N61414.AR.001834
NAB LITTLE CREEK
5090.3a

PCB SOIL REMOVAL ACTION SITE 16 CONTRACT SUBMITTALS NAB LITTLE CREEK VA

10/11/1994

NAVY PUBLIC WORKS

PCB SOIL REMOVAL ACTION
SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-93-B-3122

CONTRACT SUBMITTALS

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Prepared by:

NAVY Public Works Center
Energy/Environmental
Engineering Branch
Code 414
Norfolk, Virginia

PRECONSTRUCTION CONFERENCE PACKAGE **1/16/95**

This package includes:

- A List of those who should be notified and particiapet in the Preconstruction Conference.
- A blank Preconstruction Conference minutes format.
- A collection of important forms for the contractor.

PRECONSTRUCTION CONFERENCE NOTIFICATION

After coordination with or notification to LANTDIV - ENVIRONMENTAL and the BASE STAFF CIVIL ENGINEERING offices, the following (as a minimum) people should be contacted for each preconstruction conference by phone and follow-up by FAX:

1. CUSTOMER

   LANTDIV, Code 1822, Scott Park, 322-4788

   BASE STAFF CIVIL - ENVIRONMENTAL, Rich Stryker,

   PWC - NORVA, Code 30A, Lt. Steven Fischer, 445-7050

2. Fire ( ), Security ( ), Safety( ) Departments

3. PWC - NORVA Site Supervisor, Code 750.1, Andrew Smith, 444-4601

4. PWC - NORVA Planning & Estimating, Code 350, Lewis Beveridge,

5. Soil Removal Contract - DRMO Norfolk, Mike Sawyer,

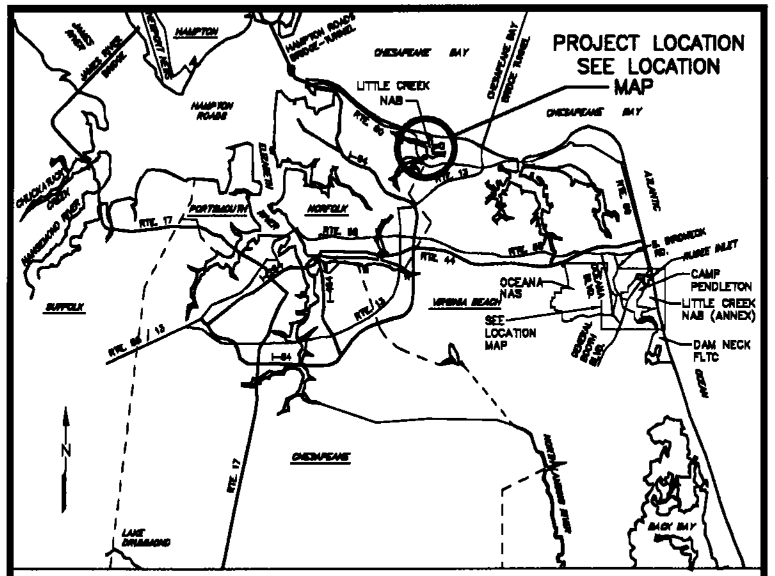
6. PWC - NORVA Project Engineers, JP Messier, Craig Mayer, Code 414, 445-4885

   PETE LANKO
   NEAL SIVAKUMAR

19. Questions: (1) LAB QUALIFICATIONS?
(2) DATA VALIDATION?

SCHOOL OF MUSIC – PLATING SHOP, ACID NEUTRALIZATION TANK–REMOVAL ACTION

NAB, LITTLE CREEK VIRGINIA BEACH, VA.



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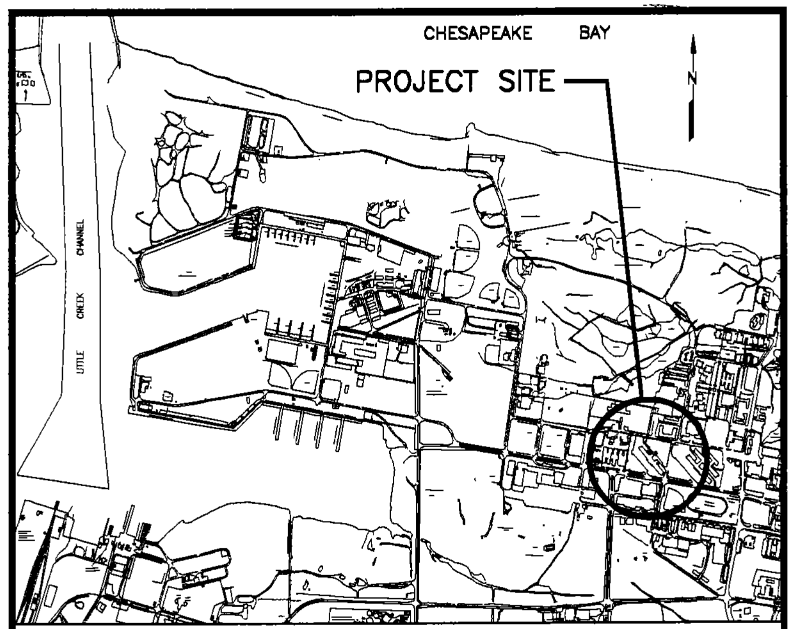
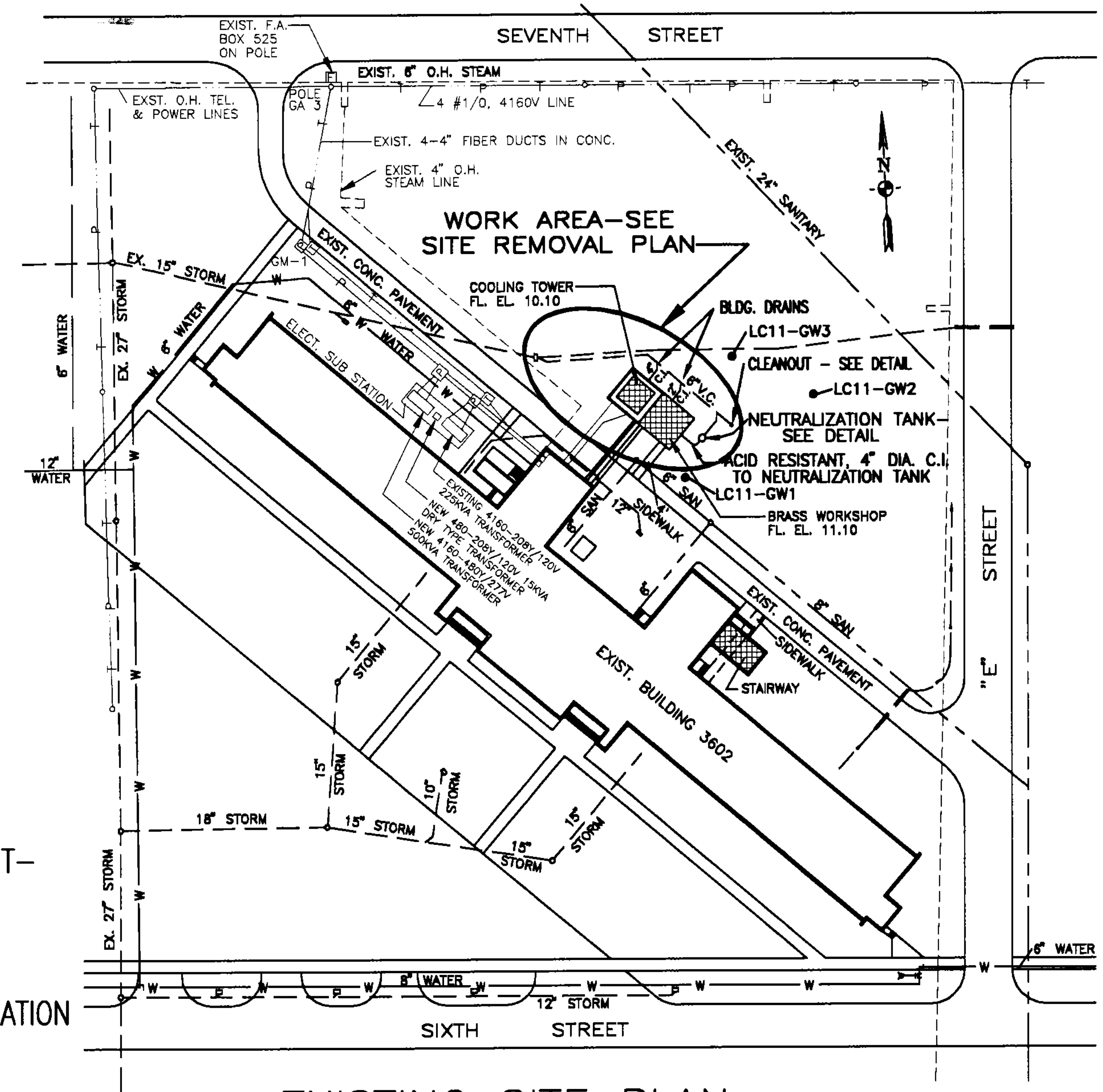
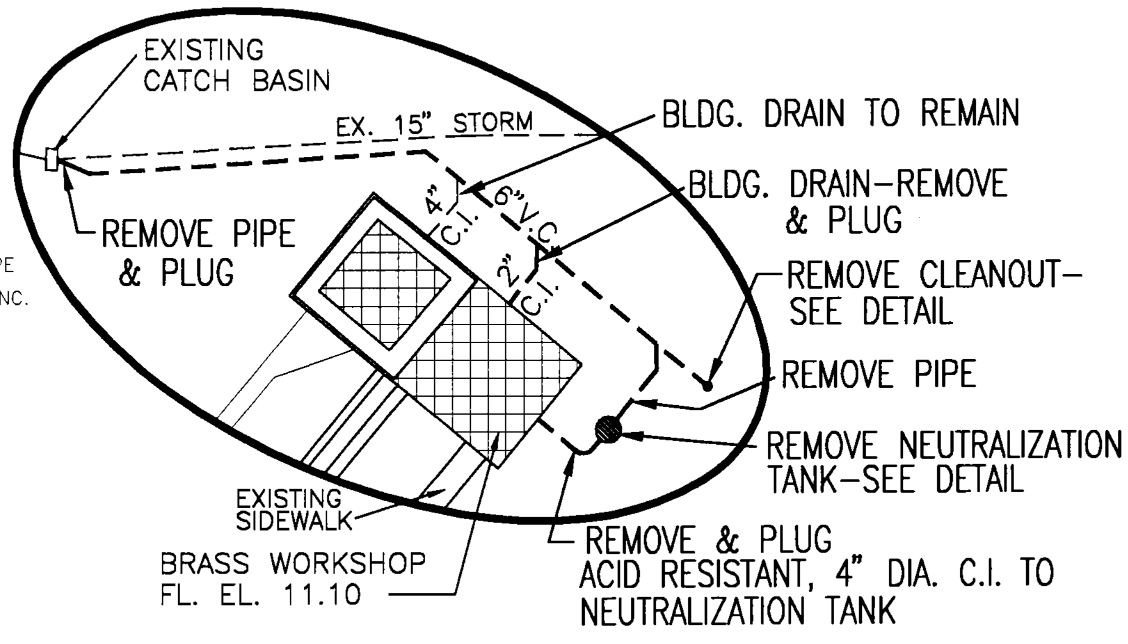


LOCATION MAP NOT TO SCALE



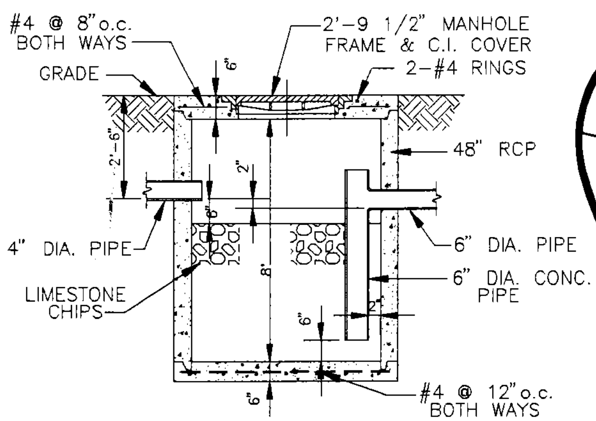
EXISTING SITE PLAN

SCALE 1"= 30'



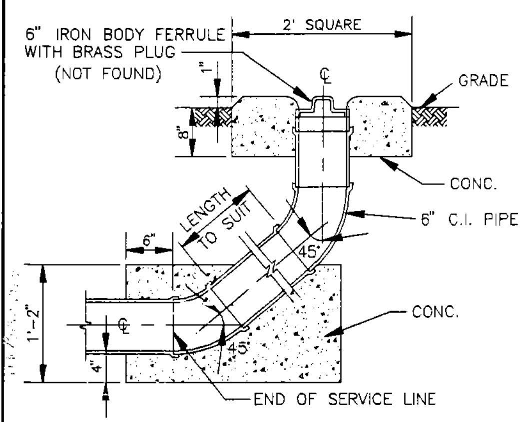
SITE REMOVAL PLAN

NOT TO SCALE



ACID NEUTRALIZATION TANK

NOT TO SCALE



CLEANOUT DETAIL

NOT TO SCALE

GENERAL NOTES:

1. THE CONTRACTOR SHALL REFER TO THE SPECIFICATIONS FOR PREPARATION OF THE WORK PLAN.
2. FOR SURVEYING EFFORT IN CONJUNCTION WITH THE WORK PLAN PREPARATION AND CONSTRUCTION ACTIVITIES, USE BENCHMARK USC&GS U 310, ELEVATION = 11.564 (NABLC). BENCHMARK IS BASED ON STATION DATUM (NABLC) AND LOCATED AT BUILDING NO. 3107 LOCATED ON 7TH STREET BETWEEN F AND G STREET. A COMPLETE BENCHMARK DESCRIPTION IS IN THE SPECIFICATIONS. ALL AS-BUILT DRAWINGS SHALL REFERENCE STATION DATUM. CONTRACTOR SHALL VERIFY ALL EXISTING ELEVATIONS ON PLAN. CORRECT ELEVATIONS SHALL BE RECORDED FOR THE AS-BUILT DRAWINGS.
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5. AFTER COMPLETION OF CONTAMINATED SOIL REMOVAL, RESTORE AREA TO MATCH EXISTING ELEVATIONS. RESEED ALL DISTURBED AREAS WITH STANDARD TURF IN ACCORDANCE WITH THE SPECIFICATIONS.
6. BORING LOGS FOR MONITORING WELLS LC11-GW1 TO LC11-GW3 ARE PROVIDED IN THE SPECIFICATIONS.
7. PROVIDE NEW 3" CAST IRON OR PVC PIPE FROM EXISTING 4" C. I. CONDENSATE DRAIN TO EXISTING CATCH BASIN. SLOPE TO DRAIN. MATCH EXISTING INVERT ELEVATION AT CATCH BASIN. PATCH HOLE AT CATCH BASIN AS REQUIRED. COMPACT BEDDING AND BACKFILL OF TRENCH TO 95% DENSITY.

LEGEND

EXISTING

(hatched)	MASONRY BUILDING
— — —	OVERHEAD STEAM
—— ——	STORM SEWER
– – – –	SANITARY SEWER
— W —	WATER LINE
— P —	POWER
— T —	TELEPHONE
•	MONITORING WELL LOCATION

GRAPHIC SCALE

0' 30' 60' 90' 120' 150'

SCALE : 1" = 30'

REVISIONS

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND — ATLANTIC DIVISION — NORFOLK, VIRGINIA

NAVAL STATION — NAVAL AMPHIBIOUS BASE, LITTLE CREEK VIRGINIA BEACH, VA.

SCHOOL OF MUSIC–PLATING SHOP ACID NEUTRALIZATION TANK SITE

SITE PLAN

CODE ID. NO. 80091 SIZE D

SCALE 1=30

EPD NO. 364842

SPEC. NO. 05-93-3121

CONSTR. CONTR. NO. N62470-93-B-3121

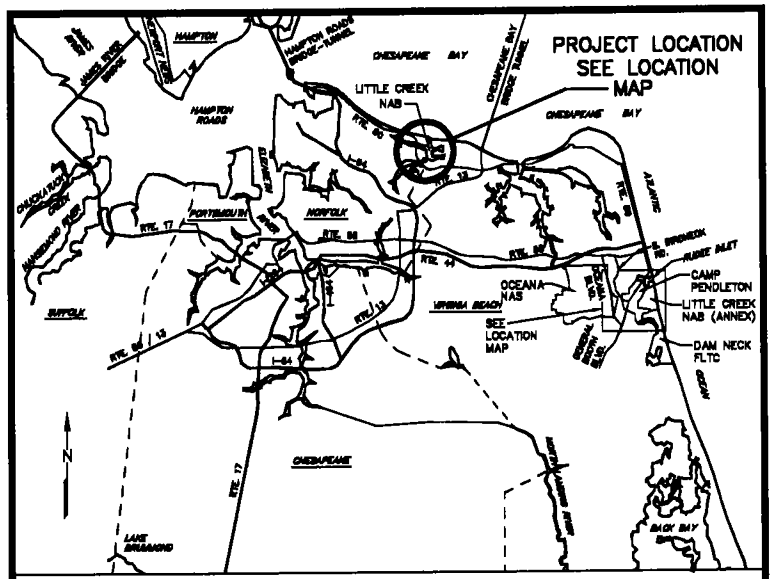
NAVFAC DRAWING NO. 4264942

SHEET 1 OF 1

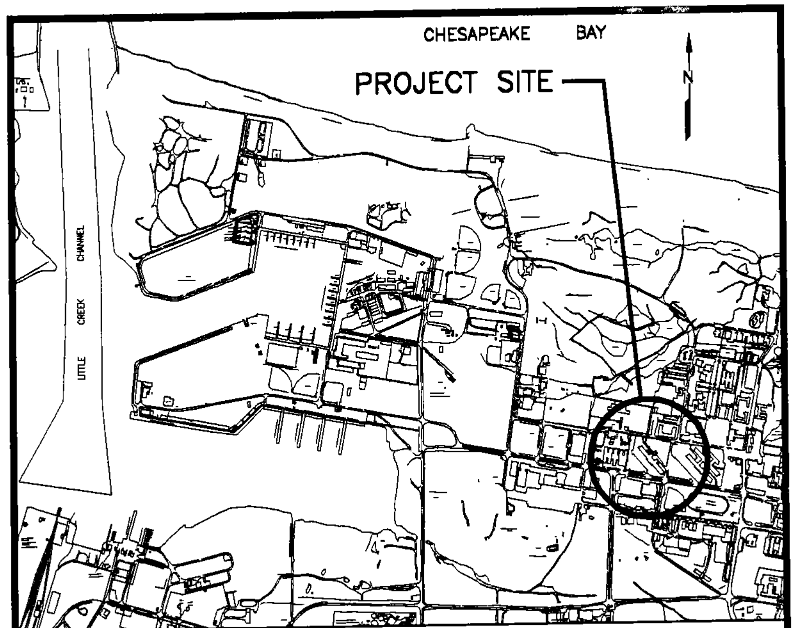
C–1

FILENAME: C:\3121-LCK\3121C1.DWG, SCALE: 1" = 30', 08/17/93 at 13:01

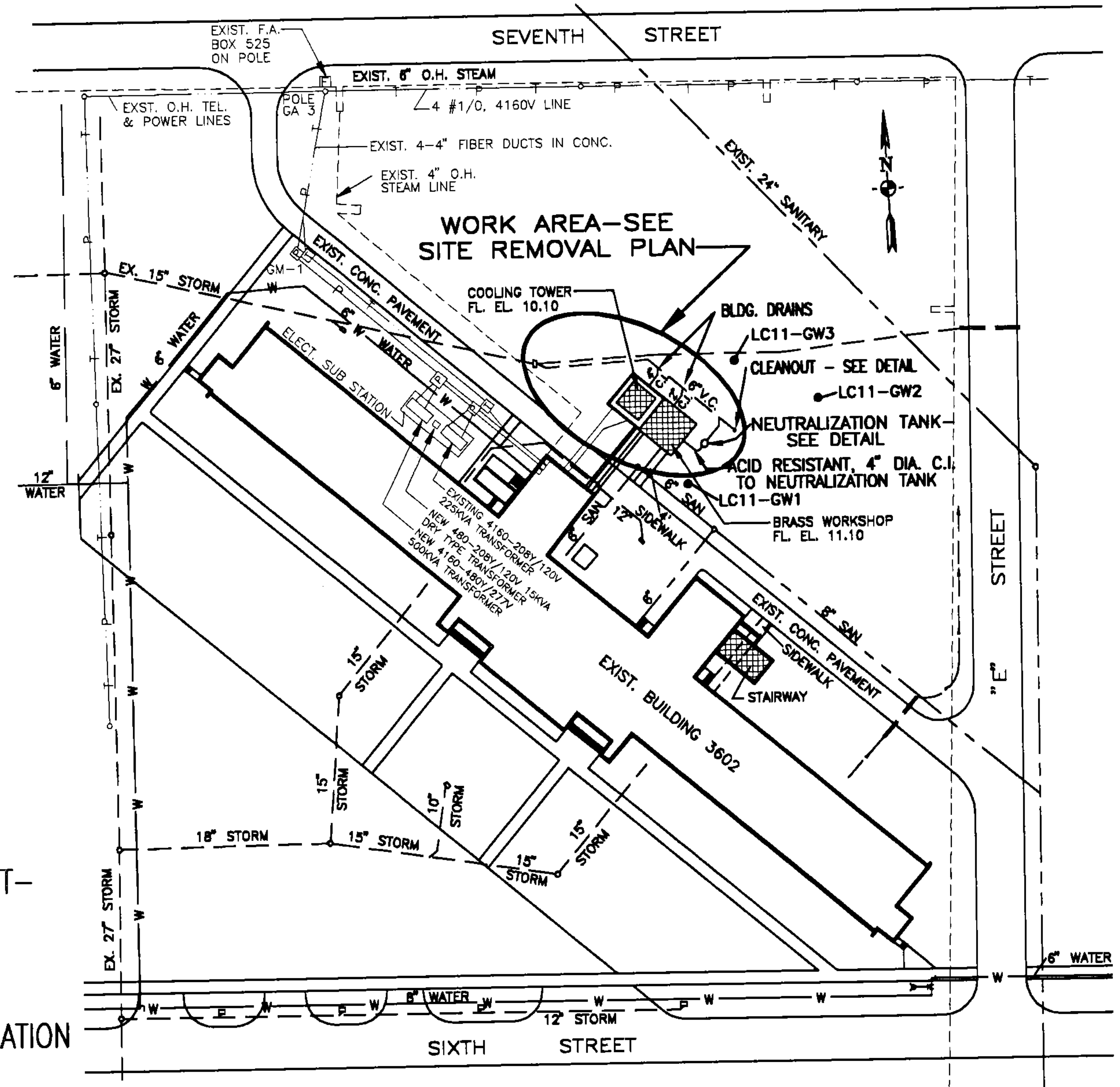
SCHOOL OF MUSIC - PLATING SHOP, ACID NEUTRALIZATION TANK-REMOVAL ACTION
NAB, LITTLE CREEK — VIRGINIA BEACH, VA.



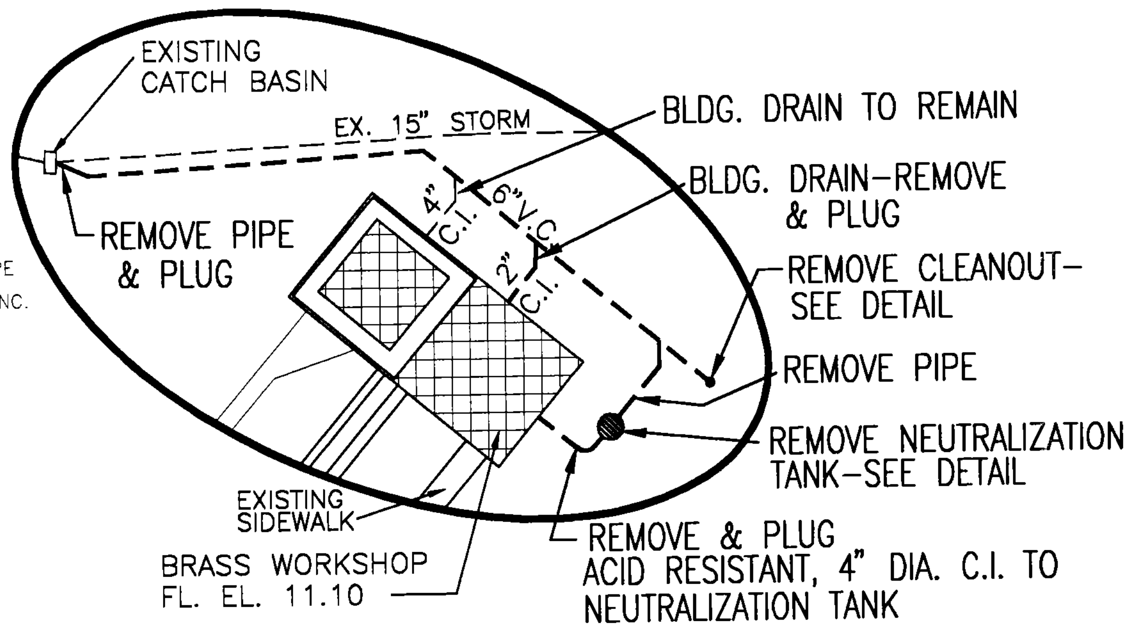
VICINITY MAP — NOT TO SCALE



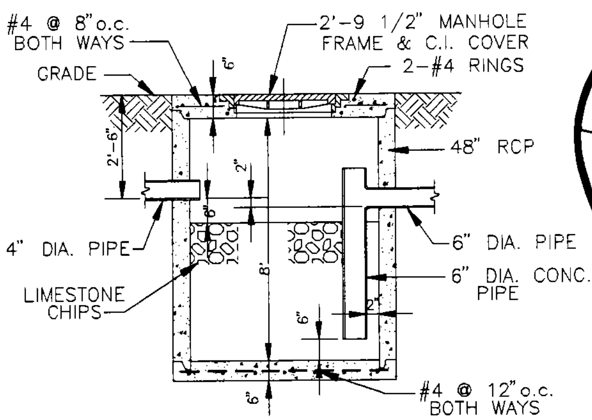
LOCATION MAP — NOT TO SCALE



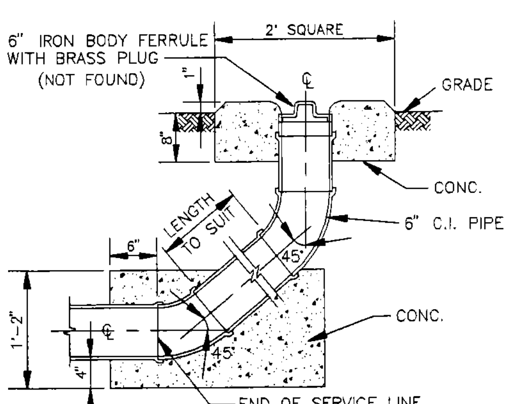
EXISTING SITE PLAN
SCALE 1"= 30'



SITE REMOVAL PLAN
NOT TO SCALE



ACID NEUTRALIZATION TANK
NOT TO SCALE



CLEANOUT DETAIL
NOT TO SCALE

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LEGEND

EXISTING

- MASONRY BUILDING
- OVERHEAD STEAM
- STORM SEWER
- SANITARY SEWER
- WATER LINE (—W—)
- POWER (—P—)
- TELEPHONE (—T—)
- MONITORING WELL LOCATION (•)

GRAPHIC SCALE
0' 30' 60' 90' 120' 150'
SCALE : 1" = 30'

REVISIONS

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION — NORFOLK, VIRGINIA
NAVAL STATION
NAVAL AMPHIBIOUS BASE,LITTLE CREEK VIRGINIA BEACH, VA.
SCHOOL OF MUSIC-PLATING SHOP
ACID NEUTRALIZATION TANK SITE
SITE PLAN

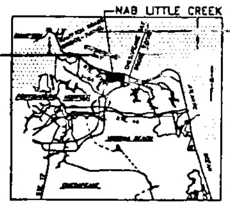
SRP
GES
ACTIVITY - SATISFACTORY TO

CODE ID. NO. 80091	SIZE D
SCALE: 1=30	
EFD NO. 364942	
STA. PROJ. NO.	
SPEC. NO. 05-93-3121	
CONSTR. CONTR. NO. N62470-93-B-3121	
NAVFAC DRAWING NO. 4264942	
SHEET 1 OF 1	
C-1	

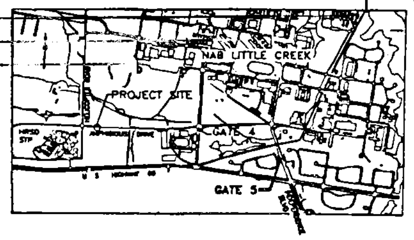
FILENAME: C:\3121-LCK\3121C1.DWG; SCALE: 1" = 30', 08/17/93 at 13:01

REVISIONS				
SYM	DESCRIPTION	DATE	SATISFACTORY	AP

SITE OPERATION PLAN
PCB SOIL REMOVAL ACTION SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA



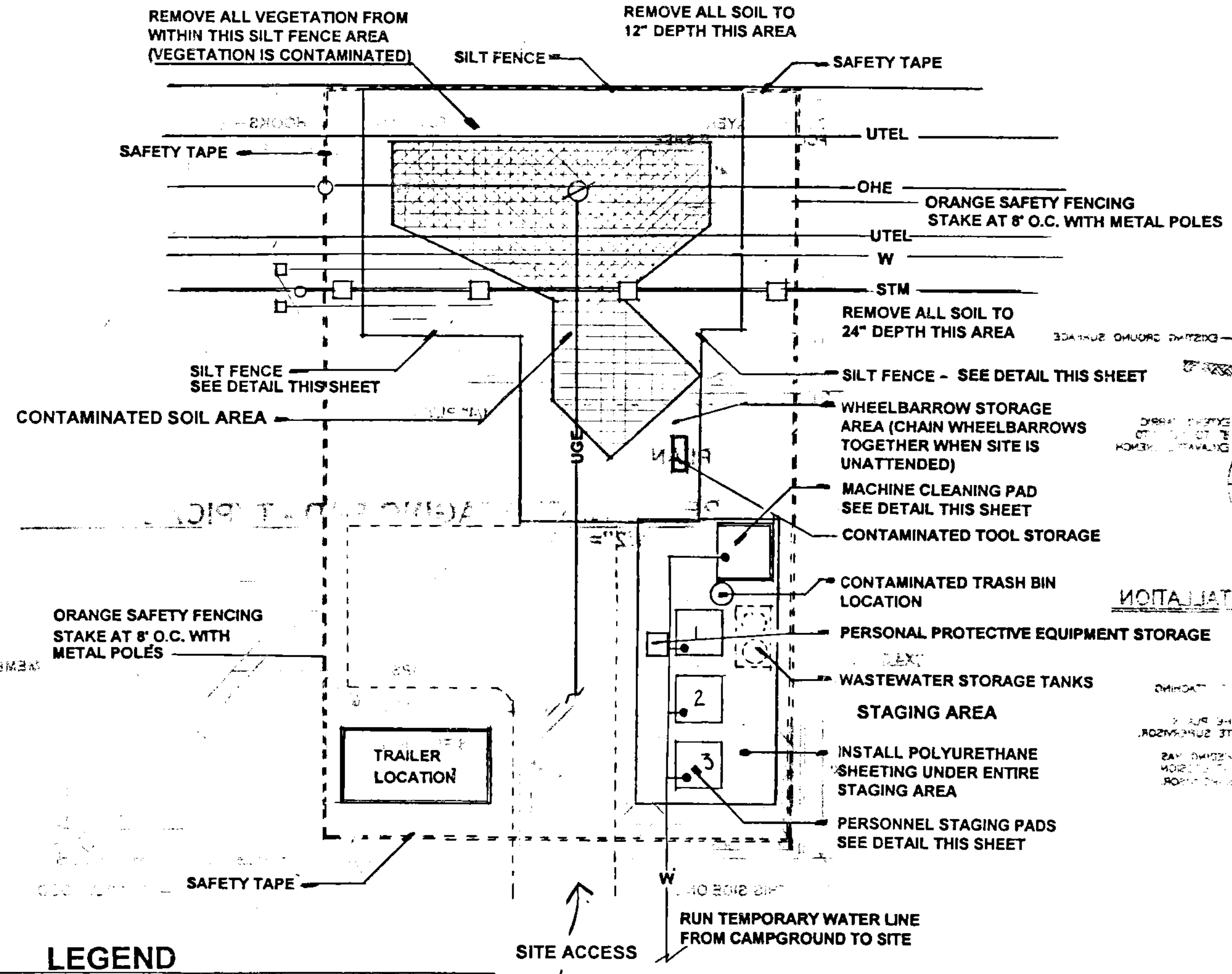
VICINITY MAP
NTS

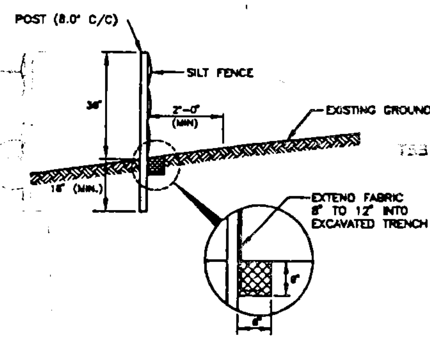


LOCATION MAP
NTS

PERSONNEL STORAGE PAD NOTES

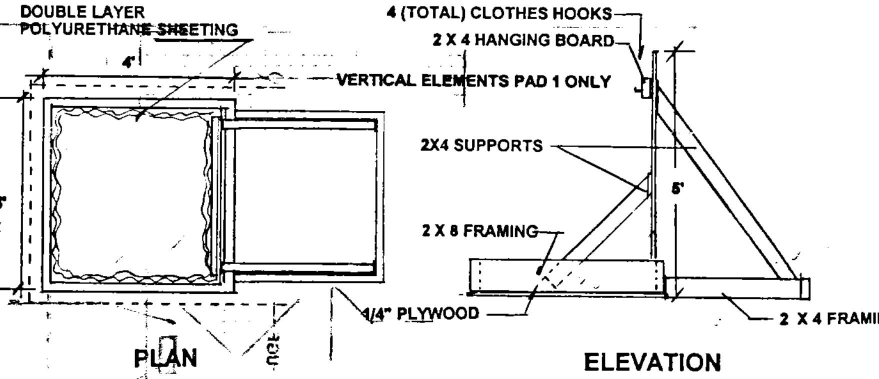
PAD #	NOTE
1	PAD 1 TO HAVE CLOTHES HOOKS, WATER SUPPLY, TARP TO COVER HANGING BOARD
2	PAD 2 TO HAVE WATER SUPPLY, THIS PAD ONLY HA 4'X4' BASE. NO HANGING BOARD REQUIRED
3	PAD 3 TO HAVE WATER SUPPLY AND DECONTAMINA SOLUTION BASIN. THIS PAD ONLY HAS 4'X4' BASE. N HANGING BOARD REQUIRED



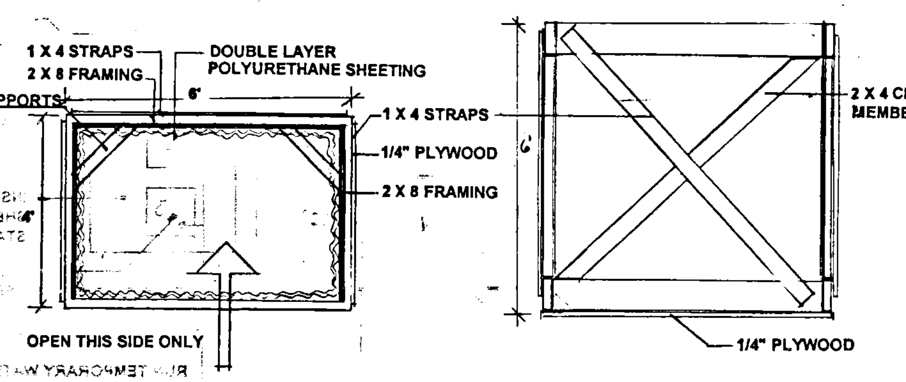


DETAIL (1) SILT FENCE INSTALLATION
N.T.S.

NOTES:
1. TAKE ALL SLACK OUT OF FABRIC BEFORE ATTACHING TO STAKES.
2. FENCE TO BE PLACED AS SHOWN ON THE PLANS OR AS OTHERWISE DIRECTED BY THE SITE SUPERVISOR.
3. SILT FENCE WILL BE REMOVED AFTER SEEDING HAS ACHIEVED ADEQUATE GROWTH TO PREVENT EROSION AS OTHERWISE DIRECTED BY THE SITE SUPERVISOR.



PERSONNEL STAGING PAD - TYPICAL
1/2"=1'-0"



PLAN

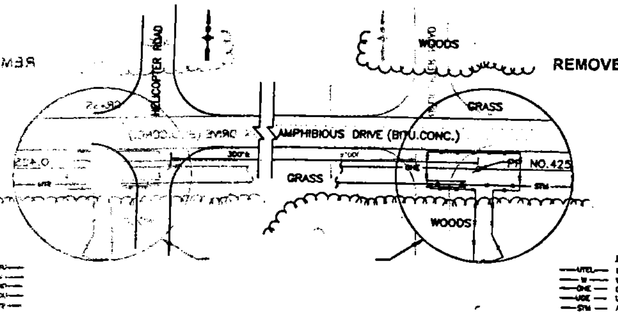
ELEVATION

MACHINE CLEANING PAD
1/2"=1'-0'

LEGEND

UTEL	UNDERGROUND TELEPHONE
OHE	OVERHEAD ELECTRIC LINE
W	WATER
STM	ABOVEGROUND STEAM
	12" SOIL DEPTH REMOVAL ZONE
	24" SOIL DEPTH REMOVAL ZONE
UGE	UNDERGROUND ELECTRIC LINE
	SPRAY NOZZLE

SITE PLAN
1"=10'

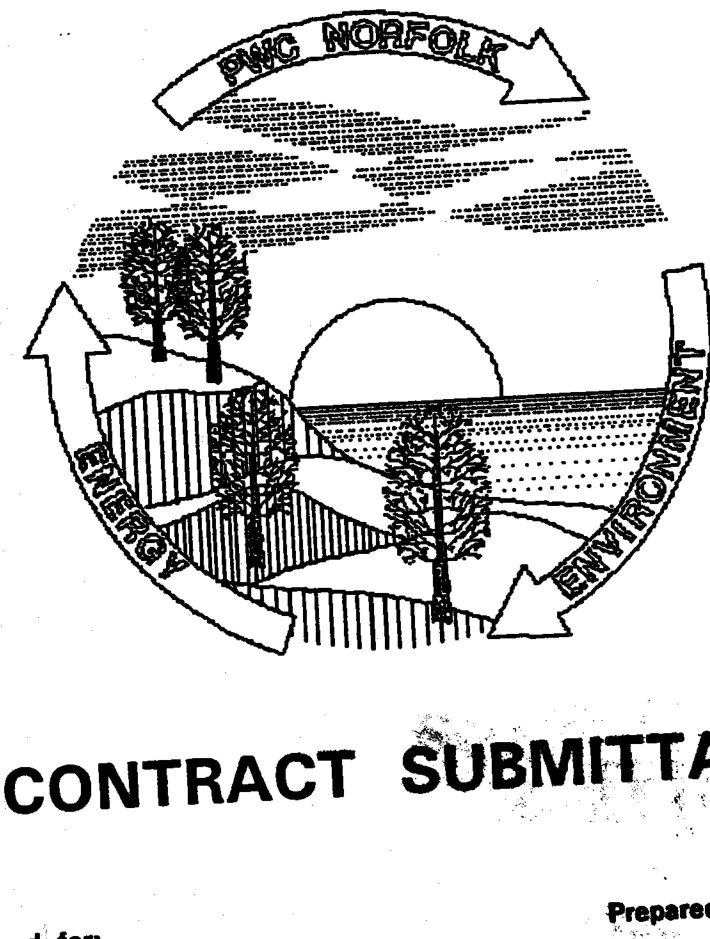


SITE PREPARATION PLAN
NTS

NOTE: LOCATIONS SHOWN ARE APPROXIMATE
EXACT LOCATIONS OF SILT FENCE, SAFETY TAPE
SAFETY FENCE, TRAILER, PPE STORAGE, ETC...
WILL BE DETERMINED ON SITE.

SITE OPERATION PLAN	PA - 1
DEPARTMENT OF THE NAVY NAVAL STATION	NAVAL FACILITIES ENGINEERING COM
NAVY PUBLIC WORKS CENTER	NORFOLK, VIR
JOB ORDER NO. 1324041	SITE OPERATION PLAN PCB SOIL REMOVAL ACTION SITE 16 LITTLE CREEK NAVAL AMPHIBIOUS BA NORFOLK, VIRGINIA
DES CTM DR CTM CHK JRM	
BR MGR.	
SUBMITTED BY: DATE:	
FIRM MEMBER PRINCIPAL	
BC F.P.	
DIV. DIR.	
APPROVED: DATE:	SIZE D; CODE IDENT NO. 80091; NAVFAC DRAWING NO. 4282728; PWC DRAWING 1502
SATISFACTORY TO ACTIVITY	CONSTR. CONTR. NO. N62470-93-B-3122
APPROVED: DATE:	
FOR C.O. FOR COMMANDER, NAVFAC	SCALE: GRAPHIC; SPEC.; SHEET 1 OF

PCB SOIL REMOVAL ACTION
SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-93-B-3122



CONTRACT SUBMITTALS

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Prepared by:

NAVY Public Works Center
Energy/Environmental
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PCB SOIL REMOVAL ACTION
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NORFOLK, VIRGINIA
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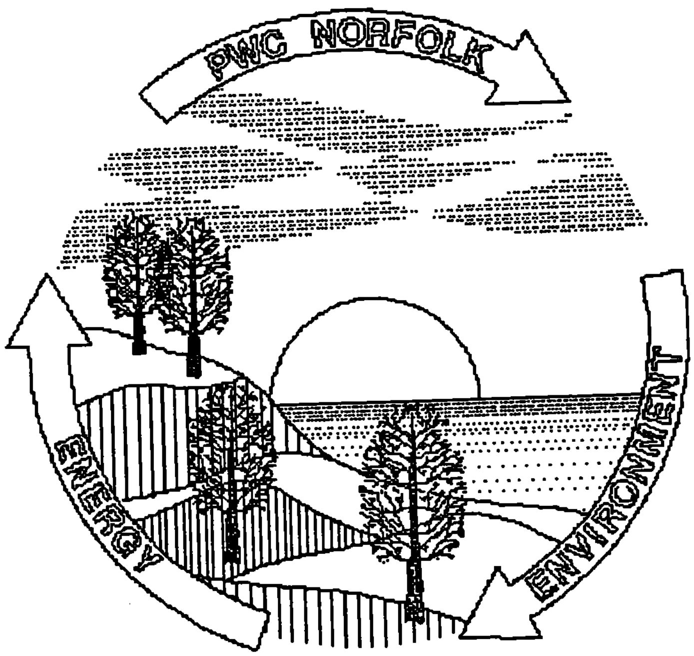

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Prepared for:

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Norfolk, Virginia

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Code 414
Norfolk, Virginia

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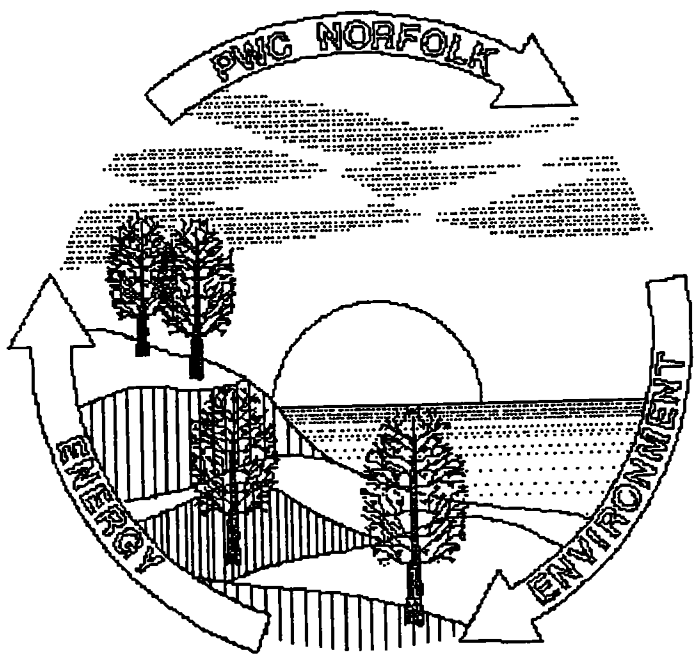
Work Plan	B
Quality Control Plan	C
Environmental Protection Plan	D
Health and Safety Plan	E
Sampling and Analysis Plan	F

ENVIRONMENTAL CONDITIONS REPORT

PCB SOIL REMOVAL ACTION - SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-93-B-3122



Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Prepared by:

NAVY Public Works Center
Energy/Environmental
Engineering Branch
Code 414
Norfolk, Virginia

11 October, 1994

FINAL

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1.0	**Introduction**	1
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2.0	**Areas of Concern**	2
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	2.2 Underground High Voltage Wires	2
	2.3 Underground Telephone Lines	2
	2.4 Aboveground Steam Line	2
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	2.5.1 On-site van	3
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1.0 INTRODUCTION

1.1 OVERVIEW

Located south of Amphibious Drive and approximately 300 feet east of Helicopter Road is the PCB soil removal site. Power pole 425 is situated in the center of the site and formerly held a capacitor which leaked less than five gallons of dielectric fluid out and onto the ground and pole.

The dielectric fluid contained PCB's and thus contaminated the underlying soil. Previous site characterizations have found that concentrations of contamination run from 2100 part per million down to non-detectable.

The extent of possible contamination is presently safety fenced in and warning signs are posted to keep people out of the area.

2.0 AREAS OF CONCERN

2.1 Vehicular Traffic

Amphibious Drive runs directly adjacent to the site from east to west. During the excavation phases it is anticipated that Amphibious Drive will be restricted at certain times. Amphibious Drive is a major vehicular thoroughfare. Traffic will not be restricted between the hours of 0630-0800 and 1530-1700 on Amphibious Drive. During excavation a backhoe will be utilized which will require that traffic in the roadway lane adjacent to site be temporarily rerouted to the opposing lane. Proper warning signs, markers, and flagpeople will be present to warn oncoming traffic of the situation.

The restricting and/or re-routing of vehicular traffiic will be coordinated with base police and the IR Program Coordinator. PWC Norfolk will cooperate with base personnell to notify base residents and employees via Plan of the day notices and a base newspaper article. These will occur at least three weeks prior to any vehicular/pedestrian restrictions.

2.2 Underground High Voltage Lines

A high voltage line runs underground from power pole 425 south towards the campground. A high voltage work crew will uncover the line prior to excavation for safety purposes, to deter damage to the line, and to allow for an efficient excavation.

2.3 Underground Telephone Lines

Two telephone lines run underground and parallel to Amphibious Drive and are located approximately four feet on either side of power pole 425. Prior to commencing excavation, the two telephone lines will be uncovered to allow for an efficient excavation and to deter damage to the lines.

2.4 Aboveground Steam Line

A steam line runs aboveground through the site from east to west and parallel to Amphibious Drive. The line is located approximately ten (10) feet south of power pole 425 and is approximately two feet off the ground. The steam line will pose no problem for excavation. Proper care will be taken during excavation so not to incur any damage to the line during excavation.

2.5 Temporary Facilities and Services

2.5.1 On-site Van

A van will be put on-site within the campground to be used as an office space. The van will be used as an office for processing paperwork, having meetings, performing daily managerial routines and any required field screening of samples.

2.5.2 Services/Utilities

Temporary hook-up of a potable water supply, and on-site sanitary facilities (i.e. port-a-potty) will be established to support project work and activities. All temporary services will be connected by the on-site work crew and obtained from the campground.

2.6 Power Pole Replacement and Service Transfer

Upon completion of the contaminated PCB soil, power pole 425 will be replaced due to itself being contaminated. PWC NORVA personell will be responsible for replacement of the pole. The Little Creek NAB Utilities Department have been coordinated and will be responsible for transfer of all services from the existing pole to the new pole.

It is not anticipated that utility services will be interupted. In the event of an anticipated interuption, Little Creek NAB will be notified and consulted on appropriate times for interuption.

2.7 Campground

Precautionary measures such as warning signs and safety tape will be posted to instruct and keep people from the campground away from the work site. Activities of the project will in no way away the safety and welfare of people at the campground.

2.8 Foliage, Trees, and Vegetation

No major disturbance of foliage, trees, or vegetation will occur from site work activities. Minor amounts of brush will be cleared to gain access to the site and for temporary trailer facilities, decontamination area, drying pad area, and activity pathways to and from the site.

3.0 Permits

A permit to excavate will be issued by the base representative to PWC-NORVA just prior to notice to proceed. No other permits are anticipated to be needed at this time.

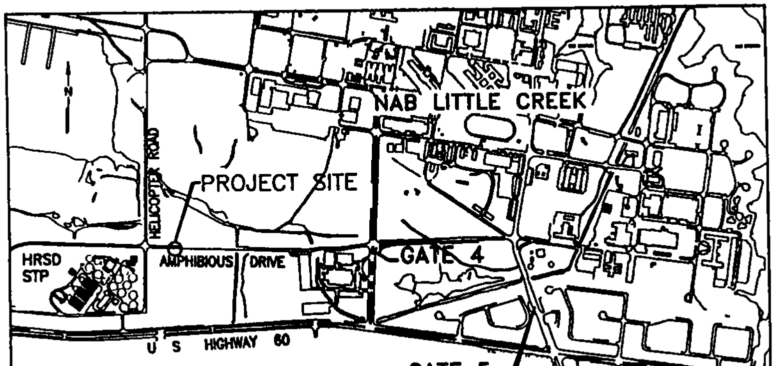
4.0 Drawings

Provided in Figure 1 is a location and site map for the project.

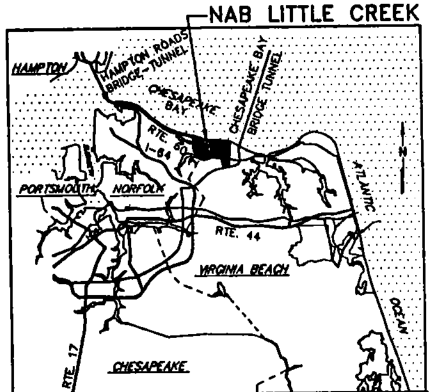
5.0 Photographs

Provided in at the end of this report are photographs that depict the existing environmental conditions of the site. Photographs will also be taken during the removal action and will be included in the report.

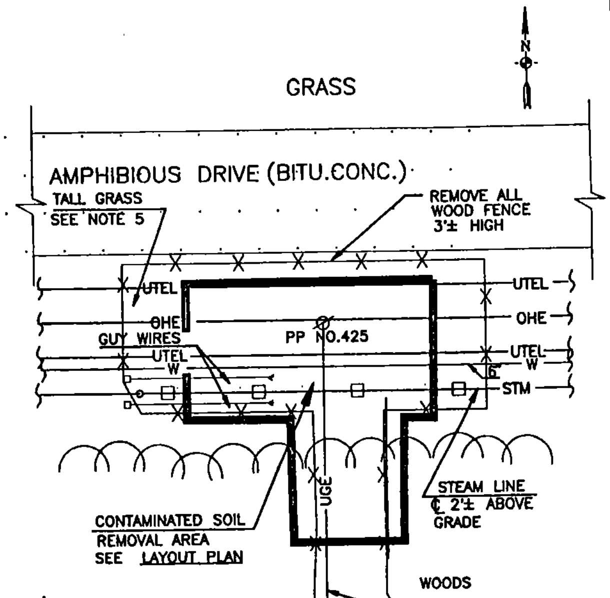
PCB SOIL REMOVAL ACTION, SITE 16
NAVAL AMPHIBIOUS BASE LITTLE CREEK
NORFOLK, VA



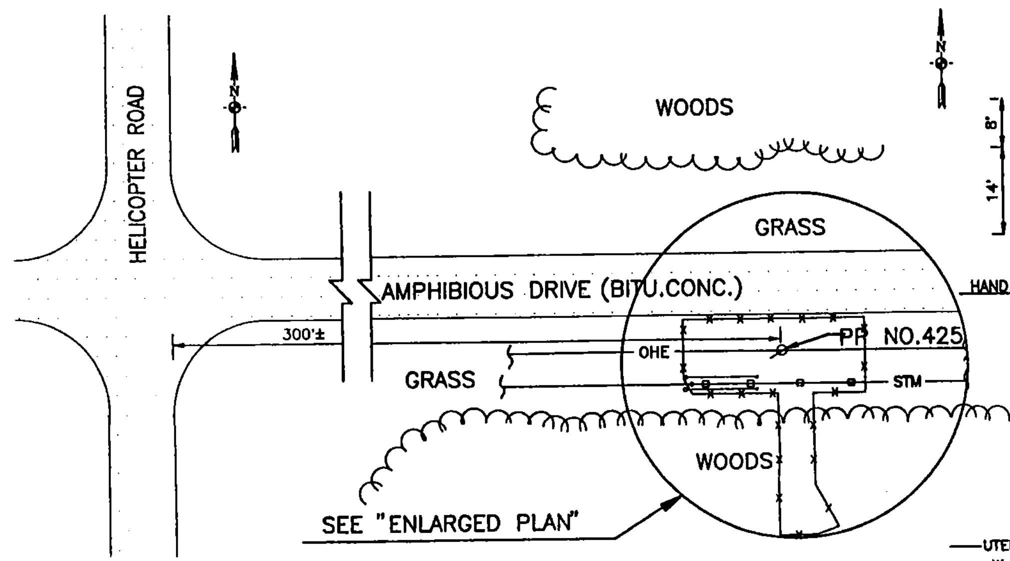
LOCATION MAP
NTS



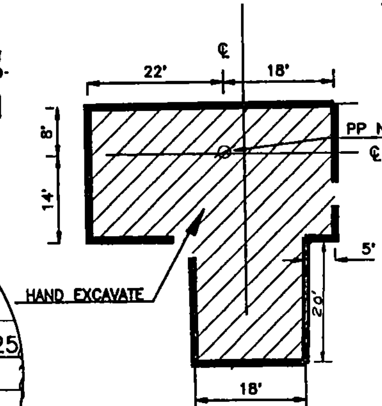
VICINITY MAP NOT TO SCALE



ENLARGED PLAN
1"=10'



LOCATION PLAN
1"=20'



LAYOUT PLAN
1"=10'

SCALE : 1" = 10' — 0' 10' 20' 30' 40' 50'
SCALE : 1" = 20' — 0' 20' 40' 60' 80' 100'

LEGEND

—UTEL—	UNDERGRUND TELEPHONE
—W—	WATER
—OHE—	OVERHEAD ELECTRICAL LINE
—UGE—	UNDERGROUND ELECTRICAL LINE
—STM—	ABOVEGROUND STEAM

NOTES:

1. ITEMS SHOWN ARE EXISTING AND SHALL REMAIN IN PLACE UNLESS NOTED OTHERWISE.
2. APPROXIMATE LIMITS OF PCB CONTAMINATED SOILS EXCAVATION ARE INDICATED ON " ENLARGED PLAN ". THE DEPTH IS APPROXIMATELY 2'. THE CONTAMINATED SOILS SHOULD BE REMOVED AND DISPOSED OF IN A TSCA APPROVED LANDFILL.
3. AFTER COMPLETION OF CONTAMINATED SOIL EXCAVATION, RESTORE AREA TO MATCH EXISTING ELEVATIONS, AND PROVIDE TURF FOR ALL DISTURBED AREAS.
4. DECONTAMINATE EXPOSED, CONTAMINATED UTILITY LINES AND CONCRETE SUPPORTS. REMOVE 50' CLASS 2 POWER POLE #425 AND REPLACE WITH NEW 50' CLASS 2 POLE. EXIST. OVERHEAD POWER LINES (2-132 KV PRIMARY CIRCUITS, SECONDARY, FIRE ALARM & TELE.) SHALL REMAIN IN SERVICE. TRANSFER EXISTING CIRCUITS INCLUDING CROSSARMS, INSULATORS AND STREET LIGHT. TRANSFER EXISTING UNDERGROUND SERVICE AND CONDUIT RISER.
5. CUT TALL GRASSES WITHIN FENCED AREA.
6. CALL "MISS UTILITY" BEFORE EXCAVATION. SEE SPECS.
7. EXISTING PCB CONTAMINATION LEVELS RANGE FROM NON-DETECTABLE TO 23 PPM. CLEANUP LEVEL SHALL BE 10 PPM OR LESS.

REVISIONS

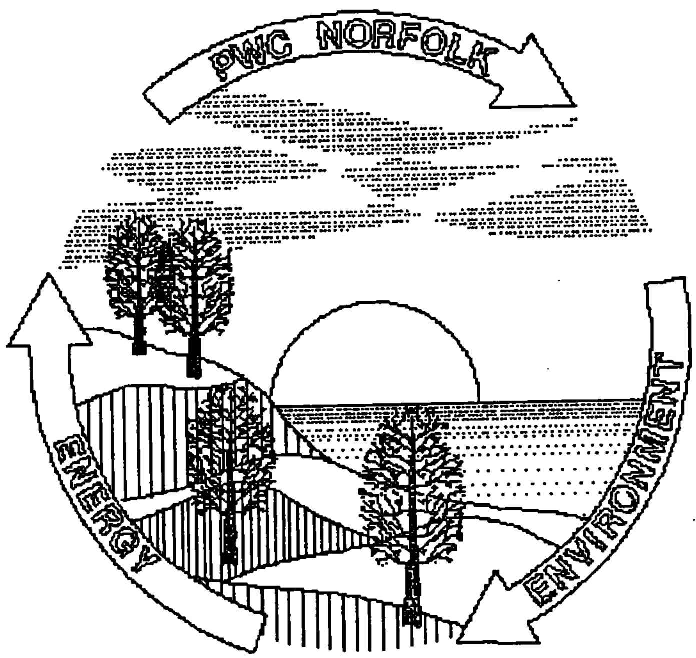
ATLANTIC DIVISION
NAVAL AMPHIBIOUS BASE, LITTLE CREEK NORFOLK, VA
PCB SOIL REMOVAL ACTION, SITE 16
TITLE, VICINITY & LOCATION MAPS, PLANS & NOTES
SCALE AS NOTED
373498
05-93-3122
N62470-93-B-3122
4273498
C-1

5.0 Photographs

Provided in at the end of this report are photographs that depict the existing environmental conditions of the site.

WORK PLAN

PCB SOIL REMOVAL ACTION - SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-93-B-3122



Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Prepared by:

NAVY Public Works Center
Energy/Environmental
Engineering Branch
Code 414
Norfolk, Virginia

11 October, 1994

FINAL

WORK PLAN

PCB SOIL REMOVAL ACTION - SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-B-93-3122

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1.0 INTRODUCTION

Public Works Center - Norfolk, Virginia is pleased to submit this Work Plan to Naval Facilities Engineering Command - Atlantic Division in response to PCB Soil Removal Action, Site 16, at Little Creek Naval Amphibious Base, Norfolk, Virginia (see Figure 1). All work will be in accordance with Naval Facilities Command NAVFAC) Specification No. 05-93-3122 dated January 25, 1994. The Environmental Protection Plan (EPP), Quality Control Plan (QCP), Sampling and Analysis Plan (SAP), and the Health and Safety Plan (HASP) are being provided as separate documents, but are to be implemented in conjunction with this work plan.

1.1 PROJECT BACKGROUND

Less than five gallons of dielectric fluid were found missing from a capacitor, formerly attached to Pole No. 425, after a lightning strike in the early 1980's as shown on Figure 1. The capacitor has since been removed from the pole, but the pole is still in use. There are no visible evidence at the site that would indicate a spill of PCB-laden fluid.

Pole No. 425 is located approximately 300 feet east of the intersection of Amphibious Drive and Helicopter Road on the south side of Amphibious Drive, approximately 12 feet from the road. This area of the facility is relatively level with a preferred direction of runoff at the site is to the south toward the campground and woods. An above-ground steam line runs parallel to Amphibious Drive in this area. A campground is located in a wooded area south of Amphibious Drive and the site.

Through previous site investigations (Reports (a) and (b) of NAVFAC Specification No. 05-93-3122 dated January 25, 1994) it has been shown that Site 16 contains PCB contaminated soil with levels which range from undetectable to 2100 ppm. The area of concern is approximately 1180 square feet. It is in the shape of a tee with the head 40 feet long by 22 feet wide and the leg 20 feet long by 18 feet wide. Approximate depth of the contamination is 2 feet deep throughout.

1.2 OBJECTIVES

The objectives to be met for the removal action include:

- Pre-removal sampling and analysis to minimize quantity of excavated soil
- Remove contaminated soil to the required cleanup level
- Replace contaminated utility pole and remove fencing
- Haul and dispose of the contaminated soil and waste via an approved disposal contractor to an approved off-site disposal facility
- Perform confirmatory sampling and analysis to ensure cleanup levels are achieved
- Reestablish grade of excavated area to meet surroundings and seed to match existing vegetation

The following sections of the Work Plan describe the activities intended to meet these objectives in a safe and effective manner. In conjunction with the following sections, the work will be performed in accordance with the Environmental Protection Plan (EPP), the Sampling and Analysis Plan (SAP), the Quality Control Plan (QCP), and the Health and Safety Plan (HSP), which are being provided as separate documents.

1.3 APPLICABLE, RELEVANT AND/OR APPROPRIATE REQUIREMENTS

All applicable, relevant and/or appropriate requirements (ARAR's) (chemical-specific, location-specific, and action-specific) are being followed in accordance with each respective regulation which governs that area of concern.

List ARARs (use CMP).

2.0 ORGANIZATION OF PROJECT

2.1 ANTICIPATED QUANTITIES OF MATERIALS

PWC - NORVA has reviewed the proposed removal action investigations and has determined that the following activities will be performed:

- Perform the site preparation activities and mobilize resources
- Construct decontamination area
- Remove approximately 100 cubic yards of soil, approximately 3000 pounds of waste (utility pole, fencing, personnel protective clothing, tools, deconatimated rags/brushes and water)
- Provide transportation and disposal of all soil and waste material
- Backfill and compact excavated quantity of soil
- Replace contaminated utility pole and remove contaminated fencing
- Regrade and seed the disturbed areas
- Perform site cleanup and demobilize resources
- Prepare final report

2.2 MANPOWER REQUIREMENTS

The work will have a crew dedicated solely to this project and be on site at all times to perform all of the removal action activities, except for transport and disposal of the soil and waste. Table 2-1 provides the listing of activities and the manpower and equipment requirements of that crew.

2.3 MANAGERIAL APPROACH TO CONSTRUCTION

PWC - NORVA's approach to project management is to maintain a close working relationship between the front line personnel and management. This is to ensure that all work is being performed effectively and efficiently, thus achieving project satisfaction.

The Project Engineers, Site Supervisor, and Planner/Estimator will jointly develop the project schedules, budgets, and work to achieve these goals over the duration of the project. A Health and Safety Officer will be available to ensure compliance with all health and safety regulations. on-site (?)

The proposed project organization is presented in Figure 2. The duties and responsibilities of the project team members are defined in Section 2.4.

2.4 PERSONNEL - DUTIES AND RESPONSIBILITIES

2.4.1 Responsibilities of PWC - NORVA are:

- Perform the remedial activities defined in the Work Plan and required per applicable specification.
- Prepare and submit scheduled status reports containing such information regarding percentage of completion, unresolved delays (encountered or anticipated) that may affect the schedule and a description of efforts made to mitigate those delays or anticipated delays, revise construction schedule, listing of activities scheduled for the next time period, and other information relating to the progress of construction as is customary in the industry.
- Initiate, maintain, and supervise all safety precautions and programs in connection with the work.
- Implement a Quality Control Plan and establish a chain of custody.
- Maintain at the site all required supporting paperwork, permits, regulations/guidelines, field orders, etc..

2.4.2 Responsibilities of PWC - NORVA's Project Team

The removal action at Site 16 on Little Creek Naval Amphibious Base will be led by a project-dedicated team, as shown in Figure 2, who is responsible for the management and completion of the overall project and the primary components of design and remediation.

The Assistant Production Officer and the Project Engineers will have combined overall responsibility for project efforts including technical, schedule, and budget aspects. The Project Engineers will be responsible for the day-to-day management and integration of all elements of the project and will be accountable for each activity. Supporting the Lead Project Engineer in the field will be the Site Supervisor, Health and Safety Officer, Laborers, and other support personnel as needed.

The Project Engineers will ensure and maintain the quality control chain of command and work directly with the project team.

Responsibilities and authority of the Project Engineers and supporting field personnel fundamental to the project are discussed in the following sections.

2.4.3 Assistant Production Officer/Branch Manager

The Assistant Production Officer is the person in charge of the overall project and has full authority for coordination and direction of the project. Specific responsibilities of the Assistant Production Officer include:

- Authorize the overall work effort
- Respond to resource requirements by securing the commitments for staff and equipment
- Monitor performance, schedules, and budgets
- Review and meet work schedule and budget objectives
- Manage and coordinate group interfaces

2.4.4 Project Engineers

The Project Engineers are responsible for performance of remedial and construction activities. Other responsibilities include:

- Day-to-day coordination of technical activities
- Provide technical guidance
- Ensure technical adequacy of field, laboratory, data management, and construction activities
- Interfacing with the Assistant Production Officer for engineering activities
- Approving the appropriate project-specific procedures and the as-built drawings

2.4.6 Site Supervisor

The Site Supervisor if the PWC - NORVA contact at the site and is responsible for performing the remediation activities in accordance with the work plan and other project plans and specifications. The Site Supervisor's responsibilities include:

- Implementing the day-to-day aspects of the Health and Safety Plan
- Coordinating engineering activities at the site as directed by the Lead or Assistant Project Engineer
- Managing the day-to-day execution of the project at the site including administrative and procurement activities
- Monitor work progress and schedule, and advise the Lead or Assistant Project Engineer of variances

2.4.7 Health and Safety Officer

The Health and Safety Officer (HSO) is responsible for implementing the Health and Safety Plan (HSP) which satisfies federal, state, and local regulations and is consistent with site conditions. The HSO may take actions independent of the project group to stop the project, if required, for compliance with the HSP.

The site supervisor is responsible for the day-to-day implementation of the HSP during site activities. The HSO will oversee this day-to-day implementation, including the following responsibilities:

- Direct the entrance and exit physical requirements
- Approval of personnel protective equipment and safety procedures specified in the HSP
- Oversee the maintenance and use of field monitoring equipment necessary to define on-site hazards associated with remediation
- Designating appropriate personnel protection level; determining protection level upgrades and downgrades as site conditions permit
- Providing necessary guidance to the project staff so they can safely perform their functions in accordance with federal, state, and local regulations.

2.4.8 Sample Technician

The responsibilities of the Sample Technician are:

- Perform all sampling activities in accordance with approved protocols.

2.4.9 Transportation and Disposal Contractor

PWC - NORVA will have a transportation and disposal contractor assigned to the project team to manage the transportation and disposal of contaminated soil and wastes. This person will be responsible for preparing waste profiles and manifests, and disposal facility approval.

2.4.10 Surveyor

The Surveyor will report directly to the Lead or Assistant Project Engineer and Site Supervisor. They will be responsible for performing the site topographic and quantity surveys as directed.

2.4.11 Laboratory Responsibilities

- Process all samples submitted for testing.
- Assist in proper sampling procedures utilized.
- Maintain a quality auditing/tracking system and chain-of-custody.

3.0 DESCRIPTION OF ACTIVITIES

3.1 SITE PREPARATION

3.1.1 Mobilization

Public Works Center - Norfolk, Virginia will mobilize the personnel, equipment, and resources necessary to complete the project as defined in this work plan. Initially, key individuals will be dispatched to the site to receive the trailers and other equipment essential to complete the project.

Initial site preparation will also include preparing the area and locating the field office trailer and connecting required utilities. Upon completion, construction equipment necessary for intrusive activities will be mobilized. This will include, but not limited to, mobilization of excavation and hauling equipment, and all other equipment and personnel necessary to complete the project as outlined in this Work Plan.

3.1.2 Temporary Facilities

PWC-NORVA will mobilize temporary facilities to accomplish the project objectives. An office trailer and a personnel decontamination area (as outlined in the Health and Safety Plan) will be established.

3.1.2.1 Utilities

(Water)

Potable water will be supplied to the site from the campground. A water hose will be connected to a campsite spicket. Connection and hookup will be accomplished by on-site workers.

(Sanitary Facilities)

PWC-NORVA will provide portable sanitary facilities unless provided by the base representative.

3.1.2.2 Project and Other Signage

PWC-NORVA will place appropriate warning signs throughout the site where pedestrians and driver safety is in danger in the area of work to help establish both controlled zones and site hazards.

3.1.2.3 Work Zone and Temporary Fences

PWC-NORVA will mark all work zones in accordance with Occupational Safety and Health Administration (OSHA) guidelines. All specific work zones will be delineated with orange plastic fencing with metal posts and appropriate warning signs will be strategically placed. Caution tape, roping, and other fencing devices will be used as specific project tasks require.

Polyprolene (30 mil) will be used to cover the excavated area on the site nightly to deter any rainfall from entering the site, keeping excess moisture out of the contaminated soil. This will allow for a quick excavation of the contaminated soil on a daily basis. If rainfall is to enter the site, the excess moiture will be allowed to freely drain down by halting work till the ground is dry.

3.1.3 Decontamination Area Construction

The personnel decontamination area will comprise a section that is 4 feet by 4 feet with ground covering of polypropelene sheeting. The equipment decontamination area will be approximately 6 feet by 4 feet. These two sections will contain all necessary decontamination equipment (i.e. wash basin, disposal barrel, washing agents, brushes, etc.) for personnel decontamination. See drawing RA-1 for construction and location.

3.1.4 Pre-Removal Action Sampling

Previous site characterization soil sampling will be used to assist in the determination of the PCB contaminated soil. The extent of the removal action will be based on this. Intermediate sampling will occur to confirm contamination limits and to separate different levels of contamination for disposal purposes.

3.2 SOIL AND DEBRIS REMOVAL

This section details the work to be completed as part of the soil removal task. This task includes the following activities:

- Clearing and grubbing areas to be excavated
- Existing fence removal
- Uncovering of high voltage and telephone lines (w/Miss Utility)
- Excavation and disposal of soil and construction waste
- Confirmatory sampling
- Common fill placement
- Utility pole replacement

The following sequence of construction activities will serve as guide for conducting the work associated with this task and will be modified as necessary to accommodate changes in site and weather conditions and/or scope of work.

- Establish ground control and conduct initial construction surveys to define preliminary excavation limits

- Fencing removal

- Silt fence and warning signs/roping/fencing installation

- Decontamination area construction

- Clearing and grubbing the area

- High voltage and telephone line excavation

- Soil excavation and loading for transport

- Covering excavation at end of each work period

- Air monitoring during soil/debris removal for future use

- Haul excavated soil and generated waste to disposal site

-sequence of construction activities -cont.-

- Post-excavation confirmatory sampling

- Utility pole replacement

- Common fill placement
  - Load and transport borrow material
  - Fill placement and compaction
  - Dust control
  - Geotechnical testing
  - Final grading

- Seeding of graded areas and reestablishment of vegetation

The above listed activities will overlap in time to provide for an efficient task duration schedule. However, the majority of these activities are weather dependent and, thus, the duration of these activities will be governed by weather conditions. The proposed construction schedule is presented as Figure 3 and is discussed in Section 5.

3.2.1 Surveying

This section details the surveying requirements associated with soil and debris removal activities and common fill placement. The work to be conducted during this activity involves the following:

- Establishing ground control monuments on site
- Establishing the defined removal action areas
- Determining the confirmatory sample locations
- Determining final excavation limits
- Performing finish grade survey

3.2.2 Clearing and Grubbing

PWC-NORVA will remove from the site and properly dispose of only vegetation that impedes or interferes with the safe and effective implementation of the tasks and requirements of the site work. This vegetation will include, but not limited to, trees, weed growth, brush, logs, roots and leaves, as well as other debris.

3.2.3 High Voltage Wire Exposure

PWC-NORVA with assistance from the high voltage work crew at Little Creek Naval Amphibious Base with uncover and expose the high voltage line that runs from the utility pole south towards the campground to allow excavation to commence without delay.

3.2.4 Telephone Wire Exposure

PWC-NORVA will uncover and expose two telephone lines that run west to east on either side of the utility pole at a distance of five feet from the pole. This will allow excavation work to be facilitated without any delays.

3.2.5 Soil Excavation

PWC-NORVA will notify the base representative 48 hours prior to start of excavation activities. Abticipated excavation activities are to begin around the middle of July and be completed no later than the end of July in 1994. The area of excavation is as shown on Drawing A. The excavation will range in depth from a proposed 1 to 2 feet deep. All excavated contaminated soil will be directly loaded into containers for disposal. The containers will be located directly adjacent to the excavated area to allow minimal movement of equipment during the operation. This will continue until proposed excavation limits are met. Confirmatory sampling will then be conducted to prove all soil is removed below the contamination limit.

3.2.6 Decontamination Area Operations

The construction of the decontamination pad is as previously discussed in Section 3.1.2.5. The operations to be performed on the pads are briefly discussed as follows.

Decontamination of vehicles, equipment, and/or debris will be performed manually with a cleaning agent, scrub brushes, spray bottles, and rags. Decontamination procedures are discussed later in Section 4.0.

3.2.7 Field Sampling and Screening

Field sampling and screening will be in accordance with the Sampling and Analysis Plan (SAP), as a separate document.

3.2.8 Backfill and Compaction

Backfill operations will begin as soon as possible after PWC-NORVA receives analytical data from confirmatory sampling that shows the excavation has met the cleanup criteria. Samples of the fill will be obtained for initial classification and density testing to verify satisfactory compliance with the technical specifications. Compaction will be a result of drum rolling and hand tampening.

3.2.8.1 Borrow Area

PWC-NORVA will use fill material from the government borrow area which is located between the Willoughby Bay Housing Area and Interstate 64.

3.2.8.2 Compaction

Fill will be placed in with 12-inch loose lifts and compacted to 85 percent of Standard Proctor Maximum Density for all cohesionless soils. Compaction of fill material; will be performed using a smooth-drum, vibratory roller. In areas that are not accessible to a roller, mechanical hand tampers will be used.

3.2.9 Site Restoration

Compaction Rate?

all areas disturbed by PWC-NORVA will be regraded and reseeded before demobilization is completed. The purpose of this activity is to restore the area to as natural a condition as reasonable, to encourage the growth of the natural flora and to minimize environmental damage during the post construction period.

3.2.9.1 Utility Pole Replacement

Existing contaminated utility pole will be replaced with a new one upon confirmation of soil cleanup. The existing pole will be disposed off site with other contaminated removal action generated waste.

3.2.9.2 Final Grading

Final grading will be performed to match existing grading and also to allow for proper drainage.

3.2.9.3 Seeding

Seed will be applied to match existing vegetation, with water and mulch provided to establish an acceptable stand of grass.

3.3 TRANSPORT AND DISPOSAL OF WASTES

The transportation and disposal of all site related wastes will be performed as discussed in the following sections.

3.3.1 Disposal of Soils and/or Debris

Soils and/or debris generated on this site will be disposed of at a TSCA approved landfill by the disposal contractor (see appendicees). The proposed disposal facility is: Advanced Environmental Technology Corporation, 5651 South Laburnham Ave., Richmond, VA 23231. The PWC-NORVA transportation and disposal contractor will complete all waste profiles and send them, along with representative sample and analytical data, to the disposal facility for their approval prior to beginning the excavation activities. The wastestream will contain all protective equipment and other site generated debris collected during the course of the project. Removal of wastes will occur only at completion of the excavation activities.

3.3.2 Transportation of Soils and/or Debris

PWC-NORVA will utilize dump trailers provided by the disposal contractor for shipping soil/debris waste to the selected landfill. PWC-NORVA will inspect each vehicle as it enters the site to ensure there are no holes or damage to the trailer bed, and will also check that all necessary permits are with the vehicle. Once loaded, PWC-NORVA will decontaminate each truck prior to it being allowed to leave the site. Uniform hazardous waste or TSCA manifests will accompany each vehicle as appropriatte. Non-hazardous shipments will be marked as such. All manifests and certifications will be completed prior to trucks being mobilized to the site. Copies of all manifests and certifications will be provided to the NAB Little Creek Environmental Quality Division. A copy of the disposal contractors Hazordous Waste Transporters Permit is included as an appendix. The disposal contract is also included as an appendix. MANIFESTS TO BE SIGNED BY ?

3.4 DEMOBILIZATION AND MAINTENANCE

PWC-NORVA will demobilize labor, equipment, and materials from the site upon completion of work activities and after having met the project objectives. Demobilization will occur in stages as various work activities are completed. Demobilization will include those activities discussed below.

3.4.1 Decontaminate Site Equipment

Site equipment will be decontaminated per the decontamination procedures of Section 4.0. After all equipment is decontaminated, the decontamination facilities will be dismantled and disposed of.

3.4.2 Site Cleanup

Utilities will be disconnected as they are no longer needed. The site supervisor will verify the site is clean and restored to an acceptable level before demobilizing the remaining site resources.

3.4.3 Demobilize Resources

All equipment will be inspected for proper decontamination prior to leaving the site. All left over materials will be removed from the site including all personnel.

3.4.4 Maintenance Program

Maintenance of the site will be provided for after acceptance of the work by the base. The following items will be performed during the maintenance period:

- Inspect the excavated areas for settling and erosion
- Repair settlement and erosion as needed

Inspections of the site will be performed and any noted deficiencies will be satisfactorily corrected. The exact equipment and materials dispatched for any single maintenance incident will vary with the required task and the severity of the damage to be repaired. Similarly, the size and skills of the crew that is dispatched will depend on the nature and extent of the required repairs. The minimum crew size is set at two persons for safety reasons.

3.5 FINAL REPORT

A final engineering report will be written and finalized after project completion. The complete final engineering report will contain the following items:

- Introduction
- Summary of Action
- Final Health and Safety Report
- Summary of Chemical and Geotechnical Testing
- Offsite Disposition of Materials
- Quality Control Summary Report
- Final Field Survey Drawing

3.6 FIELD PROCEDURES

3.6.1 Environmental Condition Report

Prior to beginning the site work, PWC-NORVA's Project Engineer and Site Supervisor along with the Base Representative will perform a survey of the project site. PWC-NORVA will take photographs, where possible, showing current environmental conditions in and adjacent to the site. The survey will define the areas of concern. Trees and vegetation to be removed/replaced will be specified. A report detailing discussions of the survey will be prepared.

3.6.2 Daily Safety Meeting

PWC-NORVA Site Supervisor will hold a daily tailgate safety meeting to advise the workers of proper methods of performing the work planned for the day. Everyone present will sign a sheet to be kept as a record of the meeting.

3.6.3 Status Reports

The PWC-NORVA Project Engineer, with assistance from the Site Supervisor and Planner/Estimator, will prepare weekly status reports for the current condition of the project. The status reports may include technical progress, cost, modifications schedule, materials, and wastes.

3.6.4 Daily Report/Quality Control Report

PWC-NORVA will prepare and submit on a daily basis (every day that work is performed) the Daily Report. A copy will be maintained at the site. The Daily Report will include a record of all work activities.

3.6.5 Test Results Summary Report

PWC-NORVA will prepare a summary report of all field tests performed, their results, and the reasons for the sampling.

3.7 PERMIT REQUIREMENTS

PWC-NORVA will obtain the permits necessary to perform work activities. For on-site work, an excavation permit (station permit) will be obtained from the Public Works Officer, Utilities Division. PWC-NORVA will also contact the proper officials as necessary to verify the location of any underground utility lines to ensure that it safe to excavate.

For off-site transportation and disposal of waste materials, PWC-NORVA will utilize a disposal contractor whom holds all required permits and certifications. All vehicles hauling waste will carry the proper waste manifests and placards required by the U.S. Department of Transportation.

4.0 PROCEDURES FOR DECONTAMINATION

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when leaving the work site, either at the end of the day, during scheduled breaks, and/or upon completion of the project.

4.1 PERSONNEL DECONTAMINATION

Decontamination procedures will ensure that material which workers may have contacted does not result in personal exposure and is not spread to clean areas outside the site. This sequence describes the general decontamination procedure. The specific stages will vary depending on the site, the task, the protection level, etc.

- Go to end of the Hot Zone and Drop tools
- Cross into the Warm Zone
- Remove rubber booties and place to side for decontamination
- Remove Saranex Tyvek suit and discard
- Remove sample gloves and discard
- Remove and wash respirator
- Rinse respirator and hang to dry
- Remove Tyvek shoe covers and discard
- Remove sample gloves and discard
- Wash hands, arms, neck, and face
- Cross into the Cold Zone
- Perform basic medical surveillance

4.1.1 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use an emergency shower. Following a thorough drenching, the worker will proceed to the decontamination area. There, the worker will remove clothing, shower, don clean clothing, and immediately be taken to a first aid station.

4.1.2 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash their hands, arms, neck, and face after performing proper decontamination procedures.

4.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be decontaminated before leaving the site. Decontamination procedures will include sweeping, wiping, scraping, hosing, steaming, washing, and rinsing of the equipment. Personnel performing this task will wear proper personal protective equipment.

4.3 DISPOSAL

All liquids and disposable clothing will be treated as contaminated waste and disposed of properly.

5.0 CONSTRUCTION

5.1 DESCRIPTION

PWC-NORVA has prepared a construction schedule for the proposed removal action at Site 16, Little Creek Naval Amphibious Base. The schedule is presented as Figure 3. The schedule begins with the notice to proceed and ends with the final report. The schedule was developed to ensure the major removal activities would be performed at the appropriate time. The schedule includes lead times for procuring and mobilizing the resources necessary to complete the total scope of the removal action. The assumptions of the schedule are presented in the following section.

5.2 ASSUMPTIONS AND REQUIREMENTS

The construction schedule presented in Figure 3 is based on the following assumptions:

- The work schedule is 8 hours per day, 5 day per week.
- The time frames for each activity is an experienced estimate.

TABLES

Table 2-1 - MANPOWER REQUIREMENTS			
Activity	**Equipment**	**Crew**	**Subcontractor**
Pre-Planning	--	Project Engineer Planner/Estimator Site Supervisor Lab Technician	--
Mobilize Resources	Rig Low Boy Trailer Pickup Truck	Project Engineer Site Supervisor 2-Operators 4-Laborers	--

Table 2-1 - MANPOWER REQUIREMENTS			
Activity	**Equipment**	**Crew**	**Subcontractor**
Site Preparation	Pickup Truck Backhoe Forklift Electrical Hook-up Water Hook-up Trailer Tool Boxes Hand Tools Wheel Barrow Power Tools Port-a-Potty	Project Engineer Site Supervisor 2-Operators 1-Electrician 2-Laborers 1-Plumber	--
Construct Decontamination Area	Hand Tools Power Tools	Project Engineer Site Supervisor 1-Carpenter 2-Laborers	--
Establish Survey Control	--	Project Engineer Site Supervisor	Surveyor
Remove Existing Fencing	--	Project Engineer Site Supervisor 2-Laborers	

Table 2-1 - MANPOWER REQUIREMENTS			
Activity	**Equipment**	**Crew**	**Subcontractor**
Install Silt and Boundary Fencing	Hand Tools Power Tools	Project Engineer Site Supervisor 2-Laborers	--
Uncover High Voltage Lines	Hand Tools Wheel Barrow	Project Engineer Site Supervisor High Voltage Crew	--
Uncover Telephone Lines	Hand Tools Wheel Barrow	Project Engineer Site Supervisor 4-Laborers	--
Excavate Site	Backhoe Forklift Hand Tools Wheel Barrow	Project Engineer Site Supervisor 2-Operators 4-Laborers	--
Confirmation Sampling and Analysis	--	Project Engineer Lab Technician	Laboratory
Partial Backfill	Backhoe Dump Truck Wheel Barrow Hand Tools	Project Engineer Site Supervisor 2-Operators 4-Laborers	--

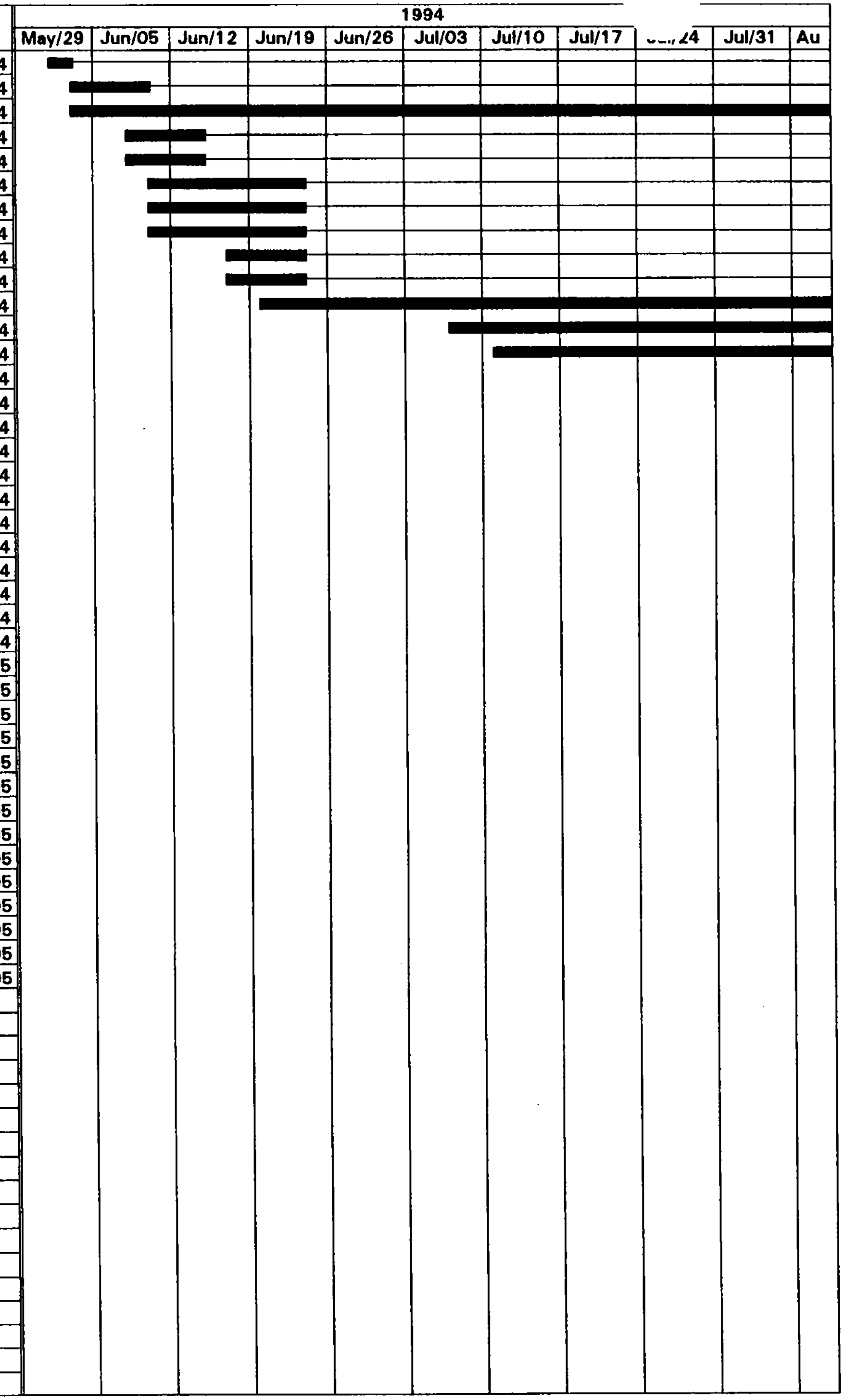
Table 2-1 - MANPOWER REQUIREMENTS			
Activity	**Equipment**	**Crew**	**Subcontractor**
Replace Utility Pole	Pole Puller Installation Crew Service Transfer Crew	Project Engineer Site Supervisor 2-Operators 4-Laborers	--
Transport and Dispose of Wastes	--	Project Engineer Site Supervisor	Disposal Contractor
Decontaminate Equipment	Water Hook-up	Project Engineer Site Supervisor 2-Laborers	--
Backfill	Backhoe Dump Truck Wheel Barrow Hand Tools	Project Engineer Site Supervisor 2-Operators 4-Laborers	--
Grading	Backhoe Wheel Barrow Hand Tools Roller	Project Engineer Site Supervisor 2-Operators 4-Laborers	--
Seeding	Hand Tools Spreader	Project Engineer Site Supervisor 4-Laborers	--

Table 2-1 - MANPOWER REQUIREMENTS			
Activity	**Equipment**	**Crew**	**Subcontractor**
Demobilize Resources	Rig Low Boy Trailer Pickup Truck	Project Engineer Site Supervisor 2-Operators 4-Laborers	--
Site Cleanup	Pickup Truck Hand Tools	Project Engineer Site Supervisor 4-Laborers	--
Final Report and Closeout	--	Project Engineer Site Supervisor Planner/Estimator Lab Technician	--

FIGURES

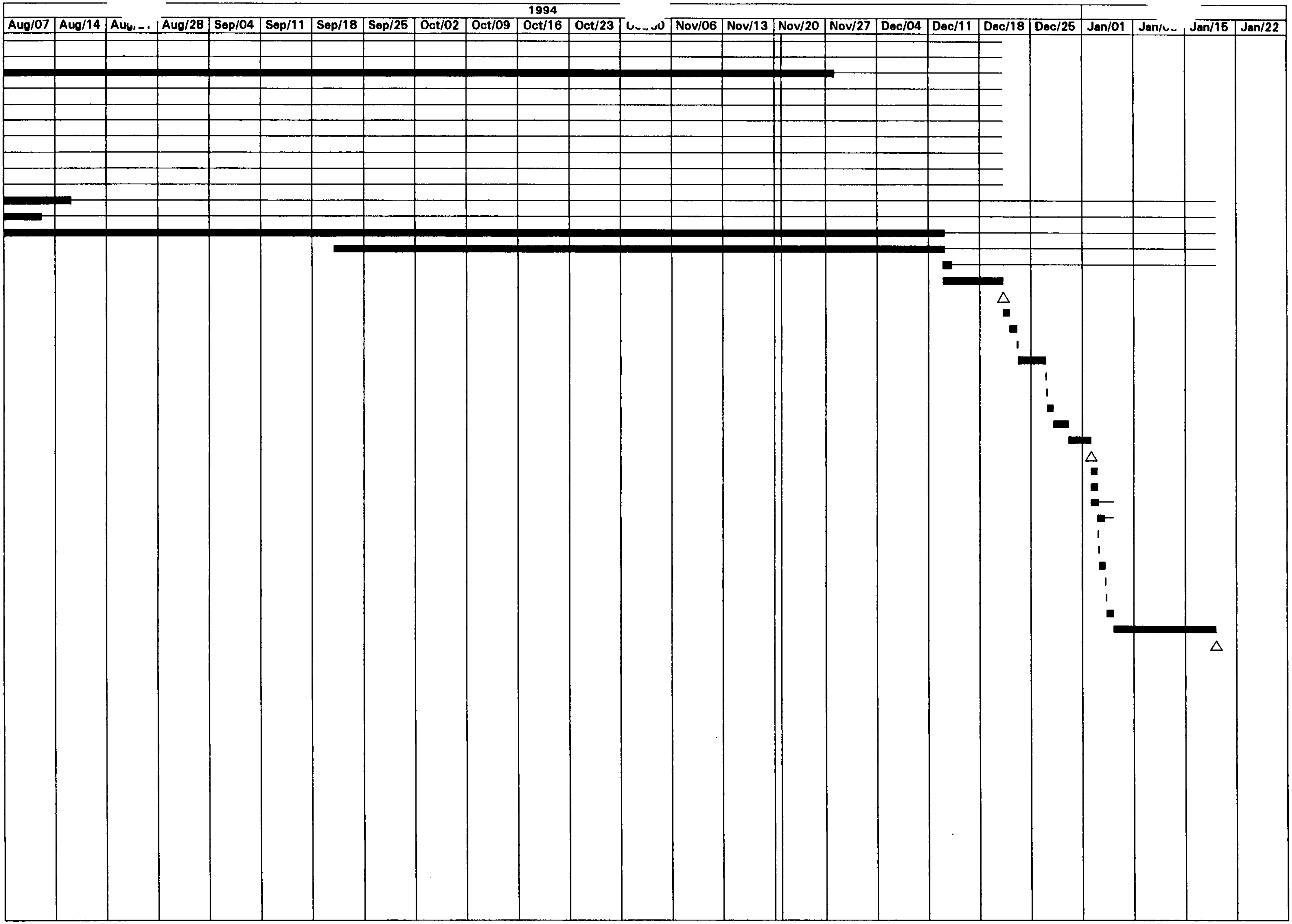
PCB SOIL REMOV ACTION - SITE 16

Row #	Task N	Responsibl	Resources	Effort (Days)	Duration (Days)	St.	End
1	Schedule	Steve	Steve*	3.67	3.00	Jun/01/94	Jun/03/94
2	Submittal Register	JP	JP*^	7.67	6.00	Jun/03/94	Jun/10/94
3	Award Disposal Contract	JP	JP*^	169.00	127.00	Jun/03/94	Nov/28/94
4	ENV Conditions Rpt	JP	JP*^	7.67	6.00	Jun/08/94	Jun/15/94
5	Work Plan	JP	JP*^	7.67	6.00	Jun/08/94	Jun/15/94
6	ENV Protection Plan	Craig	Craig*	14.33	11.00	Jun/10/94	Jun/24/94
7	Site Health/Safety Plan	Audrey	Audrey*	14.33	11.00	Jun/10/94	Jun/24/94
8	Quality Control Plan	Pete	Pete*	14.33	11.00	Jun/10/94	Jun/24/94
9	Lab Qualifications	John	John*	7.67	6.00	Jun/17/94	Jun/24/94
10	Sampling/Analysis Plan	JP	JP*^	7.67	6.00	Jun/17/94	Jun/24/94
11	Crct Msrs Plan	Lantdiv	Lantdiv*^	42.00	42.00	Jun/20/94	Aug/16/94
12	Material Procurement	Planner	Planner*	27.00	27.00	Jul/07/94	Aug/12/94
13	Submtl Review	Lantdiv	Lantdiv*^	112.00	112.00	Jul/11/94	Dec/13/94
14	Dioxin Issue	Lantdiv	Lantdiv*^	60.00	60.00	Sep/21/94	Dec/13/94
15	Precon Meeting	JP	JP*^	2.33	2.00	Dec/13/94	Dec/14/94
16	Excavation Permits	JP	JP*^	9.00	7.00	Dec/13/94	Dec/21/94
17	Notice to Proceed	Scott Park	Scott Park*	0.00	0.00	Dec/21/94	Dec/21/94
18	Mobilize	Smitty	Smitty*, W 1, W 2, W 3	2.67	0.33	Dec/21/94	Dec/22/94
19	Establish Survey Control	JP	JP*, Surveyor	2.67	1.17	Dec/22/94	Dec/23/94
20	Site Preparation	Smitty	W 4, W 5, W 6, Smitty*	2.67	0.50	Dec/23/94	Dec/23/94
21	Construct Decon Area	Smitty	Smitty*, W 4, W 5, W 6	6.67	1.17	Dec/23/94	Dec/27/94
22	Remove Fencing	Smitty	Smitty*, W 1, W 2	1.33	0.45	Dec/27/94	Dec/27/94
23	Expose High Voltage Lines	Little Creek	Little Creek*, LC Elec 1, LC El	1.33	0.38	Dec/27/94	Dec/27/94
24	Expose Telephone Lines	Little Creek	Little Creek*, LC Elec 1, LC El	1.33	0.40	Dec/27/94	Dec/28/94
25	Excavate Site	Smitty	Smitty*, W 1, W 6, W 2, W	20.00	2.20	Dec/28/94	Dec/30/94
26	Confirmation Sampling	JP	JP*, Lab Tech	2.67	1.17	Dec/30/94	Jan/02/95
27	Confirmation Approval	Scott Park	Scott Park*	0.00	0.00	Jan/02/95	Jan/02/95
28	Replace Utility Pole	Little Creek	Little Creek*, LC Elec 1, LC El	1.33	0.33	Jan/02/95	Jan/03/95
29	Decon Equipment	Smitty	Smitty*, W 3, W 4, W 5	4.00	0.67	Jan/02/95	Jan/03/95
30	Transport Soil/Waste	JP	JP*^	1.33	1.00	Jan/02/95	Jan/03/95
31	As Built Records	JP	JP*^	1.33	1.00	Jan/03/95	Jan/04/95
32	Backfill Site	Smitty	Smitty*, W 1, W 2, W 3	1.33	0.33	Jan/03/95	Jan/03/95
33	Grade Site	Smitty	Smitty*, W 1, W 2	1.33	0.23	Jan/03/95	Jan/03/95
34	Seed Site	Smitty	Smitty*, W 1, W 2	1.33	0.33	Jan/03/95	Jan/04/95
35	Demobilize	Smitty	Smitty*, W 1, W 2, W 3, W	2.67	0.53	Jan/04/95	Jan/04/95
36	Final Site Cleanup	Smitty	Smitty*, W 1, W 2, W 3	1.33	0.13	Jan/04/95	Jan/04/95
37	Status Reports	JP	JP*, Smitty, Pete	3.33	0.98	Jan/04/95	Jan/05/95
38	Prepare Final Report	JP	JP*, Pete	26.67	10.00	Jan/05/95	Jan/19/95
39	Project Complete	JP	JP*	0.00	0.00	Jan/19/95	Jan/19/95



Milestone △ Summary
Fixed Delay Slack

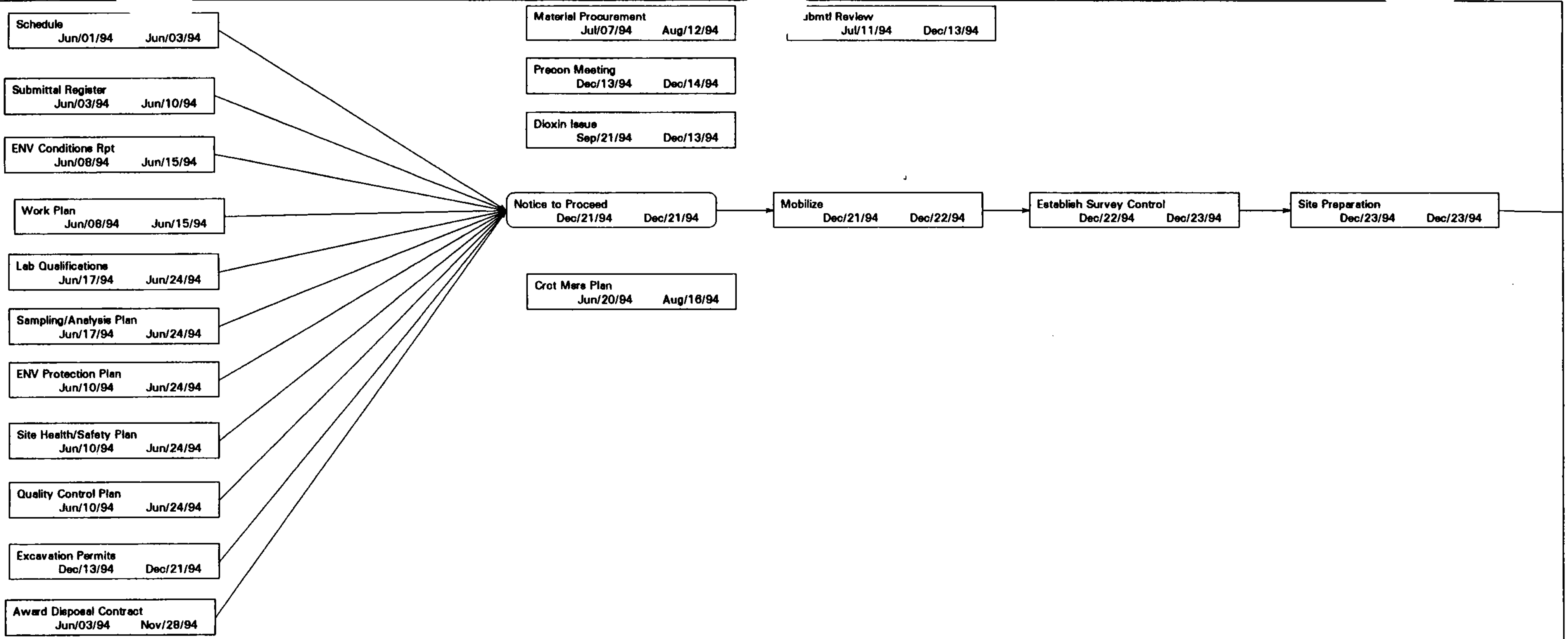
PCB SOIL REMOV ACTION - SITE 16



Milestone △ Summary
Fixed Delay Slack

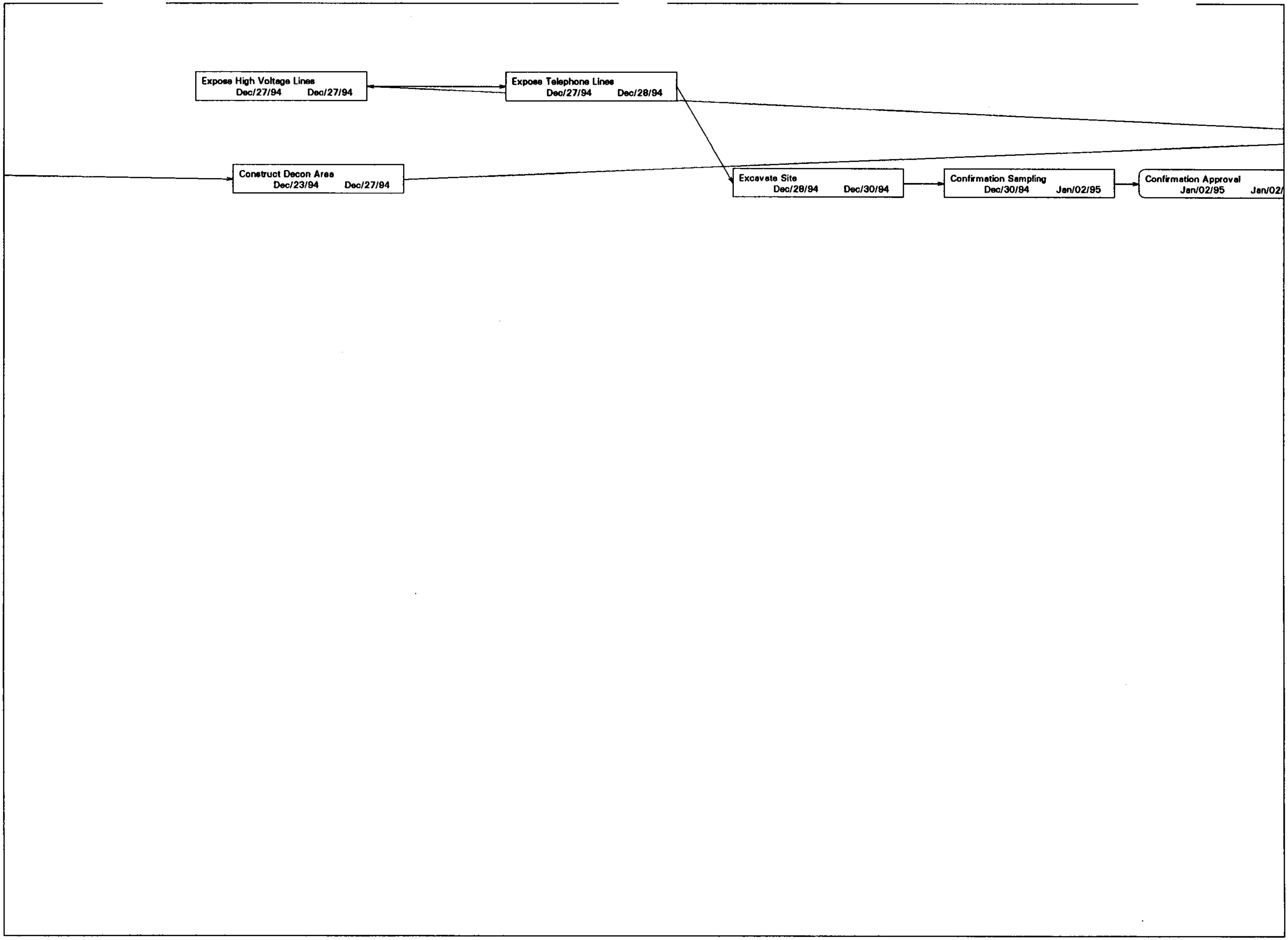
Printed: Nov/21/94
Page 2

PCB SOIL REMOV ACTION - SITE 16



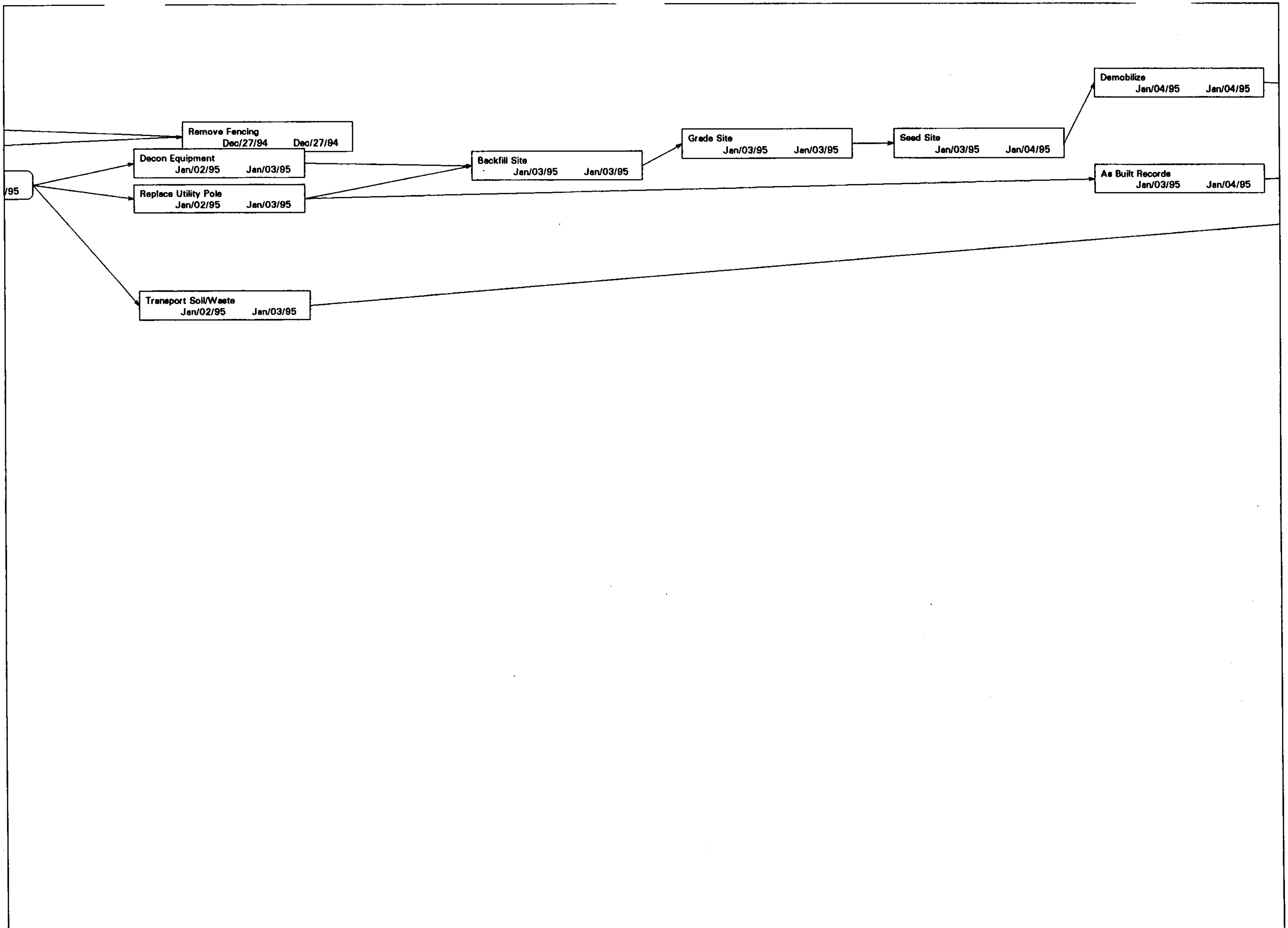
Milestone Summary

PCB SOIL REMOV ACTION - SITE 16

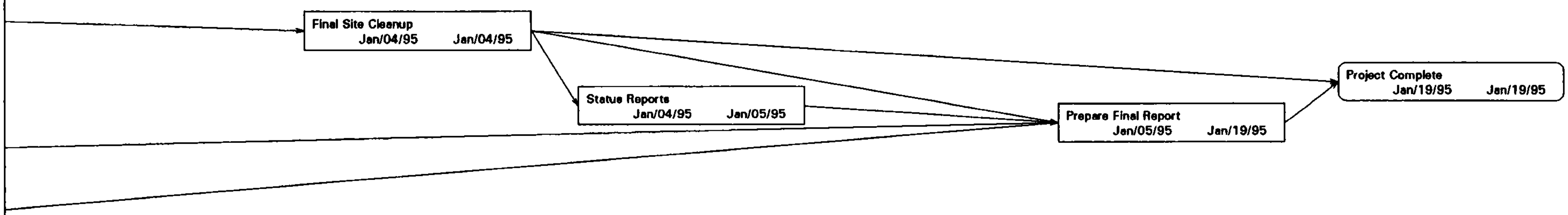


Milestone Summary

PCB SOIL REMOV ACTION - SITE 16



Milestone Summary

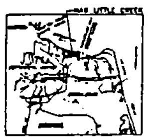


Milestone Summary

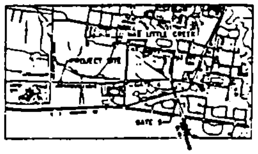
APPENDIX A

"DRAWINGS"

SITE OPERATION PLAN
PCB SOIL REMOVAL ACTION SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA



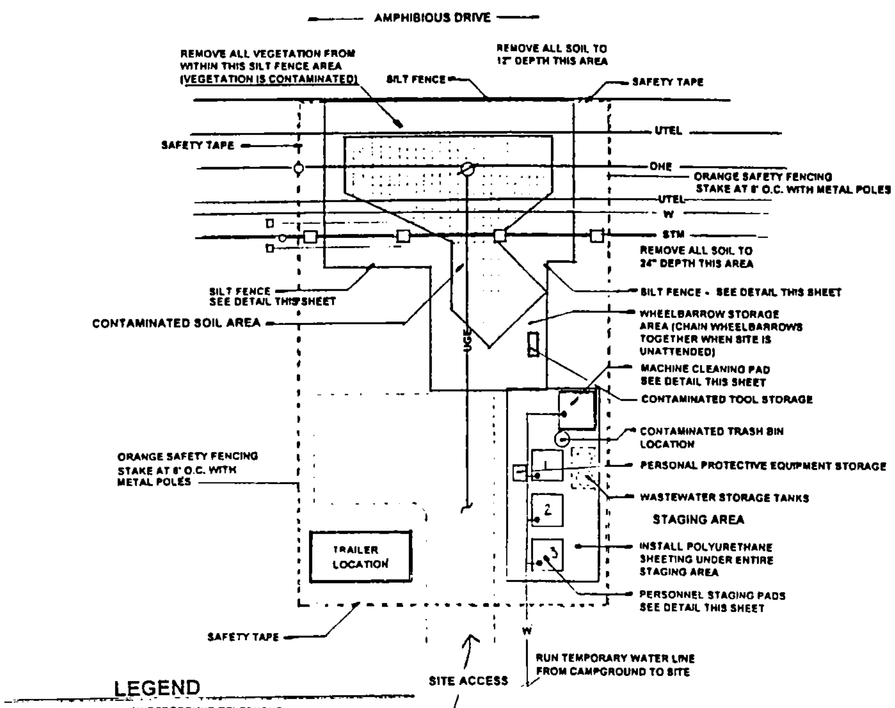
VICINITY MAP
NTS



LOCATION MAP
NTS

PERSONNEL STORAGE PAD NOTES

PAD #	NOTE
1	PAD 1 TO HAVE CLOTHES HOOKS, WATER SUPPLY, AND TARP TO COVER HANGING BOARD
2	PAD 2 TO HAVE WATER SUPPLY. THIS PAD ONLY HAS 4'X4' BASE. NO HANGING BOARD REQUIRED
3	PAD 3 TO HAVE WATER SUPPLY AND DECONTAMINATION SOLUTION BASIN. THIS PAD ONLY HAS 4'X4' BASE. NO HANGING BOARD REQUIRED

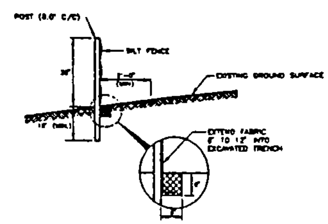


LEGEND

UTEL	UNDERGROUND TELEPHONE
OHE	OVERHEAD ELECTRIC LINE
W	WATER
STM	ABOVEGROUND STEAM
	12" SOIL DEPTH REMOVAL ZONE
	24" SOIL DEPTH REMOVAL ZONE
UGE	UNDERGROUND ELECTRIC LINE
W	SPRAY NOZZLE

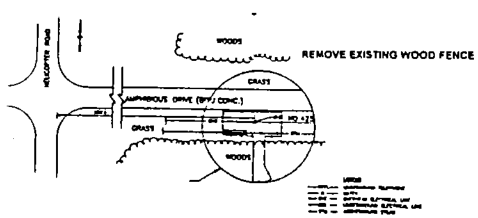
SITE PLAN
1"=10'

NOTE: LOCATIONS SHOWN ARE APPROXIMATE EXACT LOCATIONS OF SILT FENCE, SAFETY TAPE SAFETY FENCE, TRAILER, PPE STORAGE, ETC... WILL BE DETERMINED ON SITE.

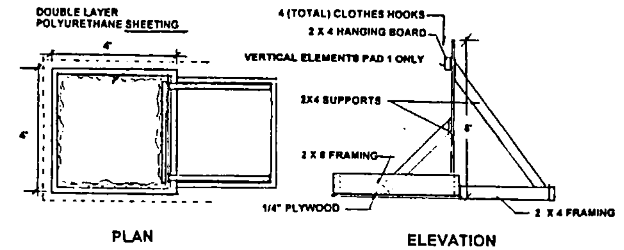


DETAIL 1 SILT FENCE INSTALLATION
N.T.S.

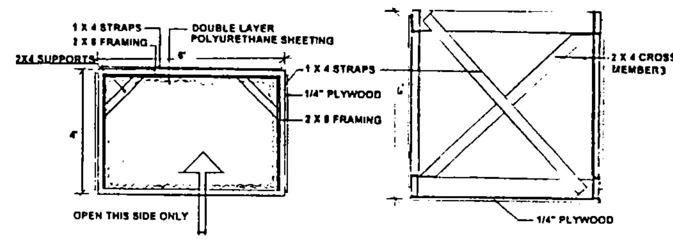
NOTES:
1. TAKE ALL SLACK OUT OF FABRIC BEFORE ATTACHING TO STAKES
2. FENCE TO BE PLACED AS SHOWN ON THE PLANS OR AS OTHERWISE DIRECTED BY THE SITE SUPERVISOR.
3. SILT FENCE WILL BE REMOVED AFTER SEEDING HAS ACHIEVED ADEQUATE GROWTH TO PREVENT EROSION AS OTHERWISE DIRECTED BY THE SITE SUPERVISOR



SITE PREPARATION PLAN
NTS



PERSONNEL STAGING PAD - TYPICAL
1/2"=1'-0"



MACHINE CLEANING PAD
1/2"=1'-0'

SITE OPERATION PLAN PA-1

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
NAVY PUBLIC WORKS CENTER
NAVAL STATION NORFOLK, VIRGINIA

JOB ORDER NO 1324041

SITE OPERATION PLAN
PCB SOIL REMOVAL ACTION SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA

SIZE	CODE IDENT NO	NAVFAC DRAWING NO	PWC DRAWING NO
D	80091	4282728	15028

CONSTR CONTR NO N62470-93-B-3122
SCALE GRAPHIC
SHEET 1 OF 1

APPENDIX B

"PROJECT SPECIFICATIONS"

DEPARTMENT OF THE NAVY

ATLANTIC DIVISION, NAVAL FACILITIES ENGINEERING COMMAND

NAVAL STATION, NORFOLK, VIRGINIA

N62470-93-B-3122

NAVFAC
SPECIFICATION
No. 05-93-3122

Appropriation: DERA

PCB SOIL REMOVAL ACTION, SITE 16

AT THE

NAVAL AMPHIBIOUS BASE
LITTLE CREEK
NORFOLK, VIRGINIA

DESIGN BY:

Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, Virginia, 23511-2699

SPECIFICATION PREPARED BY:

Civil: E. J. Gallaher IV, P.E., Date: 25 January 1994

SPECIFICATION APPROVED BY:

Specification Branch Head: M. D. Mutter, P.E. MDM
Engineering and Design Division Director: W. H. Crone, P.E.
Environmental Quality Division Director: W. H. Russell, P. E.
For EFD for Commander, NAVFAC:
Date: 9 March 1994

CONTENTS

DIVISION
1. General Requirements
SECTION
01010 General Paragraphs
2. Site Work
SECTION
02050 Demolition and Removal
02220 General Excavation, Filling, and Backfilling
02223 Transportation and Disposal of Contaminated Material

DIVISIONS 03 THRU 16 NOT USED

SECTION 01010

GENERAL PARAGRAPHS

PART 1 GENERAL

1.1 **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to by the basic designation only.

ARMY CORPS OF ENGINEERS

COE EM 385-1-1	1992 Safety and Health Requirements Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	1989 Safeguarding Construction,

1.2 **PRECONSTRUCTION SUBMITTALS**

Submit the following in accordance with Section C of the Basic Contract.

1.2.1 SD-18, Records

a. Work Plan G

1.2.1.1 Work Plan

Within 45 days of issuance of the delivery order, submit a work plan consisting of the following elements.

a. Narrative

Provide a brief description of the project objectives, scheduling, sampling and analysis requirements, decontamination procedures, removal and excavation procedures, and storage, transportation, and removal requirements.

b. Technical Specifications

Provide, in an amendment format, any additions and modifications to the contract specifications required to accurately describe the materials and work procedures envisioned to satisfy the requirements of the delivery order. Contact Code 406, Specifications Branch, Engineering & Design Division, LANTNAVFACENGCOM, (804) 444-9906, for availability of guide specification sections for those sections required, but not included in the contract documents.

c. Shop Drawings

Shop drawings shall detail and describe all components of the project not currently indicated on the contract drawings such that the shop drawings and the contract drawings, when taken together, provide a complete representation of the project requirements. Shop drawings shall include an erosion control plan in accordance with State and local regulations, consisting of site plans indicating locations of erosion control features during the various stages of construction, details of erosion control features, and applicable notes. Shop drawings shall indicate proposed methods for supporting steamline support pedestals and power pole during the excavation.

d. Environmental Protection Plan

Within 15 days of issuance of the delivery order, meet with the Navy's Technical Representative (NTR) to discuss environmental protection requirements for the project. After meeting with the NTR, prepare, and submit an environmental protection plan in accordance with Section C, Part 4.0, of the Basic Contract.

e. Site Health and Safety Plan

Provide a site specific Site Health and Safety Plan in accordance with Section C, Part 3.0, of the Basic Contract.

f. QC Plan

Provide a QC Plan in accordance with Section C, Part 6.0, of the Basic Contract.

(1) Submittal Register

As part of the QC Plan, submit a completed Submittal Register to document quality control for materials, inspection, and testing in accordance with Section C, Part 7.0 of the Basic Contract.

(2) Testing Laboratory Qualifications

As part of the QC Plan, submit qualifications for each laboratory which will be used in accordance with Section C, Part 6.0 of the Basic Contract.

g. Sampling and Analysis Plan

Provide a Sampling and Analysis Plan describing all sampling and analyses requirements for the delivery order. The Plan shall contain a field sampling plan and a quality assurance plan.

1.2.2 Forwarding Preconstruction Submittals

Within 45 days of issuance of the delivery order, and before procurement, fabrication, or mobilization, submit to Commander, LANTNAVFACENGCOM, Code 183, 1510 Gilbert Street, Norfolk, Virginia, 23511-2699, and to distribution as directed, the preconstruction submittals required in this specification. The Engineer for this project will review the work plan for the NTR to determine compliance of the Contractor's work plan with the requirements of the contract documents for this delivery order.

1.2.3 Review Comments

Contractor's work plan will be reviewed. The Engineer will compile and coordinate all Government review comments, and forward consolidated review comments to the Contractor. Review comments on the work plan shall be resolved, and submittals modified as required. After the correction of the submittals, submit one corrected final copy of the work plan to Commander, LANTNAVFACENGCOM, Code 183, 1510 Gilbert Street, Norfolk, Virginia, 23511-2699 for final review. The work plan shall be approved prior to commencement of any other work associated with this delivery order.

1.3 **SUBMITTALS**

Submit the following in accordance with Section C of the Basic Contract.

1.3.1 SD-18, Records

a. As Built Records G

b. Environmental Conditions Report

c. Network Analysis Diagram

d. Status Reports

e. QC Meeting Minutes

f. Test Results Summary Report

g. Contractor Production Report

h. QC Report

i. Rework Items List

j. Permits

k. Contractor's Closeout Report

1.3.1.1 As Built Records

Maintain two sets of full size contract drawings and two sets of full size approved shop drawings marked to show any deviations which have occurred, including buried or concealed construction and utility features revealed during the course of construction. Record horizontal and vertical location of buried utilities that differ from the contract drawings. Show the size, manufacturer's name, model number, capacity, and electrical power characteristics of the equipment installed. These drawings shall be available for review by the NTR at any time. At the completion of the work, deliver marked sets of the contract drawings to the NTR. Contractor shall incorporate all shop drawing deviations, and deliver one complete set of reproducible sepias of the shop drawings to the NTR.

1.3.1.2 Environmental Condition Report

Prior to starting work, perform a preconstruction survey with the NTR. Take photos showing existing environmental conditions on and adjacent to the site. Prior to starting work, submit the results of the survey to the NTR.

1.3.1.3 MIS Required Sorts

The MIS system shall be a system able to provide as a minimum the activities in sorts or groups as specified in the Basic Contract and any subsequent Delivery Orders.

a. Network Analysis Diagram

Within 30 days of approval of the Contractor's work plan, submit a network analysis diagram in accordance with the Basic Contract and any subsequent Delivery Orders.

b. Status Reports

All status reports shall comply with the Basic Contract and any subsequent Delivery Orders. Submit a Technical Progress Report, Cost Performance Report, Modification Log, Time-Scaled Logic Diagram, Government Materials Tracking Report, Variance Analysis Report, and Waste Materials Report. Submit the first delivery order status report approximately 30 days after approval of the Contractor's work plan. Thereafter, submit status reports every 30 days. Status report periods shall be consistent with the invoice reporting periods.

1.3.1.4 QC Meeting Minutes

The QC Representative shall document all QC meetings by delivering copies of the minutes to the NTR within 3 calendar days after each QC meeting. The submittals shall comply with Section C, Part 6.0 of the Basic Contract.

1.3.1.5 Test Results Summary Report

A summary report of all field tests containing both "required" and "actual" results plus "passed" or "failed" for conforming, non-conforming and repeated test results shall be submitted to the NTR at the end of each month in accordance with Section C, Part 6.0 of the Basic Contract.

1.3.1.6 Contractor Production Report (CPR)

The CPR shall be prepared and submitted daily to the QC Representative in accordance with Section C, Part 6.0 of the Basic Contract.

1.3.1.7 QC Report

The QC Report shall be submitted by the QC Representative to the NTR every day work is performed, material is delivered, direction is pending, or a labor force is present in accordance with Section C, Part 6.0 of the Basic Contract.

1.3.1.8 Rework Items List

The QC Representative shall deliver a copy of the rework items list to the NTR on a monthly basis in accordance with Section C, Part 6.0 of the Basic Contract.

1.3.1.9 Permits

Fifteen days prior to beginning excavation work, submit draft copies of the following permits required for onsite activities:

a. Excavation Permit; from the Public Works Officer, Utilities Division

1.3.1.10 Contractor's Closeout Report

Submit upon completion of the project. This report shall include: Introduction, Summary of Action, Final Health and Safety Report, Summary of Record Documents, Field Changes and Contract Modifications, Final Documents, Summary of Chemical and Geotechnical Testing, Offsite Disposition of Materials, and QC Summary Report.

1.3.2 Forwarding Submittals

As soon as practicable after award of the contract, and before procurement or fabrication, submit, except as specified otherwise, to Commander, LANTNAVFACENGCOM, Code 04A1, 1510 Gilbert Street, Norfolk, Virginia 23511-2699, the submittals required in this specification. The Engineer for this project will review and provide surveillance for the NTR to determine if Contractor-approved submittals comply with the contract requirements, and will review and approve for the NTR those submittals not permitted to be Contractor approved to determine if submittals comply with the contract requirements. At each "Submittal" paragraph in the individual specification sections, a notation "G", following a submittal item, indicates the NTR is the approving authority for that submittal item. One copy of the transmittal form for submittals shall be forwarded to the Resident Officer in Charge of Construction.

1.4 GENERAL INTENTION

It is the declared and acknowledged intention and meaning to provide and secure a PCB removal action at Site 16, at the Naval Amphibious Base, Little Creek, Norfolk, Virginia, complete and ready for use.

1.5 GENERAL DESCRIPTION

The work includes excavation and disposal of PCB contaminated soils, filling and backfilling, erosion control, site restoration, and incidental related work.

1.6 DESCRIPTION OF CONTAMINANTS PRESENT

Identified contaminants that may exist at the site include PCB contaminated soils as indicated.

1.7 LOCATION

The work shall be located at the Naval Amphibious Base, Little Creek, Norfolk, Virginia, approximately as shown. The exact location will be indicated by the NTR.

1.8 PROJECT INFORMATION

1.8.1 Drawings, Maps and Specifications

Five sets of contract drawings, maps and specifications will be furnished to the Contractor without charge, except applicable publications incorporated into the technical provisions by reference. Additional sets will be furnished on request at no charge. The work shall conform to the following contract drawings and maps, all of which form a part of these specifications and are available in the office of the NTR.

NAVFAC DRAWING NO.	EFD DRAWING NO.	TITLE
4273948	373498	Title, Vicinity, & Location Maps, Plans & Notes

1.8.2 Reference Reports

The following reference reports are available for examination in the office of the NTR and are intended only to show the existing conditions. Report and drawings are the property of the Government and shall not be used for any purpose other than that intended by the specification.

Report

a. "Preliminary Site Investigation Report, Naval Amphibious Base, Little Creek", EBASCO Environmental, July, 1991.

b. "Site Inspection Report, Naval Amphibious Base, Little Creek", Baker Environmental, Inc, November 1993.

1.9 PROJECT SCHEDULE AND TIME CONSTRAINTS

1.9.1 Commencement, Prosecution, and Completion of Work (APR 84)

The Contractor shall be required to (a) commence work under this contract within 10 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 150 calendar days after the required commencement of work. The time stated for completion shall include final cleanup of the premises.

1.10 SAFETY PROGRAM

In addition to safety requirements in the Basic Contract, the Contractor shall implement a safety program conforming to the requirements of Federal, state, and local laws, rules, and regulations as specifically related to contaminated soil removal and treatment operations. The program shall include, but is not limited to, the following:

a. Occupational Safety and Health Standards

b. COE EM 385-1-1

c. NFPA 241

PART 2 PRODUCTS - Not used

PART 3 EXECUTION

3.1 FACILITIES AND SERVICES

3.1.1 Availability of Utilities Services

Government utilities will be made available without charge. The Contractor will be responsible for making connections, providing transformers and meters, and making disconnections; and for providing backflow preventer devices on connections to domestic water lines. Under no circumstances will taps to base fire hydrants be allowed for obtaining domestic water.

3.1.2 Storage in Existing Buildings

Storage in existing buildings will not be allowed.

3.1.2.1 Open Site Storage Site and Location

The open site available for storage shall be confined to the areas indicated by the NTR.

3.1.3 Trailers, Storage, and Temporary Buildings

Locate these where directed. Trailers or storage buildings will be permitted, where space is available subject to the approval of the NTR. The trailers or buildings shall be in good condition, free from visible damage rust and deterioration, and meet all applicable safety requirements. Trailers shall comply with all appropriate state and local vehicle requirements. Failure of the Contractor to maintain the trailers or storage buildings in good condition will be considered sufficient reason to require their removal. A sign not smaller than 24 inches by 24 inches shall be conspicuously placed on the trailer depicting the company name, business phone number, and emergency phone number. Trailers shall be anchored to resist high winds and must meet applicable state or local standards for anchoring mobile trailers.

3.2 RESTRICTIONS ON OPERATIONS

3.2.1 Scheduling

3.2.1.1 General Scheduling Requirements

The Naval Amphibious Base, Little Creek, Norflolk, Virginia, will remain in operation during the entire construction period. The Contractor shall schedule the work as to cause the least amount of interference with station operations. Work schedules shall be subject to the approval of the NTR. Permission to interrupt station roads shall be requested in writing a minimum of 15 calendar days prior to the desired date of interruption. Amphibious Drive is a major thoroughfare for the station and is especially busy during the periods of 0630 to 0800 and 1530 to 1730, Monday through Friday. Contractor shall take necessary precautions to protect workers, pedestrians, and vehicular traffic. Notify the NTR 48 hours prior to starting excavation work.

3.2.1.2 Regular Work Hours

The regular work hours for Naval Amphibious Base, Little Creek, Norfolk, Virginia, are 0700 to 1530, Monday through Friday.

3.2.1.3 Work Outside Regular Hours

If the Contractor desires to carry on work outside regular hours or on Saturdays, Sundays or holidays, the Contractor shall submit an application to the NTR. The Contractor shall allow ample time to enable satisfactory arrangements to be made by the Government for inspecting the work in progress. At night, the Contractor shall light the different parts of the work in an approved manner.

3.2.2 Security Requirements

Contractor shall comply with general security requirements in accordance with Section C of the Basic Contract. No employee or representative of the Contractor will be admitted to the work site without satisfactory proof of United States citizenship or is specifically authorized admittance to the work site by the NTR.

3.2.3 Restrictions on Equipment

3.2.3.1 Radio Transmitter Restrictions

Conform to the restrictions and procedures for the use of transmitting equipment as directed. Do not use transmitters without prior approval.

3.3 ACTIONS REQUIRED OF THE CONTRACTOR

Contractor shall comply with all requirements stated in Section C of the Basic Contract

3.3.1 Station Permits

Permits are required for, but not necessarily limited to, welding, digging, and burning. Allow 7 calendar days for processing of the application. One copy of all applicable permits shall be posted at the job site.

3.4 PUBLIC RELEASE OF INFORMATION

Contractor shall comply with all requirements stipulated in Section C of the Basic Contract.

3.5 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined in Section C of the Basic Contract with additional requirements as follows.

3.6 REQUIRED INSURANCE

Insurance requirements from Section H of the Basic Contract are enforced in their entirety.

-- End of Section --

SECTION 02050

DEMOLITION AND REMOVAL

PART 1 GENERAL

1.1 REFERENCES

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6	1990 Demolition Operations - Safety Requirements

1.2 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the station daily Do not allow accumulations. Store materials that cannot be removed daily in areas specified by the Contracting Officer.

1.3 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," safety requirements shall conform with ANSI A10.6, "Demolition Operations - Safety Requirements."

1.4 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Sweep pavements as often as necessary to control the spread of debris.

1.5 PROTECTION

1.5.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal and excavation work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning such work.

1.5.2 Existing Work

Protect, shore, and support existing utilities and utility supports which are to remain in place, be reused, or remain the property of the Government. Repair items which are to remain and which are damaged during performance of the work to their original condition, or replace with new. Provide new supports and reinforcement for existing construction weakened by demolition, excavation, or removal work. Repairs, reinforcement, or structural replacement must have Contracting Officer approval.

1.5.3 Trees

Do not disturb existing trees adjacent to the project site.

1.5.4 Facilities

Protect electrical and mechanical services and utilities.

1.6 BURNING

Burning will not be permitted.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Power pole and Wood Fence

Remove existing power pole and wood fence completly as indicated. Power pole shall only be removed after the new power pole has been provided and all electrical appliances have been transferred to the new pole. The power pole and the wood fence posts immediately adjacent to or within the limits of the excavation shall be cut off at a point one foot above existing grade. The bottom section of the power pole and the wood fence posts shall be disposed of as PCB-contaminated material in accordance with Section 02223, "Transportation and Disposal of Contaminated Material". The top sections of the power pole and the wood fence posts, and the remainder of the wood fence shall be disposed of as construction debris as specified herein.

3.2 DISPOSITION OF MATERIAL

Except where specified in other sections, all materials and equipment removed, and not reused, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition, is vested in the Contractor upon authorization by the Contracting Officer to begin demolition. The Government will not be responsible for the condition or loss of, or damage to, such property after notice to proceed. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.3 CLEANUP

3.3.1 Debris and Rubbish

Remove and transport debris and rubbish in a manner that will prevent spillage on streets or adjacent areas.

-- End of Section --

SECTION 02220

GENERAL EXCAVATION, FILLING, AND BACKFILLING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 75	1987 Sampling Aggregates
ASTM D 698	1978 (R 1990) Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop
ASTM D 2487	1990 Classification of Soils for Engineering Purposes

FEDERAL SPECIFICATIONS (FS)

FS O-F-241	(Rev. D) Fertilizer, Mixed, Commercial

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 560/5-85-026	1985 Verification of PCB Spill Cleanup by Sampling and Analysis

1.2 DEFINITIONS

1.2.1 Cohesive Materials

Materials ASTM D 2487 classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when the fines have a plasticity index greater than zero.

1.2.2 Cohesionless Materials

Materials ASTM D 2487 classified as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.2.3 Contaminated Soil

Soils having a total Polychlorinated Biphenyl (PCB) concentration greater than 10 mg/kg (ppm) as determined by EPA method 8080 as modified for PCBs.

1.3 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0, of the Basic Contract.

1.3.1 SD-10, Test Reports

a. Certification that borrow material is free of contamination.

1.4 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

Free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and frozen, deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

2.1.1 Common Fill

Approved, unclassified soil material with the characteristics required to compact to the soil density specified for the intended location.

2.1.2 Topsoil

Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

2.2 BORROW MATERIAL

All borrow materials required to accomplish the work under these Contract Documents are subject to the following requirements:

a. The Contractor shall certify that all borrow material is free from contamination. Certification shall be submitted to the Navy's Technical Representative (NTR). The source of all borrow soil materials shall be approved by the Government. Representative samples of borrow soil materials shall not be hazardous by characteristic or specific listing as defined by Resource Conservation Recovery Act (RCRA) or Toxic Substance Control Act (TSCA) regulations. Borrow material shall not be a solid waste requiring special handling as defined in Part VIII of the Virginia Solid Waste Management Regulations. The frequency, type, and number of tests and detection limits for analysis of hazardous constituents shall be proposed by the Contractor for approval by the Government.

b. All tests necessary for the Contractor to locate an acceptable source of borrow material shall be made by the Contractor. Certification that the material conforms to the requirements along with copies of the test results from a qualified commercial testing laboratory shall be submitted to the NTR for approval at least 10 days before the material is required for use. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project. Sampling of the material source shall be done by the Contractor in accordance with ASTM D 75. The Contractor shall notify the NTR at least 24 hours prior to sampling. The NTR may, at the NTR's option, observe the sampling procedures. Acceptance of the material source shall be based on the certified test results submitted by the Contractor. No borrow materials shall be delivered to the site until the proposed source and material tests have been approved.

c. Gradation tests by the Contractor shall be made on samples taken at the place of production prior to shipment. Samples of the finished product for gradation testing shall be taken in accordance with the Contractor's quality control plan or more often as determined by the NTR, if variation in gradation is occurring, or if the material appears to depart from the specifications. The Contractor shall perform any additional tests prescribed by the NTR. Test results shall be forwarded to the NTR within 48 hours after sampling.

d. If tests conducted by the Contractor or the NTR indicate that the material does not meet specification requirements, material placement will be terminated until corrective measures are taken. Material which does not conform to the specification requirements and is placed in the work shall be removed and replaced.

e. Obtain borrow materials required from sources outside of Government property.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

3.1.1 Unsuitable Material

Remove vegetation, debris, decayed vegetable matter, sod, mulch, and rubbish from areas requiring excavation.

3.2 PROTECTION

3.2.1 Underground Obstructions

Location of the existing obstructions indicated is approximate. The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered. Contractor shall contact Miss Utility of Virginia, 800-552-7001, for assistance in located existing underground telephone line.

3.2.2 Site Drainage

Provide for the diversion of surface water encountered during construction.

3.2.2.1 Surface Drainage

So that construction operations progress successfully, completely drain construction site during periods of construction to keep soil materials sufficiently dry. Provide diversions as necessary to keep surface waters out of the excavation.

3.2.2.2 Subsurface Drainage

Dewatering will not be required. Boring logs from projects in the vicinty indicate that groundwater will not be encountered.

3.3 EXCAVATION OF PCB-CONTAMINATED MATERIALS

3.3.1 Existing Conditions

PCB contaminant levels in the indicated excavation area range from undetectable to 2100 ppm.

3.3.2 General Excavation

All excavation of every description, regardless of the type, nature, or condition of material encountered, shall be performed as specified, shown, or required to accomplish the work. Methods and equipment used to remove contaminated soil shall result in minimal disturbance to remaining soil beyond the excavation limits. Remove all contaminated soil from existing underground utility lines and concrete steam line supports exposed by the excavation. Concrete shall be brushed clean with a stiff wire brush. Any materials that become contaminated as a result of the Contractor's operation shall be removed.

3.3.3 Restrictions on Excavation Operations

In order to minmize soil moisture and alleviate the need to contain and treat PCB contaminated water, the Contractor shall comply with the following restrictions and requirements. Contractor will be allowed to commence excavation only when, (1) there has been no measurable precipitation during the previous two days, and (2) the atmospheric forecast calls for a less than 20% chance of precpitation over the next three days. After completion of the initial excavation, and while awaiting laboratory test results, the Contractor shall cover the excavated area with a minimum 10 mil thick polyethylene sheeting to prevent moisture from entering the excavation. Excavation shall remain covered until backfilling operations begin.

3.3.4 Limits of Excavation

a. Once the Contractor has excavated definite areas and depths shown on the drawings, Contractor shall take a representative number of samples as required by EPA 560/5-85-026 to determine if cleanup levels have been reached. Contractor shall field screen samples in accordance with EPA Method 4020. Ten percent of samples shall be analyzed by the Contractor's laboratory in accordance with EPA Method 8080.

b. Supplemental Excavation: Once the NTR has reviewed the results of the Contractor's laboratory soil analysis, the NTR, in conjunction with the Remedial Project Manager (RPM), may require the Contractor to excavate an additional volume of soil. Subsequent soil sampling and laboratory analysis shall follow. For proposal purposes, Contractor shall assume that the initial removal shall affect complete removal of PCB contaminated soil, and that subsequent removal and testing will not be required.

c. Backfilling of excavated areas will begin only after the results of confirmatory sample analysis are received from the offsite laboratory that indicate PCB-contaminant levels of less than or equal to 10 ppm. The Contractor will not begin placing backfill in excavated areas without the approval of the NTR.

3.3.5 Loading of Excavated Materials

Contaminated materials shall be loaded into covered containers or vehicles designed to transport such materials without spillage. Care shall be taken during loading operations to minimize the potential for spillage, tracking, or other means of deposition of contaminated materials outside the work area. Contaminated materials which become spilled on roads, streets, or other areas outside the limits of excavation during the loading operation shall be immediately reported to the NTR, and immediately cleaned up to the satisfaction of the NTR.

3.3.6 Control of Dust

Keep dust down at all times, including during nonworking periods. Sprinkle or treat the soil at the site, haul roads, and other areas disturbed by operations with dust suppressants such as water. Dry brooming will not be permitted.

3.4 FILLING AND BACKFILLING

Fill and backfill to match existing grades. Compact each lift before placing overlaying lift.

3.4.1 Common Fill Placement

Provide for general site. Place in 12-inch lifts. Compact areas not accessible to rollers or compactors with mechanical hand tampers. Aerate material excessively moistened by rain to a satisfactory moisture content. Finish to a smooth surface by blading, rolling with a smooth roller, or both.

3.5 COMPACTION

Expressed as a percentage of maximum density. Determine in-place density of existing subgrade; if required density exists, no compaction of existing subgrade will be required. Density requirements specified herein are for cohesionless materials. When cohesive materials are encountered or used, density requirements may be reduced by 5 percent.

3.5.1 General Site

Compact underneath areas designated for vegetation to 85 percent of ASTM D 698.

3.6 FINISH OPERATIONS

3.6.1 Grading

Finish grades to match existing. Grade areas to drain. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.6.2 Seed

Scarify existing subgrade. Provide 4 inches of topsoil for newly graded finish earth surfaces and areas disturbed by the Contractor. If there is insufficient on-site topsoil meeting specified requirements for topsoil, provide topsoil required in excess of that available. Seed shall match existing vegetation. Provide seed at 5 pounds per 1000 square feet. Provide FS O-F-241, Type I, Class 2, 10-10-10 analysis fertilizer at 25 pounds per 1000 square feet. Provide commercial agricultural limestone of 94-80-14 analysis at 70 pounds per 1000 square feet. Provide mulch and water to establish an acceptable stand of grass.

3.6.3 Protection of Surfaces

Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

-- End of Section---

SECTION 02223

TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following in accordance with Section C, Part 7.0, of the Basic Contract.

1.1.1 SD-08, Statements

a. Treatment facility permit

Verification that the proposed treatment facility is permitted to accept the contaminated materials specified, prior to the start of excavation.

1.1.2 SD-18, Records

a. Shipment manifests
b. Delivery and disposal certificates
c. Disposal Site Decontamination certificate
d. Work Site Decontamination certificate

1.1.2.1 Shipment Manifests

Copies of manifests and other documentation required for shipment of waste materials within 24 hours after removal of waste from the site. All shipment manifests shall be signed by the NTR.

1.1.2.2 Delivery and Disposal Certificates

Verification that the wastes were actually delivered and disposed of at the proposed treatment facility, within 7 days of shipment.

1.1.2.3 Disposal Site Decontamination Certificate

Verification that all vehicles and containers were decontaminated prior to

1.1.2.4 Work Site Decontamination Certificate

Verification that all vehicles and containers were decontaminated prior to leaving the work site, were properly operating, and were covered, within 24 hours after removal of waste from the site.

1.2 DEFINITIONS

1.2.1 Government Generated Waste

Government generated waste shall include all PCB contaminated materials existing at the site prior to commencement of contract work as specified herein.

1.2.2 Contractor Generated Waste

Contractor generated waste shall include all materials which become contaminated with PCB's as a result of Contractor activity at the site after the commencement of contract work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 Materials and Equipment

The Contractor shall furnish all labor, materials, and equipment necessary to transport and dispose of Government and Contractor generated wastes in accordance with applicable federal, state, and local requirements.

3.2 Records

The Contractor shall originate, use, and maintain the waste shipment records/manifests as required by the Resource Conservation and Recovery Act (RCRA) and the U.S. Department of Transportation.

3.3 Transportation

The Contractor shall be solely responsible for complying with all federal, state, and local requirements for transporting petroleum contaminated materials through the applicable jurisdictions and shall bear all responsibility and cost for any noncompliance. In addition to those requirements, the Contractor shall do the following:

a. Inspect and document all vehicles and containers for proper operation and covering.

b. Inspect all vehicles and containers for proper markings, manifest documents, and other requirements of waste shipments.

c. Perform and document decintamination procedures prior to leaving the worksite and again before leaving the disposal site.

3.4 Disposal

All PCB contaminated materials removed from the site shall be disposed of in a Toxic Substance Control Act (TSCA) treatment/disposal facility permitted to accept such materials.

3.5 Method of Measurement

All vehicles transporting PCB contaminated materials removed from the project site shall be weighed at a Virginia Department of Transportation certified weigh scale within 15 miles of the project site.

-- End of Section --

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General Decision Number VA930017

Superseded General Decision No. VA910017

State: Virginia

Construction Type:
Heavy

County(ies):

CHESAPEAKE* SUFFOLK* VIRGINIA BEACH*

*INDEPENDENT CITIES OF CHESAPEAKE, SUFFOLK AND VIRGINIA BEACH

HEAVY CONSTRUCTION PROJECTS (Excluding Sewer and Water Lines)

Modification Number	Publication Date
0	02/19/1993
1	02/19/1993
2	05/07/1993
3	05/28/1993

COUNTY(ies):

CHESAPEAKE*	SUFFOLK*	VIRGINIA BEACH*

ELEC0080D 03/01/1993

	Rates	Fringes
ELECTRICIANS	15.20	2.20+9%+a

a. Workmen shall take off 2 hours with pay, at the discretion of the employer, on State and National Election days; Tuesday following the first Monday in November, provided they are qualified and vote.

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* ENGI0147C 05/01/1993

	Rates	Fringes
POWER EQUIPMENT OPERATORS:		
Crane operators, 90 tons and over	16.47	3.385
Crane operators, under 90 tons	15.47	3.385
Mechanics	16.47	3.385
Backhoes	12.38	3.385
Oilers	9.59	3.385

IRON0079E 05/01/1993

	Rates	Fringes
IRONWORKERS:		
Structural & Reinforcing	16.25	3.85

PLAS0229B 05/01/1993

	Rates	Fringes
CEMENT MASONS	12.60	.80

SUVA2022A 02/20/1992

	Rates	Fringes
CARPENTERS	9.50	
LABORERS:		
Unskilled	5.00	
Landscape	5.03	.78
Pipelayers	6.50	
PILEDRIVERS	9.56	1.13
TRUCK DRIVERS	8.41	.40

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a) 1(ii)).

END OF GENERAL DECISION

APPENDIX C

"Soil Disposal Contract"

DEPARTMENT OF THE NAVY

NAVY PUBLIC WORKS CENTER

NAVAL BASE NORFOLK, NORFOLK, VIRGINIA 23511-3095

NOTICE
Bids to be opened at 2:00 p.m.

NAVFAC
SPECIFICATION
NO. 05-94-8331

IFB Number N62470-94-B-8331
at the office of the
Officer in Charge
Facilities Support Contracts
Navy Public Works Center
9742 Maryland Avenue
Norfolk, Virginia 23511-3095

PCB CONTAMINATED SOIL DISPOSAL

FOR THE NAVY PUBLIC WORKS CENTER, NORFOLK, VIRGINIA

AT

SITE 16, LITTLE CREEK NAVAL AMPHIBIOUS BASE ~~VARIOUS LOCATIONS~~

~~NORFOLK~~ NORFOLK, VIRGINIA

CONTRACT NO. N62470-94-D-8331

NOTICE

All inquiries concerning any phase of this specification, prior to bid opening, shall be made to (collect calls not accepted), the Contracting Officer, Facilities Support Contracts, Navy Public Works Center, 9742 Maryland Avenue, Norfolk, Virginia 23511-3095 (located in Building Z-140, Room 115) telephone (804) 445-4948/444-4117.

Contracts or purchase orders to be awarded as a result of this contract shall be assigned (as appropriate for specific procurement), in accordance with provisions of DPS Regulation 1 and/or DMS Regulation 1.

PART I - THE SCHEDULE

SECTION B: SUPPLIES OR SERVICES AND PRICES/COSTS

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PART 1 - THE SCHEDULE

SECTION C: DESCRIPTION/SPECIFICATION

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C.1 GENERAL

C.1.1 GENERAL REQUIREMENTS

a. The contractor shall provide all labor, supervision, tools, materials, equipment, TESTING, transportation, DOCUMENTATION/CERTIFICATION, and management necessary to provide transportation and disposal of PCB contaminated soil, water and miscellaneous items as listed in the Bid Schedule.

C.1.2 FACILITIES

a. Location. All work is ~~primarily~~ located at the following area.

(1) Naval Amphibious Base, Little Creek, Norfolk, Virginia.

b. Work at other Federal activities within a fifty (50) mile radius of the Contracting Office may be added, in accordance with FAR 52.243-1, by modification, at the discretion of the Contracting Officer.

C.1.3 WORKING HOURS

Regular working hours shall be Monday through Friday, 0715 to 1545 hours, except for federal holidays. In the case of emergencies or for the completion of emergency work initiated during regular working hours, the Contractor will be required to work outside regular working hours.

FEDERAL HOLIDAYS

New Year's Day	January 1
Martin Luther King's Birthday	3rd Monday in January
Washington's Birthday	3rd Monday in February
Memorial Day	Last Monday in May
Independence Day	July 4
Labor Day	1st Monday in September
Columbus Day	2nd Monday in October
Veteran's Day	November 11
Thanksgiving Day	4th Thursday in November
Christmas Day	December 25

C.1.4 CONTRACTOR QUALITY CONTROL

The contractor shall establish and maintain a complete Quality Control program in accordance with "CONTRACTOR QUALITY CONTROL", clause E-4, and the provisions of this clause.

Contractor performed inspections are independent of those performed by the Government. The contractor shall perform his inspections prior to requesting acceptance of the work by the Government.

The Contractor's project manager and his QC inspector shall attend the pre-performance meeting. The QC inspector shall also attend meetings with the Contracting Officer and other

PART 1 - THE SCHEDULE

SECTION B: SUPPLIES OR SERVICES AND PRICE/COSTS

B.1 INDEFINITE QUANTITY LINE ITEM QUANTITIES

The estimated line item amounts for the Indefinite Quantity portion of the contract may be unilaterally increased by the Contracting Officer by one unit or 25%, whichever is greater. The Contractor is not obligated to furnish any additional quantity under a line item beyond 125%. Any quantity greater than the 125% of the original line item may be ordered at the bid price if the Contractor agrees by signing the delivery order.

ENSURE CONTRACTOR WILL NEGOTIATE.

B.2 CONTRACT SUBLINE ITEMS

a. Bidders shall enter unit prices and amounts for contract line items and subline items as indicated in the schedules.

b. In the event there is a difference between a unit price and the extended total amount, the unit price will be held to be the intended bid and the total of the subline items will be recomputed accordingly. The line item which includes this subline item will also be recomputed to take into account the change in the subline item. If the bidder provides a total amount for a contract item but fails to enter the unit price, the total amount divided by the specified quantity will be held to be the intended unit price.

c. The Schedule of Firm Fixed Price Work and the Schedule of Indefinite Quantity Work will be used as the basis of deductions pursuant to the "CONSEQUENCES OF CONTRACTOR'S FAILURE TO PERFORM REQUIRED SERVICES" clause, Section E.

SCHEDULE OF INDEFINITE QUANTITY WORK

BID SCHEDULE

Item No.	Supplies/Services	Quantity	Unit	Unit Price	Total Amount
0001	INDEFINITE QUANTITY WORK: Price to perform indefinite quantity work in accordance with all the terms of this contract. The price of Contract Line Item 0001 is the sum of Subline Items 0001AA through 0001A~~F~~ H				
FIXED ITEM 0001AA "	"	35	TONS		
0001A~~A~~ B	Transport and Dispose of PCB Contaminated Soil (0-49 ppm) (Clause Number ______________).	~~70~~ 35	Tons	$_____	$__________
0001A~~B~~ C	Tranport and Dispose of PCB Contaminated Soil (50-500 ppm) (Clause Number ______________).	~~40~~ 20	Tons	$_____	$__________
FIXED ITEM 0001AD "	"	20			
0001A~~C~~ E	Transport and Dispose of PCB Contaminated Soil (Greater than 500 ppm) (Clause Number ______________).	~~40~~ 20	Tons	$_____	$__________
0001A~~D~~ F	Transport and Dispose of PCB Contaminated Water. (Clause Number ______________).	5	drums	$_____	$__________
0001A~~E~~ G	Transport and Dispose of PCB Contaminated UTILITY Pole	1800	Lbs.	$_____	$__________
0001A~~F~~ H	Dispose of Miscellaneous PCB Contaminated clothing, tools, plywood, plastic sheeting, etc.	800	Lbs.	$_____	$__________
	TOTAL PRICE FOR CONTRACT LINE ITEM 0001. (Contract Subline Items 0001AA through 0001A~~F~~ H)	XXXX	XXX	XXXX	$__________

NOTICE TO BIDDERS: "PROCEDURES FOR ISSUING ORDERS" (AUG 1991)(FAC 5252.216-9306) clause, Section G, and "MAXIMUM QUANTITIES (APR 1992) (FAC 5252.216-9313) clause, Section H.

END OF SECTION

Government personnel to resolve quality considerations and problems that may arise in the course of the work.

C.1.5 GOVERNMENT QUALITY ASSURANCE

The Government reserves the right to establish and maintain a Quality Assurance program in accordance with "Government Quality Assurance", clause E-5, and the provisions of this clause.

C.2 DEFINITIONS - TECHNICAL

a. Delivery Order. A delivery order is a document (DD Form 1155) prepared by the Contracting Officer that is issued to the contractor and unilaterally orders work to be performed. Delivery orders will be issued as necessary and may be amended. A sample delivery order is shown in Attachment J-G1.

b. Government Furnished Property (GFP). Government Furnished Property (GFP) includes all property in the possession of, or directly acquired by, the Government and subsequently made available to the Contractor.

c. Property Administrator. The Property Administrator is an authorized representative of the Contracting Officer assigned to administer the contract requirements and obligations relating to Government property.

EPA	Environmental Protection Agency
DOT	Department of Transportation
OSHA	Occupational Safety and Health Act
RCRA	Resource Conservation and Recovery Act
TSCA	Toxic Substance Control Act
VHWMA	Virginia Hazardous Waste Management Act
VSWMR	Virginia Solid Waste Management Regulations

C.3 CONTRACTOR FURNISHED ITEMS

TESTING AND DOCUMENTATION/

The contractor shall furnish all labor, facilities, equipment, materials, parts, supplies ~~and~~ tools, CERTIFICATION necessary for the performance of the work of this contract unless otherwise specified.

a. Items of equipment necessary to perform work as required or ordered under this contract shall be furnished, maintained and operated by the contractor. The items of equipment include open top roll-off containers (AS NEEDED) with a minimum capacity of 15 cubic yards, along with a vehicle(s) capable of moving ~~or~~ AND hauling the containers. AS REQUESTED BY THE GOVERNMENT.

C.4 TECHNICAL SPECIFICATIONS.

C.4.1 GENERAL. Work performed under this contract shall be performed in accordance with these specifications and the specifications shown in Attachment J-C 2.

C.4.1.1 TRANSPORTATION AND DISPOSAL OF PCB CONTAMINATED SOIL AND MISCELLANEOUS ASSOCIATED WASTE.

The Contractor shall be responsible for providing containers, transportation and disposal of all PCB contaminated waste to include the following items:

a. PCB contaminated soil with test results of ~~< 50 ppm.~~ 0-49 ppm.

b. PCB contaminated soil with test results of ~~> 50 ppm.~~ 50-500 ppm

c. PCB contaminated soil with test results of > 500 ppm.

d. Water contaminated from employee/equipment clean-up / decontamination.

e. PCB contaminated utility pole (50 ft length creosote timber, 18-inch diameter), ~~cut feet length~~ cut to lengths as need

f. PCB contaminated miscellaneous items from job site such as:
   (1) coveralls
   (2) plastic sheeting
   (3) gloves
   (4) goggles, ~~etc.~~
   (5) shovels, picks, wheelbarrows
   (6) wood stumps, roots, etc.

C.5 DETAILED SPECIFICATION

C.5.1 The Contractor shall provide open top roll-off containers at the clean-up site. (See Attachment J-C2).

C.5.1.2 The Contractor shall ~~place~~ unload/load containers and drums in position, to be filled by the Government.

C.5.1.~~2~~3 The Contractor shall provide the correct amount of containers to accomodate the quantity of soil ordered on the ~~bid schedule.~~ delivery order.

C.5.1.~~3~~4 Holding sites for the containers will be designated by the Contracting Officer.

C.5.2 Upon receipt of test results, as performed by the contractor, and notification by the Government, the Contractor shall transport and dispose of the contaminated soil, water, utility poles and miscellaneous materials as indicated on the bid schedule, within 5 working days, and empty

C.5.~~2~~3 The Government will provide the Contractor with the site screen testing results in order to determine disposal method. The Contractor shall provide any additional testing required by the disposal site(s) for ~~each container~~. All disposed material and provide a copy of the results to the Government.

r3 AND DISPOSAL (WITHIN 5 WORKING DAYS) jm

C.5.~~2~~.1 Prior to the removal and disposal (within 5 working days) of contaminated materials from Government property, the Contractor shall submit the following documentation:

a. The site method of disposal

b. Proof of acceptance at an EPA/TSCA approved disposal site.

c. Spill Contingency and Control Plan to include the following:

(1) Provide name and telephone number for a 24 hour emergency coordinator with alternate.

(2) Describe the methods and work practices to be employed to prevent and minimize spills, while performing work for the Government.

(3) Include equipment list, reaction time and documentation of complete spill training.

(4) Describe method of notifying the Government in the event of an accident.

r4

C.5.~~3~~ The Contractor shall dispose of PCB contaminated waste in accordance with all applicable EPA and DOT regulations, (See Attachment J-C3-1).

r4

C.5.~~3~~.1 The Contractor shall supply the Treatment Facility Permit and the Certification of Disposal Site / Method to the Contracting Officer as indicated in Attachment J-C1 and J-C3.

r4

C.5.~~3~~.2 The Contractor shall supply the shipments' manifests, delivery and disposal certification to the Contracting Officer as indicated in Attachemnt J-C1.

C.6 WORK DOCUMENTATION

The principal documentation required by this contract is summarized below. The listing is not all inclusive and additional documentation may be required. Attachment J-C1 provides a list of the required submittals for this contract. THE GOVERNMENT SHALL RECEIVE THEM WITHIN 10 WORKING DAYS AFTER DISPOSAL. jm

(1) Treatment Facility Permit
(2) Certification of Disposal (Site and Method)
(3) Shipment Manifests
(4) Delivery and Disposal Certification
(5) Disposal Site Decontamination Certificate

Performance Evaluations. The Government may, at its discretion, prepare evaluation reports on the contractor's performance. The contractor may be periodically requested to comment on these reports in writing.

END OF SECTION

APPENDIX D

"Soil Disposal Contractor's Permit"

COMMONWEALTH of VIRGINIA

DEPARTMENT OF WASTE MANAGEMENT

WILLIAM L. WOODFIN, JR.
DIRECTOR

(804) 225-2667
TDD (804) 371-8737

FEB 14 1992

Robert Kirk
Director of Field Services
Environmental Restoration Company
2nd and Maury Street
Richmond, VA 23224

Re: Transporter Permit, Envrironmental Restoration Company
VA Haz. Waste Transporter Permit#: VAD0862937190

Dear Mr. Kirk:

Enclosed is your Virginia Hazardous Waste Transporter Permit Number VAD0862937190. Should the name, EPA ID number, or corporate ownership change; the Virginia Department of Waste Management must be notified within thirty (30) days of such change. The transporter permit will then be revised and reissued in accordance with § 7.3.E.2 of the enclosed Virginia Hazardous Waste Management Regulations (VHWMR).

Your enclosed permit expires ten (10) years from the effective date of issue. Reapplication for a new permit must be received thirty (30) days prior to the expiration date of February 13, 2002.

All transporters holding Virginia permits must submit an annual report no later than April 1st of each year. This report covers activities involving hazardous waste which originates or terminates in Virginia. This report must be submitted even if there was no activity. The report is contained in the appendix of Part VII of the VHWMR.

If you have any questions concerning the regulations or permit, please call Tim Torrez of my staff at (804) 371-2977.

Sincerely,

Patrick F. Grover
Permits Supervisor
Division of Operations

COMMONWEALTH of VIRGINIA

DEPARTMENT OF WASTE MANAGEMENT
11th Floor, Monroe Building
101 N. 14th Street
Richmond, VA 23219
(804) 225-2667
TDD (804) 371-8737

HAZARDOUS WASTE TRANSPORTER PERMIT

Environmental Restoration Company is hereby granted permission to operate as a hazardous waste transporter in accordance with the provisions of Section 10-279 of the 1950 Code of Virginia, as amended, and Section 7.3 of the Virginia Hazardous Waste Management Regulations (VHWMR).

The transporter of hazardous wastes must meet all provisions of Part VII of the VHWMR.

The term of the transporter permit shall be ten (10) years from the date of issue, unless terminated earlier in accordance with Section 7.3 of the VHWMR.

Environmental Restoration Company has been assigned the control numbers shown below which must appear on all correspondence related to the transport of hazardous waste, all manifests and all documents related to the reporting of a spill or accident. These numbers may not be transferred without the approval of the Director of the Department of Waste Management.

Hazardous Waste Transporter ID Number: VAD086293719

Virginia Hazardous Waste Transporter Permit Number: VAD0862937190

Date of Issue 2/15/92

William L. Woodfin, Jr.
Director
Department of Waste Management

QUALITY CONTROL PLAN

PCB SOIL REMOVAL ACTION - SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-93-B-3122

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Prepared by:

NAVY Public Works Center
Energy/Environmental
Engineering Branch
Code 414
Norfolk, Virginia

11 October, 1994

FINAL

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1	Quality Control Organizational Chart

1.0 STATEMENT

NAVY Public Works Center - Norfolk, Virginia will provide and maintain an effective Quality Control Program (QCP) as required by contract clauses. This program will be in accordance with the requirements of Contract No. N62470-93-B-3122, Atlantic Division, Naval Facilities engineering Command, dated January 1994. PWC-NORVA will perform the inspections and tests required to ensure that materials, workmanship, and construction conform to the drawings, specifications, and contract requirements.

2.0 PROGRAM ORGANIZATION AND PERSONNEL RESPONSIBILITIES

PWC-NORVA will implement the Quality Control Program (QCP) by establishing a QC organization which includes the Project Engineers and Site Supervisor. The QC organization will have at least one individual on the job site at all times while work is in progress to verify compliance with the contract requirements. Additional QC personnel will be supplemented as necessary.

The QCP includes an inspection system, which will be available for review prior to the start of construction and throughout the life of the project. The inspection and testing processes will monitor the overall quality of work, and project controls will be instituted to assure correction of deficiencies identified during the inspections and testing. Project scheduling will be institutes to assure proper sequence and performance of the work activities.

PWC-NORVA's QC organizational chart is included as Figure 1. The responsibilities of each person identified in the QC organization are presented below.

2.1 Assistant Production Officer, Lt. Steven Fischer, USN

The Assistant Production Officer is responsible for:

- Support of the QC program

2.2 Project Engineers, JP Messier & Craig Mayer

- Providing deliverables which are both responsive and on schedules
- Review all project activities
- Monitor project progress and ensure schedule and budget maintenance
- Ensure QCP is being performed

2.3 Site Supervisor, Andrew M. Smith

- The Site Supervisor is responsible for day-to-day on-site activities. He communicates with the Project Engineer to update him on project progress and QC activities.

3.0 METHODS OF INSPECTION

A four-phase control system will be implemented for each major task and will include preparatory, initial, follow-up, and safety inspections. A QC representative will assure that no work proceeds until the appropriate inspection phase has been performed. A list of the expected major phases of work for which the inspections will be conducted is included in Table 1. In addition to an independent QC representative, the Site Supervisor will implement this same control system as part of their normal duties/responsibilities. The inspection phases are discussed in the following paragraphs.

A preparatory inspection will be performed by the QC representative prior to beginning physical work. This will include a review of the contract requirements; a check of the data sheets to assure that materials and/or equipment have been tested, submitted, and approved; a check to assure that provisions for required control testing have been made; examination of the work area to ascertain that preliminary work has been completed; and a physical examination of materials and drawings or submittal data and materials and/or equipment are on hand.

As part of this preparatory work, the QC representative will review shop drawings, certificates, and other submittal data prior to submission. Each submittal will bear the date and the signature of the QC representative indicating that the submittal has been reviewed and is in compliance with plans and specifications or show the required changes to meet the specifications.

An initial inspection will be performed by the QC representative as soon as a representative segment of the particular item of work has been accomplished. The initial inspection will include examination of the quality of workmanship and review of control testing results for compliance with contract requirements, use of defective or damaged materials, omissions, and dimensional requirements.

Follow-up inspections will be performed by the QC representative daily or as frequently as necessary to assure continuing compliance with contract requirements, including control testing, until completion of the particular segment of work.

Safety inspections will be performed by the Site Supervisor and/or QC representative on a daily basis to assure compliance with occupational health and safety requirements of the contract. Daily QC reports will be used to document the safety inspection and other inspections, and will address the safety deficiencies observed and corrective actions taken.

In addition to this four-phase inspection control system, special inspections or testing may be conducted in the event of an approved change or modification to work plans or field operations.

It is PWC-NORVA's responsibility to identify and correct deficiencies in the work. To assure that defective work is corrected and not built upon, a Rework Items System will be implemented. Rework items identified in the work during any of the inspections or testing programs by a party to this contract will be corrected as soon as practicable and recorded by completing a Rework Items List. The list will be issued to the Site Supervisor and a copy attached to the inspection report. The QC representative will be responsible for obtaining correction by the responsible party and will return the notice report upon correction with a description of the action taken and date completed. The list will be updated accordingly. Rework items will be corrected prior to final inspection. The Rework Items List is presented in Appendix A.

4.0 SAMPLING PROCEDURES

PWC-NORVA sampling procedures will meet the requirements of the project scope of work. The protocol for performing the analytical work the site water and soil prior to and during the remediation work is presented in the Sampling and Analysis Plan (SAP) dated June 17, 1994.

5.0 ANALYTICAL TESTING

PWC-NORVA will employ the services of the Public Works Center Environmental Department Laboratory, Code 930. The tests and/or services to be performed by the testing laboratory are presented in the Sampling and Analysis Plan (SAP) dated June 17, 1994. The work to be performed in this section deals with the chemical analysis of the water and soil on site.

6.0 FIELD VERIFICATION TESTING

The following procedures will be used by the PWC-NORVA QC representative during the performance of his/her duties to verify compliance with the contract requirements. Additions or modifications to these procedures may be necessary to address changing circumstances. The QC representative will be the Lead or Assistant Project Engineer. The responsibilities of the QC representative are described in Section 2.0.

6.1 Geotechnical Quality Control Procedures

Specific field verification testing will be performed in accordance with this plan. PWC-NORVA will utilize its own forces to perform the required field soils testing as per contract specifications. The geotechnician/PWC-NORVA Laboratory Manager maintains a QA program of which the equipment is calibrated on regular intervals and all measurements are traceable to the National Bureau of Standards. In accordance with Table 2, laboratory soils testing will be performed to ASTM methods.

Although the field testing is developed from acceptable test procedures (e.g., ASTM), it should be noted that while each test is an approved procedure to test for a specific characteristic, not every test can stand alone in remediation verification. Some tests are less comprehensive than others and require periodic verification by other, more detailed tests. Field tests of this type do not usually determine the primary characteristic of interest, but instead are correlated with it. In the event that any single test fails to meet the specification requirements, a second test will be performed. If the second test fail, the appropriate corrective action will be conducted. The result of that test will then be used to determine the acceptance or rejection of the construction task being monitored.

Field tests will be performed by the appropriate QC team personnel as soon as possible after material receipt or completion of a specific portion of the work. Testing will be performed on a timely basis to provide prompt confirmation or rejection of the material or constructed work. This will help minimize the possibility of having to remove satisfactory work which has been added to defective material or work.

6.1.1 Field Sampling

Samples of excavated materials will be obtained in the field for verification testing. The Sample Technician will collect the specified samples, as appropriate, as soon as the area is deemed clean. The sampling program will be performed in accordance with the SAP and the requirements of this plan, including the construction verification plan (Table 1).

6.2 Inspections

In addition to QC representative directed inspections, standard inspections will be performed during the course of remediation to verify the quality of the final constructed work. There will be visual inspections performed by the Site Supervisor, a qualified general foreman, or other appropriate personnel. These inspections are supplemental to the QC inspections and are intended to enhance the QC inspections by identifying problem areas that may require more stringent QC inspection. In the event of a discrepancy between one of these visual inspections and the field verification test performed as per Section 7.0 of this document, the field verification test result will take precedence.

Inspections will be performed in accordance with this plan, and checklists developed for the remediation. Inspections performed to a guide procedure will be documented in the daily field log while inspections performed to a checklist will be documented on the checklist.

6.3 Performance Documentation

To provide evidence of satisfactory work performance, verification test data, data reduction, and results of field inspections and sampling will be completely documented. Whenever possible, information will be recorded on a standardized form or in a bound field logbook. Documentation will include a daily log of construction activities; the appropriate field test, laboratory test, and survey data forms; photographs; and field collection and sampling custody forms.

Construction inspection personnel (e.g., Site Supervisor) will keep a daily log of project activities. Copies of the daily logs will be sent to the Site Supervisor on a daily basis. After review of the logs, they will be routed to other members of the project team as needed.

As part of the remediation control activities, a photographic record is to be prepared. Photographs will be in color. As examples, photographs could be taken of field testing, sampling locations, remediations processes, and final constructed features.

Photographs will be identified with the project number, date taken, and a brief description. This may be done individually on the back/front of the photographs or in an album in which the photographs are mounted.

Appropriate remediation control test, survey, and material installation data forms will also be prepared. They will include, as appropriate, the activity location. Field construction verification records will be collected and maintained by the Site Supervisor until they are submitted to the central project file.

6.4 Review of Construction Control Data

The QC representative will review the remediation QC data to verify that remediation specifications are being met, to determine when defective material or work may require removal and/or reconstruction, and to determine when additional testing may be required to confirm the quality of the material or work. The results of field tests, field inspections, receiving inspections, and surveys discussed in Sections 7.1.1 and 7.3 will be reviewed by the QC representative. The review will be made on a daily basis to prevent the construction of new work over defective material or work which is later found to be defective.

6.5 As-Built Documentation

All appropriate documentation will be retained in the project records system to provide, documentation of how the remedial action was actually built. Final as-built drawings and specifications will be prepared utilizing this information and retained as a permanent record of the final location, dimensions, and orientation of the construction.

7.0 INSPECTION AND TESTING DOCUMENTATION

Daily records of inspections and tests performed for each shift or subcontractor operation will be signed by the QC representative. Samples of reports and forms to be utilized are included in Appendix A.

The QC representative will prepare a daily QC report/production report which will include, as a minimum, the following:

- Project identification
- Data on weather and any delays attributed to such weather
- Number of personnel on site
- A listing of construction equipment and indication of equipment usage on the report day.
- Factual evidence that continuous QC inspections and tests have been performed. This includes but is not limited to the following data:

  -Type and number of inspections or tests performed
  -Results of inspections or tests including computations
  -Evaluation of test results--accept or reject work
  -Nature of defects, if present
  -Causes for rejection
  -Safety inspections/violations
  -Proposed remedial action
  -Corrective actions taken

- The records will cover both conforming and nonconforming work
- A statement that supplies and materials incorporated into the work are in full compliance with the requirements of the contract

8.0 MEETINGS/COORDINATION

8.1 Coordination and Mutual Understanding Meeting

After submission of the QC plan and prior to start of construction, PWC-NORVA's Project Engineers, Site Supervisor, and personnel will meet to discuss the QC program. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the PWC-NORVA management, production, and the QC representatives duties.

8.2 QC Meetings

After the start of construction, the PWC-NORVA QC representative will conduct QC meetings once every week or as needed at the work site. As a minimum, the following will be accomplished at each meeting:

- Review the minutes of the previous meeting
- Review the schedule and the status of work:

  -Work or testing accomplished since the last meeting
  -Rework items identified since the last meeting
  -Rework items completed since the last meeting

- Review the status of submittals

  -Submittals reviewed and approved since the last meeting
  -Submittals required in the near future

- Review the work to be accomplished in the next week and documentation required. Schedule the three phases of control and testing:

  -Establish completion dates for rework items
  -Preparatory phases required
  -Initial phases required
  -Follow-up phases required
  -Testing required
  -Status of off-site work or testing
  -Documentation required

  - Resolve QC and production problems

  - Address items that may require revising the QC plan:

  -Changes in procedures

TABLES

Table 1 - Inspection Schedule

Activity	Preparatory	Done	Initial	Done	Follow-up	Done
Surface Water Management Facility	Materials meet specification: Hay bales, silt fence Alignment		Proper installation Alignment and location		Proper installation	
Decontamination Area	Materials meet specification: Polyethylene		Proper installation		Meets intent of design	
Borrow Material	Sample and Analysis Geotechnical properties					
Excavation	Initial limits of area defined		Visual inspection of excavation			
Confirmation Sampling and Analysis	Sampling and laboratory procedures established		Quality control of sampling and analysis procedures Chain of custody forms			

Table 1 - Inspection Schedule						
Activity	**Preparatory**	**Done**	**Initial**	**Done**	**Follow-up**	**Done**
Backfill	Material meets specification Material availability Excavation approved for backfill		Lift thickness Density testing		Grades Density testing	
Grade Areas/Seed	Materials meet specification: Topsoil, seed		Backfill graded and compacted in accordance with specification Proper contouring of area Thickness of topsoil Installation of seed		Same as initial	
Soil/Waste Disposal	Waste facility approval Waste profile forms Manifests prepared Logistics for loading and transporting waste		Waste is properly loaded Vehicles weighed Manifests signed Weigh tickets collected		Same as initial	

Table 2 - Construction Testing Plan					
Facility Component	**Factors To Be Inspected**	**Inspection Method**	**Test Method Reference**	**Spec Sect Reqm't**	**Frequency of Testing**
Earthwork					
Backfill (Prior to Placement)	Soil Type Geotechnical	Visual-Manual Procedure	ASTM D 2487		Ongoing
		Grain Size	ASTM D 422 & 1140		1 test/type
		Moisture Content	ASTM D 2216		1 test/type
		Atterberg Limits	ASTM D 4318		1 test/type
		Compaction	ASTM D 698		1 test/type
Backfill Layer (Placement)	In-Place Moisture Content	Oven-Dry or Nuclear Method	ASTM D 2216 & 3017		1 test/lift

Table 2 - Construction Testing Plan					
Facility Component	**Factors To Be Inspected**	**Inspection Method**	**Test Method Reference**	**Spec Sect Reqm't**	**Frequency of Testing**
		Nuclear Method	ASTM D 2922		1 test/lift
Backfill Layer (Placement)	In-Place Moisture Content	Visual-Manual Method	ASTM D 2487		Ongoing
Seeding					
Disturbed Areas	Seed	Visual	Conform with VWWCC		
	Fertilizer	Visual	Specification O-F-241		
	Seed Mixture				
	Bermuda				100 lbs/acre
	Red Top				6 lbs/acre
	Fertilizer				1,000 lbs/acre
	Mulch				3,000 lbs/acre

Table 2 - Construction Testing Plan					
Facility Component	**Factors To Be Inspected**	**Inspection Method**	**Test Method Reference**	**Spec Sect Reqm't**	**Frequency of Testing**
	Topsoil	Agricultural Soil Test for Fertilizer Requirements, pH			5.5 to 7.0
Disturbed Areas	Soil Erosion Control (Silt Fence)	Meet Manufacturer's Specifications			
	Water	From Approved Source			
Erosion Control:	Method and Operation	Visual	NA		Per Event

Notes:

1. Atterberg limits will be performed on backfill provided the material is of a cohesive nature.

2. Seed mix is as recommended by Virginia Soil Conservation Service and VWWCC.

FIGURES

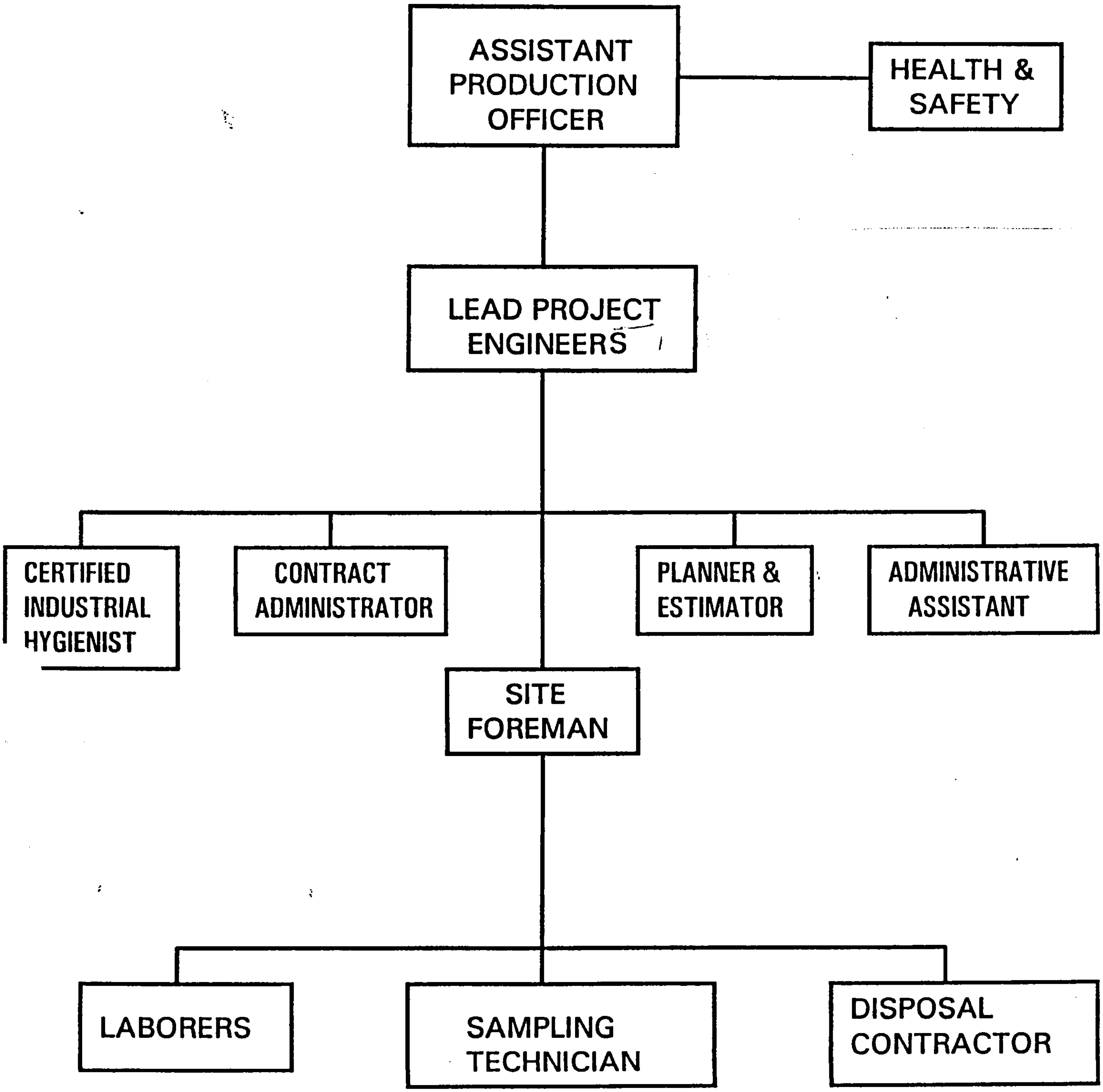


FIGURE 2

SITE 16 @ LITTLE CREEK NAVAL AMPHIBIOUS BASE
PROJECT ORGANIZATIONAL CHART

APPENDIX A

CONTRACTOR PRODUCTION REPORT (attach additional sheets if necessary)			DATE
CONTRACT NO.	TITLE AND LOCATION		REPORT NO.
TRACTOR		SUPERINTENDENT	
AM WEATHER	PM WEATHER	MAX TEMP	MIN TEMP

WORK PERFORMED TODAY

WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRADE	AAS

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? *(If YES attach copy of the meeting minutes)*	YES or NO	TOTAL WORK HOURS ON JOB SITE THIS DATE	
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? *ES attach copy of completed OSHA report)*	YES or NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
	S TRENCHING/SCAFFOLD/HV ELECTRICAL/HIGH WORK DONE? *(If YES attach statement or checklist showing inspection performed)*	YES or NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	
	WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? *(If YES attach description of incident and proposed action)*	YES or NO	SAFETY REQUIREMENTS HAVE BEEN MET?	

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY - INCLUDE NUMBER OF HOURS USED TODAY

REMARKS

CONTRACTOR/SUPERINTENDENT DATE

CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

	Y - YES N - NO. SEE REMARKS. BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT
PREPARATORY	THE PLANS AND SPECS HAVE BEEN REVIEWED		
	MATERIALS COMPLY WITH APPROVED SUBMITTALS		
	MATERIALS ARE STORED PROPERLY		
	PRELIMINARY WORK WAS DONE CORRECTLY		
	TESTING PLAN HAS BEEN REVIEWED		
	WORK METHOD AND SCHEDULE DISCUSSED		

				TEST PERFORMED AND WHO PERFORMED TEST
INITIAL	PRELIMINARY WORK WAS DONE CORRECTLY			
	SAMPLE HAS BEEN PREPARED/APPROVED			
	WORKSMANSHIP IS SATISFACTORY			
	TEST RESULTS ARE ACCEPTABLE			
	WORK IS IN COMPLIANCE WITH THE CONTRACT			

				TEST PERFORMED AND WHO PERFORMED TEST
FOLLOW	WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE			

REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)	REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

REMARKS

On behalf of the contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT

DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

GOVERNMENT QUALITY CONTROL MANAGER DATE

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

CONTRACT NO.	DATE
	REPORT NO.

PREPARATORY

Y - YES N - NO SEE REMARKS BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT
THE PLANS AND SPECS HAVE BEEN REVIEWED		
THE SUBMITTALS HAVE BEEN APPROVED		
MATERIALS COMPLY WITH APPROVED SUBMITTALS		
MATERIALS ARE STORED PROPERLY		
PRELIMINARY WORK WAS DONE CORRECTLY		
TESTING PLAN HAS BEEN REVIEWED		
WORK METHOD AND SCHEDULE DISCUSSED		

INITIAL PHASE

Y - YES N - NO. SEE REMARKS. BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT	TESTING PERFORMED AND WHO PERFORMED TEST
PRELIMINARY WORK WAS DONE CORRECTLY			
SAMPLE HAS BEEN PREPARED/APPROVED			
WORKSMANSHIP IS SATISFACTORY			
TEST RESULTS ARE ACCEPTABLE			
WORK IS IN COMPLIANCE WITH THE CONTRACT			

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

CONTRACT NO.	DATE
	REPORT NO.

Y - YES N - NO SEE REMARKS

BLANK - NOT APPLICABLE

IDENTIFY DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT

WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE

TESTING PERFORMED AND WHO PERFORMED TEST

F O L L W U P

TESTING PLAN AND LOG

./94

CONTRACT NUMBER	PROJECT TITLE AND LOCATION	CONTRACTOR

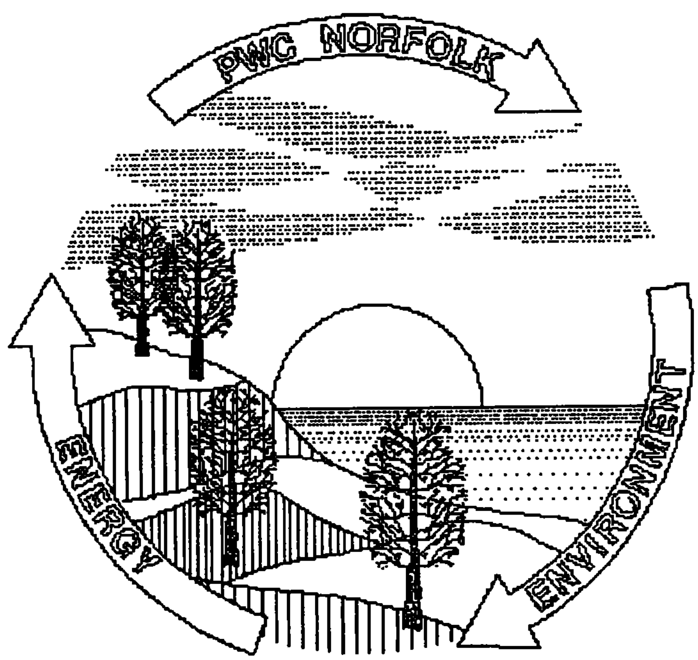
Specification Section and Paragraph #	Item of Work	Test Required	Accredited/ Approved Lab		Sampled By	Tested By	Location of Test		Frequency	Date Complete	Date Forwarded To Contr. Off.	Remarks
			Yes	No			On Site	Off Site				

REWORK . . EMS LIST

CONTRACT NO. AND TITLE				CONTRACTOR		
Number	**Date Identified**	**Description**	**Contract Requirement (Spec. Section and Par. No., Drawing No. and Detail No., etc.)**	**Action Taken By QC Manager**	**Resolution**	**Date Completed**

ENVIRONMENTAL PROTECTION PLAN

PCB SOIL REMOVAL ACTION - SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-93-B-3122



Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Prepared by:

NAVY Public Works Center
Energy/Environmental
Engineering Branch
Code 414
Norfolk, Virginia

11 October, 1994

FINAL

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RA-1	Site Operation Plan

1.0 INTRODUCTION

1.1 PURPOSE

PWC-NORVA is pleased to submit this Environmental Protection Plan (EPP) for the PCB contaminated soil removal action at site16, Little Creek Naval Amphibious Base, Norfolk, Virginia. The activities described herein are to be conducted as part of the tasks required by the Department of the Navy under Contract No. N62470-93-B-3122. The purpose of this plan is to present information for the general protection of natural resources, human health, and the environment during the execution of PCB contaminated soil removal at the above mentioned site.

This plan fulfills the requirements set forth in NAVFAC specification No. 05-93-3122, as well as meeting requirements outlined in the following documents:

- Code of Federal Regulations (CFR)
  - 29 CF 1910 - Subpart G: Occupational Health and Environmental Control
  - 40 CF 261: Identification and Listing of Hazardous Waste
  - 40 CF 262: Generators of Hazardous Waste
  - 40 CF 263: Transports of Hazardous Waste
  - 40 CF 264: Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
  - 49 CF 178: Shipping Container Specification

- NAVAL Energy and Environmental Support Activity (NEESA)

  - NEESA PS-015: 1980 Disposal of Lead-Acid Battery Electrolyte, April 18

- Virginia Division of Soil and Water Conservation Commission (VSWCC)

  - VSWCC VESCH: 1992 Virginia Erosion and Sediment Control Handbook

This plan is intended for use during the construction stage of the removal action at the site. This plan establishes guidelines which must be followed during activities at the site and must be used in conjunction with other project plans and documents.

1.2 Project Background

Less than five gallons of dielectric fluid were found missing from a capacitor, formerly attached to pole No. 425, after a lightning strike in the early 1980's. The capacitor has since been removed from the pole, but the pole is still in use. There are no visible evidence at the site that would indicate a spill of PCB-laden fluid.

Pole No. 425 is located on the Little Creek Naval Amphibious Base, Norfolk, Virginia. The pole is approximately 300 feet east of the intersection of Amphibious Drive and Helicopter Road on the south side of Amphibious Drive, approximately 12 feet from the road.

1.3 Previous Investigations

Through previous site investigations (Reports (a) and (b) of NAVFAC Specification No. 05-93-3122 dated January 25, 1994) it has been shown that Site 16 contains PCB contaminated soil with levels which range from undetectable to 2100 ppm. The area of concern is approximately 1180 square feet and two feet deep.

The site slopes gently away from Amphibious drive.

1.4 Site Remediation Activities

The remedial activities for Site 16 generally consist of:

- Remove contaminated soil to the required cleanup levels

- Replace contaminated utility pole and remove fencing

- Haul and dispose of the contaminated soil and generated waste via an approved disposal contractor to an approved off-site disposal facility

- Establish grade of excavated area to meet surroundings and seed to match existing vegetation

2.0 ORGANIZATIONAL STRUCTURE FOR IMPLEMENTATION

The following sections describe the personnel and required chain of command that will control and direct EPP activities at the site.

2.1 RESPONSIBLE PARTIES

2.1.1 Department of the Navy

Department of the Navy is the owner of the site and the responsible party for the site remediation activities. Naval Facilities Engineering Command - Atlantic Division has contracted Public Works Center- Norfolk, Virginia to perform the remediation activities. Public Works Center - Norfolk, Virginia will notify Naval Facilities Engineering Command - Atlantic Division of any EPP incident as soon as possible.

2.1.2 NAVY PUBLIC WORKS CENTER - NORFOLK, VIRGINIA (PWC-NORVA)

PWC-NORVA is responsible for implementing EPP procedures and is responsible for all information contained in this EPP.

Figure 2 depicts PWC-NORVA'S organizational structure for EPP and emergency situations.

2.2 EMERGENCY SERVICES

A summary of local and state emergency service agencies is listed in Table 1. Individual emergency service agencies and responsibilities are as follows.

2.2.1 Police

The Little Creek Naval Amphibious Base Police will be notified of any disruptions to normal traffic flow. PWC Norfolk will provide support for blocking traffic, directing traffic and other related duties during EPP situations. Incidents of trespassing will be reported to the Little Creek Naval Amphibious Base Police.

2.2.2 Fire Department

The Little Creek Naval Amphibious Base Fire Department will respond to any EPP situation requiring Fire Department services.

2.3 COORDINATION RESPONSIBILITIES

The EPP will be implemented and coordinated by PWC-NORVA as shown by the project organizational chart, Figure 2. PWC-NORVA is responsible for all aspects of the EPP including, training, drills, notification, and other aspects of this EPP.

2.3.1 Project Engineers

The Project Engineers are ultimately responsible for performance of remedial activities and construction activities at the site. The Project Engineer delegates responsibility for maintaining compliance of the EPP and Health and Safety Plan during all phases of the project to the site health and safety officer (HSO).

2.3.2 Health and Safety Officer

The HSO will be responsible for all EPP and Health and Safety Plan activities at the site. The HSO is also responsible for overseeing the decontamination of equipment and materials leaving the contaminated area and for providing and enforcing the use of personal protective equipment and clothing, decontamination procedures and emergency response procedures. The HSO, Project Engineer or other Health and Safety professional will be responsible for training on-site personnel in regards to the EPP and Health and Safety Plan.

The HSO has the authority to stop any operation that threatens the health and/or safety of the site personnel, surrounding populace or the environment. The daily EPP inspections and health and safety activities will be conducted by the HSO, Project Engineer or Site Supervisor.

2.3.3 Site Supervisor

The on-site supervisor is responsible for field implementation of the EPP procedures and the health and safety program when the HSO is not present. This responsibility includes advising site workers of the specific health and safety requirements and consulting with the HSO regarding appropriate changes to the EPP and Health and Safety Plan.

2.3.4 Site Personnel

All site personnel will be responsible for working in a safe and healthy manner. Site personnel are responsible for reporting any EPP and/or Health and Safety Plan violations and/or questions to the site supervisor. Site personnel are required to comply with all applicable local, State and federal rules and regulations.

3.0 MATERIALS INVENTORY AND COMPATIBILITY

The following section contains information regarding the materials that may be involved in a EPP incident. Table 2 list approximate quantities of the materials present on site by type.

3.1 ON-SITE MATERIALS

Soil contaminated with low level PCB compounds and vegetation directly above the contaminated soil.

3.2 FUEL AND FLAMMABLE LIQUIDS

Combustion engine equipment will be used on site during the course of the project. The types of fuel and flammable liquids associated with this equipment include:

- Diesel Fuel
- Gasoline
- Motor and Transmission oils
- Greases

3.3 OTHER MATERIALS OF CONCERN

Other materials necessary to complete the project that have the potential for spills and releases are listed below. The exact quantities of these materials will be determined during remedial activities. These materials will be used during the reestablishing of vegetative cover phase of the project.

- Agricultural Lime
- Fertilizer

3.4 Material Compatibility

The materials listed in Sections 3.1 to 3.3 are not anticipated to be mixed or combined during site operations. All of the compatibility data that exists for each material is noted on each Material Safety Data Sheet provided in Appendix A.

4.0 EMERGENCY AND DECONTAMINATION EQUIPMENT

4.1 EMERGENCY EQUIPMENT

4.1.1 Small-Scale Emergency Equipment

Small-scale emergency equipment will include:

- Portable Fire Extinguishers
- Special Fire Extinguishing Devices such as foam, inert gas, or dry chemicals as appropriate
- Spill Control Equipment
- Absorbent Materials
- Decontamination Equipment
- Breathing Respirators
- Radio and Telephone Equipment
- Various Hand Tools

The equipment will be made accessible to all on-site workers. A list of small equipment is provide in Table 3.

4.2 SPILL RESPONSE EQUIPMENT

Spill response equipment will be provided on site and will include absorbent materials, sand, chemical neutralizers and other spill contaminant devices necessary to prevent spill migration. Other equipment will include construction equipment used in ongoing construction activities.

All equipment will be tested and maintained as necessary to assure its proper operation in time of emergency. After an emergency, all equipment will be decontaminated, cleaned and fit for its intended use before normal operations resume.

4.3 DECONTAMINATION EQUIPMENT

Equipment necessary for decontamination activities will be provided, installed and verified in working order prior to any site operations. Equipment for the decontamination area includes the following items:

- Clean Water Supply
- Detergent Solution
- Brushes
- Waste Containers
- Towels
- Kerosene

5.0 SITE EVACUATION PLAN

5.1 SITE EVACUATION SIGNAL

All site personnel will evacuate the site upon hearing the evacuation signal. The signal will consist of a continuous blast from an air horn. The blast will be at least 15 seconds in duration and will be broadcast clearly to the entire site. The signal will be repeated at least two times to alert all personnel. Radio base station personnel will also broadcast a verbal evacuation command over the site channel to alert operators who may not hear the air horn signal. The evacuation signal will also be sent by visual means. Clutching throat with hands is the signal for site evacuation.

5.2 SITE EVACUATION AND ROUTES

After the evacuation signal is sounded, all personnel will immediately proceed to the meeting point. The meeting point is located south of the site in the campground area directly south of the site trailer location. A second alternative meeting point is located at the South-Eastern corner of the intersection of Amphibious Drive and Helicopter Road. This area is to be used by personnel working in the North end of the site. One supervisory person (Project Engineer, Site Supervisor or Health and Safety Officer) will proceed to this location. Radio contact will be maintained between both meeting points. All equipment, trucks, and other internal combustion engines will be shut down prior to personnel evacuation if the equipment can be reached without risking personal safety. The evacuation routes are shown on Drawing RA-1.

A Project Engineer will contact LITTLE CREEK NAVAL AMPHIBIOUS BASE authorities to inform them of the nature and extent of the emergency. A meeting coordinator will be assigned at each meeting point. The meeting coordinator will be either the Project Engineer, Site Supervisor, Foreman, Health and Safety Officer or other supervisor. The meeting point coordinator will follow the actions described in section 5.3.

5.3 POST EVACUATION ACTIONS

A head count of personnel assembled at the meeting points will be taken by the coordinator at each site after the evacuation. Information regarding missing and/or injured personnel will be brought to the immediate attention of the meeting point coordinator. No personnel will attempt to re-enter the site at this time. The Site Supervisor or appointed representative will coordinate activities with Base Authorities. After the emergency has been resolved, the Lead Engineer will indicate when personnel can enter the site and resume work.

5.4 SITE EVACUATION DRILL

All site personnel must be familiar with the evacuation signal and evacuation procedures prior to any site operations. The evacuation plan will be reviewed during all safety training.

6.0 SPILL PREVENTION AND RESPONSE

6.1 POTENTIAL SPILL SOURCES AND PREVENTION PRACTICES

The following section details PWC-NORVA's procedures for implementing this portion of the EPP. Potential activities include containment, collection and material disposal or reuse.

6.1.1 Excavation Areas

The excavation areas contain contaminated soil and construction debris that will be excavated for removal from the site and ultimate disposal. The potential spill source is run-on, or water from the excavation. The excavation areas will be surrounded by silt fence to contain all source materials within the excavation area.

6.1.2 Fuel Storage

6.1.3 On-Site Material Transportation

All source material will be transported within the contaminated area to trucks adjacent to the contaminated area.

6.2 EXTERNAL FACTORS

The following describes actions to be taken to alleviate effects to public health and safety or the environment from factors external to the site.

6.2.1 Power Outages

Power will be from utility service drops and/or PWC NORVA generators. A back-up generator will be provided, if needed, in case of failure of the primary service drops and/or generator(s) where such failure may impact the public health or safety of the environment.

6.2.2 Flooding

Flooding has the potential to be a spill instigation factor at the site during excavation phases. Flooding of the site is defined by overland flow transporting contaminated soil off-site or ponding of the water in the excavation following a rain event. To prevent this from happening, silt fence will be constructed to divert overland flow away from the site. The excavation will be covered with 30mm polyurethane sheeting during times of inactivity. Any pooling water in direct contact with the contaminated soil will be pumped and disposed off-site with other construction generated wastewater.

6.2.3 Severe Weather

Short-duration, high-intensity rain showers may create unexpected erosion and drainage problems. Immediately after such events, all containment devices will be completely inspected for structural and practical integrity. Also, spillage or leakage will be immediately corrected. Repair to these containment devices will be made as soon as possible or at least before construction continues.

6.3 PROTECTION OF NATURAL RESOURCES

Protection of natural resources is mandated in section 01560-Environmental Protection of the Statement of Work. This includes land and water sources. Protection of water resources is covered under section 8.0 - Erosion Sediment Control.

PWC-NORVA will limit the extent of clearing operations to the areas required for access to the excavation areas and support facilities.

All reasonable attempts will be made to minimize landscape defacement. In the event of damage to the existing vegetation outside of the excavation limits, the vegetation will be restored to the satisfaction of LITTLE CREEK NAVAL AMPHIBIOUS BASE site representative. Vegetation damaged beyond repair will be cleared and replaced as directed in accordance with Section 01561 of the Statement of Work.

6.4 DUST CONTROL AND EROSION PROTECTION

Hand held sprayers will be utilized, as necessary, to control dust in the excavation areas during excavation and placement of fill materials. The water source will be approved prior to utilization. Water will be applied in sufficient quantity to prevent creation of dust but not excessive as to cause ponding. Determination of the need for dust control will be the responsibility of the Site Supervisor as dictated by site conditions.

7.0 PREVENTATIVE ACTIONS

7.1 INSPECTIONS

Daily inspections of site areas will be performed by the Site Supervisor to ensure procedural compliance of storage, handling and transportation of material. Inspection and monitoring methods will be through visual observation. Monitoring equipment as described in Section 7.5 will be used when necessary in the excavation areas. Other areas and items that will be monitored and noted in the site logbook include;

- Site security facilities
- Evidence of spilled materials along silt fence
- Effectiveness of housekeeping practices
- Various shipping and storage containers used throughout the site
- Disposal staging area
- Proper placards and labeling of truck and tank contents.

7.2 EQUIPMENT MAINTENANCE

All construction equipment will be properly maintained to ensure safe operation. Equipment will be properly maintained to minimize spillage or leakage which may occur during on-site operations. Further preventive maintenance on trucks is described in Section 7.4.2

7.3 CALIBRATION OF MONITORING EQUIPMENT

Calibration frequency and procedures will be followed as per the manufacturer's recommendations for all monitoring equipment. Calibration records will be retained by PWC-NORVA.

7.4 HOUSEKEEPING PROGRAM

Site housekeeping program includes items such as: neat and orderly storage of materials, proper truck and tank placards, prompt removal of spillage, regular refuse pickup and disposal, maintenance of roads and surfaces, and provisions for the storage of material and equipment to keep them from protruding into walkways or roads.

7.4.1 Small Spillage

Small spills may include solid materials or liquid materials being mishandled, dumped, leaked, knocked over, etc. Any material spillage will be immediately contained and collected for later disposal. Excavation of pits will be performed such that exposed source material remains within the limits of excavation. All spilled liquids will be contained and collected by absorbent materials and disposed immediately thereafter. Spilled fuel and impacted soil will be contained and disposed with other contaminated soil and/or water.

7.4.2 Trucking

All hauling vehicles will be maintained in good operating condition. Tires will be properly inflated and will have adequate tread depth as per the tire manufacturer's recommendations. Trucks will not be overloaded. Truck and container end gates will be inspected to ensure they operate properly.

7.4.3 Site Security

Orange safety fencing (4 foot height), yellow warning tape and proper signage will be located around the entire site as a measure of site security. No security guard will be present.

7.4.4 Worker Training

All employees with the potential of exposure to hazardous substances will be required to attend and complete an Occupational Health and Safety Administration (OSHA) 40-hour Health and Safety Course (Hazardous Waste Operations and Emergency Response) as per 29 CFR 1910-120. Employees having this training will attend an 8-hour OSHA refresher course if the 40-hour class was taken over 1 year before that employee is to be on site.

The site specific training program will involve at least one hour of instruction per employee. The Little Creek NAB IRC will be invited to the site specific training. At a minimum, the training program will ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures and emergency equipment systems including, where applicable: procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment; key parameters for automatic cut-off systems; communication and alarm procedures; response to fires and explosions; site evacuation procedures; and shut-down operations. In addition, the employee training program will address other aspects of the EPP, such as preventative maintenance, inspection and monitoring, housekeeping practices, etc.

Job specific EPP and health and safety instructions will be reviewed before beginning each new phase of work. Weekly, or more often if conditions require, the Health and Safety officer or on-site supervisor will conduct follow-up training related to the change in operations or any other training deemed necessary by the Health and Safety Officer. Site meetings will be held daily prior to work to discuss the current project site safety considerations.

Site evacuation training will be provided as described in Section 5.2.

8.0 EROSION AND SEDIMENT CONTROL

8.1 FEATURES OF PROJECT AREAS

8.1.1 General

This plan includes one drawing, Figure 3 (RA-1), which is described further in section 8.1.2. The erosion and sedimentation controls, project areas, etc., are depicted on this drawing

8.1.2 Project Areas

Drawing RA-1 depicts the site features. Wetlands, roadways, and other site features are also shown on Drawing RA-1. The proposed erosion and sedimentation controls for the removal action are shown on Drawing RA-1. Erosion and sedimentation control measure details are shown on drawing RA-1.

8.2 SOIL CHARACTERISTICS

8.2.1 Soil Types and Characteristics

The natural soils at the NAB Little Creek have been largely disturbed by construction activities. It is estimated that 90 percent of the surface sediments the base are either urban or dredged from the surrounding waterways, and other soils have been imported. The US Department of Agriculture, Soil Conservation Service (SCS,1985) list two general soils for the NAB Little Creek:

- Newhan-Duckston-Corolla - occurring in the coastal region along Chesapeake Bay, characterized as excessively to poorly drained and formed in marine or eolian sediments.
- Udorthents-Urban Lands - occurring throughout the rest of the site, characterized as well to moderately drained with a loamy substratum, and formed primarily in disturbed sediments.

8.3 PROJECT ACTIVITIES

8.3.1 Site Preparation

Construction activities that will impact runoff during site preparation include the following:

- Clearing and grubbing for van/office area, personnel staging and decontamination areas, site access, etc.

- Setup of site equipment

8.3.2 Soil and Debris Excavation

Excavation and removal of soil from within the contaminated region is the main remediation activity. No excavation will occur during or immediately after rain incidents. All generated construction debris/waste will be cleaned prior to off-site disposal.

8.4 RUNOFF

8.4.1 Project Area

All runoff from the disturbed project areas will be collected and disposed with other construction generated wastewater. The erosion and sedimentation control facilities will minimize the run-on affecting the site.

8.4.2 Upgradient Watershed

The silt fence will be used to divert upgradient run-on around the project site.

8.4.3 Impact

The Erosion and Sedimentation Control Plan will minimize the impact to the watershed from project activities.

8.5 EARTH MOVING ACTIVITIES

8.5.1 General

The anticipated project activities that require erosion and sedimentation controls are described in the following sections.

8.5.1.1 Site Preparation

The first tasks at the site will consist of site preparation activities. Project areas will be cleared and grubbed. A potable water supply hook-up and an office van will be staged. Site utilities and office trailer areas will be located and completed. Silt fence will be installed at the locations shown on drawing RA-1

8.5.1.2 Soil and Debris Excavation

Prior to excavation activities at the site, silt fence will be installed as shown on drawing RA-1.

8.5.1.3 Site Regrading and Revegetation

The final task at the site will involve the regrading and revegetation of the excavation and project areas. Each excavation area will be graded to previous elevations and drainage conditions. The areas will be seeded and mulched in accordance with the technical specifications. All silt fence will be removed after vegetation is established. The areas disturbed for the ancillary features will also be seeded after the facilities have been removed.

8.6 TEMPORARY CONTROL MEASURES

8.6.1 General

This section describes the various temporary erosion and sedimentation controls that will be used during earth moving activities at the site. The specific use of the controls is described in section 8.5. All controls will comply with the technical specifications presented in Appendix B.

8.6.2 Silt Fence

Silt fence will be utilized as a temporary sedimentation control measure around the project areas as shown on Drawing RA-2. Silt fence will also be placed as necessary to accommodate site conditions at the direction of the Lead Engineer and/or Site Supervisor.

8.7 PERMANENT CONTROL MEASURES

8.7.1 General

This section describes the various permanent erosion and sedimentation controls that will be used during and upon completion of earth moving activities at the site. The specific use of the controls is described in Section 8.5. All controls will comply with the technical specifications presented in the Statement of Work and the Virginia Erosion and Sediment Control Manual (VESCM).

8.7.2 Vegetation Establishment

All disturbed site areas will be vegetated upon project completion with the specified long-term seed mixture. No other permanent control measures are anticipated.

8.8 MAINTENANCE PROGRAM

8.8.1 General

This section describes the maintenance program for the erosion and sedimentation control measures at the site.

8.8.2 Temporary Control Measures

Maintenance of the erosion and sedimentation controls during the project will be performed by PWC NORVA. All controls will be inspected daily, as well as after each storm event. Sediment removed from controls will be collected and bulked with excavation materials for off-site disposal.

8.8.3 Permanent Control Measures

After project completion and demobilization, PWC NORVA will inspect the seeded and mulched areas on a bi-weekly basis for 10 weeks. If erosion is observed during the inspection, PWC NORVA will make necessary repairs to the seedbed and mulch the affected area.

TABLES

TABLE 1

EMERGENCY INFORMATION

In the event of a fire, uncintrollable spilll, explosion, or any occurrence that might be harmful to personnel or adjacent property, the SSHO will immediately notify the proper emergency services.

Emergency Notification Numbers

Fire Department	804-444-7333
Ambulence	804-398-7283
Police	804-464-7621

Procedures for Reporting Incidents

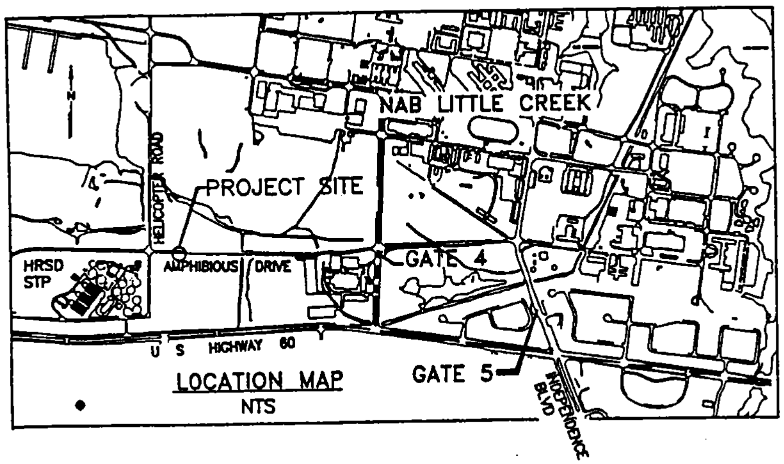
In the event of any of the above circumstances, contact the people listed below:

Immediately call:

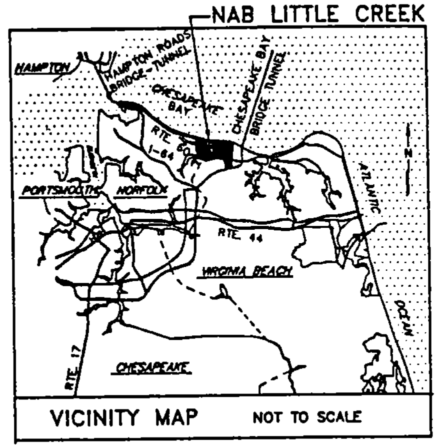
Project Engineers J.P. Messier/Craig Mayer	804-445-4885/6
National Response Center	1-800-424-8802

FIGURES

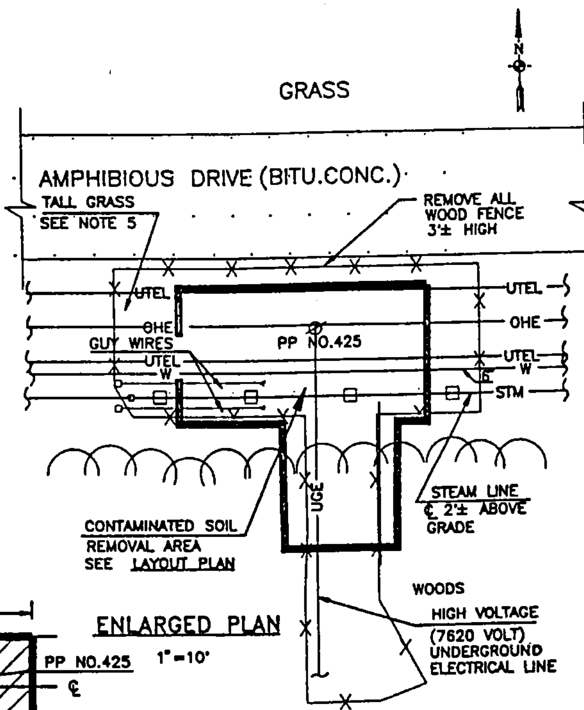
PCB SOIL REMOVAL [illegible]CTION, SITE 16
NAVAL AMPHIBIOUS BA[illegible] LITTLE CREEK
NORFOLK, VA



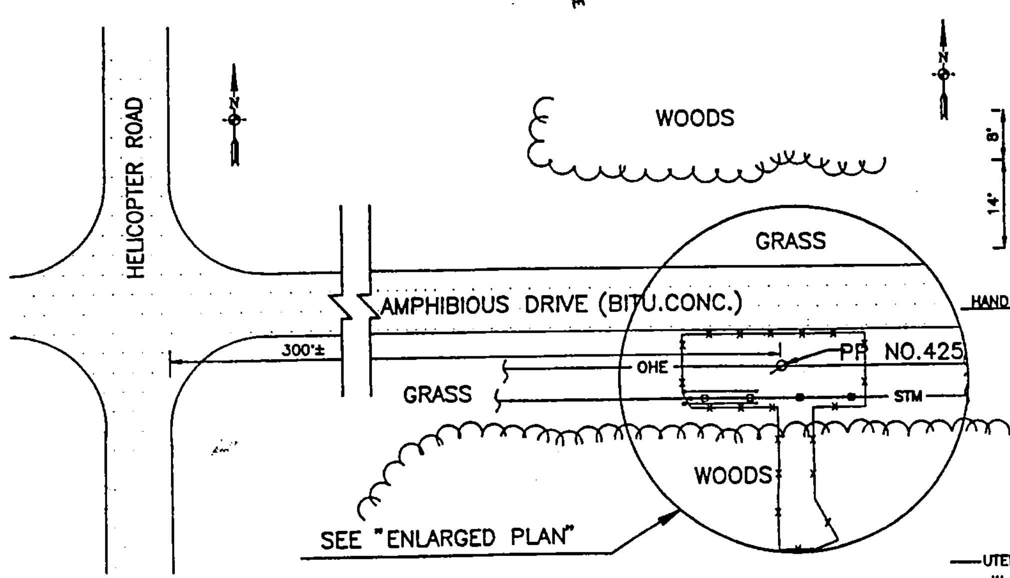
LOCATION MAP
NTS



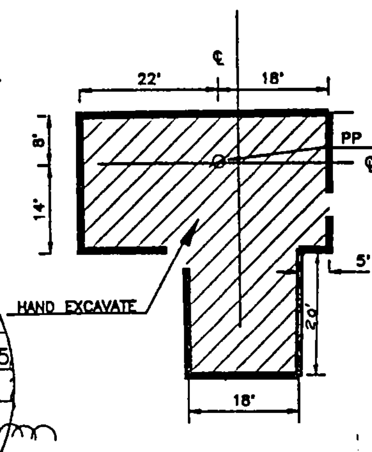
VICINITY MAP NOT TO SCALE



ENLARGED PLAN
1"=10'



LOCATION PLAN
1"=20'



LAYOUT PLAN
1"=10'

SCALE : 1" = 10' — 0' 10' 20' 30' 40' 50'
SCALE : 1" = 20' — 0' 20' 40' 60' 80' 100'

LEGEND

—UTEL—	UNDERGRUND TELEPHONE
—W—	WATER
—OHE—	OVERHEAD ELECTRICAL LINE
—UGE—	UNDERGROUND ELECTRICAL LINE
—STM—	ABOVEGROUND STEAM

NOTES:

1. ITEMS SHOWN ARE EXISTING AND SHALL REMAIN IN PLACE UNLESS NOTED OTHERWISE.
2. APPROXIMATE LIMITS OF PCB CONTAMINATED SOILS EXCAVATION ARE INDICATED ON " ENLARGED PLAN ". THE DEPTH IS APPROXIMATELY 2'. THE CONTAMINATED SOILS SHOULD BE REMOVED AND DISPOSED OF IN A TSCA APPROVED LANDFILL.
3. AFTER COMPLETION OF CONTAMINATED SOIL EXCAVATION, RESTORE AREA TO MATCH EXISTING ELEVATIONS, AND PROVIDE TURF FOR ALL DISTURBED AREAS.
4. DECONTAMINATE EXPOSED, CONTAMINATED UTILITY LINES AND CONCRETE SUPPORTS. REMOVE 50' CLASS 2 POWER POLE #425 AND REPLACE WITH NEW 50' CLASS 2 POLE. EXIST. OVERHEAD POWER LINES (2-132 KV PRIMARY CIRCUITS, SECONDARY, FIRE ALARM & TELE.) SHALL REMAIN IN SERVICE. TRANSFER EXISTING CIRCUITS INCLUDING CROSSARMS, INSULATORS AND STREET LIGHT. TRANSFER EXISTING UNDERGROUND SERVICE AND CONDUIT RISER.
5. CUT TALL GRASSES WITHIN FENCED AREA.
6. CALL "MISS UTILITY" BEFORE EXCAVATION. SEE SPECS.
7. EXISTING PCB CONTAMINATION LEVELS RANGE FROM NON-DETECTABLE TO 2100 PPM CLEANUP LEVEL SHALL BE 10 PPM OR LESS.

REVISIONS

ATLANTIC DIVISION

NORFOLK, VIRGINIA

NAVAL AMPHIBIOUS BASE, LITTLE CREEK NORFOLK, VA

PCB SOIL REMOVAL ACTION, SITE 16

TITLE,VICINITY & LOCATION MAPS,PLANS & NOTES

SCALE AS NOTED

373498

05-93-3122

N62470-93-B-3122

4273498

SHEET 1 OF 1

C-1

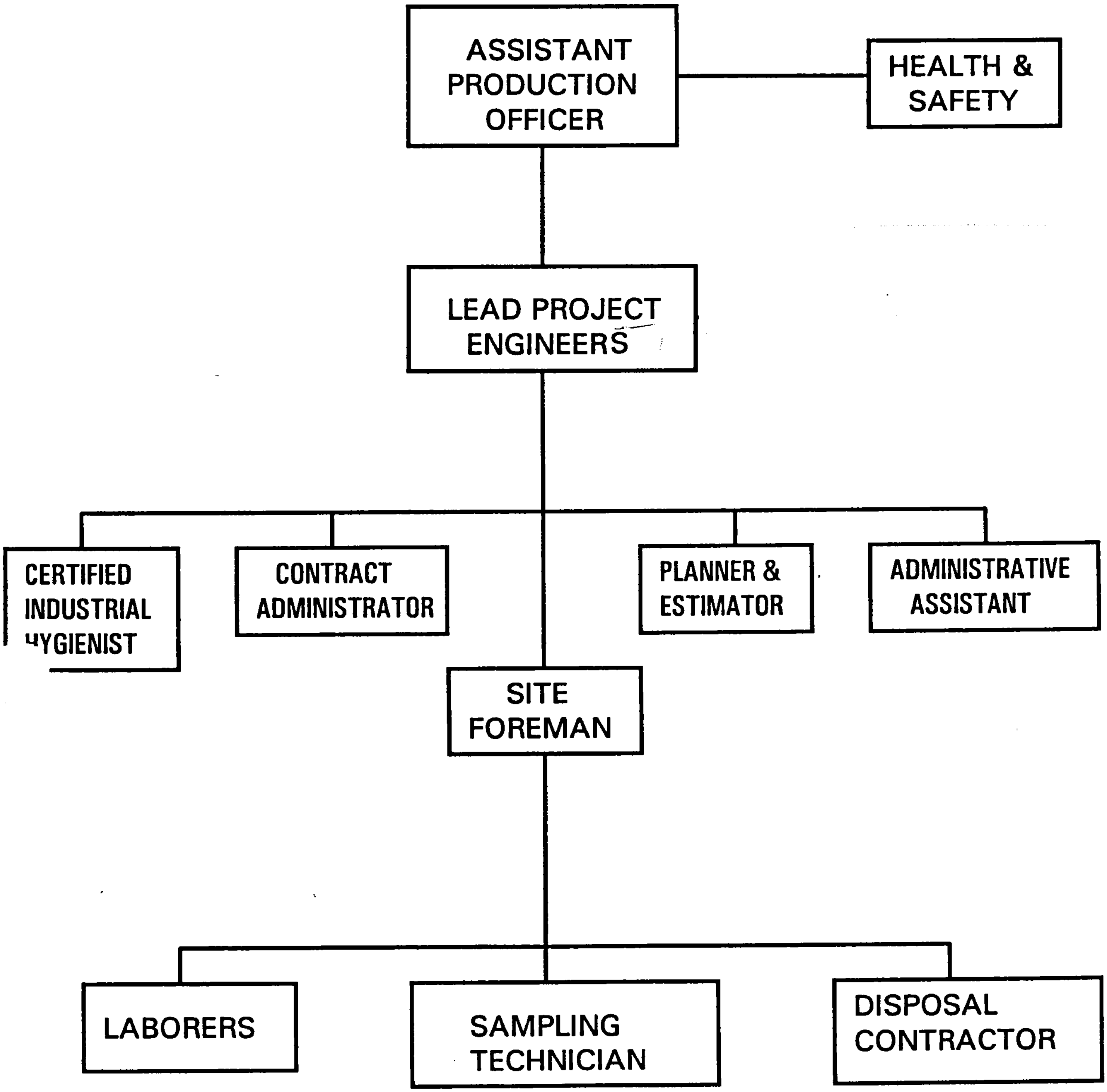
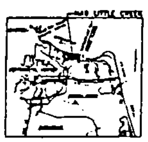


FIGURE 2

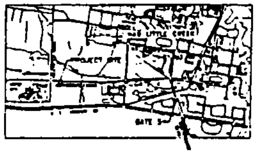
SITE 16 @ LITTLE CREEK NAVAL AMPHIBIOUS BASE
PROJECT ORGANIZATIONAL CHART

SITE OPERATION PLAN
PCB SOIL REMOVAL ACTION SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA

REVISIONS				
SYM	DESCRIPTION	DATE	SATISFACTORY	APPROVED



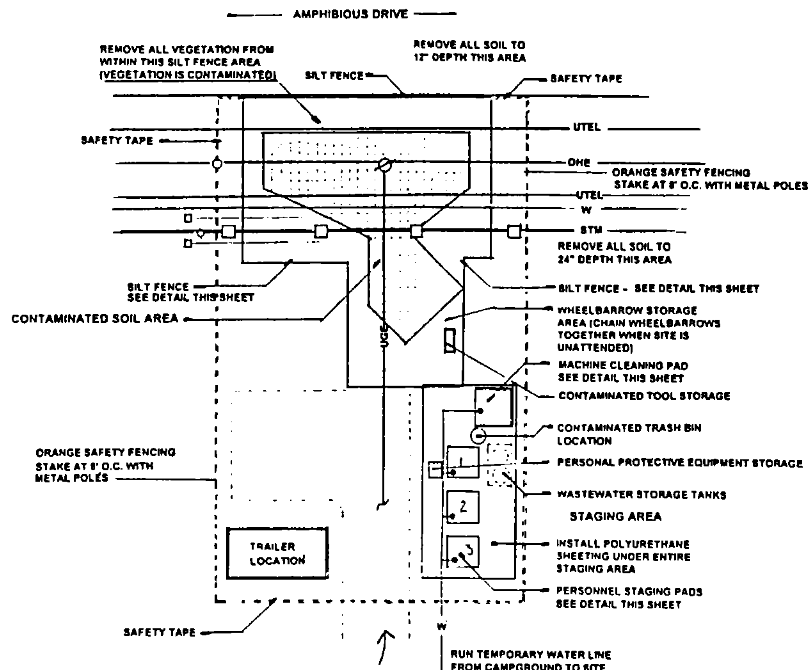
VICINITY MAP
NTS



LOCATION MAP
NTS

PERSONNEL STORAGE PAD NOTES

PAD #	NOTE
1	PAD 1 TO HAVE CLOTHES HOOKS, WATER SUPPLY, AND TARP TO COVER HANGING BOARD
2	PAD 2 TO HAVE WATER SUPPLY. THIS PAD ONLY HAS 4'X4' BASE. NO HANGING BOARD REQUIRED
3	PAD 3 TO HAVE WATER SUPPLY AND DECONTAMINATION SOLUTION BASIN. THIS PAD ONLY HAS 4'X4' BASE. NO HANGING BOARD REQUIRED

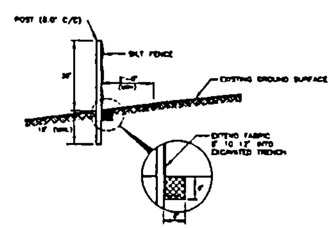


LEGEND

UTEL	UNDERGROUND TELEPHONE
OHE	OVERHEAD ELECTRIC LINE
W	WATER
STM	ABOVEGROUND STEAM
	12" SOIL DEPTH REMOVAL ZONE
	24" SOIL DEPTH REMOVAL ZONE
UGE	UNDERGROUND ELECTRIC LINE
W	SPRAY NOZZLE

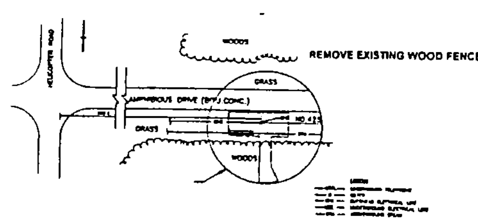
SITE PLAN
1"=10'

NOTE: LOCATIONS SHOWN ARE APPROXIMATE EXACT LOCATIONS OF SILT FENCE, SAFETY TAPE SAFETY FENCE, TRAILER, PPE STORAGE, ETC. WILL BE DETERMINED ON SITE.

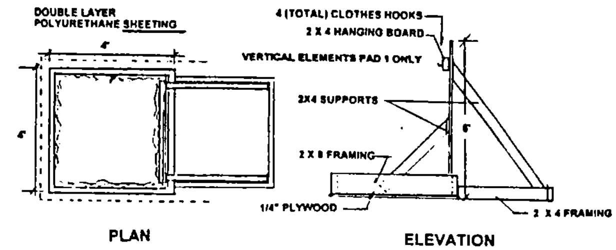


DETAIL 1 SILT FENCE INSTALLATION
N.T.S.

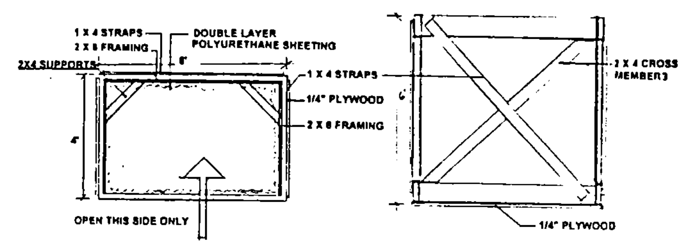
NOTES:
1. TAKE ALL SLACK OUT OF FABRIC BEFORE ATTACHING TO STAKES
2. FENCE TO BE PLACED AS SHOWN ON THE PLANS OR AS OTHERWISE DIRECTED BY THE SITE SUPERVISOR.
3. SILT FENCE WILL BE REMOVED AFTER SEEDING HAS ACHIEVED ADEQUATE GROWTH TO PREVENT EROSION AS OTHERWISE DIRECTED BY THE SITE SUPERVISOR



SITE PREPARATION PLAN
NTS



PERSONNEL STAGING PAD - TYPICAL
1/2"=1'-0"



MACHINE CLEANING PAD
1/2"=1'-0"

SITE OPERATION PLAN			PA-1
DEPARTMENT OF THE NAVY / NAVAL STATION	NAVY PUBLIC WORKS CENTER	NAVAL FACILITIES ENGINEERING COMMAND	NORFOLK VIRGINIA
JOB ORDER NO 1324041	SITE OPERATION PLAN PCB SOIL REMOVAL ACTION SITE 16 LITTLE CREEK NAVAL AMPHIBIOUS BASE NORFOLK, VIRGINIA		
SIZE D	CODE IDENT NO 80091	NAVFAC DRAWING NO 4282728	PWC DRAWING NO 15028
		CONSTR CONTR NO N62470-93-B-3122	SHEET 1 OF 1

APPENDIX A
MSDS INFORMATION

Material Safety Data Sheet

from Genium's Reference Collection

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

GENIUM PUBLISHING CORP.

No. 683

POLYCHLORINATED BIPHENYLS (PCBs)

Issued: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: POLYCHLORINATED BIPHENYLS (PCBs)

Description (Origin/Uses): Commercial PCBs are mixtures that were once widely manufactured by combining chlorine gas, iron filings, and biphenyls. Their high stability contributes to their intended commercial applications and their accidental, long-term adverse environmental and health effects. PCBs are useful as insulators in electrical equipment because they are electrically nonconductive. Their distribution has been limited since 1976. The Aroclor PCB codes identify PCBs by type. The first two digits of a code indicate whether the PCB contains chlorinated biphenyls (12), chlorinated terphenyls, (54), or both (25, 44); the last two digits indicate the approximate percentage of chlorine. Found in insulating liquid, synthetic rubber, plasticizers, flame retardants, floor tile, printer's ink, paper and fabric coatings, brake linings, paints, automobile body sealants, asphalt, adhesives, electrical capacitors, electrical transformers, vacuum pumps, gas-transmission turbines, heat-transfer fluids, hydraulic fluids, lubricating and cutting oil, copying paper, carbonless copying paper, and fluorescent light ballasts.

1
3 0
-
Genium

Synonym: Chlorodiphenyls

Other Designations (Producer, Trade Name, Nation): Monsanto, Aroclor* (USA, Great Britain); Bayer, Clophen* (German Democratic Republic); Prodelec, Phenoclor*, Pyralene* (France); Kanegafuchi, Kanechlor*; Mitsubishi, Santotherm* (Japan); Caffaro, Fenclor* (Italy).

Trade Name	CAS No.	*RTECS* No.	Trade Name	CAS No.	*RTECS* No.
Aroclors	01336-36-3	TQ1350000	Aroclor 1242	53469-21-9	TQ1356000
Aroclor 1016	12674-11-2	TQ1351000	Aroclor 1248	12672-29-6	TQ1358000
Aroclor 1221	11104-28-2	TQ1352000	Aroclor 1254	11097-69-1	TQ1360000
Aroclor 1232	11141-16-5	TQ1354000	Aroclor 1260	11096-82-5	TQ1362000

HMIS			
H	1	R	1
F	1	I	3
R	0	S	1
PPG*		K	1

SECTION 2. INGREDIENTS AND HAZARDS/EXPOSURE LIMITS

PCB-42% Chlorine/Aroclor 1242
CAS No. 53469-21-9
OSHA PEL (Skin*)
8-Hr TWA: 1 mg/m³
ACGIH TLV (Skin*), 1988-89
LV-TWA: 1 mg/m³

PCB-54% Chlorine/Aroclor 1254
CAS No. 11097-69-1
OSHA PEL (Skin*)
8-Hr TWA: 0.5 mg/m³
ACGIH TLV (Skin*), 1988-89
TLV-TWA: 0.5 mg/m³

All PCBs/Aroclors
CAS No. 1336-36-3
NIOSH REL 1977
10-Hour TWA: 0.001mg/m³
Toxicity Data**
Mouse, Oral, LD_{50}: 1900 mg/kg

*This material can be absorbed through intact skin, which contributes to overall exposure.
**See NIOSH, *RTECS* (Genium ref. 90), at the locations specified in section 1 for additional data with references to tumorigenic, reproductive, mutagenic, and irritative effects.

SECTION 3. PHYSICAL DATA

Boiling Point: Ranges from 527°F (275°C) to 725°F (385°C)
Solubility in Water (%): Insoluble
Pour Point: Ranges from -31°F (-35°C) to 87.8°F (31°C)

% Volatile by Volume: Ranges from 1.2 to 1.6
Molecular Weight (Average): Aroclor 1242: 258 Grams/Mole
Aroclor 1254: 326 Grams/Mole

Appearance and Odor: Clear to light yellow mobile oil to a sticky resin; a sweet "aromatic" odor. As the percentage of chlorine increases, the PCB becomes thicker and heavier; e.g., Aroclor 1254 is more viscous than Aroclor 1242.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point*	Autoignition Temperature: Not Found	LEL: Not Found	UEL: Not Found

Extinguishing Media: Use water spray/fog, carbon dioxide (CO_2), dry chemical, or "alcohol" foam to extinguish fires that involve polychlorinated biphenyls. Although it is very difficult to ignite PCBs, they are often mixed with more flammable materials (oils, solvents, etc.) **Unusual Fire or Explosion Hazards:** If a transformer containing PCBs is involved in a fire, its owner may be required to report the incident to appropriate authorities. Consult and follow all pertinent Federal, state, and local regulations. **Special Fire-fighting Procedures:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode; fire fighters must also wear a complete set of protective clothing. **Comments:** The hazards of PCB fires are associated with the possibility of their being released into the environment where they and their products of degeneration can pose serious long-term health risks. These potential problems are heightened by the PCBs' resistance to biological and chemical degradation and by the possibility that they will contaminate underground water systems (see sect. 5)

*Ranges from 284°F (140°C) to 392°F (200°C).

SECTION 5. REACTIVITY DATA

bility/Polymerization: Polychlorinated biphenyls are very stable materials. Hazardous polymerization cannot occur. **mical Incompatibilities:** PCBs can react dangerously with sodium or potassium. These reactions are part of an industrial process used estroy PCBs; however, people have been killed by explosions at PCB treatment, storage, and disposal sites. **Conditions to Avoid:** Limit human exposure to PCBs to the lowest possible level; especially avoid contact with skin. **Hazardous Products of Decomposition:** Th[illegible]dation of PCBs can produce toxic gases such as carbon monoxide, chlorine, chlorinated aromatic fragments [illegible]les, [illegible] hydrogen chloride. Incomplete combustion of PCBs produces toxic compounds such as polychlorinated diben[illegible] maj[illegible] product of combustion), and polychlorinated dibenzo-*p*-dioxin (PCDD or dioxin).

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SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: The EPA lists PCBs as carcinogens, and the IARC classifies them as probable human carcinogens (group 2B). **Summary of Risks:** Effects of accidental exposure to PCBs include acneform eruptions; eye discharge; swelling of the upper eyelids and hyperemia of the conjunctiva; hyperpigmentation of skin, nails, and mucous membrane; chloroacne; distinctive hair follicles; fever; hearing difficulties; limb spasms; headache; vomiting; and diarrhea. PCBs are potent liver toxins that can be absorbed through unbroken skin in hazardous amounts without immediately discernible pain or discomfort. Severe health effects can develop later. In experimental animals, prolonged or repeated exposure to PCBs by any route results in liver damage at levels that are less than those reported to have caused cancer in rodents. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** Skin, eyes, eyelids, blood, liver. **Primary Entry:** Inhalation, skin contact/absorption. **Acute Effects:** Skin and eye irritation, acneform dermatitis, nausea, vomiting, abdominal pain, jaundice, liver damage. **Chronic Effects:** Possible cancer (evidence of this is inconclusive); reproductive effects (jaundice, excessive secretion of tears, dermal chromopexy); and hepatitis. **FIRST AID:** **Eyes.** Immediately flush eyes, including under the eyelids, gently but thoroughly with flooding amounts of running water for 15 minutes. **Skin.** Rinse exposed skin with flooding amounts of water; wash with soap and water. **Inhalation.** Remove the exposed person to fresh air; restore and/or support breathing as needed. Have qualified medical personnel administer oxygen as required. **Ingestion.** Induce vomiting by sticking your finger to the back of the exposed person's throat. Have him or her drink 1 to 2 glasses of milk or water. **Get medical help (in plant, paramedic, community) for all exposures.** Seek prompt medical assistance for further treatment, observation, and support after first aid. **Note to Physician:** PCBs are poorly metabolized, soluble in lipids, and they accumulate in tissues or organs rich in lipids. Liver function tests can help to determine the extent of body damage in exposed persons. If electrical equipment containing PCBs arcs over, the PCBs or other hydrocarbon dielectric fluids may decompose and give off hydrochloric acid (HCl), a potent respiratory irritant.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: *Treat any accidental release of PCBs as an emergency. An SPCCP (spill-prevention control and countermeasure plan) must be formulated before spills or leaks occur.* PCBs are resistant to biodegradation, soluble in lipids, and chemically stable; as such they have become significant contaminants of global ecosystems. Releases of PCBs require immediate, competent, professional response from trained personnel. *Each release situation is unique and requires a specifically designed cleanup response.* General recommendations include adhering to Federal regulations (40 CFR Part 761). Notify safety personnel, evacuate nonessential personnel, ventilate the spill area, and contain the PCBs. All wastes, residues, and contaminated cleanup equipment from the incident are subject to EPA requirements (40 CFR 761). Consult your attorney or appropriate regulatory officials for information about reporting requirements and disposal procedures. **Waste Disposal:** Contact your hazardous waste disposal firm or a licensed contractor for detailed recommendations, especially when PCBs are unexpectedly discovered. Follow Federal, state, and local regulations. PCBs are biomagnified in the food chain; i.e., their concentration increases at each link. The disposal of PCBs or of PCB-contaminated materials is strictly regulated; violations of applicable laws can result in fines, lawsuits, and negative publicity. **Warning:** Accidental spills of PCBs that may affect water supplies must be reported to Coast Guard personnel at the National Response Center, telephone (202) 426-2675.

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000 Subpart Z).
EPA Designations (40 CFR 302.4)
CERCLA Hazardous Substance, Reportable Quantity: 10 lbs (4.54 kg), per the Clean Water Act (CWA), §§ 311 (b) (4) and 307 (a).

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing of PCBs is possible, wear a full face shield. Follow OSHA eye- and face-protections regulations (29 CFR 1910.133). **Respirator:** Wear a NIOSH-approved respirator per Genium reference 88 for the maximum-use concentrations and/or exposure limits cited in section 2. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (leaks or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets, etc., to prevent any contact of PCBs with your skin. **Ventilation:** Install and operate general and local maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the OSHA PEL standards cited in section 2. Local exhaust ventilation is preferred because it prevents dispersion of the contamination into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do not wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean this material from your shoes and equipment. Heavily soiled clothing must be properly discarded in a manner consistent with applicable regulations. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in work areas.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage Segregation: Store PCBs in closed containers in a cool, dry, well-ventilated area. Protect containers from physical damage. **Special Handling/Storage:** All storage facilities must have adequate containment systems (dikes; elevated, nonporous holding platforms; retaining walls) to prevent any major release of PCBs into the environment. Carefully design and implement these extra precautions now; do not wait until you have to respond to an accidental release of this material.

Transportation Data (49 CFR 172.101-2; PCBs were the first materials to be directly regulated by Congress by way of TSCA in 1976.)

DOT Shipping Name: Polychlorinated Biphenyls
DOT Hazard Class: ORM-E
ID No. UN 23115
DOT Packaging Requirements: 49 CFR 173.510

IMO Shipping Name: Polychlorinated Biphenyls
IMO Hazard Class: 9
IMDG Packaging Group: II

References: 1, 6, 26, 38, 84-94, 100, 101, 116, 117, 120, 122.

Prepared by PJ Igoe, BS; Industrial Hygiene Review: DJ Wilson, CIH; **Medical Review:** W Silverman, MD

Technical [illegible] Ana[illegible]tical, Inc. (PCB and VOC Specialists), Schenectady, New York, Telephone: (518) 346-4592

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APPENDIX B
TECHNICAL SPECIFICATIONS

STD & SPEC 3.01

SAFETY FENCE

Definition

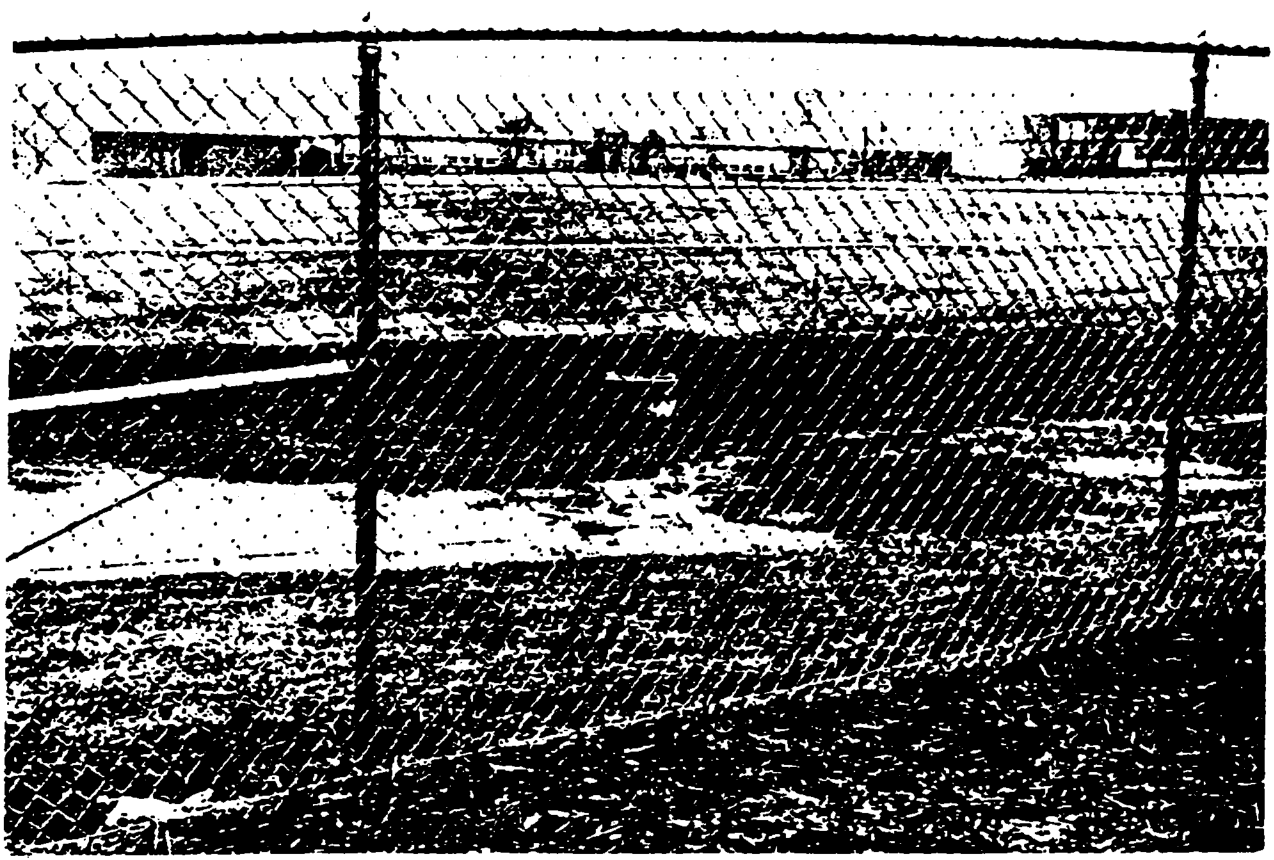
A protective barrier installed to prevent access to an erosion control measure.

Purpose

To prohibit the undesirable use of an erosion control measure by the public.

Conditions Where Practice Applies

Applicable to any control measure or series of measures which can be considered unsafe by virtue of potential for access by the public.



Planning Considerations

The safety of the public must always be considered at both the planning and implementation phases of a land-disturbing activity. If there is any question concerning the risk of a particular erosion control measure to the general public, the measure should be relocated to a safer area, or an appropriate safety fence should be installed to prevent undesired access. Many times, the danger posed by a control may not be easily seen by plan designers and reviewers - that is when the on-site contractor or inspector must correct such situations in the field. Properly designed and installed safety fences prevent the trespassing of people into potentially dangerous areas, such as children using a sediment basin or a stormwater retention structure as play areas. The installation of these fences will protect people from hazards and the owner from possible litigation.

Two different types of fence will be discussed in this specification. The designer, developer, and contractor should always be sure that the most appropriate type of fence is utilized for a particular need.

Design Criteria

1. Safety fences should be located so as to create a formidable barrier to undesired access, while allowing for the continuation of necessary construction operations.

2. Safety fences are most applicable to the construction of berms, traps, and dams. In use with those structures, safety fences should be located far enough beyond the outer toe of the embankment to allow for the passage of maintenance vehicles. Fences should not be installed across the slope of a dam or dike.

3. The height of the fence shall be a minimum of 5 feet for plastic fence and 6 feet for metal fence. A fence must never be so short as to become an attraction for children to climb on or over.

4. Signs noting potential hazards such as "DANGER-QUICKSAND" or "HAZARDOUS AREA - KEEP OUT" should be posted and easily seen by anyone approaching the protected area.

5. Plastic (polyethylene) fence may be used as safety fencing, primarily in situations where the need is for a temporary barrier (see Plate 3.01-1). The fence should meet the physical requirements noted in the following table:

TABLE 3.01-A

PHYSICAL PROPERTIES OF PLASTIC SAFETY FENCE

Physical Property	Test	Requirements
Recommended color	N/A	"International" orange
Tensile yield	ASTM D638	Average 2000 lbs. per 4 ft. width
Ultimate tensile strength	ASTM D638	Average 2900 lbs. per 4 ft. width
Elongation at break(%)	ASTM D638	Greater than 1000%
Chemical resistance	N/A	Inert to most chemicals and acids

Source: Conwed Plastics

6. Metal or "chain-link" fence should be used when a potentially dangerous control measure will remain in place permanently, such as a stormwater detention or retention basin (see Plate 3.01-1). However, they may also be used for measures which will only serve a temporary function, at the discretion of those responsible for project safety. The metal fence must meet the following physical requirements:

   a. Fabric shall be zinc-coated steel, 2-inch mesh, 9-gauge, minimum.

   b. Zinc coating shall have a minimum weight of 1.8 ounces per square foot.

   c. Posts shall be steel pipe, zinc-coated.

   d. Top nails shall be steel pipe, zinc-coated.

   e. Braces shall be made of zinc-coated steel.

   f. Gates shall be single or double swing, zinc-coated steel. They shall be a minimum of 12-feet wide.

Construction Specifications

1. Safety fences must be installed prior to the E&S measure becoming accessible.

2. The polyethylene web of the plastic safety fence shall be secured to a conventional metal "T" or "U" post driven into the ground to a minimum depth of 18 inches; posts should be spaced at 6-foot centers. See "perspective" view in Plate 3.01-1.

3. The metal safety fence shall be installed as per the following procedure:

   a. Line posts shall be placed at intervals of 10 feet measured from center to center of adjacent posts. In determining the post spacing, measurement will be made parallel with the ground surface. See "perspective" view in Plate 3.01-1.

   b. Posts will be set in concrete and backfilled or anchored by other acceptable means.

   c. Posts set in the tops of concrete walls shall be grouted into preformed holes to a minimum depth of 12 inches.

   d. All corner posts, end posts, gate posts, and pull posts shall be embedded, braced, and trussed as shown in the "Standard Fence - Chain Link" detail found in the latest version of the Virginia Department of Transportation (VDOT) Road and Bridge Standards.

   e. Fencing fabric shall not be stretched until at least 4 days after the posts are grouted into walls or 14 days after the posts are set into concrete.

   f. The fabric shall be stretched taut and securely fastened, by means of tie clips, to the posts at intervals not exceeding 15 inches and to the top rails or tension wires at intervals not exceeding 2 feet. Care shall be taken to equalize the tension on each side of each post.

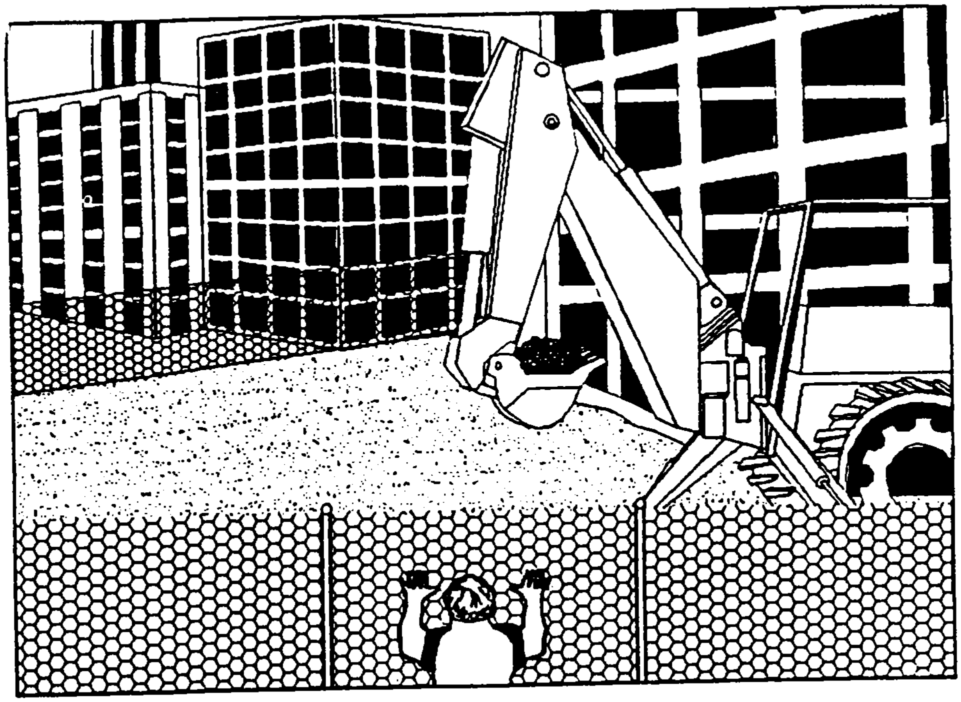
4. Applicable warning signs noting hazardous conditions must be installed immediately upon installation of safety fence.

Maintenance

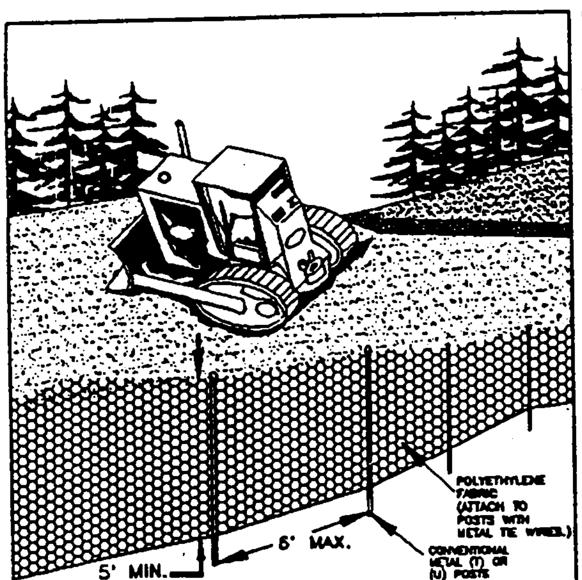
1. Safety fence shall be checked regularly for weather-related or other damage. Any necessary repairs must be made immediately.

2. Care should be taken to secure all access points (gates) at the end of each working day. All locking devices must be repaired or replaced as necessary.

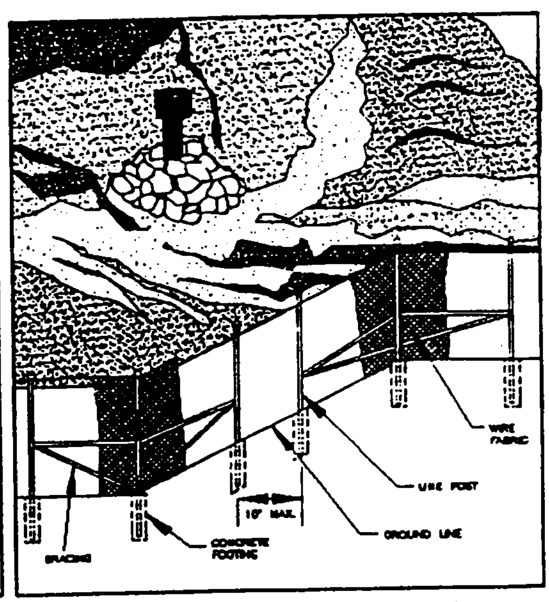
SAFETY FENCE



PERSPECTIVE VIEW



PERSPECTIVE VIEW
PLASTIC FENCE



PERSPECTIVE VIEW
METAL FENCE

Source: Adapted from Conwed Plastics and VDOT Road and Bridge Standards

Plate 3.01-1

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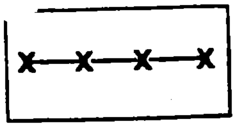
STD & SPEC 3.05



SILT FENCE

SF

Definition

A temporary sediment barrier consisting of a synthetic filter fabric stretched across and attached to supporting posts and entrenched.

Purposes

1. To intercept and detain small amounts of sediment from disturbed areas during construction operations in order to prevent sediment from leaving the site.

2. To decrease the velocity of sheet flows and low-to-moderate level channel flows.

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Conditions Where Practice Applies

1. Below disturbed areas where erosion would occur in the form of sheet and rill erosion.

2. Where the size of the drainage area is no more than one quarter acre per 100 feet of silt fence length; the maximum slope length behind the barrier is 100 feet; and the maximum gradient behind the barrier is 50 percent (2:1).

3. In minor swales or ditch lines where the maximum contributing drainage area is no greater than 1 acre and flow is no greater than 1 cfs.

4. Silt fence will not be used in areas where rock or some other hard surface prevents the full and uniform depth anchoring of the barrier.

Planning Considerations

Laboratory work at the Virginia Highway and Transportation Research Council (VHTRC) has shown that silt fences can trap a much higher percentage of suspended sediments than straw bales, though silt fence passes the sediment-laden water slower. Silt fences are preferable to straw barriers in many cases because of their durability and potential cost savings. While the failure rate of silt fences is lower than that of straw barriers, many instances have been observed where silt fences are improperly installed, inviting failure and sediment loss. The installation methods outlined here can improve performance and reduce failures.

As noted, flow rate through silt fence is significantly lower than the flow rate for straw bale barriers. This creates more ponding and hence more time for sediment to fall out. Table 3.05-A demonstrates these relationships.

Both woven and non-woven synthetic fabrics are commercially available. The woven fabrics generally display higher strength than the non-woven fabrics and, in most cases, do not require any additional reinforcement. When tested under acid and alkaline water conditions, most of the woven fabrics increase in strength, while the reactions of non-woven fabrics to these conditions are variable. The same is true of testing under extensive ultraviolet radiation. Permeability rates vary regardless of fabric type. While all of the fabrics demonstrate very high filtering efficiencies for sandy sediments, there is considerable variation among both woven and non-woven fabrics when filtering the finer silt and clay particles.

Design Criteria

1. No formal design is required. As with straw bale barriers, an effort should be made to locate silt fence at least 5 feet to 7 feet beyond the base of disturbed slopes with grades greater than 7%.

TABLE 3.05-A

TYPICAL FLOW RATES AND FILTERING EFFICIENCIES OF PERIMETER CONTROL

Material	Flow Rate (gal./sq.ft./min)	Filter Efficiency(%)
Straw	5.6	67
Synthetic Fabric	0.3	97

Source: VHTRC

2. The use of silt fences, because they have such a low permeability, is limited to situations in which only sheet or overland flows are expected and where concentrated flows originate from drainage areas of 1 acre or less.

3. Field experience has demonstrated that, in many instances, silt fence is installed too short (less than 16 inches above ground elevation). The short fence is subject to breaching during even small storm events and will require maintenance "clean outs" more often. Properly supported silt fence which stands 24 to 34 inches above the existing grade tends to promote more effective sediment control.

Construction Specifications

Materials

1. Synthetic filter fabric shall be a pervious sheet of propylene, nylon, polyester or ethylene yarn and shall be certified by the manufacturer or supplier as conforming to the requirements noted in Table 3.05-B.

2. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0° F to 120° F.

3. If wooden stakes are utilized for silt fence construction, they must have a diameter of 2 inches when oak is used and 4 inches when pine is used. Wooden stakes must have a minimum length of 5 feet.

TABLE 3.05-B

PHYSICAL PROPERTIES OF
FILTER FABRIC IN SILT FENCE

Physical Property	Test	Requirements
Filtering Efficiency	ASTM 5141	75% (minimum)
Tensile Strength at 20% (max.) Elongation*	VTM-52	Extra Strength - 50 lbs./linear inch (minimum) Standard Strength - 30 lbs./linear inch (minimum)
Flow Rate	ASTM 5141	0.2 gal./sq.ft./ minute (minimum)
Ultraviolet Radiation Stability %	ASTM-G-26	90% (minimum)

* Requirements reduced by 50% after six months of installation.

Source: VHTRC

4. If steel posts (standard "U" or "T" section) are utilized for silt fence construction, they must have a minimum weight of 1.33 pounds per linear foot and shall have a minimum length of 5 feet.

5. Wire fence reinforcement for silt fences using standard-strength filter cloth shall be a minimum of 14 gauge and shall have a maximum mesh spacing of 6 inches.

Installation

1. The height of a silt fence shall be a minimum of 16 inches above the original ground surface and shall not exceed 34 inches above ground elevation.

2. The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.

3. A trench shall be excavated approximately 4-inches wide and 4-inches deep on the upslope side of the proposed location of the measure.

4. When wire support is used, standard-strength filter cloth may be used. Posts for this type of installation shall be placed a maximum of 10-feet apart (see Plate 3.05-1). The wire mesh fence must be fastened securely to the upslope side of the posts using heavy duty wire staples at least one inch long, tie wires or hog rings. The wire shall extend into the trench a minimum of two inches and shall not extend more than 34 inches above the original ground surface. The standard-strength fabric shall be stapled or wired to the wire fence, and 8 inches of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees.

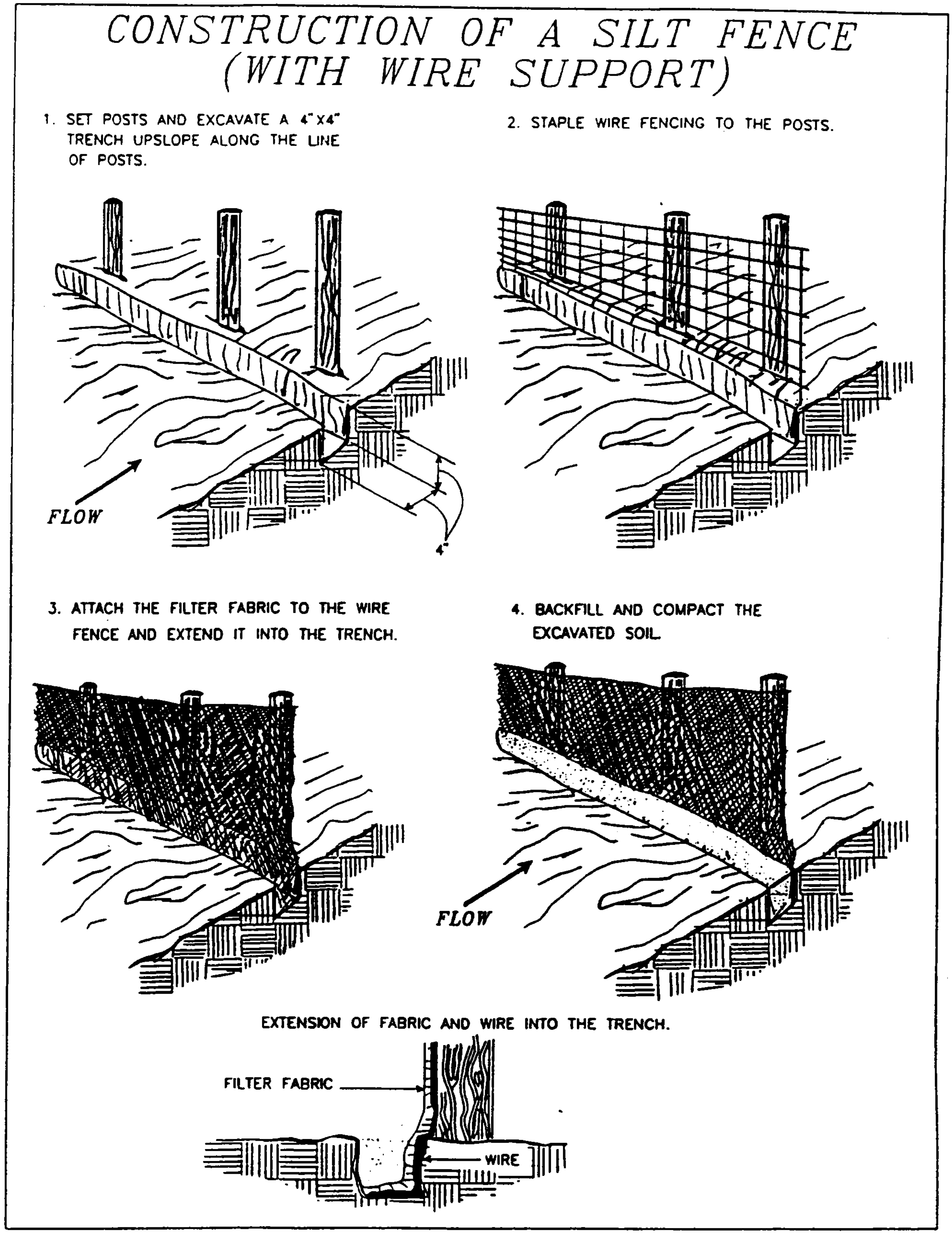
5. When wire support is not used, extra-strength filter cloth shall be used. Posts for this type of fabric shall be placed a maximum of 6-feet apart (see Plate 3.05-2). The filter fabric shall be fastened securely to the upslope side of the posts using one inch long (minimum) heavy-duty wire staples or tie wires and eight inches of the fabric shall be extended into the trench. The fabric shall not be stapled to existing trees. This method of installation has been found to be more commonplace than #4.

6. If a silt fence is to be constructed across a ditch line or swale, the measure must be of sufficient length to eliminate endflow, and the plan configuration shall resemble an arc or horseshoe with the ends oriented upslope (see Plate 3.05-2). Extra-strength filter fabric shall be used for this application with a maximum 3-foot spacing of posts.

   All other installation requirements noted in #5 apply.

7. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric.

8. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

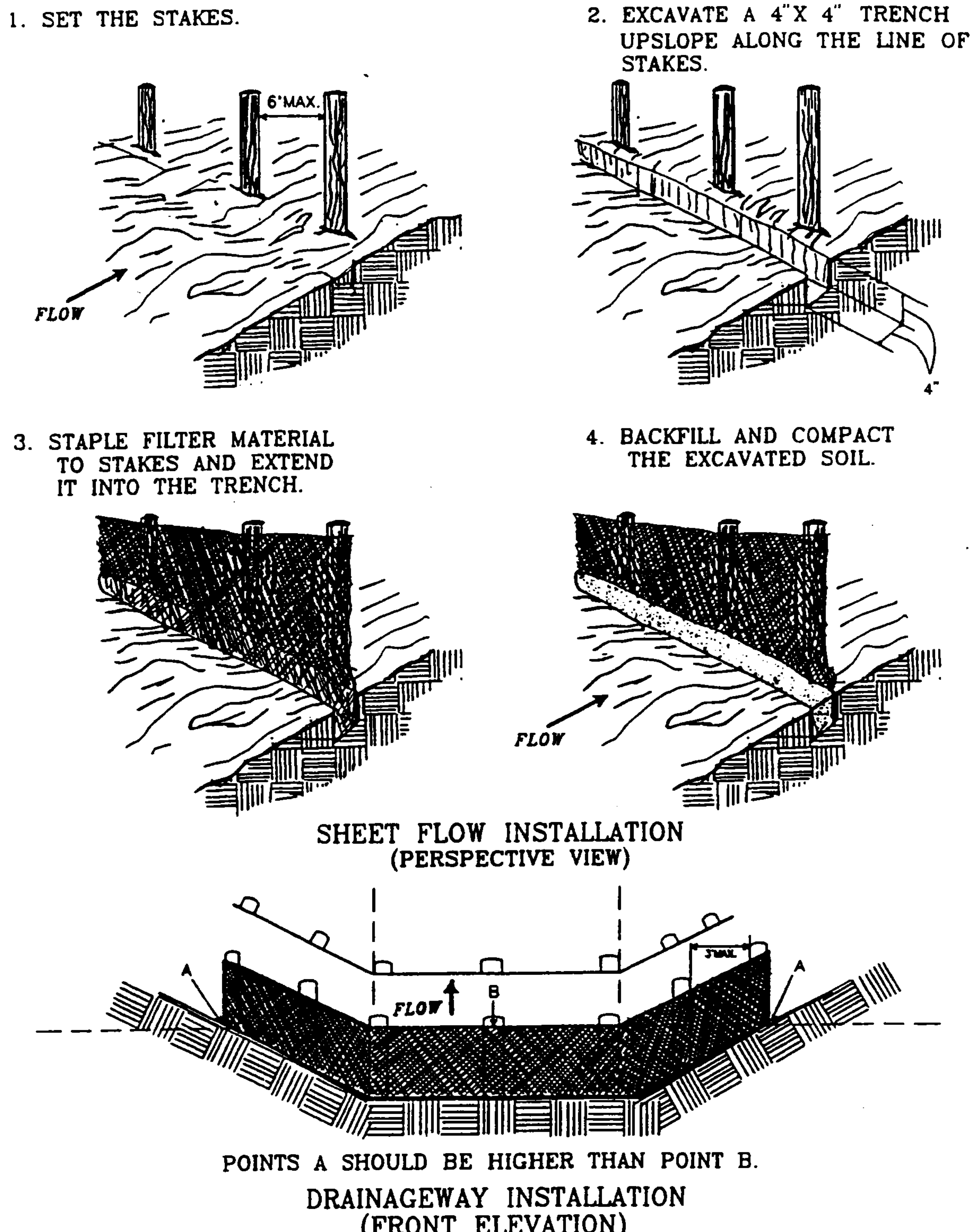


Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Plate 3.05-1

DRAFT

CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)



Source: Adapted from Installation of Straw and Fabric Filter Barriers for Sediment Control, Sherwood and Wyant

Plate 3.05-2

DRAFT

Maintenance

1. Silt fences shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.

2. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting.

3. Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the barrier still be necessary, the fabric shall be replaced promptly.

4. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-half the height of the barrier.

5. Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade, prepared and seeded.

DRAFT

HEALTH AND SAFETY PLAN

PCB SOIL REMOVAL ACTION - SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-93-B-3122

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Prepared by:

NAVY Public Works Center
Energy/Environmental
Engineering Branch
Code 414
Norfolk, Virginia

11 October, 1994

FINAL

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1.0 INTRODUCTION

NAVY Public Works Center - Norfolk, Virginia is pleased to submit this Health and Safety Plan (HSP) to Naval Facilities Engineering Command - Atlantic Division in response to PCB Soil Removal Action, Site 16, at Little Creek Naval Amphibious Base, Norfolk, Virginia. All work will be in accordance with Naval Facilities Command (NAVFAC) Specification No. 05-93-3122 dated January 25, 1994.

1.1 PROJECT BACKGROUND

Less than five gallons of dielectric fluid were found missing from a capacitor, formerly attached to a utility pole, after a lightning strike in the early 1980's. Previous site investigations (Reports (a) and (b) of NAVFAC Specification No. 05-93-3122 dated January 25, 1994) have shown that Site 16 contains PCB contaminated soil with levels which range from undetectable to 2100 ppm. The area of concern is approximately 1180 square feet with an approximate depth of 2 feet.

The Health and Safety Plan (HSP) documents policies and practices which will protect workers and the general public from potential hazards posed by work at this site. PWC-NORVA considers safety the highest priority at a work site. All activities will be conducted in a manner that minimizes the probability of injury, accident or incident. Every active worker on site will receive comprehensive safety training and will acknowledge the receipt of this training.

1.2 SCOPE OF WORK

The scope of work includes the following activities:

- Sample collection
- Site preparation
- Excavation of contaminated soil and generated waste
- Store, haul and dispose of the contaminated soil and replace existing utility pole
- Backfill, regrade and reseed the excavated area and replace structures
- Construct, operate and dismantle a decontamination area

2.0 KEY PERSONNEL

The Health and Safety Officer (HSO), the Site Supervisor (SS), the Project Engineers and a Certified Industrial Hygienist (CIH) will be responsible for formulating, implementing and enforcing the HSP.

2.1 CERTIFIED INDUSTRIAL HYGIENIST

The CIH shall be responsible for overssing the contents of the HSP and shall ensure that the HSP complies with all state, federal and local health and safety requirements. The HSO will coordinate with the CIH, all proposed changes in the HSP and the CIH will be available for consultation when required.

2.2 HEALTH AND SAFETY OFFICER

The HSO will administer the HSP at the site and will be on site while work is in progress. The HSO's primary responsibilities will include personal and environmental monitoring, personal protective equipment (PPE) maintenance and the assignment of protection levels. The HSO will be the main contact for any on-site emergency and will be responsible for stopping work when an unacceptable health or safety risk exists. The HSO is responsible for assuring that all site personnel understand and comply with all safety requirements.

2.3 PROJECT ENGINEER

The Project Engineers (PE's) have the overall responsibility for the project and to assure that the project goals are attained in a manner consistent with the HSP. The PE's will coordinate with the SS and HSO to assure that the project goals are completed in a manner consistent with the HSP.

2.4 SITE SUPERVISOR

The SS is responsible for field implementation of the HSP and will remain on-site while work is in progress. The SS establishes and ensures compliance with procedures and site control areas and coordinates these responsibilities with the HSO.

2.5 EMPLOYEES

Each employee is responsible their personal safety as well as the safety of others in the area. All employees will use the equipment provided by PWC-NORVA in a responsible manner. All PWC-NORVA personnel will follow the general safety policies set forth by the Occupational Safety and Health Office at PWC-NORVA and the specific requirements associated with this project.

2.6 KEY SAFETY PERSONNEL

The following is a list of individuals that share responsibility for health and safety at the work site.

		Qualifications
Site Supervisor (site phone)	Andrew M. Smith Cellular - TBD	40-hr Hazardous Site Workers Course
Health and Safety Officer (site phone)	Audrey Weber Cellular - TBD	40-hr Hazardous Site Workers Course First Aid, CPR Health & Safety Pers.@ Dept. of Environmental Quality
Project Engineers	J.P. Messier (804)445-4885	40-hr Hazardous Site Workers Course Proj. Manager for site remediation and UST removal actions
	Craig Mayer (804)445-4885	40-hr Hazardous Site Workers Course Proj. Manager for site remediation and UST removal actions
Certified Industrial Hygenist	G.M. Dulka (804)444-1420	C.I.H.

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Site Supervisor (site phone)	Andrew M. Smith Cellular - TBD	40 hr hazwoper first aid CPR
Health and Safety Officer (site phone)	Audrey Weber Cellular - TBD	40 hr. Hazwoper emergency disaster training preparedness Basic industrial hygiene ~~Federal~~ law and regulation first aid & CPR ~~over~~ 4 years exp. H&S dept of Envir. Quality
Project Engineers 40 hr. hazwoper	J.P. Messier (804)445-4885	
40 hr. hazwoper	Craig Mayer (804)445-4885	
Certified Industrial Hygenist	G.M. Dulka (804)444-1420	

3.0 RECORDKEEPING

All accident, injury and training records will be maintained at the work site by the HSO.

4.0 JOB HAZARDS

This section includes a description of the potential chemical, physical and environmental hazards which workers may be exposed to during work on this project.

4.1 CHEMICAL HAZARDS

The only known chemical hazard is polychlorinated biphenyls (PCBs). PCBs can enter the body through the skin and eyes and via inhalation and ingestion. Exposure to PCBs can lead to irritation of the skin and eyes, the formation of an acne like dermatitis and liver damage. PCBs are a suspected carcinogen with a PEL/TLV of 0.5 mg/m^3.

4.2 PHYSICAL HAZARDS

4.2.1 NOISE

Exposure to noise will be controlled to reduce the incidence of hearing loss and to minimize fatigue and the probability of accidents. The standard set by the Occupational Safety and Health Administration (OSHA) limits an employees exposure to 90 dBA calculated as an 8 hour, time weighted average (TWA). The noise level will be reduced or held below prescribed limits by engineering controls or through a hearing conservation program. Any employee exposed to noise levels equal to or greater than 85 dBA over an 8 hour period will be provided equipment to prevent hearing loss.

4.2.2 HEAT STRESS

The combination of warm ambient temperatures and protective clothing increases the potential for heat stress. Heat stress manifests itself as heat rash or cramps and heat exhaustion or heat stroke. Heat stress is covered in the 40-hour OSHA HazMat Course and will be discussed at the daily safety meetings. Workers will be encouraged to increase their consumption of water and electrolyte containing beverages.

The Little Creek NAB Safety Office takes a daily WBGT reading and posts the corresponding flag for the current heat stress condition. The site supervisor will obtain this information to calculate and monitor safe working times.

4.3 ENVIRONMENTAL HAZARDS

Environmental hazards such as weather, animals, insects and irritant plants always pose a hazard when working outdoors. The HSO and SS will take action to alleviate these problems if they occur.

4.3.1 POISON IVY

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and sumac. The most common allergic reactions are itching and redness on the affected area and the development of a rash. Severe allergic reactions may produce a rash characterized by redness, blisters, swelling and intense burning and itching. Ordinarily, a rash will develop immediately after contact with the plant, but may be delayed 24 - 48 hours.

Site workers will be screened to determine if a history of poison ivy and/or bee stings exist. If unknown, medical records will be consulted.

The most distinguishing feature of these plants is their leaves, which are composed of a cluster of 3 leaflets each. Areas containing poison ivy should be pointed out to workers and to avoid contact with the skin, paper tyvek should be worn.

If contact is made with a poisonous plant, immediately practice the following first aid:

- Remove contaminated clothing, wash all exposed areas with soap and water, followed by rubbing alcohol
- Apply calamine or other soothing lotion if rash is mild.
- Seek medical advice if the reaction is severe.

4.3.2 TICKS

Heavily vegetated areas may contain ticks. All personnel walking through such areas should wear a minimum of a paper tyvek suit and boot covers. An insect repellent is also suggested.

Ticks can transmit several diseases including Rocky Mountain Spotted Fever and Lyme Disease. The longer a tick is attached, the greater its chance to transmit disease. If you have been bitten, practice immediate first aid.

- Cover the tick with a heavy oil (mineral, salad or machine) to close its breathing pores. If the tick does not immediately disengage, allow oil to remain for 30 minutes. Carefully remove the entire tick with a pair of forceps.
- Wash with soap and water, thoroughly, but gently the area from which the tick was removed. Wipe the bite area with an antiseptic.
- Place the tick in a jar labeled with the date, location of the bite and location acquired. If any symptom appears, contact a physician immediately.

4.3.3 LYME DISEASE

Lyme disease may cause a number of medical conditions that can be treated If left untreated Lyme disease can cause serious nerve and heart problems as well as a disabling type of arthritis. The early signs of Lyme disease include:

- Flu like symptoms such as stiff neck, sore throat, fever, chills, headache and joint or muscle pains.
- Skin rash around the bite area. The rash may be painful and feel hot.

4.3.4 SNAKEBITE

There are two poisonous snakes indigenous to the Tidewater are, the cotton mouth or water moccasin and the copperhead. Very few people die from snakebite, however anyone bitten by a snake should receive medical attention quickly. Prior to receiving medical assistance, the following actions can be taken.

- Keep victim calm.
- If bite is on arm or leg, keep bitten area below the area of the heart.
- Splint wound - to immobilize. Do not dress or apply antiseptic to the wound.

4.4 JOB HAZARD ANALYSIS

JOBS[a]	HAZARD	CONTROL MEASURE
All	Slips, Trips and Falls	Clear walkways and work areas of equipment,tools, debris and excavated material. Mark, identify or barricade other obstructions.
1,2,3	Sharp Objects	Wear cut resistant gloves. Maintain all hand and power tools in safe condition.
All	Fire	Prohibit smoking, post "NO SMOKING" signs. Shut-off vehicles, equipment during refueling. Eliminate sources of ignition from the area. Use grounding and bonding during refueling.

1,2,3	Flying Objects	Avoid equipment swing areas. Barricade or enclose the work area. Make eye contact with equipment operators before approaching equipment. Restrict entry to authorized personnel. Wear safety boots, hard hats and safety glasses at all times. Understand and review hand signals.
3	High Noise Levels	Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8 hour work period).
2,3,4	Handling Heavy Objects	Observe proper lifting techniques. Obey sensible lifting limits. Use mechanical lifting equipment when possible.
3,4,5	Inhalation and Contact w/Substances	Provide workers with the proper skin, eye and respiratory protection.
All	High Temperature	Monitor for heat stress.
1	Contact Dermatitis	Wear PPE to avoid skin contact. Identify and review poisonous plants with workers.
1,2	Underground Utilities	Identify all underground utilities around the the excavation site before work commences. Cease work immediately if unknown utility markers are uncovered.

ã See Job Description's, following page

<u>Job Description's</u>

1	Site preperation	_	Removing Vegetation, Installing Safety Fence.
2	Site set-up	_	Constructing Decon areas
3	Excavating	_	Hand and mechanical removal of soil into dumpsters
4	Pole removal/ replacement	_	Remove existing contaminated utility pole and replace with new.
5	PCB Sampling	_	Soil/wipe sampling of site for PCB's.

5.0 WORK AREAS

To prevent the contamination of adjacent areas, the work area will be divided into three zones:

- Exclusion or "hot" Zone (EZ)
- Contamination-Reduction or Warm" Zone (CRZ)
- Support or "Cold" Zone (SZ)

See drawing HSP-1 for location of these zones.

5.1 EXCLUSION ZONE

The EZ is the area suspected to contain the contaminated material and presents the greatest hazard to workers. All personnel entering the area must wear the mandated level of protection for that area. The EZ for this project is the actual excavation site.

5.2 CONTAMINATION - REDUCTION or WARM ZONE

The CRZ is established between the EZ and SZ. In this area, personnel will perform the decontamination process required to leave the EZ. All personnel will enter and exit the EZ through the CRZ.

5.3 SUPPORT or COLD ZONE

The SZ is the control area, located away from the EZ, which contains the site access roads and administrative area. There will be a clearly marked and controlled access point from the SZ to the CRZ. This access will be closely monitored by the SS and SSO to ensure proper safety procedures are followed. Each zone will be marked with signage on all sides.

6.0 PROTECTIVE EQUIPMENT

6.1 ANTICIPATED PROTECTION LEVELS

TASK	PROTECTION LEVEL
Site Preparation	LEVEL D
Soil Excavation	LEVEL C
Waste Handling	LEVEL C
Site Restoration	LEVEL D
CRZ Workers	LEVEL C
SZ Workers	LEVEL D

6.2 PROTECTION LEVEL DESCRIPTIONS

This section lists the minimum requirements for each protection level listed in Section 6.1.

6.2.1 Level D

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing suitable for the weather

6.2.2 Level C

- Full-face air purifying respirator with appropriate cartridges
- Hooded approved, tested, chemical resistant personal protective coveralls
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, or PVC overboots
- Nitrile, neoprene or PVC gloves over latex gloves

6.3 RESPIRATOR REQUIREMENTS

6.3.1 CARTRIDGES

All personnel working in Level C protection will wear respirators equipped with cartridges approved (at a minimum) for the following contaminants:

- Organic vapors <1000 ppm
- Dusts, fumes and mists with a TWA <0.05 mg/m^3

All cartridges will be changed a minimum of once daily. Dusty conditions may necessitate more frequent changes as inhalation resistance increases.

6.3.2 CERTIFICATION/FIT TESTING

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. All personnel will undergo annual respirator fit tests. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be allowed on the site.

6.3.3 RESTRICTIONS

Contact lenses will not be worn with any type of respirator. Normal eyeglasses can not be worn with a full face respirator. Workers requiring corrective lenses must obtain special spectacles designed for use with respirators. No personnel who have facial hair that interferes with respirators fit will be allowed to wear a respirator or work in areas requiring respirator use.

6.3.4 INSPECTION AND CLEANING

Respirators will be checked periodically by a qualified individual and inspected before each use. After each use the respirator will be decontaminated and hygienically cleaned.

6.4 INSPECTION OF PERSONAL PROTECTIVE EQUIPMENT

All personal protective equipment (PPE) will be inspected before use. Each item to be used will be certified fit by a qualified inspector.

7.0 GENERAL SAFETY

The following items are designed to protect the health and safety of the worker and will be discussed in the safety brief, prior to the commencement of work.

- Eating, drinking, chewing gum or tobacco, smoking or any other activity that increases the probability of hand to mouth transfer of contaminants is prohibited in the EZ and CRZ.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, smoking or other activities which require hand to mouth contact.
- A buddy system will be used in the EZ. Visual contact will be maintained at all times between buddies when performing hazardous duties.
- Hand signals will be established for communication.
- All employees and visitors must sign in and out of the site
- All personnel must comply with established safety procedures. Any staff member who does not comply with the safety policy will be immediately dismissed from the site.

8.0 DECONTAMINATION PROCEDURES

8.1 PERSONNEL DECONTAMINATION

Decontamination procedures will ensure that the contaminated material is not carried to clean areas or result in personal exposure to any staff member. The specific stages of decontamination required for this project are:

1. Go to the end of the EZ.
2. Remove and discard outer gloves and shoe covers.
3. Step into the CRZ and remove personal protective clothing suit and inner gloves.
4. Remove and wash respirator.
5. Rinse respirator and hang to dry.
6. Wash hands and face.
7. Exit the CRZ.

A fresh water spicket will be provided in the CRZ zone. A 5 gallon bucket with cleaning fluid will be provided in the EZ zone.

8.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be disposed with other construction generated PCB wastes. The exception to this is the bucket on the excavator. All loose dirt will be scraped or swept from the equipment while in the EZ. All soil will be contained in the equipment cleaning pad and disposed with other site generated contaminated soil. The excavater bucket will be moved into the CRZ and washed and rinsed. All reusable equipment will be wipe tested for 10 ppm PCB'S prior to leaving the site. If the test results are acceptable, the equipment can be removed. Equipment to be disposed of should be placed in the appropriate containers in the EZ.

9.0 EMERGENCY RESPONSE

9.1 MEDICAL EMERGENCY

The procedures listed below will be used to respond to a medical emergency. All employees will be briefed on their responsibilities and the procedures to follow prior to beginning work at the site. Any person trained or certified in first aid should be identified to all personnel. At least two persons on-site at a given time will be trained in First-Aid and CPR. The same people will also be trained in Bloodbourne Pathogens in accordance with 29 CFR 1910.1030.

In the event of a medical emergency or an accident:

- The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident.

- The SS or other site personnell will call out the emergency situation to other site personnel. If evacuation is required, the evacuation procedure as described in the EPP Section 5.

- The SS will be summoned and any on-site medical personnel alerted.

- If an apparent life threatening condition exists, the SS or SSO will contact emergency personnel. An on-site person will be appointed to meet and direct the emergency personnel.

- If the condition is non-life threatening, the SSO will direct the worker through decontamination and appropriate first-aid or medical attention will be administered. Decontamination will consist of the steps listed in section 8.1. If assistence is required, the person providing the assistance will follow the same decontamination procedures as outlined in section 8.1.

- A list of emergency telephone numbers and directions to the nearest medical center will be posted in all the trailer in the SZ (administrative area).

- The SS and SSO will file the appropriate accident/medical report and interview witnesses to determine the nature and/or cause of the illness or accident.

- The nearest medical emergency assistance source is the Little Creek NAB Medical Center. A map will be posted on site and directions will be explained during training sessions. Written directions will be given to all site personnel.

9.2 OTHER EMERGENCIES

The Environmental Protection Plan outlines response actions and evacuation plans in the event of a fire, spill or hazardous weather. See Section 6.0 Spill prevention and Response.

TABLES

TABLE 1

EMERGENCY INFORMATION

In the event of a fire, uncontrollable spill, explosion, or any occurrence that might be harmful to personnel or adjacent property, the SSHO will immediately notify the proper emergency services.

Emergency Notification Numbers

Fire Department	804 - 444 - 7333
Ambulance	804 - 398 - 7283
Police	804 - 464 - 7621

Procedures for Reporting Incidents

In the event of any of the above mentioned incidents, immediately call:

Project Engineer(s)	
J.P. Messier	804 - 445 - 4885/6
Craig Mayer	804 - 445 - 4885/6
National Response Center	1 - 800 - 424 - 8802

FIGURES

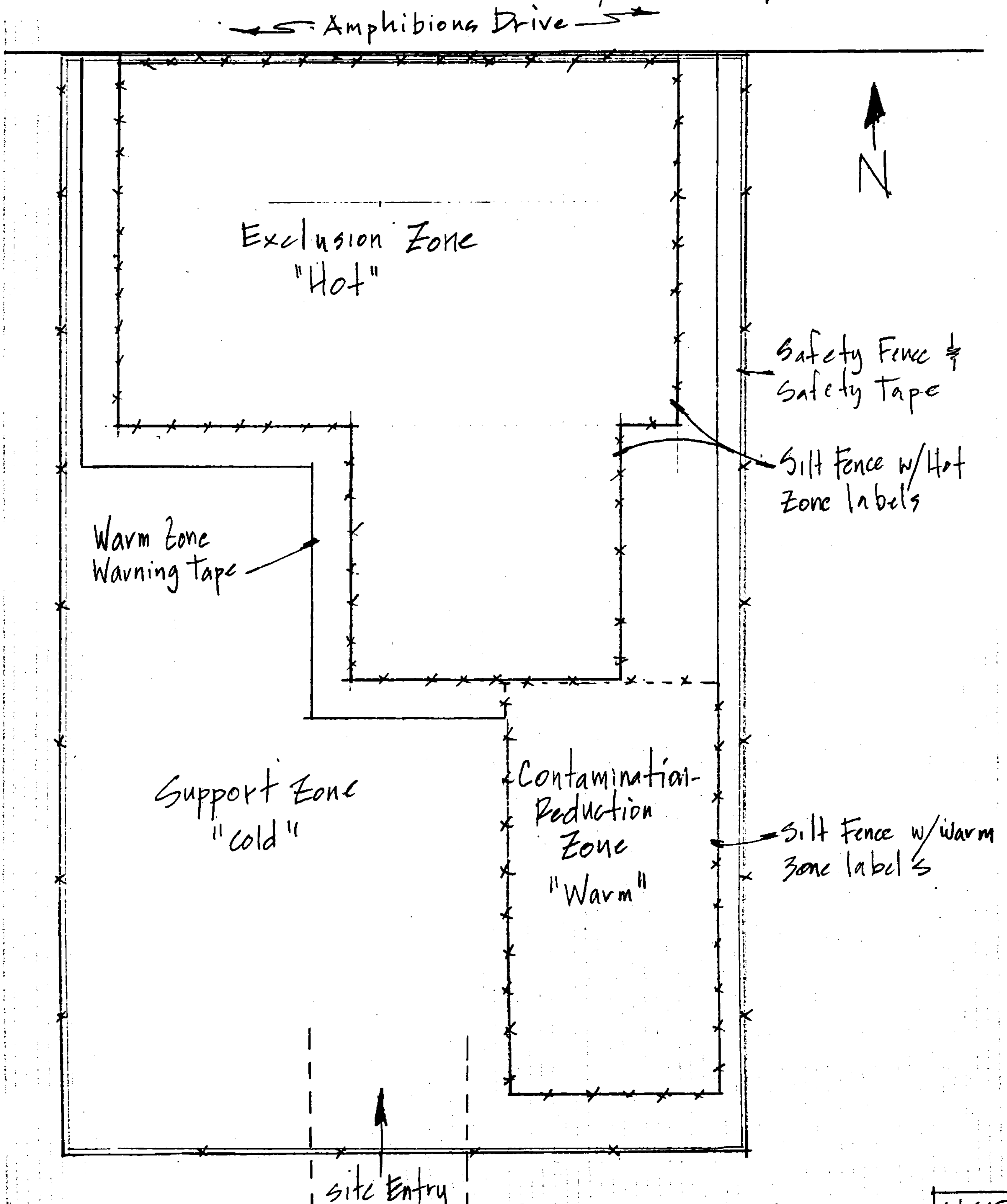
PWC NORFOLK

ENGINEERING DEPARTMENT

TITLE: Work Zone Delination Plan - Site 16 Little Creek NAB

BLDG: Site 16 J.O.# PAGE: 1 OF 1

BY: GM DATE: 10/21 CHKD: JPM DATE: 10/21



Site 16 NAB Little Creek - Work Zone Delination

1" = 10'-0"

HSP-2

SAMPLING AND ANALYSIS PLAN

PCB SOIL REMOVAL ACTION - SITE 16
LITTLE CREEK NAVAL AMPHIBIOUS BASE
NORFOLK, VIRGINIA
CONTRACT NO. N62470-93-B-3122

Prepared for:

Department of the NAVY
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Prepared by:

NAVY Public Works Center
Energy/environmental Engineering Branch
Code 414
Norfolk, Virginia

11 October, 1994
FINAL

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2	Summary of Containers, Preservation, and Holding Times for Water Samples
3	Summary of Containers, Preservation, and Holding Times for Imported Soil Samples
4	Soil Verification Plan

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Figure No.	Title
1	Plan of Soil Sampling Grid

1.0 INTRODUCTION

NAVY Public Works Center - Norfolk, Virginia is pleased to submit this Sampling and Analysis Plan (SAP) for the PCB soil removal action at site 16, Little Creek Naval Amphibious Base - Norfolk, Virginia. The contents of this plan follow the requirements as stated in NAVFAC Specification No. 05-93-3122. Supporting this plan are the Work Plan, Quality Control Plan, and the Health and Safety Plan.

During implementation of this plan, the most current USEPA procedures will be followed and quality control will be performed in accordance with the Quality Control Plan.

This sampling plan details the sampling involved for the following components of the project:

- Pre-removal action sampling and analysis of the proposed excavation area to obtain waste disposal facility approval through use of a disposal contractor.
- Soil in the excavated walls and bases in the contaminated soil area as identified in the guide specification.
- Decontamination water.
- Borrow fill material.

The sampling procedures, number of samples to be collected, cleanup levels, and chemical and/or geotechnical analyses required are discussed in the following sections. In addition, field screening will be performed as discussed in Section 2.0 in the excavated areas to help delineate the limits of contamination.

2.0 FIELD SCREENING

Established clean-up level for the PCB contaminated soil is 10 ppm as per NAVFAC 05-93-3122. Proposed limits of excavation will be accomplished as given in the Work Plan. Upon completion of initial excavation, field screening of the site will be accomplished to check for compliance with the clean-up level.

Field screening will be accomplished using "ENSYS PCB RIS©" soil test as a field-based alternative to laboratory based methods. It is a semi-quantitative test that gives an absence/presence indication around the chosen detection level. The test was designed to be most sensitive to the common Aroclors, such as 1248 which is what the site soil is contaminated with.

The PCB RIS© soil test conforms to EPA SW-846 Method 4020 for screening for PCB's using immunoassay detection. Product validation studies have indicated that the test can correctly identify over 95% of samples with PCB contamination.

3.0 SOIL SAMPLING AND ANALYSIS PLAN

The nature of contamination has previously been defined in the guide specification which lists one primary contaminant in the soil and their respective target soil criteria (or cleanup levels). They are:

- Polychlorinated biphenyls (PCB's){Aroclor 1248} 10 ppm

NAVY Public Works Center - Norfolk, Virginia will use field screening sampling to determine if contamination above the target soil criteria exists in soil at the preliminary limits of excavation. If the preliminary limits of excavation pass the field screens, soil confirmation sampling will be conducted in accordance with EPA 560/5-85-025 (Verification of PCB Spill Cleanup by Sampling and Analysis). If the excavation does not pass the field screens, additional excavation will be performed.

3.1 SAMPLE POINT LOCATION

For removal action purposes, once the excavation or portion thereof passes the field screening, EPA 560/5-85-025 (Verification of PCB Spill Cleanup by Sampling and Analysis) will be followed. Thirty seven samples will be taken in accordance with the EPA guidelines in the locations shown in Figure 1.(Proposed sampling grid). The thirty seven samples will be composited into four samples for laboratory analysis.

The sampling grid will be laid out once the preliminary limits of contamination are excavated. The actual locations of the confirmatory samples will be determined in the field. Should preliminary excavation limits increase based on either field screening or confirmatory sampling, then the sampling grid will be extended appropriately. Confirmatory sampling will be repeated as necessary after (1) each passing field screening event and (2) until the target soil cleanup criteria is met.

3.2 SAMPLE COLLECTION

During the removal action, soil samples will be taken using a coring device. Core samples will be taken to a depth of about twelve (12) inches. The samples will be collected in new sterilized glass bottles and capped with a Teflon-line lid. The samples will be properly labelled, a yellow TSCA PCB mark affixed, and placed in an ice chest (to keep the sample about 4°C). The sample collection data will be entered in the field log book and on the chain-of-custody form.

Upon completion of sampling at each location, the sampling tool will be decontaminated using the following procedures:

- Wash with nonphosphate detergent solution
- Triple rinse with tap water
- Wiped with a disposable wipe cloth

After each sample, rubber gloves and wipe cloth will be discarded into a plastic bag intended for disposal of PCB-contaminated materials. All decontamination water will be collected for proper disposal.

Should the preliminary limits of excavation not need to be exceeded based on field screening and confirmatory sampling, it is estimated that the number of field screening samples will be thirty-seven (37) with (4) being chosen as confirmatory samples for lab processing.

3.3 QUALITY ASSURANCE AND QUALITY CONTROL SAMPLES

Table 1 presents information regarding analytical methods, a summary of containers, and holding times for all soil samples. See Section 7.0 - QA Plan. The quality control samples to be collected during the work site include:

- One field replicate/duplicate for each ten samples collected

4.0 WATER SAMPLING AND ANALYSIS PROGRAM

A water sampling and analysis program will be implemented to characterize all water generated as a result of field work activities for on-site treatment and discharge.

4.1 DECONTAMINATION WATER

Water generated from project decontamination operations will be sampled at the storage container and analyzed. The water will be analyzed for PCB contamination only. Sampling and analytical work will be conducted in accordance with appropriate procedures contained in 40 CFR Part 136. Sampling will also be performed in accordance with NAVY Public Works Center standard procedures.

Per Part 136, when sampling of municipal and industrial wastewater, field measurement for residual chlorine is required. This will be done with field test kits meeting requirements of EPA Methods 330.4 and 330.5. If the residual chlorine is present, then sodium thiosulfate will be added as a preservative as outlined in Table 2. In addition, the sample bottles for water will not be prerinsed with sample prior to collection, and automatic sampling equipment will be as free as possible of Tygon tubing and other potential sources of contamination.

4.2 QUALITY ASSURANCE AND QUALITY CONTROL

Table 2 presents information regarding analytical methods, a summary of containers and holding times for water samples. See Section 7.0. The quality control samples collected during the site work include:

- One trip per shipping container
- One field replicate/duplicate for each ten samples collected

5.0 BORROW MATERIAL SAMPLING

Borrow material (backfill) for the excavated area will be trucked to the site from a government borrow source located at the Willoughby Housing area and Interstate 64. Samples of the random fill borrow material will be obtained for chemical and geotechnical analysis as shown in Tables 3 and 4, respectively. Upon completion of the analyses, the results will be reviewed and approved by the Base representative prior to beginning any backfill activities. The procedures for obtaining representative borrow material samples for analysis are described below.

5.1 RANDOM FILL

Approximately 100 cubic yards of random fill material will be required if the proposed excavations do not exceed the preliminary limits. Before acceptance is given by the Base representative, the random fill material must satisfy the chemical and geotechnical requirements.

5.1.1 Sampling for Chemical Analysis

The sampling technician will obtain representative random fill samples from the random fill at a depth to be determined in the field based on the area use for borrow material.

Two soil samples will be obtained from the random fill at locations to be determined in the field, and one quality control sample will be collected. Composite soil sampling will be utilized. A coring tool will be used to collect soil continuously down to the calculated depth. The composite samples will be thoroughly mixed, taking care to minimize soil volatilization. Each soil composite will then be transferred to two 16-ounce jars for chemical analysis as per Table 3.

The sample technician will determine the sample location from which the quality control sample will be obtained. No decontamination will be performed between sampling points at a sampling location; however, decontamination will be performed between sampling locations following the procedures outlined in Section 3.2.

5.1.2 Sampling for Geotechnical Analysis

Soil samples will be obtained from two locations within the proposed random sill borrow site. Geotechnical analysis per Table 4 will be performed on these samples. Soil samples will be obtained down to the calculated average depth of excavation. Several pounds of soil will be collected taking care to obtain an even soil distribution. If more than one soil type is encountered, an additional several pounds of soil will be collected of each additional soil type and treated as a separate sample.

Once a representative sample of soil is obtained, it will be placed in a 6-gallon plastic bucket lined with a double plastic garbage bag. The soil will carefully be placed into the plastic bag, taking care not to damage the bag. Once the bucket is full of the soil, the bags will be tied and taped to prevent excessive moisture loss. The lid will be placed on the bucket and sealed using duct tape or other means. The following information will be recorded in the field notes, as a minimum:

- Sampling date and time
- Name(s) of sampling team members
- Site name and sample location number
- Depth to where the composite was made
- Brief description of sample (i.e., consistency, color, soil type, rocks' fragments, moisture, etc.)

- Sample identification number and amount collected
- Analysis to be performed

In addition, labelling and shipment of the soil samples will follow the procedures detailed in Section 7.0. Upon completion of sampling, the excavation will be backfilled. The sample location markers will remain in place until otherwise notified.

5.2 TOPSOIL

Approximately 20 cubic yards of new topsoil will be required to complete the site restoration on the preliminary excavation limits. The topsoil will be obtained from an approved source.

6.0 SAMPLE SHIPMENT PREPARATION

The purpose of this section is to establish the procedures to be implemented for the sample shipment. The basis for all procedures is understood to follow the Quality Control Plan (QCP). The following sections describe:

- Sample containers
- Sample preservation
- Sample chain-of-custody procedures

6.1 SAMPLE CONTAINERS

Different types of containers will be used to collect samples for the sampling media including:

- Glass 4-ounce and 8-ounce bottles with Teflon-line caps (soil samples)

- Glass 1-liter bottles with Teflon-lined cap (water and soil samples) and glass 40-milliliter vials with Teflon-lined septa lid (water samples only)

The laboratory will provide cleaned containers prior to shipment to the field. Sample preservation, containers, and sample holding times are summarized in Tables 1 through 4.

6.2 SAMPLE PRESERVATION

The purpose of sample preservation is to prevent or retard the degradation/transformation of chemicals in the sample during transport and storage. The samples will be preserved in the field at the time they are taken. Tables 1, 2, 3 and 4 list preservation requirements for the samples.

6.3 CHAIN-OF-CUSTODY PROCEDURES

The following will be used in the chain-of-custody process for sample tracking and field activities:

- Sample identification and labeling
- Sample chain-of-custody
- Sample collection log

6.3.1 Sample Identification and Labelling

All samples will be adequately marked for identification from the time of collection and packaging through shipping and storage. Marking will generally be made on the sample container (jar, bottle, etc.). Sample identification will include, as appropriate:

- Project name and number
- Sample number
- Sample location (e.g., depth or sample interval, and field coordinates)
- Sampling date and time
- The initials of the individual(s) performing the sampling
- Sample preservation used

6.3.2 Chain-of-Custody Record

Documentation of the sample chain-of-custody is provided by the use of a chain-of-custody record that includes the sampling location, the type and amount of samples collected, the date and time of sample collection, the name(s) of the person(s) responsible for sample collection, the date and time of all custody transfers, the signature of the persons relinquishing and accepting sample custody, laboratory request for analysis, and other pertinent information.

Chain-of-custody procedures document sample possession from the time of collection to disposal. A sample is considered in custody if it is:

- In one's physical possession
- In view, after being in physical possession
- In a locked area so that no one can tamper with it, after having been in physical custody
- In a secured area, restricted to unauthorized personnel

A chain-of-custody record will be initiated in the field by the sample technician and will accompany each group of samples during shipment to the laboratory. Each time custody of sample changes, the new custodian will sign the record and indicate the dates of transfer. An example of a NAVY Public Works Center - Norfolk, Virginia chain-of-Custody record is included in Appendix A.

All original chain-of-custody records, analytical data, and other project documentation will be maintained in a project file at home base. A legible copy of the field chain-of-custody record will be maintained in the field office on site. Once samples are received in the laboratory, chain-of-custody records will be signed by a designated representative of the laboratory and copies of the signed chain-of-custody records will be submitted to the field office or other designated representative.

6.3.3 Sample Collection Log

A sample collection log is prepared for each sample to record information pertaining to the location and collection of a sample. The following information will be included on the sample collection log, as appropriate:

- Unique sample number
- Sample location
- Collector's initials
- Date and time of sample collection
- Sample coordinates
- Sample identification (type, media, sequence, blank, spike, duplicate, split)

An example of a sample collection log is provided in Appendix A.

6.3.4 Analytical Laboratory

Upon sample receipt, the receiving technician or designee will:

- Compare samples received against those listed on the chain-of-custody record
- Ensure all samples are free of damage and reject any that are damaged, noting on the chain-of-custody record
- Place the samples in adequate laboratory storage
- Sign and date for receival of all samples as per the chain-of-custody record

7.0 QUALITY ASSURANCE PLAN (QA PLAN) FOR SAMPLING AND ANALYSIS

The purpose of this section is to establish QA procedures to be implemented during sampling and analysis. The basis for all procedures is understood to follow Quality Control Plan (QCP). The QCP includes many of the sampling and analysis QA procedures. The following sections describe:

- List of required QA procedures
- Laboratory Approval
- Manifesting

7.1 LIST OF REQUIRED QA PROCEDURES

In accordance with NEESA 20.2-047B the following Level D QC procedures are required:

Level D laboratory requirements.

- Method Blanks: one per batch per matrix
- Blank spikes or laboratory control samples: one per batch per matrix
- Matrix spikes/matrix spike duplicates: for organics one per 20 samples per matrix.

Level D field QC requirements:

- Field blank: one per source per event
- Field duplicate: 10% frequency per

7.2 LABORATORY APPROVAL

The Laboratory, James R. Reed & Associates, Incorporated is certified by the State of North Carolina Department of the Environment, Health, and Natural Resources to preform PCB analysis as shown in Appendix 3.

TABLES

"Sampling Process Summaries"

Table 1 - Summary of Containers, preservation, and Holding Times for Soil Samples					
Parameter	**Bottle Requirements**	**Preservation Requirements**	**Holding Time**	**Analytical Method (1)**	**Bottle Volume**
From Excavation:					
PCB	Glass, teflon-lined cap	Cool to 4°C	Extraction within 7 days; analyze 40 days	EPA 8080	1 x 8 ounces

Notes:

(1) Standard EPA Methods, and in accordance with 40 CFR 136, as appropriate.

Table 2 - Summary of Containers, Preservation, and Holding Times for Water Samples

Parameter	Bottle Requirements	Preservation Requirements	Holding Time	Analytical Method	Bottle Volume
PCB's	Amber glass with Teflon-lined cap	Cool to 4°C(1)	Extract within 7 days, analyze within 40 days	EPA 8080	1 x 1 liter

Notes:

(1) If residual chlorine is present, add 3 ml of 10% sodium thiosulfate per gallon.

Table 3 - Summary of Containers, Preservation, and Holding Times for Imported Soil Samples					
Parameter	**Bottle Requirements**	**Preservation Requirements**	**Holding Time**	**Analytical Method (1)**	**Bottle Volume**
Borrow Fill: TCLP Volatiles TCLP Semivolatiles TCLP Metals	Glass, Teflon-lined cap	Cool to 4°C	14 days	EPA 1311	1 x 16 ounce
PCB/Pesticides	Glass, Teflon-lined cap	Cool to 4°C	Extraction within 7 days; analyze within 40 days	EPA 8080	1 x 8 ounce

Notes:
TCLP = Toxicity Characteristic Leaching Procedure

(1) Standard USEPA Methods, and in accordance with 40 CFR 136, as appropriate.

(2) RCRA characteristics or reactivity, ignitability, and corrosivity (40 CFR 264) will be determined from the sample collected for metals analysis.

Table 4 - Soil Verification Plan					
Facility Component	**Factors to be Inspected**	**Inspection Method**	**Test Method Reference**	**Section of Construction Specs. Containing Test Requirements**	**Frequency of Testing**
		Earthwork			
Random Fill from Borrow	Soil Type Geotechnical	Visual-Manual Procedure	ASTM D 2487	2220	Ongoing
		Grain Size	ASTM D 1140 ASTM D 422	2220	1 test/type
		Atterberg Limits	ASTM D 4318	2220	1 test/type
		Compaction	ASTM D 698	2220	1 test/type
Random Fill Layer (Placement)	Soil Type Geotechnical	Visual-Manual Procedure	ASTM D 2487	2220	Ongoing

	In-Place Moisture Content	Oven-Dry or Nuclear Method	ASTM D 2216 ASTM D 3017	2220	1 test/lift
	In-Place Density Relationship	Sand-Cone or Nuclear Method	ASTM D 2922	2220	1 nuclear density test/lift

APPENDIX A

**"Chain-of-Custody
and
Sample Collection Forms"**

CHAIN-OF-CUSTODY RECORD

ENVIRONMENTAL

PWC ENVIRONMENTAL LABORATORY
CODE 930 BLDG Z-140
9742 MARYLAND AVENUE
NORFOLK, VA 23511 - 3095
PH: (804)445-8851 FAX: (804)445-8852

CLIENT INFORMATION

COMPANY/COMMAND: CODE:
CONTACT:
PHONE: FAX:
J.O. #:
SIGNATURE:
PERMIT NO.:

LAB USE ONLY												FIELD READINGS		
LINE ITEM #	SAMPLE NO.	SAMPLE ID/LOCATION		DATE	TIME	COMP./GRAB	SAMPLED BY	MATRIX	PRESERVATIVE	# OF SAMPLES /CONTAINERS	ANALYSIS	pH	TEMPERATURE	OTHER
			START											
			STOP											
			START											
			STOP											
			START											
			STOP											
			START											
			STOP											
			START											
			STOP											
			START											
			STOP											
			START											
			STOP											

TURNAROUND: ____________ *(FOR RUSH TURNAROUND STATE REASON BELOW)*
SPECIAL INSTRUCTIONS: ____________

SAMPLE DISPOSAL: RETURN TO CLIENT ________ or DISPOSAL BY LAB: ________

SAMPLING/COLLECTION CHARGE:
POSSIBLE SAMPLE HAZARDS:

MICROBAC DELIVERY ORDER #: ________

1. CUSTOMER IS RESPONSIBLE FOR ALL CHARGES NECESSARY FOR THE PROCESSING AND ANALYSIS OF SAMPLE(S).
2. SAMPLES RECEIVED AFTER 3:00 PM MON. -- THURS. AND 2:00 PM ON FRIDAY WILL BE PROCESSED THE NEXT BUSINESS DAY (7:30 AM -- 4:00 PM).

RELIQUISHED BY:	COMPANY/COMMAND:	DATE/TIME:
RECEIVED BY:	COMPANY/COMMAND:	DATE/TIME:
RELIQUISHED BY:	COMPANY/COMMAND:	DATE/TIME:
RECEIVED BY:	COMPANY/COMMAND:	DATE/TIME:
RELIQUISHED BY:	COMPANY/COMMAND:	DATE/TIME:
RECEIVED BY:	COMPANY/COMMAND:	DATE/TIME:

SOIL SAMPLE FIELD COLLECTION REPORT

Project Number ____________________
Project Name ____________________
Site Location ____________________

Collected By ______________________________ Date and Time Collected ________________

Sample Location ____

SAMPLE(S) LOCATION SKETCH (use back side if necessary)

SAMPLE ID NUMBER	DEPTH OF SAMPLE	SOIL DESCRIPTION (color, composition, staining, odor, field measurements)

Sampling Method ____

Composite Sample? Y ___ N ___ Composite Sample ID Number ________________

Describe Compositing ____

SAMPLE TYPES COLLECTED

TYPE	VOLUME	PER SAMPLE?	PER COMPOSITE?
		Y ___ N ___	Y ___ N ___
		Y ___ N ___	Y ___ N ___
		Y ___ N ___	Y ___ N ___
		Y ___ N ___	Y ___ N ___

Number of Containers ______________

Date Received by Lab ____________________ Laboratory ______________________________

Remarks: ____

WATER SAMPLE
FIELD COLLECTION REPORT

Project Number ____________________
Project Name ____________________
Site Location ____________________

Sample ID Number ____________________ Date Collected ____________________

Sample Location ____________________ Time Collected ____________________

Diameter of Well ____________________(in.) Collected By ____________________

Depth to Bottom of Well ____________________(ft.) Casing Stick Up ____________________(ft.)

Static Water Level ____________________(ft.) Measured From ____________________

Well Volumes Purged ____________________ Purging Method ____________________

Type of Sample ____________________ Sampling Method ____________________

Depth of Sample ____________________(ft.) Measured From ____________________

Sample Collection Order ____________________

FIELD MEASUREMENTS

Water Temperature ____________________ pH ____________________

Specific Conductance ____________________ umho/cm at ____________________(Temperature)

Other ____________________

METER CALIBRATION

pH STD	METER READING	SP. COND. STD	METER READING	____/STD	METER READING

SAMPLE TYPES COLLECTED

TYPE	VOLUME	FILTERED	PRESERVATION
________	________	Y ____ N ____	Y ____ N ____
________	________	Y ____ N ____	Y ____ N ____
________	________	Y ____ N ____	Y ____ N ____
________	________	Y ____ N ____	Y ____ N ____

Number of Containers ____________________

Date Received by Lab ____________________ Laboratory ____________________

Remarks: ____________________

FIELD ACTIVITY DAILY LOG

Project Number ____________________

Project Name ____________________

Date ____________ Page _____ of _____

.ld Activity Subject

Description of daily activities and events:

Visitors on Site

Changes from plans and Specs, and other special orders and important decisions

.her Conditions

Important Telephone Calls

PROJECT NAME ______________ PROJECT NUMBER ______

SAMPLE LOCATION ______________________________

BORING/WELL NUMBER ____________ DATE __________

DEPTH OF SAMPLE __________ TIME TAKEN __________

COLLECTOR'S NAME ______________________________

SAMPLE TYPE: ___ GROUNDWATER ___ SURFACE WATER

___ SOIL ___ SLUDGE/WASTE

PARAMETERS ____________ PRESERVATIVE _________

BOTTLE ___ OF ___ ___ FILTERED ___ NONFILTERED

TEST EQUIPMENT LIST

EQUIPMENT NUMBER	EQUIPMENT NAME

NOTE:
THIS LIST SHALL BE COMPLETED FOR ALL TESTS. ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BE LISTED.

REA. IME INSTRUMENT CALIBRATION LOG

Project Number ____________________

Project Name ____________________

Site Location ____________________

Instrument ____________________ Manufacturer ____________________ Instrument Serial Number ____________________

DATE/ TIME	TEMP.	BAR PRESS.	% REL. HUMID.	GAS STD (NAME)	STD CONC. (ppm)	ATTEN. SPAN SET/ SENS. CAL.	ZERO CHECK	METER READING (ppm)	COMMENTS	ANALYST SIGNATURE

REAL TIME AIR MONITORING LOG

Prc Number ____________________ ______
Project Name ____________________
Site Location ____________________

DATE/ TIME	ANALYST	TIME	INSTRUMENT (MFG/MODEL/ SERIAL NO.)	CALIBRATION DATE & CPD.	COMPOUND MEASURE	SPAN SET OR SENS. CAL.	CONC. (UNITS)	LOCATION/ACTIVITY/COMMENTS

REAL TIME AIR SAMPLING LOG

Project Number ____________________ Date ________
Project Name ____________________ PID No ________
Site Location ____________________ LEL/O_2 No. ________

SAMPLER	TIME OF DAY	READING	SAMPLING TIME	LOCATION	PERSON SAMPLED	PPE	TASK PERFORMED

Notes: ____

Name ____________________

Signature ____________________

AIR SAMPLE COLLECTION REPORT

Project Number ______________________
Project Name ______________________
Site Location ______________________

Sample ID Number ______________________ Date Collected ______________________

Sample Probe Location ______________________ Collected By ______________________

Depth to Bottom of Probe ______________________(ft.) Ambient Temperature ______________(ft.)

Is Water Level Present? ___ Yes ___ No Water Level¹ (if present) ______(ft.)

Weather Conditions ____

PURGING DATA

Purge Pump ID Number ______________________ Purge Start Time ______________________

Calibrated Purge Rate ______________________(ml/min) Purge End Time ______________________

Volume of Air Purged ______________________(liters) ______________________

SAMPLE COLLECTION

Sampling Pump ID Number ______________________ Sampling Start Time ______________________

.brated Sampling Rate ______________________(ml/min) Sampling End Time ______________________

Volume of Air Sampled ______________________(liters)

Number of NIOSH Tubes ______________________

NIOSH Tube Labels: ______________, ______________, ______________

______________, ______________, ______________

Remarks: ____

____

____

____

____

____

____

____

ɔs: (1) Depth below top of well casing.

APPENDIX B

"EPA 560/5-85-026"

Recd 10-10-[illegible]
FROM MERRIL ASHCRAF[illegible]

United States
Environmental Protection
Agency

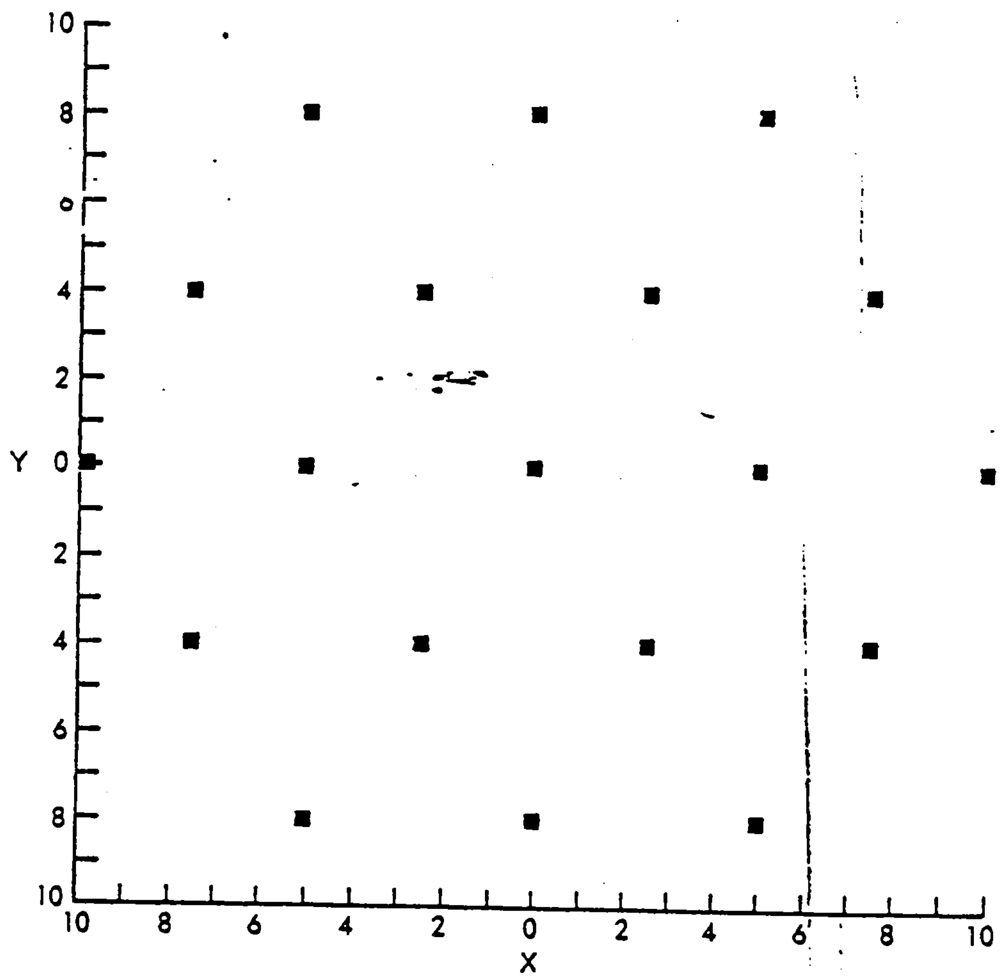
Office of
Toxic Substances
Washington DC 20460

EPA 560/5-85-026
August, 1985

Toxic Substances

EPA

VERIFICATION OF PCB SPILL CLEANUP BY SAMPLING AND ANALYSIS



PREFACE

This Interim Report was prepared for the Environmental Protection Agency under EPA Contract No. 68-02-3938, Work Assignment 37. The work assignment is being directed by Mitchell D. Erickson. This report was prepared by Dr. Erickson, Bruce A. Boomer, Gary L. Kelso, and Steve E. Swanson of Midwest Research Institute (MRI). The sampling design (Section IV.A) was written by David C. Cox and Bradley D. Schultz of the Washington Consulting Group, 1625 I Street, N.W., Washington, D.C. 20006, under subcontract to Battelle Columbus Laboratories, Subcontract No. F4138(8149)435, EPA Contract No. 68-01-6721 with the Design and Development Branch, Exposure Evaluation Division. The EPA Task Managers, Daniel T. Heggem, Richard A. Levy and John H. Smith, as well as Joseph J. Breen, Joseph S. Carra, and Martin P. Halper, of the Office of Toxic Substances, provided helpful guidance and technical information.

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Chemical and Biological Sciences
Department

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I. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) under the authority of the Toxic Substances Control Act (TSCA) Section 6(e) and 40 CFR Section 761.60(d), has determined that polychlorinated biphenyl (PCB) spills must be controlled and cleaned up. The Office of Toxic Substances (OTS) has been requested to provide written guidelines for cleaning up PCB spills, with particular emphasis on the sampling design and sampling and analysis methods to be used for the cleanup of PCB spills.

This work assignment is divided into two phases. The reports of Phase I are presented in Draft Interim Report No. 1, Revision No. 1, "Cleanup of PCB Spills from Capacitors and Transformers," by Gary L. Kelsó, Mitchell D. Erickson, Bruce A. Boomer, Stephen E. Swanson, David C. Cox, and Bradley D. Schultz, submitted to EPA on January 9, 1985. Phase I consists of a review and technical evaluation of the available documentation on PCB spill cleanup, contacts with EPA Regional Offices and industry experts, and preparation of preliminary guidelines for the cleanup of PCB spills. The document was aimed at providing guidance in all aspects of spill cleanup for those organizations which do not already have working PCB spill cleanup programs.

Phase II, reported in this document, reviews the available sampling and analysis methodology for assessing the extent of spill cleanup by EPA enforcement officials. This report includes some of the information from the Phase I report, incorporates comments on the Phase I report and the general issue which were received at a working conference on February 26-27, 1985, and addresses the issue from the perspective of developing legally defensible data for enforcement purposes.

This report, intended primarily for EPA enforcement personnel, outlines specific sampling and analysis methods to determine compliance with EPA policy on the cleanup of PCB spills. The sampling and analysis methods can be used to determine the residual levels of PCBs at a spill site following the completion of cleanup activities. Although the methodologies outlined in this document are applicable to PCB spills in general, specific incidents may require special efforts beyond the scope of this report. Future changes in EPA policy may affect some of the information presented in this document.

Following a summary of the report (Section II), Section III presents an overview of PCB spills and cleanup activities. The guidelines on sampling and analysis (Section IV) includes discussion of sampling design, sampling techniques, analysis, and quality assurance.

II. SUMMARY

This report presents the results of Phase II of this work assignment. Phase I consisted of a review and technical evaluation of the available documentation on PCB spill cleanup, contacts with EPA Regional Offices, and preparation of preliminary guidelines for the cleanup of PCB spills.

Phase II (this document) reviews the available sampling and analysis methodology for assessing the extent of spill cleanup by EPA enforcement officials. The report incorporates some of the information from the Phase I report and general issues received at a working conference on PCB spills.

The EPA has set reporting requirements for PCB spills and views PCB spills as improper disposal of PCBs. Cleanup activities have not been standardized since PCB spills are generally unique situations evaluated on a case-by-case basis by both the PCB owner (or his contractor) and the responsible EPA Regional Office. Components of the cleanup process may include protecting the health and safety of workers; reporting the spill; quick response/securing the site; determination of materials spilled; cleanup procedures; proper disposal of removed PCB materials; and sampling and analysis. The level of action required is dependent on the amount of spilled liquid, PCB concentration, spill area and dispersion potential, and potential human exposure.

A sampling design is proposed for use by EPA enforcement staff in detecting residual PCB contamination above a designated limit after a spill site has been cleaned. The proposed design involves sampling on a hexagonal grid which is centered on the cleanup area and extends just beyond its boundaries. Guidance is provided for centering the design on the spill site, for staking out the sampling locations, and for taking possible obstacles into account. Additional samples can be collected at the discretion of the sampling crew.

Compositing strategies, in which several samples are pooled and analyzed together, are recommended for each of the three proposed designs. Since an enforcement finding of noncompliance must be legally defensible, the sampling design emphasizes the control of the false positive rate, the probability of concluding that PCBs are present above the allowable limit when, in fact, they are not.

Sampling and analysis techniques are described for PCB-contaminated solids (soil, sediment, etc.), water, oils, surface wipes, and vegetation. A number of analytical methods are referenced; appropriate enforcement methods were selected based on reliability. Since GC/ECD is highly reliable, widely used, and is included in many standard methods, it is a primary recommended method for most samples. Secondary methods may be useful for confirmatory analyses or for special situations when the primary method is not applicable.

Quality assurance (QA) must be applied throughout the entire monitoring program. Quality control (QC) measures, including protocols, certification and performance checks, procedural QC, sample QC, and sample custody as appropriate, should be stipulated in a QA plan.

III. OVERVIEW OF PCB SPILLS AND CLEANUP ACTIVITIES

A. Introduction to PCB Spills and Cleanup

The EPA has established requirements for reporting PCB spills based on the amount of material spilled and disposal requirements for the spilled PCBs and materials contaminated by the spill. Under TSCA regulations [40 CFR 761.30(a)(1)(iii) and 40 CFR 761.60d], PCB spills are viewed as improper disposal of PCBs. Although specific PCB cleanup requirements are not established in the TSCA regulations, each regional administrator is given authority by policy to enforce adequate clean-up of PCB spills to protect human health and the environment.

1. Current Trends

Due to regional variations in PCB spill policy and the lack of a national PCB cleanup policy, PCB cleanup activities have not been standardized. Individual companies owning PCB equipment and contract cleanup companies have developed their own procedures and policies for PCB cleanup activities keyed to satisfying the requirements of the appropriate EPA Regional Office. In addition, the EPA Regional Offices typically have provided suggestions for companies unfamiliar with PCB cleanup.

PCB spills are generally viewed as unique situations to be evaluated on a case-by-case basis by both the PCB owner (or his contractor) and the EPA Regional Office. However, a general framework is often used to approach the problem. Most cleanup activities involve quick response, removal or cleaning of suspected contaminated material, and post-cleanup sampling to document adequate cleanup. Major considerations involved in the cleanup process include minimizing environmental dispersion, minimizing any present or future human exposure to PCBs, protecting the health and safety of the cleanup crew, and properly disposing contaminated materials.

In general, the involvement of EPA Regional Offices is limited to phone conversations often including a follow-up call to receive the analytical results of the post-cleanup sampling. If the EPA representative is not satisfied with the reported data, additional documentation, sampling and analysis, or cleanup (followed by further sampling and analysis) may be requested.

In cases of special concern (e.g., large spills), EPA Regional Offices may work more closely with the PCB owner or contractor in planning the cleanup, sampling and analysis activities, and on-site inspections.

2. Limitations of This Overview

The general discussion in this chapter refers to the procedures, policy, and considerations that seem to be widely used at present by PCB owners and spill cleanup contractors in meeting the requirements of the EPA Regional Offices. The activities described do not involve EPA regulations or policy except where indicated, since the EPA has not established requirements on PCB cleanup procedures.

Table 1 categorizes PCB spills into approximate levels of action for PCB spill cleanup based on concern. Potential environmental problems increase with increases in PCB concentrations, amount of spilled liquid, spill area and dispersion potential, and potential human exposure. The three spill types presented in Table 1 are based on very rough estimates. "Severity" in one key item such as human exposure could raise a spill to a Type 3 (i. e., requiring special attention). On the other hand a spill of a large volume of liquid may be considered a Type 2 spill due to a relatively low concentration of PCBs. The three categories are only approximate and are intended to demonstrate the flexibility needed in responding to PCB spills. EPA Regional Offices should provide guidance on spill cleanup activities whenever questions develop.

The situations described in this chapter are limited to recent PCB spills of similar magnitude to the reported spills associated with PCB oil transformers and capacitors (i.e., Type 2 in Table 1). Unusually severe spill incidents (Type 3 in Table 1) involving large volumes of PCBs, a large spill area, a high probability of significant human exposure, and/or severe environmental or transportation scenarios may require special considerations, beyond the scope of this discussion.

All spills from regulated equipment are typically subject to the detail of effort outlined in this chapter. Although cleanup of smaller spills (Type 1 in Table 1) is required if the concentration of PCBs in the spilled material is 50 ppm or greater, the spill and the cleanup activities normally are not reported to EPA.

Future changes in EPA policy may invalidate some of the discussions appearing in this chapter. For example, if EPA adopts any type of formal categorization scheme for PCB spills, some of the assumptions made in this chapter may become inappropriate.

B. Components of the Cleanup Process

1. Health and Safety

Protection of the health and safety of the clean-up crew during the PCB cleanup operation is an important concern. References discussing health and safety considerations relevant to some PCB spill incidents include NIOSH Criteria for A Recommended Standard for Exposure to Polychlorinated Biphenyls (PCBs) (1977c) and Health Hazards and Evaluation Report No. 80-85-745 (NIOSH 1980). The appropriate level of health and safety protection is dependent upon the specifics of the spill.

2. Reporting the Spill

If the regulatory limits are exceeded, the spill must be reported to Federal, State, and local authorities as applicable. Under EPA regulations [Fed. Reg. 50:13456-13475], spills over 10 lb must be reported to The National Response Center. The toll free phone number is (800) 424-8802.

Table 1. Approximate Levels of Action for PCB Spill Cleanup Based on Concern

	Categories of increasing concern Type 1	Type 2	Type 3
Approximate gallons of spilled liquid	< 1	> 1	> 5
Area of spill (sq ft)	< 125	250 (avg.)	> 1,000
PCB concentration in spilled liquid (ppm)	< 500	≥ 50	Variable or high
Types of spilled liquid	Mineral oil (or variable)	Variable	Variable, Askarel
Exposure scenario	Various	Various	Special concern for high exposure situations

Notes:
- Type 1 spill is usually not reported.
- Type 2 spill is reported and discussed in this chapter.
- Type 3 spill is not discussed in this chapter and may require special EPA assistance.
- "Severity" in one key item may raise the spill to a higher risk category.

3. Quick Response/Securing the Site

Quick response is desirable to mitigate the dispersion of the spilled material and to secure the site. Federal regulations require that cleanup actions commence within 48 hr of discovery of a spill [40 CFR 761.30(a)(1)(iii)]. More rapid response is highly preferable.

A quick response allows removal or cleaning of the PCB-contaminated material before it is dispersed by wind, rain, seepage, and other natural causes or by humans or animals. In securing the site, the cleanup crew determines the spill boundaries, prevents unauthorized access to the spill site, and notifies all parties involved.

The methods used to secure the site will vary on a case-by-case basis, depending on the specific circumstances. The extent of the spill is usually determined by visual inspection with the addition of a buffer area that may include PCBs finely dispersed from splattering. Evaluating the extent of the spill involves considerable judgment, including consideration of the cause of the spill, weather conditions, and specifics of the site.

Field analysis kits may aid the crew in determining the extent of the spill in some instances. The field kits, when used properly, can serve as a screening tool. The need for quick response has limited the usefulness of the more accurate field analytical techniques such as field gas chromatography. Practical problems associated with availability of the equipment and trained staff, set-up time, and cost have limited the use of such techniques at this time.

4. Determination of Materials Spilled/Cleanup Plan

After securing the site, the response crew will either (a) immediately proceed with the cleanup operation, or (b) identify the materials spilled and formulate an appropriate cleanup plan. A suitable cleanup plan can be developed by identifying the type of PCB material (i.e., mineral oil, PCB oil, Askarel) and considering such factors as the volume spilled, area of the spill, and site characteristics.

Based on reasoning similar to Table 1, the crew leader can determine the necessary level of effort in accordance with the policy of the PCB owner and the EPA Regional Office. He can determine if additional guidance is needed, plan the sampling and analysis, and make other decisions related to the level of effort and procedures needed.

5. Cleanup Procedures

The cleanup procedure may include, but may not necessarily be limited to, the following activities:

- Removal or repair of failed/damaged PCB equipment,
- Physical removal of contaminated vegetation;

- Physical removal of contaminated soils, liquids, etc.,
- Decontamination or physical removal (as appropriate) of contaminated surfaces, and
- Decontamination or removal of all equipment potentially contaminated during the cleanup procedures.
- Encapsulation may be employed only with EPA approval.

The specific procedures used in a cleanup are selected by the PCB owner or the cleanup contractor. Key considerations include removal of PCBs from the site to achieve the standards required by the EPA region, company, or other applicable control authority; avoidance of unintentional cross contamination or dispersion of PCBs from workers' shoes, contaminated equipment, spilled cleaning solvents, rags, and other sources; and protection of workers' health.

The cleanup crew shall make every possible effort to keep the spilled PCBs out of sewers and waterways. If this has already occurred, the crew needs to contact the local authorities. Water is never used for cleaning equipment or the spill site.

A simple PCB spill cleanup may involve the removal of the leaking equipment, removal of contaminated sod and soil by shovel, cleaning pavement with an absorbant material and solvents, and decontamination or disposal of the workers' equipment (shovels, shoes, gloves, rags, plastic sheets, etc.). More complicated situations may include decontamination of cars, fences, buildings, trees and shrubs, electrical equipment, or water (in pools or bodies of water).

In some cases, adequate decontamination of surfaces (pavements, walls, etc.) may not be possible. An alternate to physical removal of the surface material is encapsulation of the contaminated area under a coating impervious to PCBs. (EPA approval would be required.)

6. Proper Disposal of Removed PCB Materials

All PCB-contaminated materials removed from the spill site, must be shipped and disposed in accordance with relevant Federal, State, and local regulations. TSCA Regulations [40 CFR 761.60] outline the requirements for the disposal of PCBs, PCB articles, and PCB containers in an incinerator, high efficiency boiler, chemical waste landfill, or an approved alternative method. Facility requirements for incineration and chemical waste landfills are presented in 40 CFR 761.70 and 40 CFR 761.75, respectively. Applicable Department of Transportation regulations are listed in 49 CFR 172.101.

7. Sampling and Analysis

Although sampling and analysis will be discussed in detail in Chapter IV, this discussion gives an overview of applicable considerations and current practice. Sampling and analysis may not always be needed (especially for the spills described as Type 1 in Table 1), but enforcement authorities or property owners may ask for proof that the spill site has been adequately decontaminated. This can be accomplished by taking a number of samples representative of the area contaminated by the spill. Samples should represent the full extent of the spill, both horizontal and vertical, as well as the types of materials in the spill area (soil, surfaces, water, etc.).

Sampling design and technique as well as sample handling and preservation should incorporate acceptable procedures for each matrix to be sampled and concern for the adequacy and accuracy for the samples in the final analysis.

Analysis of the samples for PCB content should be performed by trained personnel using acceptable procedures with due consideration of quality assurance and quality control.

Further discussion of sampling and analysis (applicable to EPA enforcement activities) appears in Chapter IV.

8. Remedial Action

If the analysis results indicate the cleanup was not in compliance with designated cleanup levels, additional cleanup is needed. Additional sampling can pinpoint the location of remaining contaminated areas if the original sampling plan was not designed to identify contaminated sub-areas within the spill site.. If additional cleanup is needed, the cleanup crew will continue as before, removing more material or cleaning surfaces more thoroughly. Remedial action will be followed by additional sampling and analysis to verify the adequacy of the cleanup.

9. Site Restoration

This is not addressed under TSCA and is a matter to be settled between the company responsible for the PCB spill and the property owner.

10. Records

Although there are no TSCA requirements for records of PCB cleanup activities except for documentation of PCBs stored or transported for disposal [40 CFR 761.80(a)], the PCB owner should keep records of the spill cleanup in case of future questions or concern. Relevant information may include dates, a description of the activities, records of shipment and disposal of PCB-contaminated materials, and a report of collected samples and results of analysis.

11. Miscellaneous Considerations

a. Expeditious and effective action are desired throughout the cleanup process to minimize the concern of the public, especially residents near the site or individuals with a special interest in the site. Likewise, speed and effectiveness in the cleanup may prevent any future concern or action related to the PCB spill.

b. Education and training of the spill response crews and responsible staff members is a constant concern. The employees need sufficient training to make proper judgements and to know when additional assistance or guidance is needed.

IV. GUIDELINES ON SAMPLING AND ANALYSIS

Reliable analytical measurements of environmental samples are an essential ingredient of sound decisions for safeguarding public health and improving the quality of the environment. Effective enforcement monitoring should follow the general operational model for conducting analytical measurements of environmental samples, including: planning, quality assurance/quality control, verification and validation, precision and accuracy, sampling, measurements, documentation, and reporting. Although many options are available when analyzing environmental samples, differing degrees of reliability, dictated by the objectives, time, and resources available, influence the protocol chosen for enforcement monitoring. The following section outlines the factors critically influencing the outcome and reliability of enforcement monitoring of PCB spill cleanup.

A. Sampling Design

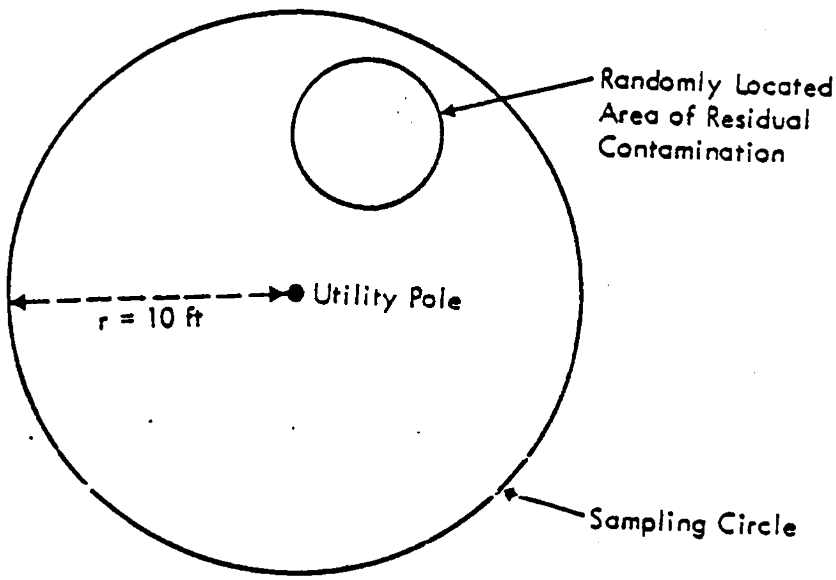
This section presents a sampling scheme, for use by EPA enforcement staff, for detecting residual PCB contamination above a limit designated by EPA-OPTS after the site has been cleaned up. Two types of error traceable to sampling and analysis are possible. The first is false positive, i.e., concluding that PCBs are present at levels above the allowable limit when, in fact, they are not. The false positive rate for the present situation should be low, because an enforcement finding of noncompliance must be legally defensible; that is, a violator must not be able to claim that the sampling results could easily have been obtained by chance alone. Moreover, all sampling designs used must be documented or referenced.

The second type of error possible is a false negative, i.e., failure to detect the presence of PCB levels above the allowable limit. The false negative rate will depend on the size of the contaminated area and on the level of contamination. For large areas contaminated at levels well above the allowable limit, the false negative rate must, of course, be low to ensure that the site is brought into compliance. The false negative rate can increase as the area or level of contamination decrease.

1. Proposed Sampling Design

In practice, the contaminated area from a spill will be irregular in shape. In order to standardize sample design and layout in the field, and to protect against underestimation of the spill area by the cleanup crew, sampling within a circular area surrounding the contaminated area is proposed. Guidance on choosing the center and radius of the circle, as well as the number of sample points to be used is provided in Section 2 below.

The detection problem was modeled as follows: try to detect a circular area of uniform residual contamination whose center is randomly placed within the sampling circle. Figure 1 illustrates the model. The figure depicts a sampling circle of 10 ft centered on a utility pole (site of the spill). After cleanup, a residually contaminated circle remains. However, in choosing locations at which to sample, the sampler has no knowledge of either the location of the circle or the level of contamination. This



Fiqure 1. Randomly located are of residual contamination within the samp ing circle.

lack of knowledge was modeled by treating the sampling locations as fixed and the center of the contaminated circle as a randomly located point in the circle of radius 10 ft. The implicit assumption that residual contamination is equally likely to be present anywhere within the sampling area is reasonable, at least as a first approximation (Lingle 1985). This is because more effort is likely to have been expended in cleaning up the areas which were obviously highly contaminated.

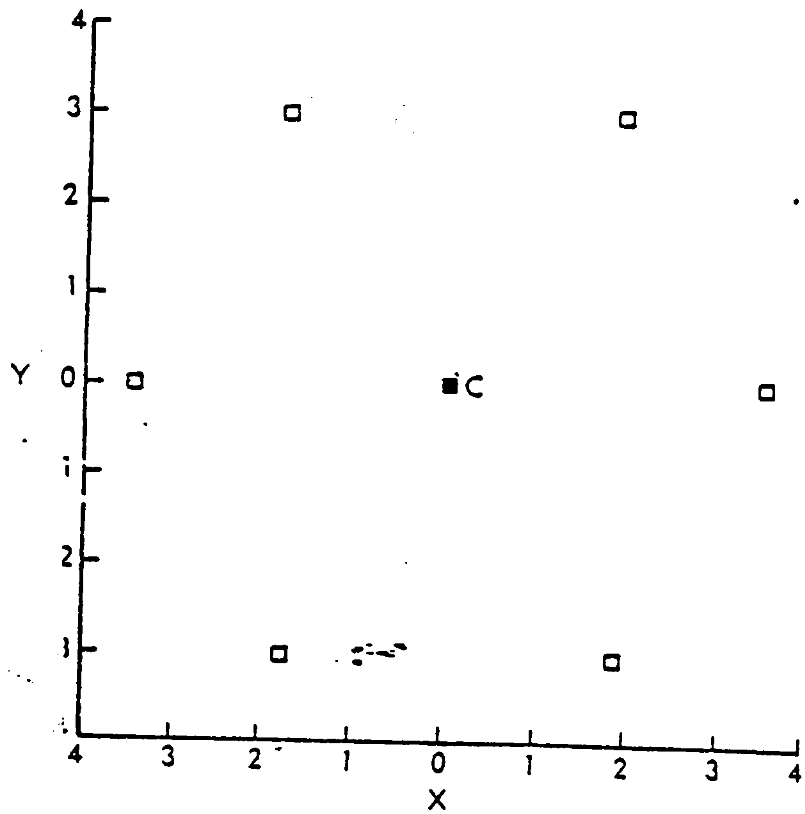
Two general types of design are possible for this detection problem: grid designs and random designs. Random designs have two disadvantages compared to grid designs for this application. First, random designs are more difficult to implement in the field, since the sampling crew must be trained to generate random locations onsite, and since the resulting pattern is irregular. Second, grid designs are more efficient for this type of problem than random designs. A grid design is certain to detect a sufficiently large contaminated area while some random designs are not. For example, the suggested design with a sample size of 19 has a 100% chance to detect a contaminated area of radius 2.8 ft within a sampling circle of radius 10 ft. By contrast, a design based on a simple random sample of 19 points has only a 79% chance of detecting such an area.

Therefore, a grid design is proposed. A hexagonal grid based on equilateral triangles has two advantages for this problem. First, such a grid minimizes the circular area certain to be detected (among all grids with the same number of points covering the same area). Second, some previous experience (Mason 1982; Matern 1960) suggests that the hexagonal grid performs well for certain soil sampling problems. The hexagonal grid may, at first sight, appear to be complicated to lay out in the field. Guidance is provided in Section 2 below and shows that the hexagonal grid is quite practical in the field and is not significantly more difficult to deploy than other types of grid.

The smallest hexagonal grid has 7 points, the next 19 points, the third 37 points as shown in Figures 2 through 4. In general, the grid has $3n^2 + 3n + 1$ points. To completely specify a hexagonal grid, the distance between adjacent points, s, must be determined. The distance s was chosen to minimize, as far as possible, the size of the residual contaminated circle which is certain to be sampled. Values of s so chosen, together with number of sampling points and radius of smallest circle certain to be sampled are shown in Table 2. For example, the grid spacing for a circle of radius 20 ft for the 7-point design is $s = (0.87)(20) = 17.4$ ft. For a given size circle, the more points on the grid, the smaller the residual contamination area which can be detected with a given probability.

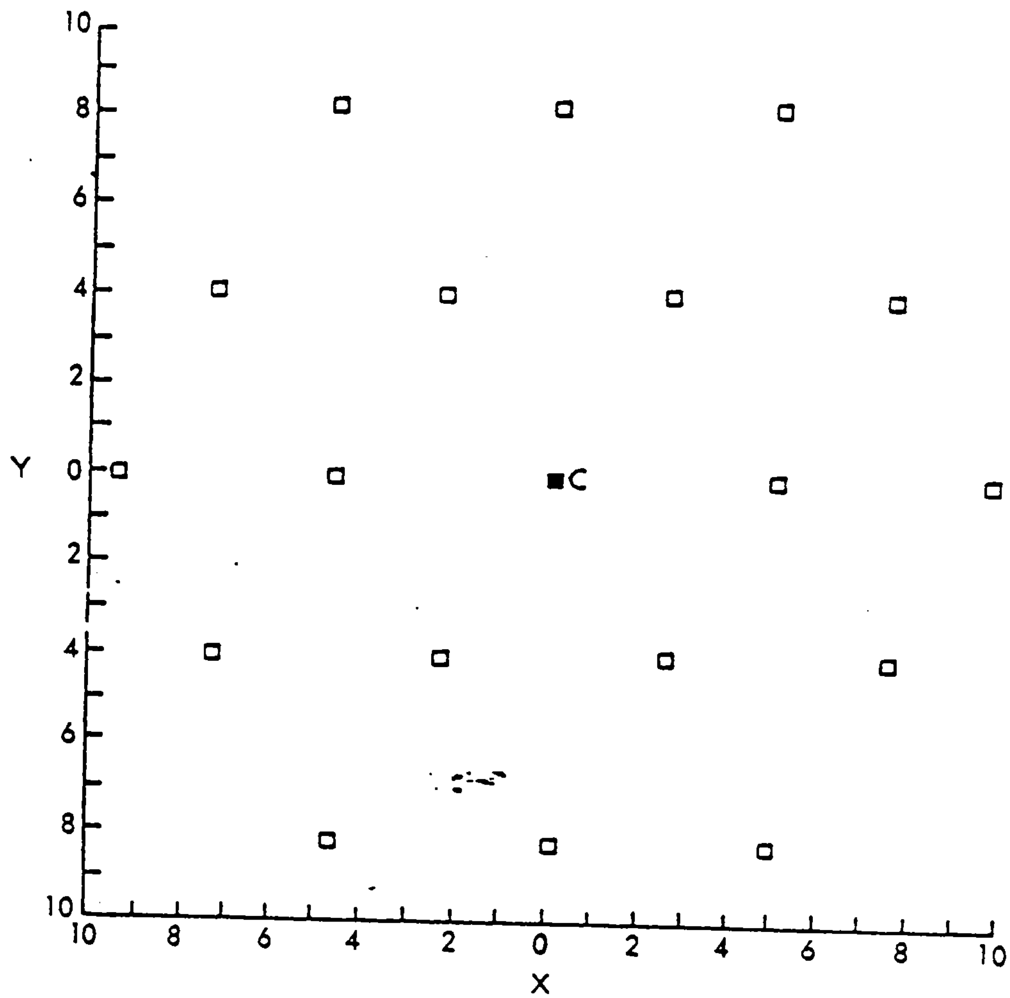
Table 2. Parameters of Hexagonal Sampling Designs for a Sampling Circle of Radius r Feet

No. of points	Distance between adjacent points, s (ft)	Radius of smallest circle certain to be sampled
7	0.87r	0.5r
19	0.48r	0.28r
37	0.3r	0.19r



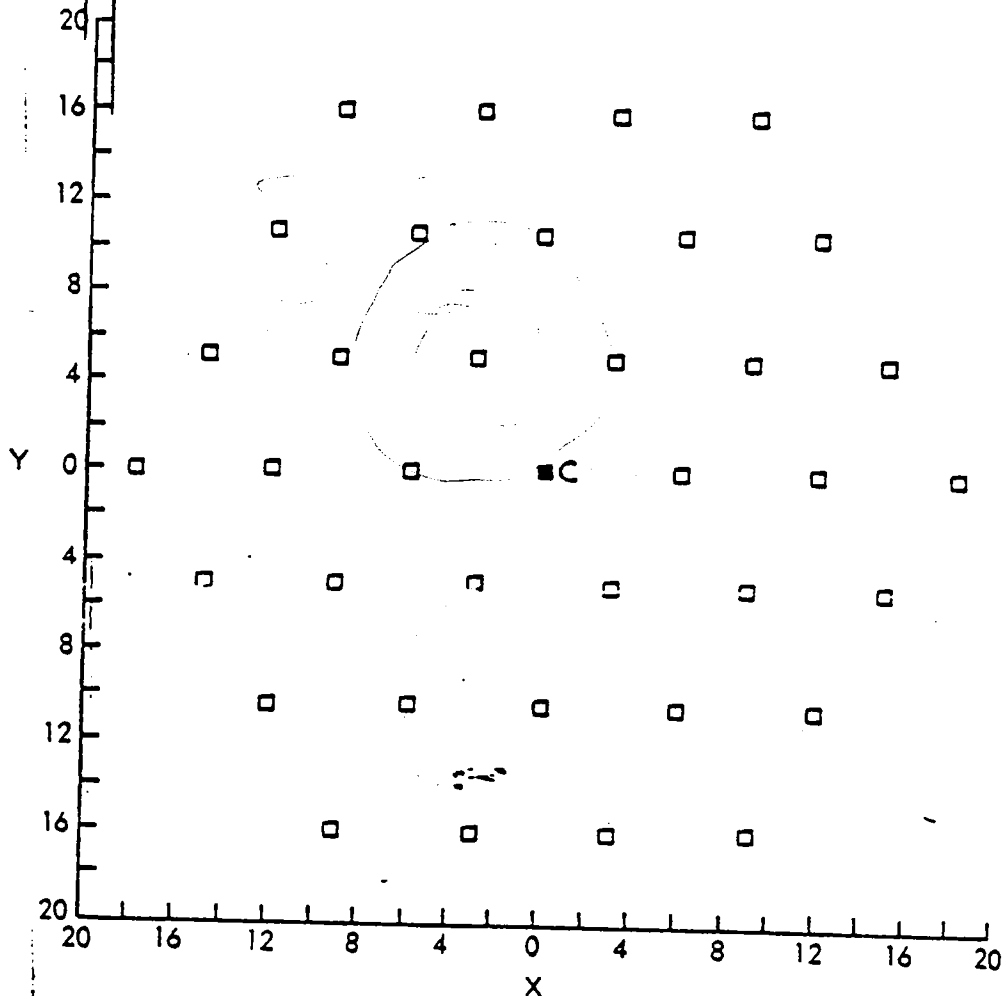
The outer boundary of the contaminated area is assumed to be 4 feet from the center (C) of the spill site.

Figure 2. Location of sampling points in a 7-point grid.



The outer boundary of the contaminated area is assumed to be 10 feet from the center (C) of the spill site.

Figure 3. Location of sampling points in a 19-point grid.



The outer boundary of the contaminated area is assumed to be 20 feet from the center (C) of the spill site.

Figure 4. Location of sampling points in a 37-point grid.

The first three hexagonal designs are shown in Figures 2 to 4, for a sampling circle radius of $r = 10$ ft. The choice of sample size depends on the cost of analyzing each sample and the reliability of detection desired for various residually contaminated areas. Subsection 2 below provides some suggested sample sizes for different spill areas, based on the distribution of spill areas provided by the Utility Solid Waste Activities Group (USWAG 1984; Lingle 1985).

2. Sample Size and Design Layout in the Field

a. Sample Size

The distribution of cleanup areas for PCB capacitor spill sites, based on data collected by USWAG (1984; Lingle 1985) is shown in Table 3. The smallest spill recorded in the USWAG database is 5 ft^2, the largest 1,700 ft^2. The median cleanup area is 100 ft, the mean 249 ft^2; the wide discrepancy between the mean and the median reflects the presence of a small percentage of relatively large spills in the database.

Recommended sample sizes are given in Table 4. Several considerations were involved in arriving at these recommendations. First, the maximum number of samples recommended for the largest spills is 37, in recognition of practical constraints on the number of samples that can be taken. Even so, it is important to note that not all samples collected will need to be analyzed. The calculations in Section 5 below show that, even for the 37 sample case, no more than 8 analyses will usually be required to reach a decision. Since the cost of chemical analyses is a substantial component of sampling and analysis costs, even the 37-sample case should not, therefore, be prohibitively expensive. Second, the typical spill will require 19 samples. Small spills, with sampling radius no greater than 4 ft, will have 7 samples, while the largest spills, with sampling radius 11.3 ft and up, will require 37 samples. It should be noted that only capacitor spills are represented in Table 3. Transformer spills, however, would be expected to be generally smaller than capacitor spills because energetic releases are less likely from transformers. Thus, one would expect the smaller sample sizes to be relatively more likely for transformer spills than capacitor spills.

Table 3. Distribution of PCB Capacitor Spill Cleanup Areas Based on 80 Cases

Cleanup area (ft^2)	Percent of cases
≤ 50	32.5
51-100	18.8
101-200	15.0
201-300	12.5
301-400	3.8
401-700	7.5
701-1,300	8.8
≥ 1,300	1.3

Source: Lingle 1985.

Table 4. Recommended Sample Sizes

Sampling area (ft^2)	Radius of sampling circle (ft)	Percent of PCB capacitor spills	Sample size
≤ 50	≤ 4	32.5	7
51-400	4-11.3	50.0	19
> 400	> 11.3	17.5	37

The final consideration in recommending sample sizes was to achieve roughly comparable detection capability for different size spills. The radius of the smallest contaminated circle certain to be sampled at least once by the sampling scheme is used for comparative purposes (see Table 2). Table 5 presents some calculations of this quantity. The absolute detection capability of the sampling scheme is seen to be relatively constant for different spill sizes. This means that a given area of residual contamination is about as likely to be detected in any sized spill.

Table 5. Detection Capability of the Recommended Sampling Schemes

Sampling area (ft^2)	Radius (ft)	Sample size	Radius of smallest circle to be sampled (ft)
50	4.0	7	2.0
150	6.9	19	1.9
400	11.3	19	3.2
875	16.7	37	3.2

b. Design Layout in the Field

Figure 5 presents a typical illustration of design layout in the field. The first step is to determine the boundaries of the original cleanup area (from records of the cleanup). Next, find the center and radius of the sampling circle which is to be drawn surrounding the cleanup area. The following approach is recommended:

(a) Draw the longest dimension, L_1, of the spill area.

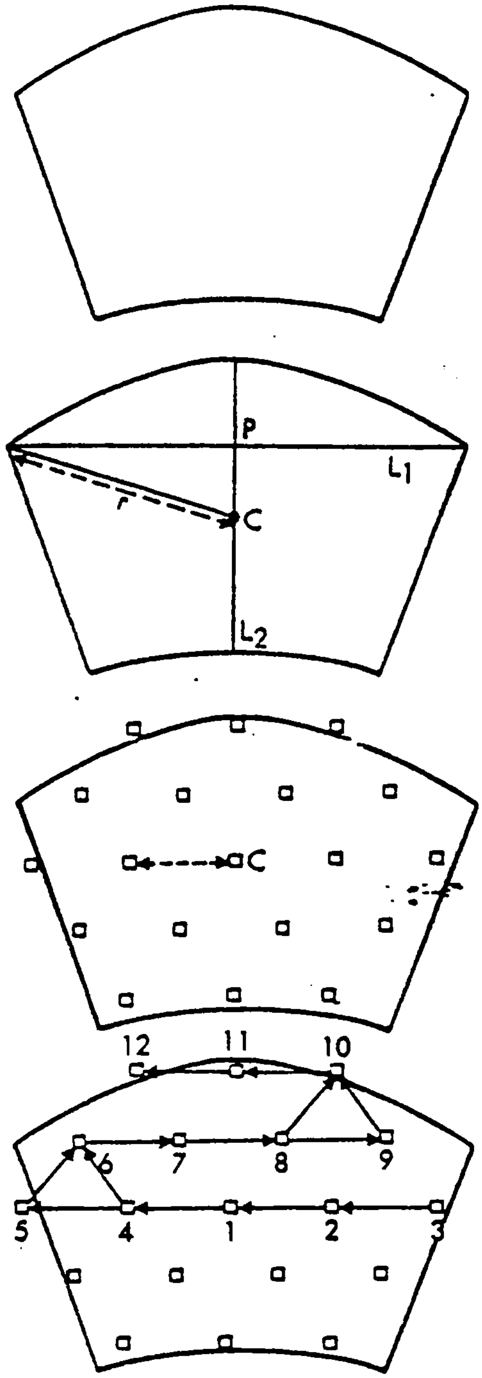
(b) Determine the midpoint, P, of L_1.

(c) Draw a second dimension, L_2, through P perpendicular to L_1.

(d) The midpoint, C, of L_2 is the required center.

(e) The distance from C to the extremes of L_1 is the required radius, r.

Figure 5 shows an example of the procedure; Figure 6 demonstrates how the center is determined for several spill shapes. Even if the center determined is slightly off, the sampling design will not be adversely affected.



(a) Original cleanup area

(b) Locating the center of the sampling circle

(c) Centering the hexagonal grid

(d) Staking out the grid points

Figure 5

Once the sampling radius, r, has been found, the sample size can be selected based on Table 4.

> <u>Example</u>: Suppose $r = 5$ ft. From Table 4, a sample size of 19 should be used.

Having selected the sample size, the grid spacing can be calculated from Table 2.

> <u>Example</u> (continued): For a 19-point design with radius $r = 5$, the grid spacing is $s = 0.48r = (0.48)(5) = 2.4$ ft.

The procedure for laying out a 19 point design is as follows. The first sampling location is the center C of the sampling circle, as shown in Figure 5. Next, draw a diameter through C and stake out locations 2 through 5 on it as shown; adjacent locations are a distance s apart. The orientation of the diameter (for example east-west) used is not important; it may be chosen at random or for the convenience of the samplers. The next 4 locations, Nos. 6-9, are laid out parallel to the first row, again a distance s apart. The only difficulty is in locating the starting point, No. 6, for this row. To accomplish this the sampler needs two pieces of rope (or surveyor's chain, or equivalent measuring device) of length s. Attach one piece of rope to the stake at each location 4 and 5. Draw the ropes taut horizontally until they touch at location 6. Once the second row is laid out, the third and final row of 3 locations in the top half of the design is found similarly, starting with number 10. In the same way, the bottom half of the design is staked out. The 7-point or 37-point designs are laid out in an analogous fashion.

Once the sampling locations are staked out the actual samples can be collected. In the example in Figure 5, <u>three of the sampling locations fall outside the original cleanup area. Samples should be taken at these points, to detect contamination beyond the original cleanup boundaries. This verifies that the original spill boundaries were accurately assessed</u>.

In practice, various obstacles may be encountered in laying out the sampling grid. Many "obstacles" can be handled by taking a different type of sample, e.g., if a fire hydrant is located at a point in a sampling grid otherwise consisting of soil samples, then a <u>wipe</u> sample should be taken at the hydrant, rather than taking a sample of nearby soil. The obstacle most likely to be encountered is a vertical surface such as a wall. To determine the sampling location on such a surface, draw taut the ropes (chains) of length s attached to two nearby stakes and find the point on the vertical surface where their common ends touch. See Figure 7 for an illustration of the procedure. If more samples from the vertical surface are called for, the same principle may be applied, always using the last two points located to find the next one.

3. <u>Judgemental Sampling</u>

The inspector or sampling crew may use best judgement to collect samples wherever residual PCB contamination is suspected. These samples are

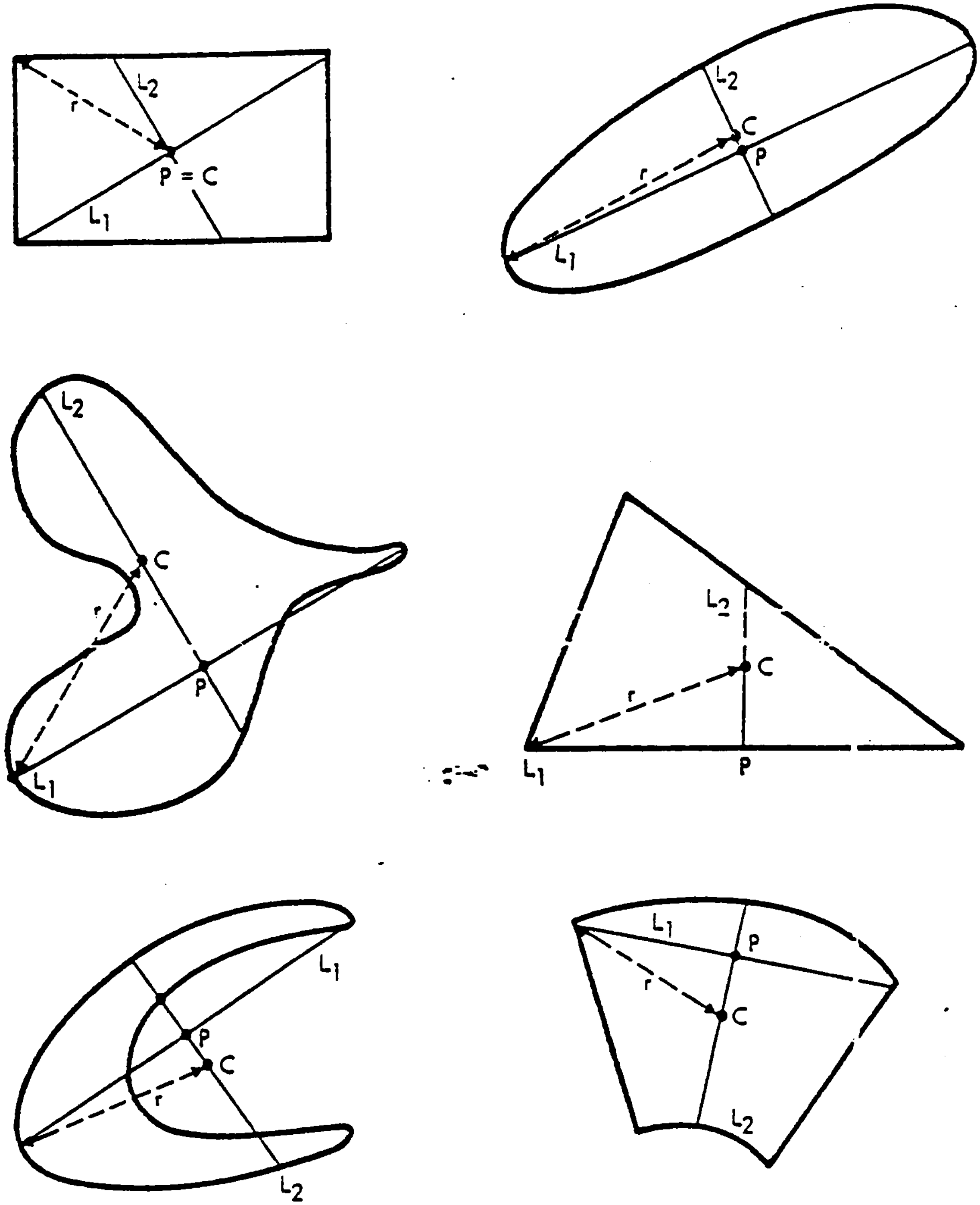


Figure 6. Locating the center and sampling circle radius of an irregularly shaped spill area.

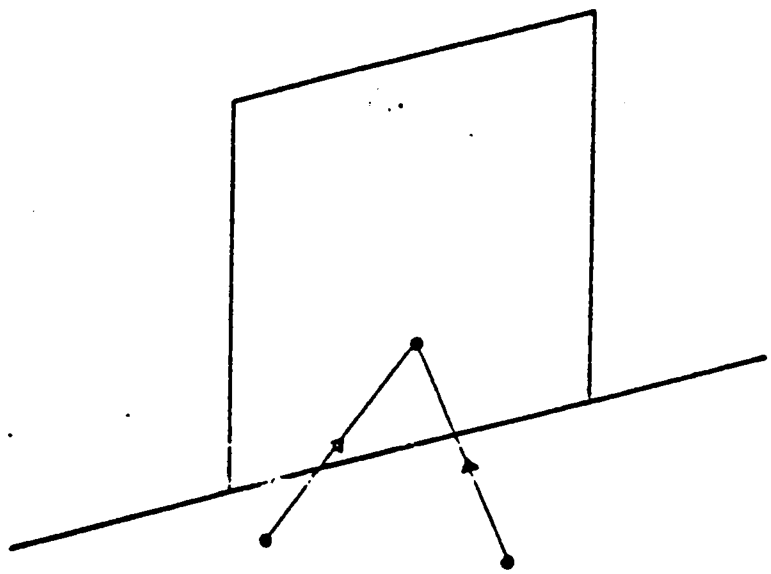


Figure 7. Location of a sampling point on a vertical surface.

in addition to those collected from the sampling grid. Examples of extra sampling points include suspicious stains outside the designated spill area, cracks or crevices, and any other area where the inspector suspects inadequate cleanup.

4. Compositing Strategy for Analysis of Samples

Once the samples have been collected at a site, the goal of the analysis effort is to determine whether at least one sample has a PCB concentration above the allowable limit. This sampling plan assumes the entire spill area will be recleaned if a single sample contaminated above the limit is found. Thus, it is not important to determine precisely which samples are contaminated or even exactly how many. This means that the cost of analysis can be substantially reduced by employing compositing strategies, in which groups of samples are thoroughly mixed and evaluated in a single analysis. If the PCB level in the composite is sufficiently high, one can conclude that a contaminated sample is present; if the level is low enough, all individual samples are clean. For intermediate levels, the samples from which the composite was constructed must be analyzed individually to make a determination. Thus, the number of analyses needed is greatly reduced in the presence of very high levels of contamination in a few samples or in the presence of very low levels in most samples.

For purposes of this discussion, assume that the maximum allowable PCB concentration in a single soil sample is 10 ppm. The calculations can easily be adapted for a different level or for different types of samples. Based on review of the available precision and accuracy data (Erickson 1985), method performance of 80% accuracy and 30% relative standard deviation should be attainable for soil concentrations above 1 ppm.

To protect against false positive findings due to analytical error, the measured PCB level in a single sample must exceed some cutoff greater than 10 ppm for a finding of contamination. Assume that a 0.5% false positive rate for a single sample is desired. As will be shown later, this single sample false positive rate controls the overall false positive rate of the sampling schemes to acceptable levels. Then, using standard statistical techniques, the cutoff level for a single sample is

$$(0.8)(10) + (2.576)(0.3)(0.8)(10) = 14.2 \text{ ppm},$$

where 0.8(80%) represents the accuracy of the analytical method, 10 ppm is the allowable limit for a single sample, 2.576 is a coefficient from the standard normal distribution, and 0.3(30%) is the relative standard deviation of the analytical method. Thus, if the measured level in a single sample is 14.2 ppm or greater, one can be 99.5% sure that the true level is 10 ppm or greater.

Now suppose that a composite of, say, 7 samples is analyzed. The true PCB level in the composite (assuming perfect mixing) is simply the average of the 7 levels of the individual samples. Let X ppm be the measured PCB level in the composite. If $X \leq (14.2/7) = 2.0$, then all 7 individual samples are rated clean. If $X > 14.2$, then at least one individual sample must be above the 10 ppm limit. If $2.0 < X \leq 14.2$, no conclusion is possible based on analysis of the composite and the 7 samples must be analyzed individually to reach a decision. These results may be generalized to a composite of any arbitrary number of samples, subject to the limitations noted below.

The applicability of compositing is potentially limited by the size of the individual specimens and by the performance of the analytical method at low PCB levels. First, the individual specimens must be large enough so that the composite can be formed while leaving enough material for individual analyses if needed. For verification of PCB spill cleanup, adequacy of specimen sizes should not be a problem. The second limiting factor is the analytical method. Down to about 1 ppm, the performance of the stipulated analytical methods should not degrade markedly. Therefore, since the assumed permissible level is 10 ppm, no more than about 10 specimens should be composited at a time.

In compositing specimens, the location of the sampling points to be grouped should be taken into account. If a substantial residual area of contamination is present, then contaminated samples will be found close together. Thus, contiguous specimens should be composited, if feasible, in order to maximize the potential reduction in the number of analyses produced by the compositing strategy. Rather than describe a (very complicated) algorithm for choosing specimens to composite, we have graphically indicated some possible compositing strategies in Figures 8 Through 11. Based on the error probability calculations presented in Section 5 below, we recommend the compositing strategies indicated in Table 6. The recommended strategy for the 7-point design requires no explanation. The strategies for the 19- and 37-point cases are shown in Figures 9 and 11, respectively. The strategies shown in Figures 8 and 10 are used in Section 5 for comparison purposes. For details on the reduction in number of analyses expected to result (as compared to individual analyses), see the next Section, 5.

5. Calculations of Average Number of Analyses, and Error Probabilities

Estimates of expected number of analyses and probabilities of false positives (incorrectly deciding the site is contaminated above the limit), and false negatives (failure to detect residual contamination) were obtained for various scenarios. The calculations were performed by Monte Carlo simulation using 5,000 trials for each combination of sample size, compositing strategy, level, and extent of residual contamination. The computations were based on the following assumptions:

a. Only soil samples are involved. In practice other types of samples will often be obtained and analyzed. Although the results of this section are not directly applicable to such cases, they do indicate in general terms the type of accuracy obtainable and the potential cost savings from compositing.

A 2 GROUP COMPOSITING PLAN FOR 7 SAMPLE POINTS

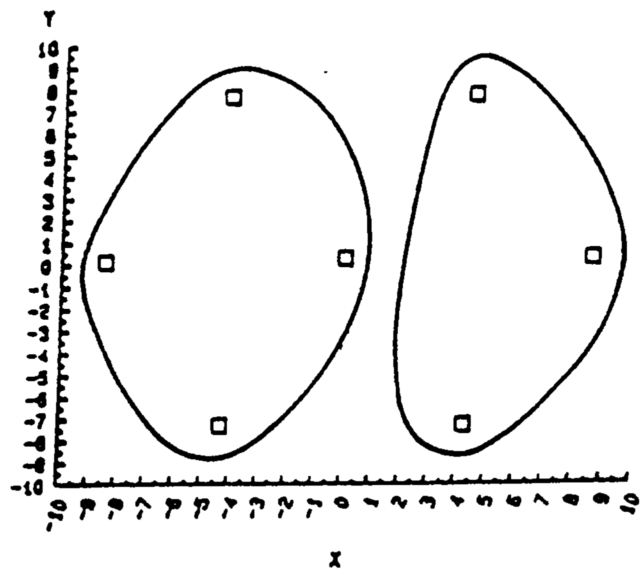


Figure 8

A 2 GROUP COMPOSITING PLAN FOR 19 SAMPLE POINTS

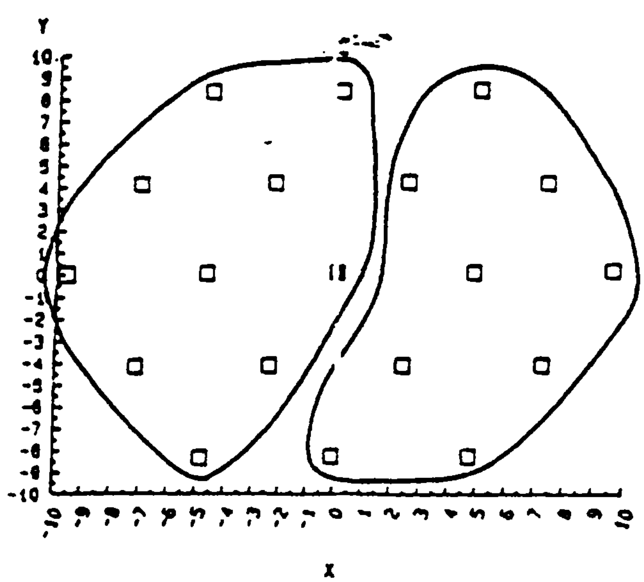


Figure 9

A 6 GROUP COMPOSITING PLAN FOR 19 SAMPLE POINTS

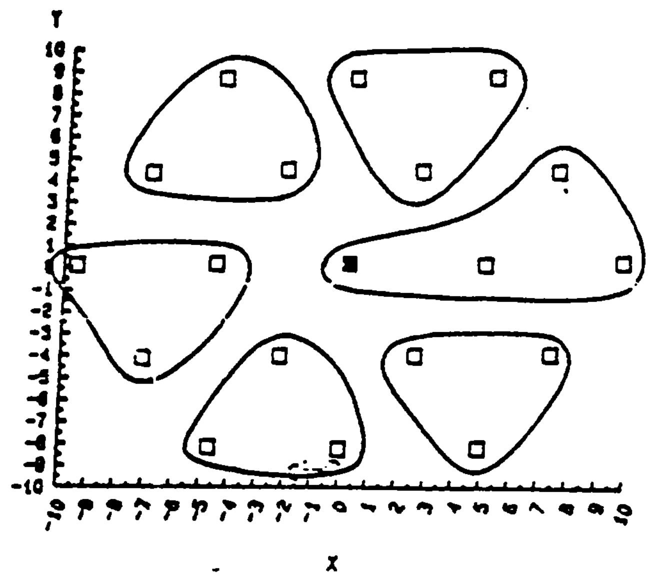


Figure 10. Location of sample points in a 19 sample point plan, with detail of a 2 group compositing design.

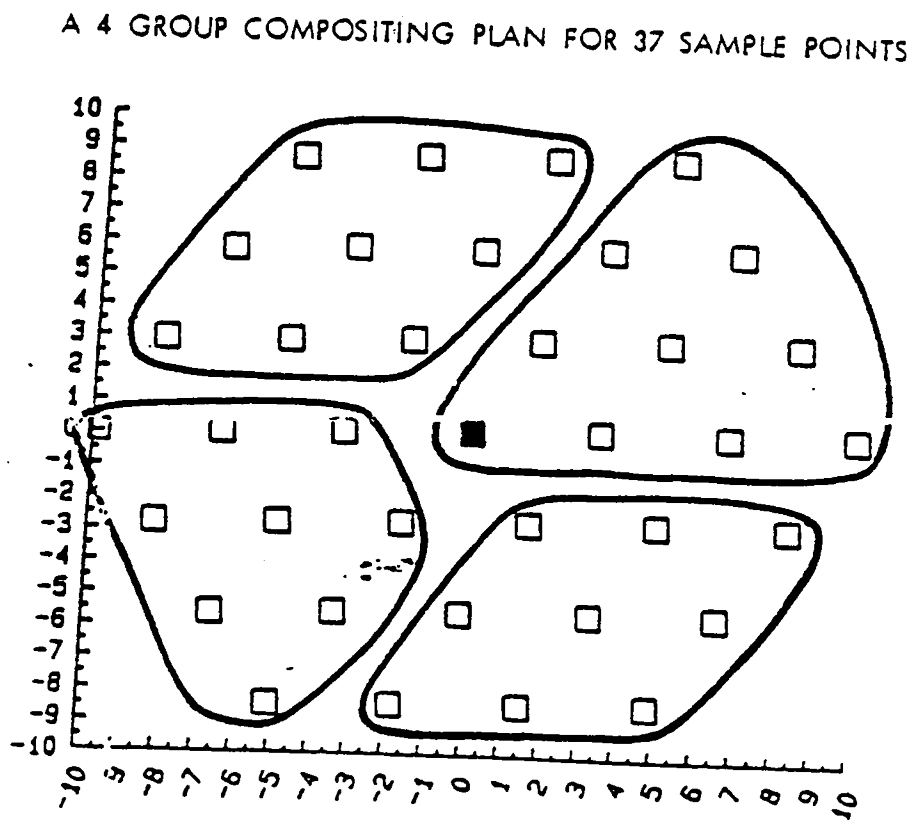


Figure 11. Location of sample points in 37 sample point plan, with detail of a 4 group compositing design.

Table 6. Recommended Compositing Strategies

No. of samples collected	Compositing strategy
7	One group of 7
19	One group of 10, one of 9
37	Three groups of 9, one of 10

b. If the true PCB level in a sample is C, then the measured value is a normally distributed random variable with mean 0.8C and standard deviation (0.3)(0.8C) = 0.24C. Thus, it is assumed that the analytical method is 80% accurate, with 30% relative standard deviation.

c. The maximum allowable level in a single sample is 10 ppm. However, the measured level for a single sample must exceed 14.2 ppm for a finding of noncompliance. As previously discussed, this corresponds to a single-sample false positive rate of 0.5%.

d. The residual contamination present is modeled as a randomly placed circle of variable radius and contamination level. The PCB level is assumed to be uniform within the randomly-placed circle and zero outside it.

e. Analysis of samples is terminated as soon as a positive result is obtained on a single analysis. If a composite does not give a definitive result (positive or negative), the individual specimens from which the composite was formed are analyzed in sequence before any other composite.

f. The compositing strategies used are shown in Figures 8 and 11.

The results of the computations are shown in Tables 7 through 20. Tables 7 through 12 show the performance of the compositing strategies recommended in Section 3. For each strategy, there is a pair of tables. The first table shows the probability of reporting a violation of a 10 ppm cleanup standard, for different levels of residual contamination and percent of cleanup area contaminated. When the contamination level is 10 ppm or less, the number in the table is the probability of a false positive, i.e., a false finding of noncompliance. These probabilities are all very low, as they should be. When the level is above 10 ppm, the number in the table is the probability that a violation will be detected by the sampling design. For levels close to 10 ppm, and for small percentages of cleanup area residually contaminated, the detection probability is low. When the level is high and the percent of area contaminated is large, however, detection probability approaches 100%. For small areas with high contamination, detection capability is modest. This is because there is only a small chance that the contaminated area will be sampled. Similarly, detection capability is also modest for large areas contaminated near the 10 ppm limit. The reason for this is that, even though a number of contaminated samples will be found in such cases, the analytical method is not likely to give positive identification of levels near the 10 ppm cutoff. This is the price paid for reducing the single-sample false positive rate to 0.5%.

The second table for each compositing strategy shows the expected (average) number of analyses needed to reach a decision. For a fixed percent of area contaminated, the smallest number of analyses is needed if the level of contamination is very high or very low. For intermediate levels, more analyses are needed. The largest number of analyses are required with a large area contaminated at close to 10 ppm. In such a situation, the levels of the composite(s) will mostly lie in the intermediate range for which no conclusion is possible based on analysis of the composite. Thus, individual analyses will almost always be required, so that the advantage of compositing is lost.

Tables 13 through 20 compare the recommended compositing strategies for the 7-point and 19-point designs to alternative compositing strategies for these designs, for 4 different contaminated percentages (1%, 9%, 25%, and 49%). The comparison is based on the expected number of analyses required. Overall detection capabilities are comparable for the different strategies. The tables show that the recommended strategies are best, except for larger areas contaminated close to the 10 ppm level.

Table 7. Probability of Declaring a Violation of a 10 ppm Cleanup Standard, for the 7 Point, 1 Composite Design[a]

Level of residual PCB contamination (ppm)		Percent of cleanup area with residual PCB contamination: 1	4	9	16	25	49
Compliant	8	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10	< 0.001	< 0.001	< 0.001	< 0.001	0.002	0.007
Noncompliant	11	< 0.001	< 0.001	< 0.001	< 0.001	0.009	0.032
	12	< 0.001	0.001	0.001	0.002	0.017	0.092
	13	0.001	0.005	0.005	0.009	0.045	0.184
	14	0.003	0.010	0.019	0.028	0.085	0.298
	15	0.006	0.016	0.039	0.065	0.134	0.396
	16	0.009	0.029	0.064	0.102	0.202	0.517
	18	0.019	0.074	0.137	0.218	0.344	0.655
	20	0.030	0.110	0.199	0.335	0.479	0.787
	25	0.048	0.186	0.342	0.554	0.736	0.905
	50	0.070	0.245	0.487	0.767	0.977	0.989
	75	0.071	0.245	0.496	0.787	0.992	0.995
	100	0.068	0.255	0.499	0.800	0.995	0.997
	150	0.070	0.246	0.481	0.796	0.998	0.999
	200	0.073	0.254	0.489	[illegible]	[illegible]	[illegible]
	300	0.069	0.257	0.494	0.792	> 0.999	> 0.999
	500	0.070	0.242	0.492	0.811	> 0.999	> 0.999

[a] Seven samples analyzed first as a composite, then individually if necessary to reach a decision.

Table 8. Expected Number of Analyses to Decide Compliance or Violation, for a 10 ppm Cleanup Standard, for the 7-Point, 1-Composite Design[a]

Level of residual PCB contamination (ppm)		Percent of cleanup area with residual PCB contamination					
		1	4	9	16	25	49
Compliant	4	1.00	1.00	1.00	1.00	1.00	1.11
	6	1.00	1.00	1.00	1.00	1.06	2.31
	8	1.00	1.00	1.00	1.00	1.44	3.96
	10	1.00	1.01	1.02	1.03	1.75	4.96
Noncompliant	11	1.01	1.04	1.05	1.11	2.01	5.31
	12	1.04	1.08	1.17	1.32	2.21	5.39
	13	1.04	1.18	1.40	1.59	2.56	5.35
	14	1.10	1.32	1.63	2.02	2.86	5.18
	15	1.13	1.45	1.85	2.35	3.22	4.90
	16	1.15	1.52	2.03	2.67	3.50	4.71
	18	1.19	1.69	2.41	3.18	3.95	4.36
	20	1.24	1.85	2.57	3.59	4.19	4.04
	25	1.26	1.98	2.85	3.84	4.47	3.61
	30	1.28	1.96	2.93	3.99	4.45	2.96
	75	1.28	1.94	2.93	3.98	4.23	2.26
	100	1.21	1.79	2.53	3.45	3.54	1.87
	150	1.09	1.28	1.52	1.86	1.89	1.30
	200	1.03	1.11	1.15	1.34	1.33	1.13
	300	1.01	1.01	1.04	1.09	1.06	1.03
	500	1.00	1.00	1.01	1.02	1.02	1.01

[a]Seven samples analyzed first as a composite, then individually if necessary to reach a decision.

Table 9. Probability of Declaring a Violation of a 10 ppm Cleanup Standard, for the 19 Point, 2 Composite Design[a]

Level of residual PCB contamination (ppm)		Percent of cleanup area with residual PCB contamination					
		1	4	9	16	25	49
Compliant	8	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10	< 0.001	< 0.001	0.002	0.007	0.015	0.028
Noncompliant	11	< 0.001	< 0.001	0.007	0.034	0.058	0.017
	12	0.001	0.002	0.029	0.084	0.153	0.281
	13	0.003	0.007	0.062	0.179	0.304	0.497
	14	0.005	0.021	0.114	0.304	0.455	0.693
	15	0.012	0.052	0.178	0.407	0.606	0.832
	16	0.025	0.083	0.264	0.518	0.744	0.908
	18	0.046	0.167	0.421	0.698	0.883	0.978
	20	0.077	0.263	0.556	0.812	0.945	0.993
	25	0.125	0.461	0.784	0.923	0.990	0.999
	50	0.161	0.631	0.978	0.992	0.999	> 0.999
	75	0.171	0.651	0.993	0.997	> 0.999	> 0.999
	100	0.168	0.642	0.994	0.999	> 0.999	> 0.999
	150	0.166	0.657	0.998	0.999	> 0.999	> 0.999
	200	0.175	0.646	0.999	0.999	> 0.999	> 0.999
	300	0.168	0.654	0.999	> 0.999	> 0.999	> 0.999
	500	0.180	0.661	0.999	> 0.999	> 0.999	> 0.999

[a]Nineteen samples analyzed first as two composites, then individually if necessary to reach a decision.

Table 10. Expected Number of Analyses to Decide Compliance or Violation, for a 10 ppm Cleanup Standard, for the 19-Point, 2-Composite Design[a]

Level of residual PCB contamination (ppm)		Percent of cleanup area with residual PCB contamination					
		1	4	9	16	25	49
Compliant	4	2.00	2.00	2.00	2.18	3.30	7.49
	6	2.00	2.00	2.00	3.79	6.70	11.22
	8	2.00	2.00	3.01	6.15	9.20	13.13
	10	2.01	2.03	3.72	7.46	10.55	14.02
Noncompliant	11	2.03	2.14	4.07	7.90	10.74	13.81
	12	2.10	2.32	4.57	8.08	10.67	12.78
	13	2.21	2.74	4.84	7.94	9.95	11.00
	14	2.25	3.02	5.16	7.90	9.31	9.27
	15	2.37	3.40	5.50	7.65	8.42	7.80
	16	2.49	3.84	5.89	7.30	7.59	6.63
	18	2.60	4.36	6.11	6.57	6.29	5.02
	20	2.68	4.65	6.26	6.18	5.48	4.25
	25	2.82	5.02	6.20	5.45	4.57	3.36
	50	2.80	5.03	5.96	4.70	3.48	2.28
	75	2.90	5.05	5.69	[illegible]	2.63	1.84
	100	2.77	4.95	5.37	3.46	2.26	1.69
	150	2.53	3.94	3.99	2.59	1.80	1.46
	200	2.21	2.67	2.61	1.91	1.55	1.33
	300	1.99	1.89	1.70	1.50	1.34	1.19
	500	1.92	1.69	1.48	1.39	1.30	1.16

[a]Nineteen samples analyzed first as two composites, then individually if necessary to reach a decision.

Table 11. Probability of Declaring a Violation of a 10 ppm Cleanup Standard, for the 37 Point, 4 Composite Design[a]

Level of residual PCB contamination (ppm)		Percent of cleanup area with residual PCB contamination					
		1	4	9	16	25	49
Compliant	8	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
	10	< 0.001	0.002	0.010	0.022	0.031	0.060
Noncompliant	11	0.001	0.008	0.041	0.084	0.124	0.225
	12	0.001	0.024	0.103	0.217	0.305	0.488
	13	0.005	0.053	0.224	0.388	0.536	0.751
	14	0.012	0.094	0.360	0.575	0.726	0.908
	15	0.023	0.159	0.501	0.740	0.859	0.950
	16	0.039	0.242	0.621	0.831	0.936	0.991
	18	0.091	0.390	0.785	0.940	0.985	> 0.999
	20	0.147	0.542	0.884	0.981	0.996	> 0.999
	25	0.249	0.771	0.958	0.995	0.999	> 0.999
	50	0.340	0.976	0.997	0.999	0.999	> 0.999
	75	0.343	0.991	0.999	0.999	> 0.999	> 0.999
	100	0.353	0.993	0.999	> 0.999	> 0.999	> 0.999
	150	0.339	0.997	> 0.999	> 0.999	> 0.999	> 0.999
	200	0.357	0.99[illegible]	> 0.999	> 0.999	> 0.999	> 0.999
	300	0.344	0.997	> 0.999	> 0.999	> 0.999	> 0.999
	500	0.348	0.999	> 0.999	> 0.999	> 0.999	> 0.99[illegible]

[a]Thirty-seven samples analyzed first as four composites, then individually if necessary to reach a decision.

Table 12. Expected Number of Analyses to Decide Compliance or Violation, for a 10 ppm Cleanup Standard, for the 37-Point, 4-Composite Design[a]

Level of residual PCB contamination (ppm)		Percent of cleanup area with residual PCB contamination: 1	4	9	16	25	49
Compliant	4	4.00	4.01	4.41	6.72	9.85	15.69
	6	4.00	4.15	6.66	10.22	13.48	19.36
	8	4.00	4.77	9.01	12.76	15.98	22.08
	10	4.02	5.36	10.56	14.29	17.18	23.04
Noncompliant	11	4.07	5.69	10.87	14.29	16.93	21.28
	12	4.18	5.97	10.94	13.74	15.68	17.84
	13	4.35	6.28	10.56	12.74	13.44	13.54
	14	4.57	6.78	10.21	11.21	11.13	10.10
	15	4.73	7.04	9.60	9.71	9.33	7.78
	16	4.90	7.33	9.08	8.77	7.83	6.12
	18	5.09	7.59	8.02	7.05	6.16	4.71
	20	5.26	7.74	7.28	6.26	5.30	3.96
	25	5.34	7.55	6.53	5.28	4.37	3.08
	50	5.27	7.14	5.39	3.78	3.06	2.16
	75	5.23	[illegible]	[illegible]	3.04	2.55	1.90
	100	5.22	6.43	3.73	2.64	2.32	1.73
	150	4.55	4.89	3.02	2.37	2.07	1.57
	200	3.95	3.57	2.53	2.15	1.90	1.52
	300	3.59	2.67	2.28	2.04	1.81	1.44
	500	3.49	2.48	2.22	1.99	1.79	1.44

[a]Thirty-seven samples analyzed first as four composites, then individually if necessary to reach a decision.

Table 13. Comparison of Expected Number of Analyses for Different Compositing Strategies for the 7-Point Design, When an Area 1% of the Size of the Cleanup Site Remains Contaminated

Level of residual PCB contamination (ppm)		1 Composite	2 Composites	Individually
Compliant	4	1.00	2.00	7.00
	8	1.00	2.00	7.00
	10	1.00	2.00	7.00
Noncompliant	12	1.04	2.02	6.98
	14	1.10	2.05	6.96
	16	1.15	2.07	6.92
	20	1.24	2.10	6.88
	25	1.26	2.11	6.84
	50	1.28	2.09	6.80
	100	1.21	1.98	6.78
	200	1.03	1.96	6.80
	500	1.00	1.96	6.81

Table 14. Comparison of Expected Number of Analyses for Different Compositing Strategies for the 7-Point Design, When an Area 9% of the Size of the Cleanup Site Remains Contaminated

Level of residual PCB contamination (ppm)		1 Composite	2 Composites	Individually
Compliant	4	1.00	2.00	7.00
	8	1.00	2.00	7.00
	10	1.02	2.01	6.99
Noncompliant	12	1.17	2.09	6.91
	14	1.63	2.32	6.69
	16	2.03	2.50	6.49
	20	2.57	2.77	6.06
	25	2.85	2.79	5.65
	50	2.93	2.60	5.45
	100	2.53	1.85	5.46
	200	1.15	1.72	5.45
	500	1.01	1.17	5.45

Table 15. Comparison of Expected Number of Analyses for Different Compositing Strategies for the 7-Point Design, When an Area 25% of the Size of the Cleanup Site Remains Contaminated

Level of residual PCB contamination (ppm)		1 Composite	2 Composites	Individually
Compliant	4	1.00	2.00	7.00
	8	1.44	2.13	7.00
	10	1.71	2.24	6.98
Noncompliant	12	2.21	2.44	6.81
	14	2.86	2.84	6.29
	16	3.50	3.23	5.64
	20	4.19	3.54	4.68
	25	4.47	3.56	4.12
	50	4.45	2.97	3.58
	100	3.54	1.61	3.51
	200	1.33	1.38	3.50
	500	1.02	1.37	3.50

Table 16. Comparison of Expected Number of Analyses for Different Compositing Strategies for the 7-Point Design, When an Area 49% of the Size of the Cleanup Site Remains Contaminated

Level of residual PCB contamination (ppm)		1 Composite	2 Composites	Individually
Compliant	4	1.11	2.02	7.00
	8	3.96	2.99	7.00
	10	4.96	3.50	6.96
Noncompliant	12	5.39	3.81	6.61
	14	5.18	3.94	5.79
	16	4.71	3.86	4.82
	20	4.04	3.49	3.53
	25	3.61	3.03	2.87
	50	2.96	2.22	2.40
	100	1.87	1.36	2.40
	200	1.13	1.23	2.39
	500	1.01	1.20	2.39

Table 17. Comparison of Expected Number of Analyses for Different Compositing Strategies for the 19-Point Design, When an Area 1% of the Size of the Cleanup Site Remains Contaminated

Level of residual PCB contamination (ppm)		2 Composites	6 Composites	Individually
Compliant	4	2.00	6.00	19.00
	8	2.00	6.00	19.00
	10	2.01	6.00	19.00
Noncompliant	12	2.10	6.03	18.93
	14	2.25	6.07	18.74
	16	2.49	6.11	18.46
	20	2.68	6.07	18.06
	25	2.82	6.01	17.75
	50	2.80	5.80	17.49
	100	2.77	5.56	17.46
	200	2.21	5.53	17.46
	500	1.92	5.57	17.46

Table 18. Comparison of Expected Number of Analyses for Different Compositing Strategies for the 19-Point Design, When an Area 9% of the Size of the Cleanup Site Remains Contaminated

Level of residual PCB contamination (ppm)		2 Composites	6 Composites	Individually
Compliant	4	2.00	6.00	19.00
	8	3.01	6.19	19.00
	10	3.72	6.32	18.96
Noncompliant	12	4.57	6.54	18.40
	14	5.16	6.74	16.90
	16	5.89	6.83	14.86
	20	6.26	6.33	11.89
	25	6.20	5.74	10.22
	50	5.96	4.45	8.94
	100	5.37	3.34	8.64
	200	2.61	3.17	8.63
	500	1.48	3.17	8.62

Table 19. Comparison of Expected Number of Analyses for Different Compositing Strategies for the 19-Point Design, When an Area 25% of the Size of the Cleanup Site Remains Contaminated

Level of residual PCB contamination (ppm)		2 Composites	6 Composites	Individually
Compliant	4	3.30	6.07	19.00
	8	9.20	7.73	19.00
	10	10.55	8.44	18.83
Noncompliant	12	10.67	8.47	17.31
	14	9.31	7.67	13.72
	16	7.59	6.57	10.58
	20	5.48	5.09	6.25
	25	4.57	4.24	4.35
	50	3.48	3.22	3.34
	100	2.26	2.51	3.29
	200	1.55	2.41	3.26
	500	1.30	2.43	3.23

Table 20. Comparison of Expected Number of Analyses for Different Compositing Strategies for the 19-Point Design, When an Area 49% of the Size of the Cleanup Site Remains Contaminated

Level of residual PCB contamination (ppm)		2 Composites	6 Composites	Individually
Compliant	4	7.49	6.28	19.00
	8	13.18	9.85	19.00
	10	14.02	10.84	18.73
Noncompliant	12	12.78	10.10	16.15
	14	9.27	7.78	11.34
	16	6.63	5.87	7.14
	20	4.25	3.92	3.74
	25	3.36	3.23	2.61
	50	2.28	2.46	2.10
	100	1.69	1.85	2.06
	200	1.33	1.79	2.04
	500	1.16	1.78	2.02

The major conclusions that can be drawn from these results are as follows. First, the proposed cutoff on the measured PCB level for a finding of noncompliance for a single sample, 14.2 ppm, is successful in controlling the overall false positive rate of the sampling scheme. For example, when an area half the size of the entire site remains contaminated just at the allowable limit of 10 ppm, the false positive rate is 1% for the 7-point design, 3% for the 19-point design, and 6% for the 37-point design. Note, that the overall false-positive rate is highest for contamination just at the allowable limit. Second, the detection capabilities of the design appear satisfactory, bearing in mind the difficulty of detecting randomly-located contamination by any sampling scheme without exhaustive sampling. As an example, the proposed 19-point design can detect 50 ppm contamination present in 9% of the cleanup area with 98% probability. Similarly, the 19-point design can detect 20 ppm contamination present in 25% of the area with 95% probability. Third, the proposed compositing strategies are quite effective in reducing the number of analyses needed to reach a decision in all cases except those involving large areas contaminated near the cutoff of 10 ppm. For example, for contaminated levels of 25 ppm or greater, the expected number of analyses to reach a decision never exceeds 5 for the 7-point design, or 7 for the 19-point design, or 8 for the 37-point design. Larger number of analyses are needed in cases of contamination close to the allowable limit of 10 ppm, up to 23 for the 37-point design when 49% of the area is contaminated at 10 ppm.

B. Sampling Techniques

The types of media to be sampled will include soil, water, vegetation and solid surfaces (concrete, asphalt, wood, etc.). General sampling methods are described below. Additional sampling guidance documents are available (Mason 1982, USWAG 1984).

1. Solids Sampling

When soil, sand, or sediment samples are to be taken, a surface scrape samples should be collected. Using a 10 cm x 10 cm (100 cm^2) template to mark the area to be sampled, the surface should be scraped to a depth of 1 cm with a stainless steel trowel or similar implement. This should yield at least 100 g soil. If more sample is required, expand the area but do not sample deeper. Use a disposable template or thoroughly clean the template between samples to prevent contamination of subsequent samples. The sample should be scraped directly into a precleaned glass bottle. If it is free-flowing, the sample should be thoroughly homogenized by tumbling. If not, successive subdivision in a stainless steel bowl should be used to create a representative subsample.

In some cases, such as sod, scrape samples may not be appropriate. For these cases, core samples, not more than 5 cm deep, should be taken using a soil coring device. These core samples should be well-homogenized in a stainless steel bowl by successive subdivision. A portion of each sample should then be removed, weighed and analyzed.

Samples should be stored in the dark at 4°C in precleaned glass bottles. If samples are to be analyzed quickly, the storage requirements may be relaxed as long as sample integrity is maintained. Before collection of

Care must be taken to assure proper use of a sampling template. Different templates may be used for the variously shaped areas which must be sampled. A 100 cm^2 area may be a 10 cm x 10 cm square, a rectangle (e.g., 1 cm x 100 cm or 5 cm x 20 cm), or any other shape. The use of a template assists the sampler in the collection of a 100 cm^2 sample and in the selection of representative sampling sites. When a template is used it must be thoroughly cleaned between samples to prevent contamination of subsequent samples by the template.

The wipe samples should be stored in precleaned glass jars at 4°C. Before collection of verification samples, the selected filter paper or gauze pad and solvent should be used to generate a field blank as described in Section IV.E.

b. Sampling Porous Surfaces

Wipe sampling is inappropriate for surfaces which are porous and would absorb PCBs. These include wood and asphalt. Where possible, a discrete object (e.g., a paving brick) may be removed. Otherwise, chisels, drills, saws, etc., may be used to remove a sufficient sample for analysis. Samples less than 1 cm deep on the surface most likely to be contaminated with PCBs should be collected.

4. Vegetation Sampling

The sample design or visual inspection may indicate that samples of vegetation (such as leaves, bushes, and flowers) are required. In this case, samples may be taken with pruning shears, a saw, or other suitable tool and placed in a precleaned glass bottle.

C. Analytical Techniques

A number of analytical techniques have been used for analysis of PCBs in the types of samples which may be associated with PCB spills. Some of the candidate analytical methods are listed in Table 21. The analysis method(s) most appropriate for a given spill will depend upon a number of factors. These include sensitivity required, precision and accuracy required, potential interferents, ultimate use of the data, experience of the analyst, availability of laboratory equipment, and number of samples to be analyzed.

As shown in Table 21, many analytical methods are available. The general analytical techniques are discussed and then compared below.

1. Gas Chromatography (GC)

As can be seen in Table 21, analysis of PCBs by gas chromatography is frequently the method of choice. PCBs are chromatographed using either packed or capillary columns and may be detected using either specific detectors or mass spectrometry. A comprehensive method for analysis of PCBs in transformer fluid and waste oils was developed by Bellar and Lichtenberg (1982). This method describes six different cleanup techniques, recommends three GC detectors, and suggests procedures for GC calibration and for measurement of precision and accuracy. This method also discusses several calculation methods.

Table 21 (Continued)

Procedure designation	Matrix	Extraction	Cleanup[c]	Determination method	Qualitative assessment	Quantitation method	LOD	QC discussed	Reference
EPA (Halocarbon)	Sludge	Hexane/ CH_2Cl_2/ acetone (83/15/2)	GPC S removal	PGC/ECD	Yes	Peak area or peak height	NS	Yes	Rodriguez et al., 1980
Priority Pollutant	Sludge	CH_2Cl_2 (base/ neutral and acid fractions)	GPC	PGC/EIMS	Yes	NS	NS	Yes	EPA, 1979c
8100	Sludge	CH_2Cl_2 (3 fractions)	GPC Silica gel	HRGC/EIMS or PGC/EIMS	Yes	NS	NS	Yes	Ballinger, 1978
8080	Solid waste	CH_2Cl_2	(Florisil)	PGC/ECD	No	Area	1 µg/g	Yes	EPA, 1982e
8250	Solid waste	CH_2Cl_2	None	PGC/EIMS	No	NS	1 µg/g	Yes	EPA, 1982e
8270	Solid waste	$CHCl_3$	None	CGC/EIMS	No	NS	1 µg/g	Yes	EPA, 1982e
EPA (spills)	Unspecified	Hexane/ acetone	(CH_3CN) (Florisil) (Silica gel) (Mercury)	PGC/ECD	No	Total area or Webb-McCall	NS	No	Beard and Schaum, 1978
EPA	Soil and Sediment	Acetone/ Hexane	Florisil Silica gel (S removal)	PGC/ECD	No	Computer	NS	Yes	EPA, 1982d
Monsanto	Sediment	CH_3CN	Saponification H_2SO_4 Alumina	PGC/ECD	No	Individual or total peak heights	2 ppb	No	Moein, 1976
ANSI	Sediment, soil	CH_3CN	Saponification H_2SO_4 Alumina	PGC/ECD	No	Single peak or summed peaks	2 ppm	Yes	ANSI, 1974
EPA (by-products)	Air collected on Florisil or XAD-2	Hexane	(H_2SO_4) (Florisil)	HRGC/EIMS	Yes	Ind. peaks	NS	Yes	Erickson et al., 1982, 1983d; Erickson, 1984b
EPA (ambient air)	Air near hazardous waste sites collected on PUF	Hexane/ ether	Alumina	PGC/ECD	No	Total area or peak height	10-50 ng/m³	No	Lewis, 1982

Table 21 (Continued)

Procedure designation	Matrix	Extraction	Cleanup[c]	Determination method	Qualitative assessment	Quantitation method	LOD	QC discussed	Reference
AOAC (29)	Food	CH_3CN/Pet. ether	Florisil MgO/ Celite Saponification	PGC/ECD	No	Total area or Ind. peaks	NS[a]	No	AOAC, 1980a
Japan	Food	Pet. ether/ CH_3CN	Silica gel Saponification (Florisil)	PGC/ECD	Yes	Summed areas perchlorination	NS	No	Tanabe, 1976
PAM	Food	Pet. ether/ CH_3CN	Silicic acid (Saponification) (Oxidation) (Florisil)	PGC/ECD (PGC/HECD) (NP-TLC) (RP-TLC)	No	Area	NS	No	FDA, 1977
AOAC (29)	Paper and paperboard	Saponification	Florisil MgO/ Celite Saponification	PGC/ECD	No	Total area or Ind. peaks	NS[a]	No	AOAC, 1980b
D3303-74	Capacitor Askarels	DI[b]	None	SCOT HRGC/FID	No	Total area	2.8 x 10^{-8} mol/L	No	ASTM, 1980a
D4059-83	Mineral oil	Dilute with hexane or isooctane	Florisil slurry (H_2SO_4) (Florisil column)	PGC/ECD[d] (PGC/HECD)	Yes	Ind. peaks or Webb-McCall	50 ppm	No	ASTM, 1983
EPA (oil)	Transformer fluids or waste oils	DI	(H_2SO_4) (Florisil) (Alumina) (Silica gel) (GPC), (CH_3CN)	PGC/HECD or /ECD or /EIMS (HRGC)	No	Total area or Webb-McCall	1 mg/kg	Yes	EPA, 1981 Bellar and Lichtenberg, 1981
EPA (by-products)	Products or wastes	Several	Several	HRGC/EIMS	Yes	Ind. peaks	NS	Yes	Erickson et al., 1982, 1983d; Erickson, 1984a
DCMA	3 pigment types	A. Hexane/ H_2SO_4 B. CH_2Cl_2	None Florisil	PGC/ECD	No	10 isomers	~ 1 ppm/homolog	Yes	DCMA, 1982
DOW	Chlorinated benzenes	DI	None	PGC/EIMS	Yes	Total peak height/homolog	NS	Yes	Dow, 1981
EPA (isomer groups)	Unspecified	Not addressed	Not addressed	HRGC/EIMS	Yes	Ind. peaks	NS	Yes	EPA, 1984d

Source: M. D. Erickson, The Analytical Chemistry of PCBs, Butterworths, Boston, MA, 1985, in press

a No specific details
b Direct injection or dilute and inject
c Techniques in parentheses are described as optional in the procedure.
d Or PGC with microcoulometric or electrolytic conductivity

b. GC/Hall Electrolytic Conductivity Detector

Electrolytic conductivity detectors have also been used with packed column gas chromatography to selectively detect PCBs (Webb and McCall 1973, Sawyer 1978). The Hall electrolytic conductivity detector (HECD) measures the change in conductivity of a solution containing HCl or HBr which is formed by pyrolysis of halogenated organic GC effluents. The HECD exhibits 10^5-10^6 selectivity for halogenated compounds over other compounds. It also gives a linear response over at least a 10^3 range. HECD and ECD were compared for their use in detecting PCBs in waste oil, hydraulic fluid, capacitor fluid, and transformer oil (Sonchik et al. 1984). They found both detectors acceptable, but noted that the HECD gave higher results with less precision than the ECD. The method detection limits ranged from 3-12 ppm for HECD and 2-4 ppm for ECD. Greater than 100% recovery of spikes analyzed by HECD indicated a nonspecific response to non-PCB components, since extraneous peaks were not observed. Another comparison of HECD and ECD for the analysis of PCBs in oils at the 30-500 ppm levels found that the type of detector made no significant difference in the results (Levine et al. 1983). The authors noted that they had expected higher accuracy from the more specific HECD. They postulated that the cleanup procedures (Florisil, alumina, and sulfuric acid) all had effectively removed the non-PCB species which would have caused interferences in the ECD and reduced its accuracy.

c. GC/Mass Spectrometry

Highly specific identification of PCBs is performed by GC with mass spectrometric (GC/MS) detection. High resolution gas chromatography is generally used with mass spectrometry, so individual PCB isomers may be separated and identified. A GC/MS produces a chromatogram consisting of data points at about 1 second intervals, which are actually full mass spectra. The data are stored by a computer and may be retrieved in a variety of ways. The data file contains information on the amount of compound (signal intensity), molecular weight (parent ion), and chemical composition (fragmentation patterns and isotopic clusters).

GC/MS is particularly suited to detection of PCBs because of its intense molecular ion and the characteristic chlorine cluster. Chlorine has two naturally occurring isotopes, ^{35}Cl and ^{37}Cl, which occur in a ratio of 100:33. Thus, a molecule with one chlorine atom will have a parent ion, M, and an M+2 peak at 33% relative intensity. With two chlorine atoms, M+2 has an intensity of 66% and M+4, 11%.

Because of its expense, complexity of data, and lack of sensitivity, GC/MS has not been used as extensively as other GC methods (particularly GC/ECD), despite its inherently higher information content. As the above factors have been improved, GC/MS has become much more popular for analysis of PCBs, and will probably continue to increase in importance. Several factors including the introduction of routine instruments without costly accessories, decreasing data system costs, and mass-marketing, have combined to keep the costs of GC/MS down while prices of other instruments have risen steadily. With larger data systems and more versatile and "user-friendly"

TLC. The two most common methods of visualization are fluorescence (Kan et al. 1973, Ueta et al. 1974) and reaction with $AgNO_3$ followed by UV irradiation (DeVos and Peet 1971, DeVos 1972, Kawabata 1974, Stahr 1984).

No direct comparison of the performance of TLC with other techniques for analysis of samples from spill sites has been made. Two studies (Bush et al. 1975, Collins et al. 1972) compared TLC and GC/ECD. In both studies, the PCB values obtained were comparable. However, the study by Bush et al. indicated that the TLC results were generally lower than GC/ECD.

3. Total Organic Halide Analyses

Total organic halide analysis can be used to estimate PCB concentrations for guiding field work, but is not appropriate for verification or enforcement analyses. A total organic halide analysis indicates the presence of chlorine and sometimes the other halogens. Many of the techniques also detect inorganic chlorides such as sodium chloride. The reduction of organochlorine to free chloride ion with metallic sodium can be used for PCB analysis. The free chloride ions can be then detected colorimetrically (Chlor-N-Oil®) or by a chloride ion-specific electrode (McGraw-Edison). The performance of these kits has not been tested with any matrix other than mineral oil. X-ray fluorescence (XRF) has also been studied as a PCB screening technique (McQuade 1982, Schwalb and Marquez 1982).

D. Selection of Appropriate Methods

1. Criteria for Selection

The primary criterion for an enforcement method is that the data be highly reliable (i.e., they are legally defensible). This does not necessarily imply that the most exotic, state-of-~~the~~-art methods be employed; rather that the methods have a sound scientific basis and validation data to support their use. Many other criteria also enter into selection of a method, including accuracy, precision, reproducibility, comparability, consistency across matrices, availability, and cost.

For PCB spills, it is assumed that the spills will be relatively fresh and therefore that PCB mixtures will generally resemble those in commercial products (i.e., Aroclor®). It is further assumed that, for most of the matrices likely to be encountered, the levels of interferences will be relatively low.

2. Selection of Instrumental Techniques

Based upon the above criteria and assumptions, either GC/ECD or GC/MS should provide suitable data. Since GC/ECD is included in more standard methods and since the technique is more widely used, it appears to be the technique of choice. The primary methods recommended below are all based on GC/ECD instrumental analysis. Some of the secondary and confirmatory techniques are based on GC/EIMS.

Table 22. Summary of Recommended Analytical Methods

Matrix	Primary method (GC/ECD)		Secondary method		
	Designation	Reference	Designation	GC detector	Reference
Solids	8080	USEPA 1982e	8250, 8270	MS	USEPA 1982e
Water	608	USEPA 1984a	625	MS	USEPA 1984b
Oil	"oil"	USEPA 1981a; Bellar and Lichtenberg, 1981	"oil"	MS	USEPA 1981a; Bellar and Lichtenberg, 1981
Surface wipes	Hexane extraction/608	None	Hexane extraction/625	MS	None
Vegetation	AOAC (29)	AOAC 1980a	None	None	None

Each laboratory is responsible for generating validation data to demonstrate the performance of the method in the laboratory. This can be done before processing of samples; however, it is often impractical. Validation of method performance (replicates, spikes, QC samples, etc.) while analyzing field samples is acceptable.

Changes in the above methods are acceptable, provided the changes are documented and also provided that they do not affect performance. Some minor changes (e.g., substitution of hexane for petroleum ether) do not generally require validation. More significant changes (e.g., substitution of a HECD for ECD) will require documentation of equivalent performance.

E. Quality Assurance

Quality assurance must be applied throughout the entire monitoring program including the sample planning and collection phase, the laboratory analysis phase, and the data processing and interpretation phase.

Each participating EPA or EPA contract laboratory must develop a quality assurance plan (QAP) according to EPA guidelines (USEPA 1980). Additional guidance is also available (USEPA 1983). The quality assurance plan must be submitted to the regional QA officer or other appropriate QA official for approval prior to analysis of samples.

1. Quality Assurance Plan

The elements of a QAP (U.S. EPA, 1980) include:

Title page
Table of contents
Project description
Project organization and responsibility
QA objectives for measurement data in terms of precision, accuracy, completeness, representativeness, and comparability
Sampling procedures
Sample tracking and traceability
Calibration procedures and frequency
Analytical procedures
Data reduction, validation and reporting
Internal quality control checks
Performance and system audits
Preventive maintenance
Specific routine procedures used to assess data precision, accuracy and completeness
Corrective action
Quality assurance reports to management

Qualitative Identification: Any questionable results should be confirmed by a second analytical method. A least 10% of the identifications, as well as any questionable results, should be confirmed by a second analyst.

Quantitation: At least 10% of all calculations must be checked. The results should be manually checked after any changes in computer quantitation routines.

d. Sample QC

Each sample and each sample set must have QC measures applied to it to establish the data quality for each analysis result. The following should be considered when preparing the QA plan:

Field Blanks: Field blanks are analyzed to demonstrate that the sample collection equipment has not been contaminated. A field blank may be generated by using the sampling equipment to collect a blank sample (e.g., using the water sampling equipment to sample laboratory reagent grade water) or by extracting the sampling equipment (e.g., extracting a sheet of filter paper from the lot used to collect wipe samples or rinsing the soil sampling apparatus into the sample jar). A field blank must be collected and analyzed for each type of sample collected.

Laboratory Reagent Blanks: These blanks are generated in the laboratory and are analyzed to assess contamination of glassware, reagents, etc., in the laboratory. Generally, a reagent blank is processed through the entire analysis process. Although in special circumstances, additional reagent blanks may be generated which are processed through only part of the procedure to isolate sources of contamination. At least one laboratory reagent blank must be generated and analyzed for each type of sample analyzed.

Check Samples: These samples contain known concentrations of PCBs in the sample matrix. They are analyzed along with field samples to demonstrate the method performance. The PCB concentrations may be known to the analyst.

Blind Check Samples: These samples are the same as the check samples discussed above, except the PCB concentration is not known to the analyst.

Replicate Samples: One sample from each batch of 20 or fewer will be analyzed in triplicate. The sample is divided into three replicate subsamples and all these subsamples carried through the analytical procedure, blind to the analyst. The results of these analyses must be comparable within the limits required for spiked samples.

Spiked Samples: The sensitivity and reproducibility must be demonstrated for any method used to report verification data. This can be done by analyzing spiked blanks near the required detection limit. To demonstrate the ability of the method to reproducibly detect the spiked sample, one or more spiked samples should be analyzed in at least triplicate for each group of 20 or fewer samples within each sample type collected. Samples will

- Date of collection.
- Exact time of collection.
- Type of sample taken (e.g., air, water, soil).
- Initialing each entry.
- Entering pertinent information on chain-of-custody record.
- Maintaining the samples in one's possession or under lock and key.
- Transporting or shipping the samples to the analysis laboratory.
- Filling out the chain-of-custody records.
- The chain-of-custody records must accompany the samples.

4. Unbroken custody during shipping. Complete shipping records must be retained; samples must be shipped in locked or sealed (evidence tape) containers.

5. Laboratory chain-of-custody procedures consist of:

   - Receiving the samples.
   - Checking each sample for tampering.
   - Checking each sample against the chain-of-custody records.
   - Checking each sample and noting its condition.
   - Assigning a sample custodian who will be responsible for maintaining chain-of-custody.
   - Maintaining the sign-offs for every transfer of each sample on the chain-of-custody record.
   - Ensuring that <u>all</u> manipulations of the sample are duly recorded in a laboratory notebook along with sample number and date. These manipulations will be verified by the program manager or a designee.

F. <u>Documentation and Records</u>

Each laboratory is responsible for maintaining complete records of the analysis. A detailed documentation plan should be prepared as part of

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AMINATION REQUIREMENTS FOR HIGH CONCE ION SPILLS, & LOW CONCENTRATION SPILLS INVOLVING _ LB. PCBs

TYPE OF CONTAMINATED ITEM			CLEANUP STANDARDS PER ACCESS AREA		
			Nonrestricted Access Areas	Restricted access areas, other than Electrical Substations	Outdoor Electrical Substations
mpervious Solid urfaces	outdoor	high contact	10 ug/100 cm^2	10 ug/100 cm^2	100 ug/100 cm^2
		low contact		100 ug/100 cm^2	
includes metals, lass, siding & aminated surfaces)	indoor	high contact	10 ug/100 cm^2	10 ug/100 cm^2	
		low contact			
onimpervious olid Surfaces	outdoor	high contact	10 ug/100 cm^2	10 ug/100 cm^2	100 ug/100 cm^2
		low contact	10 ug/100 cm^2*	100 ug/100 cm^2	
includes wood, oncrete, asphalt plasterboard)	indoor	high contact	10 ug/100 cm^2	10 ug/100 cm^2	
		low contact		10 ug/100 cm^2 *	
oil			10 ppm, minimum depth of 10" and site restored **	25 ppm	25 ppm or 50 ppm provided a notification of cleanup level is visibly posted
eplaceable Household Items			properly disposed of		

Or cleaned to 100 ug/100 cm^2 and encapsulated.

* Restored means to replace will clean soil, i.e. containing less than 1 ppm PCBs.

l spills involving 10 pounds or more of pure PCB material must be reported to the National esponse Center (1-800-424-8802).

or guidance contact the appropriate EPA regional office (in PA, MD, DE, VA, WV, and DC call 5-597-4651/7668). All spills involving surface water, sewers, drinking water, grazing land, vegetable gardens must be reported to the appropriate EPA regional office.

APPENDIX C

"LABORATORY CERTIFICATION"

STATE OF NORTH CAROLINA DEPARTMENT OF THE
ENVIRONMENT, HEALTH, AND NATURAL RESOURCES

Division of Environmental Management
Laboratory Certification Program

In accordance with the provisions of N.C.G.S. 143–215.3 (a) (1), 143–215.3 (a) (10) and NCAC 2H .0800:

JAMES R. REED & ASSOCIATES, INCORPORATED

Is hereby certified to perform wastewater analyses (as listed on attachment I) and report monitoring data to DEM for compliance with monitoring and pretreatment regulations.

This certificate does not guarantee validity of data generated, but indicates the methodology, equipment, quality control procedures, records, and proficiency of the laboratory have been examined and found to be acceptable.

This certificate shall be valid until DECEMBER 31, 1995

Certificate No. 289

Bernard E. Sims, PhD
Laboratory Section, Chief

CERTIFIED PARAMETERS LISTING

ORGANICS

LABORATORY NAME: James R. Reed & Associates
STREET: 11864 Canon Blvd. Suite 103
CITY, STATE, ZIP: Newport News, VA 23606

CERTIFICATE # 289
EFFECTIVE DATE: August 1, 1993
EXPIRATION DATE: December 31, 1995

The above named laboratory, having duly met the requirements of 15A NCAC 2H .0800, is hereby certified for the measurement of the parameters listed below that are preceded by an (X).

(X) PURGEABLE HALOCARBONS --	(X) ORGANOCHLORINE PESTICIDES & PCBs	(X) BASE NEUTRAL/ACID ORGANICS
(X) EPA - 601	(X) EPA 608	(X) EPA 625
( ) STANDARD METHODS 6230B	( ) STANDARD METHOD 6630B	( ) EPA 1625
( ) STANDARD METHODS 6230D	( ) STANDARD METHOD 6630C	( ) STANDARD METHODS 6410B
(X) EPA 5030 + 8010	( ) EPA 8080 + 3500 SERIES	( ) EPA 8250 + 3500 SERIES
( ) EPA 5030 + 8021	( ) EPA 8081 + 3500 SERIES	(X) EPA 8270 + 3500 SERIES
(X) PURGEABLE AROMATICS	( ) NITROAROMATICS & ISOPHORONE	(X) CHLORINATED ACID HERBICIDES
(X) EPA 602	( ) EPA 609	( ) STANDARD METHODS 509B
( ) STANDARD METHODS 6230B	( ) EPA 8090 + 3500 SERIES	( ) STANDARD METHODS 6640B
( ) STANDARD METHODS 6230D	( ) POLYNUCLEAR AROMATICS HYDROCARBONS	(X) EPA 8150 + 3500 SERIES
(X) EPA 5030 + 8020	( ) EPA 610	( ) EPA 8151 + 3500 SERIES
( ) EPA 5030 + 8021	( ) STANDARD METHOD 6440B	( ) ORGANOPHOSPHORUS PESTICIDES
( ) ACROLEIN, ACRYLONITRILE, ACETONITRILE	( ) EPA 8100 + 3500 SERIES	( ) EPA 8140 + 3500 SERIES
( ) EPA 603	( ) HALOETHERS	( ) EPA 8141 + 3500 SERIES
( ) EPA 5030 + 8030	( ) EPA 611	(X) TOTAL PETROLEUM HYDROCARBONS (TPH) CALIFORNIA METHOD
(X) PHENOLS	( ) EPA 8110 + 3500 SERIES	(X) GASOLINE RANGE
(X) EPA 604	(X) CHLORINATED HYDROCARBONS	(X) DIESEL RANGE
( ) STANDARD METHODS 6420B	(X) EPA 612	( ) NONHALOGENATED VOLATILE ORGANICS EPA 8015A
( ) EPA 8040 + 3500 SERIES	( ) EPA 8120 + 3500 SERIES	( ) N-METHYLCARBAMATES
( ) BENZIDINES EPA 605	( ) EPA 8121 + 3500 SERIES	( ) EPA 8318
( ) PHTHALATE ESTERS	(X) PURGEABLE ORGANICS	( ) EPA 632
( ) EPA 606	(X) EPA 624	( ) 1,2, DIBROMOETHANE (EDB) EPA 504
( ) EPA 8060 + 3500 SERIES	( ) EPA 1624	
( ) EPA 8061 + 3500 SERIES	( ) STANDARD METHODS 6210B	AMENDED DATES
( ) NITROSAMINES	( ) STANDARD METHODS 6210D	November 3, 1993
( ) EPA 607	(X) EPA 5030 + 8240	
( ) EPA 8070 + 3500 SERIES	( ) EPA 5030 + 8260	

his certification requires maintenance of an acceptable quality assurance program, use of approved methodology, and satisfactory erformance on evaluation samples. Laboratories are subject to civil penalties and/or decertification for infractions as set rth in 15A NCAC 2H.0807.

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NORTH CAROLINA WASTEWATER/GROUNDWATER LABORATORY CERTIFICATION
CERTIFIED PARAMETERS LISTING

INORGANICS

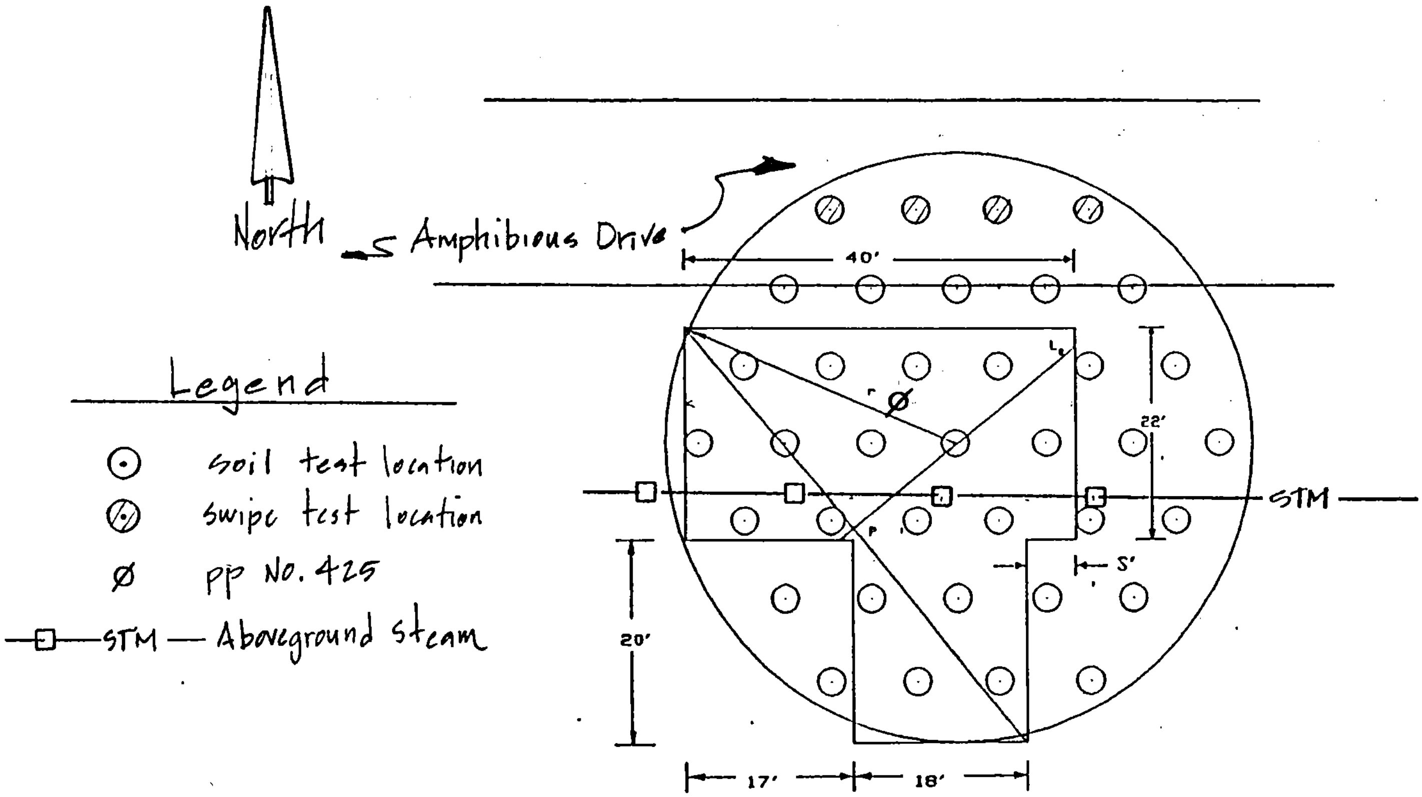
LABORATORY NAME:	JAMES R. REED & ASSOCIATES, INC.	CERTIFICATE NUMBER:	289
STREET:	11864 CANON BLVD. SUITE 103	EFFECTIVE DATE:	JANUARY 1, 1993
CITY/STATE/ZIP:	NEWPORT NEWS, VA 23606	EXPIRATION DATE:	DECEMBER 31, 1995

The above named laboratory, having duly met the requirements of 15A NCAC 2H .0800, is hereby certified for the measurement of the parameters listed below that are preceded by an (X).

(X) BOD	METALS GROUP II, REGULAR LEVEL	(X) TOTAL PHOSPHORUS
(X) COD	( ) ANTIMONY	(X) ORTHOPHOSPHATE
(X) CHLORIDE	(X) SILVER	(X) OIL & GREASE - WATER
( ) CHLORINE, TOTAL RESIDUAL	( ) THALLIUM	( ) OIL & GREASE - EPA 9071
(X) COLIFORM, FECAL MF	METALS GROUP I, LOW LEVEL	(X) pH
(X) COLIFORM, TOTAL MF	( ) ALUMINUM	(X) PHENOLS
(X) COLIFORM, FECAL TUBE	(X) ARSENIC	( ) RESIDUE, SETTLEABLE
(X) COLIFORM, TOTAL TUBE	( ) BERYLLIUM	(X) RESIDUE, TOTAL
( ) COLOR, PLATINUM COBALT	(X) CADMIUM	(X) RESIDUE, DISSOLVED 180 C
COLOR, ADMI	(X) CHROMIUM, TOTAL	(X) RESIDUE, SUSPENDED
(X) CONDUCTIVITY	( ) COBALT	(X) SULFATE
(X) CYANIDE	(X) COPPER	( ) SULFIDE
(X) FLUORIDE	( ) IRON	( ) SULFITE
(X) HARDNESS, TOTAL	(X) LEAD	(X) TOTAL ORGANIC CARBON
(X) MBAS	( ) MANGANESE	(X) TURBIDITY
METALS I, REGULAR LEVEL	(X) NICKEL	(X) TCLP EPA METHOD 1311
(X) ALUMINUM	(X) SELENIUM	(X) TCLP METALS
( ) ARSENIC	( ) VANADIUM	(X) TCLP ORGANICS
(X) BERYLLIUM	( ) ZINC	
(X) CADMIUM	METALS GROUP II, LOW LEVEL	
(X) CHROMIUM, TOTAL	(X) ANTIMONY	
( ) COBALT	(X) SILVER	
(X) COPPER	(X) THALLIUM	DATES OF AMENDMENTS
(X) IRON	(X) BARIUM	FEBRUARY 15, 1993
(X) LEAD	(X) MERCURY	AUGUST 1, 1993
(X) MANGANESE	(X) AMMONIA NITROGEN	DECEMBER 13, 1993
(X) NICKEL	(X) TOTAL KJELDAHL NITROGEN	
( ) SELENIUM	(X) NO_2 + NO_3 NITROGEN	
( ) VANADIUM	( ) NITRATE NITROGEN	
(X) ZINC	( ) NITRITE NITROGEN	

ertification requires maintenance of an acceptable quality assurance program, use of approved methodology, and satisfactory performance valuation samples. Laboratories are subject to civil penalties and/or decertification for infractions as set forth in 15A NCAC 2H.0807.

GWT
LC-21A 11/92



Sample Location Determination Calculations

r = 7.8cm x 4 = 31.2'

FROM TABLE 4: R>11.3, THUS, SAMPLE SIZE IS 37

FROM TABLE 2: S(DISTANCE BETWEEN ADJACENT POINTS)=0.3r

S=0.3(31.2)

S=9.36' OR (9.36/4)=2.35cm

calculations from EPA 560/5-85-025

The procedures and sample locations were chosen in accordance with EPA 560/5-85-025. The actual sample locations are dependent on the exact extents of excavation and will be determined at the time of final excavation.

Confirmatory Sampling Plan - NAB Site 16 Little Creek