Final RCRA Work Plan Addendum for Corrective Measures Study at Petroleum Contaminated Sites

Oceana Naval Air Station
Virginia Beach, Virginia

Prepared for

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND
Norfolk, Virginia

Contract N62470-93-D-4072

Prepared by

CH2M HILL

March 1994

Certification

I certify that the information contained in or accompanying this RCRA Facility Investigation POL Sites work plan addendum is true, accurate, and complete.

As to those identified portion(s) of this work plan addendum for which I cannot personally verify their accuracy, I certify under penalty of law that this work plan addendum and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Date: _____

Signature: _____

Nina M. Johnson, P.E.
Head of Installation Restoration, North Section
Environmental Quality Division
LANTNAVFACENGCOM

WDCR762/007.WP5

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Glossary

APEG	alkaline metal hydroxide/polyethylene glycol
ATEG	alkaline metal hydroxide/tetraethylene glycol
BDAT	best demonstrated available technology
BNs	base-neutral extractable organics
BNAs	base-neutral/acid extractable organics
BOD	biological oxygen demand
BTU	British thermal unit
cm/s	centimeters per second
CMS	Corrective Measures Study
COD	chemical oxygen demand
CRP	community relations plan
DCQAP	data collection quality assurance plan
DMSO	dimethyl sulfoxide
DRMO	Defense Reutilization and Marketing Office
EDB	ethylene dibromide
EPA	U.S. Environmental Protection Agency
HEA	health and environmental assessment
IAS	initial assessment study
ICMs	interim corrective measures
IRP	Installation Restoration Program
LDR	land disposal restrictions

MCL	maximum contaminant level
MCLG	maximum contaminant level goal
mg/kg	milligrams per kilograms
μg/kg	micrograms per kilogram
MEK	2-butanone
MIBK	4-methyl-2-pentanone
MSL	mean sea level
NAS	naval air station
NCP	National Contingency Plan
PAHs	polyaromatic hydrocarbons
PCBs	polychlorinated biphenyls
POTW	publicly owned treatment works
ppb	parts per billion
ppm	parts per million
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFA	RCRA facility assessment
RFI	RCRA facility investigation
Semivolatiles	Acid and base-neutral extractable organics
SSO	site safety officer
SVE	soil vapor extraction
SWMU	solid waste management unit
TCDD	2,3,7,8-dioxin

TCE	trichloroethylene
TDS	total dissolved solids
TIC	tentatively identified compound
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TSS	total suspended solids
VC	vinyl chloride
VOCs	volatile organic compounds
VSI	visual site inspection

WDCR762/003.WP5

Section 1
Introduction

This work plan addendum describes activities associated with corrective actions at 5 of the 17 solid waste management units (SWMUs) at Naval Air Station (NAS), Oceana, in Virginia Beach, Virginia. This work plan is an addendum to the June 1992 RCRA Facility Investigation (RFI) work plan.

A total of 17 areas were investigated during the RFI. Table 1-1 summarizes the status of the 17 SWMUs. Additional activities were recommended at 12 of these sites in the draft RFI report (CH2M HILL, 1993). Seven of these twelve sites are described in other work plan addenda. The other five sites were identified in the RFI report as areas where the primary concern was petroleum contamination in near-surface soils. It is the intention of the Navy to proceed quickly with remediation of the near-surface soils at these sites.

The sites that contain surface or near-surface petroleum contamination are:

- Site 11 - Fire Fighting Training Area
- Site 18 - Hazardous Waste Storage
- Site 19 - Waste Oil Storage Area, Building 541
- Site 20 - Waste Oil Storage Area, Building 543
- Site 24 - Bowser, Building 840

This work plan lays the groundwork for sufficiently characterizing these sites and identifying remediation alternatives for the near-surface soils, and performing the design for soil removal and disposal or treatment. The objectives of this work plan addendum are:

- Specify the sampling requirements to define the nature and extent of potential releases from the sites. The results of additional sampling will provide estimates of soil volumes requiring treatment. The data will be used to support and produce a corrective measure study (CMS).

- Define the evaluation criteria for the CMS. The CMS will develop and screen treatment alternatives. Alternative screening will be based on effectiveness, implementability, and cost.

- Outline the components for the design for the implementation of the selected soil remediation.

Table 1-2 summarizes the contaminant concentrations present at the 5 sites that are discussed in this work plan addendum. The analytical results indicate the presence of petroleum hydrocarbons and their components. These constituents are common to oil, fuel, and other petroleum products. The history of the five sites indicate that these products have been stored at these locations.

Table 1-1
STATUS OF SOLID WASTE MANAGEMENT UNITS
IN PHASE II OF THE RFI

Site	Description	Corrective Measures Study	POL Site Investigation & Remediation	Additional RFI Study	No Further Study or Remediation
1	West Woods Oil Pit	•			
2B	Line Shack 130-131	•			
2C	Line Shack 400	•			
2D	Line Shack 125			•	
2E	Line Shack 109			•	
11	Western Firefighting Training Ring		•		
15	Abandoned Tank Farm			•	
16, 16GC	Pesticide Storage Areas				•
18	Hazardous Waste Storage		•		
19	Waste Oil Storage, Bldg. 541		•		
20	Waste Oil Storage, Bldg. 543		•		
21	Transformer Storage Yard				•
22	Construction Debris Landfill				•
23	Waste Oil Bowser, Bldg. 830				•
24	Waste Oil Bowser, Bldg. 840		•		
25	Inert Landfill			•	
26	Fire Station Firefighting Training Ring				•

Notes: Refer to the RFI report (CH2M HILL, 1993) for the recommendations for each site and the rationale for future activities.

Sites 18, 19, and 24 were recommended for additional RFI study, but are included in the POL site investigation on the assumption that Phase II results will show that the extent of contamination is limited and the sites can be remediated along with Sites 11 and 20. Results to the contrary will be cause for reevaluation.

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Table 1-2
RFI SOIL SAMPLING RESULTS FOR SITES 11, 18, 19, 20, 24
NAVAL AIR STATION, OCEANA

	Site 11		Site 18		Site 19		Site 20		Site 24	
Constituents	**Ave.**	**Max.**	**Ave.**	**Max.**	**Ave.**	**Max.**	**Ave.**	**Max.**	**Ave.**	**Max**
Number of Samples	5		2		1		4		2	
TPH (mg/kg)	69	325	NA	NA	3,720	3,720	10,400	38,100	283	341
Acetone (μg/kg)	38	65	ND	ND	41*	41*	53*	87	164	260
2-Butanone (μg/kg)	6.4	19	ND	ND	ND	ND	6.8	27	37	62
Toluene (μg/kg)	1.0	2.0	ND	ND	ND	ND	4.8	10	7.5	15
Ethylbenzene (μg/kg)	0.4	2.0	ND	ND	ND	ND	9.1	29.5	55	110
Xylene (total) (μg/kg)	2.6	6.0	1.0	2.0	10	10	80.5	290	247	490
Carbon Disulfide (μg/kg)	0.2	1.0	ND	ND	ND	ND	1.8	4	ND	ND
Total VOCs (μg/kg)	48.6	69	ND	ND	10	10	156	398	510	937
Total PAH (mg/kg)	ND	ND	20.4	36.8	ND	ND	0.84	3.4	7.1	11.9
Lead (mg/kg)	11.3	12.8	68.6	113	86.3	86.3	67.8	242	9.1	14.6
Total Pesticides (μg/kg)	NA	NA	9.8	19.6	NA	NA	NA	NA	NA	NA

*Compound found in laboratory blank
NA - Not Analyzed for
ND - Not Detected

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The five sites are known to contain surface or near-surface petroleum contamination. Any groundwater contamination that may be found at any of the five SWMUs will not be addressed under this work plan. If groundwater contamination is found, the groundwater at that particular SWMU will be studied further under a separate work plan addendum.

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Section 2
Facility Background

NAS, Oceana is located in the Tidewater region of Virginia as shown in Figure 2-1. The base lies southeast of Norfolk, immediately west of the Atlantic Ocean, and just south of the Chesapeake Bay in Virginia Beach. Oceana consists of approximately 6,000 acres within the city of Virginia Beach.

In November 1940, the U.S. Government purchased 328 acres of remote, swampy land for construction of a small auxiliary airfield. During World War II, asphalt runways were constructed and the base was expanded. By the fifties, the Navy Auxiliary Air Station had become too large to work as a subordinate to stations in the area, hence it was designated a Naval Air Station. Oceana then became an all-weather air station, and was eventually officially designated a master jet base. By 1976, five of the six Atlantic Fleet Carrier Air Groups were based at Oceana. The latter part of the 1970s also involved installation of numerous training operations at NAS, Oceana. Over the years, Oceana has grown to more than 16 times its original size and now encompasses 5,916 acres of land.

Several studies have been performed under the Installation Restoration (IR) program and the RCRA Corrective Action Program. For a summary of past studies, refer to the RFI or RFI work plan. The location of the SWMUs being studied under this work plan is shown on Figure 2-2.

Site 11—Fire Fighting Training Area

Site Location and History

Site 11 consists of two fire fighting training rings and an adjacent area used for fuel farming. The site is located on the west side of Oceana at the intersection of two abandoned runways. From the early 1960s until the mid-1970s, there were two fire fighting practice sessions each weekend as part of training exercises (RGH, 1984). Fifty to seventy-five gallons of waste oil, fuel, chlorinated and aromatic hydrocarbons, and hydraulic fluid were poured into the center of the abandoned runway, ignited, and extinguished. In the mid-1970s, a fire pit with an earthen outer berm was built (RGH, 1984). The volume of liquid wastes and fuels burned increased to approximately 50,000 gallons annually (RGH, 1984). In addition to the waste listed above, other sources of ignition included paint, paint thinners and strippers, naphtha, trichlorotrifluoroethane, and PD 680 (RGH, 1984). In 1984, a new fire pit that used jet fuel was constructed adjacent to the old one. The new ring has concrete walls and bottom and discharges to an oil-water separator system (RGH, 1984).

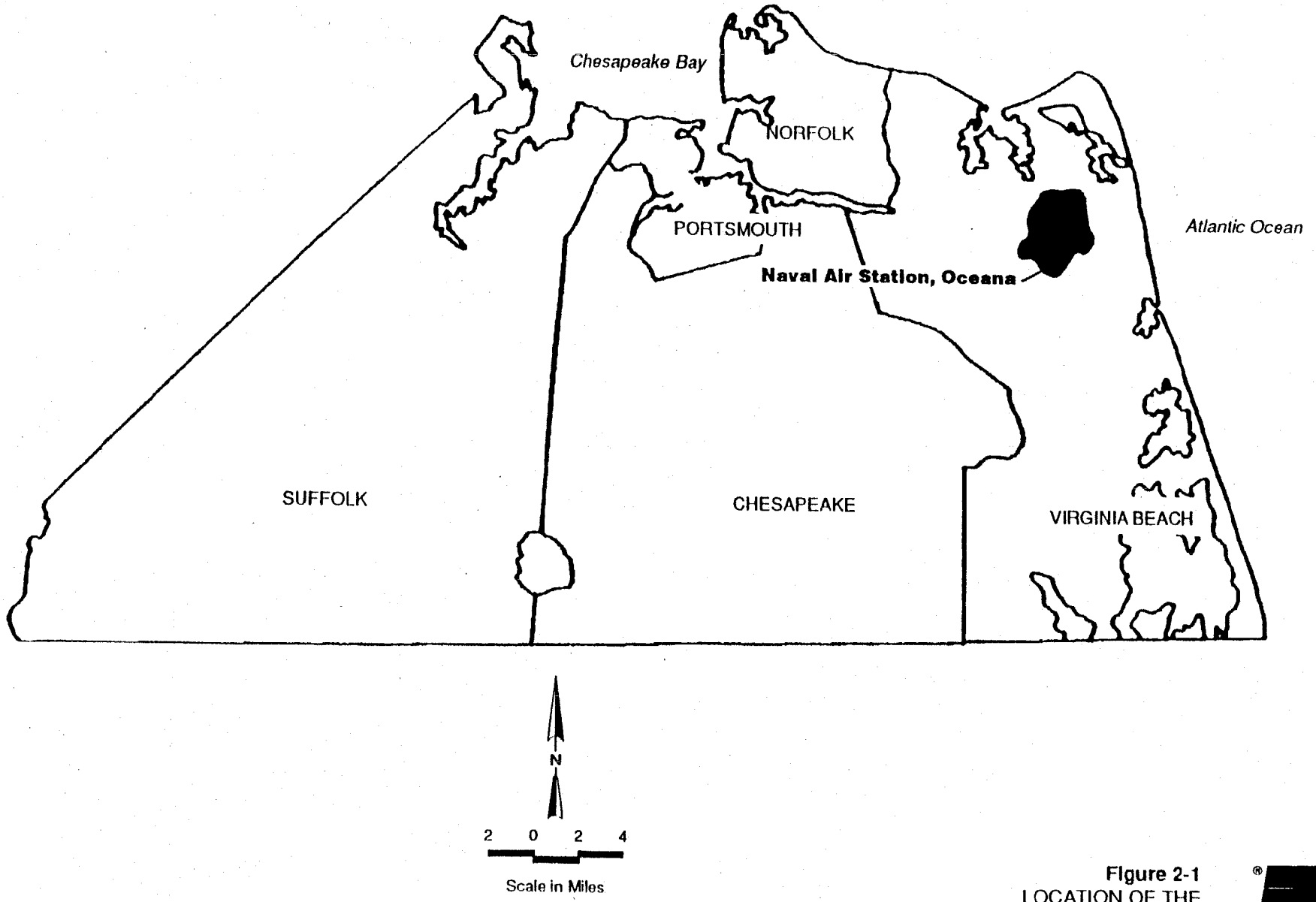

Figure 2-1
LOCATION OF THE
NAVAL AIR STATION, OCEANA

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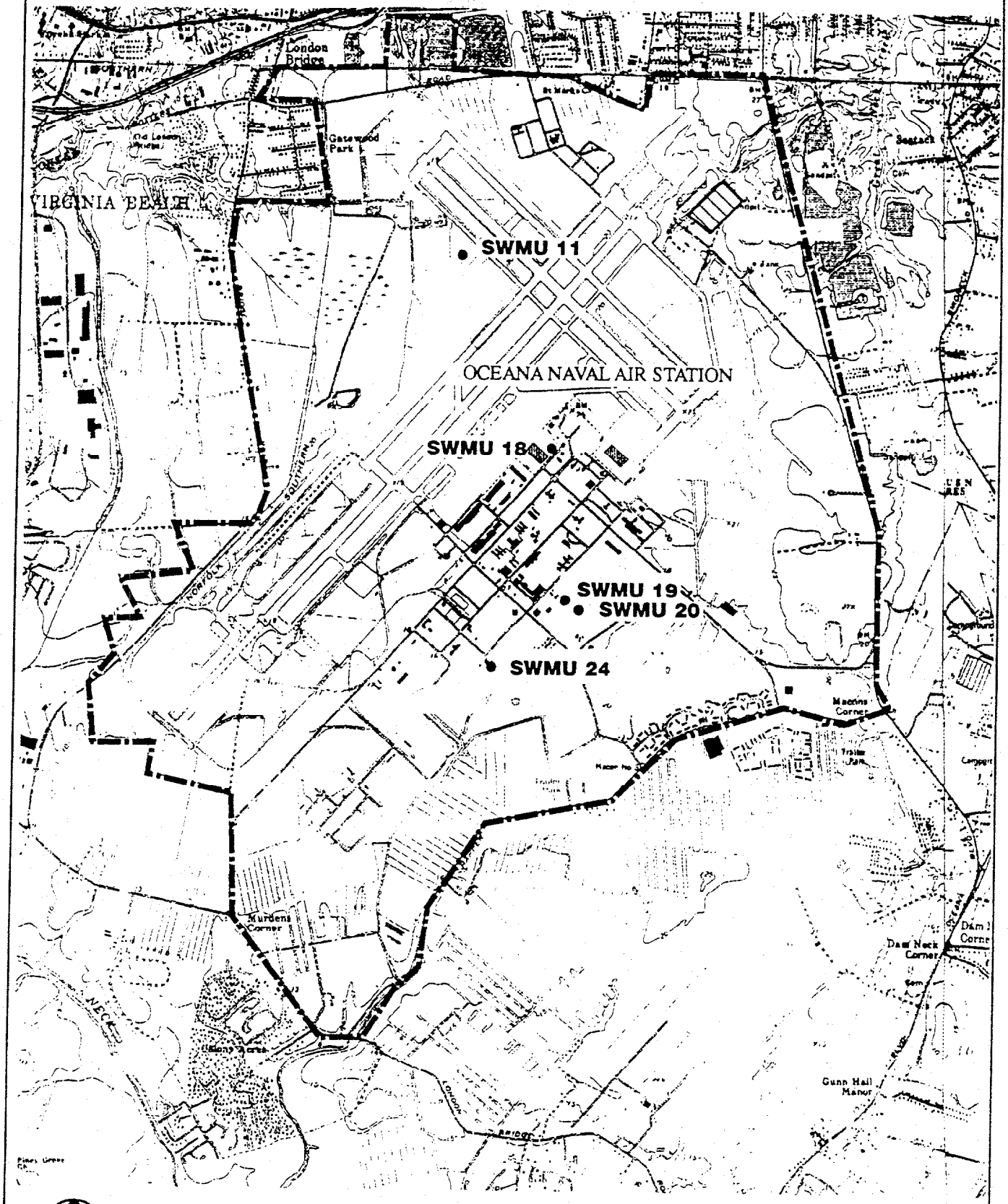

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Figure 2-2
LOCATIONS OF SWMUs
RCRA Facility Investigation–Naval Air Station, Oceana

The area directly west of the fire training pits on the west side of the abandoned runway was used for the disposal of waste fuels and lubricants by "fuel farming" (R. E. Wright, 1983). Fuel farming entails the spreading of hydrocarbon products over a large area, followed by tilling the soil to enhance volatilization and biodegradation (R. E. Wright, 1983). The fuel farming area was a rectangular area approximately 400 feet by 300 feet. The exact dimensions of the area are not known but the two east-west ridges west of the two rings and the square contours of the treeline suggest that the fuel farming area was approximately where it is indicated in Figure 2-3. There was no fuel or fuel odor from a test pit excavated in the center of the fuel farming area and well 1-MW1 in the center is not contaminated, as shown by 1990 sampling results.

RFI Site Activities

Site 11 was investigated as part of the RFI. Three soil samples were collected next to the old fire fighting ring, in the vicinity of the sampling location where total petroleum hydrocarbons (TPH) was detected during the RFI. Two additional samples were collected outside the newer fire fighting ring. These samples were analyzed for TPH, volatile organic compounds (VOCs), polyaromatic hydrocarbons (PAHs), and metals. Two shallow monitoring wells were installed in the area. The groundwater from these wells along with two existing wells was sampled for VOCs, PAHs, total and dissolved metals. The location of soil and groundwater samples are shown on Figure 2-3.

Soil

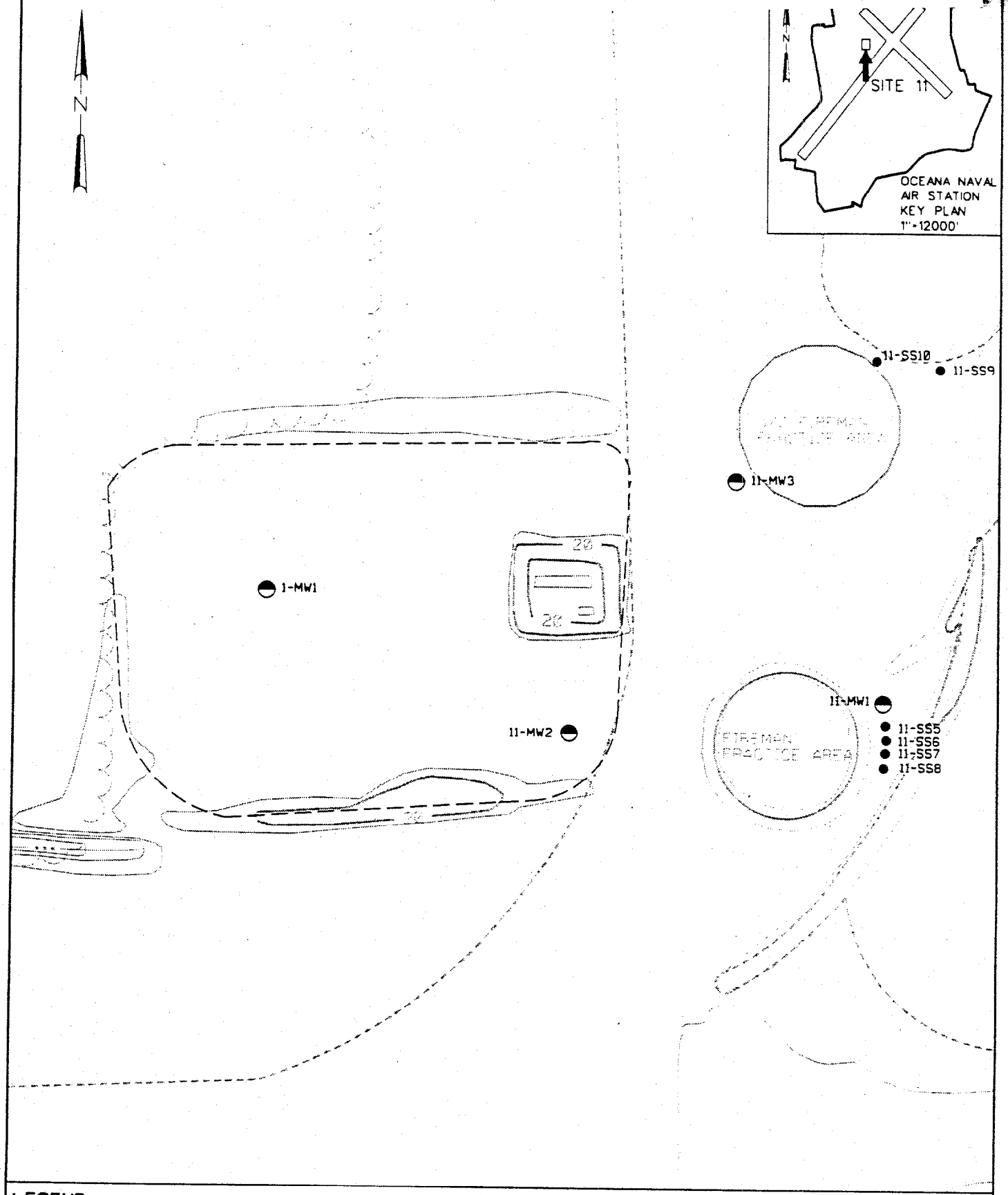
The VOCs detected in the soil samples were either near or below the contract required detection limit (CRDL) or were common laboratory contaminants detected in the associated laboratory blanks at comparable concentrations. None of the organic compounds were detected consistently in all soil samples.

PAHs were not detected in any of the soil samples. The TPH concentration was above detection limits in all samples except one. Detected TPH concentrations ranged from 2.5 to 325 mg/kg.

Several metals were detected in soils, however, most were present at concentrations below or near the detection limit or background levels.

Groundwater

Groundwater samples contained no VOCs or PAHs above the quantitative detection limits. All of the trace metal inorganic compounds detected in groundwater samples were at or near the detection limit.



LEGEND

- SOIL SAMPLING LOCATIONS
- SHALLOW MONITORING WELL
- APPROXIMATE BOUNDARY OF FUEL FARMING AREA

NOTE THAT NO SAMPLE WAS SUBMITTED FOR 11-SS8

Figure 2-3

RFI SAMPLING LOCATIONS AT SITE 11

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Site 18—Hazardous Waste Storage, Building 204

Site Location and History

Site 18 consists of two storage areas near Building 200 adjacent to B Avenue. The storage area closest to Building 200 is approximately 15 feet by 25 feet, and stores less than ten drums. Fifty-five gallon drums rest upon a raised concrete slab floor. Under the current hazardous waste management program, they are stored for a period of less than 90 days. During the visual site inspection of a second older storage shed nearby, no release controls were observed, and there is no documentation of releases; however, soil staining was observed. The newer hazardous waste storage shed has existed for at least 10 years and was in use at the time of the visual site inspection (VSI). The shed may date to 1981 when Public Works initiated the Hazardous Waste Pick-up Program.

The RCRA Facility Assessment (RFA) noted that materials typically stored at the shed may include any of the following: double-bagged empty oil and paint cans, double-bagged oily rags, and drums of oil, paint thinner, paint remover, jet fuel, solvents, asbestos, PD 680, hydraulic fluid, freon, neutralized battery acid, and electric coolant oil.

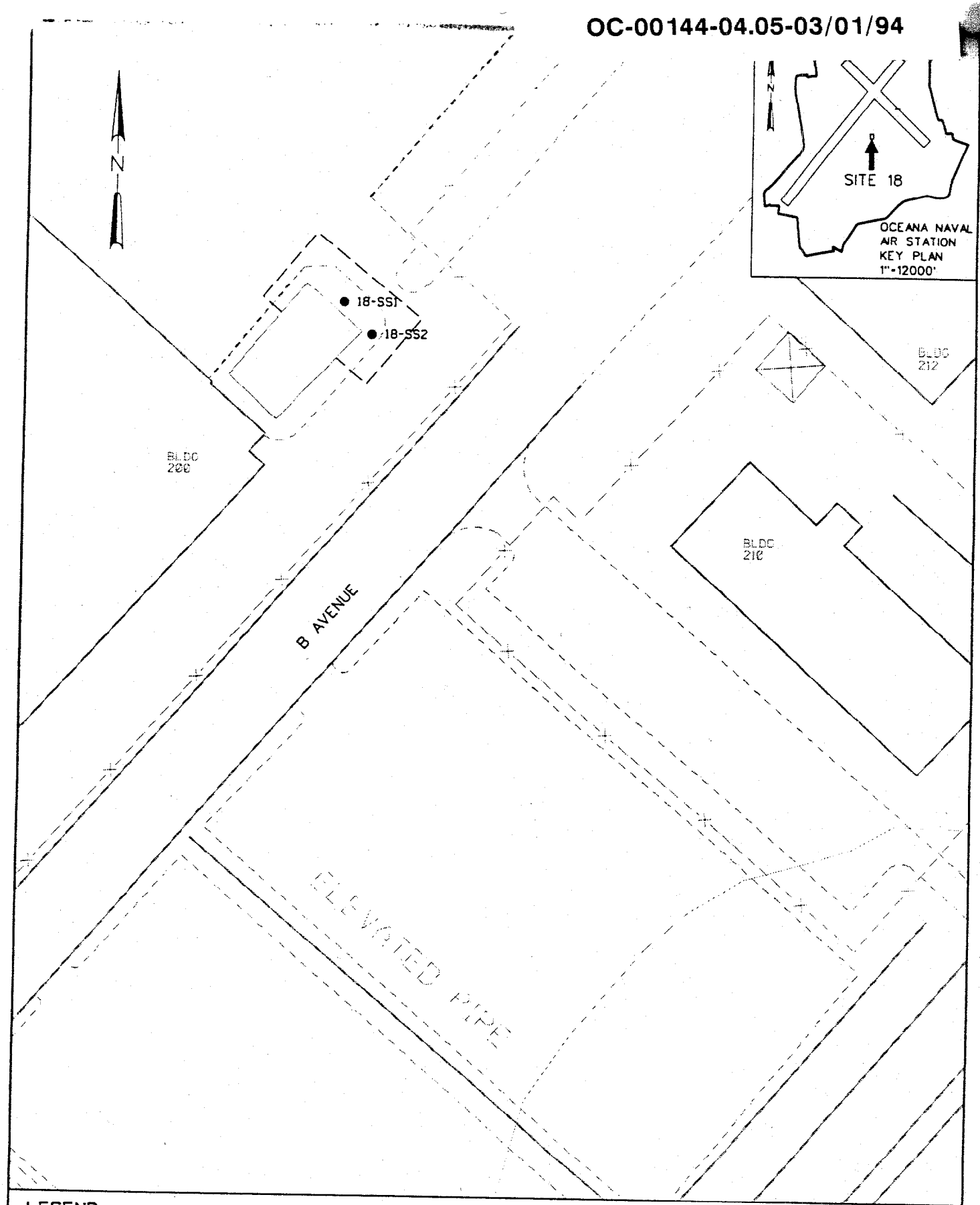
RFI Site Activities

The hazardous waste storage shed closest to Building 200 was investigated during the RFI. Two soil samples were collected near this storage area. Both samples were analyzed for Appendix IX constituents: VOCs, semivolatile organic compounds (SVOCs), metals, pesticides, herbicides, PCBs, and dioxin/furans. No samples were collected near the older storage area. No groundwater samples were collected at either storage area. Figure 2-4 shows the sampling locations.

The organic analyses detected very low concentrations of chlorinated pesticides and VOCs, and several SVOCs. No organophosphorus pesticides, herbicides or dioxins/furans were detected.

The only volatile organic compound detected was xylene, which was detected below the quantitative detection limit. Two pesticides, 4,4'-DDD and 4,4'-DDT, were detected in 18-SS1 below quantitative detection limits, at concentrations of 11 and 8.6 μg/kg, respectively. Fourteen SVOCs were present in both samples. The compounds detected are all constituents of oil and fuels, however, the exact origin of the contamination is not known.

The inorganic analyses of the Site 18 soil detected concentrations of heavy metals near the detection limit, including: arsenic, beryllium, cadmium, chromium, copper, mercury, and nickel.



LEGEND

- ● SOIL SAMPLING LOCATION
- ▭ APPROXIMATE BOUNDARY OF SWMU

0 25 50 75

SCALE IN FEET

Figure 2-4

RFI SAMPLING LOCATIONS AT SITE 18

CH2MHILL

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Site 19—Waste Oil Storage Area, Building 541

Site Location and History

Site 19 is located near Building 541, which has been the Navy Exchange Gas Station sir 1972 (RGH, 1984). This site is a 50 to 100 square foot area where waste oil, solven and transmission, brake, and hydraulic fluids were stored in 55-gallon steel drums direc on the ground. The waste fluids and oil were generated by automobile repair a maintenance work at the station (RGH, 1984). An empty 55-gallon steel drum w observed in the grassy area immediately northeast of the gas station by CH2M HI personnel during RFI activities. During the VSI completed as part of the RFA, inspect noted soil staining and dead grass in this same area. During the VSI, only one drum w observed and there were no release-control mechanisms in place (RFA, 1988).

RFI Site Activities

During the RFI, one soil sample was collected and analyzed for VOCs, PAHs, lead, a TPH. No groundwater samples were collected. Figure 2-5 shows the sample location.

Xylene (10 μg/kg) was the only VOC detected. Lead was present at 86.3 mg/kg, and TPH concentration was 3,720 mg/kg. PAHs were not detected.

Site 20—Waste Oil Storage Area, Building 543

Site Location and History

Site 20 is on the grounds of Building 543, the Auto Hobby Shop. The auto hobby shop a self-help automotive garage where Navy personnel can work on their cars when off du It has been in existence since 1976 (RGH, 1984). Waste motor oil, hydraulic flu automatic transmission fluid, PD680 and other solvents were stored in 55-gallon dru directly on the ground at this site. A strip of grass and bare ground approximately 150 fe long and 3 feet wide runs between the asphalt next to Building 543 and a larger grass ar outside the fence.

Past Investigations and RFI Site Activities

The Navy sampled soils in 3 locations in the thin grass strip on July 14, 1992. The s samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX); TPH; a lead. The soil did not contain elevated levels of BTEX compounds or lead. One sam contained 940 mg/kg of TPH, but the other two contained less than 100 mg/kg. The s between samples 20-SS1 and 20-SS2 was excavated based on these results. An additio 4 samples were collected in September 1992 to test for residual contamination. A sam adjacent to the 940 mg/kg location contained 47 mg/kg of TPH.

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Figure 2-5 RFI SAMPLING LOCATIONS At Site 19

During the RFI, CH2M HILL personnel collected soil samples from four locations east of Building 543. The soils were screened using an organic vapor meter (OVM) to determine the sampling depth. One soil sample from each of the four borings was analyzed for TPH, lead, PAHs, and VOCs. The location of the samples is shown on Figure 2-6. No groundwater water samples were collected.

Lead, TPH, and low concentrations of VOCs were detected in all soil samples. TPH concentrations ranged from 4 to 38,100 mg/kg. Lead concentrations ranged from 4.6 to 242 mg/kg. Three PAH compounds were detected in one sample (20-SS1). These were naphthalene (1,800 μg/kg), 2-methylnaphthalene (1,000 μg/kg) and 1-methylnaphthalene (800 μg/kg).

Low concentrations of six VOCs were detected at Site 20. Most of these compounds are associated with fuels or lubricants. The highest concentration was xylene, detected at levels of 10 to 450 mg/kg. Ethylbenzene, toluene, carbon disulfide, trichloro-fluoromethane, and 2-butanone were also detected at concentrations of 27 μg/kg or less.

Site 24—Bowser, Building 840

Site Location and History

Site 24 is a bowser located near Building 840. The Naval Construction Battalion (SEABEEs) has been based in Building 840 since 1972. The SEABEEs are involved in construction at NAS Oceana and other local naval installations (RFA, 1988). Waste solvents and oils generated at the equipment maintenance garage in Building 840 were hand carried and poured into the bowser, which was typically located in the southernmost corner of the SEABEE compound (RFA, 1988). The bowser was then transported to the tank farm for disposal (RFA, 1988). During the VSI, heavy staining of the ground was observed in the area surrounding the waste oil bowser at Building 840 (RFA, 1988). Current practice is to dispose of waste oil into drums that are transported to the base hazardous waste lot, where they are transferred to the DRMO and disposed or recycled appropriately. Currently, the bowsers are not used. During CH2M HILL's RFI sampling, the bowser was not present and Navy personnel on site during the sampling had no knowledge of it.

RFI Site Activities

During the RFI, two soil samples were collected within 25 feet of the southeast corner of a shed adjacent to the southwest fence. This location was specified by NAS Oceana personnel familiar with waste handling practices. Figure 2-7 shows the sample locations. These samples were analyzed for metals, VOCs, PAHs, and TPH. No groundwater samples were collected.

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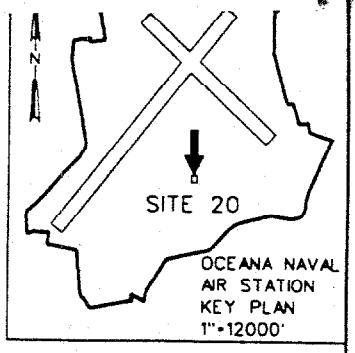

LEGEND

- SOIL SAMPLING LOCATION
- APPROXIMATE BOUNDARY OF SWMU

0 25 50 75

SCALE IN FEET

Figure 2-6

RFI SAMPLING LOCATIONS
AT SITE 20

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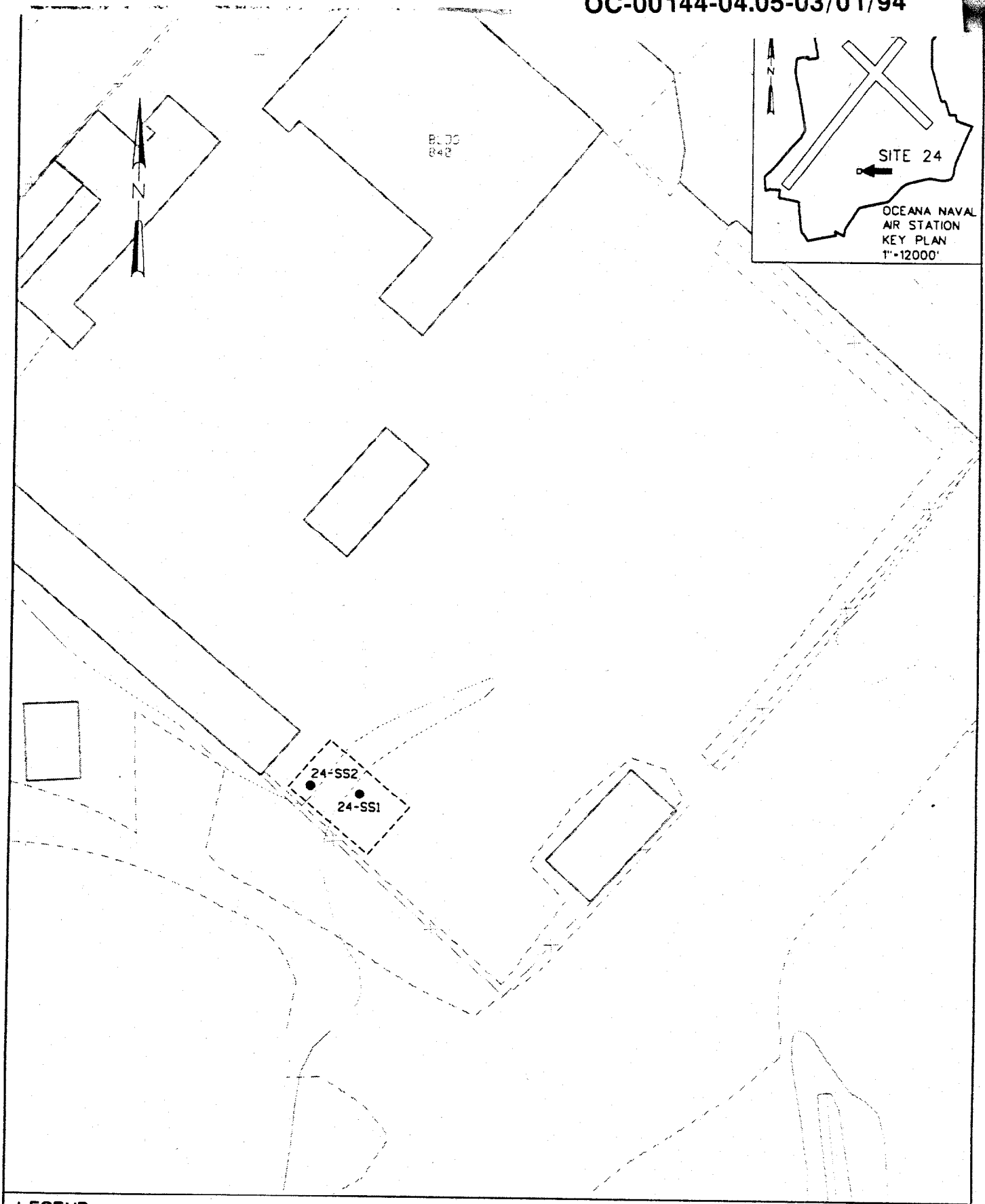

LEGEND

- SOIL SAMPLING LOCATION
- APPROXIMATE BOUNDARY OF SWMU

0 25 50 75
SCALE IN FEET

Figure 2-7

RFI SAMPLING LOCATIONS AT SITE 24

CH2MHILL

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22-OCT-1993

The analytical laboratory detected elevated TPH, VOC, and PAH constituents in the two soil samples. TPH concentrations were 224 and 341 mg/kg. Xylene and ethylbenzene were contained in one sample at concentrations of 490 and 110 μg/kg, respectively. All other VOC detections at Site 24 were either below the quantitative detection limit or are typical laboratory contaminants.

Six PAH compounds were detected. Naphthalene, 2-methylnaphthalene and 1-methylnaphthalene were detected in one sample at concentrations of 4900, 3300, and 3700 μg/kg respectively. Three PAHs detected in the other sample were pyrene (320 μg/kg), chrysene (1100 μg/kg) and benzo(a)pyrene (860 μg/kg).

The inorganic analyses performed on the Site 24 soils detected metals at background concentrations. These metals included: arsenic, beryllium, chromium, vanadium, mercury, and nickel.

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Section 3
Scope of Work

This section presents the main components for remediating surface and near-surface soils at the 5 sites. Major activities that will be performed are sampling and analysis; preparation of the Corrective Measures Study (CMS); and preparation of the remedial design. A description of these activities is presented in this section.

Sampling and Analysis

This section defines the additional field activities that will be performed prior to preparation of the CMS. The additional sampling is intended to sufficiently characterize the sites and provide the information required for near-surface soil remediation.

The work description for the field activities is comprised of the Sampling and Analysis Plan (SAP), the Data Management Plan, and the Data Collection Quality Assurance Plan. This section will serve as the SAP for the 5 sites. The Data Management Plan, and the Data Collection Quality Assurance Plan can be found in the June 1992 RFI Work Plan and will not be repeated in this document.

During the RFI, five sites were found to contain petroleum contaminated surface or near-surface soil. The sampling approach outlined in this work plan is aimed at delineating the extent of petroleum contamination in the surface soils at these five sites. Based on the findings of the RFI, the soil will primarily be analyzed for TPH and PAHs. Site 18, around the old hazardous waste storage area, will also be sampled and analyzed for the Appendix IX constituents since it is the initial investigation of that area. All samples will be collected from visually contaminated areas or collected at several depths and then field screened. The sample points and parameters at each site have been chosen based on location of the RFI samples and their analytical results.

Of the five sites, only the groundwater under SWMU 11 has been analyzed. No groundwater contamination was present at this location. The groundwater under the other four sites is not anticipated to be contaminated, due to the soil contamination being near the surface. However, in order to confirm this assumption, *in situ* groundwater samples will be collected and analyzed. The parameters to be analyzed for are based on the contamination present in the surface soils and the samples are the initial investigation of the groundwater under these specific sites.

The principal goals of the sampling activities are:

- Collect data to determine the lateral and vertical extent of contamination at each of the five sites

- Collect data necessary to develop, evaluate, and design near-surface soil remediation alternatives

The number of samples to be collected and the type of analysis at each site is summarized in Table 3-1. The discussion of sampling for each site is provided in the following paragraphs. Sample locations are proposed; actual locations will be determined by field personnel based on conditions existing at the time of the investigation.

Site Sampling

The following paragraphs outline the specific samples and parameters for each of the five sites.

Site 11 - Fire Fighting Training Areas

Four surface samples will be collected from areas of visibly contaminated or stained soil. These samples will be collected at a depth of 0.5 to 1 feet and analyzed for TPH. Two samples will be collected around the old training pit and two in the vicinity of the new training pit. These two areas are downslope of the two fire-fighting rings. The ground surface west of the rings is concrete and does not contain soil. Four *in situ* groundwater samples will be collected downgradient of the earth-bermed fire training pit. Three *in situ* soil samples also will be collected. The seven samples will be analyzed for PAHs, TPH, VOCs, and metals. Groundwater samples will be collected for both total metals and dissolved metals. The proposed sampling locations are shown in Figure 3-1. The location of 15-GP1 has been moved downgradient of the southern training ring. On the basis of the results of these seven samples, other soil and groundwater sampling may be proposed.

Site 18 - Hazardous Waste Storage Area

The sampling for this site will be expanded to sample around the RFA SWMU 3 storage shed. Two soil samples (18-SS5 and 18-SS6) from the SWMU 3 storage shed will be collected at a depth of 0.5 to 1.0 feet. These samples will be analyzed for Appendix IX constituents (VOCs, SVOCs, pesticides, herbicides, dioxins/furans and metals). The Appendix IX parameters will be used since it is the initial investigation for this area. No groundwater samples will be collected.

Soil sampling will continue around the current hazardous waste storage area. Two shallow samples (0.5 to 1.0 feet) and 2 deeper soil samples (3 to 4 feet) will be collected using a hand auger. These samples will be analyzed for TPH and PAHs. Since no groundwater samples from the site have been collected, one *in-situ* sample (18-GP1) will be collected from the center of the site and analyzed for PAHs, total and dissolved metals, and TPH.

Table 3-1
SUMMARY OF SAMPLING AND ANALYSIS PROGRAM
NAVAL AIR STATION, OCEANA

Parameters	Analytical Methods[a]	Site 11	Site 18	Site 19	Site 20	Site 24
Soil						
TPH	SM-418.1[b]	7	4	6	10	12
PAH	SW-8100	3	4	0	0	6
Appendix IX Constituents		0	2	0	0	0
VOCs		3	0	0	0	0
Groundwater						
PAH	SW-8100	4	1	1	1	4
TPH	SW-8015	4	1	1	1	4
VOCs	SW-8240	4	0	1	1	4
Metals	SW-6010/7000	4	1	0	1	6

[a]Analytical methods as per Test Methods for Evaluating Solid Waste, 3rd Edition, Dec., 1986.
[b]Analytical method as per Standard Method for Analysis of Water and Wastewater.

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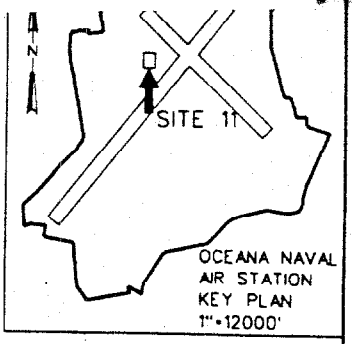

LEGEND

- SOIL SAMPLING LOCATIONS
- SHALLOW MONITORING WELL
- PROPOSED SOIL SAMPLING LOCATIONS
- PROPOSED HYDRAULIC PROBE GROUNDWATER SAMPLING LOCATION
- PROPOSED HYDRAULIC PROBE SOIL SAMPLING LOCATION

NOTE THAT NO SAMPLE WAS SUBMITTED FOR 11-SS8

0 50 100 150
SCALE IN FEET

APPROXIMATE BOUNDARY OF FUEL FARMING AREA

Figure 3-1

PROPOSED SAMPLING LOCATIONS AT SITE 11

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All of the proposed sampling locations are shown on Figure 3-2. On the basis of field evidence of contamination or analytical results from 18-GP1, other groundwater samples may be added. If contamination is detected in 18-GP1, water levels will be measured at a minimum of three locations surrounding Site 18 to determine the groundwater flow direction.

Site 19 - Waste Oil Storage Area, Building 541

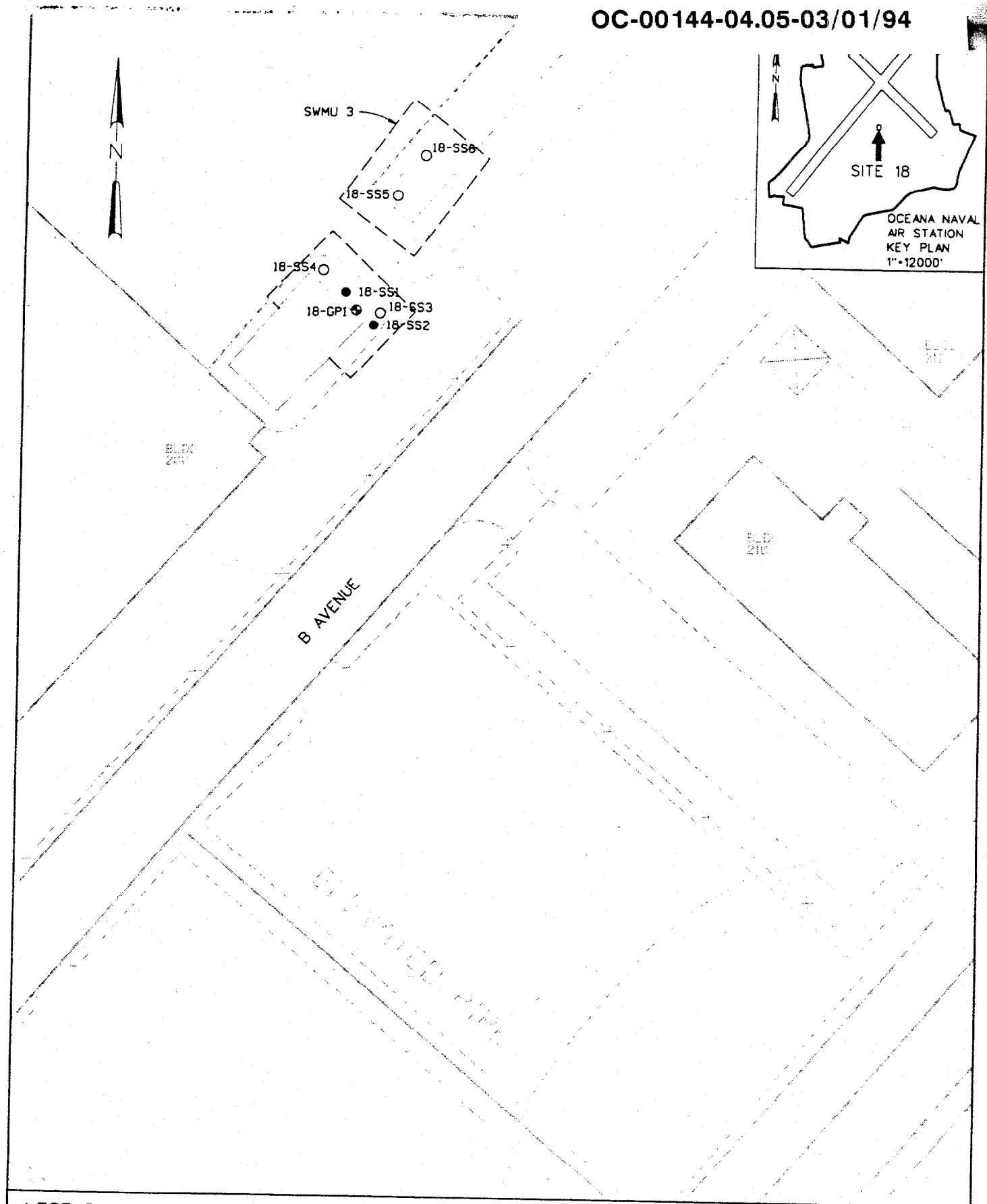
Three locations will be sampled at depths of 0.5 to 1; 2 to 3; and 5 to 6 feet using a hand auger. At each location the three samples will be screened with an OVM. The two samples from each boring with the highest reading or the most visible contamination will be analyzed for TPH. If contamination is observed at all depths, then all samples will be analyzed to aid in quantifying excavation limits for remedial actions. Since no groundwater samples have been collected, one *in-situ* groundwater sample from the center of known contamination will be collected and analyzed for VOCs, PAHs, and TPH. Water-level data from wells at the adjacent CITGO gas station were poor quality and could not be used to determine the direction of groundwater flow. Figure 3-3 shows the proposed sample locations. If there is qualitative evidence of groundwater contamination during the investigation or the analytical results indicate that the groundwater at 19-GP1 is contaminated, then groundwater may be sampled at other locations and the direction of groundwater flow will be determined by measuring a minimum of three locations.

Site 20 - Waste Oil Storage Area, Building 543

Five locations will be sampled at depths of 0.5 to 1; 2 to 3; and 5 to 6 feet using a hand auger. These locations will be from areas that are visually contaminated and outside previously excavated areas. At each location, the three samples will be screened with an OVM. The two samples from each boring with the highest reading or the most visible contamination will be analyzed for TPH. If contamination is observed at all depths, then all samples will be analyzed to aid in quantifying excavation limits for remedial actions. Since no groundwater samples have been collected, one *in-situ* groundwater sample (20-GP1) from the center of known contamination will be collected and analyzed for VOCs, PAHs, TPH, and metals. Figure 3-4 shows the proposed sample locations. If there is qualitative evidence of groundwater contamination during the investigation or the analytical results indicate that groundwater at 20-GP1 is contaminated then groundwater may be sampled at other locations and the direction of groundwater flow will be determined by measuring a minimum of three locations.

Site 24 - Bowser, Building 840

Soil borings will be taken at six locations. Three depths at each location will be sampled using a hand auger. The sample depths will be 0.5 to 1; 2 to 3; and 5 to 6 feet. At each



LEGEND

- ● SOIL SAMPLING LOCATION
- ○ PROPOSED SOIL SAMPLING LOCATION
- ◐ PROPOSED HYDRAULIC PROBE SAMPLING LOCATION
- ▭ APPROXIMATE BOUNDARY OF SWMU

0 25 50 75
SCALE IN FEET

Figure 3-2
PROPOSED SAMPLING LOCATIONS AT SITE 18

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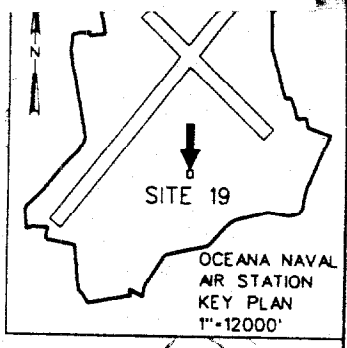

LEGEND

- ● SOIL SAMPLING LOCATION
- ○ PROPOSED SOIL SAMPLING LOCATION
- ⊕ PROPOSED HYDRAULIC PROBE SAMPLING LOCATION

0 25 50 75
SCALE IN FEET

Figure 3-3

PROPOSED SAMPLING LOCATIONS AT SITE 19

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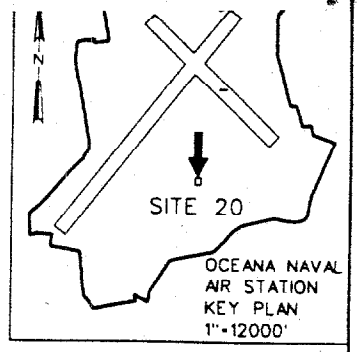

LEGEND

- ● SOIL SAMPLING LOCATION
- ○ PROPOSED SOIL SAMPLING LOCATION
- ⊕ PROPOSED HYDRAULIC PROBE SAMPLING LOCATION
- APPROXIMATE BOUNDARY OF SWMU

0 25 50 75
SCALE IN FEET

Figure 3-4

PROPOSED SAMPLING LOCATIONS
AT SITE 20

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location the three samples will be screened with an OVM. The two samples with the highest reading or the most visible contamination will be analyzed for TPH. One sample from each location with the most visible contamination will be analyzed for PAHs. Four *in-situ* groundwater samples (24-GP1 to 24-GP4) will be obtained and analyzed for VOCs, total and dissolved metals, TPH, and PAHs. Figure 3-5 shows the proposed sample locations. If there is qualitative evidence of soil or groundwater contamination, additional samples may be added in the field. The groundwater flow direction will be determined by measuring water levels in piezometers installed during *in-situ* hydraulic probe sampling.

Sample Collection Procedures

Soil Sampling

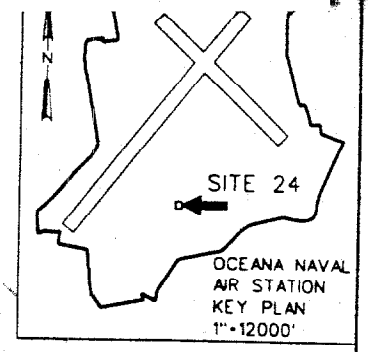
Soil samples will be collected using a stainless steel hand bucket auger. Sampling depths are specified in the individual site sections in this chapter. The samples will be transferred from the auger to the sample containers with as little disturbance as possible, using stainless steel implements. In areas where soil samples are to be collected from locations below concrete or asphalt, the concrete/asphalt will be cored or hammered prior to collecting the sample and the construction fill below the slab will be removed before sampling.

In-Situ Groundwater Sampling

In-situ grab samples of groundwater will be collected by driving a 3/4-inch-diameter drive point to 7 feet below the water table. A slotted drive point tip, which is 2.5 feet long, will allow groundwater from the 4.5 feet to 7 feet interval to flow into the drive point shaft. Sampling this interval will intersect the water table. The groundwater will then be extracted and analyzed by the field laboratory. The small hole will be backfilled with bentonite powder and sand upon removal of the drive point.

Repair of Borings

Each augered boring will be backfilled to the surface with grout. At locations where asphalt or concrete was penetrated to collect either a hydraulic probe or a soil sample, the grout will be brought to the base of the former slab and the concrete or asphalt will be repaired. Asphalt will be repaired with asphalt patch and concrete will be repaired by mixing pre-mixed concrete with additional cement and coarse aggregate to restore the quality of the existing slab.



LEGEND

- ● SOIL SAMPLING LOCATION
- ○ PROPOSED SOIL SAMPLING LOCATION
- ◐ PROPOSED HYDRAULIC PROBE GROUNDWATER SAMPLING LOCATION
- [ ] APPROXIMATE BOUNDARY OF SWMU

0 25 50 75
SCALE IN FEET

Figure 3-5

PROPOSED SAMPLING LOCATIONS AT SITE 24

CH2M HILL

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Investigation-Derived Wastes

All soils removed from the subsurface will be discarded into large polyethylene bags and then into 55-gallon steel drums to prevent exposure to potentially contaminated soils. Soil will be segregated by SWMU. The bags will be labeled and stored in drums. Personal protective equipment, construction fill underlying asphalt or concrete, and tubing and expendables used in the *in-situ* sampling will also be placed in 55-gallon drums. The concrete or asphalt rubble will be disposed in dumpsters on the base after being placed in bags. The drums will be sealed, marked with paint, and identified with proper labelling.

At the completion of field work, a composite soil sample from the bags will be taken. The sample will be analyzed by TCLP to determine appropriate disposal methods for the waste.

Decontamination Procedures

The decontamination procedures that will be used are specified in Chapter 4 of the RFI work plan. Refer to that section for specific procedures or details.

One change from RFI procedures will be the elimination of the hexane rinse. Experience from the RFI showed that hexane is not miscible with water and therefore the 10 percent solutions proposed in the RFI work plan is not workable. Hexane is less dense than water, therefore, the decontamination rinse sprayer sprays ether pure hexane or pure water, depending on the level in the sprayer.

Data Management Plan

The data management practices for this investigation will be as specified in Chapter 5 of the RFI work plan. Refer to that chapter for specific procedures or details.

Health and Safety Plan

A health and safety plan was prepared for the RFI and can be found in Chapter 6 of the RFI work plan. A revised health and safety plan modified slightly to apply to the timing and personnel of the RFI Phase II investigations was included as Attachment A with the Building 301 work plan. This attachment will serve as the health and safety plan for this investigation.

Corrective Measures Study

The purpose of the CMS is to summarize the results of supplemental data collection and develop and evaluate remediation alternatives for the surface and near-surface soil at the five sites.

The CMS will contain three major sections:

- Facility Background
- Development and Screening of Corrective Measures
- Evaluation of Corrective Measures

Facility Background

This section of the CMS will provide information on the facility, the nature and extent of contamination, summarize previous investigations or corrective actions, summarize supplemental sampling results, and summarize the objectives of the remediation program for the five sites. The primary objective for the five sites is the timely, cost-effective removal of petroleum contaminated soil.

An action level for the study has not been set. This issue will be addressed during later discussions with EPA and the Virginia Department of Environmental Quality.

Development and Screening of Corrective Measures

On the basis of the results of the RFI and supplemental sampling, a number of corrective measures have been developed. These actions will meet the remediation objectives to varying degrees and will present a range of actions to be considered.

A preliminary evaluation of corrective measure technologies was conducted in the RFI work plan in Chapter 3 (Pre-Investigation Evaluation of Corrective Measure Technologies). This evaluation was aimed at obtaining data to evaluate the appropriateness of various technologies, reduce the number of data gaps, and help focus the RFI. Several alternatives were evaluated for each SWMU. This initial evaluation was very broad, listing many alternatives. Since the levels of contamination are generally known, this list will be reduced to alternatives directed at managing petroleum contaminated soil. The alternatives that will be evaluated include:

- Treatment
- Containment
- Offsite Disposal

During development of alternatives, alternatives that are not applicable to the type and/or volume of contamination will be eliminated from further consideration.

During the development of alternatives, a determination will be made of areas and volumes of soil that will require corrective actions. A volume estimate will be calculated for each site and these results will be summed where appropriate. The volume estimates will be based on laboratory results, field measurements of distances between sample locations and landmarks, field screening results, and visual inspection of the SWMUs. If in the field, personnel feel that additional samples are required, the samples will be collected and sent

to the laboratory. Approval from the Navy will be sought for the extra analyses prior to the samples being analyzed.

Evaluation of Corrective Measures

Developed alternatives will be evaluated on three criteria:

- Effectiveness
- Implementability
- Cost

Effectiveness

The effectiveness evaluation will focus on:

- Ability to handle soil contaminants, physical properties, and volumes
- Potential impacts to human health and the environment during construction and implementation
- How proven and reliable the alternative is with respect to the contaminants
- Ability to comply with State, Federal and proposed action levels or guidelines
- How permanent/reliable the alternative is with respect to future releases

Implementability

The implementability evaluation will focus on:

- Availability of treatment, storage, disposal services, and capacity
- Availability of any necessary equipment or skilled workers
- Ability to obtain any necessary permits, if required
- Ability to perform corrective action in a timely manner

Cost

The cost evaluation will focus on:

- Capital or disposal cost
- Operation and maintenance cost, if required

If operation and maintenance (O&M) activities will be required, then their associated costs will be estimated. A present-worth analysis will be performed if O&M costs are developed.

Costs will be estimated to an accuracy of +50 percent to -30 percent.

Design of Chosen Alternative

A remedial design will be performed once a remediation alternative has been identified for the surface and near-surface soils. Specifications and drawings will be conforming to NAVFAC requirements will be prepared. The design will include all phases of the remediation required to successfully manage contaminated soil. These phases may include: excavation of contaminated soil, transportation and disposal of contaminated soil, design of treatment system, filling and backfilling excavations, regrading, water control, or site security.

Plans and specifications for the intermediate (60%), pre-final (90%), and final (100%) design will be submitted to the Navy for review. A detailed cost estimate will also be included with the intermediate design submittal.

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Section 4
Project Execution

Project Personnel

The project will proceed under the overall management of the LANTNAVFACENGCOM Engineer-In-Charge (EIC), Mr. Jim Harris. The CH2M HILL project manager will be responsible for the successful execution of this work plan and will manage the Phase II RFI, taking responsibility for staffing, coordination, cost and schedule control, and technical quality. Mr. Steven Brown of CH2M HILL's Reston office will manage the Phase II RFI.

The senior review team will review the technical and management activities of the project, including all project deliverables. This team will be composed of senior-level personnel or discipline specialists from the prime contractor's resource pool. The senior review team will be involved with the project during all phases and will function independently of the project staff, reporting directly to the project manager. Mr. Doug Dronfield of CH2M HILL's Reston office will be the principle senior reviewer.

The sampling field team leader will have at least 5 years of professional experience. The field team leader will be responsible for the coordination of field efforts, will assure the availability and maintenance of sampling equipment and materials, and will be responsible for shipping and packing materials. The field team leader will supervise the field work and sampling operations of the field technicians and will be responsible for completion of the field notebook. The field team leader will maintain close coordination with the project manager.

The site safety coordinator (SSC) has revised the health and safety plan in Chapter 6 of the RFI work plan for conditions during the Phase II RFI and will ensure that the plan is implemented during field activities. The SSC will oversee all field activities involving contractor and subcontractor personnel. This individual has the authority to terminate field activities if health-threatening situations arise or if the site safety plan is not being executed properly. The SSC will coordinate field activities with the field team leader and report directly to the contractor's project manager. The field team leader may also function as the SSC.

A quality assurance team was involved in preparation of the data collection quality assurance plan (DCQAP) (Appendix A of the RFI work plan (1992)) for field and laboratory tasks. The Quality Assurance Officers will ensure the requirements of the DCQAP are met during the field investigation, laboratory analysis, and data validation tasks. Periodic site and laboratory audits may be conducted to observe activities and to ensure that data quality objectives are satisfied. The data quality assurance officers will report periodically to the contractor's project manager for debriefing of data quality.

Community Relations

Community relations will be as specified in the Community Relations Plan (CH2M HILL, 1991), as amended and updated by the Navy for current conditions.

RFI Addendum Report

After the field investigation is completed and all analytical data has been validated, an RFI addendum report will be written presenting the results of the Phase II RFI investigation. The analytical results will be presented in tables similar to the tables in the RFI report. These results will be reviewed and compared to human health criteria for soils and groundwater presented in Appendix A and Chapter 4 of the RFI report (CH2M HILL, 1993). References will be made to sections of the RFI report, particularly Appendix A; however, all tables will present the complete historical data record and conclusions will be based on all the data. Recommended future actions at each site, particularly whether contamination merits a CMS of remediation options, will also be presented.

Schedule

Table 4-1 is the schedule of activities for the Phase II RFI of sites 2D, 2E, 15, and 25. This schedule is for the work plan addendum submission, field investigation, report preparation, and response to comments.

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Table 4-1
POL CONTAMINATED SOIL STUDY SCHEDULE

Task	Submittal Date
Submit Draft Work Plan Addendum to LANTDIV	October 28, 1993
CH2M HILL Receives LANTDIV Comments on Work Plan Addendum	November 3, 1993
Submit Draft Final Work Plan Addendum to EPA Region III	November 12, 1993
Receive EPA Comments	January 4, 1994
Submit Final Work Plan Addendum	January 14, 1994
Begin Field Work	January 31, 1994
End Field Work	February 9, 1994
Submit Draft Report to LANTDIV	March 18, 1994
Receive LANTDIV Comments on Report	April 1, 1994
Submit 60% Design to LANTDIV	April 1, 1994
Submit Draft Final Report to EPA Region III	April 10, 1994
Receive LANTDIV Comments on 60% Design	April 29, 1994
Receive EPA Comments on Final Report	May 10, 1994
Submit 90% Design to LANTDIV	May 11, 1994
Submit Final Report	May 24, 1994
Receive LANTDIV Comments on 90% Design	May 25, 1994
Submit 100% Design to LANTDIV	June 1, 1994
Receive EPA Comments on 100% Design	June 29, 1994
Submit Final 100% Design	July 13, 1994

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WDCR762/005.WP5