

01.09-08/18/99-0037

Final

**Project Plan Addendum
Sampling for the Phase III RFI**

**NAS Oceana
Virginia Beach, Virginia**

Contract Task Order 124

August 1999

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

CHM HILL

Herndon, Virginia

Addendum to the Phase III RFI Final Work Plan

This is an Addendum to the CH2M HILL, RCRA Facility Investigation (RFI), Phase III Work Plan, dated December, 1997. This Addendum to the RFI Final Work Plan defines sampling tasks and field investigation procedures that will be performed during the additional Naval Air Station, Oceana (NAS Oceana) investigation and site characterization. Figures are located at the end of the Addendum.

Sample Collection Goals and Objectives

The principal goals of the additional sampling are to: (1) collect and analyze surface water and sediment sampling at SWMU 1 to be utilized in the proposed human health and ecological risk assessments and to determine if the low concentrations of benzene and benzo(a)pyrene in the shallow ground water are impacting the surface water in the drainage ditch adjacent to the SWMU, (2) collect and analyze soil, sediment, surface water, and ground water at SWMU 15 to determine the residual contaminant concentrations in biopile soil, support a human health and ecological risk assessment of the site, and conduct natural attenuation monitoring for remedial action, (3) Collect and analyze the ground water at SWMU 2C for baseline natural attenuation parameters as a long term remedial action and to support a human health risk assessment.

Sampling Location and Media

The number of samples to be collected per media and analyses at each SWMU are summarized in Table 1 through 5. The specific sampling and site activities developed to satisfy the above goals are summarized below:

SWMU 1- West Woods Oil Disposal Pit

- Collect 5 sediment (one location, SD13 will be determined as sediment or surface soil per geologists interpretation) and 4 surface water samples. Figure 1 illustrates the sediment and surface water sampling locations. The samples will be analyzed for TCL low-concentration volatiles (VOCs) by CLP, TCL semi-volatiles (SVOCs) by CLP, and TAL metals/cyanide by CLP, plus low-concentration PAHs using Method 8310.
- Possibility of collecting surface and/or subsurface soil samples, parameters to be determined by EPA by 7/9.

SWMU 15- Abandoned Tank Farm

- Figures 2-5 present the sample locations per media to be collected at SWMU 15.
- Collect 13 subsurface soil samples (1-2 ft) and analyze for TPH and TAL total metals/cyanide; however, this may be delayed due to the unknown status of additional biological treatment at the site. Sample locations are depicted on Figure 2.
- Collect 4 surface soil samples around the pond and analyze them for TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TCL pesticides/PBCs by CLP, and TAL metals/cyanide by CLP, plus low-concentration PAHs using Method 8310. Sample locations are depicted on Figure 3.
- Collect 5 surface water samples in the pond and analyze them accordingly;

- Analyze 2 of 5 samples for TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TCL pesticides/PBCs by CLP, and TAL metals/cyanide by CLP, plus low-concentration PAHs using Method 8310. The sample locations are depicted on Figure 4.
- Analyze the remaining 3 of 5 samples for TAL total metals/cyanide by CLP, TCL SVOCs by CLP, plus low-concentration PAHs using Method 8310
- Collect 16 sediment samples (boat needed) and analyze accordingly:
 - Analyze 4 of 16 samples for TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TCL pesticides/PBCs by CLP, and TAL metals/cyanide by CLP, plus low-concentration PAHs using Method 8310. The sample locations are depicted on Figure 5.
 - Analyze the remaining 12 of 16 samples for TAL total metals/cyanide by CLP, TCL SVOCs by CLP, plus low-concentration PAHs using Method 8310
 - The break down of the sample collection for the 16 sediment samples is: 5 bottom samples, 5 side-wall samples @ 2.5 feet bgs, 5 side-wall samples @ 5.5 feet bgs, and one sample from a dry ditch
- Drill and install four shallow monitoring wells (MWs 18, 19, 20, and 21) screened from 3-18 feet bgs. The proposed well locations are depicted on Figure 6.
- Obtain ground water levels in all site monitoring wells (10 total).
- Conduct ground water sampling at the four newly installed monitoring wells, plus three existing monitoring wells (MWs 6, 7, and 8) for TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TCL pesticides/PBCs by CLP, and TAL metals/cyanide by CLP, plus low-concentration PAHs using Method 8310. In addition, the following natural attenuation parameters will be analyzed: dissolved oxygen with two DO meters (Navy's and ours), Iron II with a Hach Kit, sulfate, methane, and pH, and field parameters temperature, specific conductance, and Eh.

SWMU 2C- Line Shack Oil Disposal Area (Bldg. 400)

- Conduct ground water sampling at 20 shallow monitoring wells (Figure 7) and analyze the samples for the following parameters:
 - TCL VOCs by CLP, low-concentration PAHs using Method 8310, TAL metals (dissolved fraction only) and natural attenuation parameters (TOC, nitrate, sulfate/sulfide, chloride, methane, ethane, ethene, and alkalinity).
 - In addition, pH, Eh, specific conductance, temperature, and dissolved oxygen will be measured in the field during monitoring well purging activities. Ferrous iron will be measured in the field immediately prior to sample collection using a field test kit.
- Obtain ground water levels in all site monitoring wells. It is very important to obtain accurate water levels.

SWMU 24- Bowser, Building 840

- Possibility of collecting surface and/or subsurface soil samples, parameters and additional information will be provided by EPA by 7/9.

TABLE 1
Surface water and Sediment Sampling at SWMU 1

Location	Media	Sample #	Analyses
SD09 through SD13	Sediment	OW1-SD09 through OW1-SD13	TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TAL metals/cyanide by CLP, and low-concentration PAHs using Method 8310
SW05 through SW08	Surface water	OW1-SW05 through OW1-SW09	TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TAL metals/cyanide by CLP, and low-concentration PAHs using Method 8310

Notes: Refer to Figure 1 for locations of the samples

TABLE 2
Surface and Subsurface Soil Samples to be Collected at SWMU 15

Location	Depth (feet)	Sample #	Analyses
SS11 through SS14	0-0.5	OW15-SS11 through OCW15-SS14	TCL low-concentration VOCs by CLP, TCL low-concentration SVOCs by CLP, TCL pesticides/PCBs by CLP, TAL metals/cyanide by CLP, low-concentration PAHs using Method 8310
SB28 through SB40	1-2	OW15-SB28 through OW15-SB40	Total Petroleum Hydrocarbons (TPH), TAL metals/cyanide by CLP

Notes: This may be delayed due to the unknown status of the biological treatment at the site. Information will be forwarded by Tim Reisch. Refer to Figures 2 and 3 for locations of the samples

TABLE 3
Surface water and Sediment Sampling at SWMU 15

Location	Media	Sample #	Analyses
SW01 and SW02	Surface water	OW15-SW01 and OW15-SW02	TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TCL pesticides/PCBs by CLP, TAL metals/cyanide by CLP, and low-concentration PAHs using Method 8310
SW03 through SW05	Surface water	OW15-SW03 through OW15-SW05	TCL SVOCs by CLP, TAL metals/cyanide by CLP, and low-concentration PAHs using Method 8310
SD01 through SD6	Sediment	OW15-SD01 through OW15-SD06	TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TCL pesticides/PCBs by CLP, TAL metals/cyanide by CLP, and low-concentration PAHs using Method 8310
SD7 through SD16	Sediment	OW15-SD07 through OW15-SD16	TCL SVOCs by CLP, TAL metals/cyanide by CLP, and low-concentration PAHs using Method 8310

Notes: Refer to Figures 4 and 5 for locations of the samples

TABLE 4
Ground Water Sampling at SWMU 15

Monitoring Well	Sample #	Analyses
MWs 6, 7, and 8 (existing) and 18, 19, 20, and 21 (new)	OW15-MW##-R01	TCL low-concentration VOCs by CLP, TCL SVOCs by CLP, TCL pesticides/PCBs by CLP, TAL metals/cyanide by CLP, and low-concentration PAHs using Method 8310, Sulfate by Method 375.4, Methane, Iron II in the field using a Hach Kit,

Notes: Refer to Figure 6 for well locations

TABLE 5
Ground Water Sampling at SWMU 2C

Monitoring Well	Sample #	Analyses
MWs 01 through 20	OW2C-MW01-R01 through OW2C-MW20-R01	TCL VOCs (including ethane/ethene) by CLP, TAL metals (dissolved fraction only) by CLP, and low-concentration PAHs using Method 8310, Sulfate/Sulfide by Methods 375.4/376.1, Total Organic Carbon (TOC) using Method 415.2/9060, Nitrate by Method 353.2/353.3/354.1, Chloride by Method 325.1/325.3, Methane, Alkalinity using Method 310.1, and Iron II in the field using a Hach Kit.

Notes: The deep well MW-1D will not be sampled. Refer to Figure 7 for well locations.

Field Operations

The following section details the field activities to be performed during this investigation. The field work will be conducted in accordance with the Amended Project Plans Sampling for the Phase III RFI at NAS Oceana. The field work will include the following task:

- Mobilization/demobilization
- Soil sampling
- Sediment and surface water sampling
- Monitoring well installation
- Ground water sampling
- Sample identification and handling
- Quality control samples
- Investigation-derived waste (IDW) disposal
- Decontamination

Mobilization/Demobilization

Mobilization to Oceana NAS by CH2M HILL is scheduled for the week of July 19, 1999. All field team members will review this Addendum and the Health and Safety Plan (HASP). In addition, a field team orientation meeting will be held on the first day of field activities to familiarize personnel with the scope of work.

Soil Sampling

Subsurface and surface soil samples will be collected and submitted for chemical analysis

The subsurface soil samples shall be collected from the treated soil that is spread between the former biopile locations and the pond. The treated soil is about 18 inches thick. The treated soil will be divided into 13 equal sub-areas. Four sub-samples will be collected from each sub-area from a depth of 3-9 inches below ground surface and composited in a bowl to make one composite sample for each sub-area. The proposed sample locations are illustrated in Figure 2.

The surface soil samples will be collected from the north, south, east and western edges of the pond. The proposed sample locations are illustrated in Figure 3. The subsurface and surface soil locations and analyses for each SWMU (as applicable) are summarized in Tables 1 through 3.

Details on the surface and subsurface soil sampling methods can be found in the Standard Operating Procedure section of the Final Amended Project Plans Sampling for Phase III RFI NAS Oceana (CH2M HILL, 1997).

Surface Water and Sediment Sampling

Surface Water and sediment sampling will be conducted from the selected sampling locations. The surface water and sediment samples locations and analyses for each SWMU (as applicable) are summarized in Tables 1 through 3. Surface water and sediment sampling details can be found in the

Standard Operating Procedure section of the Final Amended Project Plans Sampling for Phase III RFI NAS Oceana (CH2M HILL, 1997).

Monitoring Well Installation

Four new monitoring wells will be installed in the surficial aquifer to a depth of 18-feet below grade at SWMU 15. These wells will be established as MWs 18, 19, 20, and 21. Well locations are depicted on Figure 6. Hollow stem auger drilling techniques will be employed for drilling and monitoring well installation. The wells will be constructed of 2-inch inside diameter (ID), Schedule 40 PVC riser and screen with 0.01 inch slot size (10-slot). Split spoon samples for lithologic characterization will be collected at 5-foot intervals for each new monitoring well boring. Monitoring well boring logs and well completion logs will be completed by the field geologist during each boring and well installation. Following installation, each new well will be thoroughly developed utilizing the surge and pump method. In addition, the wells will be surveyed for horizontal and vertical control based on the Virginia State Plan NAD 83 and will reference a USGS benchmark. Monitoring well installation details can be found in the Standard Operating Procedure section of the Final Amended Project Plans Sampling for Phase III RFI NAS Oceana (CH2M HILL, 1997).

Ground Water Sampling

One round of ground water sampling will be conducted at the selected monitoring wells at SWMU 15. The four new wells (MWs 18, 19, 20, and 21) and three existing wells (MWs 6, 7, and 8) will be sampled. Locations of these wells are illustrated on Figure 6. Ground water samples will be collected with the low-flow purging technique using a peristaltic pump or bladder pump.

Dissolved oxygen, pH, specific conductance, temperature, oxidation/reduction potential, and turbidity will be measured in the field prior to each sample collection. Water level measurements will be collected from each monitoring well prior to sampling. Dissolved oxygen shall be recorded from two meters, the Navy's and the contractors, to ensure an accurate determination.

The groundwater sample locations and analyses for each SWMU (as applicable) are summarized in Tables 4 through 5. Ground water sampling details are in the Standard Operating Procedure section of the Final Amended Project Plans Sampling for Phase III RFI NAS Oceana (CH2M HILL, 1997).

Sample Identification and Handling

The standardized numbering system will be used to identify all samples collected during the soil, sediment, surface and ground water sampling. Sample numbers are provided in the tables and on the figures. The numbering system will provide a tracking procedure to ensure accurate data retrieval of all samples collected. 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. The sample identification for all samples collected during this investigation will use the format outlined in the Data Management Plan section of the Final Amended Project Plans Sampling for Phase III RFI NAS Oceana (CH2M HILL, 1997).

Sample handling involves the field-related considerations concerning field sample documentation, nomenclature, packaging, shipping, and custody. Sample packaging and shipping procedure can be found in the Standard Operating Procedure section of the Final Amended Project Plans Sampling for Phase III RFI NAS Oceana (CH2M HILL, 1997).

Quality Control Samples

In addition to appropriate documentation and regular calibration of field equipment, quality control (QC) samples will be collected during environmental sampling activities. QC samples include field duplicates and field-related QC samples.

IDW Handling and Disposal

Four types of potentially contaminated residues are expected to be generated during the field work: (1) personal protective equipment (PPE), (2) drill rig, sampling equipment, and PPE decontamination fluids, (3) drill cuttings, and (4) development and purge water from the monitoring well installation and sampling. These materials will be drummed and the drums will be labeled as follows:

Investigation-Derived Waste

NAS Oceana, SWMU _____

Date

Contact Mr. Tim Reisch – LANTDIV

The drummed wastes are expected to be considered as non-hazardous based upon previous field investigation results. If the analytical results support this determination the wastes will be disposed of as non-hazardous. Otherwise the wastes will be characterized by TCLP and disposed of as hazardous waste.

Decontamination

The equipment involved in the field sampling activities will be decontaminated prior to and during drilling and sampling activities. This equipment includes drill rigs, down-hole tools, augers, PPE, and all non-dedicated reusable sampling equipment. Details for decontamination procedures are in the Standard Operating Procedure section of the Final Amended Project Plans Sampling for Phase III RFI NAS Oceana (CH2M HILL, 1997).

Contacts

The Activity Manager is Jack Robinson. He can be reached at CH2M HILL WDC office 703/471-6405 x4321 or at home at 703/729-1313.

The LANTDIV contact is Mr. Tim Reisch. He can be reached at LANTDIV 757/322-4758

The field task manager is Mr. Matt Louth. He can be reached at the CH2M HILL VBO 757/460-3734 x17

The field team leader is Mike Martinson. He can be reached at the CH2M HILL VBO.

Analytical Detection Limits and Containers/preservatives

Analytical detection limits and containers/preservatives are tabulated in Tables 6 through 8.

Table 6
Chemical Parameters and Detection Limits
Naval Air Station, Oceana

Compound	Reporting Limits		Compound	Reporting Limits	
	Aqueous µg/L	Soil mg/kg		Aqueous µg/L	Soil mg/kg
Low Concentration Volatile Organic Compounds and BTEX (Method 8260)					
Acetone	10	0.01	cis-1,3-Dichloropropene	5	0.005
Acrolein	100	0.1	trans-1,3-Dichloropropene	5	0.005
Acrylonitrile	100	0.1	trans-1,4-Dichloro-2-butene	5	0.005
Benzene	5	0.005	Ethyl methacrylate	5	0.005
Bromodichloromethane	5	0.005	Ethylbenzene	5	0.005
Bromoform	5	0.005	2-Hexanone	10	0.01
Bromomethane	10	0.01	Idomethane	10	0.01
Carbon disulfide	5	0.005	Methyl ethyl ketone (2-Butanone)	10	0.01
Carbon tetrachloride	5	0.005	4-Methyl-2-pentanone	10	0.01
Chlorobenzene	5	0.005	Methylene chloride	5	0.005
Chloroethane	10	0.01	Styrene	5	0.005
2-Chloroethyl vinyl ether	10	0.01	1,1,2,2-Tetrachloroethane	5	0.005
Chloroform	5	0.005	Tetrachloroethene	5	0.005
Chloromethane	5	0.005	1,1,1-Trichloroethane	5	0.005
Dibromochloromethane	5	0.005	1,1,2-Trichloroethane	5	0.005
Dibromomethane	5	0.005	Trichloroethene	5	0.005
Dichlorodifluoromethane	10	0.01	Trichlorofluoromethane	5	0.005
1,1-Dichloroethane	5	0.005	1,2,3-Trichloropropane	5	0.005
1,2-Dichloroethane	5	0.005	Toluene	5	0.005
1,1-Dichloroethene	5	0.005	Vinyl acetate	10	0.01
1,2-Dichloroethene	5	0.005	Vinyl chloride	2	0.002
1,2-Dichloropropane	5	0.005	Xylene (total)	5	0.005

Table 6
Chemical Parameters and Detection Limits
Naval Air Station, Oceana

Compound	Reporting Limits		Compound	Reporting Limits	
	Aqueous µg/L	Soil mg/kg		Aqueous µg/L	Soil mg/kg
Low Concentration Polynuclear Aromatic Hydrocarbons (Method 8310)					
Acenaphthene	1	0.067	Chrysene	0.1	0.0033
Acenaphthylene	1	0.067	Dibenzo (a,h) anthracene	0.1	0.0067
Anthracene	1	0.0033	Fluoranthene	0.1	0.0033
Benzo (a) anthracene	0.1	0.0033	Fluorene	1	0.0033
Benzo (a) pyrene	0.1	0.0033	Indeno (1,2,3-cd) pyrene	0.1	0.0067
Benzo (b) fluoranthene	0.1	0.0033	Naphthalene	1	0.0033
Benzo (ghi) perylene	0.1	0.0033	Phenanthrene	1	0.0067
Benzo (k) fluoranthene	0.05	0.0033	Pyrene	0.1	0.0033
TAL Metals by CLP					
Cyanide	0.005	0.002	Magnesium	5000	1.0
Aluminum	200	0.04	Manganese	15	0.003
Antimony	60	0.012	Mercury	0.2	0.0002
Arsenic	10	0.002	Nickel	40	0.008
Barium	200	0.04	Potassium	5000	1.0
Beryllium	5	0.001	Selenium	5	0.001
Cadmium	5	0.001	Silver	10	0.002
Calcium	5000	1.0	Sodium	5000	1.0
Chromium	10	0.002	Thallium	10	0.002
Cobalt	50	0.01	Vanadium	50	0.01
Copper	25	0.005	Zinc	20	0.004
Iron	100	0.02	Lead	3	0.0006
Natural Attenuation Parameters					
Nitrate	0.0005	-	Chloride	0.0005	-
Sulfate	0.001	-	Sulfide	0.0001	-
TOC	0.001	-	Alkalinity	0.001	-
Methane	3.3	-	Ethane	5.8	-
Propane	9.2	-	Ethylene	6.2	-

Table 6
Chemical Parameters and Detection Limits
Naval Air Station, Oceana

Compound	Reporting Limits		Compound	Reporting Limits	
	Aqueous µg/L	Soil mg/kg		Aqueous µg/L	Soil mg/kg
Pesticides/PCBs					
alpha-BHC	0.05	0.0017	4,4'-DDT	0.1	0.0033
beta-BHC	0.05	0.0017	Methoxychlor	0.05	0.017
delta-BHC	0.05	0.0017	Endrin ketone	0.1	0.0033
gamma-BHC (Lindane)	0.05	0.0017	Endrin aldehyde	0.1	0.0033
Heptachlor	0.05	0.0017	alpha-Chlordane	0.05	0.0017
Aldrin	0.05	0.0017	gamma-Chlordane	0.05	0.0017
Heptachlor epoxide	0.05	0.0017	Toxaphene	5.0	0.017
Endosulfan I	0.05	0.0017	Aroclor-1016	1.0	0.033
Dieldrin	0.1	0.0033	Aroclor-1221	1.0	0.033
4,4'-DDE	0.1	0.0033	Aroclor-1232	2.0	0.067
Endrin	0.1	0.0033	Aroclor-1242	1.0	0.033
Endosulfan II	0.1	0.0033	Aroclor-1248	1.0	0.033
4,4'-DDD	0.1	0.0033	Aroclor-1254	1.0	0.033
Endosulfan sulfate	0.1	0.0033	Aroclor-1260	1.0	0.033

**TABLE 7
REQUIRED CONTAINERS, PRESERVATIVES,
AND HOLDING TIMES FOR SOIL AND SEDIMENT SAMPLES**

Analysis	Sample Container	Preservative	Holding Time	Volume of Sample Collected
TCL Volatiles and gasses	4-oz glass bottle with teflon-lined cap	Cool to 4°C	14 days	Fill completely
TCL Semivolatiles	Two 4-oz glass bottles with teflon-lined cap	Cool to 4°C	14 days	Fill completely
Low concentration PAHs	(1) 8-oz. Glass bottle with teflon-lined cap	Cool to 4°C	14 days	Fill completely
TCL Pest/PCB	Two 4-oz glass bottles with teflon-lined cap	Cool to 4°C	14 days	Fill completely
Total Petroleum Hydrocarbons (TPH)	(1) 4-oz. Glassbottle with teflon-lined cap	Cool to 4°C	14 days	Fill completely
TAL Inorganics	4-oz glass bottle with teflon-lined cap	Cool to 4°C	6 months	Fill to shoulder

Note:

Refer to Table 2-3 for the required containers, preservatives, and holding times for the associated aqueous field quality control samples.

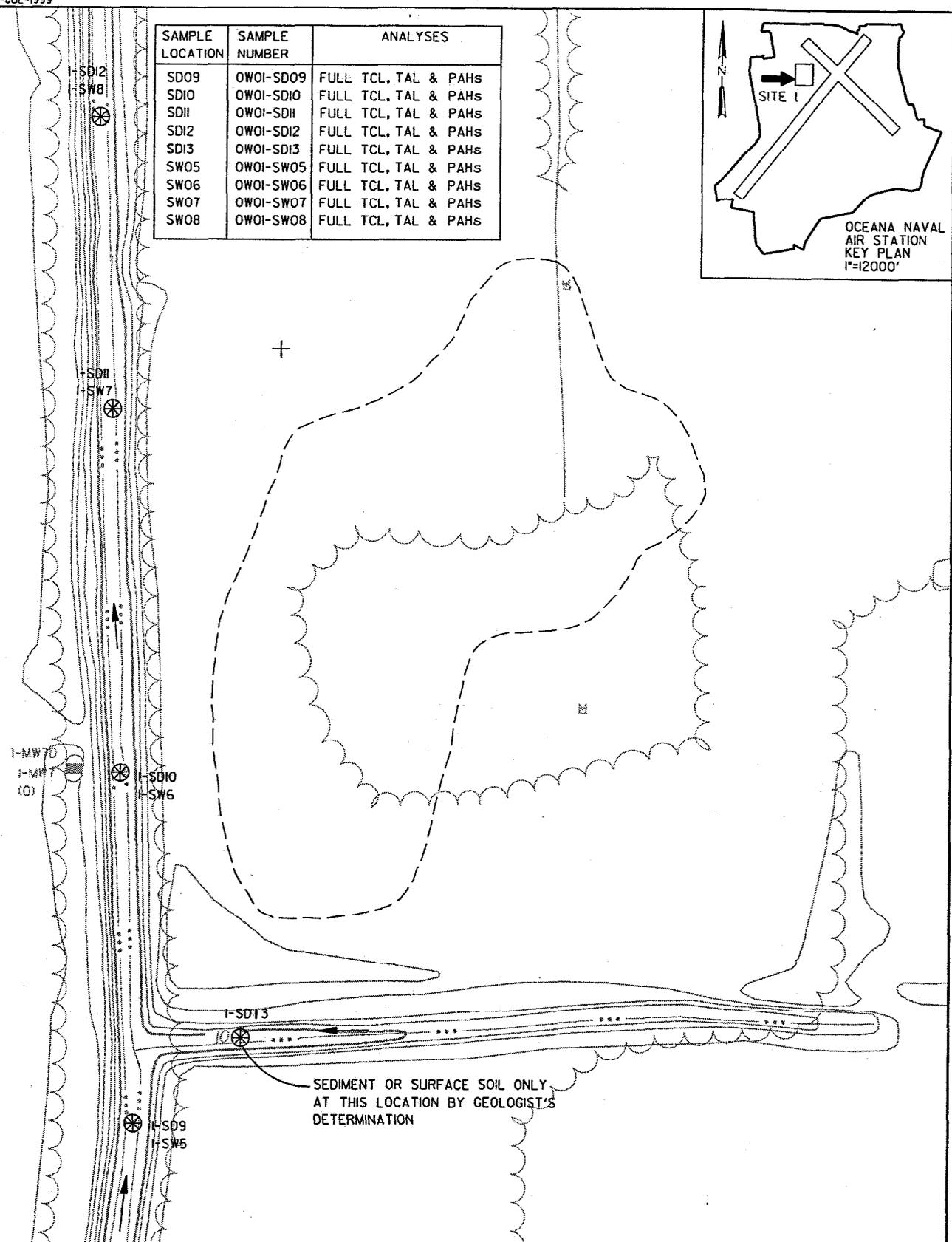
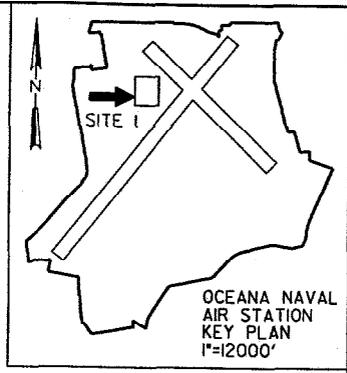
**TABLE 8
REQUIRED CONTAINERS, PRESERVATIVES,
AND HOLDING TIMES FOR WATER SAMPLES**

Analysis	Sample Container	Preservative	Holding Time	Volume of Sample Collected
TCL Volatiles and Low Concentration Volatiles	Three 40-ml glass vial w/teflon lined cap	HCl to pH <2; Cool to 4°C	14 days	Fill completely; no air bubbles
TCL Semivolatiles	2 1-liter amber bottle w/teflon lined cap	Cool to 4°C	7 days to extraction, 40 days to analysis	Fill to shoulder
TCL Pest/PCB	2 1-liter amber bottle w/teflon lined cap	Cool to 4°C	7 days to extraction, 40 days to analysis	Fill to shoulder
TAL Metals	1-liter polyethylene bottle for each analysis	HNO ₃ to pH <2; Cool to 4°C	6 months	Fill to shoulder
Low concentration PAHs	(1) 1-liter Amber bottle	Cool to 4°C	7 days	Fill to shoulder
Methane/Ethane/Ethene	(3) 40-ml glass vial w/ teflon cap	HCL to pH <2; Cool to 4°C	14 days	Fill completely; no air bubbles
Total Organic Carbon (TOC)	(1) 125 ml HDPE	H ₂ SO ₄ to pH <2; Cool to 4°C	28 days	Fill to shoulder
Nitrate	(1) 125 ml HDPE	H ₂ SO ₄ to pH <2; Cool to 4°C	28 days	Fill to shoulder
Sulfate	(1) 125 ml HDPE	Cool to 4°	28 days	Fill to shoulder
Chloride	(1) 125 ml HDPE	Cool to 4°	28 days	Fill to shoulder
Alkalinity	(1) 125 ml HDPE	Cool to 4°	14 days	Fill to shoulder
Sulfide	(1) 125 ml HDPE	NaOH & ZnAc; Cool to 4°	7 days	Fill to shoulder
TAL Cyanide	1-liter bottle	NaOH to pH > 12, Cool to 4°C	14 days	Fill to shoulder

Notes:

- Sulfate, Chloride, & Alkalinity may be stored in a 250 ml HDPE container, since these analytes do not require preservatives.
- TOC & Nitrate may be stored in a 125 ml HDPE, because both are preserved with H₂SO₄ and require only 25 ml of volume for each method.

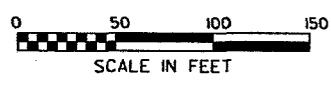
SAMPLE LOCATION	SAMPLE NUMBER	ANALYSES
SD09	OWOI-SD09	FULL TCL, TAL & PAHs
SD10	OWOI-SD10	FULL TCL, TAL & PAHs
SD11	OWOI-SD11	FULL TCL, TAL & PAHs
SD12	OWOI-SD12	FULL TCL, TAL & PAHs
SD13	OWOI-SD13	FULL TCL, TAL & PAHs
SW05	OWOI-SW05	FULL TCL, TAL & PAHs
SW06	OWOI-SW06	FULL TCL, TAL & PAHs
SW07	OWOI-SW07	FULL TCL, TAL & PAHs
SW08	OWOI-SW08	FULL TCL, TAL & PAHs



LEGEND

- SEDIMENT & SURFACE WATER SAMPLING LOCATION
- - - DIRECTION OF SURFACE WATER FLOW
- - - ESTIMATED LIMIT OF FREE PRODUCT (BASED ON TEST PITS AND BORINGS)

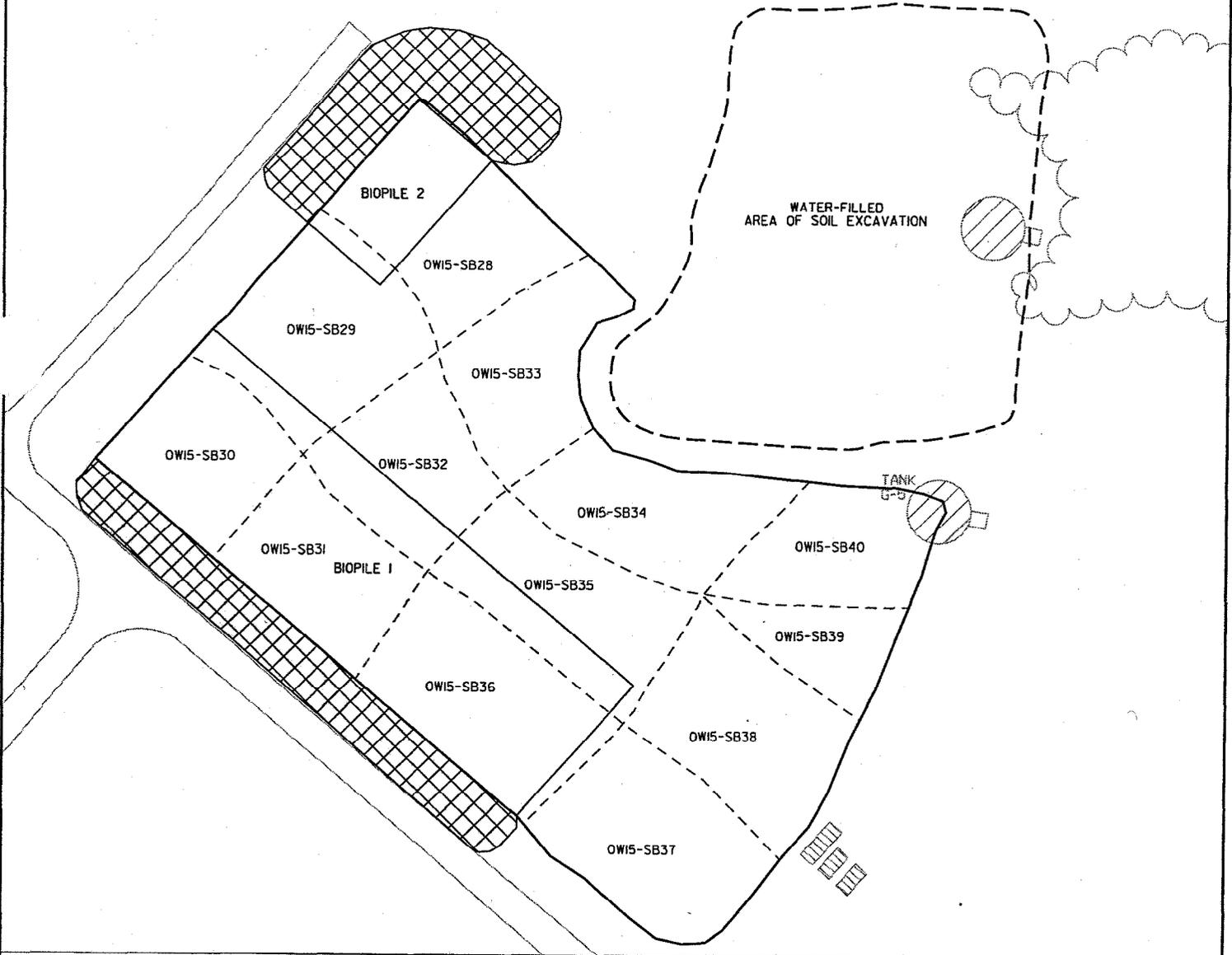
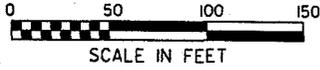
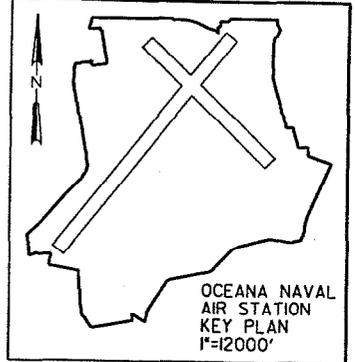
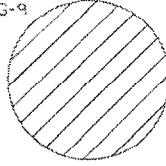
Figure 1
PROPOSED SEDIMENT & SURFACE WATER
SAMPLING LOCATIONS AT SWMU 1





NOTE:
FOUR SAMPLE LOCATIONS WILL BE RANDOMLY
SELECTED FROM EACH OF 13 SUBAREAS OF THE
TREATED SOIL. ONE SOIL SAMPLE WILL BE
COLLECTED FROM EACH SUBAREA TO COMPRISE
13 CONFIRMATORY SOIL SAMPLES.
THE 13 COMPOSITE SOIL SAMPLES WILL BE
ANALYZED FOR TPH AND TAL METALS AND
CYANIDE.

TANK
G-9



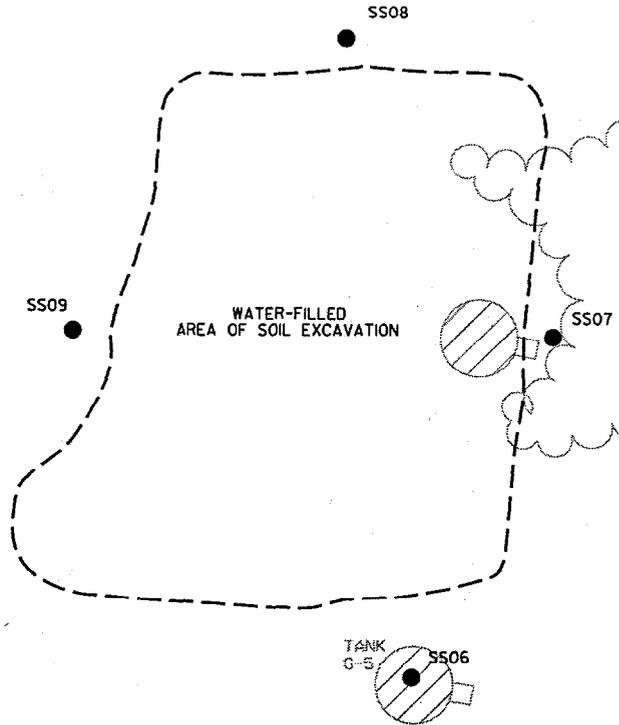
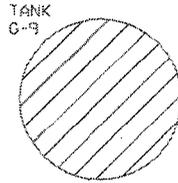
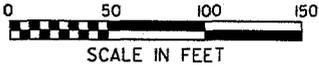
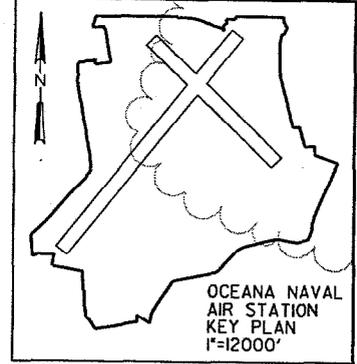
LEGEND

-  CLEAN FILL
-  APPROXIMATE AREA OF EXCAVATION

Figure 2
CONFIRMATORY SOIL SAMPLE LOCATIONS
AT SWMU 15
Naval Air Station, Oceana
Virginia beach, Virginia



SAMPLE LOCATION	SAMPLE NUMBER	ANALYSES
SS06	OW15-SS06	FULL TAL, TCL, PEST/PCB & PAHs
SS07	OW15-SS07	FULL TAL, TCL, PEST/PCB & PAHs
SS08	OW15-SS08	FULL TAL, TCL, PEST/PCB & PAHs
SS09	OW15-SS09	FULL TAL, TCL, PEST/PCB & PAHs



LEGEND

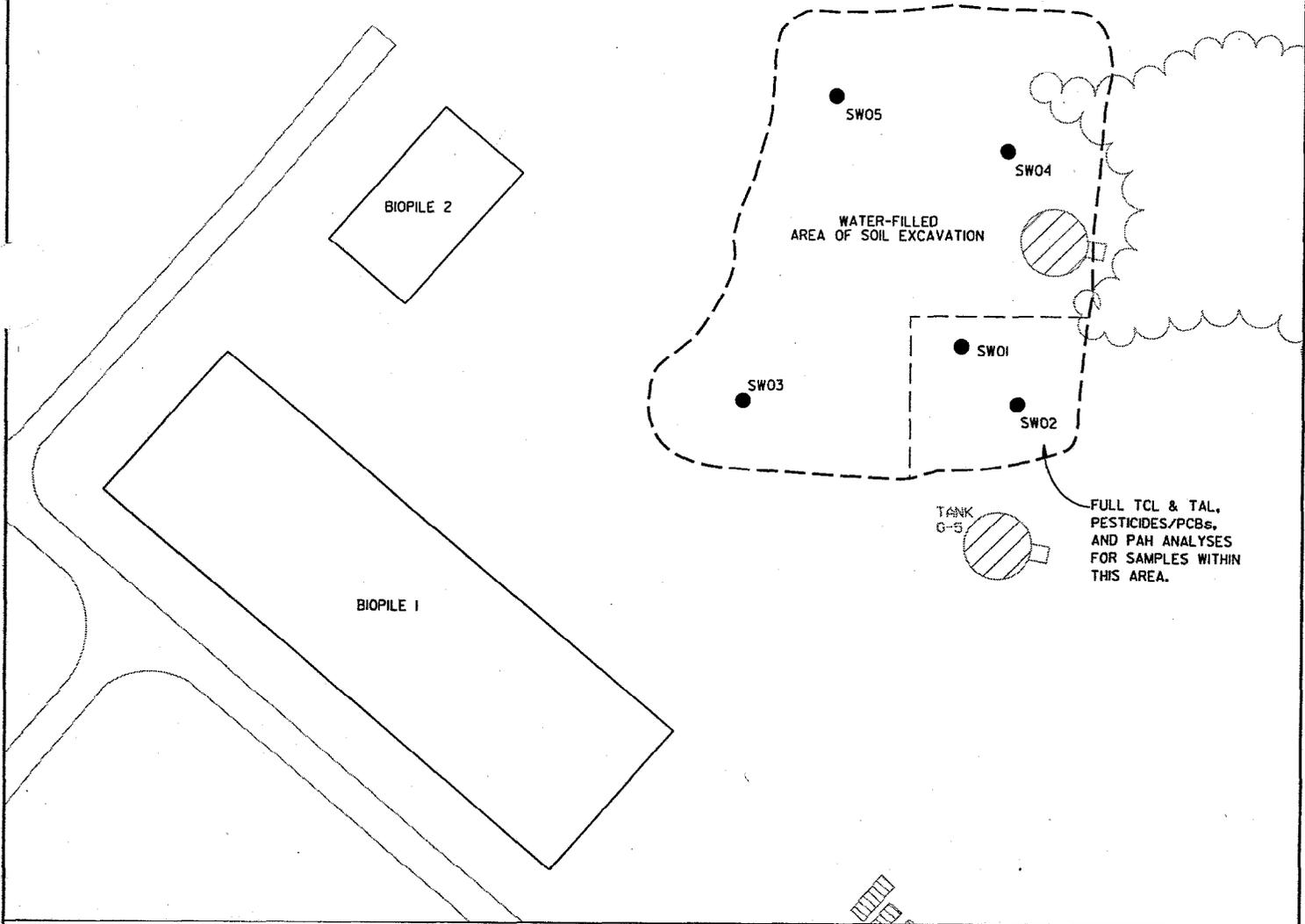
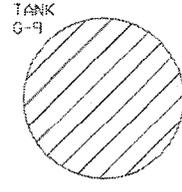
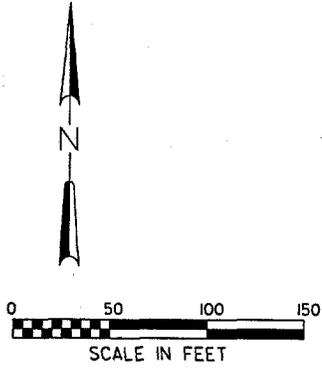
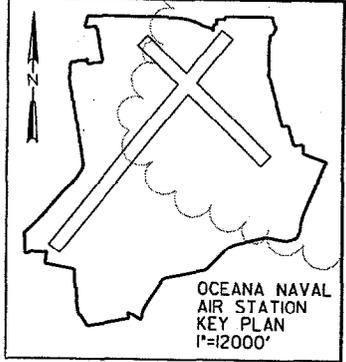
- SAMPLE LOCATION
- - - APPROXIMATE AREA OF EXCAVATION

Figure 3
SURFACE SOIL SAMPLE LOCATIONS
SWMU 15

Naval Air Station, Oceana
Virginia beach, Virginia

CH2MHILL

SAMPLE LOCATION	SAMPLE NUMBER	ANALYSES
SW01	OW15-SW01	FULL TAL & TCL & PEST/PCB & PAHs
SW02	OW15-SW02	FULL TAL & TCL & PEST/PCB & PAHs
SW03	OW15-SW03	TOTAL METALS, SVOCs & PAHs
SW04	OW15-SW04	TOTAL METALS, SVOCs & PAHs
SW05	OW15-SW05	TOTAL METALS, SVOCs & PAHs



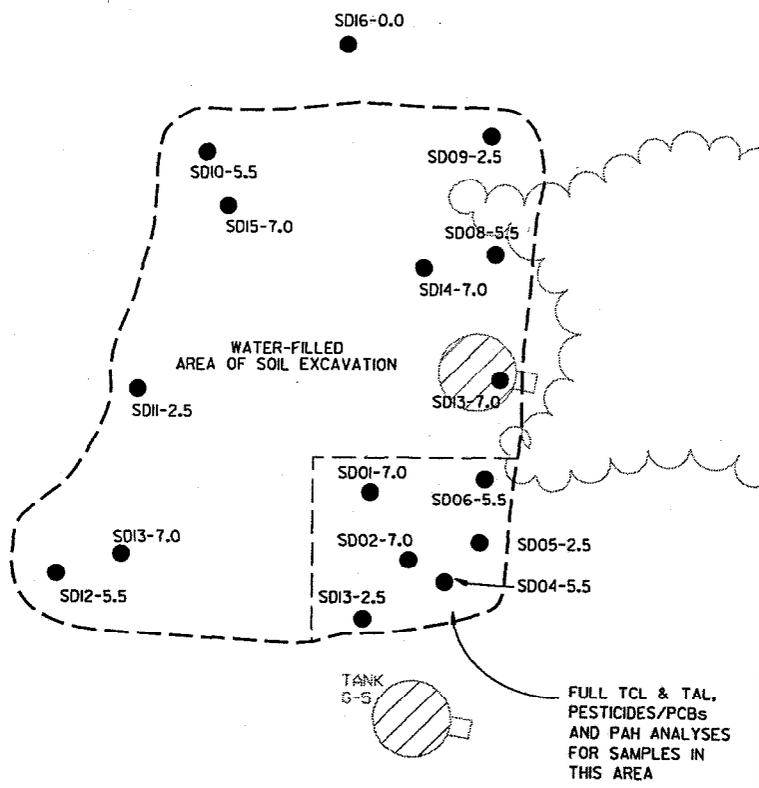
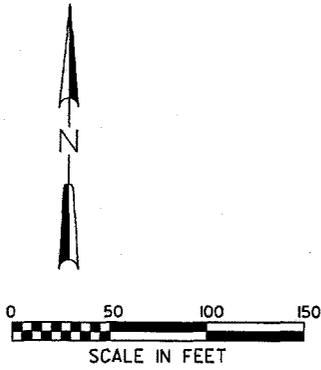
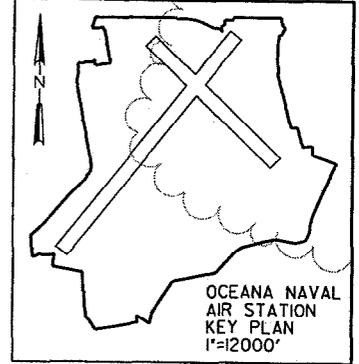
FULL TCL & TAL, PESTICIDES/PCBs, AND PAH ANALYSES FOR SAMPLES WITHIN THIS AREA.

LEGEND

- SAMPLE LOCATION
- - - APPROXIMATE AREA OF EXCAVATION

Figure 4
 SURFACE WATER SAMPLING LOCATIONS
 SWMU 15
 Naval Air Station, Oceana
 Virginia beach, Virginia
CH2MHILL

SAMPLE LOCATION	SAMPLE NUMBER	ANALYSES
SD01-7.0	OW15-SD01-7.0	TAL, TCL, PEST/PCB & PAHs
SD02-7.0	OW15-SD02-7.0	TAL, TCL, PEST/PCB & PAHs
SD03-2.5	OW15-SD03-2.5	TAL, TCL, PEST/PCB & PAHs
SD04-5.5	OW15-SD04-5.5	TAL, TCL, PEST/PCB & PAHs
SD05-2.5	OW15-SD05-2.5	TAL, TCL, PEST/PCB & PAHs
SD06-5.5	OW15-SD06-5.5	TAL, TCL, PEST/PCB & PAHs
SD07-2.5	OW15-SD07-2.5	TOTAL METALS, SVOCs & PAHs
SD08-5.5	OW15-SD08--5.5	TOTAL METALS, SVOCs & PAHs
SD09-2.5	OW15-SD09--2.5	TOTAL METALS, SVOCs & PAHs
SD10-5.5	OW15-SD10--5.5	TOTAL METALS, SVOCs & PAHs
SD11-2.5	OW15-SD11-2.5	TOTAL METALS, SVOCs & PAHs
SD12-5.5	OW15-SD12-5.5	TOTAL METALS, SVOCs & PAHs
SD13-7.0	OW15-SD13-7.0	TOTAL METALS, SVOCs & PAHs
SD14-7.0	OW15-SD14-7.0	TOTAL METALS, SVOCs & PAHs
SD15-7.0	OW15-SD15--7.0	TOTAL METALS, SVOCs & PAHs
SD16-0.0	OW15-SD16-0.0	TOTAL METALS, SVOCs & PAHs



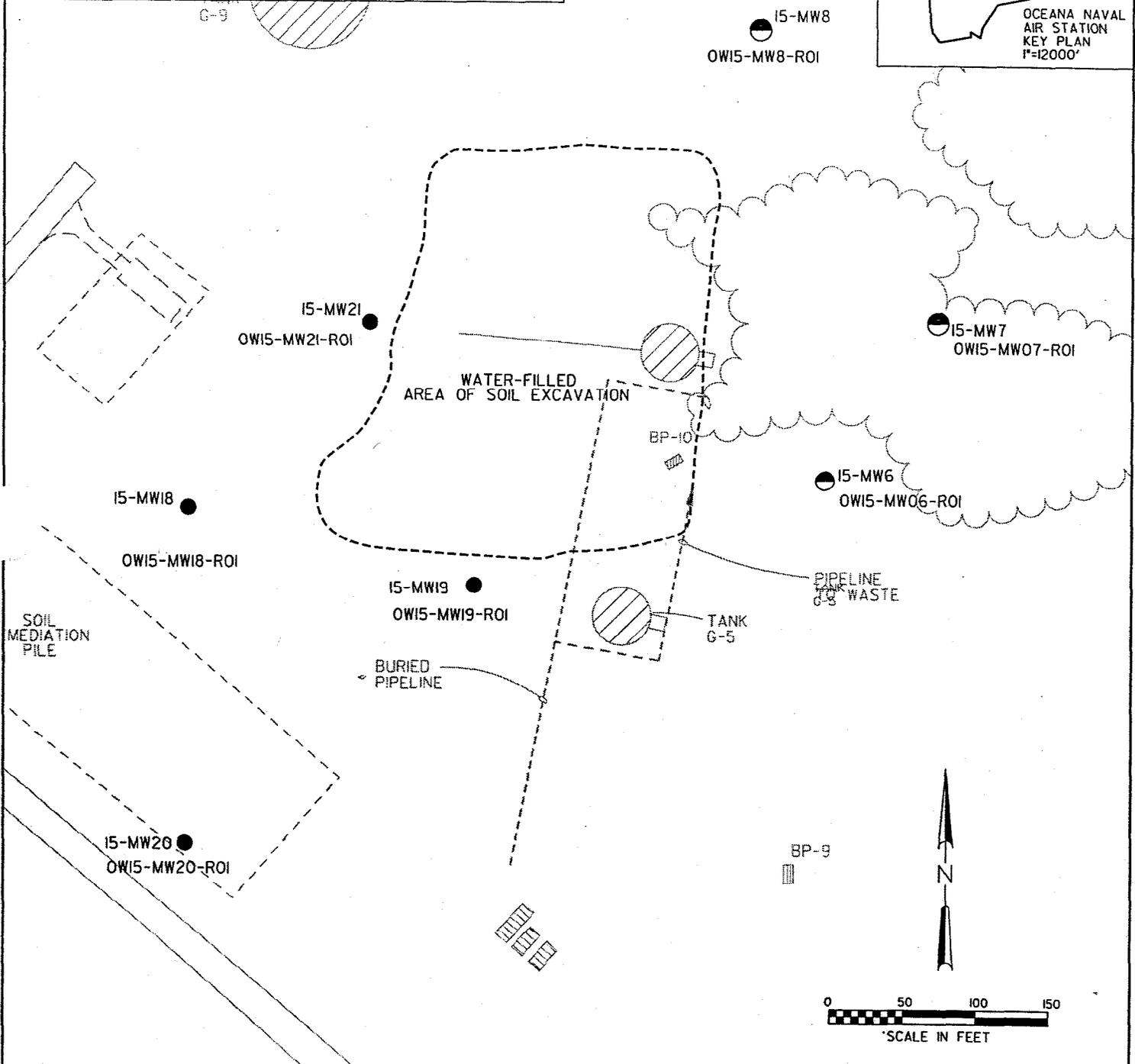
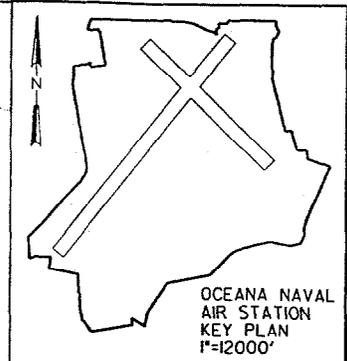
LEGEND

- SAMPLE LOCATION
- - - APPROXIMATE AREA OF EXCAVATION

Figure 5
 SEDIMENT SAMPLING LOCATIONS
 SWMU 15
 Naval Air Station, Oceana
 Virginia beach, Virginia

SAMPLE LOCATION	SAMPLE NUMBER	ANALYSIS
MW06	OW15-MW06-ROI	FULL TCL, TAL & PAHs
MW07	OW15-MW07-ROI	PLUS MNA PARAMETERS:
MW08	OW15-MW08-ROI	DO, FeII, SULFATE, METHANE,
MW18	OW15-MW18-ROI	& pH
MW19	OW15-MW19-ROI	AND FIELD PARAMETERS:
MW20	OW15-MW20-ROI	TEMP., CONDUCTIVITY
MW21	OW15-MW21-ROI	

TANK G-9

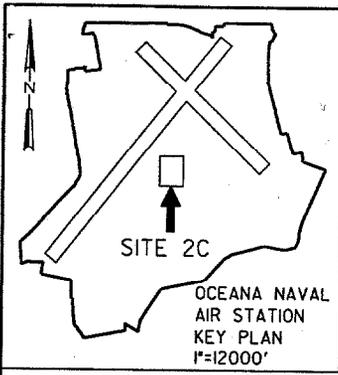


LEGEND

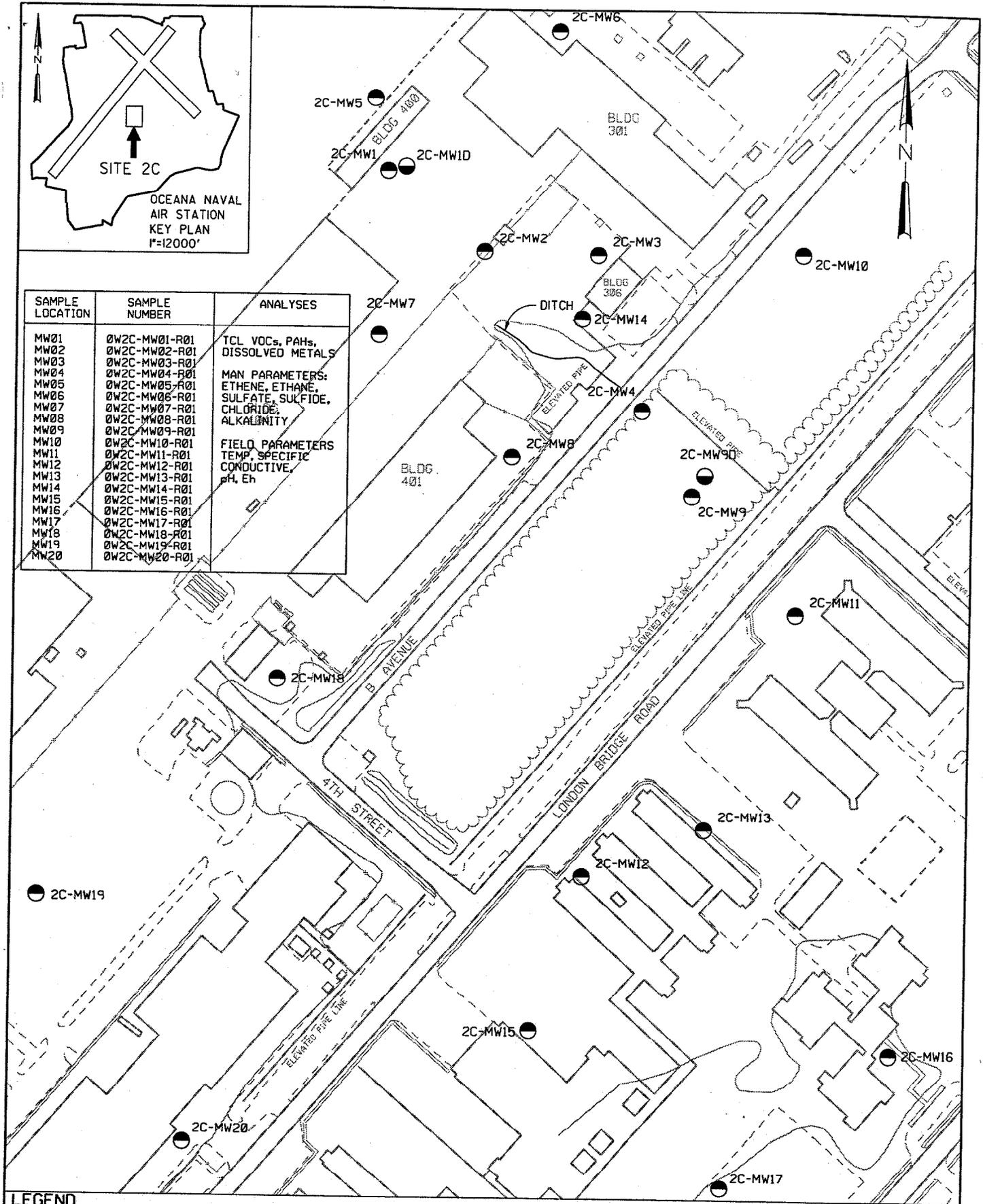
- EXISTING SHALLOW MONITORING WELL
- NEW MONITORING WELL LOCATION
- - - APPROXIMATE AREA OF EXCAVATION

Figure 6
EXISTING AND PROPOSED MONITORING WELLS
AT SWMU 15
Naval Air Station, Oceana
Virginia beach, Virginia





SAMPLE LOCATION	SAMPLE NUMBER	ANALYSES
MW01	0W2C-MW01-R01	TCL VOCs, PAHs, DISSOLVED METALS
MW02	0W2C-MW02-R01	
MW03	0W2C-MW03-R01	
MW04	0W2C-MW04-R01	
MW05	0W2C-MW05-R01	
MW06	0W2C-MW06-R01	
MW07	0W2C-MW07-R01	
MW08	0W2C-MW08-R01	
MW09	0W2C-MW09-R01	MAN PARAMETERS: ETHENE, ETHANE, SULFATE, SULFIDE, CHLORIDE, ALKALINITY
MW10	0W2C-MW10-R01	
MW11	0W2C-MW11-R01	
MW12	0W2C-MW12-R01	
MW13	0W2C-MW13-R01	
MW14	0W2C-MW14-R01	
MW15	0W2C-MW15-R01	
MW16	0W2C-MW16-R01	
MW17	0W2C-MW17-R01	
MW18	0W2C-MW18-R01	
MW19	0W2C-MW19-R01	
MW20	0W2C-MW20-R01	



- LEGEND**
- SHALLOW MONITORING WELL
 - DEEP MONITORING WELL

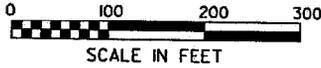


Figure 7
MONITORING WELL LOCATIONS
AT SWMU 2C ON
 Naval Air Station, Oceana
 Virginia Beach, Virginia

