

7/1/05-00895

Final

**Site Management Plan
Fiscal Years 2006 through 2010**

**Naval Amphibious Base Little Creek
Virginia Beach, Virginia**

Prepared for
**Department of the Navy
Atlantic Division
Naval Facilities Engineering Command**

Under the
**LANTDIV CLEAN III Program
Contract N62470-02-D-3052
Contract Task Order 0048**

July 2005

Prepared by



CH2MHILL

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Acronyms and Abbreviations

ABM	abrasive blast material
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
Baker	Baker Environmental, Incorporated
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BMPs	best management practices
BNA	base-neutral and acid extractable organic compound
CD	cyclodextrin
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CMP	Corrective Measures Plan
CNRMA	Commander Navy Region Mid-Atlantic
COPC	chemical of potential concern
CTO	Contract Task Order
cy	cubic yards
DCE	Dichloroethene
DD	Decision Document
DDD	Dichlorodiphenyldi-chloroethane
DDE	Dichlorodiphenyldichloro-ethene
DDT	Dichlorodiphenyltrichloro-ethane
DNAPL	dense nonaqueous phase liquid
DOD	Department of Defense
Ebasco	Ebasco Environmental Consultants
EE/CA	Engineering Evaluation/Cost Analysis
ELCS	elevated causeway
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
ESS	explosive safety submission
ESTCP	Environmental Security Technology Certification Program
FFA	Federal Facilities Agreement
FS	Feasibility Study
FWES	Foster Wheeler Environmental Services
FY	fiscal year
HHRA	Human Health Risk Assessment
HRS	Hazard Ranking System
HRSD	Hampton Roads Sanitation District

IAS	Initial Assessment Study
IR	Installation Restoration
IRA	Interim Removal Action
IRI	Interim Remedial Investigation
LANTDIV	Atlantic Division of the Navy
LTM	long-term monitoring
MCL	Maximum Concentration Limit
MDL	method detection limit
MIP	Membrane Interface Probe
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
NAB	Naval Amphibious Base
NACIP	Navy Assessment and Control of Installation Pollutants
NAVFAC	Naval Facilities Engineering Command Atlantic Division
NCP	National Contingency Plan
NEX	Naval Exchange
NFA	no further action
NPL	National Priorities List
NTCRA	non-time-critical removal action
ORC	oxygen-releasing compound
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PCP	pentachlorophenol
PID	photo ionization detector
ppb	parts per billion
ppm	parts per million
PRAP	Proposed Remedial Action Plan
PRG	Preliminary Remediation Goals
PSI	Preliminary Site Inspection/Site Investigation
PWC	Public Works Center
RA	Remedial Action
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RGH	Rogers, Golden, and Halpern

RI	Remedial Investigation
ROD	Record of Decision
RRRS	Relative Risk Ranking System
RVS	Round 1 Verification Step
SARA	Superfund Amendments and Reauthorization Act
SBU	Special Boat Unit
SERA	Screening Ecological Risk Assessment
SI	Site Inspection/ Site Investigation
SMP	Site Management Plan
SRI	Supplemental Remedial Investigation
SSA	Site Screening Assessment
SSP	Site Screening Process
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TBC	to-be-considered
TCA	trichloroethane
TCE	trichloroethylene
TCL	Target Compound List
TCLP	toxicity characteristic leachate procedure
TOC	total organic carbon
TPH-DRO	total petroleum hydrocarbons-diesel range organics
UST	underground storage tank
UTL	upper tolerance limit
VDEQ	Virginia Department of Environmental Quality
VOC	volatile organic compound
VSI	Visual Site Inspection
VSWMR	Virginia Solid Waste Management Regulations
WCSD	Watershed Contamination Source Document
WP	Work Plan
XRF	X-Ray Fluorescence

SECTION 1

Introduction

This document presents the Site Management Plan (SMP) for Naval Amphibious Base (NAB) Little Creek for the fiscal years (FYs) 2006 through 2010. The SMP meets the requirements of the Final Federal Facilities Agreement (FFA) between the Naval Facilities Engineering Command Atlantic Division (NAVFAC Mid Atlantic), Virginia Department of Environmental Quality (VDEQ), and Region III of the Environmental Protection Agency (EPA) under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) to address environmental contamination at applicable NAB Little Creek sites (DON, October 2003). The SMP is being submitted for use by the NAB Little Creek Installation Restoration (IR) Partnering Team and their respective organizations; NAVFAC, Commander Navy Region Mid-Atlantic (CNRMA), NAB Little Creek, EPA, and the VDEQ.

Figure 1-1 provides the location of NAB Little Creek.

1.1 Purpose

The purpose of the SMP is to provide a management tool for NAVFAC, NAB Little Creek, VDEQ, EPA personnel, and consultants to be used in planning, scheduling, and setting priorities for environmental remedial response activities to be conducted at NAB Little Creek. The SMP establishes schedules and conceptual approaches for continued CERCLA activities at NAB Little Creek IR Sites. The schedules and work descriptions consist of:

- Detailed schedules, near-term milestones, and descriptions of proposed activities for the current FY
- Conceptual schedules and general work approaches for activities planned for the 5-year period FY 2006 through FY 2010

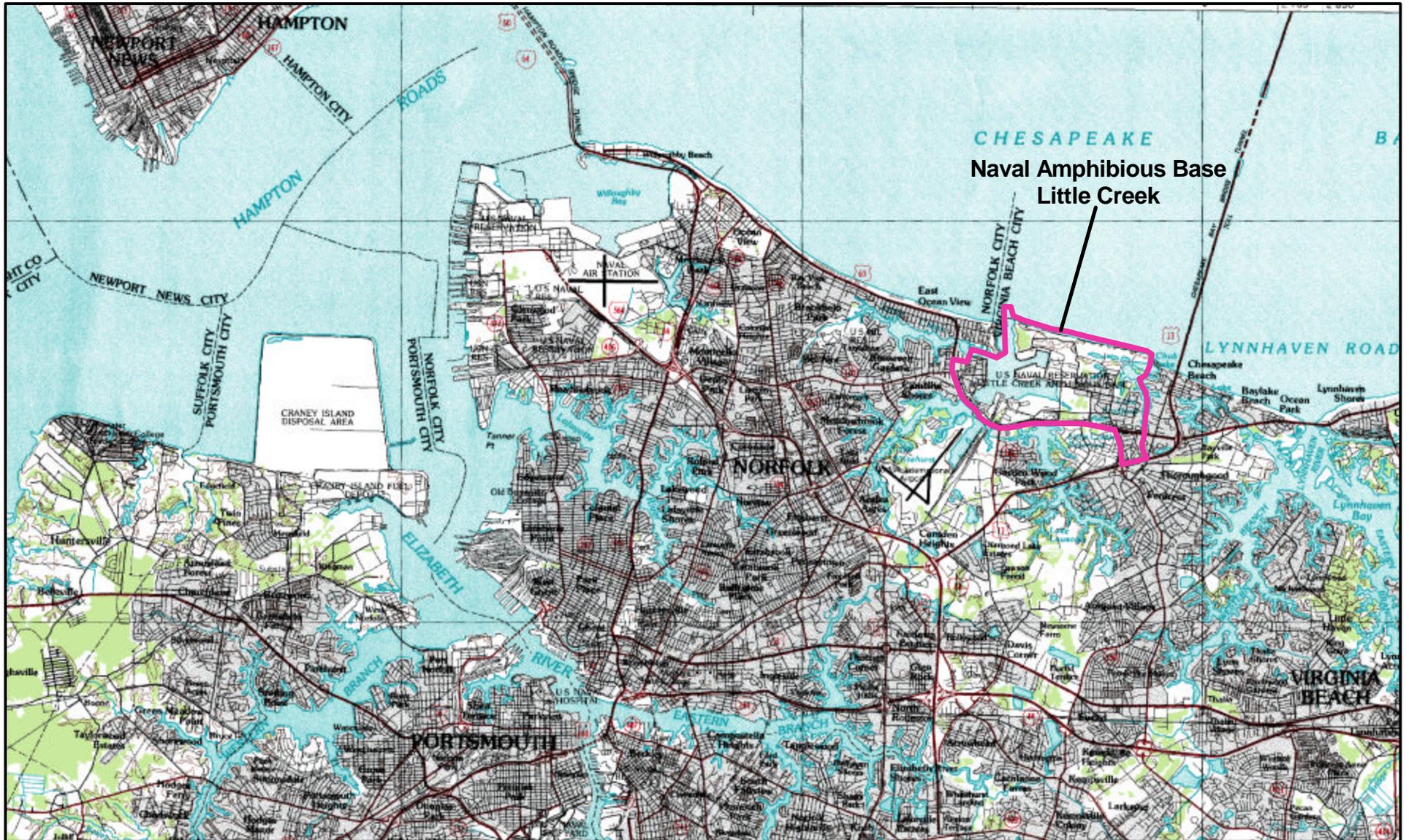
The prioritization of activities and the proposed schedules were developed by the NAB Little Creek Partnering Team and are based on several factors:

- The Partnering Team's relative ranking of the sites with regard to the potential risks that they may pose to human health and the environment (i.e., address highly ranked sites first)
- NAVFAC's internal funding goal of having remedies in place at all "high-priority" sites by FY 2010
- Goals set by the Partnering Team to meet requirements of EPA, VDEQ, NAVFAC, and the public

The SMP is a working document that is updated yearly to maintain an up-to-date documentation and summary of environmental actions at NAB Little Creek. This SMP updates and supersedes the 2005 SMP finalized in July 2004.

1.2 SMP Report Organization

This SMP consists of six sections. This section establishes the purpose of the SMP. Section 2 presents a brief history of environmental activities at the base and describes each of the sites at NAB Little Creek that are currently included in the FFA. Section 3 presents the proposed scope of work at each site for FY 2006. Section 4 specifically addresses previous and potential remedial and removal actions. Section 5 describes Navy land use planning, and Section 6 provides references.



Naval Amphibious Base
Little Creek

LEGEND

 Activity Boundary



Figure 1-1
Base Location Map
NAB Little Creek
Virginia Beach, Virginia

SECTION 2

Site Background

NAB Little Creek is primarily an industrial facility located in the northwest corner of Virginia Beach, Virginia. The western boundary of NAB Little Creek borders the City of Norfolk, Virginia (Figure 1-1). The area surrounding this 2,147-acre base is low lying and relatively flat with several freshwater lakes (Chubb Lake, Lake Bradford, Little Creek Reservoir/Lake Smith, and Lake Whitehurst) located on or adjacent to the base. NAB Little Creek centers around four saltwater bodies: Little Creek Harbor, Little Creek Cove, Desert Cove, and Little Creek Channel that connects the coves and harbor with the Chesapeake Bay.

In addition to industrial land use, NAB Little Creek is also used for recreational, commercial, and residential purposes. Specifically, the southeast corner of the base has been developed for residential use. Land development surrounding the base is residential, commercial, and industrial. Little Creek Reservoir/Lake Smith, located north of the base, serves as a secondary drinking-water supply for parts of the City of Norfolk.

NAB Little Creek grew out of four bases constructed during World War II: the Amphibious Training Base, the Naval Frontier Base, and Camps Bradford and Shelton. It consisted of three annexes named for the former owners of the property; Shelton on the east, Bradford in the center, and Whitehurst to the west. A Secretary of the Navy letter in July 1945 disestablished the separate bases and established the NAB Little Creek on August 10, 1945. In 1946, NAB Little Creek was designated a permanent base. The base's mission was the training of landing craft personnel for operational assignments.

During the last 50 years, NAB Little Creek has expanded in both area and the complexity of its mission. NAB Little Creek personnel provide logistic facilities and support services to 27 homeported ships and more than 80 tenant commands. The combination of operational support and training facilities are geared predominantly to meet the amphibious warfare training requirements of the Armed Forces of the United States. Operations that have occurred at the NAB Little Creek include: vehicle and boat maintenance, boat painting and sandblasting, construction and repair of buildings and piers, mixing and application of pesticides, electroplating of musical instruments, laundry and dry cleaning, medical and dental treatment, and the generation of steam for heat.

2.1 Environmental History

Comprehensive environmental restoration activities at NAB Little Creek began in 1984 under the Navy Assessment and Control of Installation Pollutants (NACIP) and Installation Restoration (IR) Programs. The purpose of the NACIP and IR programs was to identify, assess, characterize, and clean up or control contamination from past waste management activities at Navy and Marine Corps facilities. Given the nature and extent of its operations, the Navy has been involved with toxic and hazardous materials for several decades. The Department of Defense, as well as general industry, has realized that previously acceptable

methods of disposal are no longer sufficient, and actions are being taken, through these programs, to clean up Navy sites that pose a threat to human health or the environment. Current Navy waste management operations are in compliance with all federal, state, and U.S. Navy regulations to ensure safe operation and disposal of hazardous substances.

The NACIP program used a three-phased approach to study and clean up sites. NAB Little Creek initiated its environmental study investigation and restoration efforts under the NACIP program by conducting an initial assessment study (IAS) in 1984. The NACIP program was changed in 1986 to reflect the requirements of CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA). This revised program is referred to as the IR program.

On July 28, 1998, EPA proposed that NAB Little Creek be added to the National Priorities List (NPL). EPA evaluates industrial sites using the Hazard Ranking System (HRS), and those facilities with HRS scores exceeding 28.5 are proposed for the NPL. The HRS score of 50, assigned by the EPA to NAB Little Creek, is mainly attributed to the surface water component at Site 7 (Amphibious Base Landfill). The proposed listing was followed by a minimum 60-day review and comment period prior to the inclusion of NAB Little Creek on the NPL. On May 10, 1999, NAB Little Creek was placed on the NPL.

The FFA, negotiated between the Navy, EPA, and VDEQ, was signed in October 2003. In accordance with the FFA, all past and future work at IR sites and Solid Waste Management Units (SWMUs) will be reviewed, and a course of action for future work requirements at each site will be developed. The FFA includes specific requirements for the preparation and contents of this SMP.

The following sections provide an overview of the CERCLA process and a summary of the major multi-site studies completed to date at NAB Little Creek. Table 2-1 lists the status of each of the sites at NAB Little Creek. Table 2-2 lists each of the studies conducted at the sites identified in the FFA as requiring additional investigation.

2.1.1 CERCLA Process

The objectives of the CERCLA process are to evaluate the nature and extent of contamination at a site, and to identify, develop, and implement appropriate remedial actions in order to protect human health and the environment. The major elements of the CERCLA process are:

- Preliminary Assessment (PA)
- Site Investigation (SI)
- Remedial Investigation (RI)/Feasibility Study (FS)
- Engineering Evaluation/Cost Analysis (EE/CA) and Removal Action (may be implemented at any time in the CERCLA process)
- Proposed Remedial Action Plan (PRAP) and Record of Decision (ROD)
- Remedial Design and Remedial Action (RD/RA)

- Post-Remedial Action Monitoring and Reporting
- Community Participation

2.1.1.1 Preliminary Assessment

A PA phase begins with the initiation of the concerns about a site, area, or potential contaminant source. The PA is a limited-scope assessment designed to distinguish between sites that clearly pose little or no threat to human health or the environment and sites that may pose a threat and require further investigation. Environmental samples are rarely collected during a PA. The PA also identifies sites requiring assessment for possible response actions. If the PA results in a recommendation for further investigation, an SI is conducted.

2.1.1.2 Site Investigation

Some sites warrant preliminary or interim investigations, studies, or removal/remedial actions. If it is unclear as to whether a site should be included in the CERCLA RI/FS process, an SI is sometimes conducted to make a general determination if activities at the site have impacted environmental media. SIs typically include the collection of environmental and waste samples to determine what hazardous substances are present at a site and to determine if these substances have been released to the environment.

2.1.1.3 Remedial Investigation/Feasibility Study

The RI serves as the mechanism for collecting data to characterize site conditions, determine the nature of the waste, assess risk to human health and the environment, and, if necessary, conduct treatability testing to evaluate the potential performance and cost of the treatment technologies being considered.

The FS is the mechanism for the development, screening, and detailed evaluation of alternative remedial actions. The RI and FS can be conducted concurrently; data collected in the RI influences the development of remedial alternatives in the FS, which in turn affect the data needs and scope of treatability studies and additional field investigations. This phased approach encourages the continual scoping of the site characterization effort, which minimizes the collection of unnecessary data and maximizes data quality.

Treatability studies are performed to assist in the evaluation of a potentially promising remedial technology. The primary objectives of treatability testing are to:

- Provide sufficient data to allow treatment alternatives to be fully developed and evaluated during the FS
- Support the remedial design of a selected alternative

Treatability studies may be conducted at any time during the process. The need for a treatability study generally is identified during the FS.

Treatability studies may be classified as either bench-scale (laboratory study) or pilot-scale (field studies). For technologies that are well-developed and tested, bench-scale studies are often sufficient to evaluate performance. For innovative technologies, pilot tests may be required to obtain the desired information. Pilot tests simulate the physical and chemical

parameters of the full-scale process, and are designed to bridge the gap between bench-scale and full-scale operations.

2.1.1.4 Engineering Evaluation/Cost Analysis and Removal Action

Removal actions are implemented to clean up or remove hazardous substances from the environment at a specific site in order to mitigate the spread of contamination. Removal actions may be implemented at any time during the CERCLA process. Removal actions are classified as either time-critical or non-time-critical actions. Actions taken immediately to mitigate an imminent threat to human health or the environment, such as the removal of corroded or leaking drums, are classified as time-critical removal actions. Removal actions that may be delayed for 6 months or more without significant additional harm to human health or the environment are classified as non-time-critical removal actions (NTCRA).

For an NTCRA, an EE/CA is prepared rather than the more extensive FS. An EE/CA focuses only on the substances to be removed rather than on all contaminated substances at the site. It is possible for a removal action to become the final remedial action if the risk assessment results indicate that no further remedial action is required in order to protect human health and the environment.

2.1.1.5 Proposed Remedial Action Plan and Record of Decision

A PRAP presents the remedial alternatives developed in the FS and recommends a preferred remedial method. The public has an opportunity to comment on the PRAP during an announced formal public comment period. Site information is compiled in an administrative record and placed in the general IR program information repositories established at local libraries for public review. The public comments are reviewed and the responses are recorded in a document called a Responsiveness Summary.

At the end of the public comment period, an appropriate remedial alternative is chosen to protect human health and the environment. All parties directly involved in the restoration program (Navy, EPA, and VDEQ) must agree on the selected alternative. The ROD document is issued to explain the selected remedial action. Public comments received are addressed as part of the responsiveness summary in the ROD. Subsequent to the public comment period, RD/Remedial Action RA activities are initiated.

2.1.1.6 Remedial Design/Remedial Action

The final stage in the process is the RD/RA. The technical specifications for cleanup remedies and technologies are designed in the RD phase. The RA is the actual construction or implementation phase of the cleanup process.

Interim remedial actions are implemented to provide temporary mitigation of human health risks or to mitigate the spread of contamination in the environment. Similar to removal actions, they may be implemented at any time during the process. Examples of interim remedial actions include installing a pump-and-treat system for product recovery from the groundwater or installing a fence to prevent direct contact with hazardous materials.

For interim remedial actions, a focused FS is prepared rather than the more extensive FS. As with the removal action, an interim action may become the final remedial action if the

results of the risk assessment indicate that no further remedial action is required to protect human health and the environment.

2.1.1.7 Post-Remedial Action Monitoring and Reporting

Five-year reviews generally are required by CERCLA or program policy when hazardous substances remain on site above levels that permit unrestricted use and unlimited exposure. Five-year reviews provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. Generally, reviews are performed 5 years after the initiation of a CERCLA response action, and are conducted every 5 years as long as future uses remain restricted. Five-year reviews can be performed by EPA or the lead agency for a site, but EPA retains responsibility for determining the protectiveness of the remedy.

2.1.1.8 Community Participation

The documents prepared for the program are maintained in information repositories for review by the public. The City of Virginia Beach Central Library is the public repository for the NAB Little Creek administrative record. NAB Little Creek has developed a Community Relation Plan and established a Restoration Advisory Board (RAB) comprised of members of the community, local environment group members, and state and federal officials, who meet semi-annually to keep the community informed on environmental issues at NAB Little Creek.

2.1.2 Facility-Wide Investigations

Various facility-wide studies and investigations, including preliminary studies and detailed site investigations, have been completed at NAB Little Creek since 1984 in response to the Navy's IR program. Preliminary studies conducted to identify and assess sites posing a potential threat to human health or the environment resulting from past or current operations or waste management activities include:

- Initial Assessment Study (IAS)
- RCRA Round I Verification Step (RVS)
- Phase I Interim RCRA Facility Assessment (RFA)

A total of 132 potential contaminated sites, areas, or SWMUs, at NAB Little Creek were identified for evaluation in the IAS, RVS, RFA, and other NAB Little Creek assessments. Table 2-1 provides the correlated listing of NAB Little Creek sites, SWMUs, and AOCs (Appendix A, B, and C sites in the FFA).

Some of the site investigations included multiple sites specifically identified in the IAS for further evaluation and were not focused on a specific site assessment. These major investigations include:

- Interim Remedial Investigation (IRI)
- Preliminary Site Inspection (PSI)
- Remedial Investigation/Feasibility Study and Site Investigation (RI/FS and SI)
- Relative Risk Ranking (RRRS)
- Base-wide Background Investigation
- SWMU/IR Summary

The details and results of the investigations identified in this section are summarized below.

2.1.3 Initial Assessment Study (IAS)

The IAS at NAB Little Creek was completed in December 1984 by Rogers, Golden, and Halpern (RGH). Its purpose was to identify and assess sites posing a potential threat to human health or the environment because of contamination from prior hazardous waste management activities. The study entailed the collection and evaluation of activity records relating to waste generation, handling and disposal; characterization of physical conditions at the site such as hydrogeology; and identification of migration pathways and potential receptors. The results of these data evaluation efforts were used to develop recommendations concerning the need for a confirmation study at a given site, the goal of which was to verify the presence of contamination and determine the need for further characterization and/or remediation.

The IAS examined 17 sites at NAB Little Creek (IR Sites 1 through 17). Six sites were recommended for confirmation studies: Sites 7, 9, 10, 11, 12, and 13. Of the remaining 11 sites, mitigation measures were recommended for 4 of the sites (Sites 4, 5, 15, and 16), and no further action (NFA) was recommended for 6 of the sites (Sites 1, 2, 6, 8, 14, and 17). Site 3, the West Annex Fuel Spill, was addressed under a separate action to recover free-floating oil from the water table. Site 17, the Building 1256 Motor Oil Disposal Area, was later added to the preliminary site inspection (PSI) by the Navy.

The IAS recommendations to conduct confirmation studies were based largely on the finding that contaminants from disposal areas may migrate toward surface water bodies with little attenuation, owing to a lack of clays and organic material in the subsurface soil, and in a relatively short time because of high hydraulic conductivities in the water table aquifer. The potentially affected surface waters included Little Creek Cove, Lake Bradford, and Lake Smith. Delineation of an actual threat or risk was not possible because of the lack of site-specific hydrogeologic and groundwater quality data. Lake Bradford and Lake Smith are used for recreational purposes, and Lake Smith serves as the secondary municipal water supply for the City of Norfolk.

The IAS presented a number of detailed recommendations concerning the installation and sampling of monitoring wells; the sampling of surface soil, surface water, and sediment; and the types of laboratory analyses to be completed. The recommendations also addressed well completion depths and water-level monitoring requirements. Many of the recommendations were aimed at resolving the data gaps identified in the IAS. These recommendations became the scope of work for the RVS.

2.1.4 Round 1 Verification Step (RVS)

The RVS at NAB Little Creek was completed in October 1986 by CH2M HILL and was the first step in the confirmation study process. The purpose of the study was to verify the presence and/or absence of contamination at the six sites recommended in the IAS for a confirmation study (Sites 7, 9, 10, 11, 12, and 13). The scope of work of the RVS activities at each site was established by the recommendations presented in the IAS, with notable deviations concerning the number of monitoring wells completed and samples collected.

As part of the work conducted for the RVS, 31 monitoring wells were installed for the collection of groundwater samples and groundwater elevation data to determine groundwater flow directions. Surface water and sediment samples were collected to investigate potential impacts on nearby surface water bodies. Subsurface soil samples were collected to delineate the vertical extent of contamination in probable source areas.

As stated in the RVS, the results of the Round 1 sampling and analysis activities indicated that little or no contamination was leaving any of the three landfill sites addressed in the RVS (Sites 7, 9, and 10). Contamination was detected in one or more environmental media at Sites 11, 12, and 13. These results indicated that contamination was being released from these three sites, but the magnitude and distribution of this contamination could not be determined on the basis of the RVS findings alone. The results of the sampling and analysis activities were used to develop recommendations for additional investigations at all six sites. These recommendations were generally limited to continued or expanded sampling conducted during the IRI to confirm the RVS results.

2.1.5 RCRA Facility Assessment (RFA) Report

A RCRA RFA was conducted at NAB Little Creek in 1989 by A.T. Kearney. The RFA identified 147 SWMUs and several areas of concern (AOCs). SWMUs and AOCs are areas where wastes have been stored and/or where contaminants may have been released to the environment. Twenty-two of these SWMUs and two AOCs are associated with the 17 sites identified in the IAS. (e.g., SWMUs 123-126 are located within the bounds of Site 7).

NAB Little Creek decided not to renew their Part B permit; therefore, a RCRA RFI was not conducted, and the Base dropped out of the RCRA corrective action program. NAB Little Creek decided, however, to investigate 17 of the SWMUs by including them in the Navy's RRRS sampling program. The 17 SWMUs investigated were chosen because EPA had identified them as the sites of highest concern.

2.1.6 Interim Remedial Investigation (IRI)

The IRI was conducted in 1991 by Ebasco Environmental Consultants (Ebasco) to determine whether or not further characterization activities or RAs were warranted at Sites 7, 9, 10, 11, 12, or 13. The objectives of this investigation were to conduct a second round of sampling at the six sites sampled for the RVS, and to integrate the historical and newly acquired data, along with site-specific recommendations, for further action into a single document. The data were used to develop recommended response action, a human health risk assessment (HHRA), and site-specific recommendations concerning additional characterization.

2.1.7 Preliminary Site Inspection (PSI)

A PSI was conducted in 1991 by Ebasco to assess the threat to human health and the environment from five sites (Sites 4, 5, 15, 16, and 17) at NAB Little Creek. Chemical constituents of concern were detected in the groundwater at Site 5, and further sampling was recommended. At Site 16, elevated levels of polychlorinated biphenyls (PCBs) were detected in soil, and additional sampling was recommended to delineate contamination. Remediation was also recommended for Site 16. NFA was proposed for Sites 4, 15, and 17.

2.1.8 Remedial Investigation/Feasibility Study (RI/FS) and Site Inspection (SI)

From 1993 through 1994, Foster Wheeler Environmental Services (FWES) conducted a RI/FS at Sites 7, 9, 10, 11, 12, and 13. The RI/FS included a Phase 1 Baseline HHRA and ecological risk assessment (ERA). At this same time, FWES conducted an SI at Sites 5 and 16. The investigations included soil, groundwater, sediment, surface water, and soil-gas sampling. Additional groundwater monitoring wells were also installed. The FS recommended long-term groundwater monitoring for Sites 9 and 10, a source removal action and post-removal monitoring for Site 11, and additional evaluations at Sites 7, 12, and 13. The SI recommended semiannual groundwater monitoring at Site 5 and a soil removal action at Site 16.

2.1.9 Relative Risk Ranking System (RRRS) Report

A RRRS and a revised RRRS analysis were completed by Baker Environmental, Inc. (Baker) in 1996. The purpose of the analysis was to gather contaminant, pathway, and receptor information for 17 SWMUs. The SWMUs addressed were originally identified in the RFA as being potential sites affected by contamination. Data were collected for each of the 17 SWMUs through a field investigation in October 1995. The field investigation was aimed at identification of contaminants in surface soil, subsurface soil, and groundwater. The results of the investigation were used to identify the relative risk posed by each SWMU according to the contaminants present, the migration pathway, and the potential receptors for each media at the SWMU. Both human health and ecological receptors were considered.

Based on the RRRS, three of the SWMUs were identified as posing a high risk, and six SWMUs were identified as presenting a medium risk. The nine high- and medium-risk SWMUs are listed below. The SWMUs were consolidated and renumbered as indicated.

High-risk SWMUs:

- SWMU 84 – Demolition Debris Landfill (also referred to as IR Site 8)
- SWMU 105 – Steam Plant Flyash Silo (redesignated as “new” SWMU 2)
- SWMU 111 – Pier 10 Sandblast Yard (redesignated as “new” SWMU 3)

Medium-risk SWMUs:

- SWMU 17 – Small Transformer Storage Area (redesignated as “new” SWMU 1 and also referred to as IR Site 14)
- SWMU 117 – Special Boat Squadron 2 Battery Storage Area (redesignated as “new” SWMU 4 and also referred to as IR Site 4)
- SWMU 130 – Building 3896 Boat Painting Area (redesignated as “new” SWMU 5)
- SWMU 131-133 – SeaBee Area (consolidated and redesignated as “new” SWMU 6)

2.1.10 Background Investigations

A background groundwater quality study was conducted during three rounds of groundwater sampling completed at NAB Little Creek on November 31, 1991; September 15, 1992; and June 30, 1993. The *Background Groundwater Quality Study* report was finalized in December 1992. Results of the third round of background groundwater quality sampling were reported in the FWES RI/FS. The purpose of this study was to collect, organize, and present data on background groundwater quality and conditions.

The groundwater quality information was obtained from a network of eight monitoring wells installed in locations throughout the base to avoid areas of known or suspected contamination. The analyses performed on the groundwater samples used relatively high detection limits and did not include all Target Analyte List (TAL) total or dissolved metals analyses. Neither surface soil nor shallow subsurface soil samples were collected. The subsurface soil samples collected were from below the water table adjacent to the screened interval of each well. None of the data were validated.

CH2M HILL completed an additional background investigation for NAB Little Creek in December 2000. The objective of the investigation was to establish background concentrations of metals, pesticides, and polyaromatic hydrocarbons (PAHs) in surface and subsurface soil, and groundwater for use in comparison to IR program site data to better identify release-related constituents of concern. The statistical calculations for both soil and groundwater constituent concentrations included upper tolerance limits (UTLs) and 95 percent confidence intervals, which are used for comparison in the risk screening process.

Background soil samples were collected at non-impacted areas that represent underlying hydrogeologic conditions at NAB Little Creek and areas indicative of anthropogenic background conditions. These areas included fill areas comprised of dredged sediments and past agricultural land use areas where pesticides may have been used. A total of 29 surface and 29 subsurface soil samples were collected during the investigation. Analytical data from background soils represent surface and subsurface soils in fill, urban, and native soil areas. Background water quality samples were collected in January 2000 at six existing background wells, one newly installed well, and three wells located upgradient of base IR sites.

In September 2000, a technical memorandum was prepared, in response to an EPA comment pertaining to evaluating potential seasonal fluctuations in groundwater quality. In the summer of 2001, background monitoring wells were sampled. The analytical data from the winter 2000 and summer 2001 sampling events were compared and no significant differences were identified. It was noted that substantial differences in groundwater concentrations were noted for specific parameters in specific locations. Background UTLs were reassessed as part of the 2001 technical memorandum, and more conservative UTLs were presented for arsenic (4 µg/L) and iron (17,100 µg/L).

2.1.11 SWMU/IR Summary

In June 2000, NAB Little Creek summarized all available information on the 147 SWMUs, eight AOCs, and 17 IR sites at NAB Little Creek. The report included information obtained from the RFA and RRRS, including photographs.

2.1.12 Site Closeout Activity

During FY 2002, a closeout report was prepared for Sites 5, 15, and 16 and SWMU 2. The analytical results from samples collected at Site 5 and SWMU 2 indicated concentrations below human health screening criteria and low-to-negligible ecological risk because of the lack of direct exposure pathways. Removal actions were conducted at Sites 15 and 16 in 1995 that consisted of excavation and disposal of PCB-contaminated soil, vegetation, and the utility pole at Site 16. Additional sampling indicated that Sites 15 and 16 were not expected to pose unacceptable risks to human health and the environment. Based on the findings, the

NAB Little Creek Partnering Team determined that NFA was required at these sites. Land use at these sites is unrestricted.

In June 2003, the Tier I Partnering Team agreed to close out SWMU 30 with NFA (SPCC Plan/AST Site) and inform CNRMA UST/AST staff of their responsibility for any “needed” action. Any further assessment or remediation will be covered under the SPCC Plan/AST Program.

During FY 2003, AOCs H, I, J, and Site 14 were evaluated. The analytical results from samples collected at AOCs H, I, J, and Site 14 indicated no human health or ecological risk at any of the sites. Based on the findings, the NAB Little Creek Partnering Team determined that NFA was appropriate for these sites and the Final Closeout Report was signed in March 2004. Land use at these sites is unrestricted.

During FY 2004, SWMUs 96, 97, 98 and 119 were evaluated. Desktop audits as well as site visits showed no additional sampling was required to close out SWMUs 96, 97, and 98. The analytical results from samples collected at SWMU 119 indicated no human health or ecological risk at this site. Based on the findings, the NAB Little Creek Partnering Team determined that NFA was appropriate for these sites and the Final Closeout Report was signed in September 2004. Land use at these sites is unrestricted.

2.2 Descriptions of Sites

2.2.1 Descriptions of Sites in the CERCLA RI/FS Process

The following sites have been identified in the FFA as requiring an RI/FS under CERCLA. The remedy or no further action for each of these sites will be documented in a ROD. Locations of each site are shown on Figure 2-1. FY 2006 activities associated with each of these sites are discussed in Sections 3 of this SMP.

2.2.1.1 Site 7—Amphibious Base Landfill

The Amphibious Base Landfill is located in the south-central portion of the Base. The area is bounded on the north by the southeast shoreline of Little Creek Cove, on the east by Helicopter Road, on the south by Amphibious Drive and the Hampton Roads Sanitation District (HRSD) sewage treatment plant, and on the west by an undeveloped area and an ordnance magazine. The site is also referred to as SWMUs 123-126 in the RFA. Site 7 was originally an arm of Little Creek Cove that was filled with dredge spoils before its use as a landfill. According to the IAS, the landfill operated from 1962 to 1979; some of the original dikes built to contain the dredging spoils are still visible in the northeast corner of the landfill. The landfill was initially operated as a trench-type landfill with open burning of refuse in the trenches. The trenches were excavated to the depth at which groundwater filled the trench. Cover was applied as necessary to maintain traction for the vehicles involved in the operations. Site 7 is approximately 38 acres, and is bordered by a chain-link fence to the east and south, and Little Creek Cove to the north. Two entrances with locked gates and a gravel road control access to the site. Restricted access signs are in place around the perimeter of the site. The landfill was constructed so that the central portion is comprised of a broad flat area bounded by gentle slopes on all sides. Erosion-prone areas of the site have been reinforced on each side of the canal crossing the west side of the site.

The IAS estimated the volume of waste (excluding dredge spoils) in the landfill to be approximately 500,000 cubic yards (cy). However, based on the expected areal extent and depth of actual waste material, it is more likely that the volume disposed is less than half of this estimate. Most of the waste is presumed to be composed of nonhazardous solid waste from base housing and other residential and commercial activities at the Base. Specific records documenting the types and quantities of waste placed in the Amphibious Base Landfill are not available. Because the landfill received all wastes generated by NAB Little Creek during its operation, it most likely received potentially hazardous materials.

Until 1979, the landfill was operated under a Virginia solid waste permit (No. 276). The permit was terminated in 1982 and the landfill was considered closed by the state. After closure, the landfill area continued to be used as a metal collection and transfer site, temporary storage for wastes, and burn area for scrap wood and trees. Open burning was halted in 1984, and waste storage activities were moved in 1994. In 1994, the landfill was reportedly covered with approximately 24 inches of compacted soil and 2 to 3 inches of topsoil cover. A vegetative cover was also established to mitigate contact with surface soils in 1994. The thickness of the soil cover was confirmed by soil borings constructed in preparation for the soil cover constructed in 1998.

The RVS concluded that the landfill was not releasing contaminants to the groundwater but recommended additional groundwater, surface water, and sediment sampling. This additional sampling was performed as part of the IRI, and the results confirmed the conclusions of the RVS that the landfill was not releasing contaminants to the groundwater.

An RI/FS was conducted at six sites, including Site 7, by FWES in November 1994. Eight surface soil, five subsurface soil, nine groundwater, six surface water, and six sediment samples were collected at Site 7. Groundwater in the Columbia Aquifer beneath Site 7 flows predominantly north toward the low-lying marsh and Little Creek Cove. A tidal study was conducted as part of the RI, and the results indicated that groundwater may flow toward the tidally influenced western canal in localized areas and that the rate of groundwater to surface water discharge increases in response to a low tide. A Final FS was also completed for Site 7 by FWES in October 1997. The FS identified remedial alternatives to reduce potential human health and environmental risks associated with the various contaminants of concern identified at Site 7. The preferred alternative was identified in the October 1997 PRAP. The preferred alternative was institutional controls that consisted of removing visible debris from the landfill and placing topsoil in selected areas of the landfill where the existing cover was insufficient, construction of a new perimeter fence, and semiannual monitoring.

The Navy signed the Final Decision Document (DD) in January 1998. In June 1998, remedial actions were completed at Site 7. The remedy included the removal of 610 cy of debris along the landfill shoreline. Approximately 8,640 cy of clean fill and 11,260 cy of topsoil were placed on the landfill during the RA. A 12- to 18-inch-thick fill layer was placed over some areas of the landfill where cover was inadequate, and a 6- to 8-inch topsoil cover was placed over the entire landfill area (OHM, December 1998). The landfill waste is currently located an average of 30 inches below the ground surface. The current appearance of the landfill ranges from small stands of mature trees on the western portion of the site to tall, thick grasses in the central and eastern portions of the site. The area bordering Little Creek Cove is well vegetated, with numerous trees, dense brush, and tall grasses.

Long-term monitoring (LTM) of groundwater, surface water, and sediment was initiated in June 1998. A LTM letter report was submitted to the Navy, EPA, and VDEQ after each round of monitoring. The first eleven rounds of data between 1998 and 2004 were similar to results reported in the FWES RI/FS. The Navy, EPA, and VDEQ agreed that LTM would be discontinued until a ROD is complete for the site.

As part of the RI/HHRA/ERA, sediment samples were collected to assess potential unacceptable ecological risk in canal sediments located in the western portion of Site 7. The ERA, with agreement from EPA and DEQ, concluded that if canal sediments were removed, then remaining sediment at Site 7 presents no unacceptable ecological risk. HHRA concluded that Site 7 poses no unacceptable risks or hazards to human health based on current site use, and that the potable use of groundwater would pose potential unacceptable human health risk. The RI/HHRA/ERA was finalized in November 2004.

An EE/CA was completed to evaluate removal action alternatives for canal sediment at Site 7. No comments were received during the public comment period (January 24 - February 24, 2005). The IRA is scheduled for FY05.

A debris survey was initiated in the fall of 2004. Results of initial surveys show surface debris is present in areas of Site 7. Test pitting will be conducted in FY05 to quantify the amount of debris located beyond the soil cover. An explosive safety submission (ESS) will be submitted because of the proximity of the surface debris relative to the ordnance magazines northwest of Site 7.

2.2.1.2 Site 8—Demolition Debris Landfill

Site 8, the Demolition Debris Landfill (formerly identified as SWMU 84 in the RFA) is located at the northeast corner of the intersection of Amphibious Drive and Helicopter Road. Landfilling operations occurred from 1971 to 1979. Approximately 4,840 cy of inert waste was reportedly contained in the landfill. Waste disposal occurred to a depth of 3 feet over an approximately 2-acre area. The landfill was constructed in a pit where the Public Works Center (PWC)-Transportation Division excavated material to surface parking lots. Landfill waste included debris from buildings destroyed by fire, concrete piping, debris removed from the bar screen in the base sewage pump stations, and potentially mercury-contaminated carpeting from the demolition of a dental clinic. No release controls were in place at the site and no waste inventory is available.

Site 8 is situated adjacent to wetlands fed by a drainage canal from Lake Bradford, runoff from surrounding on-site and off-site areas, tidal inflow from Little Creek Cove, and by discharge from the surficial aquifer. Groundwater flow in the Columbia Aquifer at Site 8 appears to be in the northeast direction, following topography, and discharges to Little Creek Cove, adjacent wetlands draining into the cove, and two ponds. Access to the area is unrestricted, although heavy vegetation is believed to minimize access by Base personnel.

The Demolition Debris Landfill was included in the Navy's RRRS. Five surface soil, four subsurface soil, and three groundwater samples were collected at Site 8. A high risk ranking was determined for Site 8 because of the presence SVOCs, pesticides, PCBs, and VOCs and metals in site media.

The landfill was the subject of an SI in 1998. Groundwater, soil, and sediment sampling were conducted. The Final SI report, dated December 1999, also included a qualitative HHRA.

A site reconnaissance was conducted in December 2000 to quantify the amount of surface demolition debris present at the site. An EE/CA was completed whereby complete removal of surface debris was the selected alternative. Removal of 675 cy of miscellaneous wooden, concrete, and metal debris took place in January 2002. All materials were stockpiled, separated, and disposed of in appropriate facilities.

In order to fill data gaps identified in the 1998 SI, RI sampling was conducted in January and February 2002. The RI at the site consisted of a soil cover survey, trenching, and sampling of soil, groundwater, surface water, and sediment. The RI/HHRA/ERA was finalized in November 2004. The HHRA concluded that Site 8 poses no unacceptable risks or hazards to human health based on current site use. However, waste remaining in place poses potential unacceptable risk and requires land use restrictions. The ERA concluded that potential unacceptable ecological risks may be present in the area of Site 8 referred to as DP13 and pond 2. Therefore, an EE/CA was developed to evaluate alternatives to address potentially unacceptable human health and ecological risks at the site. The recommended alternative identified in the EE/CA was complete removal of the demolition debris landfill, removal of debris and surface sediment at DP13 and pond 2, and the creation of tidal wetlands at the site. This action will eliminate all potential unacceptable risk at Site 8. No comments were received during the EE/CA public comment period (December 2, 2004 - January 2, 2005). The IRA is expected to be completed in FY05.

2.2.1.3 Site 9—Driving Range Landfill

Site 9, the Driving Range Landfill, is located in the northeast portion of the installation, northwest of the golf course, directly east of the Sewage Treatment Plant Landfill (Site 10) and Hewitt Drive, and approximately 500 feet south of the Chesapeake Bay shoreline. The northern perimeter of the landfill is bounded by a network of sand dunes that parallels the Chesapeake Bay shoreline. Before landfilling operations, the area was a marsh environment adjoining the easternmost arm of Little Creek Cove (Ebasco, 1991).

The Driving Range Landfill comprises approximately 6 acres and operated from 1950 through 1956. After landfill operations at the site were terminated, the installation converted the area into a driving range. A berm was constructed using clean fill along the east side of Hewitt Drive, and sewage sludge was brought in along the southern site boundary to enhance growth of the grass. Although precise boundaries for the fill area have not been delineated, the boundary of the landfill generally coincides with that of the currently operating driving range (Ebasco, 1991). Groundwater in both the Columbia Aquifer and the Yorktown Aquifer at Site 9 flows to the north and discharges into Chesapeake Bay.

The IAS, conducted in 1984 by RGH, indicated that an incinerator, located on Hewitt Drive opposite the western perimeter of the Driving Range Landfill, was active during the period of operation and reportedly burned combustible materials generated by NAB Little Creek. The resulting ash and bypassed materials were disposed of in the Driving Range Landfill. After the incinerator was decommissioned, solid waste from the base was disposed of directly in the landfill. The estimated land disposal volume was 40,000 cy of waste. The IAS indicated that the landfill contents include various hazardous wastes such as PCBs,

pesticides, and used motor oil. Given the sizable population of the base and resulting significant quantities of nonhazardous solid wastes that would be generated, it is likely that the overall quantity of hazardous waste is small compared to the total volume of solid waste placed in the landfill. The landfilling methods reportedly entailed the excavation of trenches with a dragline or other heavy equipment. The trenches were filled with waste and backfilled. The depth was likely limited by the depth to the water table, typically within 5 feet of the ground surface. The IAS recommended that a confirmation study be conducted at Site 9 to verify the presence of contamination (RGH, 1984).

The RVS at NAB Little Creek, the first step in the confirmation study process, was completed at Site 9 in October 1986 by CH2M HILL. During the RVS, six monitoring wells were installed around the perimeter of Site 9 to facilitate the collection of groundwater samples and hydraulic head data to determine groundwater flow directions. Surface water and sediment samples were collected to investigate impacts on nearby surface water bodies and determine whether contaminated runoff was migrating from the IRP sites. Subsurface soil samples were collected to delineate the vertical extent of contamination in probable source areas. The results of the RVS sampling activities indicated that little or no contamination was migrating from the Site 9 landfill. However, because the quantity, nature, and extent of contaminants disposed in the landfill are uncertain, there may be unrecognized pathways from the site, and a second round of groundwater sampling was recommended (CH2M HILL, 1986).

Site 9 was included in the RCRA RFA as SWMU 24, conducted by A.T. Kearney in 1989. The RFA recommended no additional action other than the IRI activities planned at Site 9.

During the IRI, completed by Ebasco in 1991, a second round of groundwater sampling was conducted at Site 9. The data were used to develop a recommended response action, an HHRA, and site-specific recommendations concerning additional characterization. The IRI determined that Site 9 was not releasing detectable levels of contamination to the underlying groundwater and that the absence of contamination in any downgradient wells and the similarity in chemical composition between upgradient and downgradient wells indicated that the landfill does not impact groundwater quality in this area. The IRI recommended that no additional characterization or remediation were warranted based on the results of the sampling during the RVS and IRI. A groundwater monitoring program was recommended to ensure that any post-closure releases of contamination were addressed as needed (Ebasco, 1991).

Site 9 was the subject of an RI/FS performed by FWES in 1993. The investigations included soil and groundwater sampling, and the RI/FS, including a baseline HHRA, concluded that no current risk was posed by exposure to soil and groundwater at Site 9 (FWES, 1994).

A PRAP and a DD for both Sites 9 and 10 were prepared by Baker in January 1997. The documents called for long-term groundwater monitoring because of the contents of the landfill and its proximity to the Chesapeake Bay and other surface water bodies. It is important to note that the RI/FS, PRAP, and DD were conducted under the IRP before NAB Little Creek was placed on the NPL and have not been reviewed or accepted by EPA or VDEQ.

An LTM program was prepared by FWES in 1996. Groundwater monitoring was proposed to be conducted semiannually for a period of 5 years (10 rounds of sampling). Following the

first 3 years of monitoring (six rounds), a 3-year summary report was completed (CH2M HILL, 2000b) recommending further sampling rounds be conducted on an annual basis because of the lack of seasonal variation and low-level contamination and recommending that VOC analysis be dropped because of the lack of contamination. Groundwater LTM has since continued on an annual basis. Groundwater monitoring results are presented in periodic letter reports submitted to the Navy, EPA, and VDEQ following each round of sampling. The Draft Round 12 LTM Report submitted in December 2003 included recommendations to discontinue the analysis of SVOCs and PEST/PCBs in post-ROD groundwater LTM at the site based on infrequent low-level detections as shown in a statistical analysis of rounds 1 through 12 analytical results.

A soil cover survey was conducted at Site 9 by CH2M HILL in February 2000. Results demonstrated the majority of the landfill contains 2 or more feet of soil cover.

A Screening Ecological Risk Assessment (SERA) was completed for Sites 9 and 10 in June 2000 by CH2M HILL. The SERA was conducted to determine if potential risks to ecological receptors warrant additional assessment and identify potential data gaps. The SERA concluded that sufficient data were available for Sites 9 and 10 and recommended that these sites continue on to Step 3 of the ERA process because one or more chemicals of potential concern (COPC) and complete exposure pathways were identified at the sites (CH2M HILL, 2000a).

A Revised RI/HHRA/Focused Feasibility Study was completed for Sites 9 and 10 in February 2001 by CH2M HILL. The HHRA identified potential risks from the potable use of groundwater at the sites, which was an unlikely scenario based on antimony concentrations. The FS recommended institutional controls and LTM at the sites.

A BERA through Step 3A was conducted at Sites 9 and 10 in 2001 by CH2M HILL to determine if risks to ecological receptors from site-related chemicals are likely. No further action was recommended in the terrestrial habitats and for groundwater unless LTM indicates significant increases at Sites 9 and 10. Continuing to Step 3B was not warranted (CH2M HILL, 2001b).

The PRAP for Site 9 (and Site 10) was submitted for public review and comment during March 2001 for a 30-day period. A public meeting was held on March 28, 2001, to provide further information on the PRAP for the remedial actions at the sites to the general public. The PRAP consisted of three alternatives to address the contamination at the sites. The alternatives were: 1) no action; 2) institutional controls with LTM; and 3) low-permeability cap with institutional controls and long-term monitoring. The preferred alternative presented in the PRAP recommended institutional controls and LTM.

The selected remedy presented in the Final Site 9 (and 10) ROD is institutional controls with LTM (CH2M HILL, December 2003). This remedy addressed exposure pathways that may pose unacceptable human health or ecological risk from contamination. The use of institutional controls along with the implementation of LTM satisfies Remedial Action Objectives (RAOs) and meet Applicable or Relevant and Appropriate Requirements (ARARs).

The Post-ROD Project Plans were developed in 2004 and consisted of annual groundwater LTM and quarterly landfill integrity inspections. The groundwater will be analyzed for site-specific COCs for the first 4 years and a full suite of analytical parameters will be collected

prior to the 5-year review. Analytical results and landfill inspections will be summarized in a LTM Report submitted annually.

FY 2006 activities associated with Site 9 are discussed in Section 3.2.3 of this SMP.

2.2.1.4 Site 10—Sewage Treatment Plant Landfill

Site 10, the Sewage Treatment Plant Landfill, is located in the northeast portion of NAB Little Creek, approximately 500 feet south of the Chesapeake Bay shoreline and due west of the Site 9 Driving Range Landfill. The landfill is bounded on the north and the west by sand dunes, on the south by 11th Street and recreational facilities that extend onto the landfill area, and on the east by Hewitt Drive.

The landfill comprises approximately 18 acres and operated from 1941 until 1968. Existing surface features include a well-vegetated soil cover that has been partially reclaimed for use as baseball diamonds and vegetated sand dunes. Groundwater in both the Columbia Aquifer and the Yorktown Aquifer at Site 10 generally flows to the northwest and discharges into Chesapeake Bay.

An IAS was conducted at NAB Little Creek in 1984 by RGH. The estimated depth to fill is 6 feet, and the disposal volume was approximately 46,500 cy of waste. The IAS indicated that potentially hazardous constituents and a large quantity of demolition debris were likely disposed of in the landfill. It is likely that the volume of hazardous waste disposed of in the landfill is small relative to the volume of nonhazardous waste. Disposal of sewage sludge from the on-site sewage treatment plant, formerly located in the southeast portion of the fill area, continued until 1968 when the treatment plant closed. Landfilling operations began in the southern portion of the area, which included an extension of Desert Cove and then moved northward to the associated marshy lowlands. The bulk of the sewage sludge was disposed of along the northwest perimeter of the landfill, near the base of the sand dunes. The IAS recommended that a confirmation study be conducted at Site 10 to verify the presence of contamination (RGH, 1984).

The RVS at NAB Little Creek, the first step in the confirmation study process, was completed at Site 10 in October 1986 by CH2M HILL. As part of the RVS, eight monitoring wells were installed around the perimeter of Site 10 to facilitate the collection of groundwater samples and hydraulic head data to determine groundwater flow directions. Surface water and sediment samples were collected to investigate impacts on nearby surface water bodies and determine whether contaminated runoff was migrating from the IRP sites. Subsurface soil samples were collected to delineate the vertical extent of contamination in probable source areas. The results of the RVS sampling activities indicated that little or no contamination was migrating from the Site 10 landfill. However, because the quantity, nature, and extent of contaminants disposed in the landfill are uncertain, there may be unrecognized pathways from the site, and a second round of groundwater sampling was recommended (CH2M HILL, 1986).

Site 10 was included in the RFA as SWMUs 25 and 26, conducted by A.T. Kearney in 1989. The RFA recommended no additional action other than the IRI activities planned at Site 10.

During the IRI, completed by Ebasco in 1991, a second round of groundwater sampling was conducted at Site 10. The data were used to develop a recommended response action, a

human health assessment, and site-specific recommendations concerning additional characterization. The IRI concluded that the overall trend at Site 10 is toward an improvement in groundwater quality, and that the Sewage Treatment Plant Landfill is having little or no measurable impact on shallow groundwater quality in the water table aquifer beneath it. The IRI recommended that no further characterization or remediation are warranted based on the results of the sampling during the RVS and the IRI. A limited program of groundwater monitoring was recommended as well as additional characterization for the surface soils, primarily those within the baseball diamonds and golf practice area (Ebasco, 1991).

Site 10 was the subject of an RI/FS performed by FWES in 1993. The investigations included soil and groundwater sampling, and the RI/FS, including a baseline HHRA, concluded that no current risk was posed by exposure to soil and groundwater at Site 10 (FWES, 1994).

A PRAP and a DD for both Sites 9 and 10 were prepared by Baker in January 1997. The documents called for long-term groundwater monitoring because of the contents of the landfill and its proximity to the Chesapeake Bay and other surface water bodies. It is important to note that the RI/FS, PRAP, and DD were conducted unilaterally by the Navy under the IRP before NAB Little Creek was placed on the NPL and were not formally reviewed or accepted by EPA or VDEQ.

An LTM program was prepared by FWES in 1996. Groundwater monitoring was proposed to be conducted semiannually for a period of 5 years (10 rounds of sampling). Following the first 3 years of monitoring (six rounds), a 3-year summary report was completed (CH2M HILL, 2000b) recommending further sampling rounds be conducted on an annual basis because of the lack of seasonal variation and low-level contamination, and that volatile organic compounds (VOCs) analysis be dropped because of the lack of contamination. Groundwater LTM has since continued on an annual basis. Groundwater monitoring results are presented in periodic letter reports submitted to the Navy, EPA, and VDEQ following each round of sampling. The Draft Round 12 LTM Report submitted in December 2003 included recommendations to discontinue the analysis of SVOCs and PEST/PCBs in post-ROD groundwater LTM at the site based on infrequent low-level detections as shown in a statistical analysis of rounds 1 through 12 analytical results.

A SERA was completed for Sites 9 and 10 in June 2000 by CH2M HILL. The SERA was conducted to determine if potential risks to ecological receptors warrant additional assessment and identify potential data gaps. The SERA concluded that sufficient data were available for Sites 9 and 10 and recommended that these sites continue on to Step 3 of the ERA process because one or more chemicals of potential concern and complete exposure pathways were identified at the sites (CH2M HILL, 2000a).

A Revised RI/HHRA/FS was completed for Sites 9 and 10 in February 2001 by CH2M HILL. The HHRA identified potential risks from the potable use of groundwater at the sites, which was an unlikely scenario based on cadmium, manganese, thallium, and zinc concentrations. The FS recommended institutional controls and LTM at the sites.

A BERA through Step 3A was conducted at Sites 9 and 10 in 2001 by CH2M HILL to determine if risks to ecological receptors from site-related chemicals are likely. No further action was recommended in the terrestrial habitats and for groundwater unless LTM

indicates significant increases at Sites 9 and 10. Continuing to Step 3B was not warranted (CH2M HILL, 2001b).

The PRAP for Site 10 (and Site 9) was submitted for public review and comment during March 2001 for a 30-day period. A public meeting was also held on March 28, 2001, to provide further information on the PRAP for the remedial actions at the sites to the general public. The PRAP consisted of three alternatives to address the contamination at the sites. The alternatives were: 1) no action; 2) institutional controls with long-term monitoring; and 3) low-permeability cap with institutional controls and long-term monitoring. Based on these alternatives, the recommendation in the PRAP is for the implementation of alternative 2, which includes land-use restrictions to prevent the redevelopment of the site and prohibitions on groundwater use.

The selected remedy presented in the Final Site 10 (and 9) ROD is institutional controls with LTM (CH2M HILL, December 2003). This remedy addressed exposure pathways that may pose unacceptable human health or ecological risk from contamination. The use of institutional controls along with the implementation of LTM satisfies RAOs and meets ARARs.

The Post-ROD Project Plans were developed in 2004 and consisted of annual groundwater LTM and quarterly landfill integrity inspections. The groundwater will be analyzed for site-specific COCs for the first 4 years and a full suite of analytical parameters will be collected prior to the 5-year review. Analytical results and landfill inspections will be summarized in an LTM Report submitted annually.

2.2.1.5 Site 11—School of Music Plating Shop

The School of Music Plating Shop was located in Building 3651. This building is located in the eastern portion of the base, near the intersection of 7th and E Streets. The School of Music, located in Building 3602, is 10 feet southwest of the former plating shop. The site consisted of the plating shop building and an in-ground concrete tank used to neutralize plating solutions, its associated piping, and potentially contaminated soil surrounding the tank and piping. This site is also referred to as SWMU 27 (plating shop) and SWMU 28 (neutralization tank) in the RFA. Surrounding areas, apart from buildings and paved areas, are covered with grass and are generally level between manmade drainage ditches.

The neutralization tank for the plating shop had a diameter of 5 feet and a depth of 11 feet. Approximately 2.5 cy of crushed limestone were placed in the pit to neutralize the acidic plating bath wastes. Wastewater entered the tank via an acid-resistant drainpipe that originated in a sink in Building 3651. According to the IRI, neutralized wastewater was discharged from the unit into the storm sewer via an outlet and drain from the northwest side of the tank. Flow through the unit was controlled by the standpipe and drain elevations, so that all wastewater had to pass through the limestone before it could enter the discharge pipe connecting with the storm sewer.

The IAS reported that plating wastes were discharged into the neutralization tank during a 10-year period beginning in 1964. In 1974, the plating operations were transferred to a separate facility and discharges into the neutralization tank were discontinued. During its period of operation, the plating shop reportedly used silver cyanide, copper cyanide, chromic acid (brite dip), nickel plating baths, and various acids. In addition, lacquer

strippers and lacquer were also used. Small quantities of these plating baths, acids, and lacquer strippers were disposed of down the sink in the plating shop, which drains into the neutralization tank and eventually into the storm sewer system. The IAS reported that approximately 10 gallons of each plating chemical and lacquer stripper were disposed of in the shop sinks each year.

As part of the 1986 RVS, three monitoring wells were installed at Site 11. Subsurface soil samples also were collected to delineate the vertical extent of contamination in probable source areas. The results of the RVS sampling and analysis activities indicated that contamination was being released from Site 11, but the magnitude and distribution of this contamination could not be determined on the basis of the RVS findings alone. As part of the 1991 IRI, a second round of groundwater sampling was conducted.

Site 11 was the subject of a RI/FS performed by FWES in 1993. Sampling efforts associated with the RI/FS included the collection of groundwater samples from the three monitoring wells installed during the 1986 RVS and 10 surface soil samples. The findings were summarized in the RI/FS report dated November 1994. The surface soil, the neutralization tank and its contents, and groundwater at Site 11 were determined to be affected by contamination. Arsenic, beryllium, and manganese were detected above screening criteria in the surface soil, and trichloroethene (TCE) and 1,1-dichloroethene (1,1-DCE) were detected in the groundwater above Maximum Contaminant Level (MCL) drinking water standards in one of the three wells at the site. The maximum concentrations of TCE and 1,1-DCE detected in three rounds of groundwater sampling were 340 parts per billion (ppb) and 34 ppb, respectively.

A DD was issued by the Navy in November 1994, proposing the removal of the neutralization tank, associated piping, and neighboring surface and subsurface soil. The neutralization tank, piping, and surrounding soil were excavated in November 1995. An interim removal action Final Closeout Report was issued in May 1996.

A short-term, post-removal groundwater monitoring program was proposed (FWES, 1996a) to verify the effectiveness of the source and contaminated-soil removal action. Sampling results for Site 11 were scheduled to be assessed and the program reevaluated after 1 year (two rounds) of sampling. The first round of post-removal monitoring was conducted in May 1996 by FWES. The second round of monitoring was completed by CH2M HILL in December 1996. The results of the groundwater monitoring program are reported in the *Final Groundwater Monitoring Report for Sites 5 and 11* by CH2M HILL, dated February 1998.

During the post-removal groundwater monitoring, no metals were detected above MCLs or RBCs, indicating the removal action removed the source of metal contamination and the metal contamination. Historically, chlorinated hydrocarbons had only been detected in one well, LC11-GW01S, at Site 11. During the last round of the post-removal groundwater monitoring program, however, low levels of TCE were detected in LC11-GW03S at concentrations below the MCL for TCE. A decrease in the concentration of all chlorinated hydrocarbon groundwater contaminants was observed during the post-removal groundwater monitoring in well LC11-GW01S. Significant fluctuations in concentrations of contaminants have been observed in the past in this well. Therefore, additional groundwater sampling was recommended to define the extent of the contamination in the

groundwater and to evaluate if the contamination in LC11-GW01S is on a permanent and irreversible downward trend.

Supplemental Remedial Investigation (SRI) field activities at Site 11 were initiated in June 1998. As part of the SRI, additional groundwater samples were collected with a Geoprobe[®] to define the source area and extent of contamination at Site 11. Concentrations of chlorinated VOCs collected from 8 to 12 feet bgs in the shallow portion of the surficial aquifer did not exceed MCLs. Concentrations of 1,1-DCE, cis-1,2-DCE, and TCE exceeded MCLs in groundwater samples collected from the deep portion of the surficial aquifer; generally from 17 to 21 feet bgs. Total chlorinated VOCs in the lower portion of the aquifer were found at greater concentrations and were more extensive than in the upper portion of the aquifer at Site 11. Groundwater flow in the Columbia Aquifer at Site 11 appears to be controlled both by the overall base-wide groundwater flow direction (east to west near Site 11) as well as by seepage into a system of sanitary sewer pipes that border the site on the east and south (CH2M HILL, 2002e). Groundwater flow in the Yorktown Aquifer is to the northwest.

As a result of the Geoprobe[®] groundwater sampling, 15 additional monitoring wells and two piezometers were installed. These monitoring wells serve to monitor the source area and extent of the plume. All the new and existing monitoring wells were sampled in September 1998 and again in July 1999.

A Draft SRI Report for Site 11 was submitted for regulatory review during February 2001. This report summarized all new data obtained since the 1994 RI/FS report by FWES in 1994. Data evaluation included surface and subsurface soil, and groundwater (Geoprobe[®] and monitoring well) samples. A qualitative HHRA was also conducted for the site as part of the SRI. Subsequent to the SRI, four subsurface soil samples were obtained at the site from the near the location of the former neutralization tank and its associated piping in February 2001, to provide additional data to be used in the amended HHRA. Previous subsurface soil data (from the 1995 removal action) were not validated per CERCLA criteria, and this newly obtained data will be added to the SRI as an addendum.

Conclusions drawn in the SRI regarding the nature and extent of contamination at Site 11 included three inorganic constituents in surface soil samples (arsenic, lead, and iron), chlorinated VOCs, and one SVOC, pentachlorophenol (PCP), in groundwater. The concentrations of inorganics in surface soil exceeded both EPA Region III RBCs and NAB Little Creek background concentrations in one or more samples. There were two chlorinated VOCs that exceeded EPA Region III tap water RBCs: 1,1-DCE and TCE. These compounds, along with 1,1,1-trichloroethane (TCA), also exceeded drinking water MCLs in at least one monitoring well. Groundwater contamination appeared to be limited to the lower portion of the water table aquifer in the area immediately around the location of the former plating shop neutralization tank extending south to Gator Boulevard. The area of greatest chlorinated VOC concentration was directly south and southeast of the former tank.

Recommendations made in the SRI Report included additional follow-up investigation activities including a groundwater investigation north of monitoring well LS11-MW16D (which has subsequently been reclassified as AOC Site 11a) to determine if TCE contamination is associated with Site 11 or another source and a groundwater investigation to delineate the area of elevated concentrations between the former location of the neutrali-

zation tank and monitoring wells LS11-MW05D and LS11-MW04D at the bottom of the aquifer to identify maximum concentrations, mass of contaminants, and, if feasible, the presence of dense nonaqueous phase liquid (DNAPL). Also, further investigation of the sanitary sewer line adjacent to the site was recommended.

As a result of regulatory comments received on the Draft SRI, three monitoring wells were installed into the Yorktown Aquifer and sampled at Site 11 to determine if site contaminants had potentially entered the lower aquifer in September and October 2001. A Draft Final SRI Report was completed in October 2002.

A Membrane Interface Probe (MIP) investigation was conducted during the summer of 2001 to better identify the areas where DNAPL may be present around LS11-MW04D and LS11-MW05D and to quantify the extent of contamination in the northern portion of the site around LS11-MW16D. Direct-push samples were collected to confirm the MIP results. The results indicated that TCE and TCA DNAPL were present and that there has not been significant breakdown of TCE.

An Environmental Security Technology Certification Program (ESTCP) funded pilot test was conducted at Site 11 from June to October of 2002. The project was led by a consortium of four universities: University of Rhode Island, Colorado School of Mines, University of Texas at San Antonio, and University of Arizona. The goal of this pilot test was to evaluate the in-situ removal of organic contaminants from groundwater through the injection and extraction of a cyclodextrin (CD) solution. The pilot study was completed during the summer of 2002. The results and conclusions are presented in the *Cyclodextrin Enhanced In-situ Removal of Organic Contaminants from Groundwater at Department of Defense Sites* completed by T.B. Boving, J.E. McCray, W.J. Blanford, M.L. Brusseau of University of Rhode Island, Colorado School of Mines, University of Texas at San Antonio, and University of Arizona, respectively. A follow-up groundwater sampling event was completed by CH2M HILL in January 2003 to evaluate organic compounds remaining in the groundwater at the site. Additionally, an MIP investigation at Site 11 was conducted in September 2003 to further assess the impact the CD solution had on the groundwater at the site.

Because of data gaps encountered in the cyclodextrin study, an additional round of groundwater sampling as well as the installation of two monitoring wells will be conducted in FY 2005. The results from the ESTCP pilot test and follow-up groundwater sampling including the MIP investigation will be used in the upcoming FS for Site 11, scheduled to be submitted in FY 2005.

2.2.1.6 Site 12—Exchange Laundry Waste Disposal Area

The Exchange Laundry/Dry Cleaning Facility, referred to as SWMU 77 in the RFA, was located in Building 3323, near the intersection of 3rd and B Streets, in the eastern portion of NAB Little Creek. Building 3323 was torn down in 1987 for the construction of the existing commissary (Building 3445). A catch basin and a major portion of a storm water line were removed during construction of the new building in 1992. The storm water line received dry cleaning wastes from the former Naval Exchange (NEX) laundry and drained to a canal that flows between Lake Bradford and Little Creek Cove.

As reported in the IAS, wastes were dumped into the storm water line and thought to flow into the drainage canal via an outfall located immediately west of the former laundry

building. However, review of the storm water configuration, conducted by Little Creek personnel in the summer of 1991, revealed that drainage from the catch basin reportedly used for the dumping actually flows north along B Street and then west along the north side of Building 3329, before flowing into the canal. Based on this information, the outfall for wastes dumped into the catch basin was approximately 350 feet north of the outfall sampled during the IRI investigation and the 1986 RVS. Drainage into the outfall pipe sampled during the IRI comes from a relatively small area of the parking lot around Building 3432. Based on recommendations made in the Site Characterization Report for the commissary construction project, the storm water line was removed and the area regraded.

The ground surface at the site was mostly an asphalt-paved parking area associated with the car wash and former Buildings 3432, 3433, 3434, and 3435 (replaced by Building 3445). The former Building 3323 parking lot was graded for the parking area for the new commissary building in 1993. The outfall immediately west of the car wash consists of a 12-inch galvanized iron pipe located approximately 3 feet below grade. This outfall is referred to as the “southern” outfall or discharge pipe. The outfall located north of Building 3445, the “northern” outfall, which is connected to the catch basin used for disposal, was not inspected during the IRI field program, but probably had a configuration similar to the southern outfall. The catch basin used for disposal, located southwest of the intersection of 4th and B Streets, has since been removed.

The drainage canal is approximately 20 feet wide and 9 feet deep from the top of the bank. The sides of the canal are steep and covered with a relatively thick growth of vegetation. At the time of the April 1991 IRI site visit, the canal contained approximately 2 to 3 feet of water, i.e., the water level was 6 to 7 feet below the top of the bank. The canal is bordered by a 20- to 30-foot-wide strip of vegetation on either side containing abundant trees, bushes, and weeds. The flow direction in the canal is to the south and is controlled by a weir at Little Creek Cove that prevents the tides in the cove from backing up into Lake Bradford. Miscellaneous trash and refuse were observed in many places along the banks of the canal and the wooded areas (Ebasco, 1991).

The IAS reported that wastes dumped into the storm water line included tetrachloroethene (PCE) sludges, soap, sizing, and dyes. The period of operation and disposal lasted from 1973 until 1978, during which an estimated 1,320 gallons of waste were dumped into the storm water drain. Of this total, approximately 200 gallons were PCE sludges. In addition to the dumping, smaller quantities of PCE and other wastes may have entered the storm water line through runoff from spills or overflow of waste containers (Ebasco, 1991).

As part of the RVS, six surface water and six shallow sediment samples were collected at Site 12 to verify the presence or absence of contamination as recommended in the IAS. Contamination was detected in one or more media at Site 12 and recommendations were made to continue investigating the site to confirm RVS activities.

ATEC Environmental completed a two-phase environmental assessment of Site 12. The Phase I analysis, conducted in 1990, included monitoring well installation, groundwater sampling, soil sampling, and sediment sampling. The second phase of the ATEC assessment was conducted in 1991 to verify the Phase I findings and provide a more detailed delineation of the extent of groundwater contamination at Site 12. The specific activities completed for Phase II included the drilling, installation, and sampling of two additional

monitoring wells, collection of a second round of samples from the eight existing wells, and the establishment of vertical well elevation data in order to determine the direction of groundwater flow.

The Site 12 RI/FS (FWES, 1994) included monitoring well installation, and groundwater, surface water, and sediment sampling. Groundwater samples were collected from the four monitoring wells and were analyzed for VOCs. Total 1,2-DCE, TCE, and PCE were among the VOCs detected in groundwater samples. The highest total VOCs was 18,200 ppb. Four surface water samples and four sediment samples were collected from the canal adjacent to Site 12. These samples were analyzed for VOCs and TAL metals. No chlorinated solvents were detected in the canal surface water or sediment.

FWES (Phase I) and CH2M HILL (Phase II) completed the SRI for Site 12. Groundwater flow in the Columbia Aquifer is to the west; however, a leaky sanitary sewer manhole and pipe located below the water table on the west side of the site intercepts groundwater flow and creates a localized sink that impacts groundwater flow throughout the entire site. A surface water drainage canal borders the site to the west (west of the leaky sewer). Surface water in the canal appears to infiltrate to the groundwater and flow east toward the sewer. A weir artificially controls the water level in the canal.

Three monitoring wells were installed in the Yorktown Aquifer below the Yorktown Confining Unit to monitor the presence of contamination in the Yorktown Aquifer. Groundwater flow in the Yorktown Aquifer is north, toward the Chesapeake Bay (CH2M HILL, 2000b).

Groundwater sampling for natural attenuation parameters as well as for chlorinated VOCs was conducted in July and September of 1998. Biodegradation is occurring at the site, based on the reduction in concentrations of chlorinated VOCs over time and the presence of PCE breakdown products (TCE and cis-1,2-DCE) in the groundwater collected from selected wells. The purpose of this sampling was to determine the extent of contamination and if biodegradation is occurring at a rate that would make it a viable remedial alternative. The Draft SRI Report was submitted in January 2000. The Final SRI was approved by VDEQ and EPA in December 2000.

A MIP investigation was conducted at Site 12 during the summer of 2001 to better identify the location of the source plume. Results of the investigation indicated two PCE source areas at Site 12. The study revealed that there are two separate PCE plumes at Site 12. The concentrations of PCE seemed to be going down when compared to previous sampling events. The decrease in concentrations is attributed to dilution and a biological breakdown of TCE.

A Draft FS for Site 12 was submitted for regulatory review in April 2003. The Draft FS results indicate that pump and treat, biostimulation, and pump and treat with biostimulation are very similar in effectiveness when ranked in a comparative analysis. Biostimulation and pump and treat with biostimulation were predicted to provide aquifer restoration in significantly shorter timeframes than the other remedial alternatives. Comments were received by EPA and VDEQ and incorporated into the Final Site 12 FS submitted in March 2004.

In September 2004, an FS Addendum was submitted to include in situ chemical oxidation (ISCO) as an additional treatment alternative for groundwater contamination at the site, and was determined to be the preferred alternative. The Draft PRAP was submitted for review in March 2005. The PRAP and ROD are scheduled to be finalized in FY 2005.

2.2.1.7 Site 13—Public Works PCP Dip Tank and Wash Rack

The PCP Dip Tank and Wash Rack is located near the intersection of 7th and F Streets in the eastern portion of NAB Little Creek, approximately one block west of Site 11. The site consisted of the dip tank formerly used to treat wood with a mixture of PCP, diesel, and kerosene, an adjacent area that contained drying racks for the PCP-treated wood, an open area formerly used by the PWC for storage of supplies and equipment, and a concrete wash rack at the southwestern end of that area. This site is also referred to in the RFA as SWMUs 14 (wash rack) and 15 (dip tank).

The PCP dip tank was located in the southwest corner of the fenced compound west of Building 3165E. The tank was in operation from the early 1960s until 1974. According to a former Public Works Supervisor, the tank was constructed of metal, was 20 feet in length, and 5 feet in diameter. The top third of the tank was cut off and replaced with a metal lid. The bottom half of the tank was buried in the ground. A tank of this size and specifications would hold approximately 1,500 gallons.

The contents of the tank were a mixture of one part PCP to ten parts diesel and kerosene. Wood was dipped into the tank and either set on racks for drying or placed directly on trucks for delivery to where it was to be used on base. The drying racks were located immediately east of the dip tank between the tank and Building 3165E. A pump was located at the south end of the tank, outside the fenced compound. This pump was used to keep the contents of the tank mixed and to empty the contents of the tank into 55-gallon drums when it became spent. According to the former PWC supervisor, there had only been one PCP tank throughout the history of this area and it was always in this location. The dip tank was cleaned out approximately every 6 months, at which time the approximately 55 gallons of PCP sludge generated are believed to have been disposed of in the Amphibious Base Landfill (RGH, 1984). All remaining PCP solution and associated sludges were removed from the tank in 1975. The tank itself was dismantled in 1982. The area formerly containing the PCP dip tank and drying racks has since been paved with asphalt and converted to a PWC storage area.

The wash rack and associated storage area, both of which were immediately south of the dip tank and west of Building 3165D, continue to be used by the PWC. The wash rack, located at the southwestern corner of the storage area, is a concrete pad with bermed sides and centrally located deck drain. The rack was installed in 1945 and is used by the PWC to clean vehicles, equipment, and miscellaneous objects with steam and biodegradable chemical cleaners. Wash water and other runoff from the rack drains through the central deck drain into an oil/water separator located under the paved driveway between the wash rack and Building 3165. The oil/water separator is accessible via a rectangular steel manhole located in the driveway. The contents of the separator, as observed in April 1991, included both oily sludge and oil. The oily discharge from the oil/water separator is removed and taken to Craney Island Fuel Facility, and the water is routed to the sanitary sewers.

The unpaved storage area immediately north of the wash rack, between the wash rack and the former location of the PCP dip tank, was used for the storage of various materials and equipment. The IAS reported readily observable solvents, paint, fuel, and tar staining the surface in this area. During the IRI, the gravel area was free of surface staining, indicating that although the area continued to be used as a storage yard by Public Works, the occurrence of spillage and other releases has been significantly reduced (Ebasco, 1991).

As part of the RVS, five groundwater monitoring wells were installed at Site 13 to facilitate the collection of groundwater samples and hydraulic head data to determine groundwater flow directions. Three surface soil and three subsurface soil samples were collected to help define the nature of contamination in probable source areas. A second round of groundwater monitoring was conducted during the IRI.

Site 13 was the subject of an RI/FS performed by FWES in 1993. The findings were summarized in the RI/FS report dated November 1994. Groundwater, surface soil, and subsurface soil samples were collected and analyzed during this investigation. The highest total VOCs detected in surface soil was 19 ppb, and the total SVOCs detected ranged from 1,210 ppb to 95,800 ppb. VOC concentrations in the subsurface soil were as high as 250 ppb while SVOCs, primarily PCP, were detected in subsurface soil at concentrations ranging from 11,000 ppb to 890,000 ppb. The maximum total VOCs concentration detected in groundwater was 262 ppb. Vinyl chloride was detected in groundwater at 200 ppb. SVOCs were detected at four of the six groundwater sampling locations. PCP was detected at three of the six groundwater sampling locations; the highest concentration detected was 1,700 ppb near the former dip tank.

Additional site data were obtained during the Phase I SRI. VOCs were detected in ten of the twelve groundwater samples collected from monitoring wells at the site. The highest concentration of a VOC was PCE at 1,200 ppb. Several SVOCs were detected in groundwater samples. PCP was detected at the greatest concentrations, with a maximum concentration of 2,300 ppb observed near the former dip tank.

Additional soil and groundwater sampling was conducted, as part of a Phase II SRI, to fully delineate the contamination in these media. Results of this portion of the Phase II SRI are reported in the *Engineering Evaluation/Cost Analysis for Soil at Site 13: Public Works PCP Dip Tank and Wash Rack* by CH2M HILL, dated March 1999. The EE/CA was prepared to address the PCP soil contamination in the area of the former dip tank. The EE/CA recommended excavation of approximately 150 cy of soil. A PCP soil removal action was conducted in May 1999. The Final SRI was submitted in May 2002.

Groundwater flow in the Columbia Aquifer at Site 13 appears to be controlled both by the overall base-wide groundwater flow direct (northeast to southwest near Site 13) as well as by seepage into a system of sanitary sewer pipes that border the site on the west. Flow direction at the site has been observed to flow west to southwest.

The ORC pilot study was performed to reduce PCP concentrations in the groundwater. Six rounds of post-injection monitoring were conducted for a period of 60 weeks (through January 2002). Results indicated a significant decrease in PCP concentrations over the duration of the pilot study (CH2M HILL, March 2003).

A Draft FS for Site 13 FS evaluated options to address CVOC and SVOC (PCP only) contaminants in groundwater and was submitted for regulatory review in July 2003. The FS identified ARARs and TBC criteria that may affect the remediation of the groundwater within Site 13, developed RAOs including PRGs for the Columbia Aquifer, and developed and evaluated remedial alternatives to mitigate risks from exposure to groundwater at Site 13. The FS results indicate that enhanced anaerobic bioremediation and enhanced aerobic bioremediation and monitored natural attenuation (MNA) rank relatively higher than other short-term effectiveness. Enhanced aerobic bioremediation for PCP and MNA for CVOCs are expected to have the fastest cleanup time. Pump and treat is expected to have the longest cleanup time because of the high retardation factor for PCP. Comments were received by EPA and VDEQ. The results of the Final FS, dated June 2004, indicate that a treatability study using chemical oxidation would be conducted. If the treatability study was effective in reducing groundwater contamination concentrations, no further action would be pursued under CERCLA and supporting documentation would be prepared.

FY 2006 activities for Site 13 are discussed in Section 3.2.7 of this SMP.

2.2.1.8 New SWMU 3 (SWMU 111)—Pier 10 Sandblast Yard

“New” SWMU 3 (formerly classified as SWMU 111) is the Pier 10 Sandblast Yard. This area was used for sandblasting boats from 1962 to 1984. After 1984, anchors and anchor chains were sandblasted at the site. Up until 1995, sandblasting took place on a concrete pad located on the west side of Building 1263. The sandblast material was periodically removed from the site for disposal following EPA toxicity testing indicating the residue was not hazardous. Paint chips and grit covered the unpaved ground south of the pad to the water’s edge and the nearshore bottom of Little Creek Channel. In 1982, a fence was installed around the sandblasting area to limit access to the site. The fence also prevented windblown sandblast materials from migrating outside the fenced area. This fence is generally closed and locked outside working hours. Also, in 1993, photos indicated that the area had been covered with asphalt, except for a small area to the west of the sandblasting pad. Little or no vegetation covers this unpaved area. In approximately 1995, a new sandblasting area was constructed in the northwest corner of the compound. This new area consisted of a concrete pad surrounded by a 4-to-5-foot concrete wall; the old area was no longer used after 1995. All sandblasting operations at SWMU 3 ceased in 1996 when the new indoor sandblasting facility, CB125, was completed.

Within the sandblasting area, surface water drainage flows toward a catch basin. Some runoff from other areas of the site may flow into Little Creek Channel, located on the east side of SWMU 3. Little Creek Channel is not used for recreational purposes, but NAB Little Creek boat traffic and maneuvers are practiced in the area. A picnic area located in the southwest portion of SWMU 3 is used by personnel from Building 1265. The picnic area was covered by 3 inches of soil and sod in April 1999 to prevent soil contact.

SWMU 3 was originally identified in the RFA as being a potential site affected by contamination and was one of the SWMUs included in the Navy’s RRRS. Soil and groundwater sampling was conducted at SWMU 3. The results from the soil sampling conducted at SWMU 3 resulted in a high relative risk ranking as defined by the Navy’s RRRS. Arsenic, barium, beryllium, cadmium, chromium, lead, manganese, mercury, nickel, and zinc were detected in soils. Relatively high concentrations of metals have been observed in the

groundwater; however, these results were for total (unfiltered) metals from temporary wells, which typically yield high levels of metals.

In September 1998, as part of the SI, four monitoring wells were installed at SWMU 3. Groundwater sampling of the four newly installed wells and one existing upgradient well, the collection of surface and subsurface soil samples at 10 locations, and the collection of sediment samples at four locations also occurred. The Final SI report, dated December 1999, also included a qualitative HHRA. Groundwater in the Columbia Aquifer flows generally in a southeast direction and follows the topography of the site. Groundwater discharges to Little Creek Channel to the east and south of SWMU 3. The flat water table gradient and low groundwater elevations at SWMU 3 indicate the Columbia Aquifer is directly connected to the surface water in Little Creek Channel.

An RI was conducted for SWMUs 3, 7, and 8 during August and September of 2002. During the investigation, an additional three monitoring wells were installed at SWMU 3, and surface, subsurface, groundwater, and sediment sampling was conducted in order to fill data gaps and confirm results of previous investigations. A Draft RI/HHRA/ERA was submitted for regulatory review in June 2004.

The RI/HHRA/ERA is scheduled to be finalized in FY 2005.

Proposed FY 2006 activities associated with SWMU 3 are discussed in Section 3.2.8 of this SMP.

2.2.1.9 SWMU 7—Small Boats Sandblast Yard

“New” SWMU 7, the Small Boats Sandblast Yard, is located along piers 44 through 55 at Desert Cove and includes an area surrounding the northern portions of CB-125. This SWMU is also referred to as SWMU 137 in the RFA and has also previously been identified as part of IR Site 2 during the IAS. The area of SWMU 7 was used to sandblast and paint ships prior to 1996, when sand-blasting activities were moved to an indoor facility. The Small Boats Sandblast Yard was used to store spent abrasive blast material (ABM) while awaiting characterization (EP toxicity) test results. Approximately 4,000 cy of ABM from sandblasting generated from 1960 to 1982 were stored in the yard.

No release controls have been identified for this unit. Based on visual site inspections (VSI) conducted by Earth Technology Corporation in 1988, releases of spent grit and oily substances to the soil and Desert Cove have occurred in the Small Boats Sandblast Yard. According to the Navy’s responses to the RFA, oil stained soil in the area has been removed. ABM is currently present in the compound near CB125 and near CB317 and CB318. A small amount of ABM was also found west of Building 3869.

The southwestern portion of the area indicated as SWMU 7 is the site of the new paint blast facility, CB125. Before construction of the building, LANTDIV contracted with ATEC Environmental to conduct a soil and groundwater investigation. Five soil locations were sampled. The samples were analyzed for total metals and EPA toxicity metals. ATEC noted in their summary report that the only metal detected above the method detection limit (MDL) in the EP Tox analysis was zinc at 3.4 mg/L. This is below the hazardous waste criteria. In January 1993, three soil and three groundwater samples were collected from wells installed at the site. Soil samples were analyzed for toxicity characteristic leachate

procedure (TCLP) metals and groundwater was analyzed for total metals. These samples were taken in the immediate area of the new sand blasting facility CB125. The soil was found to be non-hazardous. A site reconnaissance was conducted in 1999 for the visual presence of ABM. The presence of ABM was noted in the area of CB125, and trace amounts were observed in the area along small boat piers 51 through 44.

A Final SI report for SWMU 7 was submitted in August 2001. The SI field activities were conducted in May 2000 and included the collection and analysis of the surface and subsurface soil, sediment, and groundwater samples. Three monitoring wells were installed at SWMU 7 and 28 co-located surface and subsurface samples were collected. Five sediment samples were collected along the boat piers in Desert Cove. Co-located surface and subsurface samples were analyzed for TAL metals and PAHs. Soil samples collected during monitoring well installation were analyzed for TCL organic compounds and TAL metals. All sediment samples were analyzed for TAL metals, PAHs, grain size, pH, and TOC. One sediment sample was also analyzed for TCL organics. All groundwater samples were analyzed for TCL organic compounds and TAL metals. Analytical results were qualitatively evaluated through a comparison with EPA Region III RBCs, VDEQ standards, MCLs, and to background levels established for NAB Little Creek. Groundwater in the Columbia Aquifer flows toward Desert Cove at SWMU 7, ultimately discharging to the cove. Because of the shallow nature of the groundwater table and the low groundwater gradient, Desert Cove is likely in direct contact with the water table.

An RI was conducted for SWMUs 3, 7, and 8 in August and September 2002. During the investigation, three additional monitoring wells were installed at the site. Groundwater, surface soil, subsurface soil, and sediment samples were collected for analysis. A Draft RI/HHRA/ERA Report was submitted for regulatory review in November 2003. The Draft RI conclusions indicated that there were no overall human health or ecological risks in soil or groundwater at the SWMU. However, the presence of ABM residues in the northern portion of the site is a potential continuing source of contaminants to sediment in Desert Cove. A current MILCON project to replace the piers in the vicinity of SWMU 7 may include dredging Desert Cove. If this activity takes place, it is likely that the contaminated sediment will be removed to acceptable levels. However, if the cove is not dredged for upcoming pier replacement activities, the sediment should be further evaluated for removal.

Although there was no overall human health risk in surface soil at SWMU 7, one surface soil result (LW07-SS24) indicated lead at concentrations above the EPA Region III residential child soil screening value (400 mg/kg) as determined by the IEUBK model. To eliminate the potential human health exposure risk, the area surrounding the lead “hot spot” was delineated for removal. The results of the delineation activities were incorporated into the Draft EECA for SWMU 7 (and SWMU 8) submitted for regulatory review in March 2004.

The IRA for surface soil at SWMU 7 is scheduled to occur prior to the MILCON project dredging in Desert Cove. Therefore, the Tier I Partnering Team has agreed to separate the terrestrial and aquatic portions of the site in order to best manage the remediation process. Future documentation and remedial activities beyond the Final RI/HHRA/ERA for the site will address soil and groundwater at the site as SWMU 7a, and SWMU 7b as the aquatic portion of the site (Sediment and Surface water of Desert Cove).

Because there is no overall human health or ecological risk in groundwater, SWMU 7a has been recommended for NFA. The draft PRAP was submitted for review in February 2005 and was scheduled for public review in March 2005. The Draft ROD was submitted in March 2005. The PRAP/ROD are scheduled to be finalized in FY 2005.

FY 2006 activities proposed for SWMU 7a and SWMU 7b are discussed in Section 3.2.9.

2.2.1.10 SWMU 8—West Annex Sandblast Area

“New” SWMU 8, the West Annex Sandblast Area, is also referred to as SWMU 144 in the RFA, and has also previously been identified as part of IR Site 2 in the IAS. SWMU 8 consists of three discontinuous parcels of land near the northwest corner of the base. An area at the northeast corner of the intersection of Guadalcanal Road and Amphibious Drive was previously used for sandblasting activities to remove paint from boats. As boats were hauled into the area for sandblasting, residue accumulated on the ground. Between 1949 and 1954, spent sandblasting residue was stored in areas north of Midway Road, south of Guadalcanal Road, and east of Amphibious Drive. An estimated 5,125 cy of residue was generated and stored in the area between 1949 and 1954, and an additional 3,525cy were generated between 1954 and 1971. A reconnaissance of the area in 1999 noted ABM in the area surrounding Water Tower 1553 from the surface to a depth of 5 inches. No other investigations have been conducted at SWMU 8.

A Final SWMU 8 SI Report was submitted in August 2001. The SI field activities were conducted in May 2000 and included the collection and analysis of the surface and subsurface soil, sediment, and groundwater samples. Four monitoring wells were installed at SWMU 8, and 38 co-located surface and subsurface samples were collected. Six sediment samples were collected at SWMU 8. Co-located surface and subsurface samples were analyzed for TAL metals and PAHs. Soil samples collected during the installation of the monitoring wells were analyzed for TCL organic compounds and TAL metals. All sediment samples were analyzed for TAL metals, PAHs, grain size, pH, and TOC. One sediment sample was also analyzed for TCL organics. All groundwater samples were analyzed for TCL organic compounds and TAL metals. Analytical results were qualitatively evaluated through a comparison with EPA Region III RBCs, VDEQ standards, MCLs, and to background levels established for NAB Little Creek. Groundwater in the Columbia Aquifer generally flows toward the small boat piers (Piers 11 through 19) and Little Creek Channel. An EE/CA was also prepared for SWMU 8 during FY 2000. The EE/CA presented the findings of the soil boring survey conducted to delineate the horizontal extent of ABM present in the surface and shallow subsurface soils at the site. Three recommendations for removing the ABM were presented in the EE/CA. The third alternative, excavation of contaminated material to residential land use criteria, was the preferred alternative of the three. Based on calculations in the EE/CA, this called for the excavation of approximately 2,200 cy (3,600 tons at 120 lb/cy) of soil in the vicinity of Water Tower 1553.

In November 2000, an interim removal action was initiated at SWMU 8 to remove the surface and subsurface soil contaminated with ABM. The removal action consisted of excavating between 2 and 10 inches of soil in the vicinity of the water tower for offsite disposal at a Navy-approved disposal facility. Confirmation samples were taken on the floor of the excavation during the removal action to ensure screening criteria were being met. In-situ samples were field-screened for lead using an X-Ray Fluorescence (XRF)

scanner. Fifteen confirmation samples were also obtained over the approximate 3-acre area and analyzed for TAL metals and PAHs. Three additional samples were collected for full suite analysis including TCL organics. Upon completion of the removal action, approximately 4,600 tons of soil were excavated and removed from the site. A summary of the removal action was presented in the *Project Close-Out Report, Removal of Abrasive Blast Material, Solid Waste Management Unit 8, Naval Amphibious Base Little Creek, Virginia Beach, Virginia*, prepared by OHM Remediation Services Corporation, February 2001.

An RI was conducted for SWMUs 3, 7, and 8 in August and September 2002. During the investigation, six additional monitoring wells were installed at the site. Groundwater, surface soil, subsurface soil, and sediment samples were collected for analysis. A Draft RI/HHRA/ERA Report was submitted for regulatory review in November 2003. Conclusions indicated that there are no overall human health or ecological risks for soil, groundwater, and surface water. The highest ecological site-related potential risks are associated with metals in outfall sediments. No further action was recommended for soil, groundwater, and surface water, and further sediment and confirmatory soil samples were recommended to delineate the contaminated area for removal.

Additional subsurface soil and sediment sampling was conducted in January 2004 to delineate elevated PAH concentrations detected in the soil near Water Tower 1553 during the SI conducted in May 2000 (LW08-DP23), and metals in sediment detected during the recent RI activities conducted in August 2002. Based on the results of the additional soil samples collected in the vicinity of Water Tower 1553, the Tier I Partnering Team agreed not to pursue an interim removal action to address the subsurface soil PAH contamination at SWMU 8 based on the absence of human health risk. In addition, the PAH contamination was not likely a result of CERCLA site activities because the water tower is still operational. The additional subsurface soil results from samples collected in January 2004 will be incorporated into a Revised Draft HHRA as part of the Draft RI/HHRA/ERA (CH2M HILL, November 2003). The results from the sediment delineation activities were used in development of an EE/CA to remove sediment south of Outfalls 16 and 17 at the SWMU. The Draft SWMU 8 (and SWMU 7) EE/CA was submitted for regulatory review in March 2004.

Because there is no overall human health or ecological risk in groundwater, SWMU 8 has been recommended for NFA. The draft PRAP was submitted for review in February 2005 and was scheduled for public review in March 2005. The Draft ROD was submitted in March 2005. The PRAP/ROD are scheduled to be finalized in FY 2005.

FY 2006 activities proposed for SWMU 8 are discussed in Section 3.2.10.

2.2.1.11 Skeet Range

The Department of Defense (DoD) has established the Military Munitions Response Program under the Defense Environmental Restoration Program to address munitions and explosives of concern and munitions constituents at other than operational ranges. The DoD and the Navy are establishing policy and guidance for munitions and response actions under the MMRP; however the key program drivers developed to date conclude that munitions response action will be conducted under the process outlined in the National Contingency Plan (NCP) as authorized by CERCLA.

Site description for the Skeet Range is not yet available and will be included in future updates of the NAB Little Creek SMP.

2.2.2 Descriptions of Sites Requiring Site Screening Assessments (FFA Appendix A)

The sites described in this section have been identified as requiring a screening level assessment to determine if a CERCLA release has occurred. The location of each site is shown in Figure 2-1.

2.2.2.1 Site 11a—TCE Plume Adjacent to Site 11

Site 11a, located north of Site 11, was identified during the 1998 SRI at Site 11 when TCE (100 µg/L) was found in the upgradient monitoring well sample from LS11-MW16D. Direct-push groundwater samples collected in 2001 confirmed elevated TCE in this area. Based on these results the area north of Site 11 was identified as AOC Site 11a.

A soil and groundwater investigation was conducted in July 2002 that included field screening for TCE, confirmation sampling, monitoring well installation, and groundwater sampling. The investigation results confirmed a TCE groundwater plume with higher concentrations at the bottom of the Columbia Aquifer and that TCE does not appear to be exceeding regulatory risk-based screening criteria in the soils. Groundwater flow in the Columbia Aquifer at Site 11a appears to be influenced by seepage into a system of sanitary sewer lines that border the site on the east and south (CH2M HILL, 2002e).

A MIP investigation was conducted in September 2003 to delineate the cVOC plume. In addition to TCE, a potential source area was identified where PCE concentrations were elevated in soil. Subsequent DPT samples were collected to confirm MIP results. Monitoring wells were installed and sampled using passive diffusion bags in February 2004 at various depths within the Columbia Aquifer to determine both the horizontal and vertical stratification of the plume. Results of the MIP investigation and groundwater sampling were used to develop a Treatability Study Work Plan (CH2M HILL HILL, January 2005). The Treatability Study consisted of reagent injection to effect in-situ chemical oxidation and post-injection groundwater monitoring. Implementation of the Treatability Study for in-situ chemical oxidation was completed in March 2005. Post-injection monitoring will be conducted during FY 2005 and reported in FY 2006.

2.2.2.2 Site 6—Special Boat Unit 2 Battery Storage Yard

Site 6 is the Special Boat Unit (SBU) 2 Battery Storage Yard. It is also referred to as SWMU 117 in the RFA and renumbered as “New” SWMU 4 in several subsequent Navy correspondences. Since 1943, the battery storage area has been in various locations in the vicinity of Buildings 103 and 104.

Prior to offsite disposal, spent lead-acid batteries containing electrolyte solution were stored at this site. An area of about 300 to 400 square feet, located west of Schofield Avenue and about 100 feet south of Pier 2, was used to store batteries from 1943 until 1980. Batteries were stored on wooden pallets placed on bare soil. Painting wastes, oily wastes, and scrap metal were also stored at the site on wooden pallets over soil. Pier 2 refers to flotilla piers present in the SBU compound prior to the permanent piers 60 and 61 being built. Therefore,

the location of this former storage area is now approximately 100 feet south of Pier 61. There were no release controls present in the area. Between 1980 and approximately 1993, spent batteries were stored outside Building 103 (southeast corner of the building) on wooden pallets over soil. At the time of the 1988 VSI, no batteries were in storage. Batteries are now stored inside Building 103.

The 1984 IAS and the 1988 VSI state that oil stains have been noted on the ground in the area. There are also reports of batteries rupturing during the winter, and their contents being released onto the ground. These observations pertain to the 1980-1993 storage area.

The site currently is paved with concrete and asphalt, with the exception of grass areas along the fence and around the buildings. The area is fenced with a controlled security gate. The underlying soils consist of silty sand with occasional thin clay lenses. The surficial aquifer at NAB Little Creek is not used as a potable water source. Little Creek Channel/Cove is located north of the site and receives groundwater and surface water discharge.

On October 19, 1995, utility excavation activities east of the Building 115 (within the assumed limits of the 1943-1980 storage area) uncovered oil contaminated soil. The apparent release was reported to the VDEQ. Two soil and one groundwater sample were collected and analyzed for VOCs, SVOCs, and pesticides/PCBs, and metals. The results were compared to TCLP and RBC limits and the soil and groundwater were found not to be hazardous. The soil excavated for the utility line was placed back into the excavation.

In October 1995, two surface soil samples and one groundwater sample were collected from the vicinity of Building 103 (the 1980-1993 storage area) and analyzed for SVOCs and metals in support of the RRRS report. No SVOCs were detected in surface soil or groundwater above detection limits. Metals were detected in both surface soil and unfiltered groundwater samples. The RRRS considered this site to constitute a medium risk based on metals in the surface soil and groundwater. The revised RFA suggested that surface and shallow subsurface soil sampling be conducted to determine if releases have occurred. An SSA is planned for Site 6 in FY 2005, and findings will be reported and further evaluated as appropriate in FY 2006.

2.2.2.3 SWMU 5—Building 3896 – Port Ops Boat Painting Area

“New” SWMU 5, the Building 3896 Boat Painting Area, was initially referred to as SWMU 130 in the RFA. Activities at this site included grinding of boat hulls in preparation of painting, and painting of boats. Grinding and painting took place outside over bare ground as the boats were stored on raised stands. Metal grindings and paint over-spray were allowed to fall onto the ground. No release controls were present. In addition, bilge water, metal grindings, paints, and thinners were reportedly released to the soil.

The site was paved with concrete and/or asphalt in 1994 after boat maintenance activities were initiated at the site. There is, however, an area north of the current boat maintenance area and along the compound fence that is currently unpaved and has little vegetative cover. Access to the site is and will remain restricted. The service area is fenced off and kept locked during non-working hours.

The underlying soils consist of silty sand, a thin clay layer, and cobbles. No wells are located in the area. Little Creek Channel/Cove is located south of the site and receives surface water and groundwater discharge from the site.

Surface soil and groundwater samples were collected and analyzed for VOCs, SVOCs and metals in October 1995, in support of the RRRS. No VOCs were detected in surface soil above detection limits. SVOCs were detected above detection limits in a surface soil sample collected immediately east of Building 3896. Metals were detected in the groundwater sample. The RRRS concluded that SWMU 5 presents a medium relative risk because of SVOCs in the surface soil and metals in the groundwater.

An SSA is planned for SWMU 5 in FY 2005, and findings will be reported and further evaluated as appropriate in FY 2006.

2.2.2.4 SWMU 6—SeaBee Area – CB 124

“New” SWMU 6 (formerly identified in the RFA as SWMUs 131, 132, and 133) is the SeaBee area, and consists of three separate waste management areas: Former SWMU 131, Satellite Accumulation Point; Former SWMU 132, Inoperative Wire Degreaser; and Former SWMU 133, Excess Material Storage Area.

Former SWMU 131, Satellite Accumulation Point for Paint Wastes, included a 55-gallon drum and several smaller cans stored on a wooden pallet over bare soil. Wastes stored included paints and thinners. No release controls were present and soil staining was evident.

Former SWMU 132, Inoperative Wire Degreaser, was an elevated trough 20 feet long and 12 inches deep that had been filled with JP-5 aircraft fuel to degrease wires. The degreaser has been taken out of service. No release controls were present, but JP-5 may have leaked from a valve and stained the soil below the unit.

Former SWMU 133, Excess Material Storage Area, is a gravel yard that was used to store excess paints and cables. The paints were stored on wooden pallets and were covered with canvas tarps. Stains were observed in this area.

An asphalt road exists around the perimeter of the SeaBee Area – CB 124. Concrete slabs indicate the locations of former structures. The remainder of the site is soil with little to no vegetative cover. The site is not fenced with open access.

Six surface soil and four groundwater samples were collected and analyzed for VOCs, SVOCs, and metals in October 1995 in support of the RRRS. Acetone was detected in all but one of the surface soil samples. No SVOCs were detected in surface soil above detection limits. Metals concentrations in surface soil were generally comparable to background conditions. No VOCs or SVOCs were detected in groundwater above detection limits. Lead, zinc, and several other metals were detected in one groundwater sample (LC14-W1). The RRRS concluded that this SWMU poses a medium relative risk because of metals concentrations in the groundwater. An SSA is scheduled for SWMU 6 in FY 2005, and findings will be reported and further evaluated as appropriate in FY 2006.

2.2.2.5 SWMU 13—Former Pesticide Shop

According to the Revised RFA, the former pesticide shop was located in Building 3360-3, near Building 3166 and the intersection of 6th and F Streets. However, according to PWC

personnel, the shop was actually in Building 3170, which is in the vicinity of Building 3360-3. The shop managed and applied pesticides at the base. Since the change from the Navy to contractor pest control at NAB Little Creek in 1980, there has been no storage or mixing of pesticides by PWC (MWR still handles pesticides for the golf course, see AOC H). The pesticide materials that remained at the time of the changeover were transferred to the pesticide shop at Naval Air Station, Oceana. The pesticide shop operated from 1973 to 1980, after which the building was razed. The site is now a paved parking lot.

Hand-held sprayers were reportedly rinsed daily after use and between mixtures of different pesticides if they occurred on the same day. Empty pesticide containers were triple-rinsed at this unit and disposed of with the other general solid waste in base landfills (SWMUs 24, 25, 26, 123). Metal containers were triple rinsed and then punctured or crushed to prevent reuse before disposal. Pesticide application was done by tank sprayers and hand-held sprayers. The mixed pesticides were usually completely used at the job site. Residue in tank sprayers was either left in the tank until the next job or diluted with rinse water and left in the tank to mix with the next application.

Types of pesticides used in the shop include: Abate (insect), Anticoagulant (rodent), Baygon (insect), Diazinon (insect), Dursban (insect), Mineral Oils (insect), Naled (insect), Other Carbamate (insect), Pyrethrum (insect), and Silica Aerogel (insect). No evidence of release was observed during the 1988 VSI, and no formal closure or follow-up sampling was conducted at the time the unit was razed.

As part of the IR Program, groundwater sampling has been conducted in the area and low concentrations (one order of magnitude below the EPA Region III Tap Water RBC) of 4,4'-DDT and chlordane were detected. An SSA is scheduled for SWMU 13 in FY 2005, and findings will be reported and further evaluated as appropriate in FY 2006.

2.2.3 Descriptions of Sites Requiring Desktop Audits (FFA Appendix B)

A desktop audit will be conducted on the sites described in this section to determine if there is a potential environmental concern or indication of a potential release of hazardous substances. Locations of these sites are shown in Figure 2-1.

2.2.3.1 SWMU 18—PWC Transportation Garage Spent Battery Shop, Collection Area, Bldg. 3661

All PWC transportation maintenance is conducted at Building 3661. Batteries are in both the battery shop and on a wooden platform outside the shop. The transportation garage (Building 3661) was constructed in 1974. Spent batteries were placed outside the shop on a wooden pallet that rests on the edge of the asphalt parking lot. Staining on the grassy area adjacent to the battery storage area was observed during the IAS and the VSI. According to the Navy's comments on the Draft RFA, the stained soil at this site has since been removed. Since 1993, batteries have been stored inside a berm to contain potential releases. No stains were visible in 1993 at this berm area. No sampling has been conducted at SWMU 18. A desktop audit is scheduled for SWMU 18 during FY 2005, and findings will be reported and further evaluated as appropriate in FY 2006.

2.2.3.2 SWMU 116—MWR Recreation Boat Maintenance Facility, Building 3021

The MWR Boat Maintenance Facility is located in Building 3021. The facility is currently used to store recreational boats. In the past, gasoline was poured along the fence in back of

Building 3021 for weed control. SWMU 116 refers to the area along the fence. Operation of the MWR Boat Maintenance Facility began in 1943, and the site is still active, although the use of gasoline for weed control method is no longer practiced. Facility personnel estimate approximately 5 gallons of gasoline per year were used from approximately 1969-1979.

In October 1995 during the RRRS, three shallow subsurface (12 to 18 inches) soil and one groundwater sample were collected along the fence and analyzed for VOCs and TAL metals. No VOCs were detected above 5 ppb in soil or groundwater, and no significant metal concentrations were detected. A desktop audit is scheduled at SWMU 116 during FY 2005, and findings will be reported and further evaluated as appropriate in FY 2006.

2.2.3.3 AOC D—PCB Transformer Leak, Building 3530

AOC D consists of a former PCB transformer that was situated near the front entrance to the MWR Auto Hobby Shop at Building 3530. In 1954, Building 3530 was constructed as a heavy-duty equipment maintenance shop. The building became the auto hobby shop in 1974 (A.T. Kearney, 1989). The transformer was located at ground level and reportedly leaked some oils, which were contained within a 4-inch-high metal container surrounding the transformer (A.T. Kearney, 1989). Approximately 1 to 2 inches of liquids (presumably precipitation and oils) were present in the metal pan during the 1988 VSI. In 1993, a follow-up site visit was conducted and no evidence of release was identified (NAB Little Creek, 2000).

According to the Navy's comments on the Draft RFA, the transformer was removed and disposed off base. A new PCB-free transformer replaced the PCB-containing transformer in the same location. During a 1999 site visit by the IR Partnering Team, digital pictures were taken showing oil stains on the concrete directly below the new transformer, but staining did not extend beyond 6 inches onto the concrete slab. PWC was aware that the transformer did have a leak in the past and indicated that the leak was repaired and cleaned up but that oil staining is difficult to remove from concrete. Annual inspections are now conducted on all transformers and any leaks are fixed and cleaned up using degreasing agents (NAB Little Creek, 2000). No sampling has been conducted at AOC D.

In May 1999, EPA, VDEQ, and the Navy visited AOC D and recommended the collection of surface soil samples and analysis for PCBs. A desktop audit is scheduled at AOC D during FY 2005, and findings will be reported and further evaluated as appropriate in FY 2006.

2.2.4 Sites Requiring No Further Action

One hundred and fifteen (115) sites warranted no further action following desktop audits by the Partnering Team and/or site investigations. These sites are listed in Table 2-1 as No Further Action (Appendix C) Sites and are shown on Figure 2-2. Land Use is unrestricted at these sites.

**Table 2-1
Site Status Summary Table
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, Virginia**

Table 2-1

Site ID	Other ID	Name/Description	Location	Status	Comments/Notes
IR Site 7	SWMUs 123-126	Amphibious Base Landfill	NW corner of the intersection of Helicopter Road and Amphibious Drive	RI/FS	A Final RI/HHRA/ERA was completed under the CERCLA IR Program. Eleven rounds of long-term monitoring of groundwater, sediment, and surface water was completed. LTM was discontinued in 2004 until the ROD. LTM will continue in accordance with the Post ROD LTM Plan
IR Site 8	SWMU 84	Demolition Debris Landfill	NE corner of the intersection of Amphibious Drive and Helicopter Road	RI/FS	A final RI/HHRA/ERA was completed under the CERCLA IR Program. An IRA will be completed in FY05. A NFA ROD for Site 8 is scheduled for FY06.
IR Site 9	SWMU 24	Driving Range Landfill	Near Bldg 3699, NNE Portion of Base, East of Desert Cove	RI/FS	Final ROD is in place. Selected Remedy is Land Use Restrictions (LUCs) and continued Long-term monitoring of groundwater.
IR Site 10	SWMU 25 and SWMU 26	Sewage Treatment Plant Landfill - Desert Cove Landfill (SWMU 25); Sewage Treatment Plant Landfill - South of Desert Cove Landfill (SWMU 26)	Desert Cove Area, just west of former base sewage treatment plant	RI/FS	Final ROD is in place. Selected Remedy is Land Use Restrictions (LUCs) and continued Long-term monitoring of groundwater.
IR Site 11	SWMU 27 and SWMU 28	Former School of Music Plating Shop (SWMU 27); Former School of Music Neutralization Tank (SWMU 28);	School of Music Area, East Central Portion of Base	RI/FS	A final SRI has been completed CERCLA IR Program. Site is currently undergoing investigation for contamination by VOCs. An FS for groundwater treatment is scheduled for FY05
IR Site 12	SWMU 77	NEX Laundry Disposal Area	Bldg 3323 in SE corner of base	RI/FS	A Final RI/HHRA/ERA and a Final FS has been completed. The Preferred Alternative is ISCO with bio-remediation. A PRAP/ROD is scheduled for FY05.
IR Site 13	SWMU 14 and SWMU 15	PWC Wash Rack (SWMU 14); PWC PCP Dip Tank (SWMU 15)	Bldg 3165, in the vicinity of the Public Works Compound; Paved Yard in the Public Works Center compound west of Bldg 3175, East-Central Portion of Base	RI/FS	A Final RI/HHRA/ERA and a Final FS have been completed. The preferred alternative is ISCO with Bio Remediation. A TS was November 2004; injection of ISCO and bio-remediation was completed. Following 1 year of GW monitoring, a FFS will be completed to re-evaluate alternatives.
New SWMU 3	Formerly SWMU 111, was part of IR Site 2, IR Site 2 (sandblast areas) no longer used as each sandblast area now identified as separate SWMUs	Pier 10 Sandblasting Yard	West of Little Creek Channel	RI/FS	Terrestrial and Aquatic portions of SWMU 3 will be seperated for further investigations in the CERCLA process. A Final RI/HHRA/ERA is scheduled for FY 05
New SWMU 7	SWMU 137, formerly part of IR Site 2, IR Site 2 (sandblast areas) no longer used as each sandblast area now identified as separate SWMUs	Small Boats Sandblast Yard - Piers 51-59. In June 2004, The Tier I Partnering Team agreed to separate the terrestrial portion of SWMU 7 from the aquatic portion (Desert Cove). SWMU 7a includes the soil and groundwater of SWMU 7, and SWMU 7b includes the sediment and surface water of desert cove.	Piers 51-59	RI/FS	IRA for lead in surface soil was completed in September 2004. Final RI/HHRA/ERA submitted in December 2004. Conclusions and Recommendations indicated that there is no overall human health or ecological risk in GW or Soil (SWMU 7a). Further investigations are necessary to further assess Ecological risk in Desert Cove (SWMU 7b) sediment. Draft PRAP/ROD for SWMU 7a were submitted for review in February 2005.
New SWMU 8	SWMU 144, formerly part of IR Site 2, IR Site 2 (sandblast areas) no longer used as each sandblast area now identified as separate SWMUs	West Annex Sandblasting Area	Vacant Lot west of the ACU 2 Area in the West Annex	RI/FS	An IRA was completed in September 2004 to removal Outfall sediment posing potential unacceptable ecological risk. Final RI/HHRA/ERA submitted in December 2004. Conclusions and recommendations indicated that there was no overall human health or ecological risk in soil, groundwater, surface water, and sediment, and recommended no further action for the site. NFA PRAP/ROD are scheduled for FY05.
IR Site 6	SWMU 117/4	Special Boat Unit 2 Battery Storage Area / Battery Acid Disposal Area	On the SE corner of Bldg 103, in the SW Area of the Base	Appendix A	On January 27, 1999, EPA, DEQ, and the Navy discussed this site. It was agreed that further investigation was required. Existing information suggests potential problem.SSA will be conducted in FY05.
SWMU 13		Former Pesticide Shop	Building 3170 near Building 3166 and intersection of 6th and F Streets (Off Gator Blvd)	Appendix A	On January 27, 1999, EPA, DEQ, and the Navy discussed this site. It was agreed that further investigation was required. Existing information suggests potential problem.SSA will be conducted in FY05.
New SWMU 5	SWMU 130	Port Ops Boat Painting Area	Port Ops Building 3896, west of piers 56-59	Appendix A	On May 10, 1999, EPA, DEQ, and the Navy discussed the demolition of all buildings in this area. After comparing sampling results to industrial soil RBCs, it was concluded that no special precautions needed to be taken for demolition. SSA will be conducted in FY05.
New SWMU 6	SWMUs 131-133	Seabee Area - CB124	East of Pier 47: South of Desert Cove	Appendix A	EPA, DEQ, and the Navy discussed this site on April 19 and May 10, 1999. Based on comparison of the chemical concentrations found in the soil to Industrial RBCs, EPA and DEQ agreed that NFA was required for the soil. However, due to elevated metals in groundwater recommend the collection of three filtered groundwater samples near the previous locations W1, S2, and W4 using geoprobe or other direct push technology.SSA will be conducted in FY05.
IR Site 11a			North of Site 11	Appendix A	Upgradient groundwater results at Site 11 indicated cVOC contamination. ISCO was used to treat cVOCs in groundwater in March 2004.
SWMU 18		PWC Trans. Garage Spent Battery Shop, Collection Area	North of Public Works Facility Area in Building 3661	Appendix B	Two grab samples will be collected in the grassy area behind the old batteries, composited, and tested for lead and zinc. A picture from '93 indicated another battery storage area. One grab sample will be collected from this area. EPA and DEQ agreed that if the samples are not indicative of a release, NFA will be required for that SWMU.SSA will be conducted in FY05.
SWMU 116		MWR Recreation Boat Maintenance Facility	Bldg 3021 in the northeast corner of the base	Appendix B	Site was sampled during RRRs, soil samples were collected along the fence line in 1995 and analyzed for VOCs and Metals. SSA will be conducted in FY05. EPA has considered analysis for SVOCs may be required. Sample results show lead was not found to be significant, and no significant volitiles were found. Desktop audit is scheduled for FY 05.
AOC D		PCB Transformer Leak	Bldg 3530 Between 5th and 3rd Streets in the SE Corner of the Base	Appendix B	On May 11, 1999, EPA, DEQ, and the Navy visited the AOC and decided that two soils samples will be collected from the north and east sides of the transformer from 0-6" and analyzed for PCBs.

**Table 2-1
Site Status Summary Table
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, Virginia**

Table 2-1

Site ID	Other ID	Name/Description	Location	Status	Comments/Notes
SWMU 30		Leaking Above Ground Diesel Tank	Bldg 3400, in the SE portion of the Base	Appendix C	The 150 gallon diesel tank rests on four steel legs atop an asphalt surface. A concrete berm has been placed around the tank. The tank and the berm are currently in good condition. Any further assessment or remediation will be covered under the SPCC Plan/AST Program. SPCC/AST Site. In June 2003, the team agrees to closeout SWMU 30 with NFA. The CNRMA IR staff will inform CNRMA UST/AST staff of responsibility for any "needed" action.
SWMU 96		CB301 Seabee Vehicle Maintenance Facility Scrap Storage Area	Bldg CB301, South of Desert Cove	Appendix C	Desk top audit was completed in April 2004. NFA due to Seabee activity. This area is an active industrial facility and will be covered under RCRA. A close out report was signed in September 2004.
SWMU 97		CB301 Seabee Vehicle Maintenance Facility Storm Drain	Bldg CB301, South of Desert Cove	Appendix C	Drain located immediately west of the northwest corner of CB301. Further assessment and remediation will be covered under the VPDES Program. Desk top audit was completed in April 2004. NFA due to Seabee activity. This area is an active industrial facility and will be covered under RCRA. A close out report was signed in September 2004.
SWMU 98		CB210 Elevated Causeways Mechanic Shop Material Dispensing Area	Bldg CB210, South of Desert Cove	Appendix C	Desk top audit was completed in April 2004. NFA due to Seabee activity. This area is an active industrial facility and will be covered under RCRA. A close out report was signed in September 2004.
SWMU 119		Former Special Warfare Group 2 Electronics Shop	South of Little Creek Channel, Bldg W112	Appendix C	In March 2004, the Navy, DEQ, and USEPA joint scoped the collection of three groundwater samples from 10-15' bgs for the analysis of TCL VOCs, and TCL SVOCs. Results showed no unacceptable human health or ecological risk. Closeout report was signed in September 2004.
IR Site 14	SWMU 16 and SWMU 17/1	Transformer Storage Area - Old Pole Yard (SWMU 16); Small Transformer Storage Area (SWMU 17/1)	Bldg 3664 across 7th Street from the Public Works Compound, East-Central Portion of Base	Appendix C	NFA was recomd. in IAS; consensus August 2002 Partnering for desktop audit of site and review of historical data and clarification of regulatory standards or action levels for PCBs; some additional sampling may be required in the drum storage area. Following desktop audit, the site became FoF per EPA and DEQ review (3/00). Preliminary Site Screening was conducted in August 2003. Surface and subsurface soil samples were collected in the former drum storage area. Results indicated no human health or ecological risk and the site was recommended for NFA. A Final Close-Out Report was issued and signed in March 2004.
AOC H		Pesticide Mixing Area	Buildings 3109 and 3630, near golf course	Appendix C	On January 27, 1999, EPA, DEQ, and the Navy discussed the site. It was agreed that further action was required, although no specific priority or timeline was assigned. Limited soil sampling for pesticides. Consensus for Appendix B status due to absence of existing data (3/00). Preliminary Screening was conducted in August 2004. Soil (surface and subsurface) were collected. Results indicated no human health or ecological risks at the AOC. USEPA, DEQ, and Navy agreed that NFA was required at the Site. A Final Close-Out report was issued and signed in March 2004. Land use is unrestricted at the site.
AOC I		Golf Course Pond Area	Golf course Hole 9	Appendix C	During the December 2000 partnering meeting, EPA, DEQ and the Navy discussed this site. It was agreed that further action was required, although no specific priority or timeline was assigned. Preliminary Screening was conducted in August 2004. Soil (surface and subsurface) samples were collected and analyzed for Site 9 COCs and results indicated no human health or ecological risk at the site. Additionally one sediment sample was collected in the golf course pond for Site 9 COCs to assess the potential for ecological risk at the site. Results indicated no ecological risk from site runoff in sediment. The Navy, USEPA, and DEQ agreed that NFA was required and a Final Close-Out Report was issued and signed in March 2004. Land use is unrestricted at the site.
AOC J		Burn Area	Across Hewitt Drive from driving range	Appendix C	During the December 2000 partnering meeting, EPA, DEQ and the Navy discussed this site. It was agreed that further action was required, although no specific priority or timeline was assigned. Preliminary Screening was conducted in August 2004. Soil (surface and subsurface) samples and one groundwater sample were collected. The results indicated no human health or ecological risk at the site. The USEPA, Navy, and DEQ agreed NFA was required for the site and a Final Close-Out Report was issued and signed in March 2004. Land use is unrestricted at the site.
SWMU 31		Pier 10 Leaking Above Ground Fuel Tanks	On Pier 10 near Bldg 1263	Appendix C	The three fuel tanks holding JP-5, gasoline, and diesel, were removed in 1995. Drums containing waste oil are still present at the site. However, the drums are resting on a steel platform above a concrete pad in good repair. The pad is bermed by a 4-inch high concrete curb containing a valve that allows release to outside of the bermed area. The area is in compliance with the SPCC Plan, and on June 30, 1999, the site was approved for NFA by the EPA, DEQ, and the Navy. Any further assessment or remediation will be covered under the SPCC Plan/AST Program.
SWMU 32		NEX (East Annex) Gas Station - Battery Storage Area	East end of Base	Appendix C	On March 10, 1999, EPA, DEQ, and the Navy visited the site. Due to the lack of release or stains reported in the RFA, the very small area potentially affected, and the lack of significant contamination detected in 1995, EPA and DEQ agreed that NFA was required for this SWMU.
SWMU 33		NEX (East Annex) Gas Station - Satellite Accum. Area	East end of Base	Appendix C	On March 10, 1999, EPA, DEQ, and the Navy visited the site. Due to the lack of release or stains reported in the RFA, the very small area potentially affected, and the lack of significant contamination detected in 1995, EPA and DEQ agreed that NFA was required for this SWMU.
SWMU 34		NEX Vending Office Used Oil UST	Bldg 3319, Southeast Corner of the Base	Appendix C	The tank was removed in 1990. A Site Characterization was submitted to the DEQ. The Navy received notification from DEQ on August 27, 1991 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 35		PWC Transportation Garage Used Oil UST	Bldg 3661 in East/Central Portion of Site, north of Public Works Facility	Appendix C	The tank was removed in 1989. Site Characterization was submitted to the DEQ. No closure letter was received by the Navy. However, per telephone conversation with Tom Madigan on April 13, 1999, the unit is defined as closed in the DEQ database. The draft RFA stated that the stained soils surrounding the tank fill pipes were removed and disposed. Consensus at June 1999 Partnering NFA since site is under UST program
SWMU 36		Auto Hobby Shop Used Oil UST	Bldg 3530 Between 5th and 3rd Streets in the SE Corner of the Base	Appendix C	The tank was closed in place in 1991. Two Site Characterization Reports have been submitted to DEQ. A Corrective Action Plan was also submitted and approved by the DEQ. Implementation of the CAP began March 1998. Free product is being recovered at the site. The site is monitored weekly Quarterly progress reports are submitted to DEQ. In June 1999, consensus for NFA since site is under UST program.
SWMU 37		CB301-3 Seabee Maintenance Used Oil Tank	CB301-3 South of Desert Cove	Appendix C	The tank was removed under Phase IV of the UST Program. It was replaced with double wall Fiberglass tanks and piping with interstitial monitoring on the tanks and piping. The Navy received notification from the DEQ on September 20, 1994 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 38		ACU-4 Used Oil Tanks	Bldg 3817, slightly west of Desert Cove Area in the north/central portion of the base	Appendix C	Two 2550 gallon USTs were removed in 1992. Navy had no closure letter on file. Status in DEQ database identified tanks as "currently in use." Navy will continue to coordinate with DEQ on these tanks. In June 1999, consensus for NFA since site is under UST program.
SWMU 39		East Annex Gas Station Used Oil Tank	Bldg 3615 in the far eastern portion of the base	Appendix C	The 550 gallon UST installed in 1961 was removed in 1991. The Site Characterization was submitted to the DEQ. The Navy received notification from the DEQ on August 17, 1994 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 40		BMU-2 Used Oil Tank	Bldg 3142, south of the baseball fields in the North/Central portion of the Base	Appendix C	The 550 gallon UST constructed of fiberglass reinforced plastic was installed in 1985 and removed in 1991. A Site Characterization was sent to the DEQ. The Navy received notification from the DEQ on August 16, 1994 that no further assessment or remedial action was necessary at the site.

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Site ID	Other ID	Name/Description	Location	Status	Comments/Notes
SWMU 41		MWR Equipment Rental Used Oil Tank	Bldg 3108, NW of the Public Work Facility	Appendix C	The 550 gallon UST constructed of fiberglass reinforced plastic was installed in 1985 and removed in 1990. A Site Characterization was sent to the DEQ. The Navy received notification from the DEQ on October 18, 1991 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 42		ACU-2 Used Oil Tank 3	Bldg 1231 west of the Little Creek Channel	Appendix C	The 550 gallon UST constructed of fiberglass reinforced plastic was installed in 1981 and removed in 1991. A Site Characterization was sent to the DEQ. The Navy received notification from the DEQ on August 16, 1994 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 43		ACU-2 Used Oil Tank 4	Bldg 1231 west of the Little Creek Channel	Appendix C	The 550 gallon UST constructed of fiberglass reinforced plastic was installed in 1981 and removed in 1991. A Site Characterization was sent to the DEQ. The Navy received notification from the DEQ on August 16, 1994 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 44		NSWG-2 Used Oil Tank	Between Bldgs T-9 and T-11 in the SW Area of the Base	Appendix C	The 550 gallon UST constructed of fiberglass reinforced plastic was installed in 1985 and removed in 1991. A Site Characterization was sent to the DEQ. The Navy received notification from the DEQ on August 16, 1994 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 45	cross-reference with SWMU 139	Naval Special Warfare Group 2 Solvent Tank	Bldg 3806 in the central region of the base, just north of Pier 59	Appendix C	Within the NSWG command are the SEAL Teams. NAB Little Creek is resident command for four SEAL Teams. All four occupy one large compound, of which Bldg 3806 is a part. Only one solvent tank existed in this compound, although three different SWMU numbers were assigned. This is a duplicate of SWMU 139. In June 1999, consensus for NFA since site is under UST program.
SWMU 46		NAMS Used Oil Tank 4	Bldg 3872, in the proximity of Desert Cove	Appendix C	The 500 gallon UST was constructed of stainless steel and installed in 1985. The tank was removed by 1994. The Navy received notification from the DEQ on June 8, 1994 that no further assessment or remediation was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 47		SURTASS-3 Used Oil Tank	Bldg 1558 west of Little Creek Channel	Appendix C	The 4000 gallon UST constructed of fiberglass reinforced plastic was installed in 1985 and used for storage of NORPAR 12. The tank was removed in 1995. The Navy received notification from DEQ on August 15, 1995 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 48		Oil/Water Separator	Bldg 3896, Port Ops, west of piers 56-59	Appendix C	All of the Base Oil/Water Separators discharge to the sanitary sewer system and are therefore covered under the HRSD Permit. The Oil/Water Separators are inspected and cleaned as necessary to prevent releases to the sanitary sewer system. The EPA, DEQ, and Navy discussed these SWMUs on June 30, 1999 and NFA was recommended for these SWMUs.
SWMU 49		Used Oil Tank 1	Bldg 3860, west of Desert Cove in the North/Central portion of the base	Appendix C	The 10,000 gallon UST constructed of fiberglass reinforced plastic and installed in 1976 was removed in 1992. It was replaced with a new double walled 10,000 gallon tank. If additional contamination is discovered, it will be investigated through the UST Program.
SWMU 50		Used Oil Tank 2	Bldg 3860, west of Desert Cove in the North/Central portion of the base	Appendix C	The 500 gallon UST, constructed of steel was removed in 1989. A closure letter was not sent to the Navy and could not be located. The site is listed as "closed" in the DEQ database. It was reiterated by Tom Madigan on April 1, 1999 that the tanks are closed therefore NFA. In June 1999, consensus for NFA since site is under UST program.
SWMU 51		Used Oil Tank 6	Bldg 3530, south of Desert Cove	Appendix C	The 500 gallon UST constructed of stainless steel was installed in 1954 and removed in 1990. A closure letter was not sent to the Navy and could not be located. The site is listed as "closed" in the DEQ database. It was reiterated by Tom Madigan on April 1, 1999 that the tanks are closed therefore NFA. Consensus at June 1999 Partnering NFA since site is under UST program
SWMU 52		CB208 Used Oil Tank	South of Building CB-210, slightly south of Desert Cove	Appendix C	The 550 gallon UST constructed of fiberglass reinforced plastic and installed in 1983 was removed in 1994. The Navy received notification from DEQ on May 27, 1994 that no further assessment or remedial action was necessary at the site. If additional contamination is discovered, it will be investigated through the UST Program.
SWMU 53		CB214 Used Oil Tank	Bldg CB214, directly south of Desert Cove	Appendix C	The 550 gallon UST constructed of fiberglass reinforced plastic and installed in 1983 was removed in 1994. The Navy received notification from DEQ on May 27, 1994 that no further assessment or remedial action was necessary at the site. Consensus at June 1999 Partnering NFA since site is under UST program.
SWMU 54		CB301-4 Seabee Maintenance Used Oil Tank	Bldg CB301-4	Appendix C	The tank was removed under Phase IV of the UST Program. It was replaced with double wall Fiberglass tanks and piping with interstitial monitoring on the tanks and piping. The Navy received notification from the DEQ on September 20, 1994 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program..
SWMU 55		CB315 Used Oil Tank	South of Desert Cove Area	Appendix C	The 550 gallon UST constructed of fiberglass and reinforced plastic was installed in 1983 and removed in 1991. The Navy received notification from DEQ on August 16, 1994 that no further assessment or remedial action was necessary at the site. Consensus at June 1999 Partnering NFA since site is under UST program
SWMUs 56-58		SIMA Used Oil Tanks 2-4	Building 1265 west of Little Creek Channel	Appendix C	All three tanks were 1000 gallon USTs constructed of steel and installed in 1984. SWMU 56 was removed by 1994. SWMUs 57 and 58 were removed in 1991 and replaced with oil/water separators. A Site Characterization was sent to DEQ. The Navy received notification from DEQ on August 16, 1994 that no further assessment or remedial action was necessary. In June 1999, consensus for NFA since site is under UST program.
SWMU 59		Naval/Marine Reserve Center Used Oil Tank 1	SW portion of the base, west of Little Creek Channel	Appendix C	The 550 gallon UST constructed of fiberglass reinforced plastic and installed in 1983 was removed in 1991. The Navy received notification from DEQ on October 18, 1991 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.
SWMU 60		Used Oil Tank	Bldg 3033, north of the Music School	Appendix C	The Navy has closure letter on file. Tom Madigan of TRO-DEQ identified this unit as "closed" in the DEQ database and reiterated that the tanks are closed and NFA is required. In June 1999, consensus for NFA since site is under UST program. If additional contamination is discovered, it will be investigated through the UST Program
SWMU 61		Harbormaster's Office Above Ground Used Oil Tanks	Building 3894, East/Central Portion of Base	Appendix C	Tank has been drained and removed (Draft RFA Navy comment). Because the unit is in good condition and is located in a contained area, the Revised RFA recommended NFA. Consensus for NFA (June 30, 1999).
SWMU 62		CB210 ELCS Mechanic Shop Above Ground Used Oil Tank	CB210 ELCS	Appendix C	Because the unit is in good condition and is located in a contained area, the Revised RFA recommended NFA (June 30, 1999).No releases identified, SWMU managed under SPCC Plan as AST, tank no longer in service.
SWMU 63		Fuel Farm Platform Above Ground Waste Oil Tanks	Bldg 3867, West of Desert Cove	Appendix C	These tanks will be replaced with convault tanks as part of the SPCC upgrade. The EPA, DEQ, and Navy discussed this SWMU on June 30, 1999. EPA and DEQ agreed that as long as the tanks are registered, NFA was required for this SWMU. All tanks over 660 gal are registered at Little Creek. If additional contamination is discovered, it will be investigated through the SPCC Program.
SWMU 64		BMU-2 Maintenance Above Ground Waste Oil Tank	Bldg 3142	Appendix C	Tank replaced with convault AST 10/98, soil sampling during replacement, managed under SPCC Program.Because the unit is in good condition and is located in a contained area, the revised RFA recommended NFA (June 30, 1999).

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SWMUs 65-75		Facility Oil/Water Separators	Facility Wide	Appendix C	The EPA, DEQ, and Navy discussed these SWMUs on June 30, 1999 and NFA was recommended for these SWMUs. All of the Base Oil/Water Separators discharge to the sanitary sewer system and are therefore covered under the HRSD Permit. The Oil/Water Separator are inspected and cleaned as necessary to prevent releases to the sanitary sewer system.
SWMU 76		Hazardous Waste Storage Pad	North of Gates 4 and 5 in the Southeast corner of the Base	Appendix C	Clean closure DEQ letter April 1997. Consensus for NFA.
SWMU 78		Navy Exchange Vending Office Drum Area	Exact location could not be determined after visit to building 3319	Appendix C	Sept, '93, the site was visited, and no drums were present. As part of the UST Program, a Site Characterization has been performed near the SWMU. No contamination was detected. The Navy, EPA, and DEQ visited the site on March 10, 1999 and could not find the drums, or any staining. Consensus for NFA.
SWMU 79		Navy Exchange Vending Office Scrap Yard	SE Portion of Base, Bldg 3319	Appendix C	Site has been vending office since 1954, all items removed, no longer scrap yard. No release noted during VSI, since there is no hazardous waste or hazardous constituents managed, the RFA recommended NFA for this SWMU (June 30, 1999).
SWMU 80		MWR Auto Hobby Shop Paint Booth Filters	Bldg 3530 Between 5th and 3rd Streets	Appendix C	The revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999). Painting operations ceased 1996.
SWMU 81		MWR Auto Hobby Shop Stain in Parking Lot Area	Southeast portion of base between 5th and 3rd Streets	Appendix C	On March 10, 1999, EPA, DEQ, and the Navy visited the site. The oil stains and stressed vegetation around the edges of the parking lot could not be located. The locations of the dumpsters and stains on the picture from the VSI were located. A Site Characterization has been performed near this site as part of the UST Program. No soil or groundwater contamination was detected at the site with the exception of the area immediately surrounding the UST.
SWMU 82		Boone Clinic Medical X-Ray Silver Recovery Unit	Bldg 3505, Medical Clinic Building	Appendix C	No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
SWMU 83		Boone Clinic Dental Clinic	Bldg 3505, Medical Clinic Building	Appendix C	No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
SWMU 85		SIMA Machine Shop	Bldg 1265	Appendix C	In 1998, SIMA vacated the building. No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
SWMU 86		SIMA Grind Shop	Bldg 1265	Appendix C	In 1998, SIMA vacated the building. No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
SWMU 87		SIMA Rewind Shop	Bldg 1265	Appendix C	No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999). In 1998, SIMA vacated the building.
SWMU 88		SIMA Mechanical Calibration Laboratory	Bldg 1265	Appendix C	No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999). In 1998, SIMA vacated the building.
SWMU 89		SIMA Carpentry Shop	Bldg 1265	Appendix C	No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999). In 1998, SIMA vacated the building.
SWMU 90		SIMA Boat Shop Storage Yard Satellite Accum. Area	Exact location could not be determined after visit to building 1265	Appendix C	The revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor. In June 1999, consensus for NFA (June 30, 1999).
SWMU 91		SIMA Cable Rigger Shop Storage Satellite Accum. Area	Bldg 1265	Appendix C	No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999). In 1998, SIMA vacated the building.
SWMUs 92-95		CB301 Seabee Vehicle Maintenance Facility	Bldg CB301, South of Desert Cove	Appendix C	No release identified during VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
SWMU 99		Solid Waste Incinerator Site	Bounded by Helicopter Road to the west, 10th Street to the South, and Hewitt Drive to the East	Appendix C	Operation of unit ended in 1957. The revised RFA recommended NFA for this site because the unit has been removed and there is no evidence of release (June 30, 1999).
SWMU 100		Fuel Farm Loading Platform Underground Storage Tank	Adjacent to Desert Cove near Bldg 3867	Appendix C	Above ground oil tanks (SWMU 63) are associated with this SWMU, this SWMU is also managed under the UST program.
SWMU 101		Beachmaster Unit 2 Satellite Accumulation Area	Southeast of Site 10	Appendix C	On May 11, 1999, the EPA, DEQ, and the Navy visited the site and could not determine its exact location. They resolved that NFA was required.
SWMU 103		Stationary Crane Area	Between Piers 10 and 11 located along Little Creek Cove	Appendix C	Unit removed and no evidence of release and was subsequently recommended for NFA in the revised RFA (June 30, 1999).
SWMU 104		Steam Plant Baghouses	In Building 757 between Murray Road and Amphibious Drive	Appendix C	The unit is in good condition and was recommended for NFA by the revised RFA (June 30, 1999).
SWMU 106		Steam Plant French Drain	In Building 757 between Murray Road and Amphibious Drive	Appendix C	Associated with SWMU 105 and 107, operation began 1956, SWMU also covered under HRSD Permit. The unit is in good condition and was recommended for NFA by the revised RFA (June 30, 1999).
SWMU 107		Steam Plant Coal Pile Leachate Collection System	In Building 757 between Murray Road and Amphibious Drive	Appendix C	Associated with SWMU 105 and 106, operation began 1956, SWMU also covered under HRSD Permit. The unit is in good condition and was recommended for NFA by the revised RFA (June 30, 1999).
SWMU 108		Steam Plant Fuel Tanks and Associated Pipes	In Building 757 between Murray Road and Amphibious Drive	Appendix C	The steam plant fuel tanks were inspected in 1995, and no evidence of leaks was detected. Monitoring was also completed and no evidence of contamination or free product was found. The EPA, DEQ, and the Navy discussed this SWMU on June 30, 1999 and agreed that as long as the tanks were registered, NFA was necessary for this SWMU. Any further assessment or remediation will be covered under the SPCC/AST Program
SWMU 109		Steam Plant Floor Drains	In Building 757 between Murray Road and Amphibious Drive	Appendix C	Drains from the steam plant enter the sanitary sewer system and are covered by the HRSD Permit. Therefore, NFA has been recommended for this SWMU. Status pending verification drains off-line (3/00). Bob confirmed back drains have been sealed, front drains uncertain (3/00).
SWMU 110		90-Day Accumulation Area	Two bays in Bldg 106 and an outdoor storage yard adjacent to Bldg 106	Appendix C	Because the unit is in good condition and is located in a contained area, the Revised RFA recommended NFA (June 30, 1999).
SWMU 112		Pier 10 Sandblasting Area Satellite Accumulation Area	Location cannot be determined	Appendix C	On March 10, 1999, EPA, DEQ, and the Navy visited this SWMU. The best estimate of its former location was determined to be in the middle of the parking lot. Since it is covered, it poses no likely risk to health, EPA and DEQ agreed NFA was required.
SWMU 114		ACU-2 Drum Rack and Tank Area	Building 1522, west of Little Creek Channel	Appendix C	SPCC/AST Site. The ACU 2 drum rack and tank area consists of 100 square foot concrete area surrounded by a berm. The berm will be demolished and removed as part of the SPCC upgrades. All stained soil will be excavated. TPH soil samples to be collected under SPCC and results provided to EPA/DEQ. PWC to provide information.
SWMU 115		ACU-2 Fuel Dispensing Area	Building 1522, west of Little Creek Channel	Appendix C	SPCC/AST Site. Two metal tanks rest on a concrete slab surrounded by a 6-inch concrete berm. This area will be addressed as part of the SPCC upgrades. The existing tanks will be replaced with convaults. The berm will be partially demolished and the rest filled in to form a raised platform for the new tanks. PWC will collect 3 grab samples into one composite for TPH on each log side of berm, 2 grab samples into one composite for TPH; total of 4 composite samples to be collected. PWC to provide information. DEQ close out letter March 15, 2000 received. One composite sample comprised of 7 grabs from the bottom of the excavation Sept 99 for TPH diesel with a result of 422 mg/Kg, excavation backfilled and prefab slab and convault.
SWMU 120		VC-6 Satellite Accumulation Area	Directly South of Pier 6, Bldg 2074	Appendix C	On October 4, 1993, the site was visited, and there was no evidence of stains or releases. On April 19, 1999, EPA and DEQ agreed that NFA was required for this SWMU.

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SWMU 121		Landing Force Trng Cmnd Satellite Accumulation Area	Bldg 3532	Appendix C	No releases identified during the VSI, the revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
IR Site 1		Building 1231 Oil Disposal Area	West of Little Creek Channel	Appendix C	This site was investigated within the UST program. Because the unit is in good condition and is located in a contained area, the Revised RFA recommended NFA. DEQ approved closure of the site in August 1994.
IR Site 3	SWMU 102	West Annex Fuel Leak - Piers 11-19	Piers 11-19 along the west side of Little Creek Channel	Appendix C	This SWMU was included in the IR Program (Site 3). However, NFA was recommended because the site will be monitored and regulated under the UST and VPDES Programs and permits. On August 10, 1999, EPA and DEQ recommended NFA due to coverage under other programs.
IR Site 4		Reserve Center Motor Oil Disposal Area	Naval Marine Reserve Center West of Little Creek Channel	Appendix C	This site was investigated through the UST and IR Program (SWMU 59). DEQ has granted closure of the Site in October 1991. The Navy does not own this land, and did not own it during disposal activities. The Naval Marine Reserve Center is responsible for this area. Site was sampled under IR program as PSI, NFA recomd. in PSI report; April 2003 Consensus for NFA based on UST site.
IR Site 5	SWMU 118	Motor Oil Disposal Area Special Boat Unit Yard	Between Bldgs T-9 and T-11 in the SW Area of the Base	Appendix C	On August 10, 1999, the EPA and DEQ agreed that NFA for site screening was required for this SWMU based on its status as a CERCLA IR Site. DD preparation under CTO 25 in 99 and a risk and FS was needed (March 00). In June 2002, two groundwater samples were collected and no human health risk identified and low to negligible ecological impacts and NFA was recommended. Closeout of Site in September 2002.
IR Site 15	AOC A	PBC Capacitor Spill - Fire Station Number 1	Electric Utility Pole on E Street	Appendix C	In June 2002, four soil samples were collected and no human health or ecological risks were identified, NFA was recommended. Closeout of Site in September 2002.
IR Site 16	AOC B	PCB Capacitor Spill - Pole Number 425	PCB Capacitor Pole located 300 ft east of the intersection of Amphibious Dr. and Helicopter Rd.	Appendix C	In June 2002, six soil samples were collected and no human health or ecological risks were identified, NFA was recommended. Closeout of Site in September 2002.
IR Site 17	SWMU 113	Motor Disposal Area	Bldg 1256, between piers 11 and 12	Appendix C	Oil stained soil removed in 1986; PSI sampling Pb range 7 to 57 ppm; one TPH 2750 in oil stained area. Four surface soil and four subsurface soil samples were collected in 2002 and no stained soil evident. NFA by DEQ in April 2003.
Old SWMU 1		Paint Shop Waterwall- Building 3165	Along Gator Blvd in Bldg 3165 D, two blocks from the baseball diamond	Appendix C	No releases identified 1988 VSI. The revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor. (June 30, 1999)
Old SWMUs 2-5		Wood dust/chip collection bins	Bldgs 3165, 3227, 3334, and 3530	Appendix C	Old SWMU 2 - PWC Carpentry Shop; Old SWMU 3 - Training Service Carpentry Shop; SWMU 4- Manitenance Carpentry Shop; SWMU 5- MWR Carpentry Shop. No releases identified 1988 VSI Since there are no hazardous waste or hazardous constituents managed, the revised RFA recommended NFA (June 30, 1999)
New SWMU 2	SWMU 105	Steam Plant Flyash Silo	In Building 757 between Murray Road and Amphibious Drive	Appendix C	In June 2002, two soil samples and one groundwater sample were collected and no human health or ecological risks were identified, NFA was recommended. Closeout of Site in September 2002.
Old SWMU 6		NEX Maintenance Shop Spent Battery AA	Building 3334, NW of the 5th and B St intersection	Appendix C	No releases identified 1988 VSI. The revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor(June 30, 1999).
Old SWMU 7		NEX Maintenance Shop Satellite Accumulation Area	Building 3334, NW of the 5th and B St intersection	Appendix C	No releases identified 1988 VSI. The revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
Old SWMU 8		Base Exchange (East Annex) Gas Station Dumpster	Building 3615 in the eastern portion of the base	Appendix C	Oily stains were present on the dumpster, the concrete surface, and over the curbed surface and into a grassy area during the VSI. However, On September 20, 1993, photos were taken to compare with the VSI photo. The dumpster was not present. No stains were observed on the grass area behind the curb. On March 9, 1999 EPA and DEQ agreed that NFA was required for this SWMU.
SWMU 9		PWC Training Center Scrap Metal Dumpster	Adjacent to Building 3614	Appendix C	Since there are no hazardous waste or hazardous constituents managed, the revised RFA recommended NFA (June 30, 1999).
SWMU 10		PWC Sheet Metal Shop Scrap Metal Dumpster	Adjacent to Building 3165	Appendix C	Since there are no hazardous waste or hazardous constituents managed, the revised RFA recommended NFA (June 30, 1999).
SWMU 11		Harbormaster Shop Scrap Metal Dumpster	Building 3894 near Port Ops, west of piers 56-59	Appendix C	In the Navy's comments on the draft RFA in August, 1988, it was reported that the dumpster had been removed, oil contaminated soil had been removed, and the area had been covered with asphalt. On March 9, 1999, EPA and DEQ agreed that NFA was required at this site.
SWMU 12		The Former Wharf Building Shop	Near Building 3165 in the proximity of the Public Works Facility	Appendix C	Recommended for NFA for the following reasons: 1) No releases or staining were identified during the VSI. 2) There is no evidence that PCP was ever used in this area. 3) As part of the IRP, sampling has been completed in the area and no PCP contamination was detected in the soil. 4) The area is part of CERCLA IR Site 13. It was determined through the IRP that NFA was required in this area due to lack of contamination. On March 9, 1999, EPA and DEQ agreed to NFA for this site.
SWMU 19		PWC Transportation Garage - Paint Booth Filters	Near Bldg 3661 in East/Central Portion of Base	Appendix C	The revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
SWMU 20		PWC Transportation Garage - Salvage Parts Storage Area	Building 3661 North of the Public Works Facility	Appendix C	The revised RFA suggested that soil sampling be conducted in order to determine if hazardous constituents have been released. Two surface soil and one groundwater sample were taken in 1995. They were analyzed for VOCs, SVOCs, and TAL Metals. Due to lack of contamination detected in this study, and lack of staining observed in susequent visits, on March 10, 1999, the Navy, EPA, and DEQ recommended NFA for this site.
SWMU 21		PWC Transportation Garage - Lubricating Oil Storage Area	Building 3661 North of the Public Works Facility	Appendix C	The Revised RFA suggested that soil sampling be conducted and that samples be analyzed for SVOCs, metals, and PCBs. However, on March 10, 1999, when the Navy, EPA, and DEQ visited the site, it was confirmed that the 3-inch high curb did have a concrete base. The area the drums were stored in was a berm. Due to the integrity of the berm, release to the environment was unlikely. EPA and DEQ agreed NFA was required.
SWMU 22		PWC Transportation Garage - Wash Rack	Bldg 3661 in East/Central Portion of Base	Appendix C	Because the unit is in good condition, the revised RFA recommended NFA (June 30, 1999).
SWMU 23		Rifle Range	NE Corner of Base	Appendix C	NFA recommended for this SWMU due to the approved closure of the Lead Waste Pile by DEQ in July 1995, the EPA definition that munitions are not solid wastes as described above, and the closure requirements under the range rule, independent of RCRA and CERCLA. Consensus during May 1999 partnering meeting the site is regulated under thre Munitiona Rule. TBD status (3/00) for further consideration of Rule on active ranges, Navy policy is no action on active range.
SWMU 29		Harbormaster's Office Area - Paint/Thinner Residue Tank	Bldg 3894; East/Central Portion of base	Appendix C	The fraft RFA stated the tank had been drained and removed. Because the unit is in good condition, the revised RFA recommended NFA (June 30, 1999).
SWMU 122		Gymnasium Emergency Generator	Bldg 3147, Southeast of the Public Works Facility	Appendix C	On May 6, 1999, the location of the generator was identified. No staining or evidence of release was present. EPA, DEQ, and Navy, visited the site on May 11, 1999.
SWMU 127		Amphibious Base Landfill Transfer Station	South of the intersection of Amphibious Drive and Murray Rd.	Appendix C	On April 19, 1999 EPA and DEQ agreed NFA was required for this site.
SWMU 128		Port Ops Lube Oil Dispensing Area Storm Water Drain	Building 3896, near port ops, west of piers 56-59	Appendix C	VPDES Site, Sediment samples directly under the outfall may be required (detailed in August 99 minutes), but the EPA, DEQ, and the Navy have agreed that NFA is necessary for the soil or groundwater near the site.
SWMU 129		Port Ops Satellite Accumulation Area	Port Ops Building 3896, west of piers 56-59	Appendix C	On March 10, 1999, EPA, DEQ, and the navy visited this SWMU. The compound was in good condition, and there was no evidence that releases could have occurred to soil in the area. EPA and DEQ agreed that NFA was required for the soil or groundwater near the site. However, due to reported releases to the storm drain, sediment samples were proposed but due to Navy policy they were not collected.

Table 2-1
 Site Status Summary Table
 FY 2006 Site Management Plan
 NAB Little Creek, Virginia Beach, Virginia

Table 2-1

Site ID	Other ID	Name/Description	Location	Status	Comments/Notes
SWMU 134		Portable Waste Oil Tanks Piers 51-59	Piers 51-59	Appendix C	New portable waste oil tanks with the proper secondary containment are now in use at the piers. In June 1999, consensus for NFA. Any further assessment or remediation will be covered under the SPCC Plan/AST Program
SWMU 135		Hydraulic Fuel Leak	Piers 51-59; dog leg of the pier near building 3882	Appendix C	The leak described in the Revised RFA cannot be located. No evidence of staining or release was present at the estimated location of the site. On May 11, 1999, the EPA and DEQ visited the site and determined that NFA was necessary
SWMU 136		Mobile Diving Salvage Unit II Salvage Area - Piers 51-59	Piers 51-59	Appendix C	On May 11, 1999, EPA, DEQ, and the Navy visited the area described. No staining was found. A new building has been built on top of the site. Thus, the EPA and DEQ determined that NFA was necessary.
SWMU 138		SEAL Team 4 Satellite Accumulation Area	Building 3806 South of Desert Cove	Appendix C	On April 19, 1999, EPA, DEQ, and the Navy visited this SWMU. EPA and DEQ agreed that NFA was required for the soil or groundwater near the site. However, due to reported releases to the storm drain, sediment samples under the outfall NR-26A, 33, and 34. For each outfall, 6 samples from 3 locations at 0-4" and 12-18" depth for metals and SVOCs were proposed but not collected due to Navy policy.
SWMU 139	Cross-referenced with SWMU 45	SEAL Team 4 Waste PD 680 Tank	Bldg 3806 South of Desert Cove	Appendix C	The 200 gallon tank constructed of fiberglass reinforced plastic and installed in 1983 was removed in 1990. The Navy received notification from the DEQ on October 18, 1991 that no further assessment or remedial action was necessary at the site. In June 1999, consensus for NFA since site is under UST program.

Table 2-1
Site Status Summary Table
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, Virginia

Table 2-1

Site ID	Other ID	Name/Description	Location	Status	Comments/Notes
SWMU 140		SEAL Team 4 Spent Battery Staging Area	Bldg 3806 South of Desert Cove	Appendix C	The revised RFA stated that this site is recommended for NFA because it is located inside a building or under a roof with a concrete floor (June 30, 1999).
SWMU 141		SEAL Delivery Vehicle 4 Satellite Accumulation Area	Building 3806 South of Desert Cove	Appendix C	On April 19, 1999, EPA, DEQ, and the Navy visited this SWMU. EPA and DEQ agreed that NFA was required for the soil or groundwater near the site. However, due to reported releases to the storm drain, sediment samples under the outfall NR-26A, 33, and 34. For each outfall, 6 samples from 3 locations at 0-4" and 12-18" depth for metals and SVOCs were proposed but not collected due to Navy policy.
SWMU 142	Cross-referenced with SWMU 139 and SWMU 45	SEAL Delivery Vehicle 4 Waste PD 680 Tank	Bldg 3806 South of Desert Cove	Appendix C	Within the NSWG command are the SEAL Teams. NAB Little Creek is resident command for four SEAL Teams. All four occupy one large compound, or which Bldg 3806 is a part. Only one solvent tank existed in this compound, although three different SWMU numbers were assigned. This is a duplicate of SWMU 139.
SWMU 143		Former Seabee Vehicle Maintenance Facility - CB201	Bldg CB201: South of Desert Cove	Appendix C	EPA and DEQ agreed that NFA was required for soil or groundwater near the site as long as it could be confirmed that the tanks for the gas station had been properly closed. Since there is no storm sewer or catch basin to sample sediments, EPA and DEQ decided on NFA for this site on June 30, 1999.
SWMU 145		Fuel Oil Tank	Bldg 3029, Fire Station 1, near the golf course	Appendix C	This SWMU no longer exists. The area where Bldg 3029 (Fire Station #1) was located is now an open field. The tank has been removed, and there is no evidence of oil staining. NFA consensus at June 1999 Partnering pending a site visit. Any further assessment or remediation will be covered under the SPCC Plan/AST Program
SWMU 146		SEAL Team 2 Material Storage Area	Bldg 3813: North of Pier 59	Appendix C	On April 19, 1999, EPA, DEQ, and the Navy visited this SWMU. EPA and DEQ agreed that NFA was required for the soil or groundwater near the site. However, due to reported releases to the storm drain, sediment samples under the outfall NR-26A, 33, and 34. For each outfall, 6 samples from 3 locations at 0-4" and 12-18" depth for metals and SVOCs were proposed but not collected due to Navy policy.
SWMU 147		Facility Storm Sewers/Drains	Throughout Facility	Appendix C	The storm water system is covered by a VPDES permit. Both the draft Subpart S and the RFA guidance state that it is not the EPA's position to include releases permitted under other environmental laws in the corrective action program. Therefore, NFA is recommended (June 1999).
AOC C		Non-PCB Transformer Leak	Building 366, north of Public Works Facility	Appendix C	After confirming that the transformer did not contain PCBs, the DEQ, EPA, and Navy discussed this AOC and agreed that NFA was required on May 11, 1999.
AOC E		Non-PCB Transformer Leak	Adjacent to Port Ops, Building 3896	Appendix C	After confirming that the transformer did not contain PCBs, the DEQ, EPA, and Navy discussed this AOC and agreed that NFA was required on May 11, 1999.
AOC F		Emergency Generator Leak - Pier 59	Pier 59	Appendix C	On April 19, 1999, EPA and DEQ agree that NFA is required for the AOC.
AOC G		Emergency Generator Leak - Fire Station Number 1	Fire Station #1; Building 3029	Appendix C	The area where Bldg 3029 (Fire Station #1) was located is now an open field. The generator has been removed and there is no evidence of any oil staining. On April 19, 1999, EPA and DEQ agreed that NFA was required for this AOC.

**Table 2-2
Environmental Studies, Investigations, and Actions Conducted to Date at IR Sites, SWMUs, and AOCs Identified in the FFA
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, Virginia**

IR Site or SWMU	Preliminary Studies		Preliminary Investigations	Removal Actions	Remedial Investigations	Feasibility Studies	Decision Docs	Remedial Designs/Actions	Site Closeouts
	1984 IAS	1989 RFA							
CERCLA RI/FS Process Sites									
IR Site 7	X	X	RVS - Oct 1986 IRI - Nov 1991		RI - Nov 1994 (FWES) Revised RI/HHRA/ERA - November 2004	PFS - Nov 1994 FS - Nov 1995	PRAP - Oct 1997 DD - Jan 1998	RD - Mar 1998 RA - Jun 1998 6-YR LTM - 1998 to 2003 EE/CA for canal sediment- March 2005	
IR Site 8	X	X	SI - Dec 1999	RA - Jan 2002	RI/HHRA/ERA - November 2004			EE/CA - Jan 2005	Construction Completion - Jun 2002
IR Site 9	X	X	RVS - Oct 1986 IRI - Nov 1991		RI - Nov 1994 RI - Feb 2001	PFS - Nov 1994 FFS - Feb 2001	Draft PRAP/DD - 1996 PRAP - Mar 2001 ROD - Dec 2003	Final 5-YR LTM - 1996 to 2000 3-YR Report - Jul 1999 (Draft) Draft Round 12 LTM Report and Data Trend Analysis of Rounds 1-12 - Dec 2003 Final Round 12 LTM Report and Data Trend Analysis of Rounds 1-12 - Sept 2004	
IR Site 10	X	X	RVS - Oct 1986 IRI - Nov 1991		RI - Nov 1994 RI - Feb 2001	PFS - Nov 1994 FFS - Feb 2001	Draft PRAP/DD - 1996 PRAP - Mar 2001 ROD - Dec 2003	Final 5-YR LTM - 1996 to 2000 3-YR Report - Jul 1999 (Draft) Draft Round 12 LTM Report and Data Trend Analysis of Rounds 1-12 - Dec 2003 Final Round 12 LTM Report and Data Trend Analysis of Rounds 1-12 - Sept 2004	
IR Site 11	X	X	RVS - Oct 1986 IRI - Nov 1991	DD (soil) - Nov 1994 IRA (soil) - Nov 1995 CO Report (soil) - May 1996	RI - Nov 1994 1-Yr GWM - 1996 SRI - June 2004	PFS - Nov 1994	DD - Nov 1994	CD Pilot Study - 2002	
IR Site 12	X	X	RVS - Oct 1986 IRI - Nov 1991 EA Phase I - Aug 1990 EA Phase II - Apr 1991 SCR - Jun 1992		RI - Nov 1994 SRI - Dec 2000	PFS - Nov 1994 Final FS -March 2004	Draft PRAP - March 2005		
IR Site 13	X	X	RVS - Oct 1986 IRI - Nov 1991	EE/CA (soil) - Mar 1999 IRA (soil) - Apr 1999 Closeout Report (soil) - Jul 1999	RI - Nov 1994 SRI - May 2002	PFS - Nov 1994 Final FS - June 2004		ORC Pilot Study - 2001 Final ORC Groundwater Remediation Report - Mar 2003 GW Treatability Study - November 2004	
"New" SWMU 3 (SWMU 111)		X	SI - Dec 1999 RRR - Jan 1996		RI - Aug 2002 Draft RI/HHRA/ERA Report - June 2004				
"New" SWMU 7 (SWMU 137)		X	SI with BERA - November/December 2002	EE/CA (SMWU 7a) - June 2004 IRA for Lead in Soil - September 2004	RI - Aug 2002 RI/HHRA/ERA Report - Dec 2004		Final PRAP (SWMU 7a) - March 2005 Draft ROD (SWMU 7a) - Feb 2005		
"New" SWMU 8 (SWMU 144)		X	SI with BERA - November/December 2002	EE/CA (soil) - Nov 2000 EE/CA for outfall sediment - June 2004 IRA for outfall sediment - September 2004	RI - Aug 2002 Final RI/HHRA/ERA Report - Dec 2004		Final PRAP - March 2005 Draft ROD - Mar 2005		SCR - Feb 2001
FFA Appendix A Sites									
Site 11a			SI - Nov 2002 Supplemental investigation - Sept 2003 (MIP) and Feb 2004					Treatability Study WP - Jan 2005	
IR Site 6 ("New SWMU 4 (117))	X	X							
"New" SWMU 5 (SWMU 130)		X	RRR - Jan 1996						
"New" SWMU 6 (SWMU 131-133)		X	RRR - Jan 1996						
SWMU 13		X							
FFA Appendix B Sites									
SWMU 18	X	X							
SWMU 116		X	RRR - Jan 1996						
AOC D		X							

BERA: Baseline Ecological Risk Assessment	IAS: Initial Assessment Study	RD: Remedial Design
CD: Cyclodextrin	IRA: Interim Removal Action	RFA: RCRA Facility Assessment
DD: Decision Document	IRI: Interim Remedial Investigation	ROD: Record of Decision
EA: Environmental Assessment	LTM: Long Term Monitoring	RRRS: Relative Risk Ranking System
EE/CA: Engineering Evaluation and Cost Analysis	ORC:Oxygen Release Compound - TM	RVS: Round 1 Verification Step
FFA: Federal Facility Agreement	PFS: Preliminary Feasibility Study	SCR: Site Closeout Report
FFS: Focused Feasibility Study	PRAP: Proposed Remedial Action Plan	SI: Site Inspection
FS: Feasibility Study	PSI: Preliminary Site Inspection	SRI: Supplemental Remedial Investigation
GWM: Groundwater Monitoring	RA: Remedial Action	WP: Work Plan



Legend

- Sites In the CERCLA RI/FS Process
- Sites Requiring Screening (FFA Appendix A)
- Sites Requiring Desktop Audits (FFA Appendix B)
- Sites with a final ROD and LUCS

Note: Highlighted areas only illustrate Site/SWMU/AOC locations and do not depict aerial extent of investigations.



Figure 2-1
Locations of IR Further Action Sites, SWMUs and AOCs
Five-Year Site Management Plan For FY 2006
Naval Amphibious Base Little Creek
Virginia Beach, Virginia



Legend
 ● FFA No Further Action Sites

Note: Highlighted areas only illustrate Site/SWMU/AOC locations and do not depict aerial extent of investigations.

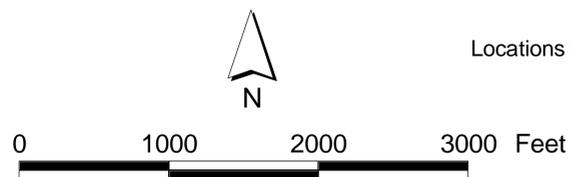
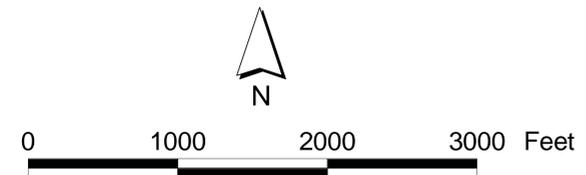


Figure 2-2
 Locations of IR Sites, SWMUs and AOCs Requiring No Further Action
 Five-Year Site Management Plan For FY 2006
 Naval Amphibious Base Little Creek
 Virginia Beach, Virginia



- Legend**
- Sites Under Investigation
 - No Further Action Sites
 - Potential Impacted Areas
 - Groundwater Plumes
 - Soil Contamination
 - Removal Action Areas

POC: Please contact Lora Fly, CNRMA IR Program Manager at 887-4933



Installation Restoration Program
 Potential Impacted Areas
 NAB Little Creek
 Virginia Beach, Virginia

SECTION 3

Proposed Activities

This section summarizes ongoing and planned IR/CERCLA activities at each site. The discussion focuses on activities that are proposed for FY 2006 through 2010. Additional scope items may be identified during or as a result of the execution of the activities discussed herein.

The review and comment periods were based on FFA guidelines and flow charts depicting the process are included as Figures 3-13 through 3-15. The schedules derived from these guidelines assume informal dispute resolution.

3.1 Site Characterization and Remediation Activities for 2006 through 2010

3.1.1 Basewide Activities

NAB Little Creek base activities consist of:

- Annual SMP Update
- Revised Master Project Plans as necessary
- CERCLA Five Year Review

The 5-year schedule for NAB Little Creek activities are presented in Figure 3-1.

3.1.2 Site 7—Amphibious Base Landfill

Planned activities at Site 7 consist of:

- Interim Removal Action for canal sediment
- Focused Feasibility Study
- PRAP and ROD
- RD
- Remedial Action

The 5-year schedule for Site 7 is presented in Figure 3-2.

3.1.3 Site 8—Demolition Debris Landfill

Planned activities at Site 8 consist of:

- Interim Removal Action
- Revised Final RI/HHRA/ERA
- NFA PRAP and ROD

The 5-year schedule for Site 8 is presented in Figure 3-3.

3.1.4 Site 9 (Driving Range Landfill) & Site 10 (Sewage Treatment Plant Landfill)

Planned activities at Sites 9 and 10 consist of:

- Maintain LUCs and LTM in accordance with the RD

The 5-year schedule for Sites 9 and 10 is presented in Figure 3-4.

3.1.5 Site 11—School of Music Plating Shop

Planned activities at Site 11 consist of:

- FS
- PRAP and ROD
- RD
- Remedial Action

The 5-year schedule for Site 11 is presented in Figure 3-5.

3.1.6 Site 12—Exchange Laundry Waste Disposal Area

Planned activities at Site 12 consist of:

- PRAP and ROD
- RD
- Groundwater Treatment Implementation Plan
- Treatment Train Optimization

The 5-year schedule for Site 12 is presented in Figure 3-6.

3.1.7 Site 13—Public Works PCP Dip Tank and Wash Rack

Future activities at Site 13 consist of:

- Treatability Study Report
- Feasibility Study Addendum
- PRAP and ROD
- RD
- Remedial Action
- Remedial Action Completion Report

The 5-year schedule for Site 13 is presented in Figure 3-7.

3.1.8 “New” SWMU 3—Pier 10 Sandblast Yard

Future activities at SWMU 3 consist of:

- Finalize RI/HHRA/ERA
- Phase II SRI
- FS
- PRAP and ROD
- RD

The 5-year schedule for SWMU 3 is presented in Figure 3-8.

3.1.9 “New” SWMU 7b—Small Boat Sandblast Yard Piers 51-59 (Aquatic)

Future activities at SWMU 7b consist of:

- BERA (as necessary)
- FS
- PRAP and ROD

The schedule for SWMU 7b is presented in Figure 3-9.

3.1.10 Site 11a—TCE Plume Adjacent to Site 11

Future activities at Site 11a consist of:

- Treatability Study
- Closeout Report

The schedule for Site 11a is presented in Figure 3-10.

3.1.11 Appendix A and B Site Screening Process (SSPs)

Future activities for SSA sites consist of:

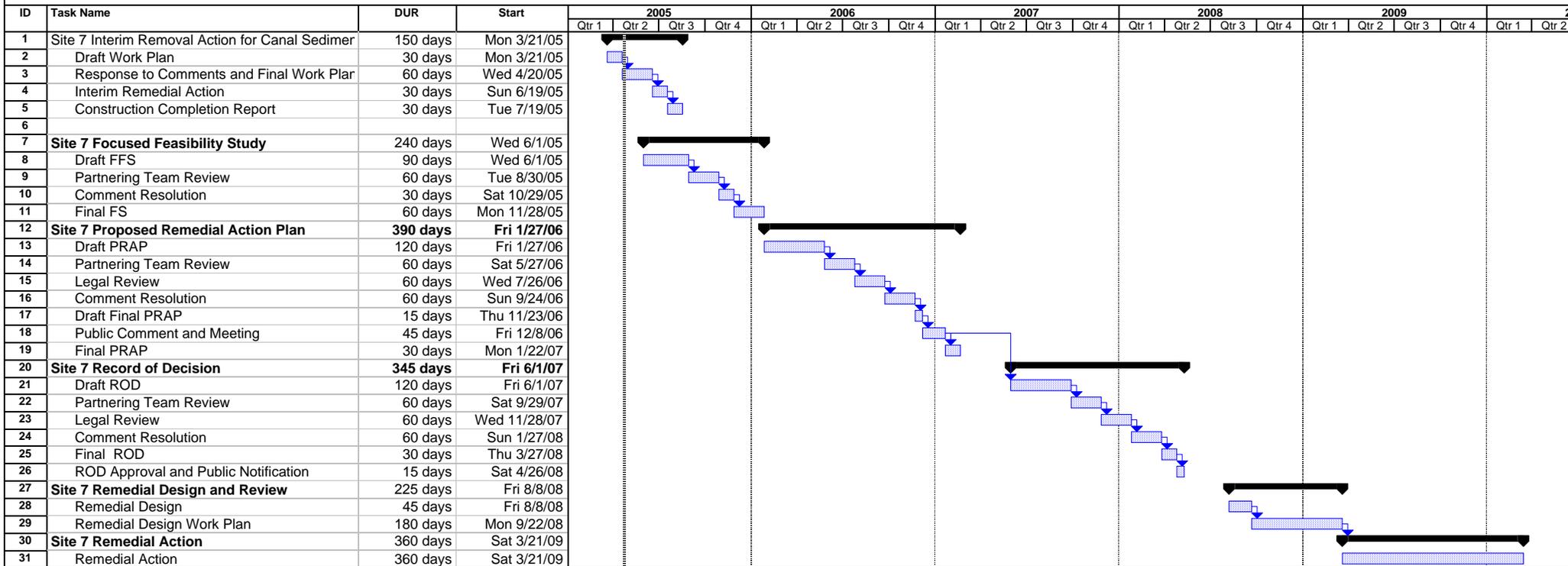
- SSAs for Site 6, SWMU 5, SWMU 6, SWMU 13, SWMU 18, SWMU 116, and AOC D

The schedule for the SSA sites is presented in Figure 3-11.

3.1.12 Skeet Range

Proposed activities at the Skeet Range are currently being developed. The five year schedule is presented in Figure 3-12.

**Figure 3-2
Schedule for Site 7 - Amphibious Base Landfill
FY 2005 Site Management Plan
NAB Little Creek, Virginia Beach, VA**

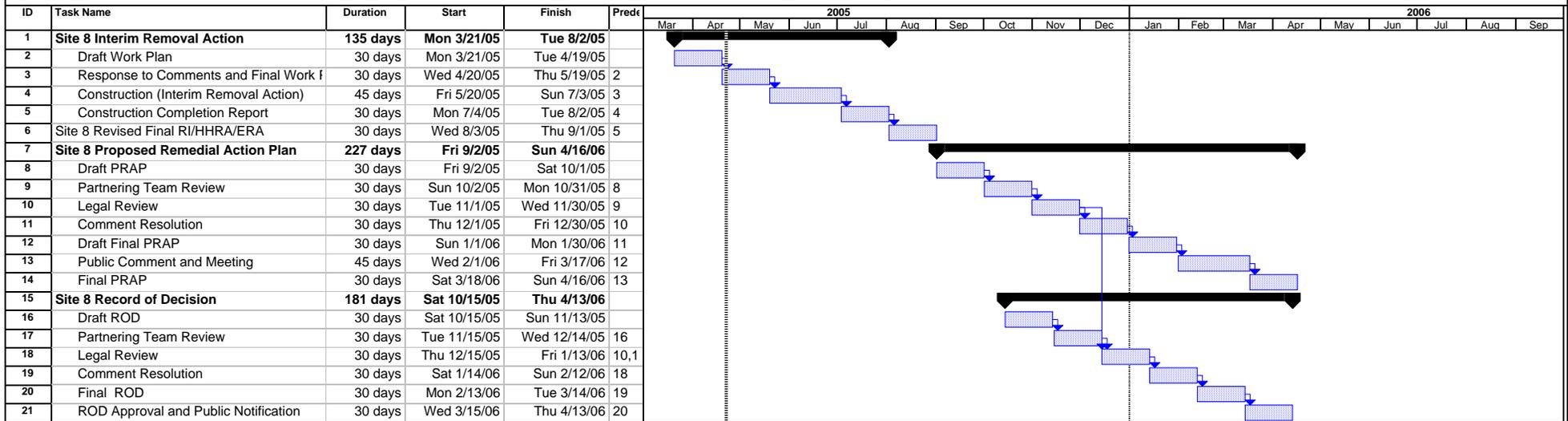


Date: Fri 4/22/05
Revised: Fri 4/22/05

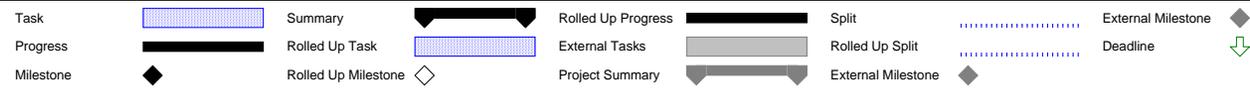
Task		Summary		Project Summary		Rolled Up Split		External Milestone	
Milestone		External Tasks		Split		External Milestone		Deadline	

Note: The review and submittal dates are based on the FFA Process Flow Charts (Figures 4-13 through 4-15) or dates previously agreed upon and assume informal dispute resolution of Draft Final Documents within a reasonable number of days. Page 1 of 1

**Figure 3-3
Schedule for Site 8 - Demolition Debris Landfill
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, Virginia**



Project: CTO74_99
Date: Fri 4/22/05



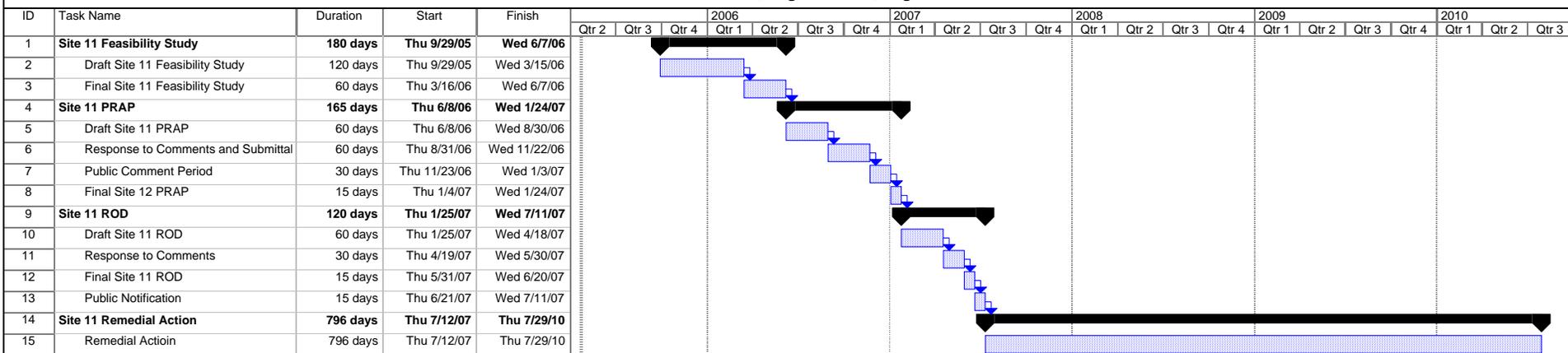
**Figure 3-4
Schedule for Sites 9 and 10
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, VA**

ID	Task Name	DUR	Start	Finish	02	2003		2004		2005		2006		2007		2008		2009		2
					H2	H1														
1	Sites 9 and 10 Remedy in Place	2117 days	Mon 12/15/03	Wed 9/30/09																
2	Sites 9 and 10 LTM/ O&M	2117 days	Mon 12/15/03	Wed 9/30/09																

Date: Fri 4/22/05
Revised: Fri 4/22/05

Task		Summary		Project Summary		Rolled Up Split		External Milestone	
Milestone		External Tasks		Split		External Milestone		Deadline	

**Figure 3-5
Schedule for Site 11- School of Music Plating Shop
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, Virginia**



Project: SMPSte11_06_D.mpp
Date: Fri 4/22/05

Task  Progress
Split  Milestone

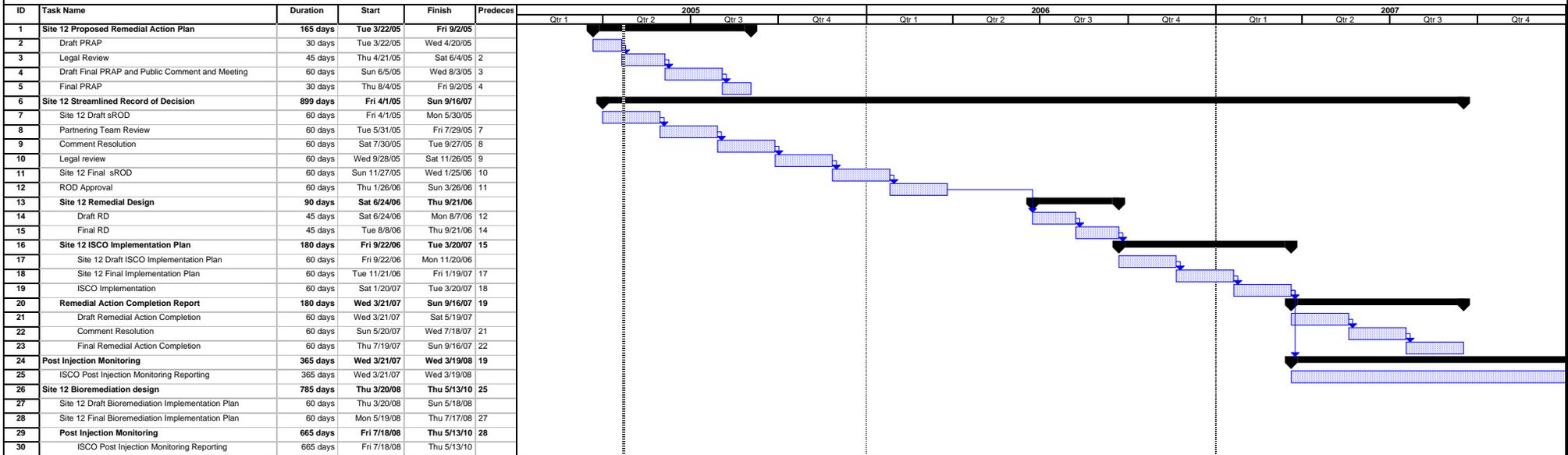
 Summary
 Project Summary

 External Tasks
 External Milestone

 Deadline




**Figure 3-6
Schedule for Site 12 - Exchange Laundry Waste Disposal Area
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, VA**

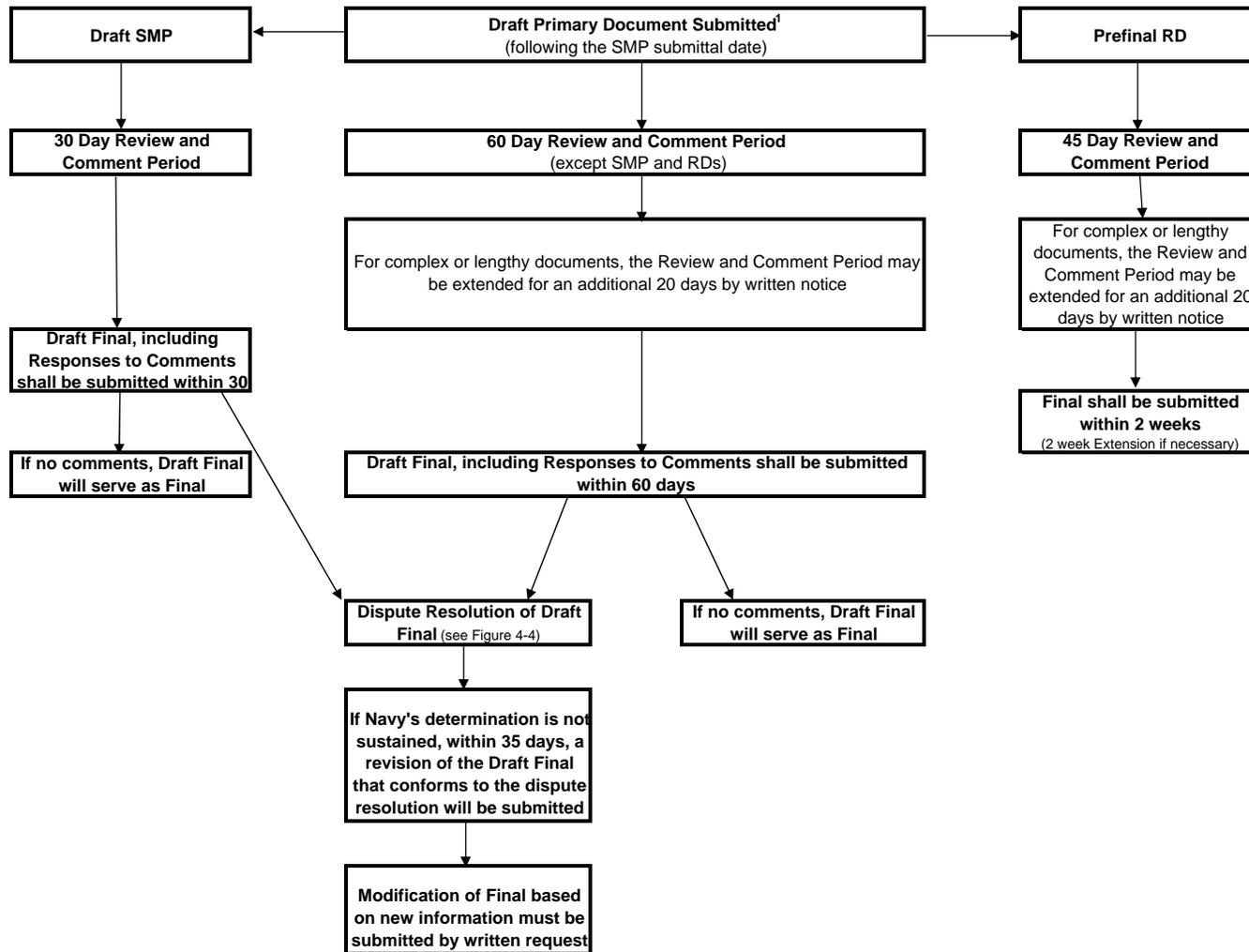


**Figure 3-12
Schedule for Skeet Range
FY 2006 Site Management Plan
NAB Little Creek, Virginia Beach, Virginia**

ID	Task Name	DUR	Start	Finish	2006				2007				2008				2009				2010			
					Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4		
1	Skeet Range	1827 days	Fri 9/30/05	Thu 9/30/10																				
2	NAB Little Creek Skeet Range	1827 days	Fri 9/30/05	Thu 9/30/10																				

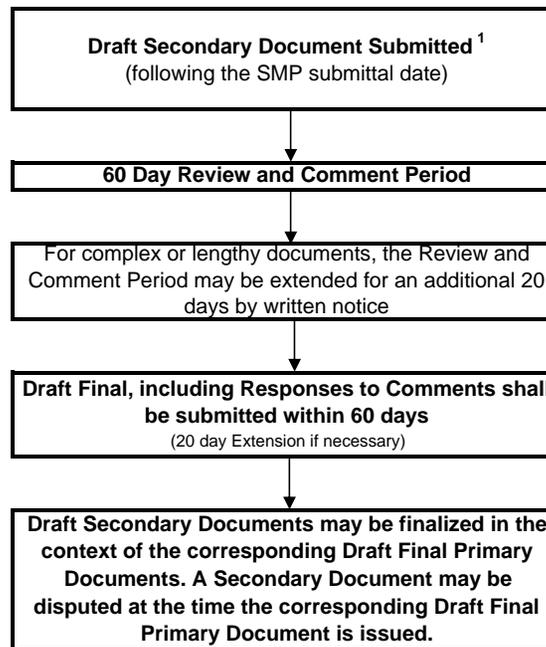
Date: Fri 4/22/05 REVISED: Fri 4/22/05	Task		Summary		Rolled Up Progress		Split		External Milestone	
	Progress		Rolled Up Task		External Tasks		Rolled Up Split		Deadline	
	Milestone		Rolled Up Milestone		Project Summary		External Milestone			

**Figure 3-13
Primary Document Submittal Flow Chart
FFA Process
NAB Little Creek
Virginia Beach, Virginia**



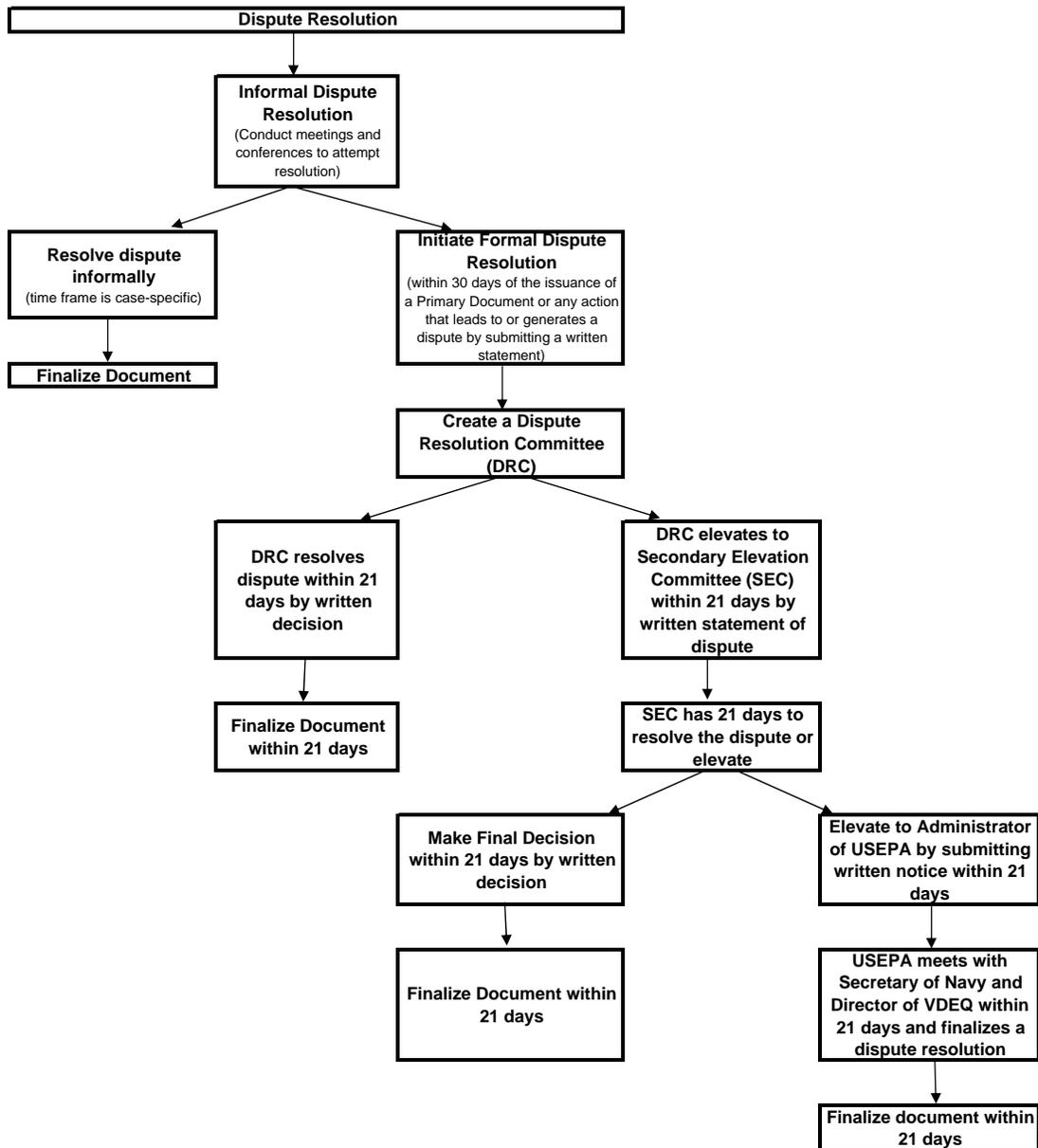
¹Little Creek Primary Documents Include: Remedial Investigation (RI)/Feasibility Study (FS)/Focused Feasibility Study (FFS) Work Plans, RI Reports, FS and FFS Reports, Proposed Remedial Action Plans (PRAPs), Records of Decision (RODs), Final Remedial Designs (RDs), Remedial Action Work Plans, Remedial Action Completion Reports (RACRs), and Site Management Plans (SMPs)

Figure 3-14
Secondary Document Submittal Flow Chart
FFA Process
NAB Little Creek
Virginia Beach, Virginia



¹Little Creek Secondary Documents Include: Health and Safety Plans (HSPs), Non-Time-Critical Removal Action (NTCRA) Plans, Pilot/Treatability Study Work Plans and Reports, Engineering Evaluation/Cost Analysis (EE/CA) Reports, Well Closure Methods and Procedures, Preliminary/Conceptual Designs or equivalents, Prefinal Remedial Designs (RDs), Periodic Reviews/5-Year Review Assessment Reports, Removal Action Memorandums, Preliminary Closeout Reports (PCORs)/Final Closeout Reports (FCORs)

Figure 3-15
Dispute Resolution Flow Chart
FFA Process
NAB Little Creek
Virginia Beach, Virginia



SECTION 4

Remedial Actions and Removal Actions

RAs are conducted to prevent a potential release of contaminants and/or further migration of contaminants to ensure the protection of human health and the environment. Site-specific remedial and removal actions conducted to date are discussed in the site descriptions presented in Section 2 of this SMP. FY05 and FY06 proposed remedial and removal actions at NAB Little Creek sites are presented below.

4.1 Site 7 – Former Amphibious Base Landfill

A NTCRA is scheduled for implementation at Site 7 in FY 2005. The removal action will include excavation of contaminated sediment in the western canal north of the collapsed culvert south to the abutment of Amphibious Drive. The EE/CA evaluating alternatives to remediate the canal sediment was finalized in February 2005.

4.2 Site 8 – Demolition Debris Landfill

An NTCRA is scheduled for implementation at Site 8 in FY 2005. The landfill contents and associated debris piles in sediment (DP 13 and pond 2) will be excavated and tidal wetlands will be constructed. The EE/CA evaluating the alternatives to remediate potential unacceptable risks at Site 8 was finalized in January 2005.

4.3 Site 12 – Former Exchange Laundry/Dry Cleaning Facility

A ROD is expected to be completed in FY 2005. Remedial action implementation is scheduled to commence at Site 12 in late FY 2005. The selected remedial action is expected to be groundwater treatment through in-situ chemical/bioaugmentation technology, and post-injection monitoring of the natural degradation of chlorinated volatile organic compounds (cVOCs). Land use controls (LUCs) will be maintained until site conditions are acceptable for unlimited exposure and unrestricted use.

Navy Land Use Planning

5.1 Navy Planning

The NAB Little Creek IRP has developed a geographical information system (GIS) that identifies all areas of past or present environmental concern. Attachment A identifies the IR sites and identifies the boundaries of potential environmental impact areas, including the extent of groundwater and soil contamination. Sites with LUCs in place are identified on Table 5-1. A CD is provided with the GIS layers in Arcview® as displayed on Attachment A. This information is available to Base Planning personnel for environmental considerations during Base operational planning and decision making. This GIS information will also be used by Base Planning personnel to ensure that land-use controls are maintained at IR sites where the ROD identifies LUCs as part of the remedy.

If in the event DoD activities will influence the areas outlined or highlighted in Attachment A, the Navy Regional Project Manager should be consulted. Contact information is listed below:

Ms. Lora Fly
Commander, Navy Region Mid-Atlantic
Regional Environmental Group
Naval Weapons Station Yorktown
Building 406, Code N455
Yorktown, Virginia 23691

**Table 5-1
 Land Use Controls at NAB Little Creek
 FY 2006 Site Management Plan
 NAB Little Creek, Virginia Beach, Virginia**

IR Site or SWMU	Site Name	Date of Final ROD	Location on NAB Little Creek	Land Use Controls
Site 9	Driving Range Landfill	15-Dec-03	Near Bldg 3699, NNE Portion of Base, East of Desert Cove	1) Prohibit digging into or disturbing the existing soil cover or contents of the landfill 2) Prohibit residential development on the site 3) Prohibit use of the shallow aquifer groundwater beneath the sites other than for environmental monitoring and testing
IR Site 10	Demolition Debris Landfill	15-Dec-03	Desert Cove Area, just west of former base sewage treatment plant	1) Prohibit digging into or disturbing the existing soil cover or contents of the landfill 2) Prohibit residential development on the site 3) Prohibit use of the shallow aquifer groundwater beneath the sites other than for environmental monitoring and testing

SECTION 6

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