MNA and LUCs for groundwater, long-term effectiveness and permanence is achieved.

Reduction in Toxicity, Mobility, or Volume through Treatment. While all the alternatives are expected to reduce toxicity, mobility, or volume, the only alternatives with treatment components are biostimulation and off-site disposal for soil and MNA for groundwater. Natural attenuation, through volatilization, diffusion, dispersion, and absorption, is expected to be an effective remedy for groundwater treatment based on the removal of the source material, the low concentrations and low frequency of detections above the NC 2L, and the lack of definable plume.

Short-Term Effectiveness. The excavation and off-site disposal alternative provides the greatest short-term effectiveness due to the shorter time frame (1 month) until protection is achieved, in comparison to biostimulation and off-site disposal (2 years). The excavation component of both soil alternatives have equal short-term effectiveness; however, the stockpiling and ex-situ treatment component of the biostimulation alternative results in increased duration exposure of contaminated media to workers and the environment during implementation. The excavation and off-site disposal alternative would result in a potential risk to surrounding communities during the transport of contaminated soil off-site. The MNA and LUCs alternative for groundwater poses minimal risk to workers conducting monitoring, as the risks are addressed through use of personal protective equipment, and the time to achieve protectiveness is 5 years.

Implementability. The excavation component of both soil alternatives is easily implemented using well-established technologies with conventional equipment and standard construction methods. The biostimulation alternative for soil is more difficult to implement because the on-site ex-situ treatment component adversely impacts MCAS Cherry Point operations by requiring bi-weekly manipulation in the airfield vicinity. Additionally, the soil pile and the mixing of soil amendments would likely attract birds requiring measures to minimize Bird Aircraft Strike Hazards (BASH). The MNA and LUCs alternative for groundwater can easily be implemented using standard procedures.

Cost. The estimated **present-worth cost** for excavation and off-site disposal ($229,300) is less than biostimulation and off-site disposal ($291,600). The estimated present-worth cost for the MNA and LUCs $194,300.

Modifying Criteria

State Acceptance. State involvement has been solicited throughout the CERCLA process. The NCDENR supports the Preferred Alternative, however, their final concurrence will be provided following the review of all comments received during the public comment period.

Community Acceptance. Community acceptance will be evaluated after the public comment period for the Proposed Plan, and will be fully evaluated in the **Record of Decision (ROD)**.

9 Preferred Alternative

The Preferred Alternative for Site 12 is excavation and off-site disposal for soil and MNA and LUCs. Based on information currently available, the Navy believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. This alternative meets the RAOs by excavating contaminated soil exceeding the NC SSLs, thereby removing the potential source of contaminants to groundwater, and prohibiting access to groundwater through LUCs until the NC 2Ls are met through MNA. The Preferred Alternative achieves the remediation goals in the shortest timeframe and in a cost-effective manner with minimal impacts to MCAS Cherry Point operations. The Preferred

If individuals have any questions or comments about OU 6 they may call or write one of the following contacts:

Mr. Rodger Jackson, Code OPCEV
NAVFAC Atlantic
North Carolina/Caribbean Integrated Product Team
6506 Hampton Blvd.
Norfolk, VA 23508-1278
(757) 322-4589

Ms. Gena Townsend
US Environmental Protection Agency, Region 4
Waste Management Division
Atlanta Federal Center
61 Forsyth St.
Atlanta, GA 30303
(404) 562-8538

Mr. George Lane
NC Department of Environment and Natural Resources
Superfund Section
401 Oberlin Rd., Suite 150
1646 Mail Service Center
Raleigh, NC 27699-1646
(919) 733-4996 x340

Alternative for soil, in comparison with the biostimulation and off-site disposal alternative, achieves remediation goals for soil in 1 month as compared to 2 years, costs $229,300 as compared to $291,600, and does not result in stockpiled material remaining on-site hindering MCAS Cherry Point operations.

The Navy expects the Preferred Alternative to meet the following statutory requirements of CERCLA Section 121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element. The NCDENR and the USEPA have reviewed the Proposed Plan and support the Preferred Alternative. However, their final concurrence will be provided following review of all comments received during the public comment period.

10 Community Participation

Community participation at MCAS Cherry Point includes a Restoration Advisory Board (RAB), public meetings, public information repositories, newsletters and fact sheets, public notices, and an IR Program web site. The Community Involvement Plan for MCAS Cherry Point provides detailed information on community participation for the IR Program. The RAB was formed in 1995 and consists of community members and representatives of the USEPA, NCDENR, Navy, and Marine Corps. RAB meetings are held about every 3 months and are open to the public to provide opportunity for public comment and input. The investigations conducted at OU 6, the findings, and potential remedial approaches have been presented and discussed at the RAB meetings.

Public input is a key element in the decision-making process. Nearby residents and other interested parties are strongly encouraged to use the comment period to relay any questions and concerns about Site 12, the remediation alternatives that have been evaluated, and the Preferred Alternative. The Navy will summarize and respond to comments in a responsiveness summary, which will become part of the official ROD.

The public comment period for the Proposed Plan provides an opportunity for input regarding the remedy selection process for Site 12. The public comment period will be from May 1 to June 15, 2006, and a public meeting will be held on May 9, 2006 at the Havelock Tourist and Event Center at 6:00 PM. All interested parties are encouraged to attend the public meeting to learn more about the alternatives developed and evaluated for Site 12. The meeting will provide an additional opportunity to submit comments on the Proposed Plan to the Navy.

Written comments must be postmarked no later than June 15, 2006. On the basis of comments or new information, the Navy may modify the Preferred Alternative or choose another alternative. The back page of this Proposed Plan may be used to provide comments to the Navy. Please cut off the page, fold, and add postage where indicated. However, use of this form is not required.

The Community Involvement Plan, IR Program fact sheets, and final technical reports concerning OU 6, Site 12 are available to the public at the following location:

Havelock-Craven County Library
301 Cunningham Blvd
Havelock, NC 28532
Phone 252-447-7509

After the public comment period, the Navy, in consultation with the USEPA and NCDENR, will determine whether the remedy proposed in this Proposed Plan should be modified on the basis of comments received. Any required modifications will be made by the Navy and reviewed by the USEPA and NCDENR. If the modifications substantially change the proposed remedy, additional public comment may be solicited. If not, then the USEPA and Navy will prepare and sign the ROD. The ROD will detail the remedial actions chosen for the site and will include the Navy's responses to comments received during the public comment period.

Glossary

Applicable or Relevant and Appropriate Requirements (ARARs): These are Federal or State environmental rules and regulations and there are three types: chemical-specific for the contaminant in question, location-specific where the site is located, and action-specific for the remedial alternative.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A Federal law, commonly referred to as the "Superfund" Program, passed in 1980 that regulates and provides for cleanup and emergency response in connection with numerous existing inactive hazardous waste disposal sites that endanger public health and safety or the environment.

Cancer Risk: Cancer risks are expressed as a number reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, USEPA's acceptable risk range for Superfund hazardous waste sites is 1 x 10-4 to 1 x 10-6, meaning there is 1 additional chance in 10,000 (1 x 10-4) to 1 additional chance in 1 million (1 x 10-6) that a person will develop cancer if exposed to a site that is not remediated.

Ecological Risk Assessment (ERA): An evaluation of the risk posed to the environment if remedial activities are not

performed at the site.

Feasibility Study (FS): Analysis of the practicability of a remedial alternative. The feasibility study usually recommends the selection of a cost-effective alternative.

Groundwater: Subsurface water that occurs in soils and geologic formations that are fully saturated.

Human Health Risk Assessment (HHRA): An evaluation of the risk posed to human health should remedial activities not be implemented.

Land Use Controls (LUCs): Methods to prevent human exposure to contaminants, such as by restricting the use of groundwater for drinking water.

Monitored Natural Attenuation (MNA): Natural attenuation is the process by which contaminant concentrations are reduced by various naturally occurring physical, chemical, and biological processes. The main processes include biodegradation and retardation.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): Provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.

National Priorities List (NPL): A list developed by USEPA of uncontrolled hazardous substance release sites in the United States that are considered priorities for long-term remedial evaluation and response.

Nine Evaluation Criteria: Priorities for remedial evaluation and response, including:

- **Overall Protection of Human Health and the Environment** - Addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- **Compliance with ARARs** - Addresses whether a remedy will meet all of the Applicable or Relevant and Appropriate Standards (ARARs) of other Federal and State environmental laws and/or justifies a waiver of the requirements.
- **Long-Term Effectiveness and Permanence** - Addresses the expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up goals have been met.
- **Reduction of Toxicity, Mobility, and Volume through Treatment** - Discusses the anticipated performance of the treatment technologies a remedy may employ.
- **Short-Term Effectiveness** - Considers the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until clean-up goals are achieved.
- **Implementability** - Evaluates the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement an option.
- **Cost** - Compares the estimated capital, operation and maintenance (O&M), and present worth costs.
- **State Acceptance** - Considers the State support agency comments on the Proposed Plan.
- **Community Acceptance** - Provides the public's general response to the alternatives described in the Proposed Plan, Remedial Investigation (RI), and Feasibility Study (FS) Reports. The specific responses to the public comments are addressed in the Responsiveness Summary section of the Record of Decision (ROD).

Non-Cancer Risk: Noncancer Hazards (or risk) are expressed as a quotient that compares the existing level of exposure to the acceptable level of exposure. There is a level of exposure (the reference dose) below which it is unlikely for even a sensitive population to experience adverse health effects. USEPA's threshold level for noncancer risk at Superfund sites is 1, meaning that if the exposure exceeds the threshold, there may be a concern for potential noncancer effects.

North Carolina 2L Standards (NC 2Ls): These are groundwater quality standards for the protection of the groundwaters of North Carolina as specified in 15A NCNC 2L .0200. They are maximum allowable concentrations resulting from any discharge of contaminants to the land or waters of the State, which may be tolerated without creating a threat to human health or which would otherwise render the groundwater unsuitable for its intended best usage.

North Carolina Department of Environment and Natural Resources (NCDENR): The State agency responsible for administration and enforcement of State environmental regulations.

North Carolina Soil Screening Levels (NC SSLs): These are soil quality standards for the protection of the groundwaters of North Carolina. They are maximum allowable concentrations resulting from any discharge of contaminants to the land or waters of the State, which may be tolerated without the threat of contaminant migration to groundwater that would result in exceedances of NC 2L Standards.

Operable Unit (OU): The facility(ies) or site(s) of concern and any other areas in close proximity to it where a hazardous substance, hazardous waste, hazardous constituent, pollutant, or contaminant from the facility has been

deposited, stored, disposed of, placed, migrated, or otherwise come to be located.

Present-Worth Cost: Total cost, in current dollars, of the remedial action. The present-worth cost includes capital costs required to implement the remedial action, as well as the cost of long-term operations, maintenance, and monitoring.

Proposed Plan: A document that presents the preferred remedial alternative and requests public input regarding the proposed cleanup alternative.

Public Comment Period: The time allowed for the members of a potentially affected community to express views and concerns regarding an action proposed to be taken by USEPA, such as a rulemaking, permit, or Superfund-remedy selection.

Record of Decision (ROD): A legal document that describes the cleanup action or remedy selected for a site, the basis for choosing that remedy, and public comments on the considered selected remedy.

Remedial Action: A cleanup method proposed or selected to address contaminants at a site.

Remedial Action Objectives: Site-specific objectives that describe what the remedial actions are expected to accomplish. They specify the contaminants and media of interest, exposure pathways, and remediation goals, and are used to develop a range of remedial alternatives.

Remedial Investigation (RI): A study of a facility that supports the selection of a remedy where hazardous substances have been disposed or released. The RI identifies the nature and extent of contamination at the facility and analyzes risk associated with COPCs.

Resource Conservation and Recovery Act (RCRA): A Federal law, passed in 1976 that ensures that wastes are managed in a manner protective of human health and the environment, to reduce or eliminate the amount of waste generated, and conserve energy and natural resources through waste recycling and recovery.

Soil Vapor Extraction (SVE): A remedial technology that uses a vacuum to extract volatile contaminants and draw them through an aboveground vapor treatment system.

Surficial Aquifer: The surficial aquifer is the saturated portion of the upper layer of sediments. The surficial aquifer is unconfined, meaning that its upper surface is the water table rather than a confining bed.

United States Environmental Protection Agency (USEPA): The Federal agency responsible for administration and enforcement of CERCLA (and other environmental statutes and regulations), and final approval authority for the selected ROD.

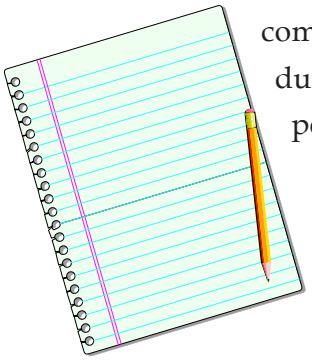
Please print or type your comments for Site 12 below.

Mark Your Calendar for the Public Comment Period

Public Comment Period

May 1 - June 15, 2006

Submit Written Comments



The Navy will accept written comments on the Proposed Plan during the public comment period.

Attend the Public Meeting

Weekday May 9, 2006 at 6:00 pm
Havelock Tourist and Event Center
201 Tourist Center Drive
Havelock, NC 28532

The Navy and MCAS Cherry Point will hold a public meeting to explain the Proposed Remedial Action Plan. Verbal and written comments will also be accepted at this meeting.

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Place stamp here

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