Prepare in quintuplicate (original and 4 copies)

CONTRACTOR DRAWINGS & INFORMATION SUBMITTAL
NORTHNAVFACENGCOM 4335/3 (Rev. 6/80)

CONTROL NO. 8C

CONTRACT NO.	DELIVERY ORDER #	ACTIVITY LOCATION
N62472-94-D-0398		Naval Education and Training Center - Newport, RI

PROJECT TITLE:
Melville North Landfill at Naval Education and Training Center (NETC), Newport, RI

FROM:	DATE
Foster Wheeler Environmental Corp. - Program QCM: Mark Miller	March 3, 1999
TO: ROICC	DATE
R. Krivinskas (2 Copies)	March 3, 1999

1. THE CONTRACTOR SUBMITTALS LISTED BELOW ARE FORWARDED FOR YOUR REVIEW AND RECOMMENDATIONS
   (a) APPLY APPROPRIATE STAMP IMPRINT TO EACH SUBMITTAL AND INDICATE REVIEW COMMENTS, AS REQUIRED.
   (b) RETAIN ONE (1) COPY OF THIS TRANSMITTAL FORM AND RETURN REMAINING COPIES WITH REVIEWED SUBMITTALS TO ROICC.
2. THESE SUBMITTALS SHOULD BE RETURNED TO THIS OFFICE BY _____
3. NO RESPONSE REQUIRED _____

COPY TO:

[X] DESIGN NTR [X] OTHER [ ]
T. GIBISON (6 COPIES) P Kulpa (1) R DeSista (1) . S McInnis (1)

Mark Miller 3-3-99
SIGNATURE AND DATE

FROM DESIGNER	DATE
TO ROICC	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE RETURNED, WITH ACTION TAKEN AS INDICATED.
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SIGNATURE AND DATE

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TO CONTRACTOR	DATE

1. THE SUBMITTALS LISTED BELOW HAVE BEEN REVIEWED AND ARE APPROVED/DISAPPROVED AS SHOWN BELOW AND ON EACH STAMP IMPRINT

COPY TO:
[ ] ROICC [ ] OTHER

FOR COMMANDING OFFICER, NORTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND — DATE

ITEM NO.	SUBMITTAL DESCRIPTION	PREPARED/ SUBMITTED BY	APPROVED	DISAPPROVED	REMARKS
8c	SD-08, Statements; Final Remedial Action Work Plan-R2	M Miller			

MISC\96-184 DOC

FOSTER WHEELER ENVIRONMENTAL CORPORATION

March 3, 1999
File #: 1284-0011-99-0075

Mr. Richard Gottlieb
Rhode Island Dept. of Environmental Management
Division of Waste Management
235 Promenade Street
Providence, RI 02908-5767

Subject: US NAVY CONTRACT NO. N62472-94-D-0398
DELIVERY ORDER NO. NETC NEWPORT, RHODE ISLAND
MELVILLE NORTH LANDFILL
REMEDIAL ACTION WORK PLAN

Dear Mr. Gottlieb:

Foster Wheeler Environmental Corporation is pleased to present, on behalf of the US Navy, the Final Remedial Action Work Plan for the Melville North Landfill located at the Navy Education and Training Center (NETC) Newport, Rhode Island. The plan has been revised to incorporate comments as provided in the February 3, 1999 RIDEM letter.

Subject to approval of this Work Plan and obtaining appropriate permits, mobilization is currently scheduled to commence April 5, 1999. Please advise prior to that date if this plan meets your acceptance.

Should you have any questions or comments, please feel free to contact me at (215) 702-4044.

Sincerely,

Carl Tippmann, P.E.
Project Manager

CT/pd
Enclosure

Cc: R. DeSista, ACOE
K. Anderson, CRMC
S. McInnis
R. Krivanskas, ROICC
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US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
FOSTER WHEELER ENVIRONMENTAL CORPORATION

FINAL

REMEDIAL ACTION WORK PLAN

FOR

MELVILLE NORTH LANDFILL
AT
NAVAL EDUCATION AND TRAINING CENTER

NEWPORT, RHODE ISLAND

MARCH 1999

Prepared for

U.S. Navy Northern Division

Revision	Date	Prepared By	Approved By	No of Pages Affected
0	11/12/98	Bryan Conley	Carl Tippmann, P.E.	all
1	1/15/99	Bryan Conley	Carl Tippmann, P.E.	all
2	3/5/99	Bryan Conley	Carl Tippmann, P.E.	

TABLE OF CONTENTS

SECTION		PAGE NO.
1.	**INTRODUCTION**	**1-1**
1.1	PROJECT BACKGROUND	1-1
1.2	OBJECTIVES	1-2
2.	**PROJECT MANAGEMENT**	**2-1**
2 1	PROJECT TEAM ORGANIZATION	2-1
2.2	PROJECT COMMUNICATION	2-2
2.3	PROJECT SCHEDULE	2-2
2.4	DOCUMENT CONTROL	2-2
2.5	PROJECT MEETINGS	2-3
3.	**FIELD ADMINISTRATIVE PROCEDURES**	**3-1**
3.1	DAILY SAFETY MEETING	3-1
3.2	STATUS REPORTS	3-1
3.3	DAILY REPORT/CQC REPORT	3-1
3.4	SUBMITTAL REGISTER	3-1
3.5	REGULATORY AGENCY PERSONNEL SITE VISITS	3-1
4.	**REMEDIAL OBJECTIVES**	**4-1**
4.1	SOIL OBJECTIVES	4-1
4.2	GROUNDWATER OBJECTIVES	4-3
5.	**PROPOSED REMEDY**	**5-1**
6.	**REMEDIAL ACTIVITIES**	**6-1**
6.1	ANTICIPATED TASKS	6-1
6.2	MANPOWER REQUIREMENTS	6-1
6 3	EQUIPMENT REQUIREMENTS	6-2
6.4	CONSTRUCTION QUALITY CONTROL	6-2
6 5	HEALTH AND SAFETY REQUIREMENTS	6-2
6.6	PROCEDURES FOR DECONTAMINATION	6-3
6.7	SITE SECURITY/SITE ACCESS	6-4
7.	**REMEDIAL CONSTRUCTION**	**7-1**
7 1	MOBILIZATION	7-1
7.2	SITE PREPARATION	7-1
7.3	STAGING AREA PREPARATION	7-3
7.4	SOIL EXCAVATION	7-3
7.5	SOIL STAGING	7-4
7.6	BACKFILL	7-5
7.7	OFFSITE DISPOSAL	7-5
7.8	WETLAND ACTIVITIES	7-6

TABLE OF CONTENTS (C ntinued)

SECTION		PAGE NO.
7.9	SITE RESTORATION	7-6
7.10	DEMOBILIZATION	7-6
7.11	SUBCONTRACTED WORK	7-6
7.12	DUST CONTROL	7-7
8.	**MATERIAL HANDLING.**	**8-1**
9.	**SAMPLING ACTIVITIES.**	**9-1**
9.1	BASELINE SAMPLING	9-1
9.2	CONFIRMATION SAMPLING	9-1
9.3	WASTE CHARACTERIZATION SAMPLING	9-3
10.	**REGULATORY COMPLIANCE.**	**10-1**
10 1	WETLAND ACTIVITIES	10-1
10.2	MONITORING WELL ABANDONMENT	10-1
10.3	STORM WATER DISCHARGE FROM CONSTRUCTION ACTIVITIES	10-2
10.4	EARTH MOVING OPERATION	10-2
10.5	DREDGING ACTIVITIES	10-2
10 6	COASTAL ZONE CONSISTENCY DETERMINATION	10-2
10.7	AIR POLLUTION CONTROL	10-3
10 8	WASTE MANAGEMENT	10-3
10.9	TSCA / PCB WASTE MANAGEMENT	10-6
10.10	DOT HAZARDOUS MATERIAL TRANSPORTATION	10-15
11.	**FINAL REPORT**	**11-1**

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Existing Conditions and Sampling Locations
Figure 3	Wetland Delineation Map
Figure 4	Proposed Limits of Excavation and Contaminated Soil Staging Area
Figure 5	Storm Water Management and Soil Erosion Control Plan
Figure 6	Sections and Details

ATTACHMENTS

Attachment 1	Figures
Attachment 2	Project Organization Chart
Attachment 3	Construction Schedule
Attachment 4	Submittal Register
Attachment 5	Rhode Island Final Regulations, Appendix 1, Section 13
Attachment 6	Storm Water Pollution Prevention Plan & Soil Erosion and Sediment Control Plan
Attachment 7	Description of Excavation Area Development

1. INTRODUCTION

Foster Wheeler Environmental Corporation (FWENC) is pleased to submit this remedial action work plan to the Department of the Navy (Navy) in response to Remedial Action Contract No. N62472-94-D-0398. This work plan describes the activities that will be performed to remove and dispose of approximately 40,000 cubic yards of contaminated soil from the Melville North Landfill located in Portsmouth, Rhode Island. The Melville North Landfill was once a part of the Naval Education and Training Center (NETC) and is now owned by private entities. The work described in this plan includes mobilization, site preparation, staging area preparation, soil excavation, confirmation sampling, waste characterization, offsite soil disposal, site restoration, and demobilization. Sections 1, 4, 5, and 9 were prepared, in part, by information provided by Tetra Tech NUS Inc (TtNUS).

1.1 PROJECT BACKGROUND

NETC is located in the City of Newport, and Towns of Middletown and Portsmouth, Rhode Island on the western shore of Aquidneck Island facing the east passage of Narragansett Bay (Figure 1). The Melville North Landfill site is located in the northwest portion of NETC on the shoreline of Narragansett Bay in the Town of Portsmouth. The site is approximately 10 acres in size and was used as a landfill from World War II until 1955. The site was excessed to the State of Rhode Island in September 1983, and was sold to Melville Marine Industries six months later. Since ownership of the site was transferred to the State of Rhode Island prior to NETC being placed on the National Priorities List (NPL) in November 1989, remediation activities at the landfill will be performed in accordance with the Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations).

Access to the Melville North Landfill site is gained from the east via Defense Highway The site is bound to the west by Narragansett Bay, to the east by the Penn Central railroad tracks and Defense Highway, to the north by vegetated wetlands, and to the south by a wooded upland area. The topography of the site is relatively flat with elevation drops between 5 and 10 feet along the shoreline and an increase in elevation between 5 and 10 feet along Defense Highway.

The landfill reportedly received a variety of waste materials from World War II until 1955. These wastes include spent acids, various waste oils, solvents, waste paints, and possibly polychlorinated biphenyl's (PCBs). Initial inspections of the site also revealed mounds of oil-soaked soil and surface areas that were covered with oil and oil sludge. It was reported that the mounds of oil-soaked soil came from disposal of the oil sludge material generated while cleaning fuel supply tanks at the nearby tank farms, or from cleanup operations of various oil spills.

Previous removal actions were conducted at the Melville North Landfill by OHM Corporation in 1995 and by FWENC in 1996. The removal actions were primarily conducted in response to the findings in the Phase II RI/FS conducted by Brown & Root Environmental. These actions included excavation and

disposal of TPH and PCB contaminated soils, stabilization and disposal of lead-contaminated soils, and backfilling the excavations with imported offsite borrow material. At the completion of the remedial actions, a Site Investigation was conducted between November 1996 and April 1997 by Brown & Root Environmental to delineate the nature and extent of the contamination remaining at the site, to determine any impacts from the site to the groundwater or to Narragansett Bay, and to determine if threats to human health and the environment were present. The investigation revealed that approximately 40,000 cubic yards of contaminated soil require removal from the Melville North Landfill to remediate the site to the Rhode Island Department of Environmental Management (RIDEM) Residential Direct Exposure Criteria (RDEC) and the RIDEM GB Leachability Criteria.

1.2 OBJECTIVES

The objective of the remedial action at the Melville North Landfill is to remove and dispose of approximately 40,000 cubic yards of contaminated soil from the site in order to achieve the residential soil clean-up criteria specified by the State of Rhode Island. Soil at the Melville North Landfill was characterized in the Site Investigation Report as being contaminated with a combination of heavy metals, TPH and volatile organic compounds. The Site Investigation Report also indicated that one isolated area of the site was found to contain PCBs.

To achieve the remedial action objectives, contaminated soil will be excavated from the site and hauled to a staging area that will be constructed at the southern end of the landfill. Samples of the excavated soil will be collected at the staging area and sent offsite for laboratory analysis Based on the sample results, an appropriate offsite disposal facility will be selected for the contaminated soils to be sent to. Upon completion of the soil excavation activities, confirmation samples will be taken from the base and side walls of each excavation to demonstrate that all of the contaminated soil in exceedance of the RIDEM RDEC has been removed. Each excavation will be backfilled with clean soil and/or unimpacted site soil when the confirmation sample results indicate that the clean-up criteria have been achieved. The specific tasks associated with the remedial action at the Melville North Landfill site are discussed in detail in Sections 6 through 10 of this Work Plan. The existing site conditions and previous sampling locations are shown in Figure 2.

2. PROJECT MANAGEMENT

FWENC will assemble a Project Management Team that will be responsible for all technical and administrative aspects of the remediation project at the Melville North Landfill. The technical responsibilities of the team include: assuring that the remediation activities are completed in accordance with the approved Remedial Action Work Plan and the State of Rhode Island Remediation Regulations; management of all construction activities including work performed by Subcontractors; and complying with all applicable local, state and federal regulations. Included among the team's administrative responsibilities are establishing and maintaining project communications, controlling the cost and schedule of the project, document control, and conducting routine project status meetings.

2.1 PROJECT TEAM ORGANIZATION

The project organization chart is included as Attachment 2. The following personnel are considered to be key team members for the performance of this project:

Senior Project Engineer/Manager, C. Tippmann: The responsibility of the Senior Project Engineer/ Manager is to provide general oversight of all facets of the project. He will be responsible for the oversight, resource allocation, scheduling and quality control of the Project. He reports to the Program Manager and is first point of contact for the Contracting Officer's Technical Representative (COTR) and the Design Navy Technical Representative (NTR).

Project Superintendent, D. Sullivan. The Project Superintendent will be responsible for all on site construction activities including supervision of craft labor and subcontractors and control of materials and equipment. The Project Superintendent reports directly to the Senior Project Engineer/Manager and Design NTR and interfaces with the Project Engineer and Site Quality Control Representative on a daily basis to ensure that quality control standards are being met

Project Engineer, B. Conley: The responsibility of the Project Engineer is to provide guidance to the field construction staff relating to compliance with the Remediation Regulations and the Remedial Action Work Plan, and to prepare technical plans and submittals. The Project Engineer reports directly to the Project Superintendent.

Project Procurement Engineer, M Machado: The Project Procurement Engineer is responsible for procurement of materials and equipment and reports directly to the Project Superintendent.

Project Controls Engineer, E. O'Brien: The Project Controls Engineer is responsible for project controls, including scheduling, invoicing, and financial reporting and reports directly to the Project Superintendent.

Health and Safety Manager, G. Coppi. The Health and Safety Manager (HSM) is responsible for general oversight of the health and safety procedures used on this project He will consult with and give direction to the Site Health and Safety Officer.

Site Health and Safety Officer, P. Mooney: The Site Health and Safety Officer (SHSO) will be responsible for the overall health and safety of all employees on site. The SHSO will be responsible for daily health and safety monitoring, implementation of all health and safety procedures and requirements, and maintenance of health and safety records. The SHSO will have the authority to shut down any operation that is deemed by him to be unsafe. He will report to the HSM and will interface closely with the Project Superintendent.

Quality Control Manager, M. Miller: The Quality Control Manager (QCM) is responsible for approval and oversight of quality control activities and procedures used on the project. He will provide direction to the Site Quality Control Representative.

Site Quality Control Representative, P. Mooney: The Site Quality Control Representative will be responsible for performing inspection and surveillance activities and for documenting results of these activities as required to achieve the quality of construction required by the Remediation Regulations and the Remedial Action Work Plan. He will report to the program QC manager and will interface with the Project Engineer and Project Superintendent.

2.2 PROJECT COMMUNICATION

Lines of communication between Foster Wheeler Environmental and other Project Team members will be as shown in the Project Organization Chart in Attachment 2. Communication between FWENC and NETC Security, Public Works, NETC Environmental, and other departments will be through the Construction NTR in the office of the Resident Officer in Charge of Construction (ROICC).

2.3 PROJECT SCHEDULE

The Construction Schedule for the Melville North Landfill project is included as Attachment 3.

2.4 DOCUMENT CONTROL

Quality control records, field and laboratory test reports, submittals and approvals, as-built drawings, changes to the contract, updated construction schedules, invoices, daily reports, and all other project record documents, as required, will be maintained in the project files. The files will be located in the site office and will be available for review by the Navy

The Submittal Register, which summarizes the submittal requirements outlined in the Quality Control Plan, is included as Attachment 4. Distribution and processing of the submittals is described in the Construction Quality Control (CQC) Plan

Technical changes to the work identified by FWENC, technical questions concerning regulations and specifications, and reporting of non-conforming items will be documented by the submittal of Field Change Requests, Requests For Information and Non-Conformance Reports respectively. These documents will be prepared by members of the Project Management Team and distributed to the Navy for

disposition. A copy of these documents will be maintained in the project files. Samples of the reports and the Formats that will be used for these reports and the daily reports are included in the CQC Plan.

2.5 PROJECT MEETINGS

Pre-construction

Before any physical work begins on the site, the FWENC project staff and the Navy and their representatives will meet to discuss coordination of the project. Items to be discussed in this meeting will include access to the site, working hours, specific health and safety issues, and general scheduling of the work.

Weekly QC/ Progress Meeting

QC/Progress Meetings will be conducted once a week. The meetings will be held at the FWENC field office unless otherwise requested by the Navy. The Environmental Protection Agency (EPA) and RIDEM can participate in the weekly meetings by telephone by calling the NorthDiv Design NTR, who will then connect them and NorthDiv into the meeting In the event that NorthDiv will not be participating by telephone in any given week, the EPA and RIDEM should call directly to the site trailer. Meeting minutes will be distributed by e-mail or fax within two business days of the meeting.

3. FIELD ADMINISTRATIVE PROCEDURES

3.1 DAILY SAFETY MEETING

FWENC supervisory personnel will hold daily safety meetings to advise the workers of proper methods of performing the work planned for the day. The topics of discussion will be listed on a sign-in sheet and the sheet will be kept as a record of the meeting

3.2 STATUS REPORTS

FWENC will prepare monthly status reports of the current condition of the project. The status reports will include a Technical Progress Report, Non-Compliance Report, Cost Performance Report, Project Schedule, updated Submittal Register, Government Materials Tracking Report, Variance Analysis Report, and a Waste Materials Report.

3.3 DAILY REPORT/CQC REPORT

Every day that work is performed, FWENC will prepare and submit a Daily Report/CQC Report to the Navy ROICC. The report will summarize the daily construction activities, list the manpower and equipment that were in use, list the materials and equipment that were received, and summarize the quality control testing and inspection that was performed. The report will be submitted to the Navy on the following business day

3.4 SUBMITTAL REGISTER

The CQC representative will prepare and continually update a Submittal Register to document quality control for materials, inspection, and testing. The Submittal Register will be maintained on site and will be available for review.

3.5 REGULATORY AGENCY PERSONNEL SITE VISITS

Regulatory agency personnel who visit the site and who have questions or comments concerning the work will give those questions or comments, in writing, to the project superintendent, who will then forward them to the Navy NTR.

4. REMEDIAL OBJECTIVES

The Remedial Objectives for the remedial action project at the Melville North Landfill were established in accordance with Section 9.02 of the Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations). The information presented in this section was prepared, in part, by TtNUS.

4.1 SOIL OBJECTIVES

The objective of this remedial action project is to remove and dispose off site the contaminated soils at the Melville North Landfill in accordance with the Remediation Regulations The following soil remediation goals will be the basis for the soil excavation activities to be conducted during the project

- Arsenic - 11.8 mg/kg throughout the vadose zone (95th percentile of Upper Threshold Limit (UTL) based on background concentrations reported in the approved *Draft Final Background Soil Investigation, Melville North Landfill, Portsmouth, Rhode Island* (TtNUS, November 1998)).

- Lead - 150 mg/kg throughout the vadose zone (RIDEM RDEC).

- Total Petroleum Hydrocarbons (TPH) - 1000 mg/kg throughout the vadose zone and 2500 mg/kg throughout the saturated zone (RIDEM RDEC). The residential TPH standard requires site compliance with RIDEM RDEC for all other substances for the classification.

- Benzo(a)pyrene – 0.4 mg/kg throughout the vadose zone (RIDEM RDEC).

- Non-aqueous phase liquids (NAPLs) - None in any environmental medium in the vadose or saturated zones, a condition considered as exceeding the RIDEM Upper Concentration Limits (UCLs) in soil and groundwater (see Section 8.07 - RIDEM Remediation Regulations).

- RIDEM GB Leachability Criteria - Not to exceed GB leachability criteria throughout the vadose or saturated zones

These remedial goals are consistent with the future land use (marina) in the vicinity of the impacted area The remedial objectives also take into account the potential for hazardous substances and TPH to leach into the GB-classified groundwater from these impacted soils, as well as to migrate to the intertidal zone and the adjacent wetlands (surface water and sediments).

Additional soil remediation goals will be applied to areas containing elevated concentrations of polychlorinated biphenyls (PCBs) and/or asbestos. In addition to the soil remediation goals listed above, the following remedial objectives will apply to these areas:

- PCBs - 10 mg/kg throughout the vadose zone (RIDEM RDEC)
- Asbestos – 1% throughout the vadose zone (National Emissions Standard for Asbestos)

Other requirements and guidance specific to the excavation activities planned for the impacted area include:

- Rhode Island Hazardous Waste Management Act of 1978 (RIGL 23-19 1 et seq.) - Hazardous Waste Management Rules and Regulations
- Rhode Island Groundwater Protection Act (RIGL 46-13 1) - Protection of Groundwater
- Rhode Island Water Pollution Control Act - Rhode Island Water Quality Regulations (RIGL 46-12, et seq)
- Rhode Island Pollutant Discharge Elimination Systems (RIGL 46-12, et seq)
- Rhode Island Coastal Resources Management Law (RIGL, Title 46, Chapter 23) and Regulations
- Rhode Island Wetlands Laws (RIGL 2-1-18 et seq)
- RCRA: (40 CFR 262) - Generator Requirements for Manifesting Waste for Off-Site Disposal, (40 CFR 263) - Transporter Requirements for Off-Site Disposal, (40 CFR 264.90-254.101, Subpart F) - Groundwater Protection, (40 CFR 110-118, Subpart G) - Closure/Post Closure Requirements
- Federal Hazardous Materials Transportation Act (40 CFR 170, 171) - Rules for Transportation of Hazardous Materials
- Federal Land Disposal Restrictions (40 CFR 268)
- Federal Toxic Substances Control Act (40 CFR 761.125)
- Federal Clean Water Act Regulations: (40 CFR 121) - Ambient Water Quality Standards; (40 CFR 122-125) - National Pollutant Discharge Elimination (NPDES) Permit Requirements (to be

obtained through RIDEM as a RIPDES permit); (40 CFR 410.15) - Effluent Discharge Limitations; (33 CFR 320-330) – Clean Water Act Section 404 and Rivers and Harbors Act Section 10 Regulatory Programs

- Federal Executive Order 11988 - Statement on Proceedings of Floodplain Management (40 CFR 6, Appendix A)

- Federal Coastal Zone Management Act (16 USC Section 1451 et seq)

- Federal Executive Order 11990 - Statement on Proceedings of Wetlands Protection (40 CFR 6, Appendix A)

4.2 GROUNDWATER OBJECTIVES

No remediation of groundwater is anticipated as part of this remedial action. The groundwater underlying and in the vicinity of the Melville North Landfill has not been found to exceed the RIDEM GB groundwater standards designated for the area

5. PROPOSED REMEDY

The proposed remedy at the Melville North Landfill includes excavating approximately 40,000 cubic yards (cy) of contaminated soil, stockpiling the soil for waste characterization, and disposing of the soil at an approved off site facility. The contaminated soil is located in three areas of the site, as identified in Figure 4. Soil removal is estimated as 14,500 cy from Excavation No.1; 25,000 cy from Excavation No. 2; and 500 cy from Excavation No. 3. Soils from Excavations Nos. 1 and 2 are contaminated both above and below the groundwater table. No contaminated soils are expected from below the groundwater table at Excavation No. 3. Excavated soils will be transported to a temporary staging/stockpiling area that will be constructed at the south end of the landfill (Figure 4). One grab sample will be collected from each truckload of excavated material to determine the appropriate stockpile in which the soil will be segregated The grab samples will be screened with a flame ionization detector (FID), and inspected for visible petroleum contamination and odor. The majority of the soil is expected to be classified as non-hazardous material as defined by the State of Rhode Island The soils will be segregated as follows:

- Unimpacted Soils - material exhibiting a FID response less than 10 ppmv and no visible petroleum contamination

- Rhode Island Regulated Soil - material exhibiting a FID response greater than 10 ppmv and/or visible petroleum contamination

- Restricted Non-Hazardous Soil - material exhibiting a FID response greater than 100 ppmv and/or visible petroleum contamination

- Hazardous Waste Soil - material exhibiting a FID response greater than 1000 ppmv and/or visible petroleum contamination

Since the majority of the soil at the Melville North Landfill was found to be contaminated with heavy metals, TPH and/or volatile organic compounds (VOCs), field screening of the soil with a FID will only serve as an initial characterization of the soil for stockpiling purposes. Waste characterization samples will be collected from the stockpiled material to determine the exact nature of the contamination in the excavated soils and to provide a more accurate classification of the soils. The analytical results from the waste characterization sampling will be the basis for determining the appropriate offsite disposal location Waste characterization sampling is discussed in Section 9 of this work plan.

Soil that was identified in the Site Investigation Report as containing PCBs will undergo further in place waste characterization prior to being excavated and directly loaded into trucks for offsite disposal. The in

place characterization will be performed as outlined in Section 9.1 of this work plan Results of the additional characterization will be used to calculate a volume of PCB contaminated soil that requires off site disposal. The calculated volume will be divided into a volume of soil containing PCBs at concentrations greater than 50ppm, and a volume of soil containing PCBs at concentrations between 10ppm and 50ppm. The two soil volumes will be used to excavate and dispose of the PCB contaminated soils in accordance with State and Federal Regulations.

To satisfy Sections 9.06 and 9.18 of the Remediation Regulations, confirmation samples will be collected at the vertical and horizontal limits of the excavation areas to demonstrate that the remedial objectives have been achieved. Samples will be collected as outlined in Section 9 of this work plan. If the analytical results from the confirmation samples indicate that contamination extends beyond the originally defined excavation limits, additional soil will be excavated under the direction of the Contracting Officer If the analytical results from the confirmation sampling confirm that the remedial objectives have been achieved, the excavation areas will be backfilled with clean offsite common fill and/or unimpacted site soil. The specific construction activities that will be performed to complete the remedial action are discussed in Section 7 of this work plan.

6. REMEDIAL ACTIVITIES

6.1 ANTICIPATED TASKS

FWENC has reviewed the Statement of Services from the Navy, and the State of Rhode Island Remediation Regulations and has determined that the following major activities, not necessarily in the order listed, will be performed:

- Perform surveying.
- Install sedimentation and erosion control measures.
- Perform tree and vegetation clearing.
- Construct temporary wheel wash and decontamination facilities.
- Abandon all of the existing monitoring wells.
- Establish exclusion zones and contamination reduction zones.
- Construct the soil staging area.
- Excavate contaminated soils from the three excavation areas
- Collect soil samples for field screening, waste characterization, and confirmation of regulatory compliance.
- Perform transportation and offsite disposal of contaminated soils.
- Backfill the three excavation areas with common fill
- Establish vegetative growth over the site
- Perform site cleanup and restoration of the landfill site.
- Demobilize resources

6.2 MANPOWER REQUIREMENTS

FWENC estimates that the following union craft labor will be required for the proposed activities:

- General Operations

Operating Engineers -	4
Laborers -	5
Teamsters -	3

6.3 EQUIPMENT REQUIREMENTS

Major construction equipment that will be used on this project will include the following The Project Superintendent will substitute/add equipment as required.

1. D-6 Bulldozer
2. Cat. 330 Excavator
3. (3) 30 Ton Off Road Dump Trucks
4 (2) 3cu. yd. Loader
5. 15 ton vibratory roller

6.4 CONSTRUCTION QUALITY CONTROL

A Construction Quality Control Plan has been prepared for this project. Construction Quality Control will be performed onsite by the QC Representative. He will be responsible for ensuring that construction conforms to the requirements of the Remedial Action Work Plan and the State of Rhode Island Remediation Regulations. This includes material testing, documentation of results, reporting results to the project superintendent, reporting deficiencies, and certifying that all submittals are in compliance with contract requirements.

Quality control inspection and testing will be performed in accordance with the Remedial Action Work Plan, the State of Rhode Island Remediation Regulations and the Quality Control Plan Testing encompasses geotechnical testing of soil materials, analytical testing of excavated material, and general testing and inspection of materials and workmanship to ensure compliance with the work plan. Testing will be conducted both on site and off site Subcontracted testing laboratories will be utilized for geotechnical and analytical testing.

6.5 HEALTH AND SAFETY REQUIREMENTS

The site-specific Health and Safety Plan (HASP) provides requirements and guidelines that will be utilized in the field to protect the health and safety of workers The SHSO will provide oversight of activities to ensure conformance with the HASP. The SHSO will supervise operations and be responsible for conducting site health and safety training/briefings, air and dust monitoring during operations, personnel monitoring, enforcing/modifying levels of Personal Protective Equipment (PPE), ensuring compliance with decontamination procedures, maintaining monitoring equipment, and documenting and reporting all health and safety related accidents or injuries.

The SHSO will conduct regular site safety inspections Weekly and monthly reports will be prepared and submitted to the Health and Safety Manager. Daily health and safety reports will also be prepared and submitted with the daily report.

The following are specific components of the HASP that affect the daily activities of workers

- A hazard assessment has been prepared for the major aspects of the project. Chemical, physical, and biological hazards associated with the project have been identified. Activity hazard analyses have been prepared to define the specific risks and means of mitigation that are associated with daily construction activities.
- Control measures to reduce the risk of exposure to chemical, physical, and/or biological hazards
- Specific training requirements that will enable workers to operate at the site and improve their awareness of health and safety are presented in the HASP.
- Control of site operations, use of PPE, site safety equipment, and on-site communications
- Real-time air monitoring and medical surveillance procedures are included in the HASP.
- Decontamination procedures, including contamination prevention, personnel decontamination, equipment decontamination, and disposal procedures, have been defined for site work.

6.6 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 each day, during scheduled breaks, and/or upon completion of the project, when leaving a contaminated or potentially contaminated area and entering a clean one, and when completing a task involving handling contaminated material prior to beginning a clean task. Decontamination procedures are included in the site-specific HASP.

6.6.1 Personnel Decontamination

The following site activities present an opportunity for personnel contamination.

- Excavation and stockpiling of landfill waste material
- Decontamination of equipment.

FWENC will apply engineering and/or work practice controls as a means of protecting personnel in performance of site-specific tasks. Engineering controls will be implemented to reduce and maintain employee exposure to or below safe levels for those tasks that include possible exposure to contaminants. When engineering controls are impractical or insufficient to protect employees during site operations, FWENC will use PPE to perform certain tasks

Any personnel exposed to possible contamination during daily activities will follow the decontamination procedures outlined in Section 8.2 of the HASP. Decontamination procedures will ensure that material which workers may have contacted in the Exclusion Zone (EZ) does not result in personal exposure and is not spread to clean areas of the site. The EZ will be limited to the work areas that are considered or

suspected to be contaminated, which will be revised and updated daily as waste material is exposed and subsequently backfilled with clean material.

6.6.2 Equipment Decontamination

All contaminated equipment will be decontaminated when switching from a contaminated task to a clean one and prior to being demobilized from the site. Decontamination procedures may include sweeping, wiping, scraping, or steam cleaning the exterior of the equipment in accordance with Section 8.2 of the HASP. Personnel performing decontamination tasks will wear the proper PPE as prescribed in the HASP. Offsite vehicles that travel through a contaminated portion of the site will have their tires washed prior to exiting the site. The exterior of the vehicles will also be inspected to assure that it is free of any contaminated soil.

6.6.3 Disposal

Decontamination solids and used PPE will be collected and disposed of at an approved offsite disposal facility. These materials will be sampled and characterized as required by the disposal facility prior to being disposed of. Decontamination liquids will be allowed to flow on to the surface of a contaminated area until such time that the area has been remediated. When all of the contaminated areas of the site have been remediated, decontamination liquids will be collected, placed in DOT-approved 55-gallon drums, sampled, and disposed of at an approved offsite disposal facility Any decontamination liquids that are generated from PCB associated activities will be collected in DOT-approved 55-gallon drums and handled in accordance with the TSCA regulations described in Section 10 9 of this work plan.

6.7 SITE SECURITY/SITE ACCESS

FWENC will maintain security at the Melville North Landfill site by installing a security gate across the entrance to the site. The gate will be locked by FWENC personnel at the end of each work day. Additionally, warning signs will be posted at the site entrance to deter people from entering the site. Access to the site will be monitored through use of a sign-in sheet that will be located in the office support trailer. Signs will be posted at the site entrance informing visitors to sign-in at the office support trailer.

7. REMEDIAL CONSTRUCTION

This section provides a description of the major tasks that will be performed to accomplish the objectives of the remedial action. Tasks will be performed in accordance with the State of Rhode Island Remediation Regulations, the Remedial Action Work Plan, the Construction Quality Control Plan, and the site specific Health and Safety Plan.

7.1 MOBILIZATION

Temporary construction offices and facilities, lay down, staging and material storage areas will be installed as part of the mobilization task Temporary facilities will include an office trailer, a washroom trailer, a craft trailer, one or more storage containers, and portable toilets. Utility connections will be made to power, water and communications. Utility work will be coordinated with the Navy. Arrangements will be made for mail delivery and solid waste and sewage disposal services Administrative staff, craft labor and equipment will be mobilized to the site as part of this task.

7.2 SITE PREPARATION

7.2.1 Erosion and Sediment Controls

Prior to site disturbance, perimeter soil erosion and sediment control devices will be constructed as discussed in the Storm Water Pollution Prevention Plan & Soil Erosion and Sediment Control Plan (Attachment 6). Silt fence will be installed along the perimeter of Excavation Areas 1 and 2, and the soil staging area on the downgradient and lateral gradient sides. Excavation Area 3 will have silt curtain installed on the seaward perimeter to control the migration of sediments. A storm water diversion swale will be constructed along the eastern perimeter of Excavation Areas 1 and 2, and the soil staging area to prevent surface water from running on to the work areas. Specific storm water management and erosion control details are shown in Figures 5 and 6.

During construction, erosion and sediment control features will be inspected and maintained on a daily basis. Accumulated sediment will be removed from the erosion and sediment controls as needed. Erosion and sediment controls are discussed in further detail in the attached Storm Water Pollution Prevention & Soil Erosion and Sediment Control Plan.

7.2.2 Site Survey

An initial site survey will be conducted to establish the controls required for performing routine construction surveys. The horizontal and vertical locations of several existing landmarks will be verified with the site topography map prior to beginning the initial site survey. The limits of the three excavation areas, the project baseline, and several temporary benchmarks will be established as part of the initial site survey. The initial site survey will be performed by a licensed surveying company.

7.2.3 Monitoring Well Abandonment

All nineteen of the existing monitoring wells at the landfill site are scheduled to be abandoned as part of the remedial action. The monitoring wells will be abandoned in accordance with Appendix 1, Section 13 of the State of Rhode Island Final Regulations. In addition to abandoning the monitoring wells, five PVC standpipes that protrude from the existing ground surface of the landfill will also be abandoned The standpipes will be removed from the ground and the cavities created by the standpipes will be backfilled with soil. The PVC standpipe material will be disposed offsite as solid waste.

7.2.4 Clearing

Clearing will be performed as needed within the limits of disturbance. Trees and brush will generally be cleared to 6-inches above the ground surface. The wood debris generated from the clearing activities will be processed through a chipper to create wood chips of 4-inch diameter maximum particle size. The wood chips will be stockpiled onsite and spread over the site upon completion of the remedial activities. Tree stumps that remain in the any of the excavation areas after the clearing activities are completed will be excavated with the contaminated soil and disposed of offsite.

7.2.5 Site Haul Roads

The site haul roads will be established in designated sections of the clean and contaminated portions of the site. The existing material at the landfill surface will be used as the base for the haul roads and clean imported common borrow will be used to upgrade the haul roads as necessary Trucks that come in contact with a contaminated portion of the landfill will have their tires and wheel wells pressure washed prior to leaving the site. Pressure washing will be performed on a stone wheel wash pad that will be constructed of 2 to 4-inch riprap at the southern edge of Excavation Area 2. Haul roads that pass through clean sections of the site will have approximately three inches of soil removed from the surface of the road once use of the road has ceased. The soil will be placed in the soil staging area to undergo waste characterization sampling and disposal offsite. Samples of the soil underlying such roads will be collected prior to and at the completion of the remedial activities to demonstrate that any contamination in the area remains below the RIDEM RDEC. If the analytical results indicate that contamination exceeds the RIDEM RDEC, then additional soil will be removed from the haul road and the area will be re-sampled. Sampling will be performed in accordance with the baseline sampling discussed in Section 9 of this work plan.

7.2.6 Decontamination Facilities

Personnel and equipment decontamination facilities will be established along the southern edge of Excavation Area 2. The personnel decontamination facility will consist of an area where personnel can don the proper PPE prior to entering the EZ, and remove PPE prior to exiting the EZ. The area will be clearly marked with high visibility tape and/or fencing. The equipment decontamination facility will consist of a layer of 2 to 4-inch stone approximately 15 feet wide by 20 feet long. Equipment will be walked on to the layer of stone to be pressure washed prior to exiting the EZ

7.3 STAGING AREA PREPARATION

All of the non-PCB contaminated soil that is excavated from the Melville North Landfill will be transported and stockpiled at a staging area that will be constructed at the southern end of the landfill. The specific location of the staging area is shown on Figure 4. Approximately 12-inches of the existing soil within the staging area footprint will be removed and temporarily stockpiled while the staging area is in use. Soil berms will be constructed over the prepared staging area surface to segregate the staging area into four separate areas. A 40-mil thick polyethylene liner will then be installed over the staging area subgrade for containment of the excavated soil. Water that collects within the stockpile area will be pumped, if necessary, for treatment or disposal. Upgradient flow directed toward the staging area will be diverted through an earthen swale that will be constructed.

Access to the staging area by trucks that are hauling contaminated soil will be gained from the western side of the area. Trucks will travel on a dedicated roadway that will be established between Excavation Area 2 and the staging area. Access to the staging area by offsite disposal trucks will be gained from the eastern side of the area. The trucks will travel to the staging area on a clean roadway, and will be loaded with soil at the staging area Upon completion of the excavation and hauling activities, approximately three inches of soil will be removed from the contaminated truck roadway. The soil will be placed in the appropriate stockpile within the soil staging area for offsite disposal Soil samples will then be taken from the roadway area to demonstrate that no residual contamination remains. The specific sampling activities are discussed in the Section 9 of this work plan.

Once all of the contaminated soil has been removed from the staging area, the polyethylene liner and the silt fence will be removed and disposed of offsite. The existing soil that was removed from the staging area footprint will be placed back over the area, and the area will be seeded

7.4 SOIL EXCAVATION

Soil excavation will generally be conducted within the limits of the three Excavation Areas identified on Figure 4. The limit of each excavation area was mapped out by FWENC based on sample locations that exceeded the RIDEM RDEC and the RIDEM GB Leachability Criteria as determined in the Site Investigation conducted by TtNUS. A detailed description of how the excavation areas were developed is provided in Attachment 7. Field screening, laboratory confirmation sampling, visual inspection, and the presence of large quantities of debris will be used during the soil excavation activities to more accurately delineate the vertical and horizontal limits of each excavation area. If the horizontal limit of any excavation area will encroach upon the railroad easement, FWENC will obtain a physical alteration permit from the Rhode Island Department of Transportation (RIDOT) maintenance division.

Excavation will begin once a given area has been staked out by the surveyors and the necessary erosion and sediment controls are in place. Soil will be excavated and directly loaded into off-road dump trucks for transportation to the soil staging area. The initial depth of excavation will be based on the depth of contamination that was reported in the Site Investigation Report (Figure 13 in Attachment 7). The

excavation depth between known depths of contamination will vary based on field screening results and visual monitoring. Excavation will generally proceed from east to west within Excavation Areas 1 and 2, and from west to east in Excavation Area 3. Soil that was found to be contaminated with PCBs, as reported in the Site Investigation Report and through the additional sampling that will be conducted during the pre-construction baseline sampling activities, will be directly loaded into trucks for offsite disposal

It is estimated that 14,500 cubic yards of soil will be removed from Excavation Area 1; 25,000 cubic yards from Excavation Area 2; and 500 cubic yards from Excavation Area 3. Excavation in each of the three excavation areas will continue until it is determined by field screening and laboratory confirmation sampling that the remedial action objectives have been achieved. High visibility fence and/or caution tape will be placed around open excavations, where necessary, to clearly mark the areas prior to them being backfilled.

If dewatering of the excavated soil is required, it will be performed within the limit of the excavation area from which the soil was excavated, or in the soil staging area Dewatering will be accomplished by placing the excavated material into a pile and allowing the free water to gravity drain. If the soil is being dewatered in the soil staging area, water that drains from the soil will be collected on the surface of the 40-mil liner and will be pumped into DOT-approved 55-gallons drums for treatment and/or disposal offsite. Water that drains from soil being dewatered within a given excavation area will drain on to the surface of the given excavation area Dewatering within a given excavation area will only be performed in sections of the area that have not yet been remediated. If dewatering of any soil that is contaminated with PCBs is required, the water will be collected for treatment and/or disposal offsite. Storage of this water will be in accordance with the TSCA regulations as discussed in Section 10 9 of this work plan.

7.5 SOIL STAGING

Excavated soils will be staged in four separate stockpiles at the soil staging area according to field screening results and visual inspection of each truckload of material. A grab sample will be taken from each truckload of material and screened with a flame ionization detector (FID) prior to being transported to the staging area Segregation of the four stockpiles will be as follows:

- Unimpacted Soils – soil exhibiting a FID response less than 10 ppmv and no visible petroleum contamination
- Rhode Island Regulated Soil – soil exhibiting a FID response greater than 10 ppmv and/or visible petroleum contamination
- Restricted Non-Hazardous Soil – soil exhibiting a FID response greater than 100 ppmv and/or visible petroleum contamination
- Potentially Hazardous Waste Soil – soil exhibiting a FID response greater than 1000 ppmv and/or visible petroleum contamination

The stockpiles will be maintained by a front-end loader that will remain in the staging area at all times. Each of the stockpiles will be covered during inclement weather and while not in use with poly sheeting. Caution tape will be placed across the staging area entrance at the end of each day. The excavated soil will remain in the stockpiles until waste characterization of the material has been completed.

7.6 BACKFILL

Upon receipt of confirmation sample results that meet or exceed the remedial objectives, sections of the three excavation areas will be backfilled with imported common borrow and/or unimpacted site soils. Imported common borrow will be a clean, unclassified material with soil characteristics that allow it to be compacted to 85% of ASTM D698 The material will have a six-inch maximum particle size and be free of debris, roots, wood, scrap metal, vegetation, refuse, soft unsound particles, and frozen, deleterious, or objectionable materials. Unimpacted site soil will consist of material excavated from the site that is found to conform to the RIDEM RDEC during the waste characterization testing outlined in Section 9.3. Backfill material will be installed such that the clean or unimpacted soil will not come in contact with material that remains to be excavated. Installation of the backfill material will generally be in one to two foot lifts followed by compaction with a vibratory roller. In-place density testing of the compacted backfill will be performed at a rate of 4 tests per acre to demonstrate that the material has been placed to achieve 85% of ASTM D698. If there are sections within an excavation area that require backfill to be installed below the water table, coarse sand or stone will be installed to the top of the water table.

Backfill material will be hauled directly to the excavation areas in offsite trailer or tri-axle dump trucks. The trucks will access the site on a dedicated haul road along the eastern edge of the site. Portions of the haul road will be constructed in clean and contaminated areas of the site, therefore a stone wheel wash pad will be constructed at the edge of the contaminated area where truck tires will be pressure washed prior to re-entering the clean area of the site Water generated from the pressure washing activities will be allowed to flow back on the contaminated portion of the site. To minimize the amount of pressure washing required, excavation and backfill along the eastern edge of the site will be completed first to allow for establishment of a clean haul road.

7.7 OFFSITE DISPOSAL

Offsite disposal of excavated soils will occur once the waste characterization analytical results have been received, and a disposal facility for the material has been approved. Soil that was found to be contaminated with PCBs, as reported in the Site Investigation Report, will be characterized in-place prior to being excavated and directly loaded into trucks for offsite disposal. The disposal trucks will access the landfill site on the clean site haul roads or on undisturbed sections of the site whenever possible. Any trucks that come in contact with contaminated landfill soil will have their tires and wheel wells pressure washed prior to leaving the site.

Soil that has been excavated and hauled to the soil staging area will be loaded on to the disposal trucks at the soil staging area. The disposal trucks will access the staging area on a clean haul road, and be

loaded by the front-end loader that remains in the stockpile area. Transportation and disposal of all excavated soils will be in accordance with Local, State, and Federal Regulations.

7.8 WETLAND ACTIVITIES

Based on the Wetland Delineation Map shown in Figure 3 and the Excavation Area map shown in Figure 4, a portion of Excavation Areas 1 and 2 will involve excavation of contaminated soil from delineated wetland areas, and Excavation Area 3 will involve excavation of contaminated soil along the coastline Prior to commencing with the excavation activities, FWENC will visit the site with the ACOE to obtain a jurisdictional determination of the wetland delineation accuracy. FWENC will also coordinate with the Rhode Island Coastal Resource Management Council (CRMC) and the RIDEM Wetlands Section regarding permits required by these agencies. FWENC will then develop a design to repair or replace wetlands in areas where wetlands will be impacted from the construction activities. The design will be submitted to the ACOE with the application for the wetland disturbance permit, and will generally involve replacing or repairing any impacted wetlands to their original condition. Upon receipt of the ACOE permit, FWENC will proceed with the wetland activities.

7.9 SITE RESTORATION

Site restoration activities will be conducted to restore the landfill site to its natural condition The landfill site will be restored by installing a layer of topsoil over the backfill material, and seeding the area with grass. Silt fence will be removed from all areas and disposed of as solid waste. Silt curtain will be removed from Narragansett Bay and will be washed if necessary

The soil staging area will be restored by removing the 40-mil liner material and silt fence, and disposing of them as solid waste. Soil that was stockpiled while creating the staging area will be spread to match the surrounding grade and seeded with grass Any fencing, gates, or site access roads will be removed or restored as required by the Navy.

7.10 DEMOBILIZATION

Following completion of construction activities, temporary facilities and utilities, personnel, equipment and materials will be removed from the site and the support zone area will be restored. Construction equipment will be cleaned before leaving the site.

7.11 SUBCONTRACTED WORK

It is anticipated that the following tasks will be performed by subcontractors to FWENC:

- surveying
- clearing
- monitoring well abandonment
- geotechnical and analytical testing

- off-site transportation and disposal

FWENC will self-perform all of the other work.

7.12 DUST CONTROL

Dust control measures will be implemented, as necessary, throughout the construction activities. Water will be applied by a water truck to work areas, haul roads, and access roads as often as required to prevent excessive dust emissions.

8. MATERIAL HANDLING

FWENC will employ numerous methods during the remedial action at the Melville North Landfill to prevent contaminated soils from coming in contact with clean areas. Material handling protocols will be implemented during soil excavation, transportation and stockpiling to accomplish this objective. The following material handling protocols will be implemented during the remedial action·

- Off road dump trucks will travel on a dedicated roadway while hauling excavated material to the soil staging area to minimize the potential for tracking surficial contamination to other sections of the site.
- Off road dump trucks will be equipped with a tailgate, and will not be loaded above the side walls of the truck body to prevent material spillage during transport to the soil staging area.
- Material excavated from each of the three excavation areas will be dewatered adjacent to the excavation, if necessary, wherever possible prior to being transported to the soil staging area. This will prevent excess free water from being transported to the soil staging area. If sufficient space is not present with a given excavation area on which soil dewatering can be performed, then dewatering will be performed in accordance with Section 7.4 of this work plan
- Prior to leaving the excavation area, the outside of each truck will be inspected to ensure that no loose soil is present.
- Each of the four stockpiles at the soil staging area will be assigned a number between one and four. Based on the field screening results of the excavated material, each truck load of material will be assigned a number according to which pile it is to be stockpiled in. The truck driver will be given a sheet of paper that indicates the stockpile designation. This will be transferred to the workers at the staging area to ensure that the material is stockpiled in the proper location.
- All of the offsite disposal trucks will be staged on clean haul roads whenever possible while being loaded from the soil staging area, or from the PCB soil area. If an offsite disposal truck is required to travel through a contaminated section of the site, the tires and wheel wells will be pressure washed prior to the truck leaving the site.
- Any vehicle or piece of construction equipment that comes in contact with a contaminated section of the site will be decontaminated prior to entering a clean section of the site.

9. SAMPLING ACTIVITIES

9.1 BASELINE SAMPLING

Baseline sampling will be performed in clean sections of the site that will be used during construction and could potentially be impacted with soil from the landfill. The specific areas that will be sampled include the soil staging area and any contaminated haul road that crosses a clean section of the site. Two samples will be collected from the prepared subgrade of the soil staging area, and one sample will be collected from the subgrade of each contaminated haul road the crosses a clean section of the site. Samples will be collected from the top three inches of soil in locations that will be determined in the field. The location of each baseline sample will be surveyed so additional samples can be collected from the same location at the completion of the construction activities. Each of the baseline samples will be analyzed for lead, arsenic, benzo(a)pyrene, and TPH.

At the completion of the construction activities, a second set of samples will be collected from the same locations as the baseline samples to demonstrate that clean areas of the site continue to remain below the Rhode Island Residential Direct Exposure Criteria for the contaminants of concern. The samples will again be analyzed for lead, arsenic, benzo(a)pyrene, and TPH.

Pre-construction baseline sampling will also be performed in the area of the site that was reported in the Site Investigation Report as being contaminated with PCBs (TP-07). This sampling will be performed to more accurately delineate the extent of the PCB contamination prior to commencing with the excavation activities. Initial samples will be collected 10-feet from the original sample location on the north, south, east, and west sides. Each sample will be analyzed for PCBs using EPA Method 8082. If the sample results indicate that the PCB concentration exceeds the RIDEM RDEC, then additional samples will be collected at 10-foot horizontal intervals in the direction of the exceedance until acceptable PCB results are obtained. An additional sample will also be collected at the next one-foot vertical depth interval if a surface soil sample contains PCBs at levels that exceed regulatory limits. In addition to collecting surface samples at 10-foot horizontal distances from TP-07, a soil sample will be collected from the 1-2 foot depth interval from the location of TP-07 This depth interval is directly below where the original PCB sample at TP-07 was collected. Upon completion of the pre-construction sampling, a volume of PCB contaminated will be estimated using the pre-construction sample results

9.2 CONFIRMATION SAMPLING

Confirmation sampling will be performed at the three excavation areas to demonstrate that the remedial objectives for the site have been achieved. Confirmation sampling will begin once the field screening results indicate that contaminated soils have been excavated to their horizontal and vertical extent. Field screening will typically be performed every 25 linear feet along the perimeter and base of each excavation area. An FID reading less than 10 ppmv, a field test kit reading of less than 300 ppm (i.e. PetroFLAG by Dexsil), and no visible petroleum contamination or odors will be field screening indicators that

confirmation sampling can begin. Confirmation sample locations and results will be used to satisfy Sections 9.06 (Points of Compliance) and 9.18 (Compliance Determination) of the Remediation Regulations as discussed below.

Confirmation samples will be collected every 50 linear feet from the perimeter of each excavation area, and at the base of each 50-foot by 50-foot grid. The soil at the perimeter sampling locations will be screened at each one-foot vertical increment with a FID to determine the depth at which the sample will be taken. The location with the highest FID reading will be designated as the sample location. The sample at the base of each 50-foot by 50-foot grid will generally be taken from the center of the grid. The confirmation samples will be submitted to a Navy-approved and RIDEM-certified laboratory for analysis Each sample will be analyzed for TPH (EPA Method 8100), arsenic (EPA Method 6010, 7060, or equivalent), lead (EPA Method 6010, 7420, or equivalent), and benzo(a)pyrene (EPA Method 8270).

In the event that the excavation in a given grid reaches the saturated zone, the sample at the base of the grid will be analyzed for TPH, VOCs, SVOCs, and SPLP Metals An acceptable saturated zone sample will not contain TPH at levels that exceed the saturated zone soil objective of 2500 mg/kg, and the remaining parameters must not exceed RIDEM GB Leachability Criteria. The saturated zone will typically be indicated by the presence of ground water.

Every fourth sample location from the perimeter and one sample location from the base of each excavation area will be used as Points of Compliance in accordance with Section 9.06 of the Remediation Regulations. Points of Compliance will be established to demonstrate compliance with the remediation goals set forth for the Melville North Landfill site, and compliance with the RIDEM GB Leachability Criteria Each sample will be analyzed for lead, arsenic, benzo(a)pyrene, and TPH to determine if compliance with the soil remedial objectives based on direct exposure to humans engaged in residential activities has been achieved. Analysis of VOCs (EPA Method 8260), SVOCs (EPA Method 8270), and synthetic precipitation leaching procedure (SPLP) metals (EPA Method1312 for procedure, EPA Method 6010, except mercury by EPA Method 7470 for analysis) will be also be performed to determine if compliance with GB leachability criteria, or with GA leachability criteria for analytes with no promulgated GB criteria has been achieved. In addition, the points of compliance will be evaluated to ensure that no NAPLs remain in any environmental media (soil or groundwater) and that no physical evidence of petroleum-based contamination in excess of RIDEM's RDEC remains on site following excavation.

For areas identified as containing elevated levels asbestos, confirmatory sampling will be conducted as above with the addition asbestos analysis (Light Optical Microscopy). Confirmation sampling in areas where PCB contaminated soil was excavated will be collected at a rate of one sample every 25 linear feet per foot height of wall with a minimum of four wall samples per excavation, and one floor sample from every 400 square feet. Immunoassay field screening may be used to determine the horizontal and

vertical extent of the PCB contamination prior to collecting confirmation samples. Each of the PCB confirmation samples will be analyzed using EPA Method 8082.

Compliance with the soil remedial objectives will be accomplished when all of the confirmation sample results show that soil contamination in exceedance of the RIDEM RDEC has been successfully removed from the site as defined in Section 8.10 (Ai) of the Remediation Regulations.

9.3 WASTE CHARACTERIZATION SAMPLING

All of the soil excavated from the Melville North Landfill site will be stockpiled in the soil staging area in four separate stockpiles based on the FID field screening results. The stockpiles will consist of soils exhibiting an FID reading less than 10 ppmv, greater than 10 ppmv, greater than 100 ppmv, and greater than 1000 ppmv. FWENC will collect composite waste characterization samples from each of the stockpiles prior to disposing of the soil offsite. Waste characterization samples will be composite samples taken from five locations within each of the stockpiles and will be analyzed in accordance with the requirements of the disposal facility. The samples will typically be analyzed for VOCs, SVOCs, PCBs, RCRA 8 Metals, TPH, Flash, pH, Reactivity, and any other parameters required by the disposal facility. Soils that are determined to contain PCBs will have composite waste characterization samples taken, for parameters other than PCBs, prior to the material being excavated. If it is determined, through waste characterization sampling, that a given 500 cubic yard stockpile of material meets the RIDEM RDEC, then this material will be considered unimpacted site soil and will be used as backfill.

To minimize the quantity of soil that will be stockpiled in the soil staging area, FWENC may collect waste characterization samples once a stockpile reaches approximately 500 cubic yards in size. Excavated soil that is placed in any given stockpile after the waste characterization samples have been taken will be separated from the stockpile and sampled with the next round of waste characterization.

The final disposal facility for the excavated soils will be selected based on the laboratory analytical results. All of the waste materials generated during the remedial action will be labeled, stored, manifested, and transported in accordance with all applicable State and Federal regulations.

10. REGULATORY COMPLIANCE

10.1 WETLAND ACTIVITIES

Tidal and freshwater wetlands are present in the planned excavation area. Removal of buried wastes will require disturbance to wetlands currently associated with the landfill. Work within wetlands will comply with the requirements of Section 10 of the Rivers and Harbors Act of 1899 for work within navigable waters of the United States and Section 404 of the Clean Water Act for excavation and fill in jurisdictional wetlands. Compliance requires restoration of disturbed wetlands and obtaining the appropriate Section 10 and 404 permits from the Army Corps of Engineers (ACOE); state authorizations administered by Rhode Island Department of Environmental Management (RIDEM) for 401 water quality certification and freshwater wetlands, and Rhode Island Coastal Resources Management Council (CRMC) for tidal wetlands.

Based upon the planned site activities, it is anticipated that impacts to wetlands will be greater than one acre rendering site related work in wetlands ineligible for approval under an ACOE Rhode Island programmatic general permit. Therefore, an individual permit would be required. An individual permit application will be prepared by FWENC and submitted to the ACOE by the Navy. In addition to coordinating with the ACOE, coordination of wetland activities will also be made with the RIDEM wetland section and CRMC as necessary.

Activities, in freshwater wetlands, required by the RIDEM Division of Site Remediation for cleanup of contamination are exempt from obtaining written authorization provided they meet the general conditions of Rule 6.01 and the specific conditions of Rule 6.05 for Site Remediation. These conditions largely address minimization of impacts, protection of wetlands functions and values, implementation of best management procedures, and restoration. FWENC considered these conditions while developing the Work Plan, which will be submitted to RIDEM by the Navy for review

Tidal waters associated with the site are designated as Type 4 Waters under the Rhode Island Coastal Resources Management Program Activities in Rhode Island's tidal waters, on a shoreline abutting tidal waters or within the 200-foot area landward and contiguous to all coastal features require CRMC assent prior to conducting these activities. The planned activities would be authorized under a Category B Council Assent An application for CRMC assent will be prepared by FWENC and submitted to CRMC by the Navy.

10.2 MONITORING WELL ABANDONMENT

Well abandonment procedures will conform to Rhode Island Department of Environmental Management (RIDEM) well abandonment requirements as published in Section 13.2 of Appendix I of the "Rules and Regulations for Groundwater Quality Monitoring Well Construction Standards and Abandonment Procedures." A well abandonment permit is not required. However, the substantive requirements of the well abandonment regulations will be followed for each of the wells abandoned.

10.3 STORM WATER DISCHARGE FROM CONSTRUCTION ACTIVITIES

The construction activities at Melville North Landfill will result in the disturbance of greater than 5 acres of ground area. This disturbance requires the need to comply with the National Pollutant Discharge Elimination System (NPDES) regulations for storm water discharges coming from the construction activities A NPDES Stormwater Permit for Construction Activities will be obtained from RIDEM by FWENC to comply with the regulations. FWENC will prepare and submit an application for coverage under the Statewide General Permit and the required Stormwater Pollution Prevention Plan. It is anticipated that FWENC will be required to sign the permit as a co-permittee with the Navy.

There is no specific effluent limitation or monitoring required for this type of discharge, however no discharge of hazardous substances to surface waters will be permitted. Although the NPDES permit does not specify an effluent limitation or monitoring requirements, RIDEM retains the right to enforce these issues under the RIPDES permit for the site. FWENC will be required to perform inspections of soils and erosion controls bi-weekly and after each precipitation event and to document all inspections in writing. RIDEM will be notified immediately if any of the soil and erosion controls are found to be ineffective or inoperative.

10.4 EARTH MOVING OPERATIONS

All excavation, grading and earth moving operation will be conducted in accordance with the Stormwater Pollution Prevention Plan, which will be prepared by FWENC for the project activities. Wetlands and wetland buffer zones have been delineated by TtNUS as depicted in Figure 3 Construction activities in the wetlands and wetland buffer zones will be conducted in accordance with RIDEM regulations and ACOE Section 10 and 404 permit requirements.

10.5 DREDGING ACTIVITIES

Excavation and dredging activities to be conducted below the high tide limit along the shoreline of Narragansett Bay are regulated by the ACOE and the CRMC and will require permit authorization. All project activities in wetlands are reviewed collectively and since total acreage impacted exceeds one acre an individual permit will be required from the ACOE. The Navy will include a request for dredging activities in the application to the ACOE and the CRMC. All dredging activities will use Best Management Practices to ensure that sedimentation will not occur in Narragansett Bay. All dredged sediments will be disposed off-site with other landfill wastes in accordance with RIDEM solid and hazardous wastes regulations.

10.6 COASTAL ZONE CONSISTENCY DETERMINATION

A coastal zone consistency determination is required from the Rhode Island CRMC for the landfill excavation, shoreline dredging, and wetland replacement activities. All activities are required to be consistent to the maximum extent practicable with the requirements of the Rhode Island Coastal Resources Management Program. Also, the ACOE will make its authorization for shoreline dredging

contingent upon the receipt of the consistency concurrence from the CRMC. The Navy is responsible for submitting a coastal zone consistency determination to the CRMC for review at least 60 days prior to the desired start date of site activities.

10.7 AIR POLLUTION CONTROL

10.7.1 Fugitive Dust and Odor Emissions

Fugitive dust and/or odor emissions may result during landfill excavation operations. Consequently, engineering controls will be used to control dust and or odor emissions This will include keeping surfaces adequately wet during intrusive activities and covering stockpiles and materials being transported to prevent fugitive dust emissions. It is anticipated that petroleum odors may be generated during excavation of oily wastes. Other odors may be generated as wastes are excavated. Strong odors are not anticipated because wastes landfilled were industrial not putrescible/garbage type wastes Air monitoring will be performed in accordance with Section 7.0 of the HASP to monitor dust levels at the site.

10.8 WASTE MANAGEMENT

All excavated waste materials and contaminated sediments will be disposed off-site in accordance with with RIDEM Solid and Hazardous Waste Regulations As wastes are excavated they will be field screened for organic vapors with a Flame Ionization Detection instrument (FID) and segregated based upon FID readings. Similar wastes will be stockpiled together and sampled and analyzed to determine waste classification. Waste materials that may not be suitable for stockpiling include liquid wastes and drums containing liquid. Uncontainerized liquid wastes encountered during excavation will be containerized and removed from the site. However, if ground water is encountered during the excavation activities, it will not be considered as a liquid waste. Drums or other intact waste containers encountered during excavation will be overpacked in DOT-approved containers and staged on site pending further direction from the Navy.

The following waste materials will be generated during remedial activities:

- Construction debris and industrial wastes containing spent acids, waste solvents and paints, oily and petroleum wastes, and PCB's.
- Sediments from dredging activities.
- Uncontaminated above grade vegetative waste generated during clearing activities on the existing landfill surface.
- Potentially contaminated vegetative waste in contact with buried site wastes generated during clearing activities.

- Uncontaminated soils from excavation of existing landfill material.
- PPE consisting of Tyvec, booties, gloves, etc. from intrusive activities in potentially contaminated waste materials.
- Decontamination solids and liquids.

All disposal facilities and transporters used for off site disposal will be approved in accordance with FWENC Corporate Regulatory Compliance Procedure EHS 1-4 and will be approved by the Navy prior to being used FWENC will prepare all waste documentation (profiles, Bills of Lading, manifests) for Navy review and signature FWENC personnel will not sign any waste documentation without written authorization of the Navy and approval from the FWENC Legal Department

10.8.1 Landfilled Wastes and Dredged Sediments

Landfilled wastes and dredged sediments will be field screened as they are excavated and stockpiled with similar wastes pending waste classification sampling and analysis. Wastes, which are found to be RCRA characteristically hazardous, will be disposed at an out of state permitted RCRA hazardous waste facility. No RCRA listed wastes are expected to be encountered because wastes were originally disposed prior to the existence of the RCRA hazardous waste regulations. PCB wastes containing greater than 50 PPM of PCB's will be disposed at an out of state permitted TSCA landfill. Non-hazardous wastes will be landfilled at a non-hazardous solid waste landfill located in either Rhode Island or Massachusetts If intact or non-intact waste drums containing liquid or free product are encountered during landfill excavation activities, they will be excavated, overpacked in DOT-approved containers, and staged on site pending further direction from the Navy. This will be considered a change in site conditions. Any such drums will not be crushed, emptied or otherwise disposed on site until direction is received from the Navy.

Non-intact drums that do not contain liquids will be considered as debris and will be stockpiled with other landfill wastes.

10.8.2 Construction and Demolition Debris

Construction and demolition debris consisting of wood, concrete, metal and other materials will be generated during excavation activities. This debris will be broken into manageable pieces if necessary, and stockpiled for waste classification sampling and disposal. Off site recycling of metal debris may be considered a more cost-effective option if the cost to source separate and handle the debris does not outweigh the cost difference for landfill disposal as a commingled waste. It is not anticipated that recycling of non-metal debris will be possible because the presence of potential hazardous contamination will render the debris unacceptable for recycling. Sampling and analysis of the waste material will be conducted as necessary in accordance with this work plan.

10.8.3 Uncontaminat d Veg tative Waste

Uncontaminated vegetative waste generated from surficial clearing activities will chipped onsite and stockpiled during the remedial activities. The material will be spread over the backfilled landfill upon completion of the remedial activities.

10.8.4 Potentially Contaminated Vegetative Waste

Potentially contaminated vegetative waste generated from below grade grubbing operations within the landfill that may have come in contact with waste materials or contaminated soils will be chipped on-site and stockpiled with other site wastes for waste classification sampling and off-site disposal.

10.8.5 PPE

PPE (tyvec, gloves, booties) generated during intrusive work that is potentially contaminated with site wastes will be placed in rolloff containers and sampled for waste classification Non-hazardous PPE will be disposed off-site at a permitted RCRA Subtitle D solid waste landfill. If hazardous, PPE will be disposed at a permitted RCRA Subtitle C hazardous waste facility. PPE will be sampled in accordance with this work plan. Any PPE generated during clean work activities, will be considered clean and will be disposed of off site as non-hazardous solid waste at a permitted Subtitle D solid waste landfill.

10.8.6 Decontamination Solids

Decontamination solids generated from decontamination of equipment that had been in contact with site wastes will be field screened for VOCs and stockpiled with similar wastes pending waste classification sampling and analysis for off-site disposal in either a RCRA Subtitle D solid waste facility or in a RCRA Subtitle C hazardous waste facility.

10.8.7 Liquid Wastes

Potential sources of liquid wastes on site include decontamination water, surface water, subsurface water, and water or free product from intact or non-intact drums. Decontamination water generated from in-place decontamination of equipment will be allowed to flow on to non-remediated sections of the landfill surface. Decontamination water generated from activities associated with PCB contaminated soil will be collected and disposed of in accordance with Section 10.9 of this work plan. Surface and subsurface water that collects in an area of the site that requires pumping will be containerized and characterized in accordance with the disposal facility's requirements. If the collected water does not require pumping, it will be allowed to settle into the landfill. Intact and non-intact drums found to contain liquid or free product will be excavated from the landfill, placed in DOT-approved containers, and staged on site pending further direction from the Navy.

10.9 TSCA/PCB WASTE MANAGEMENT

Any PCB wastes generated from decontamination of PCB contaminated equipment will be managed on site in accordance with the generator storage requirements in 40 CFR 761.65. Since site wastes were disposed prior to 1978, they are not subject to the Anti-dilution Provisions of the TSCA disposal regulations and will be classified for disposal solely upon their PCB concentration as found. All wastes containing greater than or equal to 50 PPM of PCB's will be disposed at a permitted TSCA Facility. All wastes containing less than 50 PPM of PCB's will be disposed at a permitted solid waste facility PCB wastes will be handled and stored in accordance with TSCA requirements.

10.9.1 Requirements for PCB Storage:

10.9.1.1 PCB Stockpiles

PCB wastes encountered during the project will be directly loaded into trucks for offsite disposal. In the event that PCB wastes cannot be handled as planned, PCB wastes will be stored in stockpiles for a period not to exceed 180 days. Stockpiles used for PCB wastes will be constructed in accordance with requirements under 40 CFR 761.65(c)(9):

- Stockpile shall be designed and operated to prevent dispersal by wind using means other than wetting
- The stockpile shall be equipped with a liner which is designed, constructed and installed to prevent migration of wastes through the liner into the underlying soils
- The liner shall be chemically compatible with the wastes and shall be of sufficient thickness and strength to prevent failure due to pressure gradients, physical contact with the waste, climatic conditions and the stresses of liner installation and daily operation
- The liner shall be placed upon a base or foundation capable for supporting the liner that will resist failure from pressure gradients, settlement, compression or uplift
- The liner shall be equipped with a cover with will prevent contact with precipitation and is secured to prevent removal by winds under normal seasonal climatic conditions
- The liner shall be equipped with run-on controls which will prevent stormwater flow onto the stored waste during peak discharge during at least a 25 year storm and shall have capacity to store at least the water volume from a 24 hour, 25 year storm The stormwater collection system will be emptied expeditiously after storms to maintain the design capacity of the system.

10.9.1.2 PCB Containers

- Non-bulk solids and liquid PCB wastes must be placed in containers that meet DOT 1A1 or 1A2 specification.

- All PCB wastes containing greater than 50 ppm PCBs must be removed from storage and disposed within one year of the date it was placed in storage. It is recommended that waste should be removed from storage within 9 months to allow the disposal facility three months time to dispose of the waste
- All storage areas must be inspected at least once every 30 days.
- A written inspection log and drum inventory must be maintained. The inventory should contain the date each drum was placed in storage and the date each drum was removed from storage. The drums should be individually numbered to ease tracking. The drum inventory shall be maintained in a field logbook or on a PC Spreadsheet.
- Each PCB container must be labeled with a Large PCB Marking Label (6 inches on each side). Commercially available PCB labels will be used.
- Each container must be marked with date on which the PCB waste was placed in the container.
- The storage area must be managed to allow the containers to be located by the date they were placed in storage
- The storage area must have adequate aisle space and drum labels should be facing the aisles
- The storage area must be marked with a Large PCB Marking Label (6 inches on each side). Commercially available PCB labels should be used.
- A Notification of PCB Activity Form (EPA Form 7710-53) form must be submitted to the EPA Headquarters to obtain an EPA Generator's ID Number. The Generator ID Number must be obtained prior to any off-site shipment of PCB wastes.
- An EPA Hazardous Waste Manifest must be used for all off-site shipments of PCB wastes.
- All PCB wastes greater than 50 PPM PCBs must be disposed at a TSCA permitted disposal facility.
- A Certificate of Disposal must be received from permitted disposal facility for each shipment of PCB wastes. The certificate must be retained in the generator's records

10.9.2 Storage Requirements for Greater Than 30-Day Container Storage:

- Storage area must have roof and walls to prevent precipitation from contacting stored PCB containers.
- The floor must have a continuous 6" high curb and both the floor and wall must be constructed of a continuous smooth material such as concrete or metal. The floor and curbing must not contain cracks, leaks, valves, floor drains or other openings that would allow

PCB material to escape. EPA has stated in their "PCB Question and Answer Manual" that they consider a portable pan to offer adequate containment as long as it meets these requirements.

- The containment area must hold at least two times the internal volume of the largest PCB container or stored within or 25% of the total volume of all the containers whichever is greater.

10.9.3 Storage Requirements for Temporary (Less Than 30-day) Storage

Certain PCB wastes can be stored on-site for up to 30 days without having to meet the storage area requirements for adequate roof, walls, flooring and secondary containment.

The following items can be stored outside in an uncovered area for less than 30 days:

- Non-leaking PCB Articles and PCB Equipment (capacitors, transformers etc.).
- Leaking PCB Articles and Equipment if placed in a non-leaking PCB Container with absorbent to absorb all free liquids.
- PCB containers containing non-liquid PCBs such as soil, debris etc.
- PCB liquids between 50 and 500 PPM PCBs provided that a Spill Prevention Control and Countermeasure Plan (SPCC) is prepared for the temporary storage area and each drum is labeled to indicate that it does not contain greater than 500 PPM PCBs.

10.9.4 PCB Waste Manifesting

FWENC will be responsible for preparation of the Hazardous Waste Manifests for PCB disposal. All manifests will be reviewed and signed by the Navy as generator of the waste. Manifests will be carried by the transporters and will include the following:

- The generator's name, mailing address, site address if different from the mailing address, and phone number,
- The generator's EPA I.D. number;
- The hauler (or haulers) name, phone number;
- The hauler (or haulers) EPA I.D. number;
- The treatment, storage or disposal facility's name, address, and telephone number (designated facility);
- The treatment, storage, or disposal facility's EPA I.D. number;
- The name, type, and quantity of hazardous waste being shipped, proper DOT shipping name, hazard class, and I.D. number,

- Special handling instructions and any other information required on the form to be supplied by the generator; and
- The proper codes that accurately describe the shipment of hazardous waste

Before allowing the manifested waste to leave the property, the appropriate Navy representative will.

- Sign the manifest certification by hand;
- Obtain the handwritten signature of the initial hauler and date of acceptance on the manifest;
- Retain one copy; and
- Give the remaining copies of the manifest form to the hauler.

10.9.5 Hazardous Waste

A RCRA determination will be made to determine if the material is a RCRA hazardous waste (40 CFR 261 11). RCRA regulations define hazardous waste as (1) a listed waste under 40 CFR 261.31,.32, and .33 , or (2) characteristic for ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR 261.21, .22, .23, and .24.

10.9.6 Listed Hazardous Waste

Based upon site history and past operations, the presence of listed hazardous wastes is not anticipated at Melville North Landfill because the wastes were disposed prior to the existence of the RCRA listed hazardous waste codes. Site wastes shall be regulated as RCRA wastes solely because the waste exhibits a RCRA characteristic.

10.9.7 Characteristic Hazardous Waste

A solid waste is a characteristic hazardous waste if it exhibits any of the following characteristics:

- Ignitability (D001)
- Corrosivity (D002)
- Reactivity (D003)
- Toxicity (D004-D043)

The full definition of these characteristics is provided in 40 CFR Part 261.21-.24.

Historical data indicated that spent acids, waste paints and solvents and petroleum sludges were disposed at the Melville North Landfill. Site wastes may be RCRA Corrosive or Ignitable or may exhibit RCRA Toxicity based upon the presence of RCRA metals or organics above TCLP regulatory levels. Wastes will be field screened for volatile organics and stockpiled pending full waste characterization

sampling. Wastes will be analyzed for RCRA Ignitability, Corrosivity, Reactivity and Toxicity at a frequency specified in this work plan prior to selection an off-site disposal facility.

10.9.8 Land Disposal Restrictions

The Land Disposal Restrictions (LDRs) prohibit placement of hazardous wastes on or in the land, except in an EPA approved corrective action management unit. The LDRs specify treatment technologies and treatment standards for RCRA hazardous wastes. All RCRA Characteristic wastes will be subject to the treatment standards for any Underlying Hazardous Characteristic identified in the waste in addition to the wastes primary hazardous characteristic. The Regulatory Specialist will identify LDRs for site generated RCRA wastes and will prepare Generator Land Disposal Restricted Waste Notification and Certification forms required for all off-site hazardous waste shipments. The Notification and Certification forms will be provided to the Navy for review and signature prior to off-site waste shipments.

10.9.9 Solid Waste

Solid waste are those materials defined by 40 CFR 262.1 as drilling wastes, garbage, refuse, sludge, and other discarded material including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, and agricultural operation and from community activities. Site generated solid wastes that do not exhibit any RCRA characteristics are regulated as non-hazardous wastes and will be disposed of in permitted Subtitle D solid waste facilities. All Subtitle D solid wastes facilities to be used for site waste disposal will be submitted to the Navy for approval prior to off-site shipment.

10.9.10 Waste Management Permit/Approval Requirements

There are no permitting requirements for the off-site disposal of hazardous and non-hazardous wastes generated during closure of the Melville North Landfill. FWENC is responsible for obtaining disposal approvals from the off-site disposal facilities. The Navy is responsible for obtaining RCRA Notification of Hazardous Waste Activity and TSCA Notification of PCB Activity Forms from RIDEM and/or EPA and to obtain Generator's Hazardous Waste and PCB Generator Numbers. If requested, FWENC will assist the Navy in completing and submitting these notification forms

10.9.11 Waste Minimization

Waste minimization is a prime objective of the project team during the project activities. The principal components of this program include:

- Incorporating waste minimization into all planning activities
- Segregation of waste streams
- Re-use/recycling of materials where possible

- Minimizing use of hazardous materials
- Do not contaminate materials unnecessarily
- Decontaminate and re-use equipment when practical
- Employ strict inventory control of hazardous materials
- Minimize the amount of environmental media generated using dedicated equipment to minimize decontamination requirements and decontamination wastes generated

Each of the above steps will reduce the amounts of contaminated wastes being generated. Site inspections will be conducted by both the Regulatory Specialist and the Quality Control Manager (QCM) to monitor site compliance and waste minimization activities.

10.9.12 Segregation/Screening

Waste will be segregated based upon the knowledge of the waste, including its location, potential chemical composition, appearance, odor, and field monitoring results. Similar wastes will be consolidated together for waste characterization sampling. Non-hazardous waste will be segregated from hazardous waste when ever possible. The intent is to segregate waste into categories that are intended to facilitate waste classification, minimize treatment and disposal costs, and match the acceptance criteria of the disposal facilities.

10.9.13 Containerization

After classification, wastes will be placed in DOT specification containers for off-site disposal. Bulk and non-bulk containers will be considered based on volumes of waste generated. Lined dump trailers and rolloff containers will be used for large volume wastes such as soil, debris and PPE. Smaller volume wastes such as decon water will be stored in non-bulk containers pending off-site disposal DOT specification 1A1 (closed top) and 1A2 (open top) steel drums are suitable for the non-bulk waste streams such as non-decon water.

10.9.14 Accumulation/Storage

All stockpiles, containers and portable tanks will be staged at the soil staging area located at the southern end of the landfill. The location will be approved by the Navy and RIDEM and will be used for the storage of all hazardous and non-hazardous waste generated by project activities. When test results are received, the Regulatory Specialist will initiate off-site disposal approvals and transportation services. Hazardous waste will be stored on-site for less than 90 days from the point of generation unless a generator storage limit extension is obtained from RIDEM. The Regulatory Specialist will complete any requests for extension and submit them to the Navy for review and signature prior to submittal to RIDEM for approval.

The Site Superintendent is responsible for identifying the emergency coordinator for the waste accumulation/storage area(s). The emergency coordinator is responsible for coordinating any emergency response activities related to waste storage area spills/releases The following information will be posted at the accumulation area(s) at all times:

- Name/phone number of emergency coordinator
- Location of fire extinguisher and spill control materials
- Telephone number of the base fire department
- Signage "Authorized Personnel Only"

10.9.15 Container Inspections

Waste container accumulation areas will be inspected weekly by project personnel while the field work is in progress to ensure proper labeling and secure closure, and to assess the condition of each container, the number of containers, and the condition of the storage area. Any signs of deterioration, leaking, or dents will be noted and containers will be immediately overpacked, if necessary. Inspection results will documented in writing, and the date and time of inspection and the inspector's signature will be provided on each inspection log.

10.9.16 Container Marking and Labeling

At the time of generation, all waste containers will be marked in indelible ink, paint, or grease pencil with the following information:

- Source and location
- Contents of material in the container (type of material and expected hazards)
- Accumulation start date (the date the first drop of material was put in the container)
- Date container was sampled
- Special handling instructions
- HAZARDOUS WASTE label on known or suspected hazardous waste

Upon receipt of analytical results, containers will be immediately labeled with commercially available labels. Within five days of receiving analytical results, project personnel will contact the Navy if the waste is determined to not be hazardous. After concurrence from the Navy, the hazardous waste label will be removed and the container will then be relabeled with a NON-HAZARDOUS label. Based upon final classification, the Regulatory Specialist will select a DOT proper shipping name for any material meeting a DOT hazard class The Regulatory Specialist will direct application of any required DOT markings and labels specific to the proper shipping name The Regulatory Specialist will also specify required

placarding based upon the proper shipping name selected. Completion of the EPA Hazardous Waste Label meets the DOT requirements for consignor/consignee, name, address, and contents.

10.9.17 Sampling and Waste Classification

A full sampling/analytical program, including analytical methods for constituents of concern, is outlined in this work plan. The classification of each waste stream will be based upon legally defensible analytical results from the waste characterization sampling. The Regulatory Specialist will submit the documentation supporting each waste stream classification to the Navy. The Navy will be responsible for approving all waste classifications

10.9.18 Spill Prevention Procedures

The project personnel will take the necessary precautions to prevent the possible release of contaminants to the environment during all phases of the investigative and remedial action. In the event of a spill, the site personnel will perform the following at a minimum:

- Immediately notify the Navy
- Notify the FWENC Regulatory Specialist, who will address federal and state requirements for reportable spills
- Take immediate measures, utilizing properly protected personnel, to control and contain the spill
- Isolate the hazardous area and keep all unnecessary personnel out of the area
- Stay upwind and stay out of low areas
- Keep combustibles away from the spill materials
- Use water spray or other approved methods to reduced vapors, gases, and/or dust emissions

10.9.19 Manifest Packages

Both hazardous and non-hazardous waste will be generated during this project. Since the State of Rhode Island has its own Hazardous Waste Manifest, the Rhode Island Manifest will be used unless the waste receiving state has its own manifest requirements. Non-hazardous waste will be shipped on a bill of lading or non-hazardous waste manifest. The principal components of the completed manifest package that will be submitted to the Navy may include:

- Hazardous waste manifests
- Hazardous material shipping papers
- Waste profile sheets

- LDR notification and certification forms

Supporting information will contain:

- Waste disposal history
- Analytical results
- Material Safety Data Sheets
- Information reviewed in identifying the proper waste code
- DOT waste packaging, labeling, marking, manifesting, and placard requirements

10.9.20 Manifest Package Preparation and Submittal

FWENC will prepare the complete manifest package including waste characterization, waste profiles/approvals, LDR certifications, and manifests/bills of lading

FWENC will submit to the Navy for review and signature a reproducible copy of the complete manifest package for each individual waste stream as soon as possible after waste classification and disposal facility approvals have been obtained The Navy will be responsible for signing all hazardous waste manifests, Land Disposal Restricted Waste Notification/Certification forms, and bills of lading for off-site waste shipments. The Regulatory Specialist will hold the original complete manifest package and make corrections based on the Navy review, prior to off-site shipment.

Within 24 hours of the transporter signature and off-site shipment, the project personnel will provide the Navy with two copies of the manifest (signed by the generator and the original transporter) and the remainder of the approved complete manifest package.

No waste will be transported prior to the approval of the complete manifest package and signature of the manifests and shipping documents by the NAVY FWENC will not sign waste profiles or manifest packages without written authorization from the Navy and approval of FWENC Legal Council.

10.9.21 Manifest Reporting Requirements

Under RIDEM regulations, two copies of each manifest must be sent to RIDEM. FWENC will provide the Navy with all generator copies of the signed manifest. The Navy is responsible for submitting the required copy to RIDEM. The second copy will be sent to RIDEM by the Treatment, Storage and Disposal Facility (TSDF) after the TSDF has signed the manifest.

10.9.22 Record Keeping Requirements

Records must be kept for all hazardous waste activities. Records to be retained include all hazardous waste manifests, Land Disposal Restricted Waste Notification forms, Generator Biennial Reports, manifest exception reports, bills of lading for non-hazardous waste shipments, and records of any test results, waste analyses, and waste profile sheets for at least three years after the waste was disposed FWENC will retain photocopies of all waste documentation in the project file and will forward original copies of all manifests, LDR forms and Bills of Lading to the Navy. The project team will provide all information necessary for the Navy to file the Biennial Report (EPA Form 8700-13A) by March 1 of each even numbered year. This information will be included in the Closure Report.

10.9.23 Discrepancy Reports

Any discrepancies due to differences between the quantities or types of wastes designated on the manifest or shipping papers and the quantity or type of wastes a facility actually receives must be reported. FWENC will investigate these discrepancies, rectify the identified discrepancy, and report to the Navy within 15 days after receipt of the waste by the disposal facility. This information will also be presented in the Closure Report.

10.9.24 Exception Reports

If by the 35th day after the transporter signs the manifest, the Navy has not received a signed copy of the signed manifest from the TSDF, FWENC will contact the TSDF by phone to obtain a signed copy. If the Navy has not received a signed copy of the manifest by the 38th day, an exception report will be prepared. This exception report will be submitted to the Navy for review and approval no later than day 40 FWENC will document all calls to locate shipments and submit the documentation with the exception report The Navy will submit the signed exception report to the EPA Regional Administrator prior to the 45th day. All exception reports will also be presented in each Closure Report.

10.10 DOT HAZARDOUS MATERIAL TRANSPORTATION

All waste materials destined for off-site material are expected to be non-hazardous and will not meet the definition of a DOT hazardous material, however in the event hazardous materials are encountered, FWENC will follow the following requirements for waste and sample shipments Hazardous materials will be properly classed, described, packaged, marked, labeled and in condition for shipment as required by 49 CFR 171.

Waste that does not exhibit one of the nine DOT hazard class characteristics (i e., explosive, flammable, poison, combustible, etc.) is not regulated under DOT rules for the transportation of hazardous material. If waste is suspected to be hazardous, then it will be shipped under the suspected hazard class If a particular hazard class is unable to be determined, then the soil or water may be shipped under either of the following:

Shipping Name	Hazard Class	ID Number	Packing Group	Label
Environmentally hazardous substances, liquid, n.o.s.	9	UN3082	III	CLASS 9
Environmentally hazardous substances, solid, n.o.s.	9	UN3077	III	CLASS 9

When using either one of these "n.o.s." (not otherwise specified) shipping names, at least two technical names must follow (i.e., "Environmentally hazardous substances, liquid, n.o.s. [Benzene and Acetone]").

The shipping name, identification number, packing group, instructions, cautions, weights, EPA waste code numbers and consignee/consignor designations will be marked on packages for shipment. Labeling provides information regarding the DOT hazard class.

The label to be placed on material will depend upon the results of sampling. Once the waste is characterized, reference should be made to the Hazardous Materials Table in 49 CFR 172.101 to determine the appropriate label. The package (or drum) will be marked and labeled as specified in 49 CFR 172.301.

The person offering hazardous material for shipment will offer placards (49 CFR 172.506) Any quantity of material listed in Table 1 of the regulations will be placarded. However, if there is less than 1,000 lb. of a Table 2 material, no placard is required. No Class 9 placard is required for domestic shipments. If a placard is required, the label referenced above will be affixed on each side and each end of the vehicle(s).

Hazardous material shipping papers will have the following description of the hazardous material, in the following order.

- Proper shipping name;
- Hazard class or division;
- Identification number,
- Packaging group;
- Total quantity (must appear either before or after the above information); and
- Technical and chemical group names may be entered in parentheses between the proper shipping name and hazard class or following the basic description (e.g., "Flammable liquids, n.o.s. [contains xylene and benzene], 3 UN1993, PG II").

Other required information includes:

- EPA identification (manifests);
- Emergency Response Guidebook numbers;

- Twenty-four-hour emergency response number, supplied by the generator and answered by a knowledgeable person;
- Signatures; and
- Shipper's certification.

All FWENC and subcontractor personnel involved in DOT Hazardous Material Shipment activities will have been trained in accordance with personnel training requirement outlined in 49 CFR 172 Subpart H

10.10.1 Waste Transporter Selection

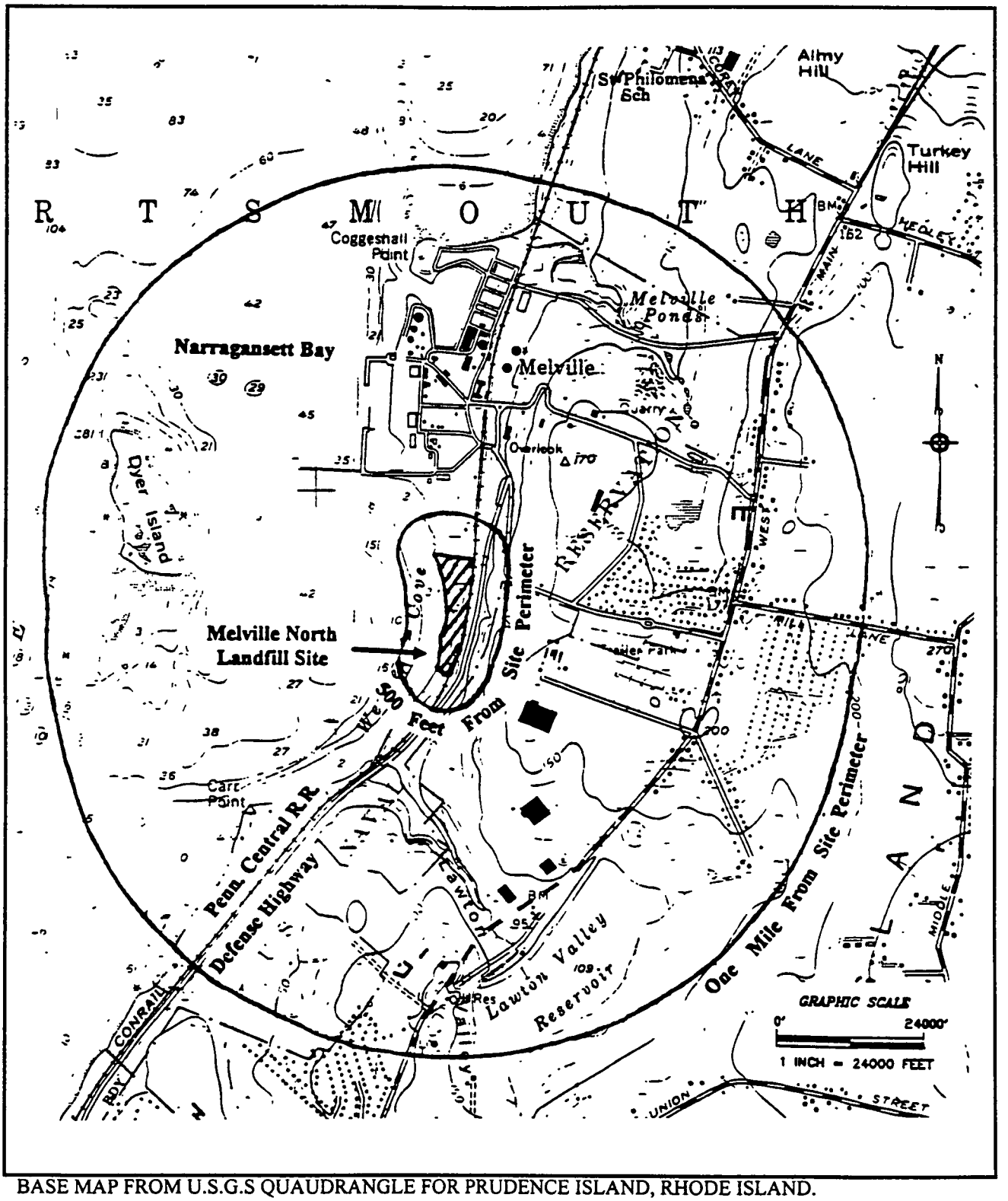
To ensure safe transport of the waste, only transporters who have demonstrated competence and the required license and permits for transporting waste will be used FWENC policies and procedures for subcontracting will be followed. Transporter EPA/State identification numbers will be kept in project and compliance files. Trucks will be covered to prevent fugitive releases of material during transport.

11. FINAL REPORT

Upon completion of the remedial activities, FWENC will prepare and submit a closeout report to document the remedial activities that were conducted at the Melville North Landfill and to fulfill the requirements of Section 9 19 of the Remediation Regulations. The report will contain a description of the remedial activities conducted at the site, a summary of the field screening activities, confirmation sampling and waste characterization analytical results, field QC inspection reports, weekly progress reports, manifest records for all of the material that was disposed of offsite, photographic documentation of the remedial activities, an estimated final cost of the remedial action, and a statement from the Navy indicating that they accept the work performed at the site. The report will also contain a signed statement from the Professional Engineer in charge of the project to certify that the work has been completed in accordance with the Remediation Regulations. The report will be submitted for Navy review within 60 days of completion of the waste disposal activities

ATTACHMENT 1

FIGURES



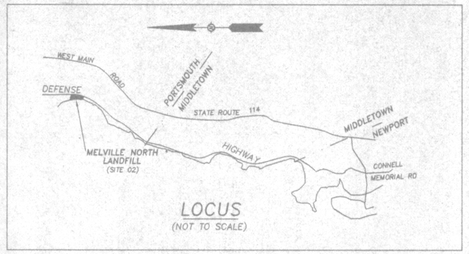
BASE MAP FROM U.S.G.S QUAUDRANGLE FOR PRUDENCE ISLAND, RHODE ISLAND.

SITE LOCATION MAP

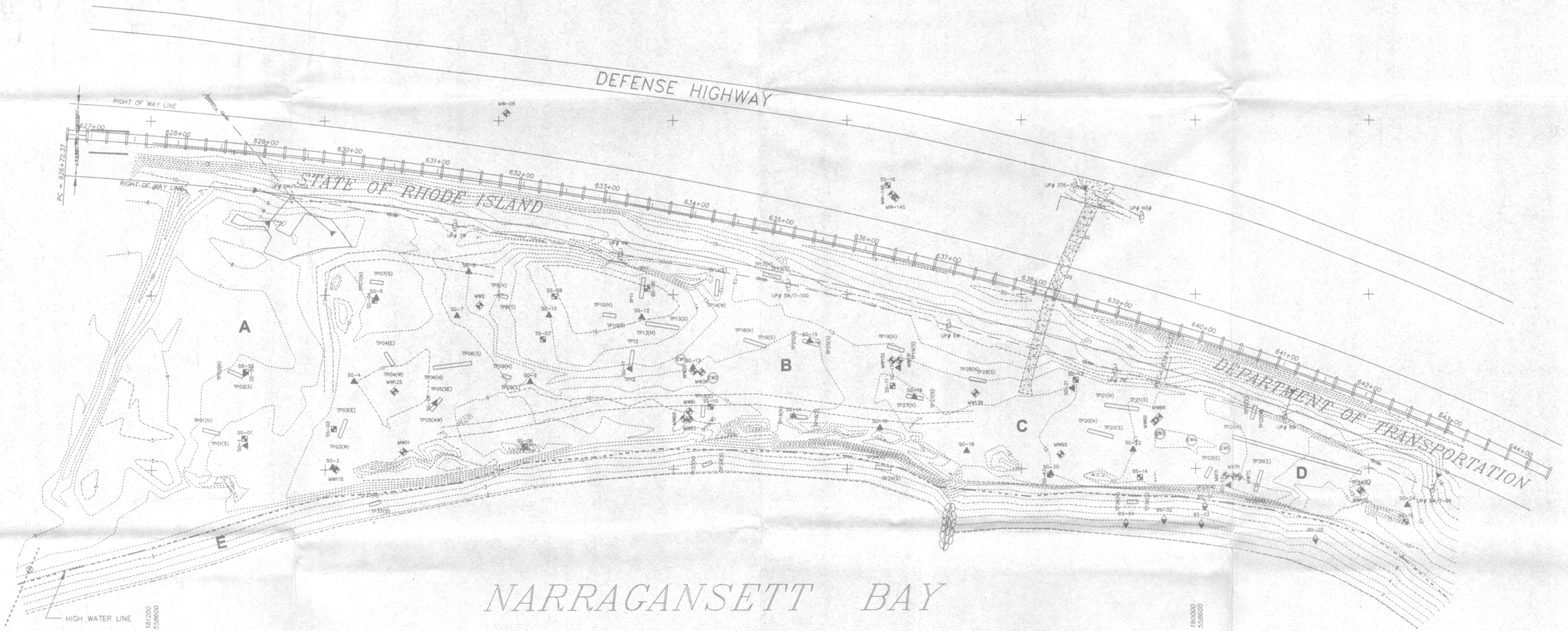
MELVILLE NORTH LANDFILL, PORTSMOUTH, RHODE ISLAND

FIGURE 1

RHODE ISLAND GRID



LOCUS
(NOT TO SCALE)



LEGEND:

- EXISTING CONTOUR
- HIGHWATER LINE
- TEST PIT LOCATION
- SURFACE SAMPLE LOCATION
- MONITORING WELL LOCATION
- BEACH SAMPLE LOCATION

TOPOGRAPHICAL SURVEY PREPARED BY SAI SURVEYING CO., TAKEN FROM DRAWING ENTITLED "SITE 02, MELVILLE NORTH LANDFILL SITE MAP," DATED 5/29/91

CAD FILE NAME: ME1599.DWG
PLOT SCALE: 1=60
DATE: 01/13/99
TIME: 3:10 PM

REV	REVISION DESCRIPTION	PREPARED	CHECKED	APPROVED	DATE
0	ISSUED FOR NAVY REVIEW				

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MELVILLE NORTH LANDFILL

NAVAL EDUCATION TRAINING CENTER
PORTSMOUTH, RHODE ISLAND

EXISTING CONDITIONS AND SAMPLING LOCATION

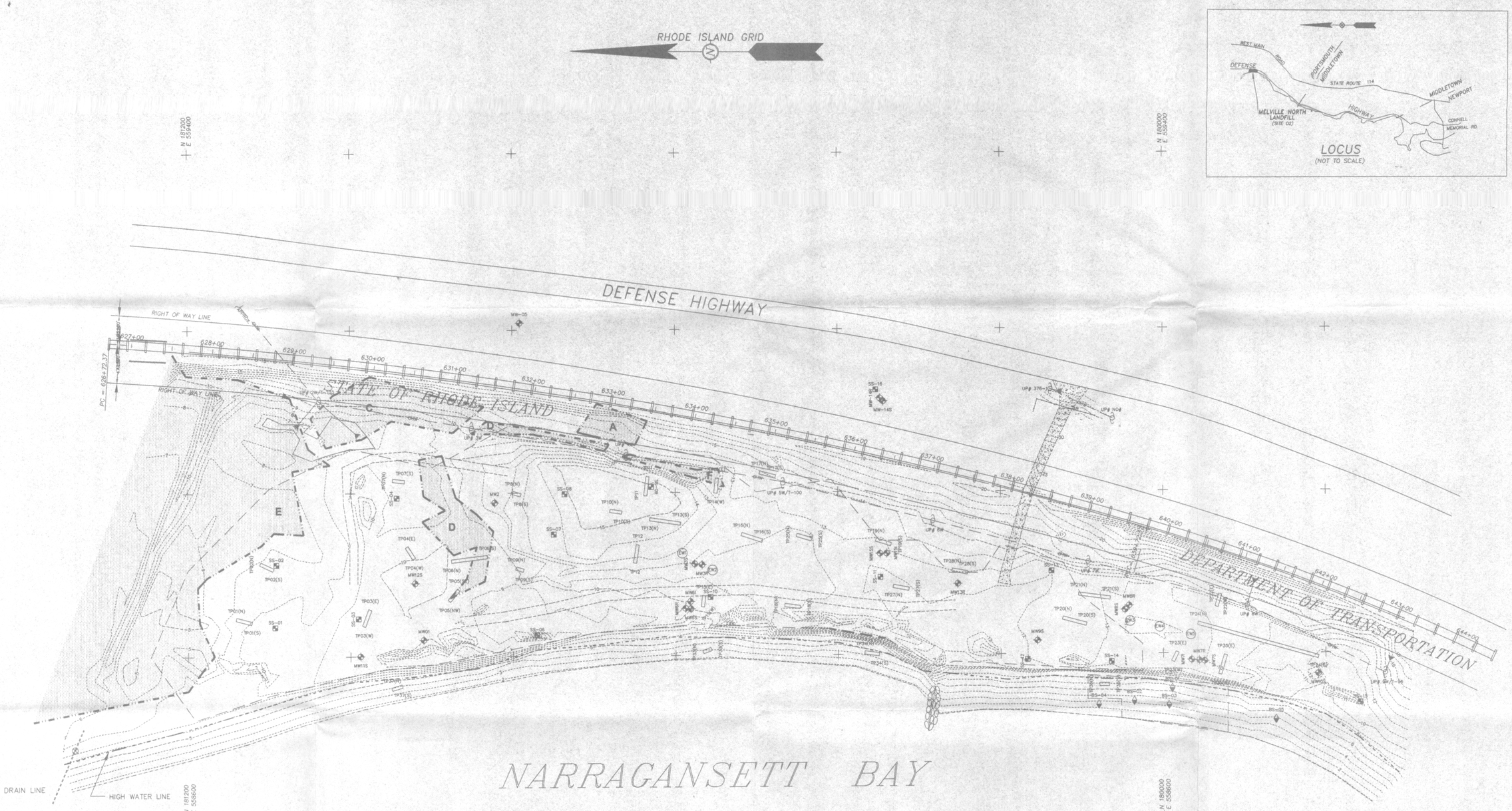
FOSTER WHEELER ENVIRONMENTAL CORPORATION
LIVINGSTON, NEW JERSEY

DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
CE	MWJ	J.R.	C.T.		

SCALE:	DRAWING NUMBER:	SH.	OF	REV.
1"=60'-0"	FIGURE 2	2	6	0

FWD1R12.DWG

001189361X



NOTES:

WETLAND DELINEATION PERFORMED BY BROWN AND ROOT ENVIRONMENTAL AND REFERENCED FROM BROWN AND ROOT DRAWING "WETLAND DELINEATION MAP, MELVILLE NORTH LANDFILL" , DATED JUNE 16, 1997, REVISION 0.

LEGEND:

- LIMIT OF EXCAVATION
- WETLANDS LIMITS
- EXISTING CONTOUR
- HIGHWATER LINE
- TP20(N) TP20(S) TEST PIT LOCATION
- SS-03 SURFACE SAMPLE LOCATION
- MW01 MONITORING WELL LOCATION
- BS-01 BEACH SAMPLE LOCATION

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MELVILLE NORTH LANDFILL

NAVAL EDUCATION TRAINING CENTER
PORTSMOUTH, RHODE ISLAND

WETLAND DELINEATION MAP

FOSTER WHEELER ENVIRONMENTAL CORPORATION
LIVINGSTON, NEW JERSEY

DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
CE	MWJ	J.R.	C.T.		

SCALE:	DRAWING NUMBER:	SH.	OF	REV
1"=60'-0"	FIGURE 3	3	6	0

REV	REVISION DESCRIPTION	PREPARED	CHECKED	APPROVED	DATE
0	ISSUED FOR NAVY REVIEW				

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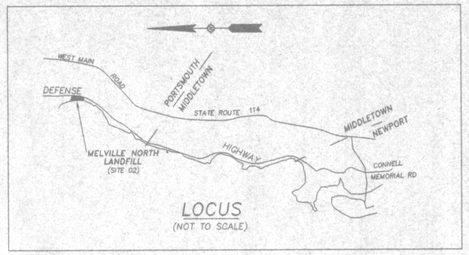
PLOT SCALE: 1=60 TIME: 3:12 PM

FWD1R12.DWG

RHODE ISLAND GRID



DEFENSE HIGHWAY

STATE OF RHODE ISLAND

DEPARTMENT OF TRANSPORTATION

NARRAGANSETT BAY

RIGHT OF WAY LINE

EXISTING RAILROAD

20' GRADED ACCESS ROAD

EXISTING GRAVEL ACCESS ROAD

DIVERSION DITCH NO.1

DIVERSON DITCH

DIVERSION DITCH NO.2

BERM

AREA 1 EXCAVATION

AREA 2 EXCAVATION

AREA 3 EXCAVATION

PROPOSED TEMPORARY OUTFALL A

TEMPORARY GRADED ACCESS

SOIL STAGING AREA LINED WITH 40 mil HDPE

DRAIN LINE

HIGH WATER LINE

PROPOSED TEMPORARY OUTFALL B

N 181200 E 559400

N 180000 E 559400

N 181200 E 558600

N 180000 E 558600

LEGEND:

- TEST PIT LOCATION
- SURFACE SAMPLE LOCATION
- MONITORING WELL LOCATION
- BEACH SAMPLE LOCATION
- DIVERSION DITCH (DETAIL 1, FIG.6)
- WETLANDS LIMITS
- CONST. ROAD
- EXISTING GRADE

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MELVILLE NORTH LANDFILL

NAVAL EDUCATION TRAINING CENTER
PORTSMOUTH, RHODE ISLAND

PROPOSED LIMITS OF EXCAVATION AND CONTAMINATED SOIL STAGING

FOSTER WHEELER ENVIRONMENTAL CORPORATION
LIVINGSTON, NEW JERSEY

DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
CE	MWJ	J.R.	C.T.		

REV	REVISION DESCRIPTION	PREPARED	CHECKED	APPROVED	DATE
0	ISSUED FOR NAVY REVIEW				

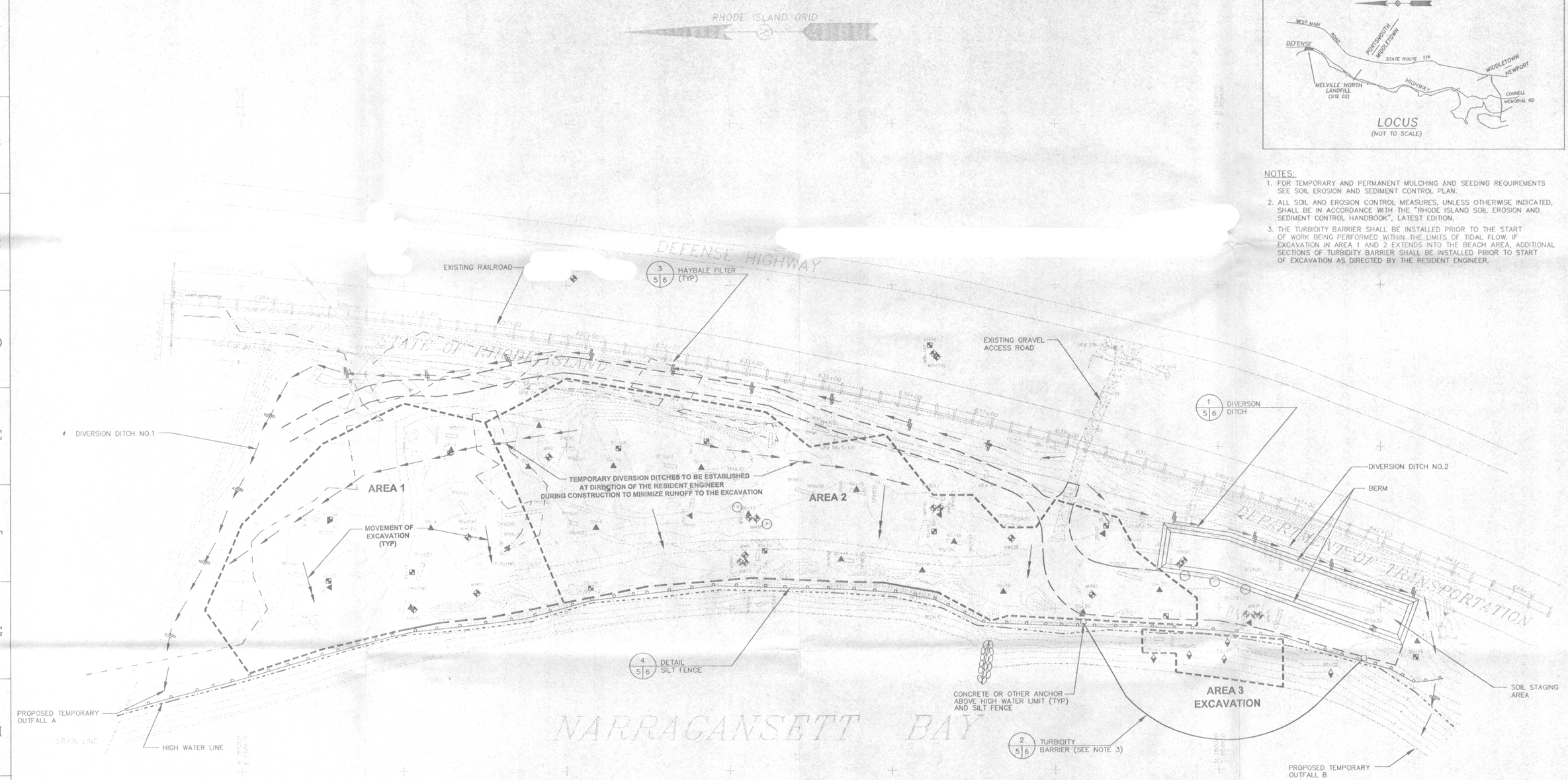
SCALE: 1"=60'-0"

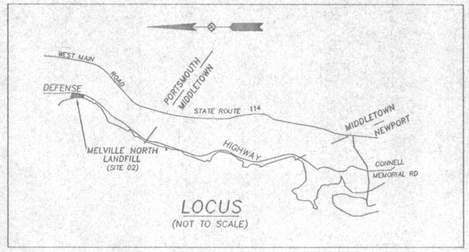
DRAWING NUMBER: FIGURE 4

SH. 4 OF 6 REV 0

CAD FILE NAME: ME1699.DWG PLOT SCALE: 1=60 DATE: 01/13/99 TIME: 4:10 PM

FWD1R12.DWG





NOTES:

1. FOR TEMPORARY AND PERMANENT MULCHING AND SEEDING REQUIREMENTS SEE SOIL EROSION AND SEDIMENT CONTROL PLAN.
2. ALL SOIL AND EROSION CONTROL MEASURES, UNLESS OTHERWISE INDICATED, SHALL BE IN ACCORDANCE WITH THE "RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK", LATEST EDITION.
3. THE TURBIDITY BARRIER SHALL BE INSTALLED PRIOR TO THE START OF WORK BEING PERFORMED WITHIN THE LIMITS OF TIDAL FLOW. IF EXCAVATION IN AREA 1 AND 2 EXTENDS INTO THE BEACH AREA, ADDITIONAL SECTIONS OF TURBIDITY BARRIER SHALL BE INSTALLED PRIOR TO START OF EXCAVATION AS DIRECTED BY THE RESIDENT ENGINEER.

LEGEND:

- TP200(N) TP20(S) TEST PIT LOCATION
- SS-03 SURFACE SAMPLE LOCATION
- MW01 MONITORING WELL LOCATION
- BS-01 BEACH SAMPLE LOCATION
- DIVERSION DITCH
- WETLANDS LIMITS
- CONST. ROAD
- 5 EXISTING GRADE
- HIGH WATER LINE
- SILT FENCE
- HAY BALE FILTER

REV	REVISION DESCRIPTION	PREPARED	CHECKED	APPROVED	DATE
1	REVISED TURBIDITY BARRIER ANCHOR	J.R.	M.W.J.		3/1/99
0	ISSUED FOR NAVY REVIEW	J.R.	M.W.J.	C.T.	1/15/99

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PORTSMOUTH, RHODE ISLAND

SEDIMENTATION AND SOIL EROSION CONTROL PLAN

FOSTER WHEELER ENVIRONMENTAL CORPORATION
LIVINGSTON, NEW JERSEY

DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
CE	MWJ	J.R.	C.T.		1/15/99

SCALE:	DRAWING NUMBER:	SH.	OF	REV
1"=60'-0"	FIGURE 5	5	6	1

CAD FILE NAME: ME1799.DWG DATE: 03/1/99
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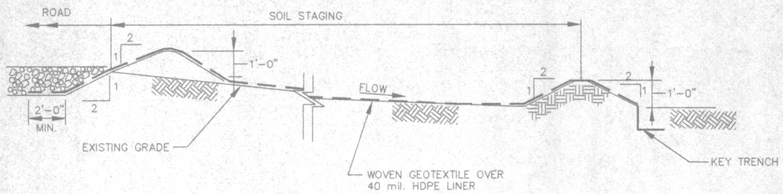
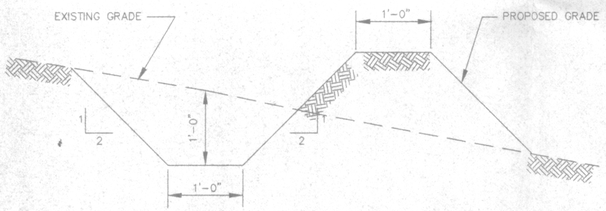
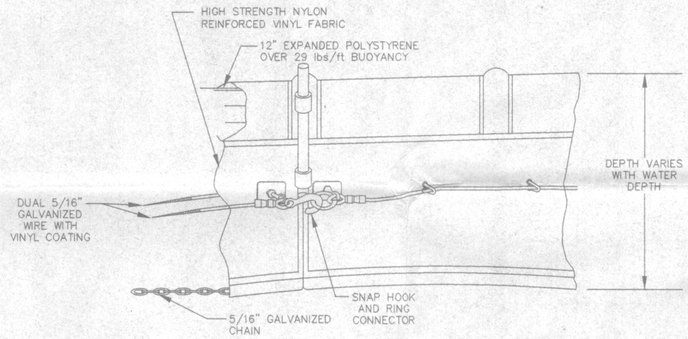
FWD1R12.DWG



SECTION A
SOIL STAGING AREA 4 | 6
NOT TO SCALE



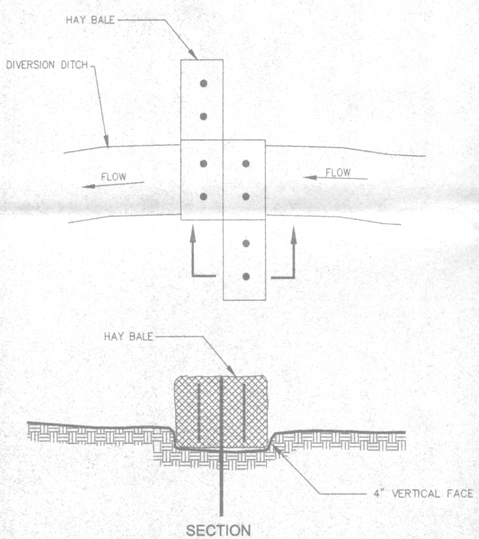
TEMPORARY DIVERSION DITCH 1 | 5 | 6
NOT TO SCALE



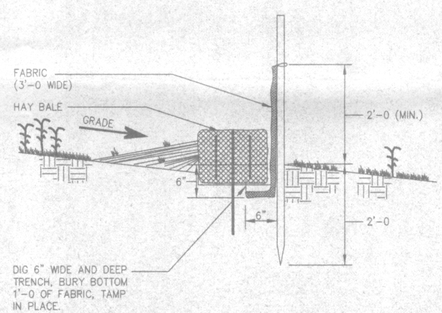
DETAIL 2
TURBIDITY BARRIER 5 | 6
NOT TO SCALE

NOTES:

1. SHALL BE INSTALLED IN 100' LENGTHS.
2. SHALL BE CONSTRUCTED OF HIGH VISIBILITY YELLOW MATERIAL
3. BARRIER SHALL BE SIZED TO EXTEND TO THE HARBOR FLOOR AT HIGH TIDE.



HAY BALE FILTER 3 | 5 | 6
NOT TO SCALE



DETAIL 4
SILT FENCE WITH HAY BALE 5 | 6
NOT TO SCALE

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MELVILLE NORTH LANDFILL

NAVAL EDUCATION TRAINING CENTER
PORTSMOUTH, RHODE ISLAND

DETAILS AND SECTIONS

FOSTER WHEELER ENVIRONMENTAL CORPORATION
LIVINGSTON, NEW JERSEY

DEPT	DESIGNED	PREPARED	CHECKED	APPROVED	DATE
CE	MWJ	J.R.	C.T.		

SCALE:	DRAWING NUMBER:	SH.	OF	REV.
NONE	FIGURE 6	6	6	0

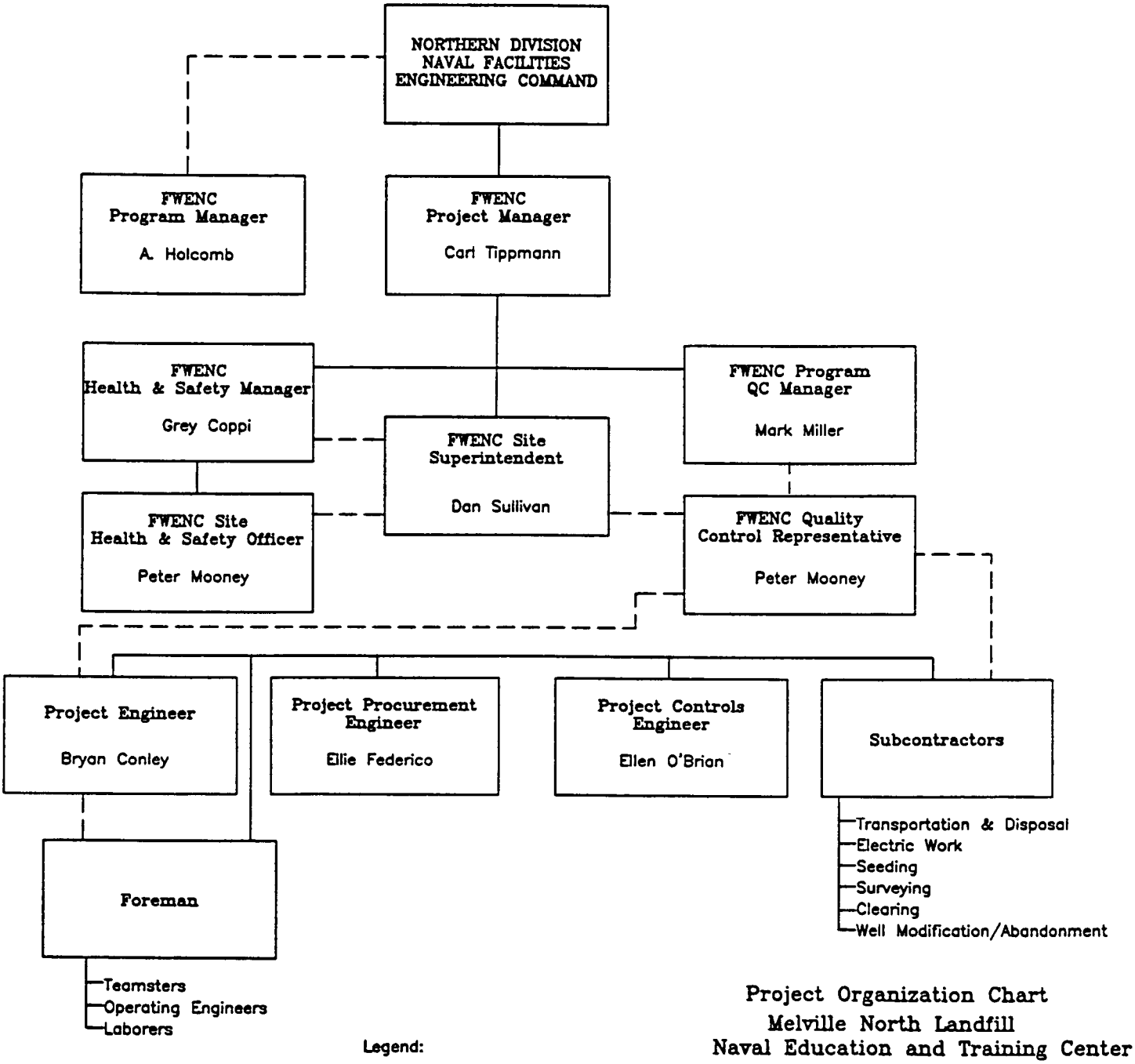
CAD FILE NAME: ME1699A.DWG DATE: 01/13/99
PLOT SCALE: 1=1 TIME: 3:17 PM

FWD1R12.DWG

ATTACHMENT 2

PROJECT ORGANIZATION CHART

Attachment 2



Legend:

——— Reports to

– – – – Interfaces with

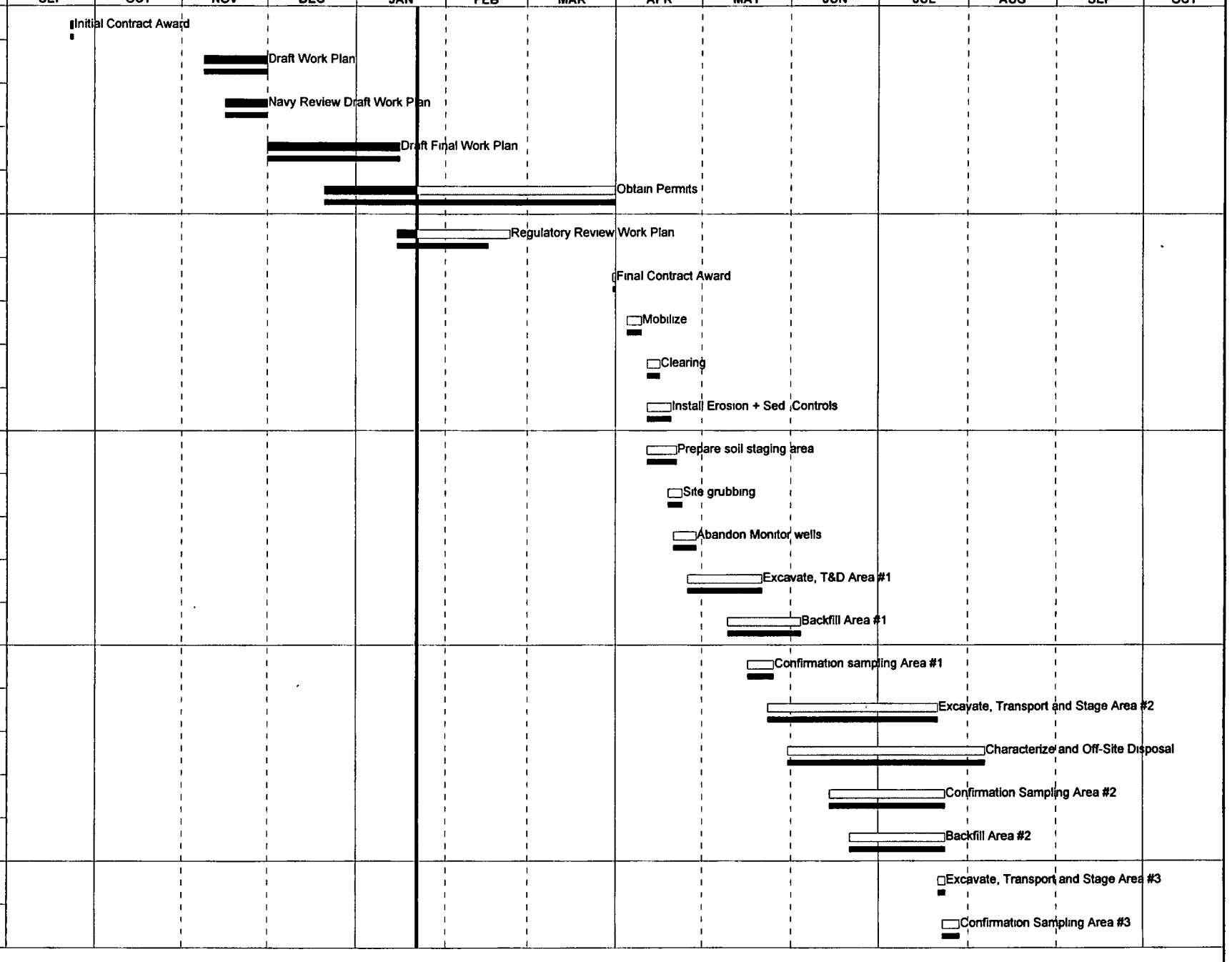
Project Organization Chart
Melville North Landfill
Naval Education and Training Center
Newport, Rhode Island

prepared for
Naval Facilities Engineering Command
Lester, Pennsylvania

ATTACHMENT 3

CONSTRUCTION SCHEDULE

Early Start	Early Finish	% Comp	
23SEP98A	23SEP98A	100	Initial Contract Award
09NOV98A	30NOV98A	100	Draft Work Plan
16NOV98A	30NOV98A	100	Navy Review Draft Work Plan
01DEC98A	15JAN99A	100	Draft Final Work Plan
21DEC98A	31MAR99	33	Obtain Permits
15JAN99A	22FEB99	0	Regulatory Review Work Plan
31MAR99	31MAR99	0	Final Contract Award
05APR99	09APR99	0	Mobilize
12APR99	15APR99	0	Clearing
12APR99	19APR99	0	Install Erosion + Sed Controls
12APR99	21APR99	0	Prepare soil staging area
19APR99	23APR99	0	Site grubbing
21APR99	28APR99	0	Abandon Monitor wells
26APR99	21MAY99	0	Excavate, T&D Area #1
10MAY99	03JUN99	0	Backfill Area #1
17MAY99	25MAY99	0	Confirmation sampling Area #1
24MAY99	21JUL99	0	Excavate, Transport and Stage Area #2
31MAY99	06AUG99	0	Characterize and Off-Site Disposal
14JUN99	23JUL99	0	Confirmation Sampling Area #2
21JUN99	23JUL99	0	Backfill Area #2
22JUL99	23JUL99	0	Excavate, Transport and Stage Area #3
23JUL99	28JUL99	0	Confirmation Sampling Area #3



Project Start	23SEP98
Project Finish	15OCT99
Data Date	22JAN99
Run Date	01FEB99

Early Bar
TARGET
Progress Bar
Critical Activity

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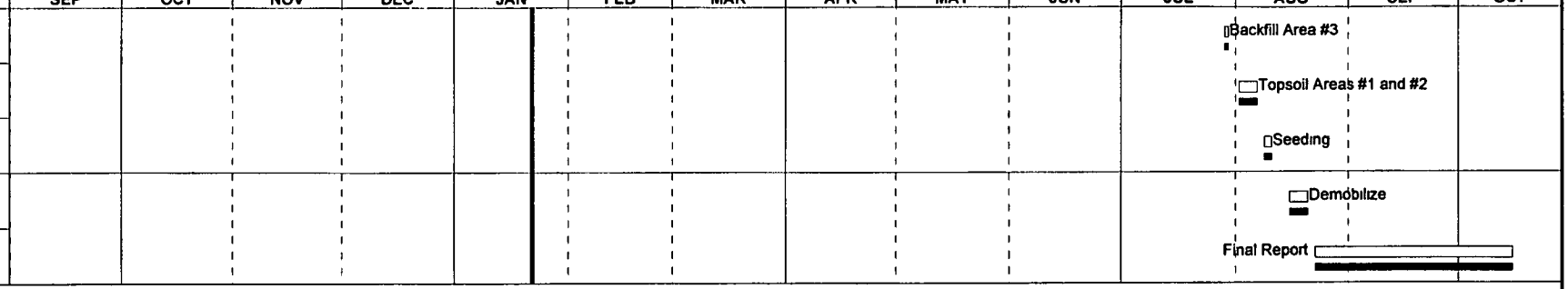
MELV

Sheet 1 of 2

MELVILLE NORTH LANDFILL

D.O. 11

Early Start	Early Finish	% Comp
29JUL99	29JUL99	0
02AUG99	06AUG99	0
09AUG99	10AUG99	0
16AUG99	20AUG99	0
23AUG99	15OCT99	0



Project Start	23SEP98
Project Finish	15OCT99
Data Date	22JAN99
Run Date	01FEB99

Early Bar
TARGET
Progress Bar
Critical Activity

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MELV

Sheet 2 of 2

MELVILLE NORTH LANDFILL

D.O. 11

ATTACHMENT 4

SUBMITTAL REGISTER

PRECONSTRUCTION SUBMITTAL REGISTER

Contract Number: N62472-94-D-0398 D.O. # 0011

Project Title: Melville North Landfill , NETC Newport

LOCATION Portsmouth, RI

CONTRACTOR Foster Wheeler Environmental Corporation

							CONTRACTOR ACTION			APPROVING AUTHORITY ACTION				CONTR	
RAWP	SD NO & TYPE OF SUBMITTAL-MATL OR PRODUCT	SPEC PARA NO	CLASSIF/ APPR BY CO *	GOVT OR A/E REVR	TRANS CONTL NO	PLANNED SUBMITTAL DATE	ACT CODE	DATE OF ACTION	DATE FWD TO APPR AUTH / DATE RECD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RECD FROM OTHER REVIEWER	ACT CODE	DATE OF ACTION	MAILED TO CONTR / RECD FROM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
Plans	SD-08, Statements														
	Remedial Action Work Plan		"G"	ROICC		1/15/98									FWENC
	Health and Safety Plan		"G"	ROICC		1/15/98									FWENC
	Construction Quality Control Plan		"G"	ROICC		1/15/98									FWENC
Surveying	SD-04, Drawings														
	Preconstruction Survey					4/28/99									
	Final Grade As Built					8/20/99									
Erosion Controls	SD-02, Manufacturers Catalog Data														
	Silt Fence					3/31/99									
	Turbidity Curtain					5/31/99									
Staging Area	SD-02, Manufacturers Catalog Data														
	40 mil Liner					3/31/99									
	SD-08, Statements														
	Manufacturers Qualifications					3/31/99									
	Surface Preparation					As Installed									
	SD-09, Reports														
	Manufacturers QC Tests					3/31/99									
	SD-13, Certificates														
	Geomembrane					3/31/99									

* Navy Notes:
Approved by
G Contracting Officer
Blank CQC Manager

* NASA Notes:
Approved by
Blank Contracting Officer

*Army Notes
Classification
GA Gov't Approval
FIO For Infor ONLY

ACTION CODES NR Not Reviewed AN Approved as Noted A: Approved
RR Disapproved, Revise and Resubmit (Others may be prescribed by the Transmittal Form

PRECONSTRUCTION SUBMITTAL REGISTER

Contract Number: N62472-94-D-0398 D.O. # 0011

Project Title: Melville North Landfill , NETC Newport

LOCATION: Portsmouth, RI

CONTRACTOR Foster Wheeler Environmental Corporation

							CONTRACTOR ACTION		APPROVING AUTHORITY ACTION				CONTR		
RAWP	SD NO & TYPE OF SUBMITTAL-MATL OR PRODUCT	SPEC PARA NO	CLASSIF/ APPR BY CO *	GOVT OR A/E REVR	TRANS CONTL NO	PLANNED SUBMITTAL DATE	ACT CODE	DATE OF ACTION	DATE FWD TO APPR AUTH / DATE RECD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RECD FROM OTHER REVIEWER	ACT CODE	DATE OF ACTION	MAILED TO CONTR / RECD FROM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
Monitoring Wells	SD-02, Manufacturers Catalog Data														
	Grout					4/10/99									
	SD-09, Reports														
	Well Completion Reports					As Installed									RIDEM
Excavation	SD-09, Reports														
	Field Screening					As Excavated									FID for TPH
	Laboratory Confirmation					As Excavated									FID + 5 days
Backfill	SD-09, Reports														
	TCLP Analytical					5/5/99									Borrow Source
	Moisture Density Tests					5/5/99									Proctors
	Field Density Tests					As Installed									
Disposal	SD-08, Statements														
	Disposal Facility Qualifications					4/12/99									
	Transport Contractor Qualifications					4/12/99									US DOT
	SD-09, Reports														
	Shipping Manifests					As Shipped									
	Return Manifests					As Received									
Restoration	SD-02, Manufacturers Catalog Data														
	Seed Composition					8/1/99									
	SD-09, Reports														
	Topsoil Composition					8/1/99									

ACTION CODES NR Not Reviewed AN Approved as Noted A Approved
RR Disapproved, Revise and Resubmit (Others may be prescribed by the Transmittal Form

* Navy Notes
Approved by
G. Contracting Officer
Blank CQC Manager

* NASA Notes
Approved by
Blank Contracting Officer

*Army Notes
Classification
GA Gov't Approval
FIO. For Infor ONLY

ATTACHMENT 5

RHODE ISLAND FINAL REGULATIONS

APPENDIX 1

SECTION 13

13.0 Monitoring Well and Piezometer Abandonment:

13.1 General:

(a): All monitoring wells and applicable piezometers as described in Rule 1.0 of this Appendix that are no longer used to gather information on geologic or groundwater properties shall be abandoned pursuant to the provisions of Rule 13.2 of this Appendix. Well abandonment shall take place within 60 days after its use has been terminated, unless a written exemption is received from the Director for continued use.

(b) Innovative wells: Innovative wells as described in Rule 12.0 of this Appendix shall be abandoned at the end of use in order to remove the conduit to groundwater. Abandonment of innovative wells shall consist of removal of the well and grouting of the borehole. Innovative wells are exempted from the abandonment procedures described in Rule 13.2 of this Appendix.

13.2 Abandonment Procedures: The well shall be inspected from the land surface through the entire depth of the well before it is sealed to ensure against the presence of any obstructions that will interfere with sealing operations.

(a) Wells constructed with an impermeable annular seal shall be abandoned by cutting off the casing a minimum of 4 feet below land surface. The remaining casing shall be completely filled with a neat cement grout or bentonite-cement grout. The remaining hole volume shall be backfilled with natural material, with the following exception: where backfilling with natural material would result in a grout plug less than 4 feet long, the hole shall be filled to approximately one foot from the ground surface with the neat cement grout or bentonite-cement grout.

(b) Wells not known to be constructed with an impermeable annular seal shall be abandoned by completely removing the well casing and sealing with neat cement or bentonite-cement grout to approximately one foot from the ground surface. If the casing cannot be removed during the abandonment of a well, the casing shall be thoroughly ripped or perforated from top to bottom. except that perforations will not be required over intervals of the well that are sealed with cement. The screened portion of the well and the annular space between the casing and the drillhole wall shall be effectively and completely filled with cement or bentonite-cement grout applied under pressure.

CROSS-SECTION OF TYPICAL MONITORING WELL

After US EPA, 1986, RCRA Groundwater Monitoring Technical Enforcement Guidance Document

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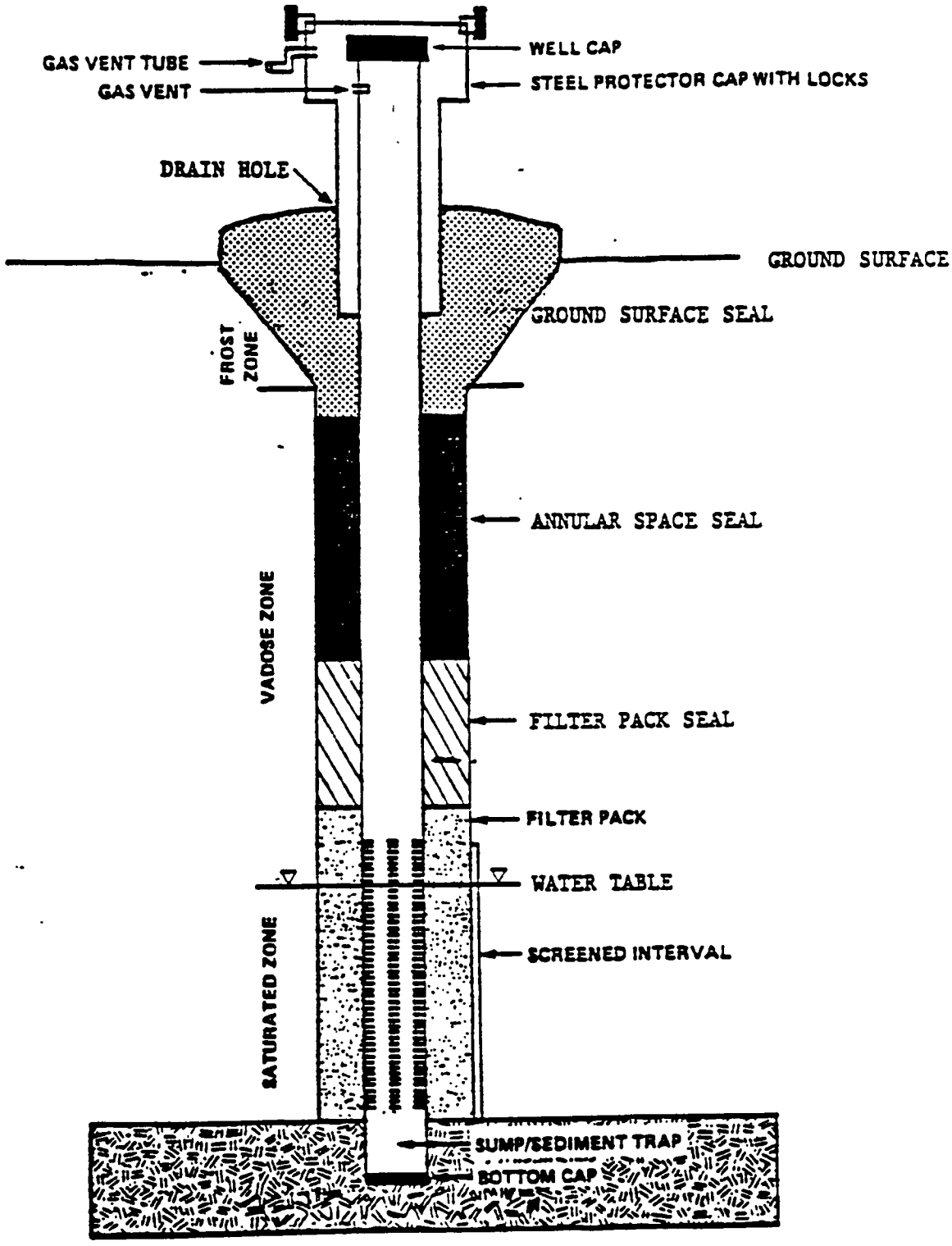

CROSS-SECTION OF TYPICAL MONITORING WELL

After US EPA, 1986, RCRA Groundwater Monitoring Technical Enforcement Guidance D cument

ATTACHMENT 6

STORM WATER POLLUTION PREVENTION &

SOIL EROSION AND SEDIMENT CONTROL PLAN

US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
DELIVERY ORDER NO. 0011
FOSTER WHEELER ENVIRONMENTAL CORPORATION

STORM WATER POLLUTION PREVENTION PLAN AND SOIL EROSION AND SEDIMENT CONTROL PLAN

FOR

LANDFILL EXCAVATION
AT THE
MELVILLE NORTH LANDFILL

PORTSMOUTH, RHODE ISLAND

Prepared for

U.S. Navy Northern Division

FEBRUARY 1999

Revision	Date	Prepared By	Approved By	Pages Affected
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TABLE OF CONTENTS

SECTION		PAGE NO.
1.0	**INTRODUCTION**	**1**
2.0	**PROJECT DESCRIPTION**	**1**
2.1	SITE HISTORY	1
2.2	EXISTING CONDITIONS	1
2.3	SOIL INFORMATION	2
2.4	EXISTING SITE DRAINAGE	2
3.0	**CONSTRUCTION ACTIVITIES**	**2**
4.0	**TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES**	**3**
4.1	DIVERSION DITCHES	3
4.2	SILT FENCE	4
4.3	HAY BALE CHECK DAMS	4
4.4	TEMPORARY SEEDING AND MULCHING	4
4.5	CONSTRUCTION ENTRANCE STABILIZATION	4
4.6	TURBIDITY BARRIER	5
4.7	DUST CONTROL	5
5.0	**PERMANENT EROSION AND SEDIMENT CONTROL**	**5**
6.0	**INSPECTION AND MAINTENANCE**	**5**
7.0	**PLAN MODIFICATION AND RECORD KEEPING**	**6**
8.0	**SPILL CONTROL AND RESPONSE**	**6**
9.0	**WASTE DISPOSAL**	**7**

APPENDICES

A **Figures**
B **Inspection Form for Erosion Control Structures**
C **Calculations**
D **Reference Drawings**
E **Construction Schedule**
F **Permit Applications**

1.0 INTRODUCTION

Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) respectfully submits this Storm Water Pollution Prevention Plan (SWPPP) and Soil Erosion and Sediment Control Plan (SESCP) to the Department of the Navy in response to the Delivery Order entitled "Melville North Landfill Waste Removal and Disposal" located at the Melville NETC Newport, Portsmouth, Rhode Island. The purpose of the report is to describe the methodology to minimize sediment runoff in storm water discharge from the subject site during construction activities. All sediment and erosion control measures are described herein. The activities described in this plan will be conducted as part of the tasks required by the Department of the Navy under Contract No. N62472-94-D-0398.

2.0 PROJECT DESCRIPTION

2.1 SITE HISTORY

The site is approximately 10 acres in size and was used as a landfill from World War II until 1955. The site was excessed to the State of Rhode Island in September 1983, and was sold to Melville Marine Industries six months later. Since ownership of the site was transferred to the State of Rhode Island prior to NETC being placed on the National Priorities List (NPL) in November 1989, remediation activities at the landfill will be performed in accordance with the Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations).

2.2 EXISTING CONDITIONS

NETC is located in the City of Newport, and Towns of Middletown and Portsmouth, Rhode Island on the western shore of Aquidneck Island facing the east passage of Narragansett Bay (see Figure 1, Appendix A). The Melville North Landfill site is located in the northwest portion of NETC on the shoreline of Narragansett Bay in the Town of Portsmouth. Access to the Melville North Landfill site is from Defense Highway. The site is bound to the west by Narragansett Bay, to the east by the Penn Central railroad tracks and Defense Highway, to the north by vegetated wetlands, and to the south by a wooded upland area.

As presented on attached drawing SE-1, the site topography is relatively flat with elevation drops between 5 and 10 feet along the shoreline and an increase in elevation between 5 and 10 feet along Defense Highway. Presently upland area of the site is completely vegetated with grass, low-lying shrubbery and occasional small caliper trees. The water front area consists of a natural sand and gravel beach typical with the local shoreline. Areas of wetlands are present at the north end of the site as presented on the drawing SE-1. The proposed soil excavation will result in the disturbance of wetlands. Required wetland

disturbance permits will be obtained from RIDEM and The U. S. Army Corps prior to the start of construction. Details for disturbance and restoration of wetlands will not be addressed in this report, although will be addressed in the above mentioned submissions.

2.3 SOIL INFORMATION

The site soil generally consists three distinct unconsolidated geological units overlying bedrock. The units, in ascending order include. 1). deposited fill consisting of debris and soil cover; 2). stratified drift , and 3). glacial till. Bedrock is a fine grained metamorphic rock described as foliated graphitic rock including slate, phyllite and schist.

The average thickness of deposited fill material is approximately 4 feet with a maximum thickness of 8 feet. The stratified drift material consists mainly of stratified sand with varying amounts of silt and gravel. Peat is also intermittently through the site at the north and central portions of the landfill

2.4 EXISTING SITE DRAINAGE

Drawing SE-1 presents the existing site topography and flow patterns at the Site. The site consists of five drainage areas encompassing from the centerline of the rail line on the east, west to the waterfront. Runoff collected at the east side of the railroad tracks from up-gradient drainage areas are presently conveyed to the east and west beyond the site to culverts under rail and then ultimately to the waterfront.

3.0 CONSTRUCTION ACTIVITIES

The proposed remedy at the Melville North Landfill includes excavating approximately 40,000 cubic yards (cy) of contaminated soil, stockpiling the soil for characterization, and treating/disposing the soil at an approved off-site facility. The excavation will be performed in three phases, Area 1, Area 2 and Area 3 as presented in attached Drawing SE-2. Areas 1 and 2 are upland areas beyond the high water line. Excavation of these areas will be performed to remove all contaminated soil exceeding established clean-up criteria. The extent of the excavation has been estimated based on soil sampling data collected during previous site investigations. Post excavation sampling will be performed to verify the complete removal of contaminated material It is anticipated that only a small portion of excavation will extend below the groundwater table and that dewatering will not be required.

Excavated soils will be transported to a temporary staging/stockpiling area that the south end of the site as shown on Drawing SE-2. The staging area will be constructed of a using a continuous perimeter earth berm being a minimum of one foot height. The area will be covered with 40 mil seamed HDPE lined keyed into the outer edge of the earth berm. Typical sections and details of the proposed earth berms are

presented on attached Drawing SE-3. Rain water will be collected with in the staging area will be removed via vacuum tanker truck at transported to appropriate disposal location.

Segregated piles from each excavation will then be characterized by laboratory sampling to determine disposal requirements. Stock piles will also be covered using tarps to prevent mixing with rainwater.

The contaminated soil staging area will be graded to prevent run-on and runoff of storm water. A temporary diversion ditch will be installed along the eastern berm to intercept runoff from up-gradient and convey it to the waterfront.

At the completion of construction, the site will be restored to the pre-construction grades and revegetated with grass. The proposed condition shall have the storm water runoff characteristics as the original site and therefore no storm water management features are proposed

4.0 TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

Soil erosion and sediment control on this project will be conducted in accordance with the Rhode Island Sediment and Erosion Control Handbook (RISESCH), latest edition. The guidelines will be followed through the use of silt fence, hay bales, seeding and mulching, and other means. Temporary soil erosion and sedimentation controls to be utilized as presented on Drawing SE-2.

4.1 DIVERSION DITCHES

During construction activities, temporary diversion ditches will be constructed up-gradient of the excavation to intercept storm water runoff and convey it to the waterfront. Two diversion ditches, Ditch 1 and 2, presented on Drawing SE-2, will intercept runoff from the east. Calculations for these diversion ditches are included in Attachment C.

Diversion ditches required for management of storm water runoff within the area of disturbance will be determined by Foster Wheeler's Resident Engineer during construction. The progression of construction will be dependent on the nature of encountered material and results of chemical characterization. Excavation will be performed starting in Area 1 and 3 and then move to Area 3. Excavation in Areas 1 and 2 will be performed from east to west. Clean fill will be backfilled behind the excavation to minimize the extent of the open excavation where ever practical. Temporary diversion ditches and silt fence will be installed along the area of excavation at the direction of the Resident Engineer in accordance with the RISESCH to satisfy the following criteria:

- minimize runoff to the excavation;
- segregate runoff from excavation area and backfilled areas;
- prevent the migration of sediment from excavation and backfill areas.

Excavation of Area 3, which located on the beach below the high water level, will only be performed during low tide. Excavation in this area is estimated to be approximately 500 cubic yards.

4.2 SILT FENCE

Silt fence will be utilized as a temporary sedimentation control device during construction. Silt fence will be installed using a hay bale filter to intercept sheet flow from the site and will be located as shown on Drawing SE-2, Appendix D. Material and construction shall be in accordance with the RISESCH.

4.3 HAY BALE CHECK DAMS

Hay Bale check dams will be utilized within the temporary diversion ditches during the course of construction. Hay bale check dams will be constructed in accordance with the RISESCH. Hay bale check dams will be placed at 100-foot intervals within the swale, but in no case shall they be spaced so that the toe of the upstream dam is higher than the top of the downstream dam. Hay bale check dams will be temporary and will be inspected and maintained during routine erosion and sediment control inspections. Hay bales will be toed to a depth of 3 to 4 inches and all weeds/weed seeds will be removed from the hay bales so that the native grasses and wetland vegetation will establish itself, or other measures will be taken. If erosion of the 3H:1V or steeper side slopes becomes a problem during construction, earth dikes may be constructed at the top of the slope to control run-off.

4.4 TEMPORARY SEEDING AND MULCHING

Temporary seeding and mulching will be used to stabilize disturbed areas where construction activity has been temporarily or permanently ceased for a period greater than 14 days, unless the construction activity in the area will resume within 21 days All temporary seeding and mulching shall be performed in accordance with "Temporary Vegetative Cover", Chapter 4, Section A and "Temporary Mulching" Chapter 5, Section A of the Rhode Island Soil Erosion and Sediment Control Handbook, latest edition.

4.5 CONSTRUCTION ENTRANCE STABILIZATION

The existing gravel access road shall be improved to provide a 6-inch thick (minimum), crushed stone platform extending 100 feet at the site exit(s) to remove soil from the tires of construction traffic before exiting onto Defense Highway. The crushed stone platform will be underlain by a non-woven geotextile for stabilization, if required as determined by the Resident Engineer. Materials and construction shall be in accordance with the RISESCH. Defense Highway will be swept or scraped, as necessary, to remove any excess dirt, mud, or rock tracked from the construction site.

4.6 TURBIDITY BARRIER

During excavation of the beach area (Area 3), a heavy duty floating turbidity barrier will be placed adjacent to the waterfront encompassing the area below the high water tide limit. The barrier will limit siltation of the waterfront during construction activities. The turbidity barrier shall be high visibility yellow and will extend the full depth of water at high tide. See Detail 2 on Drawing SE-3, Appendix D.

4.7 DUST CONTROL

Dust control will be maintained on site throughout the duration of the construction activities. Many of the temporary erosion control measures will aid in dust suppression, such as temporary grassing, mulching, and the construction entrance stabilization. Water spraying will be used to reduce the generation of dust during construction, and is expected to generate little, if any, run-off from the site The frequency of water spraying will be dependent upon the weather conditions at the site

5.0 PERMANENT EROSION AND SEDIMENT CONTROL

Permanent mulching and seeding of grass will be used over the final graded surface to reduce sediment runoff and increase infiltration. Seeding will commence within 14 days following cessation of construction. All permanent planting and seeding shall be performed in accordance with "Permanent Vegetative Cover Requirements", Chapter 4, Section B and "Permanent Mulching", Chapter Five, Section B of the Rhode Island Soil Erosion and Sediment Control Handbook, latest edition Mulch will be applied around plantings and on all seeded areas. Mulch will be applied to the seeded swales and other areas, as necessary.

6.0 INSPECTION AND MAINTENANCE

Maintenance of the temporary erosion and sediment controls during the course of the construction work will be performed by Foster Wheeler Environmental. A copy of the SWPP/SESCP will be kept on site at all times for the duration of construction activities. Routine inspections will be performed to assure that erosion and sediment control measures are effective (see attached form, Appendix B). Section 212 of the Rhode Island Department of Transportation Specifications will be used as a guideline during the routine inspections. All controls will be inspected on a weekly basis and within 24 hours after any storm event that generates at least 0.25 inches of rainfall in a 24-hour period. The inspections will include checking the silt fence for structural integrity, siltation, and undermining; checking rock check dams for silt accumulation and for proper spacing between check dams; and inspecting the diversion ditches for structural integrity and soil erosion. Significant releases of sediment to off site receiving waters will be reported to RIDEM. The reporting requirements for and the definition of a significant release of sediment

will be worked out, and agreed to, by RIDEM. All measures taken to clean up the discharge and steps taken to prevent future releases will also be reported to RIDEM.

Sediment will be removed from erosion and sediment control structures when it has accumulated to a point where the control structures would be ineffective during the next storm event. Sediment removed from the temporary controls will be collected and stockpiled for placement in the landfill subgrade. Sediment temporarily stockpiled on site will be placed in such areas and in such a manner as to minimize wash-off of sediments back into the site drainage system. Silt fence, and hay bales may be used in minimizing wash-off. Before covering the last of the subgrade, sediment deposits will be removed from erosion control features and placed in the landfill subgrade.

Areas of the site that have been permanently seeded will be inspected regularly after seed germination to ensure complete coverage of exposed areas. Temporary erosion and sediment controls will be removed once the disturbed areas have been stabilized.

7.0 PLAN MODIFICATION AND RECORD KEEPING

Should routine inspection indicate that this plan requires modification to prevent discharge of pollutants from the site, the plan modification and implementation of modified controls will be done within 7 days of the inspection that identified the deficiency.

Records relating to the implementation of the Soil Erosion and Sediment Control Plan will be maintained for 2 years following final stabilization of the site.

8.0 SPILL CONTROL AND RESPONSE

Possible spills include diesel fuel and hydraulic fluid from trucks and heavy equipment operating on site. These and other small hazardous spills/environmental releases will be contained as close to the source as possible. An exclusion zone around the spill area will be established. The material safety data sheets will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents will be placed directly on the substance to contain the spill and aid recovery. Any acid spills will be neutralized prior to attempting recovery. Berms of earthen or sorbent materials will be used to contain the leading edge of the spills. Drainage ways will be blocked to prevent spilled material from leaving the site and entering the waterfront. Spill containment materials and recovered spilled material will be properly disposed. The following will be the responsibility of the Emergency Coordinator:

- Determine the nature of major spill components.

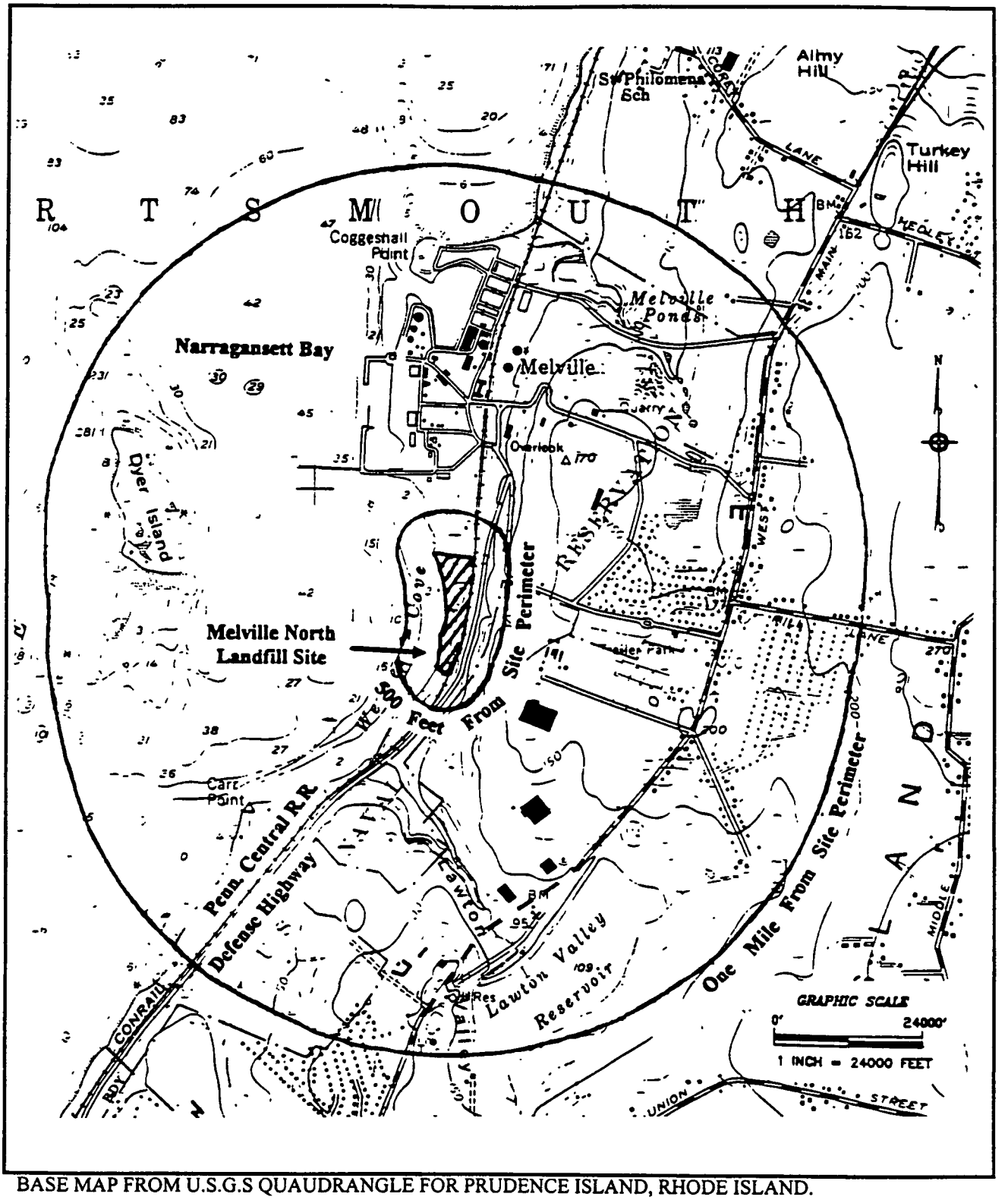
- Make sure all unnec ssary persons are removed from the spill area.
- Notify appropriate response teams and authorities.
- Prescribe PPE in accordance with the Site-Specific Health and Safety Plan.
- If a flammable liquid, gas, or vapor is involved, remove all ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, pumps, etc.)
- Try to stop the leak with appropriate material.
- Remove all surrounding materials that can react or compound with the spill.

9.0 WASTE DISPOSAL

Waste material of all types will be disposed of in a manner consistent with federal, state, and local laws and/or regulations.

APPENDIX A

FIGURES



BASE MAP FROM U.S.G.S QUAUDRANGLE FOR PRUDENCE ISLAND, RHODE ISLAND.

SITE LOCATION MAP

MELVILLE NORTH LANDFILL, PORTSMOUTH, RHODE ISLAND

FIGURE 1

APPENDIX B

INSPECTION FORM FOR EROSION CONTROL STRUCTURES

INSPECTION FORM FOR EROSION CONTROL STRUCTURES

MELVILLE NORTH LANDFILL REMEDIATION

NETC, NEWPORT, RHODE ISLAND

INSPECTOR _____ DATE: _____

Location of Control	In Place?	Condition	Sediment-Depth	Washed Out or Overtopped?

MAINTENANCE REQUIRED.

_____

_____

_____

_____

_____

_____

TO BE PERFORMED BY:

_____

ON OR BEFORE:

_____

SIGNATURE:

_____

APPENDIX C

CALCULATIONS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY MWJ DATE 1/13/99 SHEET 2 OF ____

CHKD BY ____ DATE ____ OFS NO ____ DEPT NO ____

CLIENT Department of the Navy

PROJECT Melville North Landfill

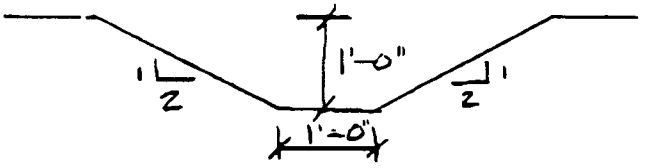
SUBJECT Diversion Ditch Sizing

1 - Check diversion ditch size based on worse case:
two diversion ditches are proposed with the following contributing drainage areas

Diversion Ditch #1	1.4 Ac contrib.
Diversion Ditch #2	0.7 Ac contrib

∴ Ditch #1 worst case

A - Determine Capacity of Estimated Ditch size:



Ditch Considerations:
- Ditch Slope 1%
- Bare earth ditch

- Cross Section Area = A_c = (1 x 1) + (1 x 2) = 3 sf
- Flow using Manning Formula: (Sheet 5 of 10)

$$Q = \frac{1.49}{n} R^{2/3} S^{1/2} A_c$$

R = Hydialic radius = $\frac{A}{WP}$
A = Area (ft^2)
WP = Wetted perimeter (ft)
S = Slope (ft/ft)
n = roughess coef.

n = 0.06 (required for determining capacity - Sheet 6 of 10)

$$Q = \frac{1.49}{0.06} \left(\frac{3}{1+2\sqrt{5}}\right)^{2/3} (0.01)^{1/2} (3)$$

= 4.99 cfs capacity

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY MWJ DATE 1/13/99 SHEET 3 OF

CHKD. BY DATE OFS NO. DEPT NO

CLIENT Department of The Navy

PROJECT Melville North landfill

SUBJECT Diversion Ditch SIZING

B- Determine actual flow from drainage area;

- Drainage Area #1 = A_D = 1.4 Ac (worse case)
- Use Rational Method (sheet 7 of)

$Q = CIA_D$ (sheet of)

A_D = Area of Drainage Area (Ac)
I = Rainfall intensity (in/hr)
C = runoff coefficient

C = 0.15 (sheet 7 of 10)

- Determine time of concentration (t_c)

$$t_c = \frac{\text{Distance}}{\text{Velocity}}$$

- Distance = 1400 ft of channel
- Velocity = 1.0 ft/s (sheet 8 of 10)

$$t_c = \frac{1400\text{ft}}{1.0\text{ ft/s}} = 1400\text{ sec}$$
$$= 23.3\text{ min}$$

- Determine rainfall intensity (I)

(2 year storm, sheet 9 of 10)

$$I = \frac{k}{t_c + b}$$

k = 106
b = 17 } (sheet 10 of 10)
t_c = min

$$I = \frac{106}{23.3+17} = 2.63\text{ in/hr}$$

$$Q = CIA = (0.15)(2.63\text{ in/hr})(1.4\text{ Ac})$$
$$= 0.55\text{ cfs}$$

∴ actual flow is less than design flow, ditch is sufficiently sized.

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY MWJ DATE 1/13/99 SHEET 4 OF ___

CHKD. BY ___ DATE ___ OFS NO. ___ DEPT. NO. ___

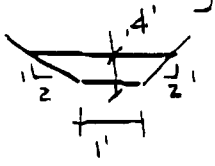
CLIENT Department of The Navy

PROJECT Melville North Landfill

SUBJECT Diversion Ditch Sizing

2 – Check velocity at actual flow

- Determine depth of flow by trial & error
- Try h = 0.4 ft



$A_\Delta = (1 \times .4) + (.4 \times .8)$
$= 0.72$ SF

$$Q = \frac{1.49}{0.06}\left(\frac{0.72}{1+2\sqrt{.4^2+.8^2}}\right)^{2/3}(0.01)^{1/2}(0.72) = 0.73 \text{ cfs}$$

∴ to high

- Try h = 0.35 ft → Q = 0.55 cfs ∴ to low
- estimate between

$$\frac{.73-.55}{.4-.35} = \frac{.73-.68}{.4-d} \qquad d = 0.386 \text{ ft} \qquad A_d = 0.639 \text{ sf}$$

- Mannings Velocity Equation (Sheet 5 of 10)

$$V = \frac{Q}{A} = \frac{1.49}{n}(R)^{2/3}S^{1/2}$$

$n = 0.03$ (for determining velocity, Sheet 6 of 10)

$$= \frac{1.49}{0.03}\left(\frac{0.639}{1+2\sqrt{.386^2+2(.368)^2}}\right)(0.01)^{1/2}$$

$= 1.20$ fps ∴ less than 2 fps, OK

large, then the friction loss will not depend so much on the Reynolds number as on the channel roughness. The *Manning formula* is frequently used to evaluate the constant C. Notice that the value of C depends only on the channel roughness and geometry.[3]

$$C = \frac{1.49}{n}(r_H)^{1/6} \qquad 5.7$$

n is the Manning roughness constant. Combining equations 5.6 and 5.7 produces the *Chezy-Manning equation.*

$$v = \frac{1.49}{n}(r_H)^{2/3}\sqrt{S} \qquad 5.8$$

All of the coefficients and constants in the Chezy-Manning equation may be combined into the *conveyance*, K.

$$Q = vA = \frac{1.49}{n}(A)(r_H)^{2/3}\sqrt{S}$$
$$= K\sqrt{S} \qquad 5.9$$

Example 5.1

A rectangular channel on a 0.002 slope is constructed of finished concrete and is 8 feet wide. What is the uniform flow if water is at a depth of 5 feet?

The hydraulic radius is: $r_H = \frac{(8)(5)}{8+8+5} = 2.22$ ft

From Appendix A, the roughness coefficient for finished concrete is 0.012. The Manning coefficient is

$$C = \frac{1.49}{0.012}(2.22)^{1/3} = 141.8$$

The discharge from equation 5.9 is

$$Q = (141.8)(8)(5)\sqrt{(2.22)(0.002)} = 377.9 \text{ cfs}$$

5 VARIATIONS IN THE MANNING ROUGHNESS CONSTANT, n

For most calculations, n is assumed to be constant. The accuracy of other parameters used in open flow calculations often does not warrant considering the variation of n with depth, and the choice to use varying n values is left to the individual designer.

If it is desired to acknowledge variations in n with respect to depth, it is expedient to make use of tables or graphs of hydraulic elements. Table 5.1 lists such hydraulic elements under the assumption that n varies. (Appendix C can be used for both varying and non-varying n.)

[3] Originally proposed in 1868 by an investigator with the name of Gaukler. In Europe, the Manning equation may be known as *Strickler's equation.*

Table 5.1
Circular Channel Ratios
(n varying with depth)

d/D	Q/Q_{full}	v/v_{full}
0.1	0.02	0.31
0.2	0.07	0.48
0.3	0.14	0.61
0.4	0.26	0.71
0.5	0.41	0.80
0.6	0.56	0.88
0.7	0.72	0.95
0.8	0.87	1.01
0.9	0.99	1.04
0.95	1.02	1.03
1.00	1.00	1.00

Example 5.2

2.5 cfs of water are in uniform flow in a 20″ sewer line ($n = 0.015$, $S = 0.001$). What are the depth and velocity? (Assume n varies with depth.)

If the pipe were to flow full, it would carry Q_{full}.

$$D = 20/12 = 1.667 \text{ ft}$$
$$r_H = \frac{1}{4}D = \frac{1}{4}(1.667) = 0.417 \text{ ft}$$
$$Q_{full} = \frac{1}{4}\pi(1.667)^2\left(\frac{1.49}{0.015}\right)(0.417)^{2/3}\sqrt{0.001}$$
$$= 3.83 \text{ cfs}$$
$$v_{full} = \frac{3.83}{\frac{1}{4}\pi(1.667)^2} = 1.75 \text{ ft/sec}$$

$Q/Q_{full} = 2.5/3.83 = 0.65$. From Appendix C, $(d/D) = 0.66$ and $(v/v_{full}) = 0.92$. So,

$$v = (0.92)(1.75) = 1.61 \text{ ft/sec}$$
$$d = (0.66)(20) = 13.2 \text{ inches}$$

6 NORMAL DEPTH

When the depth of flow is constant along the length of the channel (i.e., depth is neither increasing nor decreasing), the flow is said to be *uniform.* The depth of flow in that case is known as the *normal depth*, d_o. If the normal depth is known or can be calculated, it can be compared with the actual depth of flow to determine if the flow is uniform.[4]

[4] In reality, there are two normal depths for any given discharge. This is apparent from the specific energy curves presented elsewhere in this chapter.

Source: Rhode Island Soil Erosion and Sedimentation Control Handbook.

appropriate vegetative retardance factors listed in Table 6B-5.

Bare Channels The minimum capacity and maximum velocity shall be determined by using Manning's equation with an "n" value of 0.06 for capacity and 0.03 for velocity. Bare channels are recommended only for temporary installations and agriculturals uses

D. Cross Section The shape of the channel cross section shall be such that the diversion can be properly maintained with modern equipment. The channel may be parabolic, vee-shaped or trapezoidal (Figure 6B-1). The side slopes for permanent diversions shall not be steeper than 2:1 and preferably 4:1 for maintenance purposes Where frequent crossings are expected, side slopes should be flatter. The back slope of the ridge is not to be steeper than 2:1 and preferably 4:1. The ridge shall include a settlement factor equal to 5 percent of the height. The minimum top width of the diversion ridge after settlement is to be 4.0 feet at the design water elevation.

In determining the cross section for temporary diversions, give consideration to soil type, frequency of operation and type of equipment that is anticipated to be crossing the diversion. In no case shall slopes be steeper than 1-1/2:1.

The top of the constructed ridge shall not be lower at any point than the design elevation plus the specified overfill for settlement.

Maximum Permissible Velocity (ft./sec.)

SOIL TEXTURE	BARE CHANNEL	CHANNEL VEGETATION CONDITION		
		Poor	*Fair*	*Good*
Sand, silt, loam, sandy loam, loamy sand, loam and muck	2.0	2.0	2.5	3.5
Silty clay loam, sandy clay loam, clay, clay loam, sandy clay, silty clay	2.5	3.0	4.0	5.0

Source: Engineering Field Manual for Conservation Practices, USDA Soil Conservation Service, 1979

Vegetative Retardance Factors

RANGE OF VEGETATION HEIGHT DURING DIFFERENT PERIODS OF THE YEAR	VEGETATIVE RETARDANCE FACTORS *For Determining Minimum Capacity*	*For Determining Maximum Allowable Velocity*
Good Stand		
between 6" and less than 2"	D	E
between 10" and 2"	C	D
between 24" and 2"	B	D
Fair or Poor Stand		
between 10" and less than 2"	D	E
between 24" and 2"	C	D
between 30" and 2"	B	D

Source: Engineering Field Manual for Conservation Practices, USDA Soil Conservation Service, 1979

Sheet 6 of 10

Source: Civil Engineering Reference Manual

many unit hydrographs, each lagging the other by time t, the duration of the storm which produced the unit hydrograph. After a sufficient number of lagging unit hydrographs have been added together, the accumulation will level off and remain constant. At that point, the lagging can be stopped. The resulting accumulation is known as an *S-curve*.

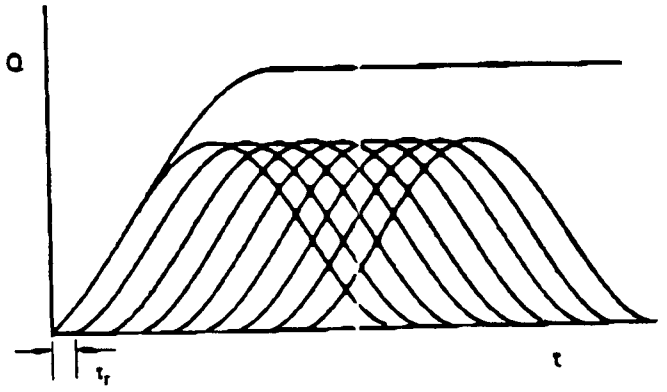


Figure 6.14 Constructing the S-Curve

If two S-curves are drawn, one lagging the other by time t', the area between the two curves represents a hydrograph area for a storm of duration t'_r. The differences between the two curves can be plotted and scaled to a unit hydrograph by multiplying by the ratio of (t_r/t'_r).

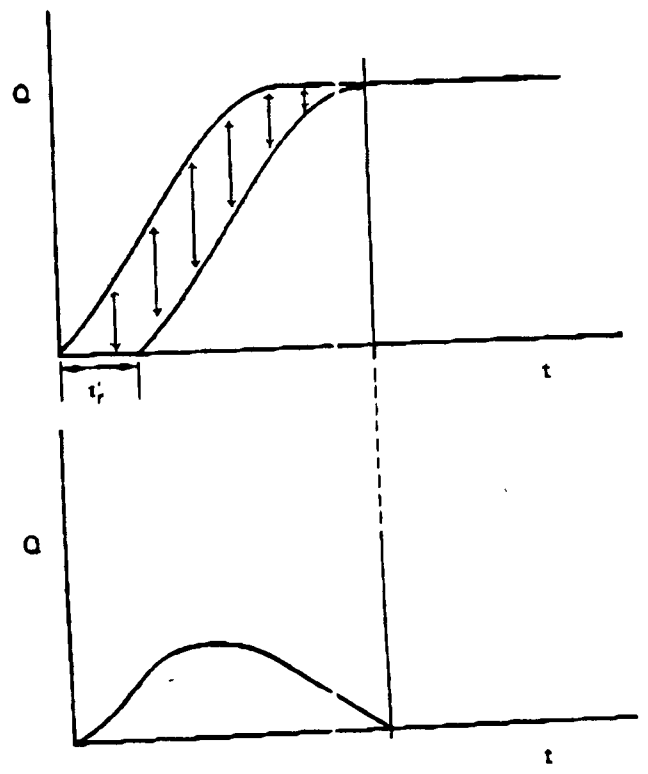


Figure 6.15 Using S-Curves to Construct a t' hydrograph

12 PEAK RUNOFF FROM THE RATIONAL METHOD

Although total runoff data is required for reservoir and dam design, the instantaneous peak runoff is needed to size culverts and storm drains.

In the closed-form equations used to find peak runoff, it is usually assumed that the rainfall is applied to a surface at a constant rate. If this assumption is true and the surface is largely impervious, the runoff will eventually equal the rate of rainfall. The time between the start of rainfall and the time of peak flow is known as the *time of concentration*, t_c. Typical values of t_c for areas less than 50 acres range from 5 to 30 minutes.

The *rational formula* is based on the assumptions given and has been in widespread use for small areas (i.e., less than several hundred acres or so) but is seldom used for areas greater than five square miles. Values of C are found in appendix A.

$$Q_p = CIA_d \qquad 6.29$$

Strictly speaking, Q_p is in acre-inches/hour, but it is typically taken as cubic feet per second since the conversion between these two units is 1.008. For a small drainage area, t_c is taken as the largest combination of overland flow time and channel time. *Channel time* is found by dividing the channel length by the (usually assumed) channel velocity.[6] Assuming laminar flow, the overland flow time for small areas without defined channels can be found from the *Izzard formula*. Equation 6.30 should be used only if the product (IL_o) is less than 500.

$$t = \frac{(41)(b)(L_o)^{1/3}}{(CI)^{2/3}} \qquad 6.30$$

$$b = \frac{0.0007(I) + C_r}{S^{1/3}} \qquad 6.31$$

The retardance coefficient, C_r, is given in table 6.4.

Table 6.4
Retardance Coefficient

Type of Surface	C_r
smooth asphalt	0.007
concrete pavement	0.012
tar & gravel pavement	0.017
closely clipped lawn	0.046
dense bluegrass turf	0.060

[6] If the pipe or channel size is known, the velocity can be found from $Q = Av$. If the pipe size is not known, then A will have to be estimated. In that case, one might as well estimate v instead. 6 fps is a reasonable velocity. The minimum velocity for a self-cleansing pipe is 2 fps.

HYDROLOGY

Sheet 7 of 1

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(21-127)

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Table 21-16 for
ydrologic Determina-

TABLE 21-16 Common Runoff Coefficients

Type of Drainage Area	Runoff Coefficient C
Business:	
Downtown areas	0.70–0.95
Neighborhood areas	0.50–0.70
Residential:	
Single-family areas	0.30–0.50
Multi-units, detached	0.40–0.60
Multi-units, attached	0.60–0.75
Suburban	0.25–0.40
Apartment dwelling areas	0.50–0.70
Industrial:	
Light areas	0.50–0.80
Heavy areas	0.60–0.90
Parks, cemeteries	0.10–0.25
Playgrounds	0.20–0.35
Railroad-yard areas	0.20–0.40
Unimproved areas	0.10–0.30
Streets:	
Asphalt	0.70–0.95
Concrete	0.80–0.95
Brick	0.70–0.85
Drives and walks	0.75–0.85
Roofs	0.75–0.95
Lawns:	
Sandy soil, flat, 2%	0.05–0.10
Sandy soil, avg, 2–7%	0.10–0.15
Sandy soil, steep, 7%	0.15–0.20
Heavy soil, flat, 2%	0.13–0.17
Heavy soil, avg, 2–7%	0.18–0.22
Heavy soil, steep, 7%	0.25–0.35

tion of Waterway Areas for the Design of Drainage Structures in Small Drainage Basins," (*University of Illinois Engineering Experimental Station Bulletin* 426, 1962).

After selection of the design-storm frequency of occurrence, for example, a 50- or 100-year-frequency storm, the rainfall intensity I may be determined from any of a number of formulas or from a statistical analysis of rainfall data if enough are available. Chow lists 24 rainfall-intensity formulas of the form

$$I = \frac{KF^{n_1}}{(t+b)^n} \tag{21-128}$$

where I = rainfall intensity, in/h
K, b, n, and n_1 = respectively, coefficient, factor, and exponents depending on conditions that affect rainfall intensity
F = frequency of occurrence of rainfall, years
t = duration of storm, min
= time of concentration

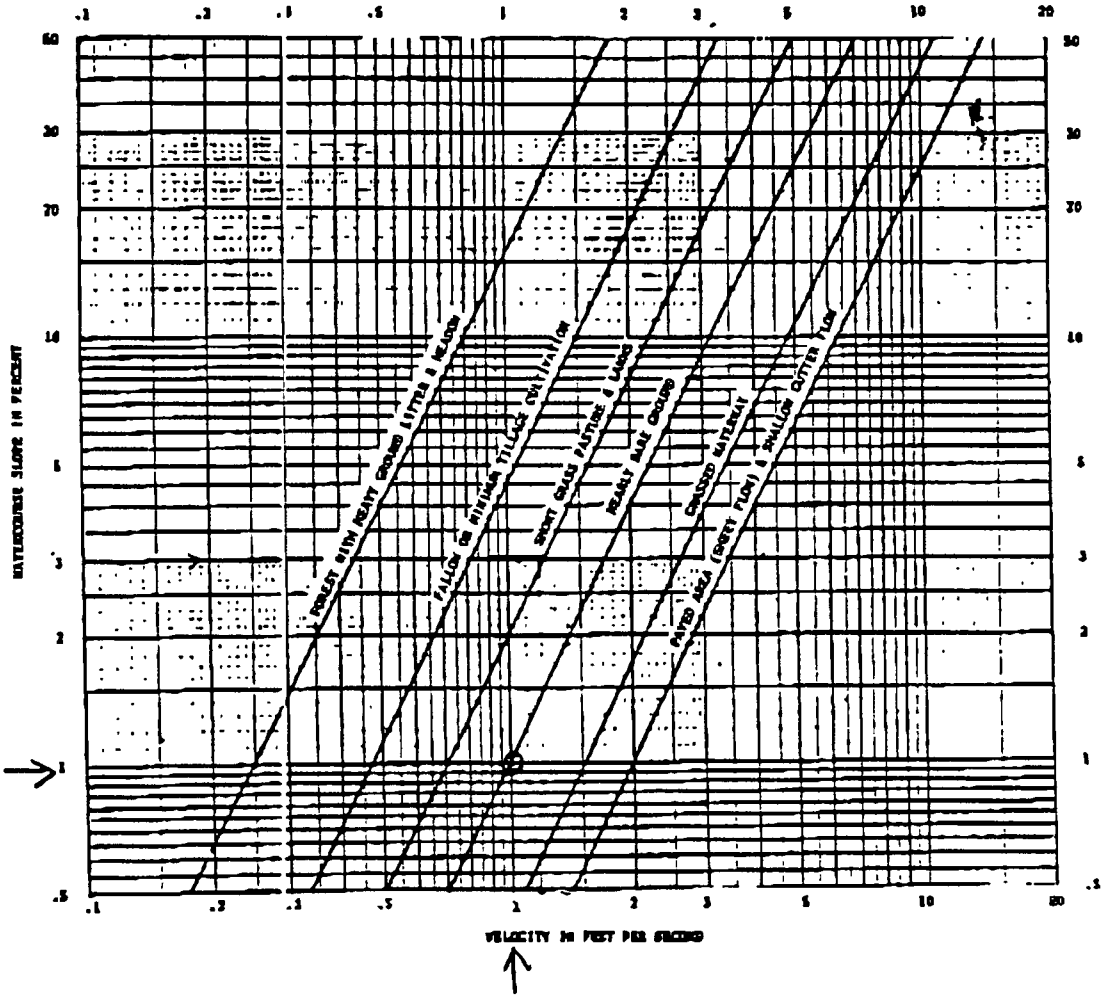
Perhaps the most useful of these formulas is the Steel formula:

$$I = \frac{K}{t+b} \tag{21-129}$$

where K and b are dependent on the storm frequency and region of the United States (Fig. 21-73 and Table 21-17).

Equation (21-129) gives the average maximum precipitation rates for durations up to 2 h.

Source; Standard Handbook for Civil Engineers, 3rd Edition Sheet 7 of 10



VELOCITIES FOR ESTIMATING OVERLAND FLOW TIME

FIGURE 2-2

Source: USDA Soil Conservation Service

Sheet 8 of 10

The time of concentration T_c at any point in a drainage system is the sum of the overland flow time; the flow time in streets, gutters, or ditches; and the flow time in conduits. Overland flow time may be determined from any number of nomographs developed for the purpose. (See V. T. Chow, "Handbook of Applied Hydrology," McGraw-Hill Book Company, New York.) The flow time in gutters, streets, ditches, and conduits can be determined from a calculation of the average velocity using the Manning equation [Eq. (21-89)]. The time of concentration is usually expressed in minutes.

After determining the time of concentration, calculate the corresponding rainfall intensity from either Eq. (21-128) or Eq. (21-129), or any equivalent method. Then select the runoff coefficient from Table 21-16 and determine the peak discharge from Eq. (21-127).

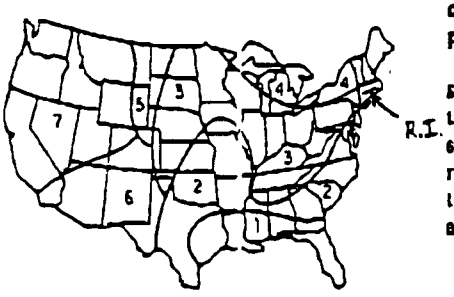


Fig. 21-73. Regions of the United States for use with the Steel formula.

Since the rational formula assumes a constant uniform rainfall for the time of concentration over the entire area, the area A must be selected so that this assumption applies with reasonable accuracy. Adhering to this assumption may necessitate subdividing the drainage area.

Method for Determining Runoff for Major Hydraulic Structures • The unit-hydrograph method, pioneered in 1932 by LeRoy K. Sherman, is a convenient, widely accepted procedure for determining runoff for major hydraulic structures. (Leroy K. Sherman, "Streamflow from Rainfall by Unit-Graph Method," *Engineering News-Record*, vol. 108, pp. 501–505, January–June 1932.) It permits calculation of the complete runoff hydrograph from any rainfall after the unit hydrograph has been established for the particular area of concern.

The unit hydrograph is defined as a runoff hydrograph resulting from a unit storm. A unit storm has practically constant rainfall intensity for its duration, termed a *unit period*, and a runoff volume of 1 in (water with a depth of 1 in over a unit area, usually 1 acre). Thus, a unit storm may have a 2 in/h effective intensity lasting ½ h or a 0.2-in/h effective intensity lasting 5 h. The significant part of the definition is not the volume but the constancy of intensity. Adjustments can be made within unit-hydrograph theory for situations where the runoff volume is different from 1 in, but corrections for highly variable rainfall rates cannot be made.

The unit hydrograph is similar in concept to determining a set of factors for a specific drain-

TABLE 21-17 Coefficients for Steel Formula

Frequency, years	Coefficients	Region						
		1	2	3	4	5	6	7
2	K	208	140	106	70	70	68	32
	b	30	21	17	13	16	14	11
4	K	247	190	131	97	81	75	48
	b	29	25	19	16	13	12	12
10	K	300	230	170	111	111	122	60
	b	36	29	23	16	17	23	13
25	K	327	280	230	170	130	155	67
	b	33	32	30	27	17	26	10
50	K	315	350	250	187	187	180	65
	b	28	38	27	24	25	21	8
100	K	367	375	290	220	240	210	77
	b	33	36	31	28	29	26	10

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Source: "Std. Handbook for Civil Engineers", 3rd Edition

Sheet 9 of 10

Source: Rhode Island Soil Erosion and Sedimentation Control Handbook

TABLE 6-6

Design Storm and Freeboard Determinations

DIVERSION TYPE	TYPICAL AREA OF PROTECTION	DESIGN STORM FREQUENCY	FREEBOARD REQUIRED
Temporary	Construction areas (structures, roads, piplelines, etc)	2 years	0.0
	Building sites	5 years	0.0
Permanent	Infiltration	10 years	0.3 ft.
	Agricultural Land	10 years	0.3 ft.
	Urban Land Areas, Play Fields, Recreation Areas, Agricultural Buildings, etc.)	25 years	0.3 ft.
	Homes, schools, industrial buildings,etc.	25 years	0.5 ft.

Source. National Handbook of Conservation Practices, USDA Soil Conservation Service, 1987

TABLE 6-7

Channel Dimensions for Small Diversions

Q (cfs)	CHANNEL DIMENSIONS TOP WIDTH (ft.)	DEPTH (ft.)*
5	12	1.9
10	22	1.9

* The depth given above includes 0.3 ft. freeboard and 0.1 ft. settlement. Side slopes shall be 3 : 1 or flatter, and the ridge top width shall be 4 ft. or wider.

Source: Standards for Soil Erosion and Sediment Control in New Jersey, New Jersey State Soil Conservation Committee, 1980

TABLE 6-8

Spacing for Small Diversions Used with Road Right of Ways

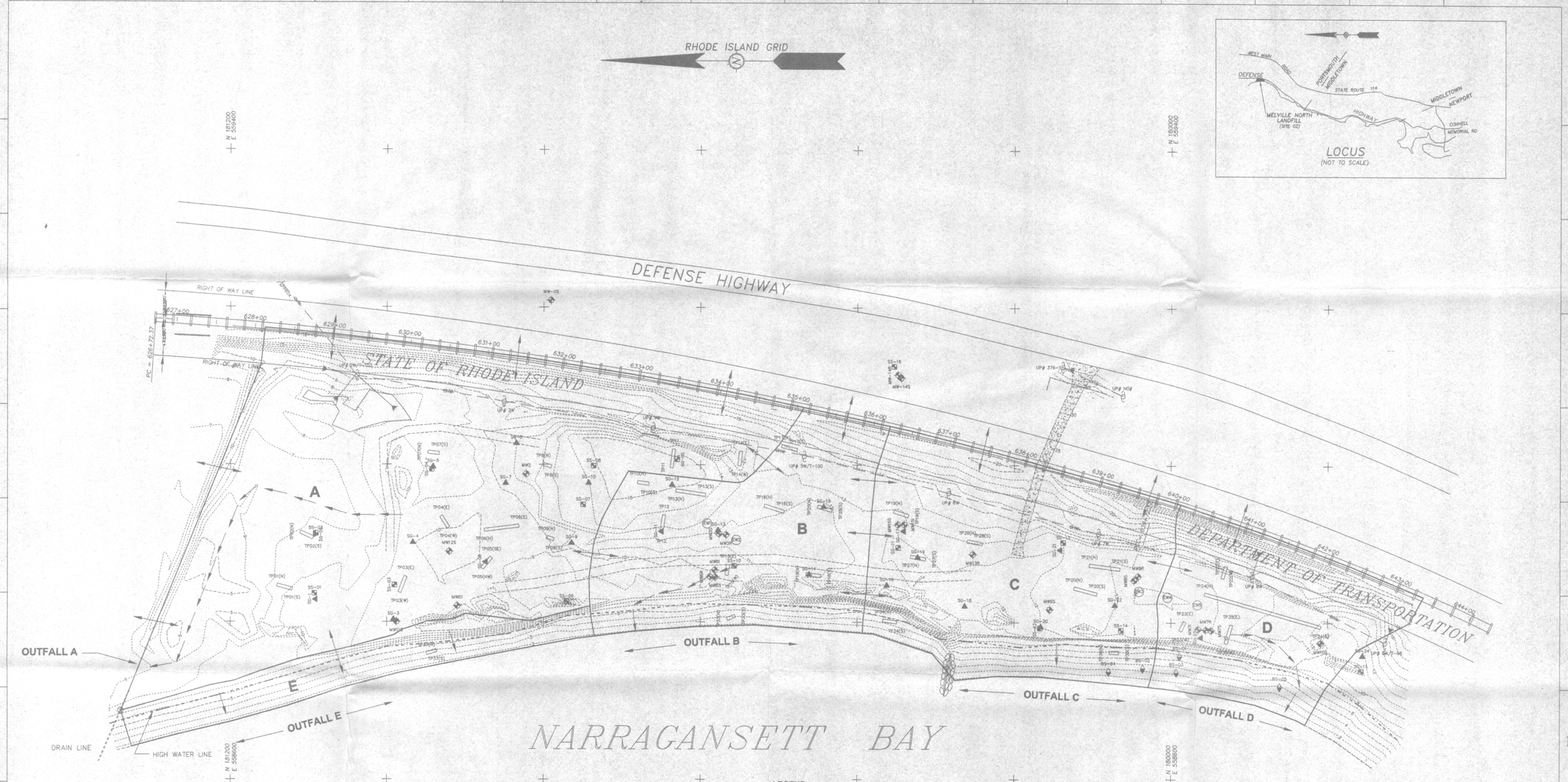
ROAD GRADE (percent)	APPROXIMATE DISTANCE BETWEEN DIVERSIONS (ft.)
1	400
2	245
5	125
10	78
15	58
20	47
25	40
30	35

Source: Standards for Soil Erosion and Sediment Control in New Jersey, New Jersey State Soil Conservation Committee, 1980

Sheet 10 of 10

APPENDIX D

REFERENCE DRAWINGS



LEGEND:

- EXISTING CONTOUR
- HIGHWATER LINE
- TEST PIT LOCATION
- SURFACE SAMPLE LOCATION
- MONITORING WELL LOCATION
- BEACH SAMPLE LOCATION
- EXISTING DRAINAGE DIVIDE

TOPOGRAPHICAL SURVEY PREPARED BY SAI SURVEYING CO., TAKEN FROM DRAWING ENTITLED "SITE 02, MELVILLE NORTH LANDFILL SITE MAP," DATED 5/29/91

CAD FILE NAME: ME11299.DWG DATE: 01/13/99
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MELVILLE NORTH LANDFILL

NAVAL EDUCATION TRAINING CENTER
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EXISTING CONDITIONS AND SAMPLING LOCATION

FOSTER WHEELER ENVIRONMENTAL CORPORATION
LIVINGSTON, NEW JERSEY

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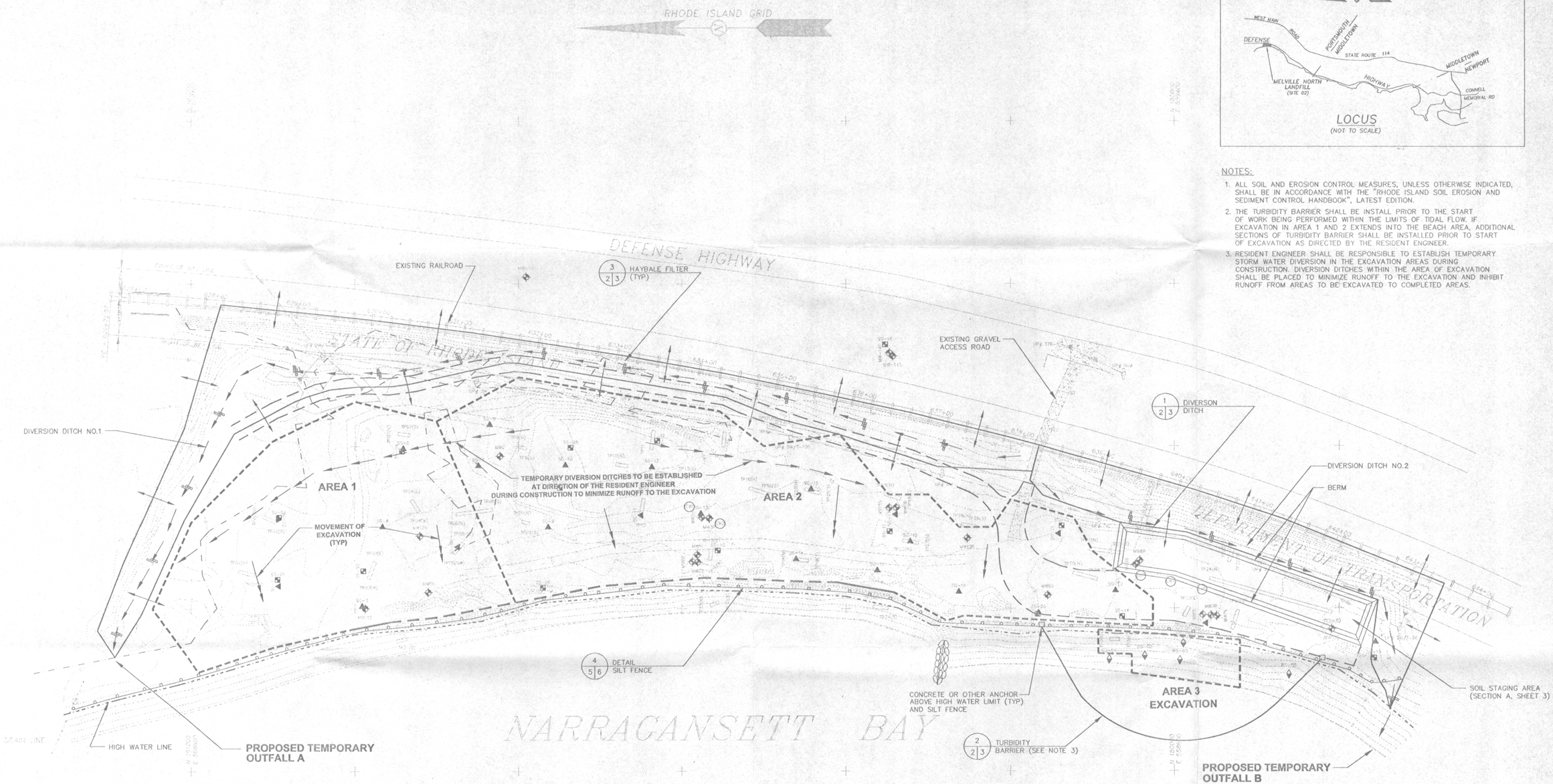

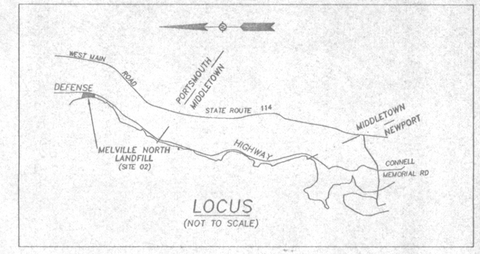

NOTES:

1. ALL SOIL AND EROSION CONTROL MEASURES, UNLESS OTHERWISE INDICATED, SHALL BE IN ACCORDANCE WITH THE "RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK", LATEST EDITION.
2. THE TURBIDITY BARRIER SHALL BE INSTALL PRIOR TO THE START OF WORK BEING PERFORMED WITHIN THE LIMITS OF TIDAL FLOW. IF EXCAVATION IN AREA 1 AND 2 EXTENDS INTO THE BEACH AREA, ADDITIONAL SECTIONS OF TURBIDITY BARRIER SHALL BE INSTALLED PRIOR TO START OF EXCAVATION AS DIRECTED BY THE RESIDENT ENGINEER.
3. RESIDENT ENGINEER SHALL BE RESPONSIBLE TO ESTABLISH TEMPORARY STORM WATER DIVERSION IN THE EXCAVATION AREAS DURING CONSTRUCTION. DIVERSION DITCHES WITHIN THE AREA OF EXCAVATION SHALL BE PLACED TO MINIMIZE RUNOFF TO THE EXCAVATION AND INHIBIT RUNOFF FROM AREAS TO BE EXCAVATED TO COMPLETED AREAS.

LEGEND:

- TP20(4) TP20(5) TEST PIT LOCATION
- SS-03 SURFACE SAMPLE LOCATION
- MW01 MONITORING WELL LOCATION
- BS-01 BEACH SAMPLE LOCATION
- TEMPORARY DRAINAGE DIVIDE DURING CONSTRUCTION
- DIVERSION DITCH
- WETLANDS LIMITS
- CONST. ROAD
- 5 EXISTING GRADE
- HIGH WATER LINE
- SILT FENCE
- HAY BALE FILTER

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SEDIMENTATION AND SOIL EROSION CONTROL PLAN

FOSTER WHEELER ENVIRONMENTAL CORPORATION
LIVINGSTON, NEW JERSEY

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0	ISSUED FOR NAVY REVIEW	J.R.	M.W.J.	C.T.	1/15/99

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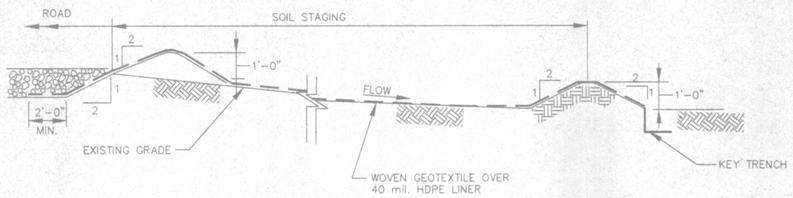

SECTION A
SOIL STAGING AREA 2|3
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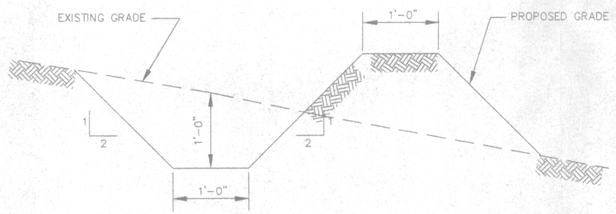

TEMPORARY DIVERSION DITCH 1 2|3
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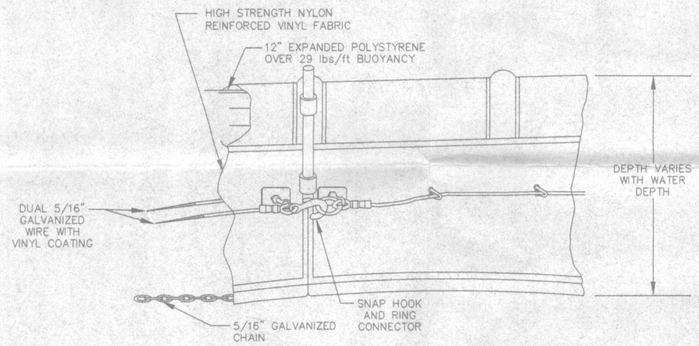
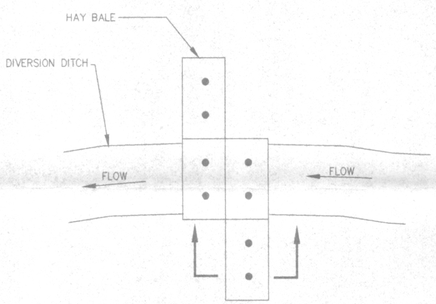
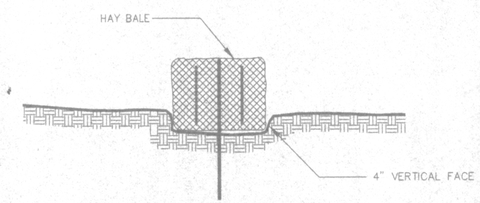


DETAIL 2
TURBIDITY BARRIER 2|3
NOT TO SCALE

NOTES:
1. SHALL BE INSTALLED IN 100' LENGTHS.
2. SHALL BE CONSTRUCTED OF HIGH VISIBILITY YELLOW MATERIAL
3. BARRIER SHALL BE SIZED TO EXTEND TO THE HARBOR FLOOR AT HIGH TIDE.





SECTION

HAY BALE FILTER 3 2|3
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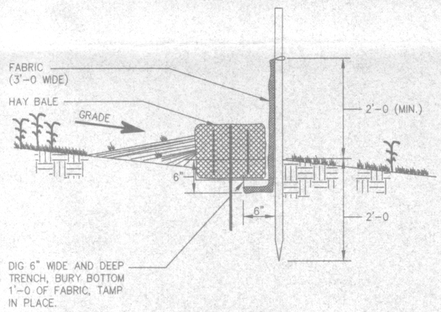

DETAIL 4
SILT FENCE WITH HAY BALE 2|3
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DETAILS AND SECTIONS

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APPENDIX E

CONSTRUCTION SCHEDULE

CONSTRUCTION SCHEDULE

Mobilize	April 5, 1999
Begin Waste Removal	April 26, 1999
Complete Waste removal	July 23, 1999
Complete Site Restoration	August 10, 1999
Demobilize	August 20, 1999

ATTACHMENT 7

DESCRIPTION OF EXCAVATION AREA DEVELOPMENT

US NAVY NORTHERN DIVISION
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-94-D-0398
FOSTER WHEELER ENVIRONMENTAL CORPORATION

CONTAMINANT MAPPING AND EVALUATION OF REQUIRED EXTENT OF EXCAVATION FOR MELVILLE NORTH LANDFILL AT NAVAL EDUCATION AND TRAINING CENTER

NEWPORT, RHODE ISLAND

JANUARY 1999

Prepared for

U.S. Navy Northern Division

Revision	Date	Prepared By	Approved By	No. of Pages Affected
0	1/8/99	Michael Junghans, P.E.	Carl Tippmann, P.E.	all

TABLE OF CONTENTS

SECTION	PAGE NO.
1. INTRODUCTION:	1
1.1 PROJECT BACKGROUND	1
1.2 REMEDIAL OBJECTIVES	2
2. CONTAMINANT DISTRIBUTION	3
2.1 COMPUTER MODEL	4
2.2 CONTAMINANT MAPPING	4
2.3 SURFACE CONTAMINATION MAPPING	5
2.4 SUBSURFACE CONTAMINATION MAPPING	6
3. ESTIMATED SOIL EXCAVATION	7
4. CONCLUSIONS	8

FIGURES:

Figure 1, Arsenic - Surface Contamination (0-2)
Figure 2, Arsenic - Subsurface Contamination
Figure 3, Benzo(a)pyrene - Surface Contamination (0-2)
Figure 4, Benzo(a)pyrene - Subsurface Contamination
Figure 5, Lead - Surface Contamination (0-2)
Figure 6, Lead - Subsurface Contamination
Figure 7, TPH - Surface Contamination (0-2)
Figure 8, TPH - Subsurface Contamination
Figure 9, Beach Seep Area - TPH Concentrations
Figure 10, Composite of Exceedances - Surface Contamination
Figure 11, Composite of Exceedances - Subsurface Contamination
Figure 12, Composite of Exceedances - Surface, Subsurface and Beach Contamination
Figure 13, Estimated Areas of Excavation
Figure 14, Estimated Excavation Depth at Sampling Points

1. INTRODUCTION:

Foster Wheeler Environmental Corporation (FWENC) is pleased to submit this report on contaminant mapping and evaluation of contaminated soil removal at the Melville Landfill (the "Site") located at the Naval Education and Training Center (NETC) in Newport, Rhode Island. This report to the Department of the Navy (Navy) is in response to Contract No. N62472-94-D-0398. This report evaluates the extent of on-site contamination and estimates the area of contaminated soil to be excavated as part of the Remedial Action planned for the site. The initial extent of excavation is based on surface and subsurface soil sampling performed at the Site by Brown and Root Environmental during the remedial investigation phase of the project. Additional excavation will be dictated by field observations and post excavation confirmatory samples.

1.1 PROJECT BACKGROUND

NETC is located in the City of Newport, and Towns of Middletown and Portsmouth, Rhode Island on the western shore of Aquidneck Island facing the east passage of Narragansett Bay. The Melville North Landfill site is located in the northwest portion of NETC on the shoreline of Narragansett Bay in the Town of Portsmouth. The site is approximately 10 acres in size and was used as a landfill from World War II until 1955. The site was excessed to the State of Rhode Island in September 1983, and was sold to Melville Marine Industries six months later. Since ownership of the site was transferred to the State of Rhode Island prior to NETC being placed on the National Priorities List (NPL) in November 1989, remediation activities at the landfill will be performed in accordance with the Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations).

Access to the Melville North Landfill site is from Defense Highway. The site is bound to the west by Narragansett Bay, to the east by the Penn Central railroad tracks and Defense Highway, to the north by vegetated wetlands, and to the south by a wooded upland area. The topography of the site is relatively flat with elevation drops between 5 and 10 feet along the shoreline and an increase in elevation between 5 and 10 feet along Defense Highway.

The landfill reportedly received a variety of waste materials from World War II until 1955. These wastes include spent acids, various waste oils, solvents, waste paints, and possibly polychlorinated biphenyl's (PCBs). Initial inspections of the site also revealed mounds of oil-soaked soil and surface areas that were covered with oil and oil sludge. It was reported that the mounds of oil-soaked soil came from disposal of

the oil sludge material generated while cleaning fuel supply tanks at the nearby tank farms, or from cleanup operations of various oil spills.

Previous removal actions have been conducted at the Melville North Landfill by OHM in 1995 and by FWENC in 1996. The remedial actions were primarily conducted in response to the findings in the Phase II RI/FS conducted by Brown & Root Environmental. These actions included excavation and disposal of TPH and PCB contaminated soils, stabilization and disposal of lead-contaminated soils, and backfilling the excavations with imported clean offsite borrow material. At the completion of the remedial actions, a Site Investigation was conducted between November 1996 and April 1997 by Brown & Root Environmental to delineate the nature and extent of the contamination remaining at the site, to determine any impacts from the site to the groundwater or to Narragansett Bay, and to determine if threats to human health and the environment were present. The investigation resulted in the establishment of clean-up levels for removal of contaminated soil from the Melville North Landfill based on risk analysis, the Rhode Island Department of Environmental Management (RIDEM) Residential Direct Exposure Criteria and the RIDEM GB Leachability Criteria

1.2 REMEDIAL OBJECTIVES

The Remedial Objectives for contaminated soil excavation at the Melville North Landfill were established in accordance with Section 9.02 of the Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Remediation Regulations). The information presented in this section was prepared by Tetra Tech NUS, Inc.

The objective of this remedial action project is to remove and dispose off site the contaminated soils at the Melville North Landfill in accordance with the Remediation Regulations. The following soil remediation goals will be the basis for the soil excavation activities to be conducted during the project:

- Arsenic - 11.8 mg/kg throughout the vadose zone (95th percentile of Upper Threshold Limit (UTL) based on background concentrations reported in the *Draft Final Background Soil Investigation, Melville North Landfill, Portsmouth, Rhode Island* (TtNUS, November 1998)).

- Lead - 150 mg/kg throughout the vadose zone (RIDEM RDEC).

- Total Petroleum Hydrocarbons (TPH) - 1000 mg/kg throughout the vadose zone and 2500 mg/kg throughout the saturated zone (RIDEM RDEC). The residential TPH standard requires site compliance with RIDEM RDEC for all other substances for the classification.

- Benzo(a)pyrene – 0.4 mg/kg throughout the vadose zone (RIDEM RDEC).

- Non-aqueous phase liquids (NAPLs) - None in any environmental medium in the vadose or saturated zones, a condition considered as exceeding the RIDEM Upper Concentration Limits (UCLs) in soil and groundwater (see Section 8.07 - RIDEM Remediation Regulations).

- RIDEM GB Leachability Criteria - Not to exceed GB leachability criteria throughout the vadose or saturated zones.

These remedial goals are consistent with the future land use (marina) in the vicinity of the impacted area. The remedial objectives also take into account the potential for hazardous substances and TPH to leach into the GB-classified groundwater from these impacted soils, as well as to migrate to the intertidal zone and the adjacent wetlands (surface water and sediments).

Additional soil remediation goals will be applied to areas containing elevated concentrations of polychlorinated biphenyls (PCBs). In addition to the soil remediation goals listed above, the following remedial objectives will apply to these areas:

- PCBs - 10 mg/kg throughout the vadose zone (RIDEM RDEC)

- Asbestos – 1% throughout the vadose zone (National Emissions Standard for Asbestos)

2. CONTAMINANT DISTRIBUTION

To determine the required area of contaminated soil excavation, the first step was to map the extent of estimated soil contamination at the site. Then the clean-up criteria applied to the mapped contamination to determine the required extents of excavation. Data used for the mapping of the soil contamination was taken from the "Site Investigation Report, Melville North Landfill" prepared by Brown and Root Environmental dated August 1997.

The data was collected during field investigations performed by Brown and Root between October 1996 and May 1997. Field investigations included sediment sampling, wetlands delineation, ecological assessment, geophysical survey, passive soil gas sampling, soil borings, installation of monitoring wells, test pit excavation surface and subsurface sampling, ground water sampling and a tidal study. Collected

surface and subsurface sampling data was utilized by Foster Wheeler to determine the extent of soil contamination exceeding soil clean-up criteria presented above.

Evaluation of the data indicated five contaminants exceeding the clean-up criteria: 1) arsenic; 2) benzo(a)pyrene; 3) lead; 4) total petroleum hyrocarbons (TPH); and 5) polychlorinated biphenyls (PCBs). Data was segregated into two stratums for evaluation: 1). surface soil contamination - 0 to 2 feet below ground surface (BGS); and 2). subsurface soil contamination - greater than 2 feet BGS. Sufficient data was available to map surface and subsurface contamination of all the contaminants except PCBs.

2.1 COMPUTER MODEL

To estimate the extent of contamination in the surface and subsurface soil stratums, a three dimensional contouring program, Surfer for Windows, was used to estimate contaminant distribution based on the collected soil sampling data. Surfer for Windows, version 6.0, by Golden Software, is a grid-based contouring and three dimensional surface plotting graphics program that interpolates irregularly spaced XYZ coordinates to a evenly spaced grid data set which can be utilized to develop contours, in this case, contamination contours.

2.2 CONTAMINANT MAPPING

In order to develop contaminant contours, certain boundary conditions had to be established. The first, as mentioned above, was to segregate the data into two sets: surface soil contaminant data, 0 to 2 feet below ground surface (BGS); and subsurface soil contaminant data, greater than 2 feet BGS. Secondly, a site perimeter was established outside which it has been assumed the contamination does not exist. The selected boundary was the DOT easement along the east, the low water level to the west, the berm within the wetlands to the north and beyond the limit of sampling to the south. The clean soil boundary limit encompasses all the sampling points which have indicated exceedances in established clean-up criteria. In addition, the assumed clean boundary also encompasses the waste limits established Brown and Root in the August 1997 Site Investigation Report.

The geostatistical method selected for interpolation of the sampling points for development of contaminanat contours was the Kriging method. The Kriging method is a widely accepted method for interpolation of a moderate number of sampling points.

2.3 SURFACE CONTAMINATION MAPPING

Surface soil contaminant mapping was performed for arsenic, benzo(a)pyrene, lead and TPH using samples collected from the upper two feet of soil. All sample points within the upper two feet which were analyzed were utilized for development of the contaminant contour maps. Sample locations which were not analyzed for a given contaminant or had estimated values were not utilized.

Attached Figure 1 presents contaminant contours generated for surface soil sampling of arsenic contamination. The contours are bounded by clean soil boundary which is described above in Section 2.2. The area of arsenic estimated to be above the clean-up limit of 11.8 mg/l, is indicated by the heavy dashed line. Sampling points used to develop the contaminant contour map are indicated on the figure. The mapping indicates three areas of contamination in the northern half of the site exceeding the clean-up requirements. These areas are centered around TP-2, TP-9 and TP-10.

Figure 3, presents the surface contamination contours developed for benzo(a)pyrene. The RIDEM residential standards for clean-up of benzo(a)pyrene is 0.4 mg/l which has been represented by the heavy dashed line The mapping indicates six areas of surface contamination which are distributed throughout the site.

Lead concentrations in the surface soil are presented in Figure 5. The clean-up level for lead, 150mg/l, was exceeded in two locations in the central portion of the site Consistently high levels of contamination are indicated by the mapping in the area of contamination centering at TP-10.

Two areas of contamination exceeding the clean-up criteria of 1000 mg/l for TPH, are indicated by the mapping presented in Figure 7. These areas are at the northern end of the site, with the greatest contamination at the extreme north. Additionally, TPH contamination above the clean-up criteria was identified at locations on the beach apparently due to seepage from the landfill. A previous up-gradient hot spot which was removed in October 1995 may be the source of the contamination as presented in the Brown and Root Site investigation report, Section 4.2.1.. The contamination was limited to a small area of the beach. The TPH concentration for the beach area is presented on Figure 9. Due to the concentrated area of contamination, the limit of soil exceeding the clean-up standards was manually estimated. The contamination in this area will be removed based on field observations with post excavation confirmation.

PCB's were also found in the surface soil at the location TP-7. Due to the lack of additional sampling points, the extent of PCB's can not be mapped using this method. Additional sampling in the vicinity of TP-7 will have to be performed to properly determine the extent of PCB contamination.

To evaluate the estimated horizontal extent of contaminated surface soil that exceeds the clean-up criteria, Figure 10 has been developed to present a composite of all the areas of surface contamination which exceed the clean-up criteria. The composite area shows the majority of the contaminated surface soil removal to be in the northern portion of the site where several estimated contamination limits overlap indicating areas of mixed contamination which would be expected in a landfill condition.

2.4 SUBSURFACE CONTAMINATION MAPPING

As for the surface soil, mapping of subsurface contamination was also performed for arsenic, benzo(a)pyrene, lead and TPH using soil sample data collected from greater than two feet below ground surface. All soil sample points below two feet which were analyzed were utilized for development of the contaminant contour maps. Sample locations which were not analyzed for a given contaminant or had estimated values were not utilized. If sampling was performed a multiple depths at a given location, the highest value would be used to map the contamination. Since consistent vertical profiling was not done, additional vertical segregation of the data was not performed.

Figure 2 presents contaminant contours generated for subsurface arsenic contamination. The area of arsenic soil contamination estimated to be above the clean-up limit of 11.8 mg/l is indicated by the heavy dashed line. A continuous area of significant arsenic contamination is indicated toward the central portion of the site with peaks of concentration at TP-10, SB-16, TP-25 and TP-27. Two smaller areas centered around TP-1 and SB-18 are indicated to the north and south respectively. The subsurface contaminant contours encompass the areas of arsenic contamination mapped for the surface soil which centered around TP-1 and TP-10, indicating a vertical connection.

Figure 4, presents the subsurface contamination contours developed for benzo(a)pyrene. The residential standards for clean-up of benzo(a)pyrene is 0.4 mg/l which has been represented by the dark dashed line. The mapping indicates three areas of surface contamination which are distributed throughout the site similar to the mapped surface contamination. This potentially indicates a vertical connection between the surface and subsurface contamination.

Lead concentrations in the surface soil are presented in Figure 6. The clean-up level for lead of 150mg/l was exceeded through the majority of the site resulting in a single large area of contamination. Lead contamination appears to extend vertically as demonstrated by the area of subsurface contamination encompassing the area mapped for the surface contamination. It should be noted that the mapping

indicated levels of lead concentration exceeding the clean-up criteria along the DOT right-of-way to the east. Additional field sampling should be performed in this area to further define the eastern extent of lead contamination.

One area of contamination exceeding the clean-up criteria for TPH, 1000 mg/l, are indicated by the subsurface contamination mapping presented in Figure 8. This subsurface contamination of TPH does not appear to follow the same pattern as the surface contamination, although, both areas overly each other in the northern portion of the site.

To evaluate the estimated horizontal extent of contaminated surface soil above the clean-up criteria, Figure 11 has been developed to present a composite of all the areas of subsurface contamination which exceed the clean-up criteria. The composite area shows subsurface contamination exceeding clean-up criteria to be through the majority of the site. Mapped areas of contamination for different constituents overlap through the composite area indicating a mixed area of contamination.

3. ESTIMATED SOIL EXCAVATION

To evaluate the total extent of soil contamination in the surface and subsurface soil, Figure 12 presents a composite of surface (including beach contamination) and subsurface estimated areas of soil contamination exceeding the clean-up criteria. From this composite area the estimated extent of soil excavation required for the remedial action can be developed as presented in Figure 13.

The estimated limit of excavation presented in Figure 13 has been adjusted based on site conditions The western limit of mapped contamination presented in Figure 12 has been adjusted to terminate at the berm along the waterfront. The berm lies at the high water level which is the estimated limit of contaminated soil based on site topography and sampling results from the beach area. This should be verified by field testing during the remedial action.

For the purposes of this estimation of contaminated soil removal, it will be assumed that the groundwater is at ten feet below ground surface throughout the site and that excavation will be performed, where contamination extends, to the groundwater. Proper field determination of the depth to ground water will be required to determine proper excavation depths.

To estimate the required depth of excavation, the deepest point exceeding the clean-up criteria, up to ten feet below ground surface (assumed groundwater table), for any of the evaluated contaminants was

determined at each of the sampling locations. These depths are presented on Figure 14. An estimation of the in place volume of soil requiring removal based on these depths for the estimated limits of excavation yielded a volume of approximately 40,000 cy of contaminated soil removal.

Since samples were not consistently collected at each of the sampling points at interval depths through the extent of contamination, the accuracy of vertical profiling is limited. For example, if a sample was taken at two and four feet only and both samples showed contamination above the clean-up criteria, and no additional samples were taken, then at that point the vertical limit of contamination has not been defined. The limits will have to be field verified to ensure that the vertical limit of contamination has been reached. Therfore, the volume of excavation may vary based on encountered field conditions.

4. CONCLUSIONS

The mapped area of soil contamination exceeding the clean-up criteria for the surface and subsurface soil encompasses the majority of the site. The horizontal limits of contamination will have to be verified in the field utilizing side wall confirmation sampling, especially along the D.O.T. right-of way at the central portion of the site. Also, visual screening and post excavation sampling will be required to confirm the vertical extent of excavation.

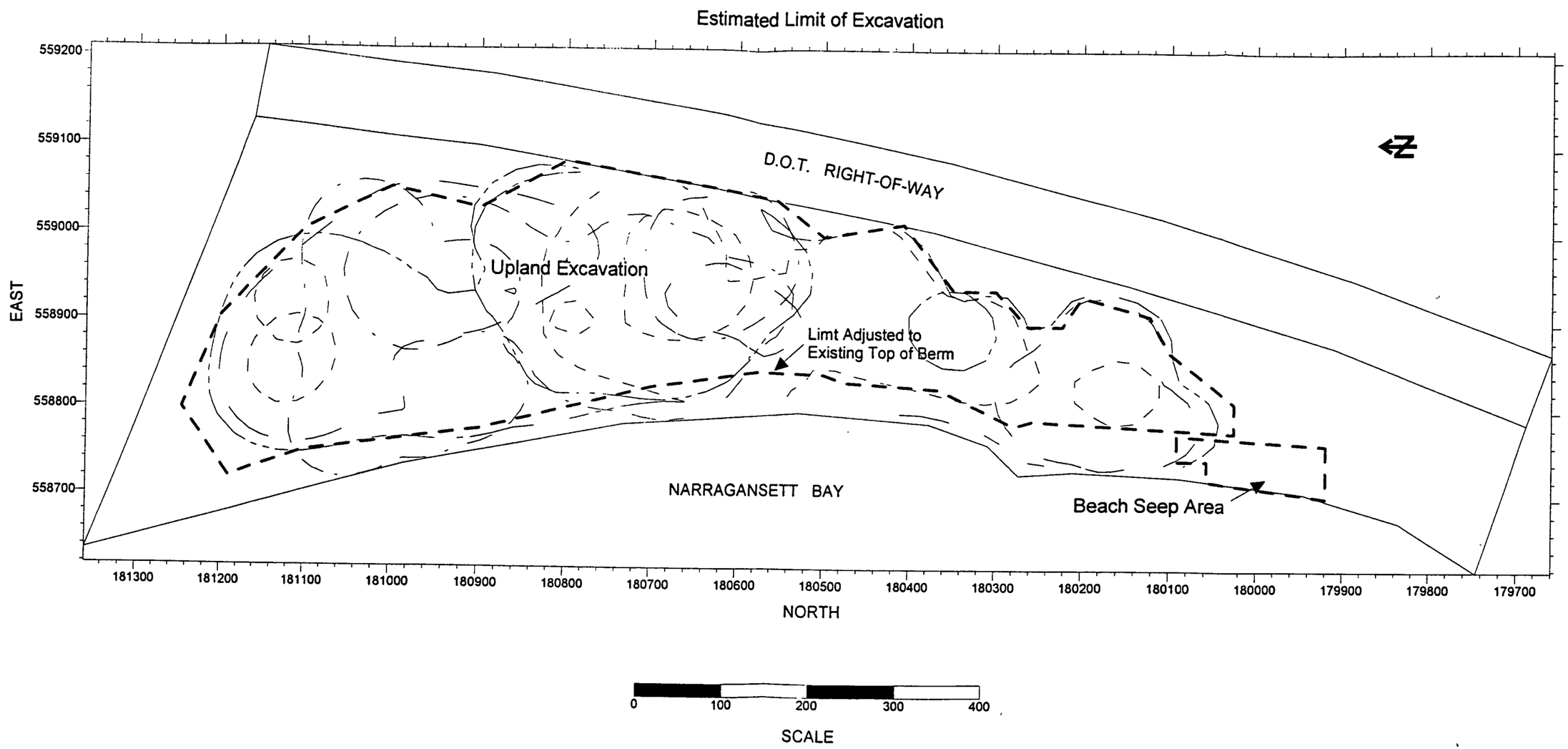

Estimated Limit of Excavation
559200
559100
559000
558900
558800
558700
EAST
D.O.T. RIGHT-OF-WAY
Upland Excavation
Limt Adjusted to
Existing Top of Berm
NARRAGANSETT BAY
Beach Seep Area
181300
181200
181100
181000
180900
180800
180700
180600
180500
180400
180300
180200
180100
180000
179900
179800
179700
NORTH
0
100
200
300
400
SCALE

FIGURE 13

Composite of Exceedances - Surface Contamination (0-2 feet)

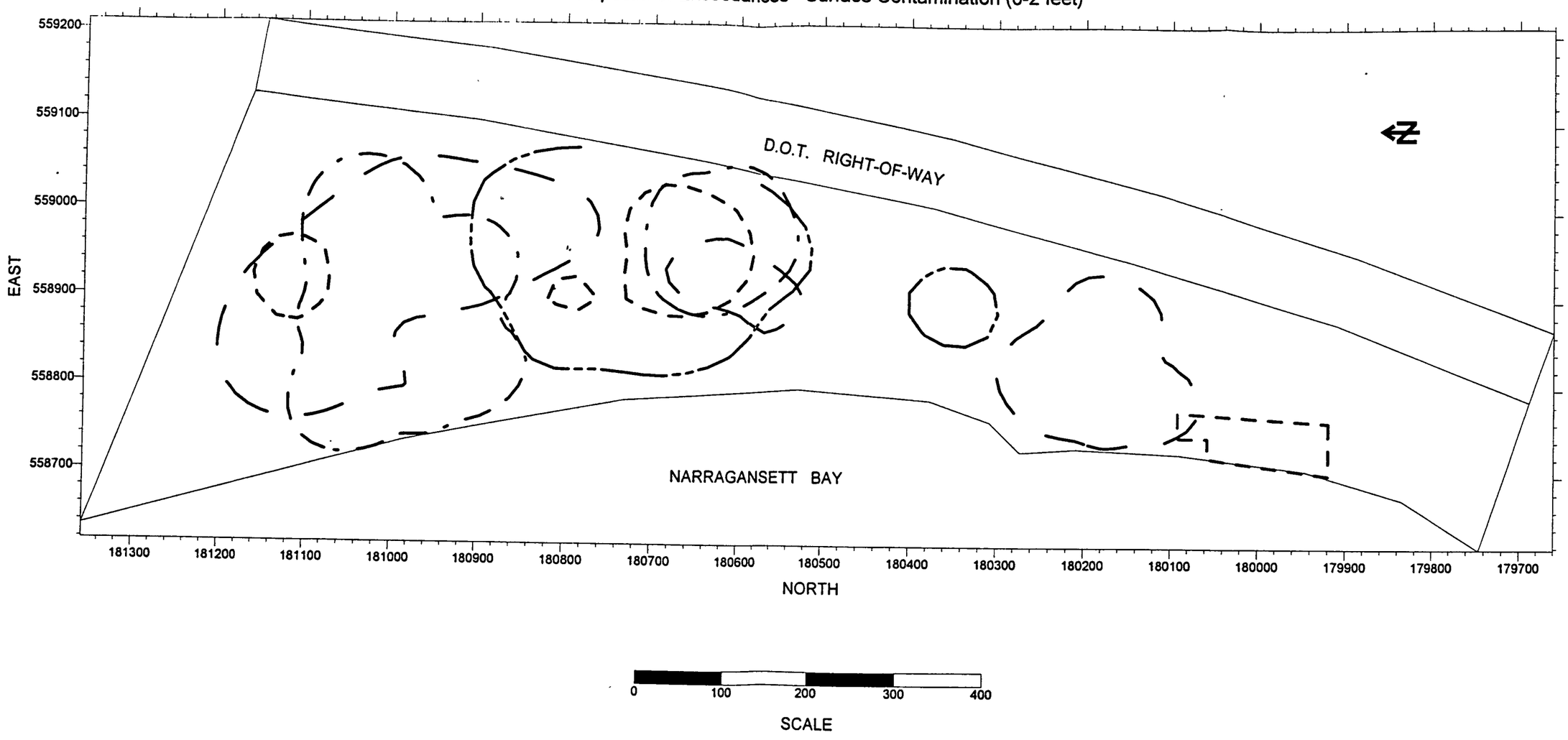


FIGURE 10

Estimated Depth of Excavation at Sampling Points

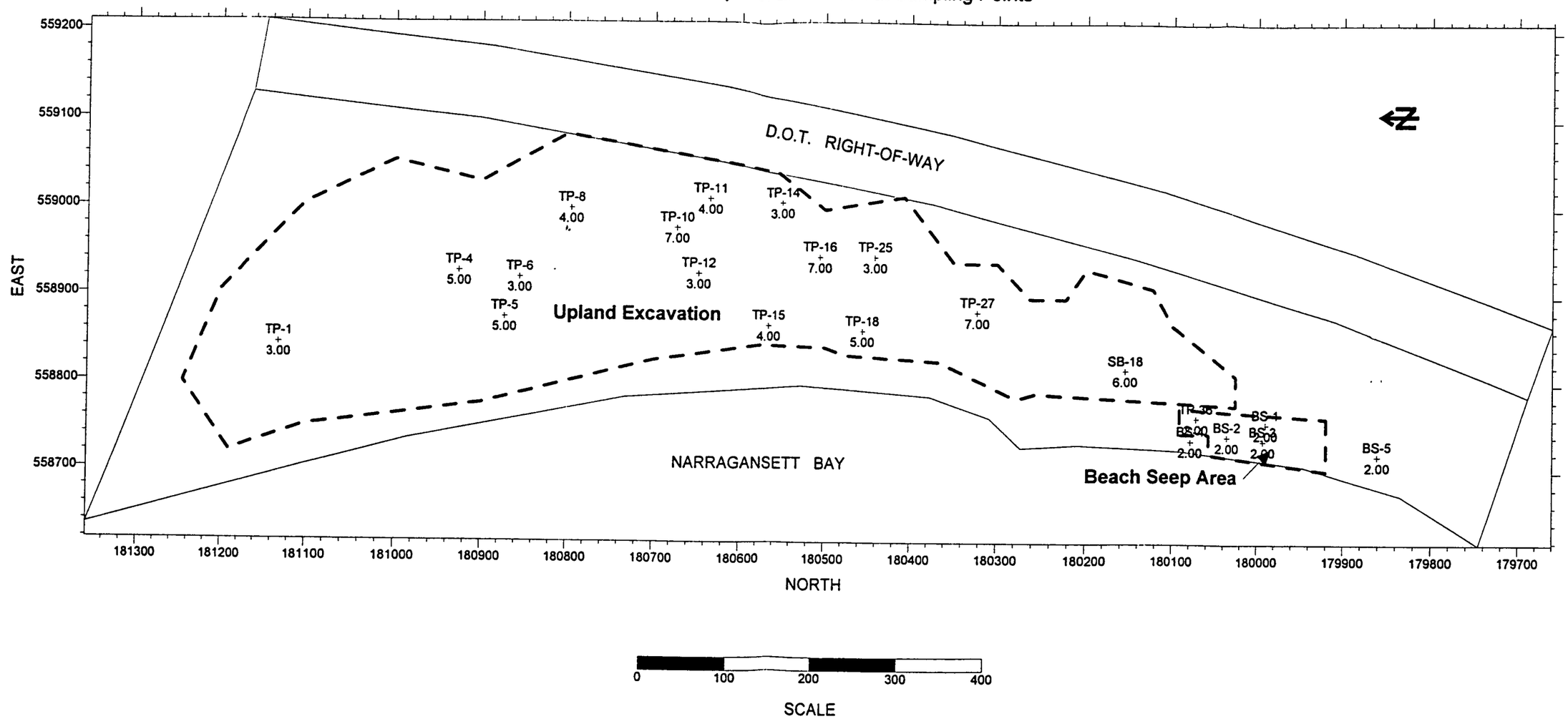


FIGURE 14

Composite of Exceedances - Subsurface Contamination

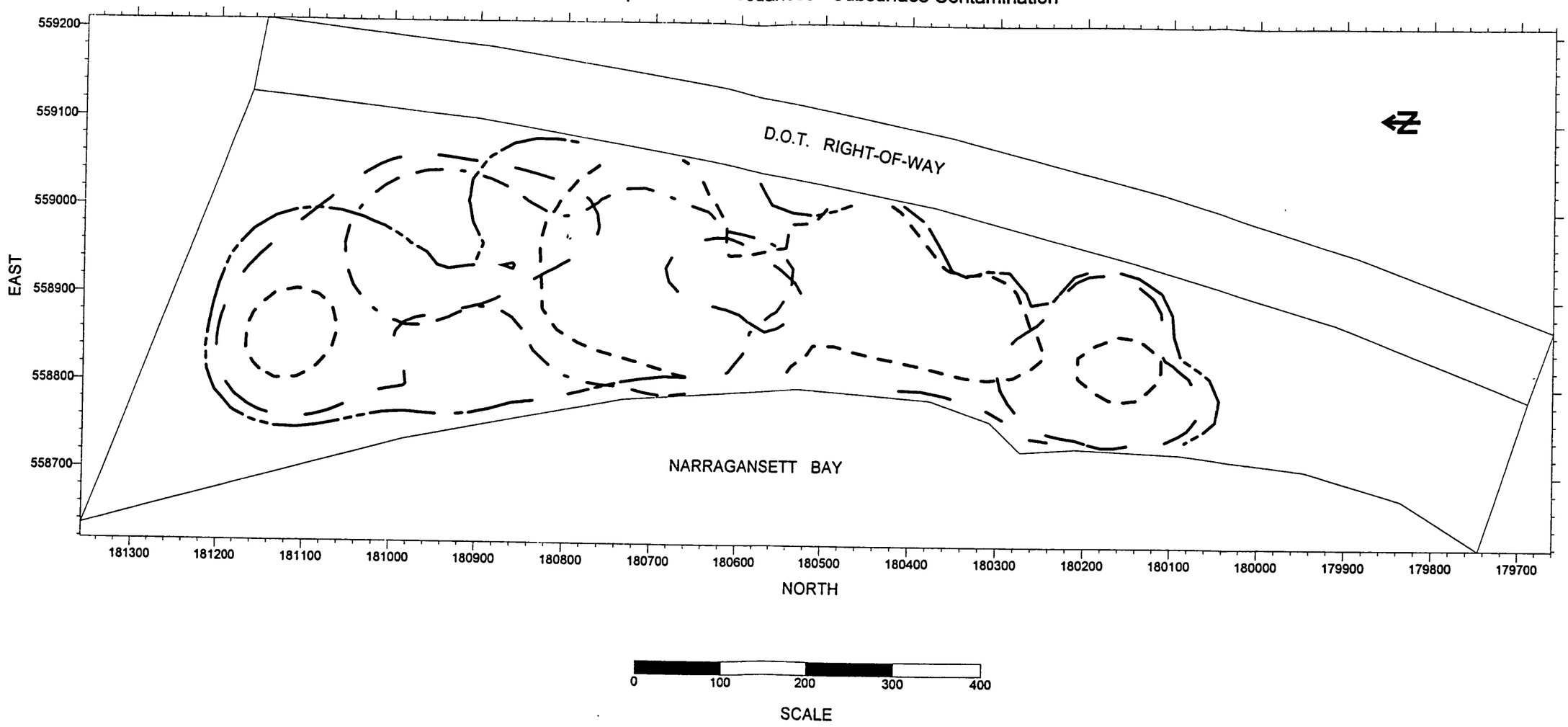


FIGURE 11

Composite of Exceedances - Surface, Subsurface and Beach Contamination

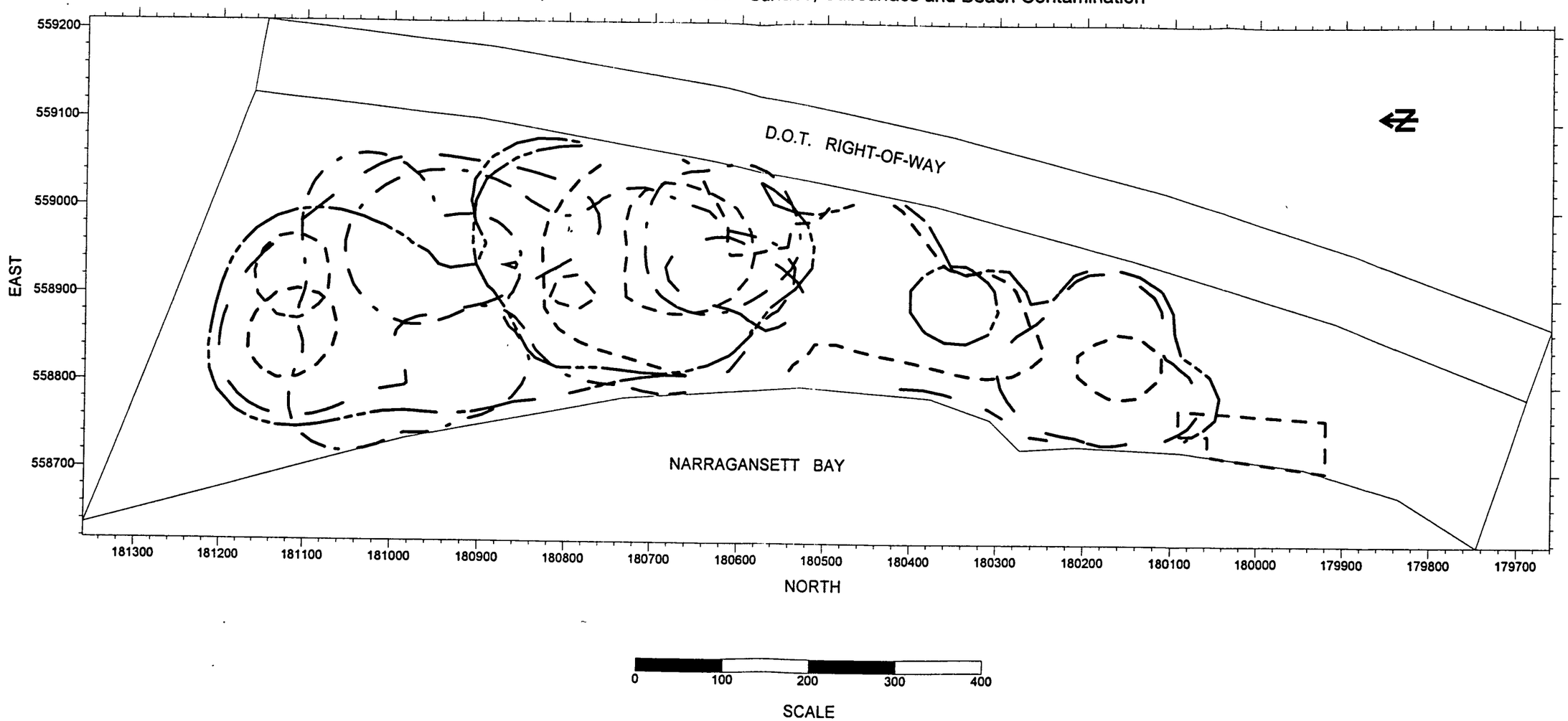


FIGURE 12

Lead - Subsurface Contamination

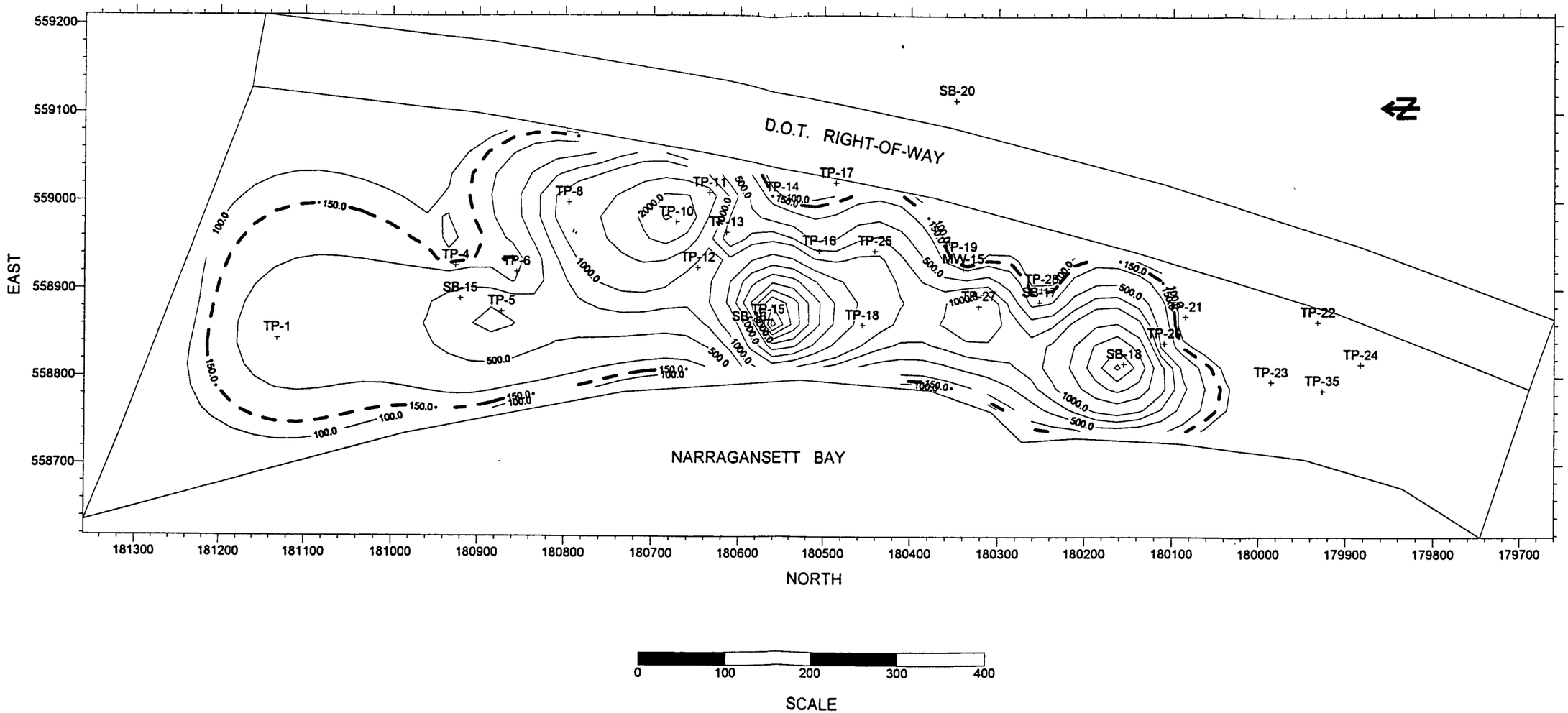


FIGURE 6

TPH - Surface Contamination (0-2 feet)

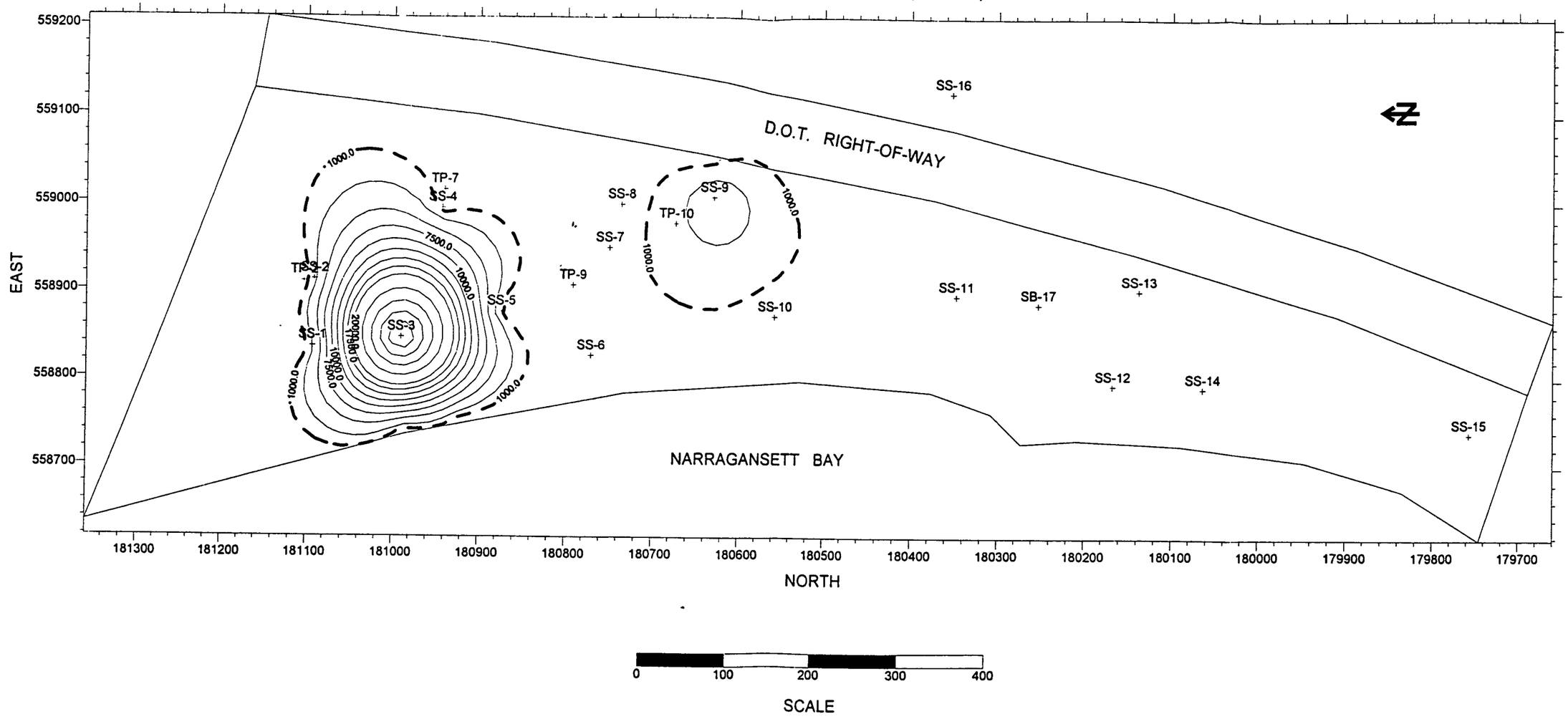


FIGURE 7

TPH - Subsurface Contamination

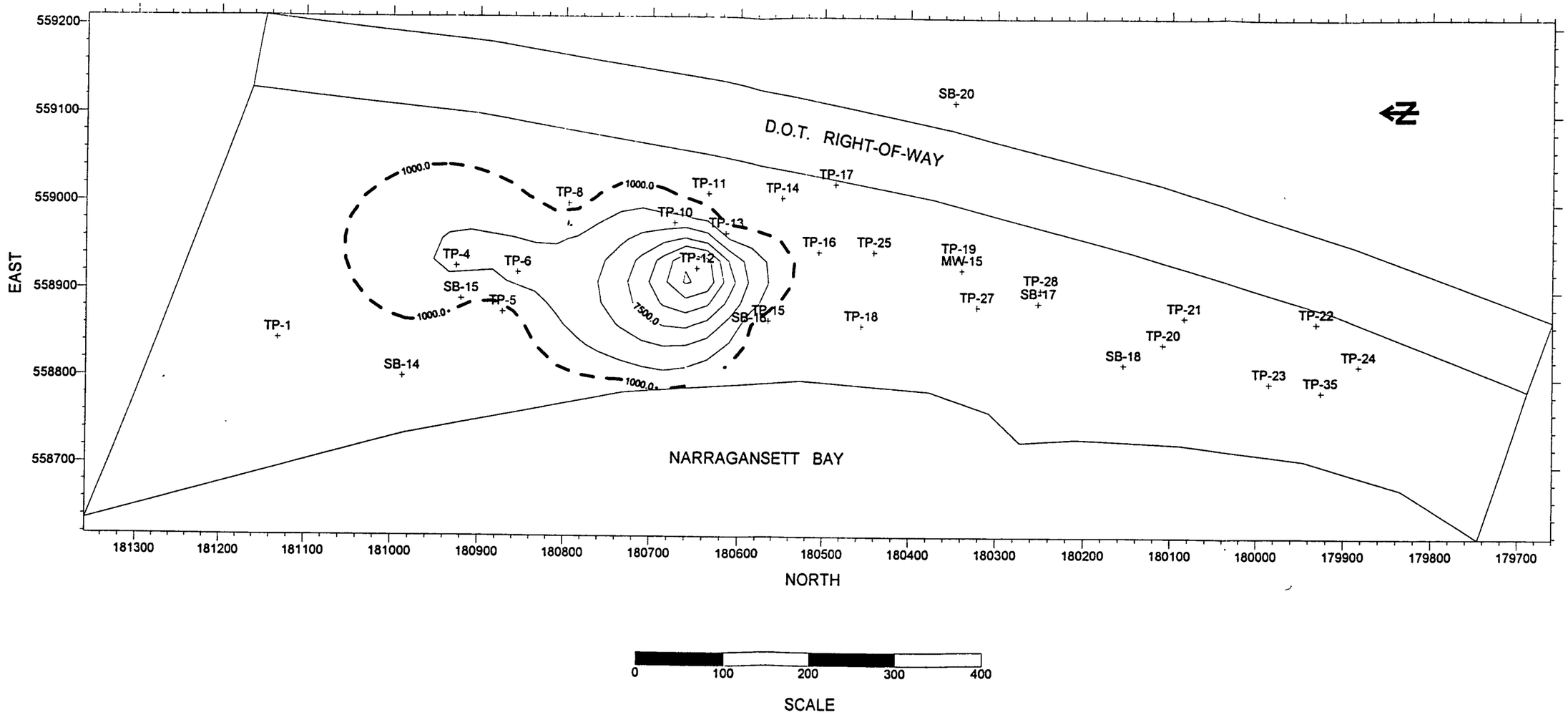
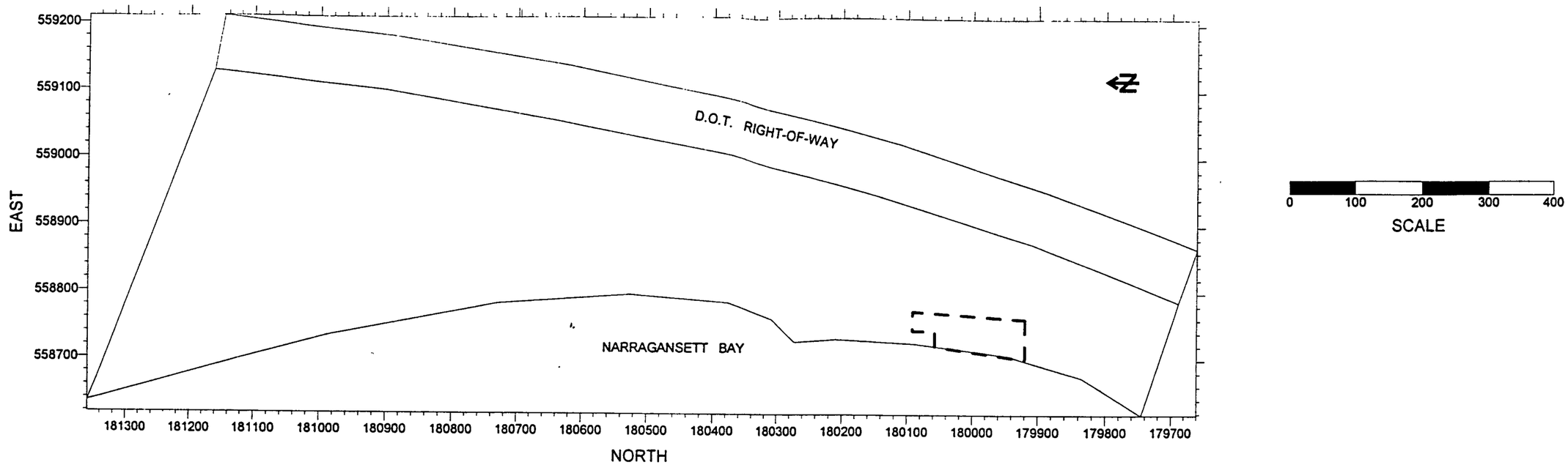


FIGURE 8

Beach Seep Area Location



Beach Seep Area - TPH Concentrations

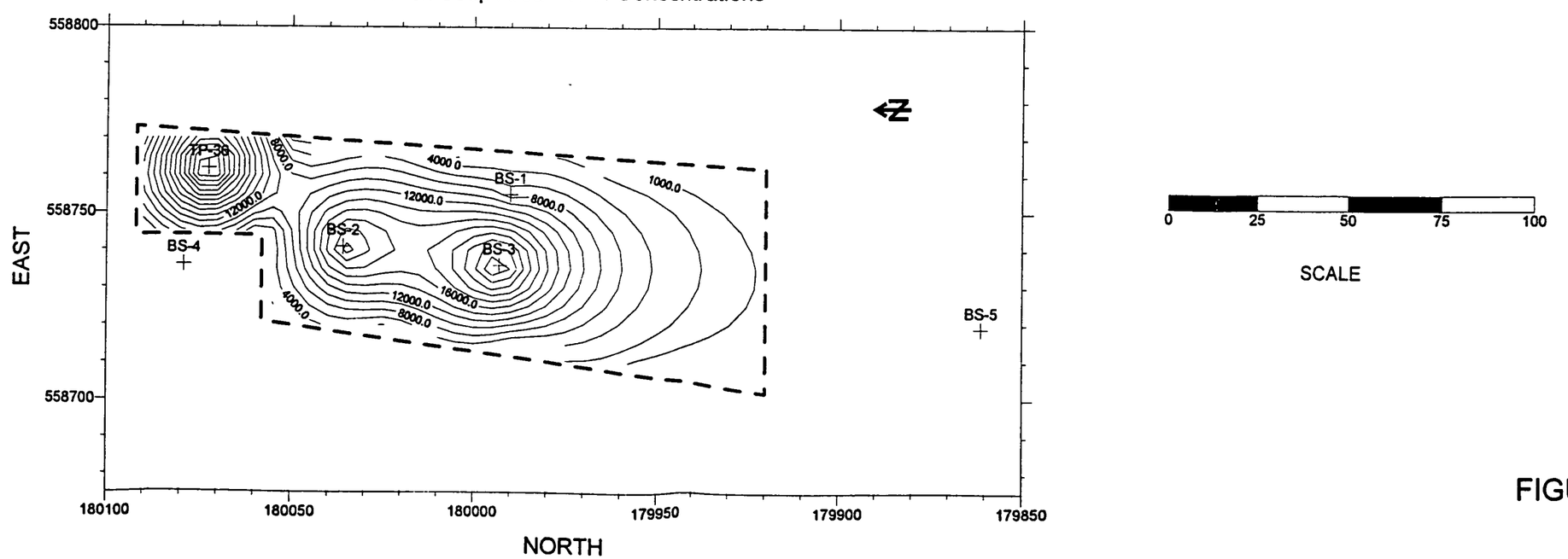


FIGURE 9

Benzo(a)pyrene - Surface Contamination (0-2 feet)

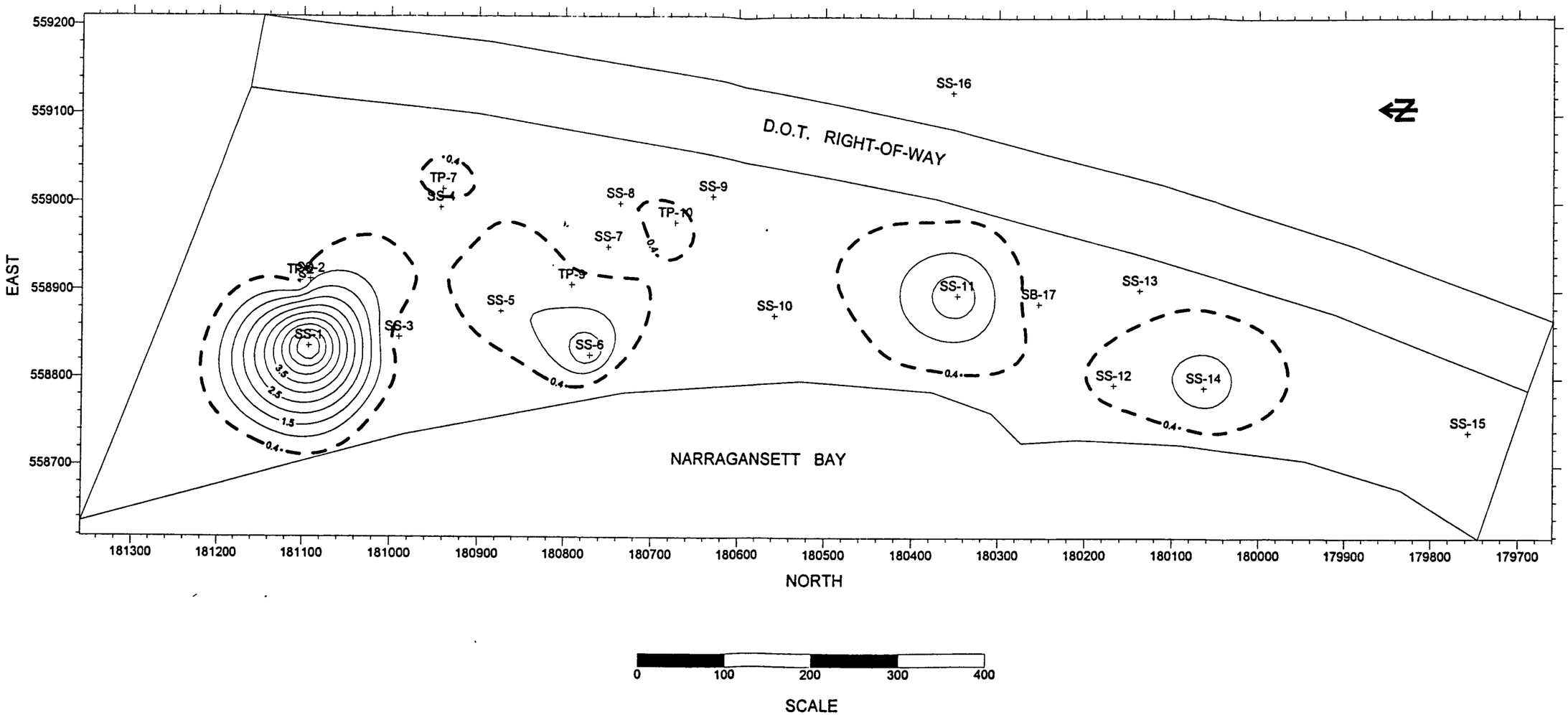


FIGURE 3

Benzo(a)pyrene - Subsurface Contamination

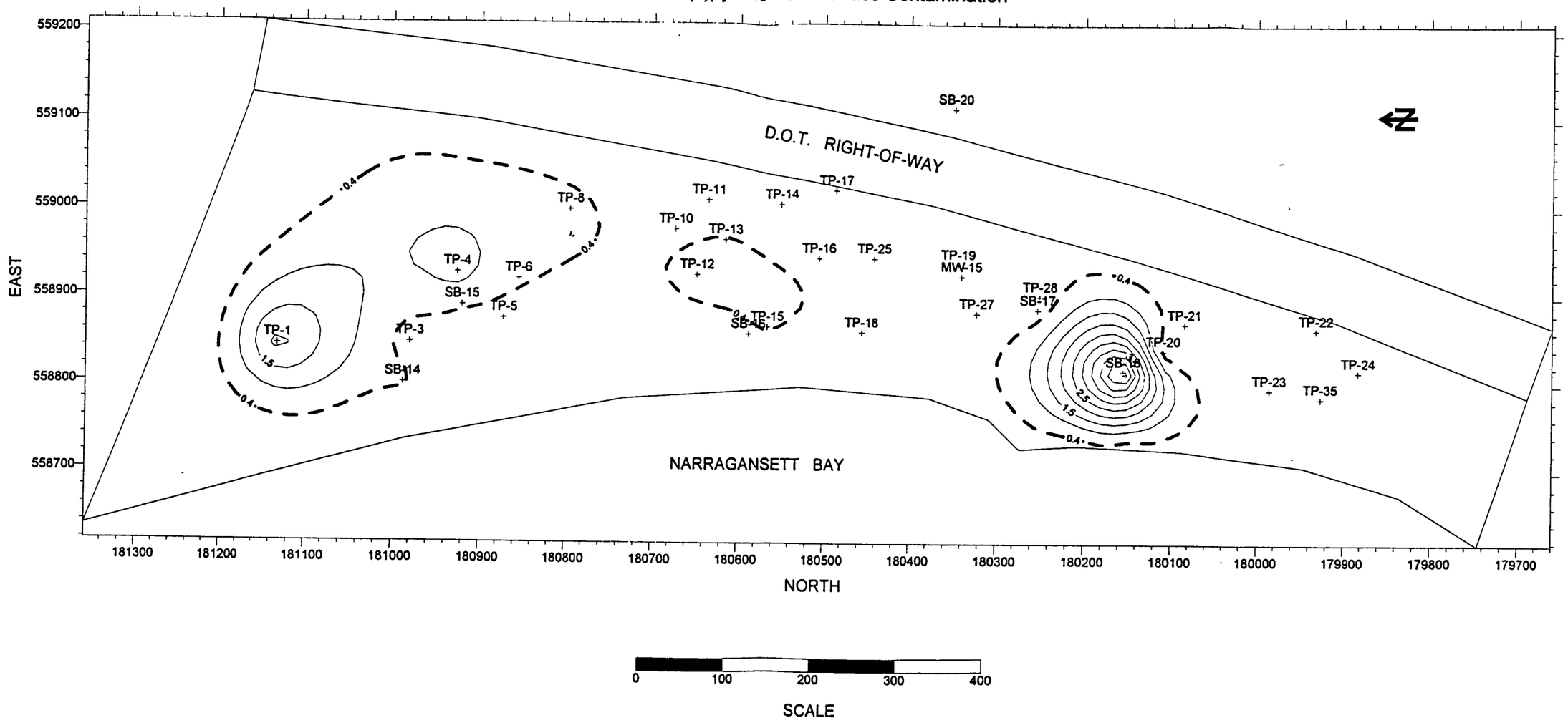


FIGURE 4

Lead - Surface Contamination (0-2 feet)

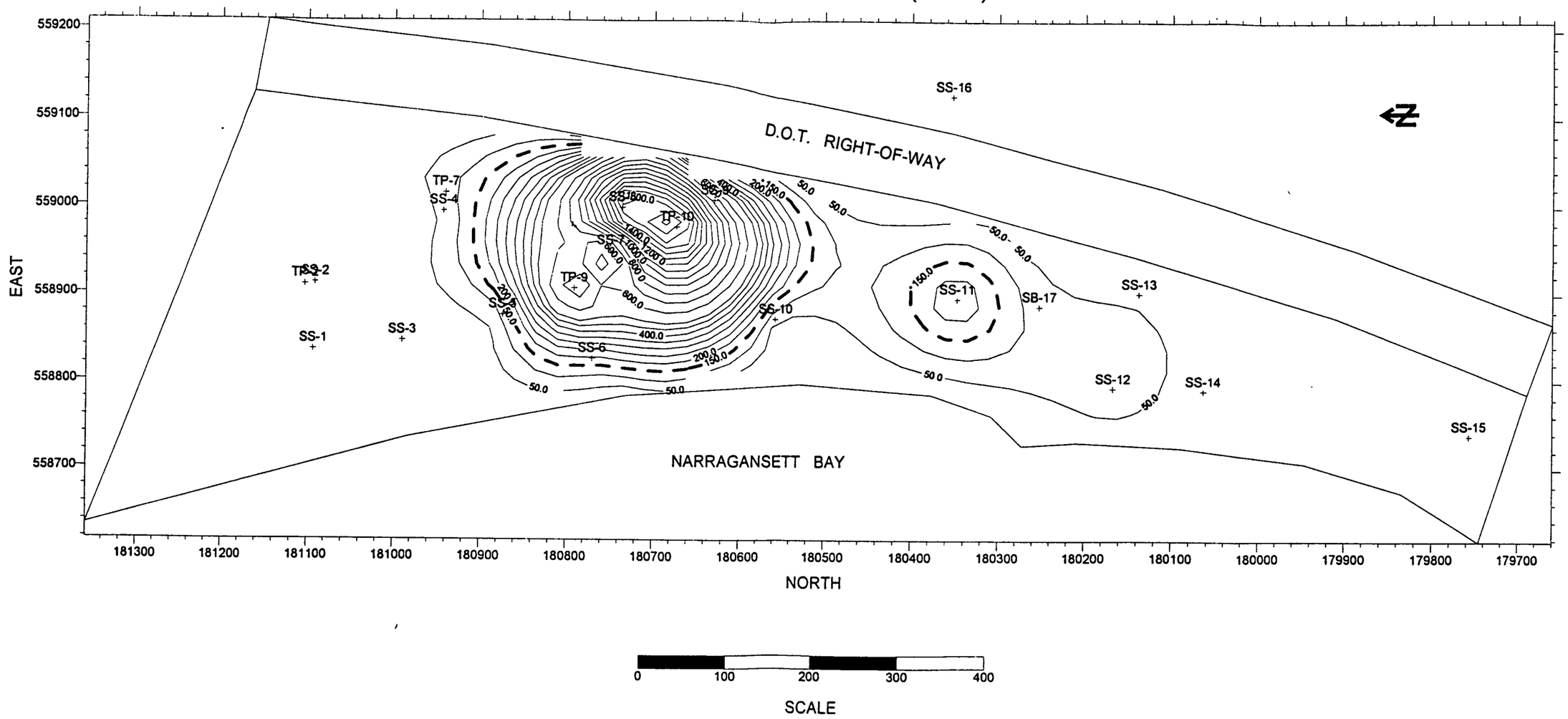


FIGURE 5

Arsenic - Surface Contamination (0-2 feet)

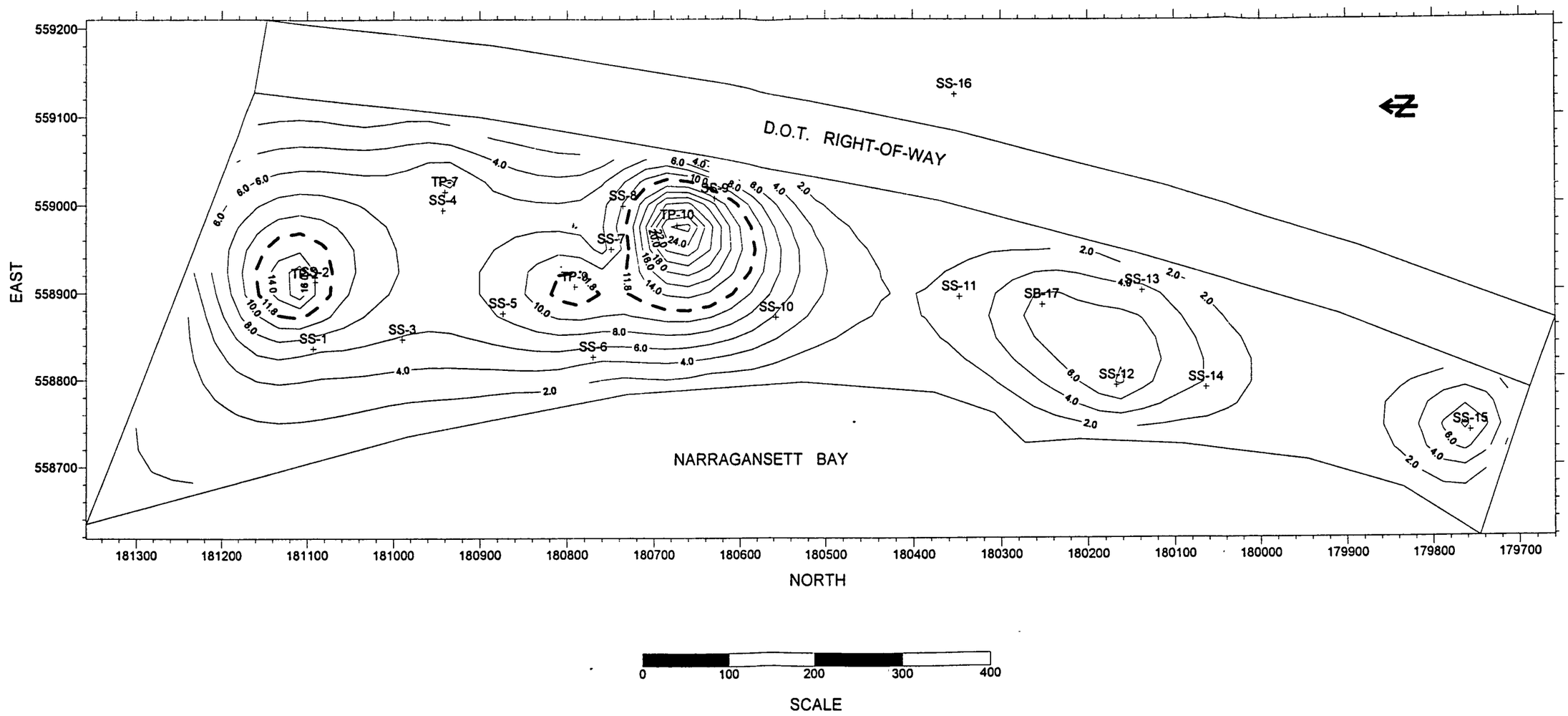


FIGURE 1

Arsenic - Subsurface Contamination

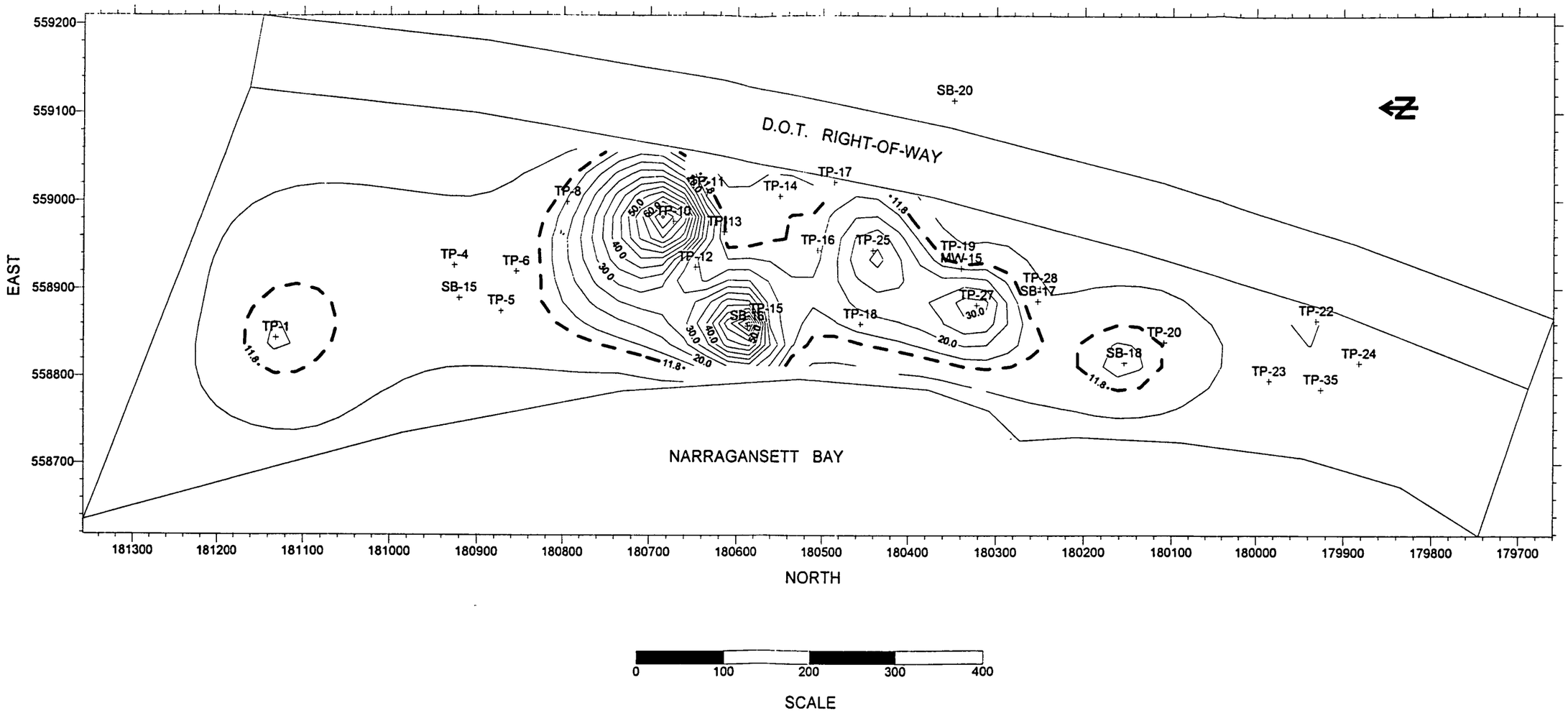


FIGURE 2