

01.09-5/1/2000 -00392

Final
**Work Plan
And
Sampling and Analysis Plan
Site Investigations at
SWMU 7/137, and
SWMU 8/144**

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

Contract Task Order 098

May 2000

Prepared for

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

Under the

**LANTDIV CLEAN II Program
Contract N62470-95-D-6007**

Prepared by



CH2MHILL

Virginia Beach, Virginia

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Acronyms and Abbreviations

ABM	Abrasive Blast Material
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CLEAN	Navy Comprehensive Ling Term Environmental Action Navy
CLP	Contract Laboratory Program
COC	Chain of Custody
CTO	Contract Task Order
DEQ	Department of Environmental Quality
DQO	Data Quality Objectives
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
GPS	Global Positioning System
HASP	Health and Safety Plan
IDWP	Investigation Derived Waste Plan
IR	Installation Restoration
IRP	Installation Restoration Program
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAVFACENGC	Naval Facilities Engineering Command
NFA	No Further Action
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyls
PWC	Public Works Center
QAPP	Quality Assurance Project Plan
RA	Risk Assessment
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RRRS	Relative Risk Ranking System
SI	Site Investigation
SOP	Standard Operating Procedure
SPSA	Southeastern Public Service Authority
SVOC	Semi-volatile Organic Compounds
SWMU	Solid Waste Management Unit

ACRONYMS AND ABBREVIATIONS (CONTINUED)

TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOX	Total Organic Halogen
TPH	Total Petroleum Hydrocarbons
VOC	Volatile Organic Compounds
WP	Work Plan

1.0 Introduction

This work plan describes the activities that will be conducted as part of Site Investigations (SI) at SWMU 7/137, and SWMU 8/144 at the Naval Amphibious Base (NAB) Little Creek, Virginia Beach, Virginia. The plan is prepared under the Naval Facilities Engineering Command (NAVFACENGCOM) LANTDIV Navy Contract N62470-95-D-6007, Navy Comprehensive Long Term Environmental Action Navy (CLEAN), District III, Contract Task Order - 098. The two sites addressed by this work plan are:

- SWMU 7 - Small Boats Sandblast Yard, Desert Cove
- SWMU 8 - West Annex Sandblast Area

SWMU 7, and SWMU 8 were formerly referred to in the 1989 Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) as SWMU 137 and SWMU 144, respectively. Additionally, Installation Restoration (IR) Site 2 Sandblast Areas included SWMU 7 and SWMU 8. Reference to these SWMUs as IR Site 2 has been discontinued.

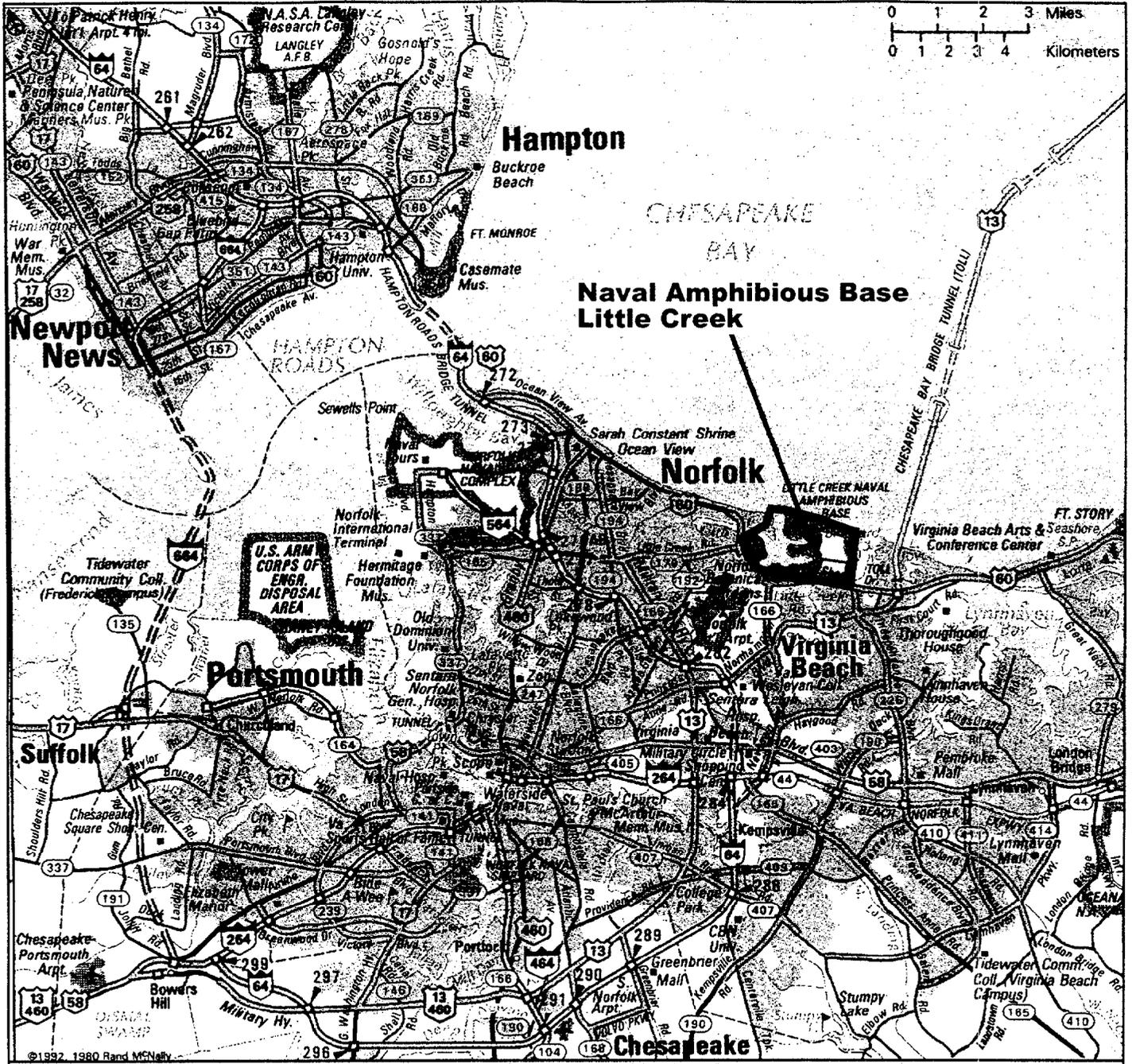
The general background and physical setting of NAB Little Creek in addition to information detailing previous site investigations are described in Sections 2 and 3 of the Master Project Plans (CH2M HILL, March 1999). Master Project Plans also provide detailed descriptions of field procedures. A regional location map of NAB Little Creek is provided as Figure 1-1 and a facility map is provided as Figure 1-2.

Previous investigations and site inspections have identified SWMU 7, and SWMU 8 as requiring environmental consideration. In the southwestern portion of SWMU 7, a soil and groundwater investigation was conducted by ATEC Environmental prior to the construction of building CB125 (ATEC, 1989). No sampling events have been conducted at SWMU 8. However, due to the existence of exposed abrasive blast material (ABM), further investigation is deemed necessary. ABM consists of sand-blast grit and paint chips derived from sand blast activities for the removal of paint from ships, and is also commonly referred to as "black beauty." A description of previous investigations conducted at each SWMU is addressed in greater detail in Section 2 of this work plan.

This work plan describes the field activities proposed for implementation of a SI at SWMU 7 and SWMU 8. The site investigation activities described in this plan include the following elements:

- Identify and evaluate existing information for each site, including a review of available aerial photos and historical information
- Conduct soil and sediment sampling and analysis at each site to assess potential contamination

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Source: Rand McNally

Figure 1-1
REGIONAL LOCATION MAP
NAB Little Creek
Virginia Beach, Virginia

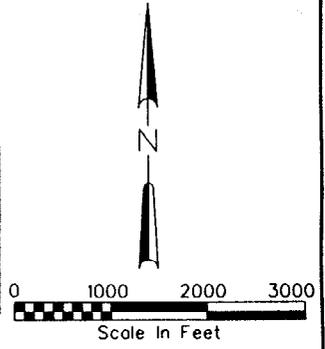
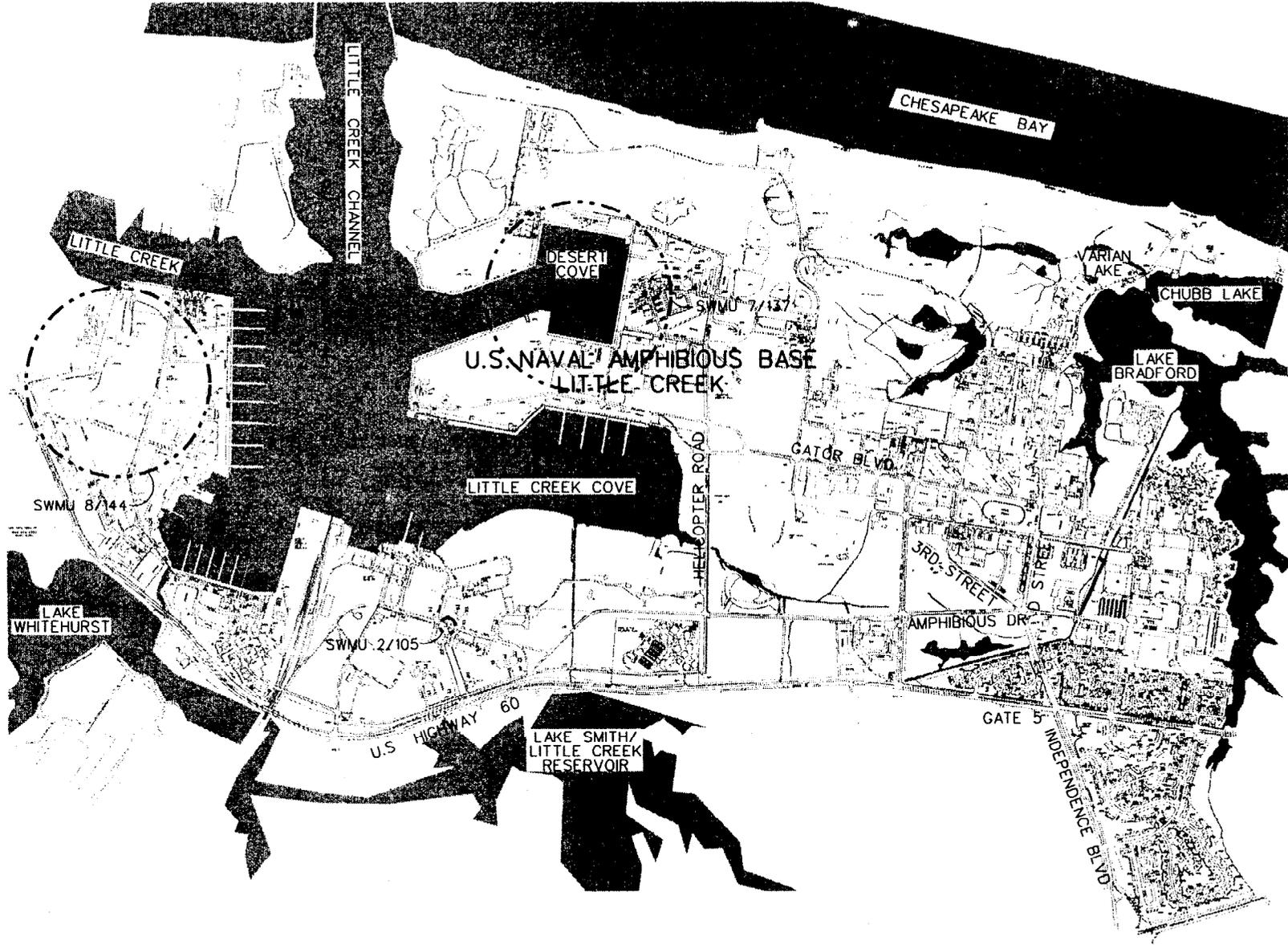


Figure 1-2
SITE FACILITY MAP
NAVAL AMPHIBIOUS BASE LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

- Install monitoring wells at each site and conduct groundwater sampling and analysis to assess potential groundwater contamination
- Evaluate soil, sediment and groundwater data to determine if either further investigation or potential remediation activities are appropriate for each SWMU
- Conduct a qualitative risk screening assessment through the comparison of site data collected during the SI with risk screening criteria
- Prepare a Site Investigation Report describing site activities, summarizing investigation findings, and address further action/no action recommendations

The objectives of the SI are to:

- Obtain the information necessary to assess site conditions for the presence or absence of contamination
- Qualitatively assess risk to human health
- Determine future actions at each SWMU, including consideration of No Further Action (NFA), additional investigation, or remediation

The work plan is organized into the following Sections. Section 2 presents the environmental history of each SWMU; Section 3 presents the technical approach for meeting project objectives; Section 4 presents general information regarding project management and staff organization; and Section 5 presents the schedule for the completion of these tasks.

2.0 Site Environmental History

Environmental Characterization and Remediation activities at NAB Little Creek are being conducted under the United States Department of Defense Installation Restoration Program (IRP). The IRP at NAB Little Creek is being conducted in accordance with applicable federal and state environmental regulations and requirements. In addition, the Navy solicits involvement and comments from the US Environmental Protection Agency (EPA) and the Virginia Department of Environmental Quality (DEQ) through a Partnering process and regulatory document review.

A brief description and information on previous and ongoing investigations pertaining to SWMU 7 and SWMU 8 is presented below. Site maps for SWMUs 7 and 8 are presented as Figures 2-1 and 2-2, respectively.

2.1. SWMU 7 – Small Boats Sandblast Yard

SWMU 7, also referred to as SWMU 137, is located along piers 44 through 55 at Desert Cove and includes an area surrounding the northern portions of CB-125. 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 ABM while awaiting characterization test results. Approximately 4,000 cubic yards of ABM from sandblasting (black beauty) generated from 1960 to 1982 were stored in the yard.

No release controls have been identified for this unit. Based on visual site inspections conducted by Earth Technology Corp. in 1988 (Visual Site Inspection logbook), releases of spent grit and oily substances to soil and Desert Cove have occurred in the small boats sandblast yard. According to the Navy's draft RFA, (Kearney, 1989) oil stained soil in the area has been removed. ABM is present in the compound near Buildings CB125, CB317 and CB318. A small amount of ABM was also found west of Building 3869.

The southwestern area indicated for SWMU 7 is the site of the new indoor sandblast facility, CB125. Prior to construction of the building, LANTRIV contracted with ATEC Environmental to conduct a soil and groundwater investigation. Five locations were sampled. At boring numbers B-1, B-2, and B-3, two composite samples were collected from 0-2.5 ft and 2.5-5.0 (labeled A and B respectively). At boring locations B-4 and B-5, composite samples were collected from 0-2.5 ft. The samples were analyzed for total metals and Extraction Procedure (EP) Toxicity metals. Results for total metals are shown in Table 2-1. All soil sample results are below EPA Region III RBC for residential use. ATEC noted in their summary report that the only metal detected above the method detection limit (MDL) in the EP Toxicity analysis was zinc at 3.4 mg/L for sample B-1A.

TABLE 2-1
 SWMU 7/137 Soil Sampling Event, 1989
 Soil Borings-mg/kg; Water-mg/L MDL=1.0

Total Metals	B-1A	B-1B	B-2A	B-2B	B-3A	B-3B	B-4	B-5	EPA RBC Residential (mg/kg)
	Soil								
Arsenic	ND	1.0	4.3E-01C						
Barium	11	13	8.7	3.5	18	10	7.3	16	5.5E+03N
Cadmium	ND	3.9E+01N							
Chromium	12	12	8.4	2.7	15	7.5	4.1	13	2.3E+02N
Lead	98	45	94	8.3	75	4.2	13	96	400
Mercury*	ND	2.3E+01N							
Selenium	ND	3.9E+02N							
Silver	ND	3.9E+02N							
Copper	41	23	24	2.9	27	3.6	8.2	61	3.1E+03N
Nickel	4.8	4.1	2.9	1.8	9.2	5.4	1.6	7.5	1.6E+03N
Zinc	110	280	44	3.3	55	14	19	80	2.3E+04N

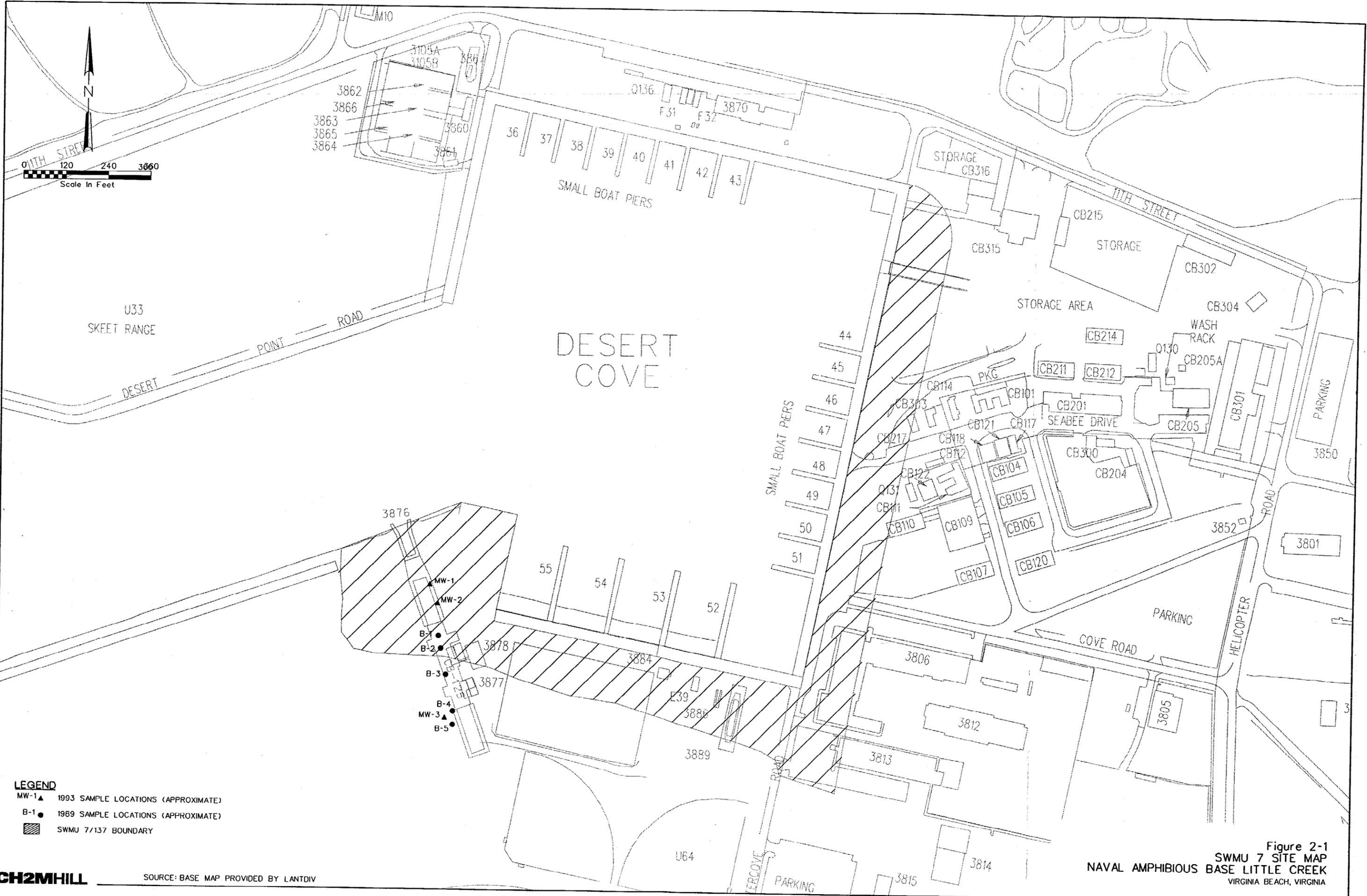
*RBC value for mercuric chloride used

N-Noncarcinogenic effects

C-Carcinogenic effects

ND- Not detected

In January 1993, three soil and three groundwater samples were collected from wells installed at the site at the locations shown on Figure 2-1. Soil samples were analyzed for TCLP metals and groundwater was analyzed for total metals. Results are summarized in Table 2-2. These samples were taken in the immediate area of the new sand blasting facility CB-25 (Figure 2-1). No other soil or groundwater investigations have been conducted in the area of SWMU 7. However in 1999, a site reconnaissance was conducted for the visual presence of ABM. The presence of ABM was noted in the area of CB125 with only trace amounts in the area along small boat piers 51 through 44.



LEGEND
 MW-1▲ 1993 SAMPLE LOCATIONS (APPROXIMATE)
 B-1● 1989 SAMPLE LOCATIONS (APPROXIMATE)
 [Hatched Box] SWMU 7/137 BOUNDARY

Figure 2-1
 SWMU 7 SITE MAP
 NAVAL AMPHIBIOUS BASE LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA

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TABLE 2-2
 SWMU 7/137 Soil and Groundwater Sampling Event, 1993

All mg/L Metals	Soil (TCLP)			Groundwater			MDL
	MWS-1	MWS-2	MWS-3	MW-1	MW-2	MW-3	
Arsenic	ND	0.057	ND	0.287	0.111	0.198	0.002
Barium	ND	ND	ND	ND	ND	ND	0.150
Cadmium	ND	ND	ND	ND	ND	0.016	0.010
Chromium	ND	ND	ND	ND	ND	ND	0.033
Lead	ND	ND	ND	ND	ND	ND	0.099
Mercury	ND	ND	ND	ND	ND	ND	0.0002
Selenium	0.02	0.476	0.449	ND	ND	ND	0.002
Silver	0.045	ND	ND	ND	ND	ND	0.016

ND- not detected

2.2. SWMU 8/144 – West Annex Sandblast Area

A vacant lot in the vicinity of the northwestern boundary of NAB Little Creek near the intersection of Midway 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, sandblasting and residue storage occurred in areas north of Midway Road, south of Guadalcanal Road, and east of Amphibious Drive (Figure 2-2). An estimated 5,125 cubic yards of residue was stored in the area between 1949 and 1954, and an additional 3,525 cubic yards were stored between 1954 and 1971. A reconnaissance of the area in 1999 noted ABM in the area surrounding water tower 1558 from the surface to a depth of 5 inches. No other investigations have been conducted at SWMU 8.

3.0 Objectives and Technical Approach

The objectives of the site investigations at SWMU 7 and SWMU 8 are to:

- Evaluate the absence/presence of soil and blastgrit/flyash contamination, and if present, evaluate the potential extent of contamination
- Evaluate the presence/absence of groundwater contamination and sediment contamination
- Determine whether further investigation or potential remediation activities are necessary at each site
- Conduct a qualitative risk screening assessment from data collected during the site investigation

The tasks to be implemented for the investigation of SWMU 7 and SWMU 8 include: project planning, field investigation, sample analysis and validation, data evaluation, and preparation of a Site Investigation Report. Site data will be evaluated to identify potential constituents of concern through a comparison of facility-wide background data collected in January of 2000. Risk screening assessments will be conducted through a comparison with EPA Region III risk-based criteria.

To simplify the process of developing site specific project plans, a Master Work Plan (WP), Master Field Sampling Plan (FSP), Master Quality Assurance Project Plan (QAPP), Master Investigation-Derived Waste Plan (IDWP), and Master Health and Safety Plan (HASP) have been prepared for Installation Restoration Program (IRP) activities to be performed at NAB Little Creek (Draft Master Project Plans, Volumes I and II, Naval Amphibious Base Little Creek, Virginia Beach, Virginia, March 1999). The Master Project Plans provide the details for sampling and analysis protocols to be followed and general types of activities to be accomplished for implementation of field activities at NAB Little Creek. Preparation of site specific plans is simplified through reference to the Master Plan documents.

Checklists that supplement the detailed protocols and Standard Operating Procedures (SOP) presented in the Master Work Plan documents are presented in Appendix A, and provide information specific to sampling the selected SWMUs for the Site Investigation. The work plan checklists (FSP, QAPP, HASP, and IDWP) are based on the existing Draft Master Work Plans (including other supporting documentation and additions/deviations from the Master Plan). Information regarding the site history of NAB Little Creek, facility background, previous investigations, and hydrology and geology are presented in the Master Work Plan.

3.1. Field Work Support

Fieldwork support includes coordinating subcontractors, mobilization, and field preparation activities. As part of the initial field mobilization to NAB Little Creek, CH2M HILL will coordinate with subcontractors for drilling and well installation, utility clearance,

surveyor, analytical laboratory, and data validation services for work at the Base. The subcontracted analytical laboratory will meet NFESC Level D quality control. Mobilization of equipment and supplies will be brought to the site when the CH2M HILL field team mobilizes for field activities. Demobilization activities will consist of general site restoration prior to the return transport of field equipment and crew.

Utility clearances will be performed prior to the start of any subsurface investigation activities at the site. CH2M HILL will coordinate subsurface utility clearances with the Public Works Center (PWC) at the Base and procure the services of a utility clearance subcontractor to clear utilities. CH2M HILL will ensure that all appropriate contacts have been made with Base personnel and that clearances have been given for proposed subsurface sampling locations, including marking of utilities near the areas of proposed subsurface sampling locations, prior to the initiation of field operations.

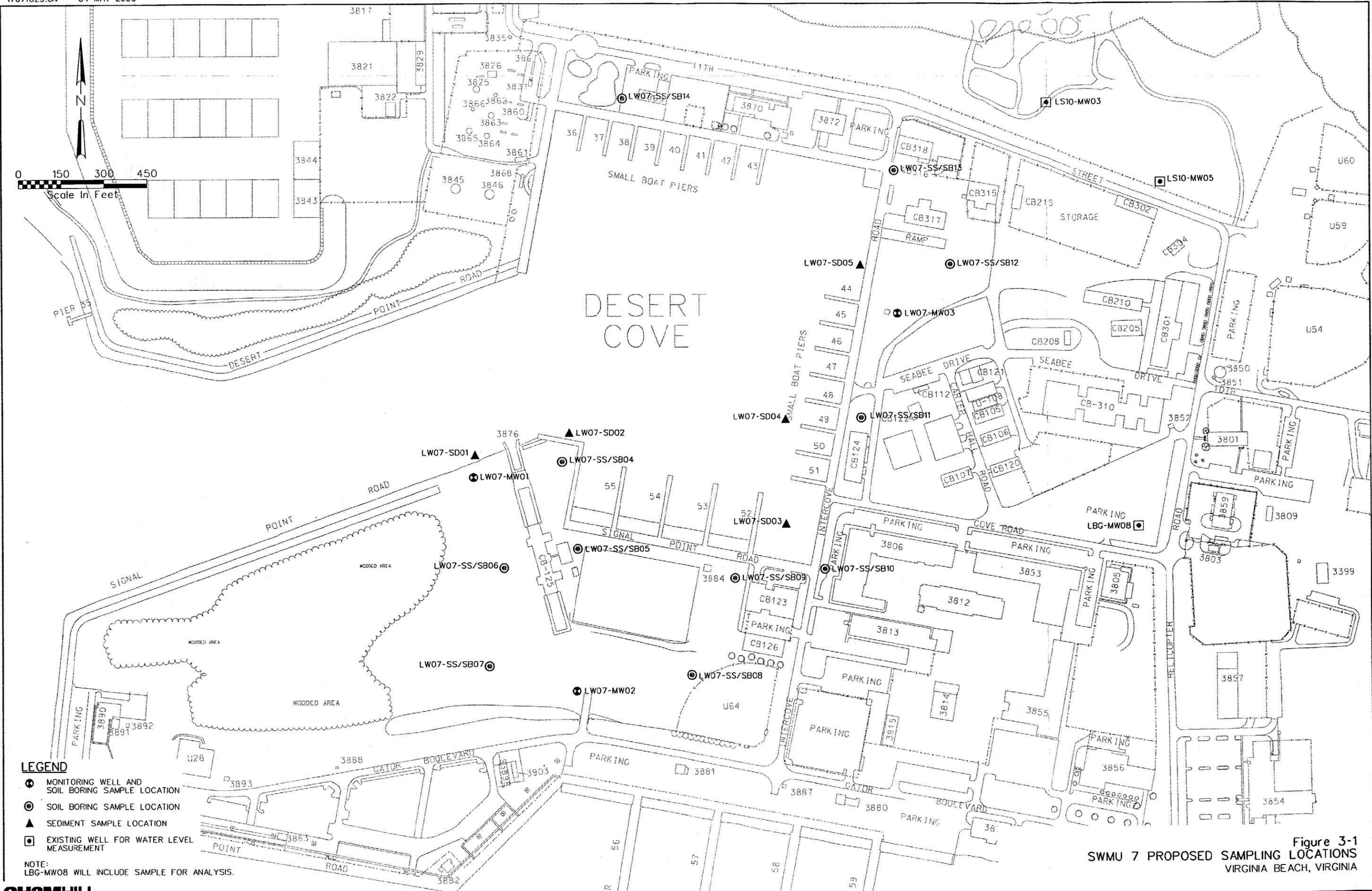
3.2. Site Investigations at SWMU 7 – Small Boats Sandblast Yard Desert Cove

Site investigation activities at SWMU 7 will include installation of three monitoring wells, the sampling and analysis of these monitoring wells as well as existing background well LBG-MW08, the collection and analysis of 14 surface and 14 subsurface soil samples, and the collection and analysis of five sediment samples. Sample locations were chosen in order to best determine potential contaminants in soils, sediment, and groundwater where ABM is visually present and in areas where historical information indicates that ABM has been stored or disposed.

3.2.1. Soil and Sediment Sampling

Soil

Soil samples will be collected at the 14 proposed locations shown in Figure 3-1. Twenty-eight co-located surface and subsurface soil samples will be collected from the 14 locations. Surface soil samples will be collected at depths of approximately 0 to 6 inches bgs and subsurface samples will be collected from 1 to 3 feet bgs. With the exception of samples collected from monitoring well borings, surface samples will be collected using either a hand auger or direct push sampler (Geoprobe) and subsurface samples collected using the direct push Geoprobe. Samples from monitoring well borings will be collected using a split spoon sampler through hollow stem augers. Although data evaluation for the purpose of the Site Investigation will be limited to risk screening, sample depths were selected for applicability to future potential human health and ecological risk assessments. However, sample depths may be adjusted to accommodate stratigraphic changes or the visual presence of ABM or other indications of contamination based on the professional judgement of the site geologist. Sample locations (north LW07-SS1SB14) and south of the area historically identified for ABM storage/disposal (and in the vicinity of the softball field) were selected to provide more complete coverage of the area to better identify the potential presence/absence of ABM.



- LEGEND**
- ⊕ MONITORING WELL AND SOIL BORING SAMPLE LOCATION
 - ⊙ SOIL BORING SAMPLE LOCATION
 - ▲ SEDIMENT SAMPLE LOCATION
 - ⊠ EXISTING WELL FOR WATER LEVEL MEASUREMENT

NOTE:
LBG-MW08 WILL INCLUDE SAMPLE FOR ANALYSIS.

Figure 3-1
SWMU 7 PROPOSED SAMPLING LOCATIONS
VIRGINIA BEACH, VIRGINIA

The applicable Standard Operating Procedures (SOPs) for the collection of soil samples is presented in Volume 2 of the Master Project Plans and are included with the Field Sampling Plan Checklist (Appendix A).

Six of the 28 soil samples collected at SWMU 7 will be sent to an offsite laboratory for analysis of TAL metals and TCL organics. This full suite analysis will be performed on three surface and three subsurface samples located in the area of visible sandblast grit and adjacent to Desert Cove. The remaining 22 samples (co-located surface and subsurface soil samples from the remaining 11 locations) will be submitted to the laboratory for analysis of TAL metals and PAHs. Quality control samples will consist of three duplicate samples and two MS/MSD samples. All boring locations will be surveyed for horizontal coordinates using a GPS.

If ABM is identified at a thickness in excess of one to two inches, a sample of the ABM will be collected for analysis of full TCLP parameters for characterization. It is estimated that no more than two samples for TCLP will be submitted for analysis.

Sediment

Sediment samples will collect adjacent to the bulkhead in Desert Cove at five locations (Figure 3-1). Samples will be analyzed for TAL metals, PAHs, grain size, pH, and total organic carbon (TOC). One of the samples will also be analyzed for TCL organics to provide more complete characterization of sediment adjacent to SWMU 7. Samples will be collected from 0 to 4 inches and identified as LW07-SD01 through SD05. Sediment sampling will be conducted using a hand corer or a Ponar grab sampler. A stainless steel trowel will be used to transfer sediment into sampling jars.

Prior to the collection of sediment samples the depth of the water, the distance from the bulkhead and nature of any rip-rap will be identified. The type and consistency of the sediment sample and the approximate depth of the sediment sample will also be recorded in the field notebook.

Sediment samples will be collected in a manner to minimize the loss of finer grained sediments and to minimize the amount of water collected within the sample matrix. Water will be decanted off the sample slowly so as to maximize retention of fine-grained materials in the sample. Protocols for sediment sampling are presented in Volume 2 of the Master Project Plans for NAB Little Creek.

3.2.2. Monitoring Well Installation

Three monitoring wells will be installed at SWMU 7. Locations of the monitoring wells are presented in Figure 3-1. Monitoring well LW07-MW01 is proposed in the area of visible ABM at the anticipated downgradient boundary of past sandblast activities and present indoor sandblast facility CB125. Well LW07-MW02 is proposed to be located south of CB125. This area may also be in a downgradient direction from the sandblast facility should groundwater flow towards Little Creek Cove immediately to the south. Well LW07-MW03 is proposed in the vicinity of visual surface ABM based on a 1999 site reconnaissance. Assessing groundwater flow direction was also considered in the placement of these wells.

Monitoring wells will be installed in the water-table aquifer at a depth of approximately 20 feet bgs. The well will be installed using 4-1/4 inch ID hollow stem augers. Split spoon samples will be collected continuously for lithologic characterization. An initial boring will be drilled to the clay sediments of the Yorktown Formation to identify the depth to the Yorktown confining unit. The wells will be constructed with the screened interval across the water table and through most of the aquifer. The wells will be constructed of 2-inch diameter PVC with 0.01-inch slots and will be screened in the surficial aquifer with an estimated screen length of 15 feet, placed between about 5 to 20 feet bgs. The wells will be completed with flush-mount protective covers. All wells will be thoroughly developed and will be surveyed for ground and casing elevations and horizontal coordinates.

3.2.3. Groundwater Sampling

Groundwater samples will be collected from the three proposed monitoring wells to be installed at SWMU 7 and from existing background well LBG-MW08. Samples will be collected from the monitoring wells using a Grundfos® Redi-Flo2 submersible pump employing low flow sampling techniques. The applicable Standard Operating Procedures (SOP) for the collection of groundwater samples is presented in Volume 2 of the Master Project Plans and are included with the Field Sampling Plan Checklist.

Water level measurements will be obtained from the wells prior to purging and sampling. Additionally, groundwater level measurements will be obtained from existing background well LBG-MW08 and existing Installation Restoration Site 10 monitoring wells LS10-MW05 and LS10-MW03. Groundwater samples from the three wells installed at SWMU 7 and LBG-MW08 will be submitted for analysis of total and dissolved TAL metals and cyanide and low concentration TCL organics.

A summary of proposed soil, sediment, and groundwater samples is presented in Table 3-1.

TABLE 3-1
 SWMU 7 Small Boats Sandblast Yard Desert Cove
 Site Investigation Samples
 Naval Amphibious Base Little Creek, Virginia Beach, Virginia

Parameter	Method	No. of Samples	Trip Blanks	Equipment Rinsate Blanks	Field Blanks	Field Duplicates	Matrix Spike/Duplicate	Total Number of Samples
Groundwater Samples								
TCL Volatile Organics (Low Concentration)	CLP S OLC02	4	1	1	1	NA	NA	7
TCL Semi-volatile Organics (Low Concentration)	CLP OLC02	4	NA	1	1	NA	NA	6
TCL Pesticides/PCBs (Low Concentration)	CLP OLC02	4	NA	1	1	NA	NA	6
TAL Metals (Total)	CLP ILM04	4	NA	1	1	NA	NA	6
TAL Metals (Dissolved)	CLP ILM04	4	NA	NA	NA	NA	NA	4
Soil Samples								
TCL Volatile Organics	CLP OLM03	6	2	NA	NA	NA	NA	8
TCL Semi-volatile Organics	CLP OLM03	6	NA	NA	NA	NA	NA	6
TCL Pesticides/PCBs	CLP OLM03	6	NA	NA	NA	NA	NA	6
TAL Metals	CLP ILM04	28	NA	2	NA	3	2	35
PAHs	SW846 8310	22	NA	2	NA	3	2	29
Sediment Samples								
TAL Metals	CLP ILM04	5	NA	1	NA	1	1	8
PAHs	SW846 8310	4	NA	1	NA	1	1	7
TCL Volatile Organics	CLP OLM03	1	1	NA	NA	NA	NA	2
TCL Semi-volatile Organics	CLP OLM03	1	NA	NA	NA	NA	NA	1
TCL Pesticides/PCBs	CLP OLM03	1	NA	NA	NA	NA	NA	1
Grain Size	ASTM 0422	5	NA	NA	NA	NA	NA	5
PH	SW846 9045	5	NA	NA	NA	NA	NA	5
TOC	Lloyd Kahn	5	NA	NA	NA	NA	NA	5

TABLE 3-1
 SWMU 7 Small Boats Sandblast Yard Desert Cove
 Site Investigation Samples
 Naval Amphibious Base Little Creek, Virginia Beach, Virginia

Parameter	Method	No. of Samples	Trip Blanks	Equipment Rinsate Blanks	Field Blanks	Field Duplicates	Matrix Spike/Duplicate	Total Number of Samples
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Notes:

All analysis methods are for the latest version of CLP

NA = Not Applicable

CLP = Contract Laboratory Program (most recent version)

TCL = Target Compound List

TAL = Target Analyte List

Duplicates and MS/MSD QC samples for groundwater are combined for SWMUs 7, and 8, and are included with SWMU 8 (Table 3-2).

Assumptions regarding rate of sample collection:

1. One day is required to collect groundwater samples
2. Two days are required to collect soil and sediment samples

Trip blanks – one per cooler containing VOC samples per day

Equipment Rinsate blanks – one per matrix per day;

Field Blanks – one per event

Field Duplicates – one per every ten samples per matrix/medium per day

Matrix Spike/Matrix Spike Duplicates – One per 20 samples per matrix (not required for low-concentration analyses by CLP OLC02)

3.3. Site Investigation at SWMU 8 – West Annex Sandblast Yard

The objectives of the Site Investigation activities at SWMU 8 are to determine the extent of ABM at the site for assessment of potential removal options, characterize ABM for disposal, and to evaluate potential impacts to soil and groundwater. Proposed field activities include:

- Soil borings constructed in a general grid pattern to visually identify the horizontal and vertical extent of ABM
- Installation of four (4) monitoring wells and the collection of groundwater samples for analysis
- Collection and analysis of three to five ABM samples for disposal characterization
- Collection and analysis of 19 surface and 19 subsurface soil samples
- Collection of two surface soil samples immediately adjacent to the limits of ABM and three subsurface soil samples immediately underlying ABM

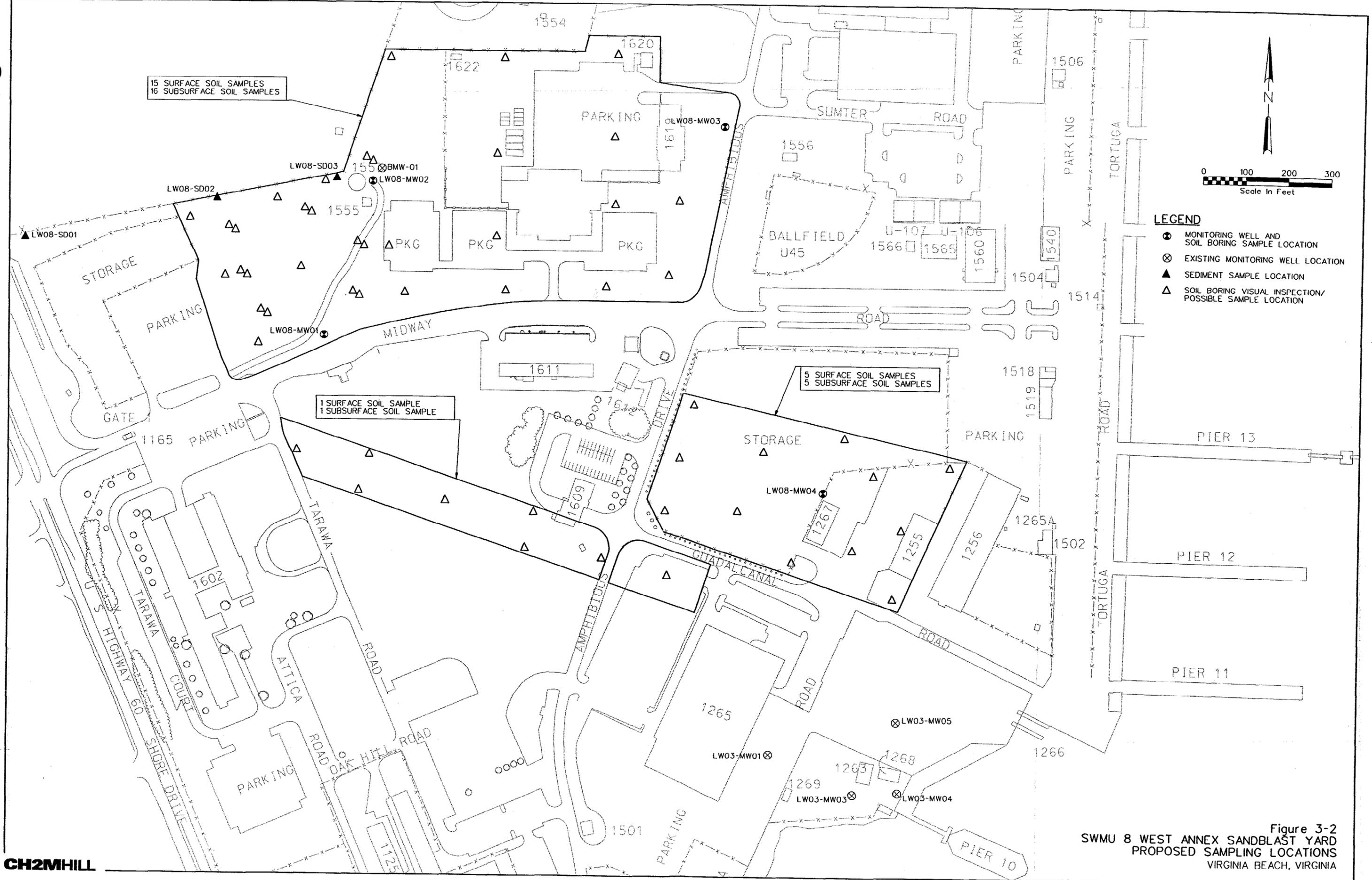
- Collection and analysis of three (3) sediment samples

Sample locations have been selected to characterize the boundaries of SWMU 8 and identify potential contaminants in soils and groundwater in areas where ABM is visually present and in areas where historical information indicates that ABM has been stored.

3.3.1. Delineation of Sandblast Material

To visually identify the horizontal and vertical extent of ABM, soil borings will be constructed across the site for delineation of the presence/absence of sandblast grit. Borings will be constructed to a depth of three feet, or greater if necessary, to identify vertical extent. Borings will be generally performed using a direct push drill rig (Geoprobe). Where a monitoring well will be installed at a soil boring location, a hollow stem auger drill rig will be used to install the soil boring. Due to the presence of buildings, parking areas, and the discontinuous nature of SWMU 8, borings are proposed in a general grid pattern in the principal area of SWMU 8 north of Midway Road. In this area north of Midway Road, 33 borings are proposed for visual identification of ABM and three borings for monitoring wells (Figure 3-2). Borings are located to characterize conditions along the boundary of SWMU 8 and incorporate areas where ABM is most prevalent from visual observations, such as near water tower 1553. To better delineate the extent of ABM in the vicinity of water tower 1553, borings are concentrated along the boundary where ABM is visually present on the ground surface. Exact locations for these borings will be determined in the field based on site conditions and the professional judgement of the site geologist. All boring locations will be staked, marked with station identification, and surveyed using a GPS.

The second largest area of SWMU 8 lies east of Amphibious Drive. Thirteen boring locations are proposed for visual delineation of ABM. Borings are located to incorporate the area near building 1267 where sandblast activities were reported to have occurred and along the perimeter of the area.



LEGEND

- MONITORING WELL AND SOIL BORING SAMPLE LOCATION
- ⊗ EXISTING MONITORING WELL LOCATION
- ▲ SEDIMENT SAMPLE LOCATION
- △ SOIL BORING VISUAL INSPECTION/POSSIBLE SAMPLE LOCATION

Figure 3-2
 SWMU 8 WEST ANNEX SANDBLAST YARD
 PROPOSED SAMPLING LOCATIONS
 VIRGINIA BEACH, VIRGINIA

The third and smallest area of SWMU 8 is a narrow (approximately 100 feet wide) rectangular segment south of Midway Road. Sandblast material was reported to have been stored/disposed of in this area. Sandblast material was not found in this area during a site reconnaissance and preliminary hand auger survey in 1999. Eight boring locations are proposed for visual determination of the presence/absence of ABM in this area. It is not anticipated that there will be any obstructions that would prevent the sampler from penetrating to the desired depths.

3.3.2. Characterization of Sandblast Material

Characterization of ABM for evaluation of disposal alternatives as part of potential future removal actions will be accomplished through the collection and analysis of three to five samples of ABM. Given the estimated size of the former storage/disposal area of SWMU 8, these samples should provide adequate coverage over the site for representative characterization of ABM waste. The selection of samples for analysis will be based on visual presence of paint chips in the blast grit, professional judgement of the site geologist, and distribution/coverage across the site. Additional samples may be collected and stored on ice until the blast grit delineation effort is complete for final selection of the samples for off-site analysis. If it is the judgement of the site geologist that greater than five samples are needed to adequately characterize the ABM, additional samples may be collected, but will not be submitted for analysis until approval by the Navy. At the selected locations, the depth interval selection for each ABM sample will be biased for the visual presence of paint chips and representative vertical distribution. Each sample depth will be recorded.

The ABM samples will be analyzed for toxicity characteristic leaching procedure (TCLP), total petroleum hydrocarbons (TPH), total organic halogen (TOX), benzene, toluene, ethylbenzene, and xylene (BTEX). This suite of analyses meets the necessary requirements for determining acceptance of ABM for potential disposal at the Southeastern Public Service Authority (SPSA) facility in Portsmouth.

3.3.3. Soil and Sediment Sampling

Soil samples will be collected at 24 locations at SWMU 8. Co-located surface and subsurface samples will be collected at each location. Co-located surface and subsurface samples will be collected at 19 locations (38 samples) in proximity to identified ABM based on the professional judgement of the site geologist. In the vicinity of water tower 1553, additional samples (three subsurface samples immediately underlying the ABM and two surface soil samples immediately adjacent to the limits of ABM) are proposed to characterize soils immediately adjacent to the limits of ABM. A total of 43 soil samples will be collected. Surface soil samples will be collected at depths of approximately 0 to 6 inches bgs and subsurface soil samples will be collected from 1 to 3 feet bgs. The selection of soil samples for analysis will be based on the presence of ABM and biased to identify "worse case" conditions in proximity to ABM and to characterize soils across the site and near the perimeter of SWMU 8.

With the exception of samples collected from monitoring well borings, surface samples will be collected using either a hand auger or direct push sampler (Geoprobe) and subsurface samples collected using the direct push Geoprobe. Samples from monitoring well borings will be collected using split spoon sampler through hollow stem augers. Although data evaluation for the purpose of the Site Investigation will be limited to risk screening, sample

depths were selected for applicability to future potential human health and ecological risk assessments. However, sample depths may be adjusted to accommodate stratigraphic changes or the visual presence of ABM or other indications of contamination based on the professional judgement of the site geologist. The sample depths may be adjusted to accommodate stratigraphic changes or the visual presence of ABM or other indications of contamination based on the professional judgement of the site geologist. The applicable Standard Operating Procedures (SOP) for the collection of soil samples is presented in Volume 2 of the Master Project Plans and are included with the Field Sampling Plan Checklist (Appendix A).

Eight of the 43 soil samples collected at SWMU 8 will be sent to an offsite laboratory for analysis of TAL metals and TCL organics. This full suite analysis will be performed on the four surface and four subsurface samples collected at the four locations for monitoring well construction (LW08-MW01 through LW08-MW04). The remaining 35 soil samples (co-located surface and subsurface samples at 15 locations and five samples adjacent to and underlying the limits of ABM) will be sent to an offsite laboratory for analysis of total metals and PAHs. Appropriate duplicate samples and MS/MSD samples will be collected at SWMU 8 to evaluate the precision and reproducibility of the offsite laboratory analysis. All boring locations shall be surveyed for horizontal coordinates using a GPS.

Three sediment samples are proposed in the drainage ditch along the northwestern boundary of the site. These samples will be collected for analysis of TAL metals, PAH's, TOC, pH, and grain size. One sediment sample will also be analyzed for TCL organics.

3.3.4. Monitoring Well Installation

Four monitoring wells are proposed for installation at SWMU 8. Locations of the monitoring wells are shown in Figure 3-2. Two of the monitoring wells (LW08-MW01 and LW08-MW02) are proposed in the western most portion of SWMU 8 north of Midway Road. Sandblast material is visually present on the ground surface in this area.

Although the direction of groundwater flow is not known in the area, it is anticipated to be easterly toward Little Creek Channel. A monitoring well (LW08-MW03) is proposed in this downgradient direction in the northeastern portion of SWMU 8 along Amphibious Drive. A monitoring well (LW08-MW04) is also proposed in the portion of SWMU 8 east of Amphibious Drive and north of Guadalcanal Road. Based on historical reports, this is an area of former sandblast activity.

Monitoring wells will be installed in the water table aquifer at a total depth of approximately 20 feet bgs using 4-1/4 ID hollow-stem augers. Continuous split spoon samples will be collected for lithologic characterization. An initial boring will be drilled to the clay sediments of the Yorktown formation to identify the depth to the Yorktown confining unit. The wells will be constructed with the screened interval across the water table. It is estimated that 15-foot screens with 0.01-inch slots will be installed to total depths between 15 and 20 feet bgs. The wells will be 2-inch diameter PVC and completed with flush-mount protective covers. All wells will be thoroughly developed and will be surveyed for ground and casing elevations and horizontal coordinates.

3.3.5. Groundwater Sampling

Groundwater samples will be collected from the four monitoring wells proposed for the Site Investigation at SWMU 8. Groundwater samples will be collected from the monitoring wells using a Grundfos® Redi-Flo2 submersible pump employing low flow sampling techniques. The applicable Standard Operating Procedures (SOP) for the collection of groundwater samples is presented in Volume 2 of the Master Project Plans and are included with the Field Sampling Plan Checklist (Appendix A).

Water level measurements will be obtained from the wells prior to purging and sampling. Additionally, groundwater level measurements will be obtained from existing background well LBG-MW11 north of SWMU 8, and existing wells LW03-MW01, LW03-MW05 and LW03-MW03 at SWMU 3 southeast of SWMU 8. Groundwater samples from the four wells installed at SWMU 8 will be submitted for analysis of total and dissolved TAL metals and low concentration TCL organics.

A summary of proposed soil and groundwater analyses is presented in Table 3-2.

TABLE 3-2
SWMU 8 West Annex Sandblast Area
Site Investigation Samples
Naval Amphibious Base Little Creek, Virginia Beach, Virginia

Parameter	Method	No. of Samples	Trip Blanks	Equipment Rinsate Blanks	Field Blanks	Field Duplicates	Matrix Spike/Duplicate	Total Number of Samples
Groundwater Samples								
TCL Volatile Organics (Low Concentration)	CLP S OLC02	4	1	1	1	1	1	9
TCL Semi-volatile Organics (Low Concentration)	CLP OLC02	4	NA	1	1	1	1	8
TCL Pesticides/PCBs (Low Concentration)	CLP OLC02	4	NA	1	1	1	1	8
TAL Metals (Total)	CLP ILM04	4	NA	1	1	1	1	8
TAL Metals (Dissolved)	CLP ILM04	4	NA	NA	NA	NA	NA	4
Soil Samples								
TCL Volatile Organics	CLP OLM03	8	2	2	NA	1	1	14
TCL Semi-volatile Organics	CLP OLM03	8	NA	2	NA	1	1	12
TCL Pesticides/PCBs	CLP OLM03	8	NA	2	NA	1	1	12

TABLE 3-2
SWMU 8 West Annex Sandblast Area
Site Investigation Samples
Naval Amphibious Base Little Creek, Virginia Beach, Virginia

Parameter	Method	No. of Samples	Trip Blanks	Equipment Rinsate Blanks	Field Blanks	Field Duplicates	Matrix Spike/Duplicate	Total Number of Samples
TAL Metals	CLP ILMO4	43	NA	4	NA	4	2	53
PAHs	SW846 8310	35	NA	2	NA	4	2	45
Sediment Samples								
TAL Metals	CLP ILMO4	3	NA	1	NA	1	1	6
PAHs	SW846 8310	2	NA	1	NA	1	1	5
TCL Volatile Organics	CLP OLM03	1	1	NA	NA	NA	NA	2
TCL Semi-volatile Organics	CLP OLM03	1	NA	NA	NA	NA	NA	1
TCL Pesticides/PCBs	CLP OLM03	1	NA	NA	NA	NA	NA	1
Grain Size	ASTM 0422	3	NA	NA	NA	NA	NA	3
PH	SW846 9045	3	NA	NA	NA	NA	NA	3
TOC	Lloyd Kahn	3	NA	NA	NA	NA	NA	3
Sandblast Material Characterization Samples								
TCLP (full)	SW846 1311	5	NA	NA	NA	NA	NA	5
TPH	EPA 418.1	5	NA	NA	NA	1	NA	6
BTEX	SW846- 8021	5	1	NA	NA	1	NA	7
TOX	SW846 9020	5	NA	NA	NA	1	NA	6

TABLE 3-2
 SWMU 8 West Annex Sandblast Area
 Site Investigation Samples
 Naval Amphibious Base Little Creek, Virginia Beach, Virginia

Parameter	Method	No. of Samples	Trip Blanks	Equipment Rinsate Blanks	Field Blanks	Field Duplicates	Matrix Spike/Duplicate	Total Number of Samples
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Notes:

NA = Not Applicable

CLP = Contract Laboratory Program (most recent version)

TCL = Target Compound List

TAL = Target Analyte List

The analytical methods to be used after TCLP extraction include VOCs - 8260, SVOCs- 8270, pesticides- 8081, herbicides-8151, metals - 6010/6020, mercury- 7470, reactivity cyanide- 9010, reactivity sulfide- 9030/9034, ignitability- 1010, corrosivity- 9040(water 9045 (soil))

Assumptions regarding rate of sample collection:

1. One day is required to collect groundwater samples
2. Four days are required to collect soil samples (2 days from well borings and 2 days for the remaining borings)

Trip blanks – one per cooler containing VOC samples per day

Equipment Rinsate blanks – one per matrix per day;

Field Blanks – one per event

Field Duplicates – one per every ten samples per matrix/medium per day

Matrix Spike/Matrix Spike Duplicates – One per 20 samples per matrix (not required for low-concentration analyses by CLP OLC02)

3.4. Sample Designation

Sampling locations and sampled media collected during the Site Investigations at SWMU 7 and SWMU 8 will be assigned unique designations to allow the sampling information and analytical data to be entered into a database management system. The database management system can be incorporated into a Geographic Information System (GIS) to be developed for NAB Little Creek under a separate CTO. The following sections describe the sample designation specifications.

Specifications for Field Location Data

Field station data consists of information assigned to a physical location in the field where a sample is collected. For example, a soil boring that has been installed will require a name that will uniquely identify it with respect to other soil boring locations, or other types of sampling locations. The station name provides for a key in the database to which any samples collected from that location would be linked, to form a relational database.

A listing of the location identification numbers will be maintained by the field team leader, who will be responsible for enforcing the use of the standardized numbering system during

all field activities. Each station will be designated by an alphanumeric code that will identify the station location by facility, site type, site number, location type, and sequential location number. The schema that will be used to identify field station data is documented in Section 3 of the Master Field Sampling Plan.

Specifications for Analytical Data

Analytical data will be generated through sampling of soil, sediment, and groundwater at NAB Little Creek. Each analytical sample collected will be assigned a unique sample identifier. The schema used as a guide for labeling analytical samples in the field is documented below. The format that will be used for electronic deliverables from the analytical laboratory and the data validator is documented below.

Sample Identification Schema

A standardized numbering system will be used to identify all samples collected during groundwater and soil sampling activities. The numbering system will provide a tracking procedure to ensure accurate data retrieval of all samples taken. A listing of the sample identification numbers will be maintained by the field team leader, who will be responsible for enforcing the use of the standardized numbering system during all sampling activities. Sample identification for all samples collected during the investigations will use the format identified in Table 3-3.

TABLE 3-3
Summary of Sample Identification Schematic

First Segment	Second Segment	Third Segment
Installation, Site Type, Site Number	Location Type	Location Number, Qualifier
AANN	AA	NNN (Soil) NNA(Wells) NN (Soil)

Notes: "A"= alphabetic "N"= numeric

<u>Installation:</u>	<u>Location Type:</u>	<u>Location Number:</u>	<u>Sample Round (Wells)</u>
L = Naval Amphibious Base Little Creek	SB = Subsurface Soil Sample Location	Sequential Location Number	NN = last 2 digits of year
Site Type:	SS = Surface Soil	<u>Qualifier:</u>	A = quarter of the year sampled:
S = Installation Restoration Site	<u>Sample Location</u>	P = Duplicate sample	A = 1 st Quarter
W = SWMU	MW = Monitoring Well		B = 2 nd Quarter
A = Amphibious base-wide	TB = Trip Blank		C = 3 rd Quarter
B = Non-site-specific background	EB = Equipment Blank		D = 4 th Quarter
	FB = Field Blank		<u>Sample Depth</u>
<u>Site Number:</u>			00 = surface to 1 ft bgs
Site Number is assigned to a defined area (e.g. Site 07).			01 = 1 to 3 ft bgs
Site numbers are associated with particular environmental programs as defined by Site Type. Base-wide and background do not have numbers associated with them.			02 = 2 to 4 ft bgs
			04 = 4 to 6 ft bgs
			06 = 6 to 8 ft bgs
			08 = 8 to 10 ft bgs
			10 = 10 to 12ft bgs

Each sample will be designated by an alphanumeric code that will identify the facility, site, matrix sampled, and contain a sequential sample number. QA/QC samples will have a unique sample designation. The general guide for sample identification is documented in Section 3 of the Master Field Sampling Plan.

Electronic Deliverable File Format

This effort includes checking the data from the laboratory and converting it into an electronic format that can be readily incorporated into the GIS Data Management system for NAB Little Creek. An offsite laboratory will analyze the SWMU 7 and SWMU 8 investigation samples and tabulate the results in an electronic format specified by CH2M HILL. The data validator will add data validation qualifiers to the table of analytical results. In addition to hard copy data package deliverable, CH2M HILL will receive an electronic file from the data validator in a table format that will facilitate downloading into a database. A summary of analytical data electronic deliverable format is presented in Table 3-4.

TABLE 3-4
Electronic Data Deliverable Format

Field Name	Field Type	Description
Sample_ID	A20	The CH2M HILL sample ID (taken from the Chain of Custody)
Sample_Analysis	A5	The analysis performed on the sample. We classify our samples into six main groups: VOA, SVOA, METAL, PEST/PCB, WCHEM, TCLPV, TCLPS, TCLPP, and TCLPM.
Date_Analyzed	D10	The date the sample was analyzed.
Date_Received	D10	The date the sample was received in the lab.
Date_Collected	D10	The date the sample was collected.
Lab_Sample_ID	A15	The lab sample ID.
Dilution_Factor	N	The dilution factor used, if applicable.
SDG_Number	A6	The SDG number.
CAS_Number	A6-A2-A1	CAS Number of the compound being analyzed (For pH, use PH; for TOC, use TOC; for TOX, use TOX).
Chem_Name	A50	The compound being analyzed.
Ana_Value	N	The analytical result.
Std_Qual	A5	The lab qualifiers, if any (e.g., U, UJ, B)
DV_Qual	A5	The data validation qualifier (e.g., J, R)
Units	A10	The unit of the result (e.g., MG/L)
Detect_Limit	N	The detection limit for the compound.
Method	A15	Analytical method used to analyze the sample fraction.

3.5. Sample Analysis and Validation

This task involves efforts related to the sample management and data validation. CH2M HILL will be responsible for tracking sample analysis and obtaining results from the laboratory. The analytical data generated during the field activities will be validated by an independent data validation subcontractor according to EPA standard procedures. Laboratory analyses of samples will be performed according to data quality objectives (DQOs) discussed in the Master Quality Assurance Project Plan. The results will be used for human health and ecological risk screening assessments and will require the highest level of DQOs.

Quality control samples to be collected during the Site Investigation are shown on Tables 3-1 and 3-2. A detailed discussion of quality control procedures for field investigations at NAB Little Creek is presented in the Master Quality Assurance Project Plan.

3.5.1. Sample Analysis

All soil and groundwater analyses will be conducted at a contracted laboratory that fulfills all requirements of the U.S. Navy's QA/QC Program Manual and EPA's Contract Laboratory Program (CLP). A signed certificate of analysis will be provided with each laboratory data package, along with a certificate of compliance certifying that all work was performed in accordance with the applicable federal, state, and local regulations. All analyses will be performed following the highest level of Navy quality control guidance.

Analytical results will be validated using EPA Region III guidance. All analytical results for chemicals of concern will be validated before the project staff performs data interpretations. The data validation will be performed by an independent subcontractor. Data that should be qualified will be flagged with the appropriate symbol. Results for QA/QC samples will be reviewed and the data qualified further, if necessary. Finally, the data set as a whole will be examined for consistency, anomalous results, and reasonableness.

Field Quality Control Procedures

Quality control duplicate samples and blanks are used to provide a measure of the internal consistency of the samples and to provide an estimate of the components of variance and the bias in the analytical process. Field quality control procedures are detailed in the Master Quality Assurance Project Plan.

Blanks

Blanks provide a measure of cross-contamination sources, decontamination efficiency, and other potential errors that can be introduced from sources other than the sample. ASTM Type II water will be used for blanks. Four types of blanks can be generated during sampling activities: trip blanks, field blanks, equipment rinsate blanks, and temperature blanks.

One trip blank will be included in each cooler used for the daily shipment of VOC samples. If more than one cooler is being sent on a given day, all of the VOC samples will be placed in one cooler, if possible, to minimize the number of trip blanks needed. The trip blanks will be prepared before each sampling event, shipped or transported to the field with the sampling bottles, and returned unopened for analysis. Trip blanks will indicate if there is contamination during shipment to the field, from storage in the field, or from shipment from the field to the analytical laboratory.

One field blank will be collected at each SWMU. Field blanks are used to determine if there is any influence from ambient conditions in the sampling area location imparted to the sample, and to determine the chemical quality of water used for such procedures as decontamination and blank collection. More may be needed if windy and/or dusty field conditions occur.

One equipment blank per sample medium will be obtained for each day of sampling. Equipment blanks will give an indication of the efficiency of decontamination procedures.

EPA has recently requested that a temperature blank be included in each cooler containing samples for CLP analyses so that the laboratory can record the temperature without disturbing the samples. The temperature blank will be labeled, but will not be given a sample number nor will be listed as a sample on the chain of custody (COC) form.

Duplicates

Field duplicate samples will be collected at a frequency of 1 per 10 field samples per matrix. The location from which the duplicates are taken will be randomly selected. Each duplicate sample will be split evenly into two sample containers and submitted for analysis as two independent samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of 1 for every 20 field samples collected. Analytical results of these samples indicate the impact the matrix has on extracting the analyte for analysis. MS/MSD samples give an indication of the laboratory's analysis accuracy and precision within the sample matrix. Data validators will use these results to evaluate the accuracy of the analytical data. Matrix spike/matrix spike duplicate samples are not required for low concentration CLP analysis (OLC02) for groundwater samples.

3.5.2. Data Validation

Analytical results will be validated by CH2M HILL subcontractors approved by the Navy. Data validators will use EPA Region III guidance. Data that should be qualified will be flagged appropriately. Results for QA/QC samples will be reviewed and the data will be qualified further, if necessary. Finally, the data set as a whole will be examined for consistency, anomalous results, and reasonableness.

3.6. Data Evaluation

Analytical and lithologic data will be evaluated to characterize site soil and groundwater quality and assess the horizontally and vertically distribution of ABM across SWMU 8 for assessment of remedial options. Graphic and tabular presentations that facilitate a better understanding of the nature and extent of contamination at each site will be prepared.

Data collected during a facility-wide background investigation conducted in January 2000 will be reviewed for comparison of site data from each SWMU to established background conditions. The comparison of background and site data will be used to identify potential release-related constituents of concern and for risk management relative to human health and environmental receptors. A risk screening will be conducted through a comparison of site data with EPA Region III Risk Based Concentrations (RBCs). For soil, comparisons with both residential and industrial RBCs will be made.

3.7. Site Investigation Report (SI)

A draft SI Letter Report will be prepared that addresses the sampling and analysis for SWMU 7 (Small Boats Sandblast Yard – Desert Cove) and SWMU 8 (West Annex Sandblast Area). The draft report will present the results of previous investigations and findings of the site investigation activities. A qualitative human health risk assessment (RA) will be performed using new and any available existing data as appropriate. The results of the risk screening will be documented in the SI Report. The SI Report will include the following items:

- History, background and physical characteristics of each site, including the environmental setting and results of previous studies where available
- A description of the SI investigation activities
- Presentation and evaluation of the analytical data and the results of the qualitative risk screening, including contaminant concentration maps
- Conclusions and discussion of potential further actions

4.0 Project Management and Staffing

The CH2M HILL Project Manager designated for the oversight of this project is Ms. Donna Caldwell. Mr. Scott MacEwen, who serves as Activity Manager for NAB Little Creek, will support Ms. Caldwell. Ms. Caldwell will be responsible for such activities as technical support and oversight, budget and schedule review and tracking, preparation and review of invoices, personnel resources planning and allocation, and coordination with LANTDIV, NAB Little Creek, and subcontractors.

Qualified CH2M HILL staff members will perform the site investigations field program. CH2M HILL will notify LANTDIV and NAB Little Creek which CH2M HILL personnel will mobilize to the site prior to initiating field activities.

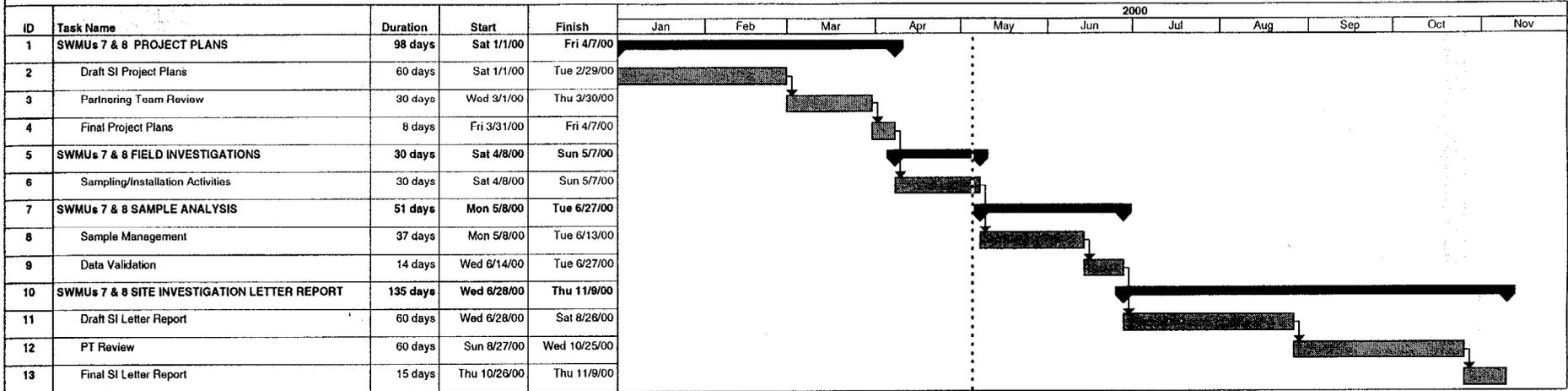
5.0 Project Schedule

This section presents the project schedule and the due dates of deliverables. Figure 5-1 and Table 5-1 show a breakdown on project milestones, primary deliverables and assumed intervals for governmental review.

TABLE 5-1
Project Schedule
Naval Amphibious Base Little Creek

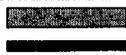
Task	Duration	Start	Finish
SWMUs 7 & 8 PROJECT PLANS	98 days	01/01/2000 8:00	04/07/2000 17:00
Draft SI Project Plans	60 days	01/01/2000 8:00	02/29/2000 17:00
Partnering Team Review	30 days	03/01/2000 8:00	03/30/2000 17:00
Final Project Plans	8 days	03/31/2000 8:00	04/07/2000 17:00
SWMUs 7 & 8 FIELD INVESTIGATIONS	30 days	04/08/2000 8:00	05/07/2000 17:00
Sampling/Installation Activities	30 days	04/08/2000 8:00	05/07/2000 17:00
SWMUs 7 & 8 SAMPLE ANALYSIS	51 days	05/08/2000 8:00	06/27/2000 17:00
Sample Management	37 days	05/08/2000 8:00	06/13/2000 17:00
Data Validation	14 days	06/14/2000 8:00	06/27/2000 17:00
SWMUs 7 & 8 SITE INVESTIGATION LETTER REPORT	135 days	06/28/2000 8:00	11/09/2000 17:00
Draft SI Letter Report	60 days	06/28/2000 8:00	08/26/2000 17:00
PT Review	60 days	08/27/2000 8:00	10/25/2000 17:00
Final SI Letter Report	15 days	10/26/2000 8:00	11/09/2000 17:00

Fig
Projec
Little Creek Nava. hibious Base
Virginia Beach, Virginia



Project: Swmu8_00
Date: Fri 5/5/00

Task
Progress



Milestone
Summary



Rolled Up Task
Rolled Up Milestone



Rolled Up Progress
External Tasks



Project Summary
Split



Rolled Up Split

6.0 References

A TEC Environmental Consultants. Correspondence. *Environmental Subsurface Investigation at LANTDIV Blast and Paint Facility*, August, 1989.

A.T. Kearny, 1989 (Kearny, 1989). *RCRA Facility Assessment (RFA)*.

Baker Environmental Inc., January 1996 (Baker, 1996). *Relative Risk Ranking System Data Collection Sampling and Analysis Report*.

CH2M HILL, March 1999. *Draft Master Project Plans, Volumes I and II, Naval Amphibious Base Little Creek, Virginia Beach, Virginia*. Prepared for the Department of the Navy, Naval Engineering Command, Atlantic Division, Norfolk, Virginia.

Naval Amphibious Base Little Creek, *SWMU/IR Summary for Naval Amphibious Base Little Creek*, August 1999.

Appendix A

Sampling and Analysis Plan Checklists

SWMU 7 and SWMU 8 Investigation - Derived Waste Plan Checklist

This checklist supplements the Master IDW Plan with site-specific information. Once completed for a specific project, it provides necessary IDW information for each investigation. It is to be taken into the field with the Master IDW Plan.

Site: SWMU 7 (Small Boats Sandblast Yard - Piers 44-55) and SWMU 8 (West Annex Sandblasting Area)

1. IDW Media: Soil cuttings
 Well development or purge water
 Decontamination residual soil and wastewater
 PPE or disposable equipment
 Other _____

2. Expected Regulatory Status: Hazardous
 Solid Waste
 Unknown
 Other Waste management activities regulated by OSHA
Hazardous waste standard (49 CFR 171.120)

3. Site Location: Soil cuttings will be generated at all locations. Decontamination fluids, purged groundwater, and PPE will be generated at all well locations. (See sampling location map in the SWMU 7 and SWMU 8 Work Plan)

4. Nature of Contaminants Expected:
 Petroleum contamination
 Polyaromatic hydrocarbon
 Pesticides
 Herbicides
 PCBs
 Metals
 Other - _____

5. Volume of IDW Expected: Drums - Maximum of 33. 3 for decontamination of fluids; 20 for soil cuttings; 10 for purged groundwater. PPE will be disposed of as solid waste.
 Cubic Yards
 Tons
 Gallons

6. Compositing Strategy for Sample Collection: No IDW sampling is planned. IDW disposal will be based on analytical results from sampling.

7. IDW Storage
X ___ As per Master IDW Plan ___ Other _____

8. Waste Disposal
X ___ As per Master IDW Plan ___ Other _____

Quality Assurance Project Plan Checklist

This checklist supplements the Master QAPP with site-specific information. Once completed for a specific project, it provides necessary quality assurance information for each investigation. It is to be taken into the field with the Master QAPP.

Site: SWMU 7 (Small Boats Sandblast Yard Piers 44-55) SWMU 8 (West Annex Sandblast Yard)

1. List sampling tasks: Geoprobe and split spoon subsurface soil sampling, surface soil sampling, groundwater sampling.
2. List data quality objectives: The objectives of the SWMU 7 and SWMU 8 investigations include:
 - a. Determination of groundwater and soil concentrations of total metals and TCL organics using CLP protocols
 - b. Completion of a qualitative risk screening assessment from data collected during the investigations
3. Organization:

LANTDIV Navy Technical Representative	Bob Schirmer / LANTDIV
USEPA Remedial Project Manager	Bruce Beach / USEPA
VDEQ Federal Facilities Project Manager	Robert Weld / VDEQ
CH2M HILL Activity Manager	Scott MacEwen / CH2M HILL WDC
Quality Control Senior Review	Ann West / CH2M HILL WDC
Technical Project Manager	Donna Caldwell / CH2M HILL HRO
Field Team Leader	Laura Cook / CH2M HILL HRO ____
4. Table of samples with analyses to be performed and associated QC samples (attached):

SWMU 7 and SWMU 8 Work Plan
5. Analytical Quantitation Limits:
X ____ As per Table 8-2 of Master QAPP ____ Other (attached)
6. QA/QC Acceptance Criteria (e.g., precision, accuracy)
X ____ As per Table 4-1 of Master QAPP ____ Other (attached)
7. Data reduction, validation, and reporting:
X ____ As per Section 9 of Master QAPP ____ Other (attached)

8. Internal QC Procedures (field and laboratory):

X As per Section 10 of Master QAPP

Other (attached)

9. Corrective Action:

X As per Section 14 of Master QAPP

Other (attached)

10. Other deviations from Master QAPP - None

Site-Specific Field Sampling Plan Checklist

This checklist supplements the Master Field Sampling Plan with site-specific information. Once completed for a specific project, it provides necessary field sampling information for each investigation. It is to be taken into the field with the Master FSP.

Site: SWMU 7 (Small Boats Sandblast Yard) and SWMU 8 (West Annex Sandblasting Area)

1. Tasks to be performed:

- | | |
|--|---|
| <input type="checkbox"/> Geophysical surveys
<input type="checkbox"/> Soil gas surveys
<input checked="" type="checkbox"/> Sediment Sampling
<input checked="" type="checkbox"/> Surface soil sampling
<input type="checkbox"/> Soil boring installation
<input checked="" type="checkbox"/> Subsurface soil sampling
<input checked="" type="checkbox"/> Monitoring well installation and development
<input type="checkbox"/> Monitoring well abandonment
<input checked="" type="checkbox"/> Groundwater sampling | <input type="checkbox"/> In-situ groundwater sampling
<input type="checkbox"/> Aquifer testing
<input type="checkbox"/> Hydrogeologic measurements
<input type="checkbox"/> Biota sampling
<input type="checkbox"/> Trenching
<input checked="" type="checkbox"/> Land surveying
<input type="checkbox"/> Investigation derived waste sampling
<input checked="" type="checkbox"/> Decontamination
<input type="checkbox"/> Other _____ |
|--|---|

2. Field measurements to be taken:

- | | |
|---|---|
| <input checked="" type="checkbox"/> temperature
<input checked="" type="checkbox"/> pH
<input checked="" type="checkbox"/> dissolved oxygen
<input checked="" type="checkbox"/> turbidity
<input checked="" type="checkbox"/> specific conductance
<input type="checkbox"/> organic vapor monitoring
<input type="checkbox"/> geophysical parameters (list):
<input type="checkbox"/> electromagnetic induction
<input type="checkbox"/> ground-penetrating radar | <input checked="" type="checkbox"/> surveying
<input type="checkbox"/> magnetometry
<input checked="" type="checkbox"/> global positioning system
<input type="checkbox"/> soil gas parameters (list):
<input type="checkbox"/> combustible gases
<input checked="" type="checkbox"/> water-level measurements
<input checked="" type="checkbox"/> pumping rate
<input type="checkbox"/> other _____ |
|---|---|

3. Sampling program (nomenclature, etc.):

- As per Section 3.1 of Master FSP Other

4. Map of boring, well installation and sampling locations (attach to checklist): See SWMU 7 and SWMU 8 Work Plan.

5. Table of field samples to be collected: See SWMU 7 and SWMU 8 Work Plan.

6. Applicable SOPs (Volume 2 of Master Project Plans) or references to specific pages in Master FSP:

- Direct Push Soil Sample Collection
- Installation of Shallow Monitoring Wells

- Shallow Soil Sampling
- Homogenization of Soil and Sediment Samples
- Logging of Soil Borings
- Field Measurement of pH
- Field Measurement of Specific Conductance and Temperature
- Groundwater sampling at monitoring wells
- Low Flow Groundwater Sampling
- Water Level Measurement
- Field Filtering
- Chain-of-Custody
- Packaging and Shipping Procedures
- Equipment & Field Rinse Blank Preparation
- Decontamination of Personnel and Equipment
- Decontamination of Drilling Rigs and Equipment
- Disposal of Fluids and Solids
- Sediment Sampling

6. Site-specific procedures or updates to protocols established in the Master FSP:
Described in the Site Investigation Work Plan.

Site-Specific Health and Safety Plan

This checklist must be used in conjunction with the Master HASP. This checklist is intended for use by CH2M HILL employees only. All CH2M HILL employees performing tasks under this checklist must read and sign both this checklist and the Master HASP and agree to abide by their provisions (see EMPLOYEE SIGNOFF attached to the checklist).

Site: SWMU 7 (Small Boats Sandblast Yard Piers 44-55) and SWMU 8 (West Annex Sandblasting Yard)

Location(s): Sampling Location Maps attached (SWMU 7 and SWMU 8 Work Plan)

This document shall be maintained on site with the Master Health and Safety Plan. It will include as attachments from the Work Plan a site map and the site characterization and objectives for this site.

The procedures described in the Master Health and Safety Plan will be followed unless otherwise specified in this Site-Specific Health and Safety Plan.

1. HAZWOPER-Regulated Tasks

- | | |
|--|---|
| <input type="checkbox"/> Test pit and excavation | <input checked="" type="checkbox"/> Groundwater sampling |
| <input type="checkbox"/> Soil boring installation | <input type="checkbox"/> Aquifer testing |
| <input checked="" type="checkbox"/> Geoprobe boring | <input type="checkbox"/> Hydrologic measurements |
| <input type="checkbox"/> Geophysical surveys | <input type="checkbox"/> Surface water sampling |
| <input checked="" type="checkbox"/> Hand augering | <input type="checkbox"/> Biota sampling |
| <input checked="" type="checkbox"/> Subsurface soil sampling | <input type="checkbox"/> Investigation-derived waste (drum) sampling and disposal |
| <input checked="" type="checkbox"/> Surface soil sampling | <input type="checkbox"/> Observation of loading of material for offsite disposal |
| <input type="checkbox"/> Soil gas surveys | <input type="checkbox"/> Oversight of remediation and construction |
| <input checked="" type="checkbox"/> Sediment sampling | <input type="checkbox"/> Other _____ |
| <input checked="" type="checkbox"/> Monitoring well/drive point installation | |
| <input type="checkbox"/> Monitoring well abandonment | |

2. Hazards of Concern: (Check as many as are applicable. Refer to Section 3 of Master H&S Plan for control measures):

- | | |
|--|---|
| <input checked="" type="checkbox"/> Heat stress | <input checked="" type="checkbox"/> Slip, trip, or fall hazards |
| <input type="checkbox"/> Cold stress | <input checked="" type="checkbox"/> Back injury |
| <input checked="" type="checkbox"/> Buried utilities, drums, tanks | <input type="checkbox"/> Confined space entry |
| <input type="checkbox"/> Inadequate illumination | <input type="checkbox"/> Trenches, excavations |
| <input checked="" type="checkbox"/> Drilling | <input type="checkbox"/> Protruding objects |
| <input checked="" type="checkbox"/> Heavy equipment | <input checked="" type="checkbox"/> Vehicle traffic |
| <input checked="" type="checkbox"/> Working near water | <input type="checkbox"/> Ladders, scaffolds |
| <input type="checkbox"/> Flying debris | <input type="checkbox"/> Fire |
| <input type="checkbox"/> Gas cylinders | <input checked="" type="checkbox"/> Working on water |
| <input checked="" type="checkbox"/> Noise | <input checked="" type="checkbox"/> Snakes or insects |

X___ Poison ivy, oak, sumac

___ Radiological

X___ Ticks

___ Other _____

3. Contaminants of Concern (List if known. Refer to Table 3.8 of the Master HASP)

___ PAHs _____

___ Metals _____

___ Pesticides _____

4. Personnel (List CH2M HILL field team members and telephone numbers):

Field team leader(s) Donna Caldwell 757-873-1442

Site safety coordinator(s) Donna Caldwell 757-873-1442

Field team members Laura Cook 757-460-3734

5. Contractors/Subcontractors

X___ Procedures as per Master HASP

X___ Other Geoprobe and drilling subcontractor and utility clearance subcontractor have not been identified at the writing of this HASP checklist.

Name: To be added _____

Contact: To be added _____

Telephone: To be added _____

6. Level of personal protective equipment (PPE) required: D

Refer to Table 5.1 of Master HASP, CH2M HILL SOPs HS-07 and HS-08, and Respiratory Protection, Section 2 of the Site Safety Notebook.

7. Air monitoring instruments to be used (refer to Master HSP for action levels):

___ OVM 10.6

___ FID

___ CGI

___ Dust monitor

___ O₂

X PID

8. Decontamination procedures:

___ As per Section 7 of Master HASP

X ___ Other As described in the SWMU 7 and SWMU 8 Work Plan.

9. List any other deviations or variations from the Master HASP: None
10. Emergency Response (Check that all names and numbers are correct on page 37 of Master HASP and attach corrected page to this checklist)
11. Map to hospital (Highlight route to hospital from site and attach to this checklist)
12. Emergency Contacts (Check that all names and numbers are correct on page 37 of Master HASP and attach corrected page to this checklist)
13. Approval. This prepared site-specific checklist must be approved by John Longo/NJO or authorized representative

Name John Longo/NJO

Title: Health and Safety Manager Date: 5/8/00



14. Employee Signoff. All CH2M HILL employees working at the site must sign the attached Employee Signoff for the checklist as well as for the Master HASP.

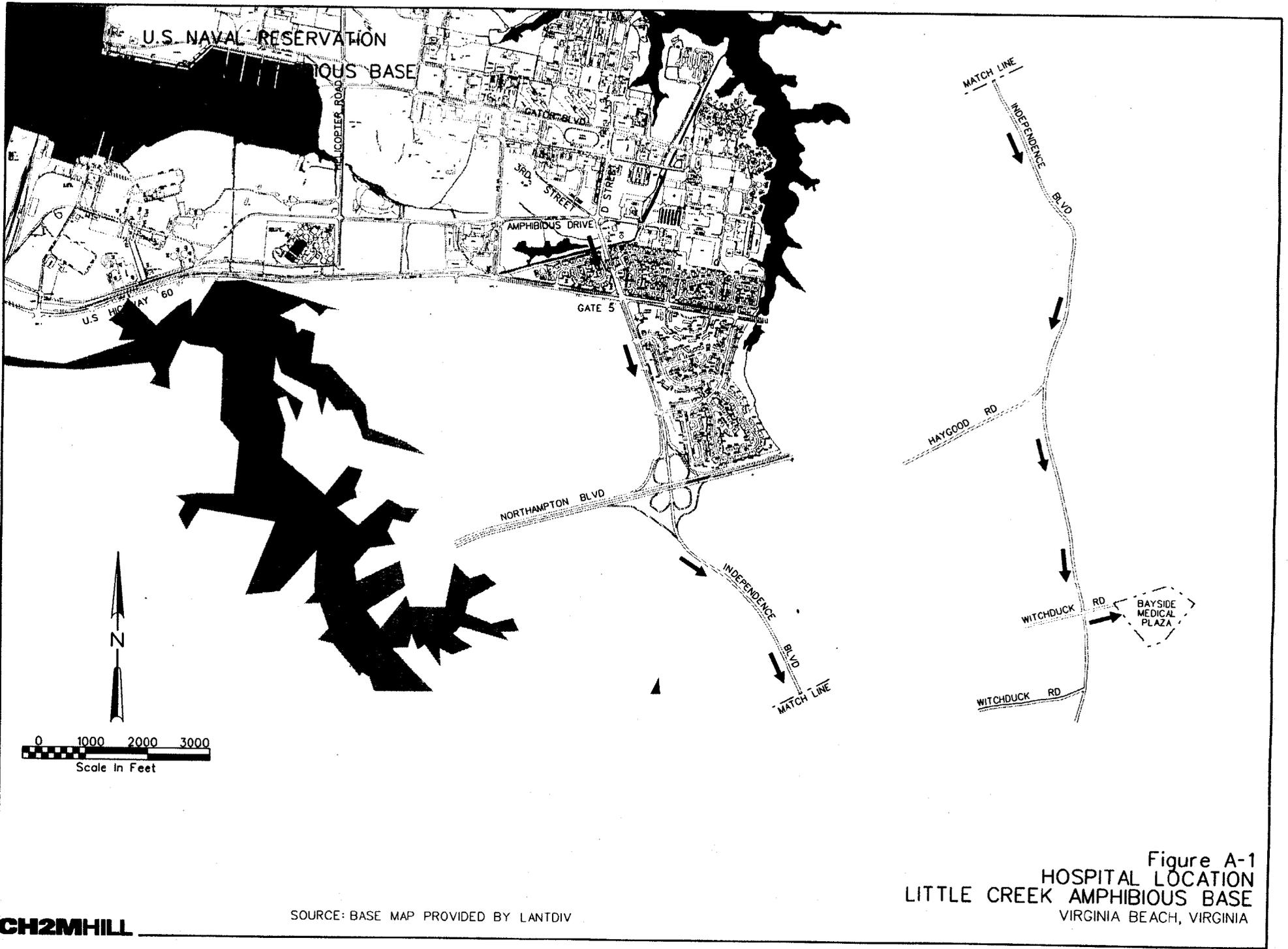


Figure A-1
 HOSPITAL LOCATION
 LITTLE CREEK AMPHIBIOUS BASE
 VIRGINIA BEACH, VIRGINIA

SOURCE: BASE MAP PROVIDED BY LANTDIV