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NAS CECIL FIELD
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REMEDIATION WORK PLAN SITE 5 NAS CECIL FIELD FL

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BECHTEL ENVIRONMENTAL INC

REMEDIATION WORK PLAN
FOR SITE 5 - CECIL FIELD

FOR NAVAL AIR STATION - CECIL FIELD

JACKSONVILLE, FLORIDA

Prepared for

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Under Contract No. N62467-93-D-0936

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REVISION 0

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FOREWORD

This Remediation Work Plan (RWP) has been prepared to document the scoping and planning process performed by the U.S. Navy to support remedial action activities at Site 5 of Operable Unit 2 located at the Naval Air Station (NAS) Cecil Field site in Jacksonville, Florida.

NAS Cecil Field is on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List. A negotiated, signed Federal Facilities Agreement is in place for the site. Under CERCLA guidelines, an interim remedial action is planned at Site 5 in accordance with this RWP.

Remedial action is necessary in selected areas of contamination for the protection of human health and the environment. This RWP describes the approach that will be used to conduct the remedial action and describes the organization that will be employed.

1.0 INTRODUCTION

The U.S. Department of Navy, Southern Division, Naval Facilities Engineering Command intends to conduct remedial actions at the Naval Air Station (NAS) Cecil Field, Jacksonville, Florida. This Work Plan addresses Operable Unit 2, Site 5, which is the former Oil Disposal Area, Northwest, where waste oils, fuels, and grease were reportably dumped in an unlined pit. Bechtel Environmental, Inc. (BEI), the Environmental Response Action Contractor, will perform the remedial action on this site. This remedial action is required to address contaminated soils acting as a source of contamination at Site 5 at NAS Cecil Field.

This Remediation Work Plan (RWP) is intended to document the scope of the remediation effort and the procedures to be used.

The activities described in this plan are based on the following:

- Observations made during a site visit by BEI and Navy personnel to NAS Jacksonville on July 12, 1994

- Discussion and conclusions from a meeting held between BEI, ABB Environmental Services, Inc. (ABB-ES), and Navy personnel in Jacksonville on July 12, 1994

- Information contained in the Focused Feasibility Study, Site 5, Operable Unit 2, Source Control Remedial Alternatives, NAS Cecil Field, Jacksonville, Florida, prepared by ABB-ES, April 1994.

In implementing this Plan, BEI will supply qualified personnel and equipment to the project; coordinate, manage, and supervise construction and soil remediation activities onsite; ensure compliance with contract and regulatory requirements; and lastly, provide documentation to the Navy that will include a data summary. BEI's approach to complete these tasks is presented in the following sections of this plan.

The remainder of Section 1.0 provides general site information and the justification and objectives for the proposed remediation.

Section 2.0 presents the BEI organization and responsibilities for completing the work.

Section 3.0 provides a site history and a brief description of Site 5.

Section 4.0 provides the scope of work, the approach BEI will take to achieve the remedial objectives, and a description of the remedial action components and field activities.

Section 5.0 presents BEI's sampling and analysis plan and includes details on the surveys and remediation activities planned.

Sections 6.0, 7.0, and 8.0 address the Waste Management Plan, Safety and Health Plan, and Quality Control Plan, respectively.

1.1 GENERAL SITE INFORMATION

NAS Cecil Field is located in southwestern Duval County approximately fourteen miles southwest of downtown Jacksonville. The site encompasses approximately 31,000 acres. The primary mission of the site is to provide a work place, service, and managerial support for the operation and maintenance of naval weapons and aircraft to activities and units of the operating forces as designated by the Chief of Naval Operations.

1.2 JUSTIFICATION AND OBJECTIVES FOR THE PROPOSED ACTION

The primary threat to human health and the environment associated with Site 5 is related to the potential for uncontrolled releases of contaminants from exposed surfaces and subsurface disposal areas. Contaminants could be released from these sources via infiltration and percolation, wind dispersion, gaseous emissions, runoff, leaching to groundwater, and disturbance by humans or animals. Even though the soil contamination does not pose an immediate threat to human health, the cleanup of uncontained materials is necessary for the longterm protection of human health and the environment.

2.0 ORGANIZATION AND RESPONSIBILITIES

2.1 PROJECT ORGANIZATION

BEI is the Environmental Response Action Contractor for the Navy, Southern Division Naval Facilities Engineering Command. BEI will subcontract for necessary laboratory support and analyses required for NAS Cecil Field. A project organization chart is provided in Figure 2-1.

2.2 COORDINATION AND RESPONSIBILITIES FOR FIELD WORK

As the Environmental Response Action Contractor for the Navy, BEI provides support to the NAS Cecil Field and management of remedial action field activities, which includes all activities necessary to implement field work delineated in work plans. Typically, these activities include development and procurement of subcontract services; development, implementation, and overview of plans; collection and review of data, including sampling results, quality assurance/ quality control submittals, and sample tracking and custody; technical guidance to onsite personnel; report preparation; cost management; and schedule control.

The BEI program manager is responsible to the Navy for the completion of all aspects of the work. The program manager is supported by a project manager and representatives from engineering, construction, environmental safety and health, contract administration, quality control, project administration, and project controls. A brief description of the responsibilities of the project manager and each group are described below.

2.2.1 Project Manager

- Implements overall guidance provided by the BEI program manager on a site-specific basis

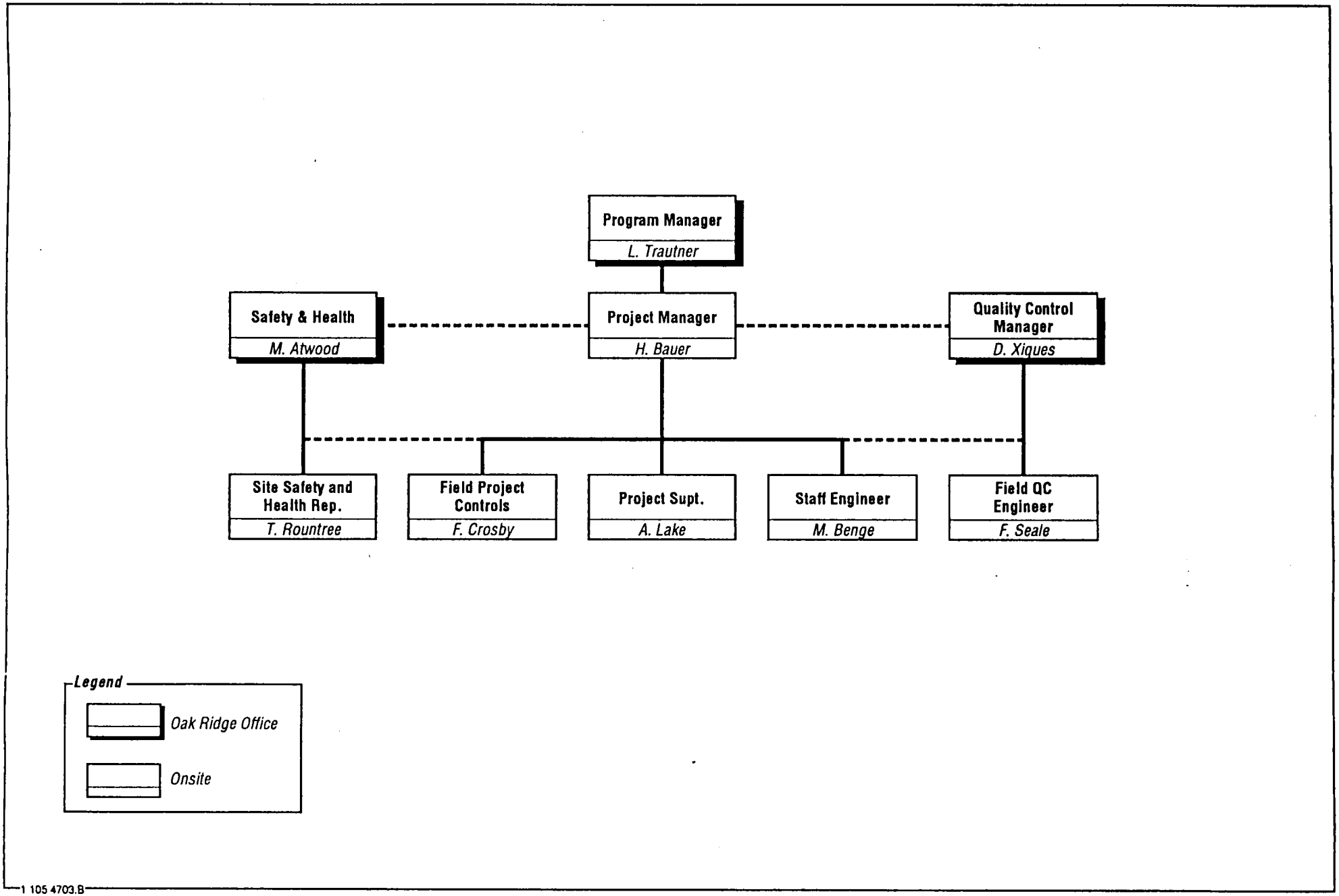

Figure 2-1
Project Organization

- Manages a team of professionals from each of the disciplines described below to accomplish the goals of the Naval Facilities Engineering Command project managers and the BEI program manager

- Interfaces directly with Navy project managers to implement directions on a site-specific basis

2.2.2 Engineering

- Develops bid packages and technical specifications needed to subcontract any remedial action work

- Provides site interface/coordination with regulatory agencies

- Modifies technical specifications and drawings, as required

- Provides geotechnical field support to remedial action efforts

- Provides onsite waste management and identification

- Participates in technology selection

- Develops work plans for remedial action

- Manages and evaluates chemical data obtained during remedial action activities

2.2.3 Construction

- Reviews all site plans for constructibility

- Provides field engineering services to monitor onsite work

- Administers subcontracts to complete work plans (i.e., cost, completion)

- Obtains manual craft

- Directs craft to implement work plans

- The project superintendent is responsible to the BEI project manager for day-to-day operations at the site.

2.2.4 Environmental Safety and Health

- Develops plans, objectives, evaluations, and documentation for all environmental compliance, safety, and health matters

- Ensures that all applicable federal, state, and local regulatory requirements are met

- Supports onsite waste management

- Provides site-specific safety and health training
- Provides a site safety and health representative (SSHR)
- Performs audits of site activities to ensure implementation of the Safety and Health Plan and to assess the effectiveness of the program.

2.2.5 Contract Administration

- Identifies bidders for subcontract work
- Coordinates bid and subcontract bid and award process
- Manages revisions to subcontracts
- Ensures compliance with Prime Contract

2.2.6 Quality Control

- Prepares site-specific quality control (QC) plan
- Implements the QC plan
- Audits quality assurance system and performance
- Conducts periodic reviews of program plans

2.2.7 Project Controls

- Provides cost and schedule support, including budgeting and monitoring
- Provides site automation services

2.2.8 Project Administration

- Provides administrative services such as document control, reproduction, archival, and mail distribution
- Provides document editing services

3.0 SITE BACKGROUND AND SETTING

3.1 GENERAL SITE DESCRIPTION

This RWP focuses on Site 5, Operable Unit 2 (Figures 1-1 and 1-4, Appendix A) located east of Perimeter Road and to the west of Lake Fretwell. Site 5 covers an area of approximately 2 acres where waste oil and fuel were disposed in a pit. Visible staining of soils is evident at the site and

a distinct petroleum odor exists when soils are disturbed. Additionally, it is estimated that 300 gallons of free product are contained within Site 5.

3.2 SITE HISTORY

Disposal was conducted at Site 5 in the 1950s. Unknown quantities of waste fuel and oil were dumped at the site. Based on the appearance of soils and odor still present at the site, waste liquids may have been disposed of at the site more recently than the 1950s. Solvents, paints, and paint thinners may have also been mixed with waste oils and disposed at the site; however, specific records of such disposal are not available. A disposal pit can be seen on 1969 aerial photographs (ABB-ES 1994).

Samples have been collected within the area of the historical pit. Samples were analyzed for selected organics, metals, pesticides, and polychlorinated biphenyls (PCBs). Soils were found to be contaminated with ethylbenzene, toluene, xylenes, trichloroethylene, phenols, PCBs, and polynuclear aromatic hydrocarbons. Total recoverable petroleum hydrocarbons (TRPHs) were detected in all samples.

4.0 SCOPE OF WORK

4.1 REMEDIAL ACTION OBJECTIVES, SOIL ACTION LEVELS, AND INTERIM ACTION DESCRIPTION

4.1.1 Remedial Action Objectives (RAOs)

Waste oils and fuels were disposed of at Site 5. As a result, contaminated soils and free product are acting as a source of groundwater contamination. Remediation of contaminated soil in the vadose zone and the free product present above the water table would reduce the source of groundwater contamination and reduce risks associated with direct contact exposure. Therefore, RAOs at Site 5 for this interim remedial action are (ABB-ES 1994):

- Remediate contaminated soils in the vadose zone to reduce the source of contaminants to groundwater
- Remove free product to the extent practicable to reduce the source of contamination to groundwater
- Remediate contaminated surface soils to reduce health risks from direct contact exposure

The RAOs for the interim remediation do not address soil below the groundwater table; the RAOs were developed to reduce direct contact risks (ABB-ES 1994).

4.1.2 Soil Action Levels

The soil action levels that are the basis for defining the extent of soil removal and for establishing a soil treatment standard are 50 ppm TRPH and 1 ppm PCBs (ABB-ES 1994). TRPH data are extensive for the site and other contaminants including PCBs were found to be contained within the area of TRPH contamination.

4.1.3 Interim Action Description

The remedial alternative selected for the interim action to achieve the RAOs consists of excavation of contaminated soil from Site 5 with subsequent onsite biological treatment of contaminated soil (ABB-ES 1994). A process-flow diagram for this alternative is provided in Figure 4-3, Appendix A. A schedule showing estimated durations of the work described in this work plan is also provided in Appendix A. The following subsections are descriptions of the scope of specific work items required to implement the interim remedial action.

4.2 MOBILIZATION

Mobilization will include delivering to the jobsite and work areas all construction equipment, tools, materials, supplies, and miscellaneous articles and establishing a work force sufficient to commence and sustain construction and remediation activities as required.

4.3 CLEARING

Clearing will consist of removing all designated vegetation and debris within the established limits of areas to support the remedial action activities. Clearing will be performed in accordance with the Technical Specification for Clearing and Grubbing, Appendix B.

Clearing will be required for the area of soil designated to be excavated, an area for installation of the onsite soil treatment system, including sufficient area for O&M of the system, a temporary contaminated soil stockpile, and an area for storage of materials, supplies, and equipment.

4.4 WELL CLOSURE/INSTALLATION

4.4.1 Monitoring Well Closure

Prior to soil remediation, six monitoring wells within the limits of excavation will be removed and closed by ABB-ES. Appropriate replacement monitoring wells will be installed by ABB-ES.

4.5 WINDROW TREATMENT AREA CONSTRUCTION

Contaminated soil will be excavated from the designated area of Site 5 using conventional equipment and placed on top of a newly-constructed treatment area. The treatment area will consist of approximately 33 windrows of contaminated soil. The windrow treatment area will be constructed adjacent to the Site 5 excavation (see Appendix H, Figures). The purpose of the treatment area is to allow aboveground treatment of soil while preventing offsite migration of contaminated soil or water (ABB-ES 1994). The primary components of the windrows include a hydraulic barrier (e.g., a 30 mil High Density Polyethylene (HDPE) flexible membrane liner), a drainage layer (sand or gravel), and a treatment layer (contaminated soil). For additional information, see the Construction Drawing for Sections and Details of the Windrows, Appendix H. Additionally, a layer of sand may be placed between the drainage layer and the treatment layer to protect the integrity of the drainage layer during machinery operations. The hydraulic barrier and sand/gravel will be graded to allow adequate drainage. Surface water runoff controls (e.g., earthen berms, ditches, drainage piping, sumps, etc.) will be constructed as necessary to prevent off site migration of contaminants (see Section 4.6.4). A conceptual

drawing from the Focused Feasibility Study (ABB-ES 1994) of the treatment pad is shown in Figure 4, Appendix A.

The dimensions of the treatment area and facilities are included on the Plan, Section, and Details Construction Drawing in Appendix H.

4.5.1 Utilities

A water source and electrical generator will be provided for operation of the treatment system. Water will be necessary for moisture control of the soil windrows and electricity will be necessary for lighting, operation, maintenance of a storage facility, and equipment maintenance.

Water generated from the perforated drain pipe collection system within each windrow will be collected, stored, and used for future moisture control of the treatment windrows. The collected water will be applied to the treatment windrow area through a series of high pressure spray nozzles strategically placed throughout the treatment area. The recirculation of moisture control water, with the addition of rainfall, should be an adequate supply to control the treatment windrows. If sufficient water is not collected within the drainage system, a water tanker truck will be mobilized to supplement the recirculation and collection system.

4.6 CONTAMINATED SOIL EXCAVATION

4.6.1 Excavation Interferences

Prior to beginning excavation, the designated areas will be checked for existing utilities and other potential interferences. The BEI Construction Representative will perform a walkdown of the areas to be excavated to visually observe locations of manholes, hydrants, valves, open cuts, overhead obstructions, curbs, buildings, etc., and other unusual conditions. The NAS Cecil Field personnel will be consulted for as-built locations of underground utilities. In addition, the BEI Construction Representative will perform location surveys using standard field utility detection equipment. No excavation will be initiated until the subgrade interference survey is complete.

4.6.2 Limits of Excavation

The areal limits of excavation for Site 5 are indicated on Figures 2-1 through 2-4, Appendix A. These boundaries are primarily based upon historical TRPH contamination data that indicate exceedance of 50 ppm TRPH (ABB-ES 1994). The corresponding figures in Appendix A present the limits of remediation (or limits of excavation) for depths of 0 to 2 ft, 2 to 4 ft, 4 to 6 ft, and 6 to 8 ft. The limits of remediation for the 0 to 2 ft depth range (Figure 2-1, Appendix A) encompass the limits for the remaining depth ranges. Therefore, this boundary will define the areal limits of excavation on the ground surface. After soil within the 0 to 2 ft boundary is removed, the limits of excavation corresponding to the 2 to 4 ft and subsequent ranges will be established on the ground. Figure 2-5 (Appendix A), is a profile of the vertical limits of excavation based upon the estimated extent of TRPH exceeding 50 ppm. The total volume of unsaturated contaminated soil that will be addressed under this interim measure is estimated to be 16,300 yd^3.

This interim action will not address contaminated soil that is present below the groundwater table. Because of the historical fluctuation in the groundwater table from 1 ft to 7 ft bls and to maximize the amount of contamination that would be addressed by this interim action, the remediation is scheduled to occur in the proper season to maximize the amount of the vadose zone excavation. Evaluation of historical data suggest that groundwater has been the lowest in August and September and highest from November to April (ABB-ES 1994). Therefore, the vertical limit of excavation will be at the water table or at the point where the soil is saturated at the time of construction. In order to capitalize on the low groundwater table during the initial excavation, all contaminated soil will be excavated. Approximately one-third (1/3) of the material will comprise the treatment windrows, with the remaining two-thirds (2/3) of material used to construct a contaminated soil stockpile. Once the initial batch of contaminated soil is successfully treated, the remaining material would be placed within the treatment windrows in two additional batches.

Past investigations indicate that soil TRPH contamination may extend beneath Perimeter Road. TRPH data from field screening/sampling that will be conducted during excavation activities will dictate whether removal of soil underneath Perimeter Road will be necessary. If excavation affects the service of Perimeter Road, a temporary bypass road will be constructed to satisfy NAS Cecil Field requirements for continued service of this road.

During excavation, the areal extent of contaminated soil will be controlled using field screening sampling techniques to confirm the presence of soil above the 50 ppm guideline (i.e., soils above 50 ppm will be excavated). As the excavation progresses near the established limits as indicated on Figures 2-1 through 2-5 (Appendix A), field screening sampling will be initiated to delineate soil below the 50 ppm criterion to confirm that all material requiring excavation has been removed. For additional information regarding field screening sampling during excavation, see Section 5.0 of this RWP.

Confirmatory soil sampling of the sidewalls of the excavation will be completed in accordance with Section 5.0. Sampling will take place once excavation in an area, as determined in the field, has been completed (all OVA readings are less than 50 ppm). If confirmatory sampling results indicate that TRPH levels are greater than 50 ppm, field screening methods will be used to delineate the area of excess contamination (over 50 ppm on the OVA). Excavation will proceed as specified above and new confirmatory sampling will be completed to ensure that all contamination over the specified levels have been removed.

Once all material has been excavated and the extent of contaminated material requiring removal is verified, a registered land surveyor will provide the necessary survey information (coordinates, cross-sections, elevations, etc.) to prepare as-built drawings for the excavation.

4.6.3 Method of Excavation

Excavation will be performed in accordance with the Technical Specification for Contaminated Earthwork and Miscellaneous Demolition, Appendix C.

All excavation will be by backhoe and/or excavator where practical. In areas where interferences are present and preclude use of mechanized equipment, excavation will be by hand. All

interferences such as existing utilities will be properly maintained while the excavation is in progress and remain protected until the excavation is backfilled.

4.6.4 Run-on and Run-off Controls

Run-on and run-off controls will be constructed to prevent stormwater runoff from entering the open excavation and soil treatment area. The controls will also prevent potentially contaminated stormwater or groundwater seepage that may pond inside the open excavation and soil treatment area from migrating offsite. These controls will consist of earthen berms, diversion ditches, stormwater drainage piping and inlets, and silt fences, as necessary.

4.6.5 Free Product Removal

Based upon results of past investigations, a non-aqueous phase liquid (NAPL) or free product, is present at Site 5 (observed in monitoring well CEF-5-6S and surrounding temporary wells) directly above the water table (Figure 1-11, Appendix A), estimated to be 10 in. thick, with an estimated volume of 300 gallons (ABB-ES 1994). Analysis of the free product indicated the presence of PCBs at 26 mg/ℓ.

Any free product encountered as a result of excavation and observed standing or floating within the excavation will be removed to the extent practicable. Free product will be removed by total fluids pumping (water and free product). All pumps, hoses, and appurtenances will be set up to preclude leaks, spills, explosion, etc., and will be flushed with water prior to disconnection to eliminate residual material within internal surfaces of the equipment. The free product and any free product/groundwater mixture will be pumped and containerized at a location adjacent to Site 5.

Excavation of soils saturated with free product will be a continuation of the excavation of vadose zone soils. This saturated soil will be separated from unsaturated soil, as practicable, during excavation activities. Saturated soil will be segregated as necessary and placed on a drainage pad that will allow the free product to drain from the saturated material. The drained, liquid material will be collected, containerized, and transported offsite for proper disposal. It is assumed that the saturated soil will contain greater than 1 ppm PCBs and, therefore, will require offsite treatment and/or disposal (see Section 6.0). Free product and associated saturated soil will be removed to the extent practicable as directed by the BEI Construction Representative. The volume of saturated soils is estimated to be 10 yd^3 (ABB-ES 1994).

Absorbent media will also be used as necessary to remove free product. All free product recovered by pumping and expended absorbent media containing the recovered free product will be containerized and dispositioned in accordance with Section 6.0, Waste Management.

4.6.6 Material Transport

As contaminated soil is excavated, the material (unsaturated only) will be loaded into trucks for transport to the newly construction windrow treatment pad. All material will be loaded, transported, and off-loaded in accordance with the Technical Specification for Transportation of Contaminated Materials, Appendix D. The material will be off-loaded directly onto the treatment pad as directed by BEI Construction Representative, and as shown on Figure 4, Appendix A.

4.7 SOIL STOCKPILE CONSTRUCTION

4.7.1 Contaminated Stockpile Construction

Contaminated soil excavated from Site 5 and awaiting treatment will be stored in the temporary contaminated soil stockpile.

The area designated for the contaminated soil stockpile will be cleared as indicated in Section 4.3. Once cleared, the site will be graded as required. A 30 mil High Density Polyethylene (HDPE) liner will be placed to contain the material. The contaminated soil stockpile will be protected daily with a temporary, minimum 5 mil cover. The daily cover will be provided to totally contain the contaminated soil stockpile. The specified cover will be such that the effort to remove and apply the cover is minimal. The cover will be held in place by nylon rope and steel drive anchors. The site, liner, and cover will be such that runoff resulting from the stockpile will be directed back into the excavation at Site 5.

The contaminated soil stockpile will be sized to provide containment for approximately 2/3rds of the excavated soil. A construction drawing for the contaminated stockpile is included in Appendix H.

4.8 OPERATION AND MAINTENANCE OF THE WINDROW COMPOSTING TREATMENT SYSTEM

Treatment of the unsaturated soil will be accomplished onsite using the windrow composting system. This technique consists of creating optimal microbial conditions within the contaminated soil through the mechanical turning of the soil at regular intervals by mobile equipment. Initially, composting amendments including lime, animal manure, or other organic rich material will be added and mixed with the soil by mechanical means using conventional construction equipment (backhoe and/or front-end loader) or special windrow machinery. After initial mixing, the mixed materials will then be formed into windrows.

The actual dimensions of the windrows are largely a function of the characteristics of the composting material and the equipment used for turning. Windrows are typically trapezoidal in shape (Figure 4, Appendix A). The windrows will be from 10 to 12 ft wide and 2 to 3 ft high, 250 ft long, and spaced 2 ft apart, forming 33 parallel windrows on the treatment pad. The estimates are based upon treatment taking place in three 5,400 yd^3 batches of soil. (See Appendix H, Figures.)

After the soil has been excavated, placed on the treatment pad, initial amendments added and mixed, and formed into a windrow fashion, operation and maintenance (O&M) of the treatment system will begin. O&M requirements will include periodic mechanical turning (mixing) of the soil windrows to provide oxygen, maintain proper soil pH, nutrient, and moisture levels. The frequency of soil mixing is estimated to be once every 5 to 7 days (ABB-ES 1994). Treatability testing by ABB-ES has been initiated to determine the optimum O&M parameters necessary to successfully treat the soil.

O&M will also include drainage and runoff control, placement of a cover (e.g., plastic sheeting) over the treatment area as necessary for rain infiltration control, dust and odor control, storage

and maintenance of supplies, equipment and machinery maintenance, data evaluation, and progress reporting.

O&M of the composting treatment of soils will include periodic sampling and analysis to determine if treatment is being accomplished. Soil samples will be composited (one sample from every 200 yd^3 of soil). Nutrient, pH, and moisture levels will be monitored and adjusted as needed. Levels of TRPH and PCB concentrations and enumerations of total-and-petroleum-specific bacteria will be monitored. Decline in TRPH concentrations and increase in total and petroleum-specific bacteria over time are indications that removal of organic contaminants is occurring. Sampling and analysis requirements are presented in Section 5.0.

The cleanup criteria established for Site 5 soil is to achieve reduction of TRPH to 50 ppm (ABB-ES 1994). Bioremediation of Site 5 soils would cease when the cleanup criteria (50 ppm TRPH and 1 ppm PPB) has been achieved. It is estimated that it will require approximately 120 days to treat one batch of Site 5 soil (ABB-ES 1994) or a total of approximately one year for total treatment time. More accurate predictions of treatment time can be made through treatability testing.

Because this treatment system is primarily aerobic, the treatment system developed for Site 5 is probably not conducive to PCB contamination (ABB-ES 1994). Soil monitoring for PCBs is required prior to backfilling treated soils into the excavation to ensure that PCB concentrations are below the PCB action level of 1 ppm established for this interim action.

4.9 BACKFILL

Backfill will be performed in accordance with the Technical Specification for Uncontaminated Earthwork, Appendix E.

Initially, the excavation will be backfill with general fill from a borrow source reviewed and approved by BEI. Prior to obtaining treated soil, general fill will be used to bring the excavation up to within four feet of land surface. This will provide a safe, open excavation to accommodate the long treatment durations, and preclude water from filling the excavation during the treatment periods when the excavations is open. Additionally, the area of excavation remaining open will be protected using temporary fencing to avoid inadvertent intrusion until the areas are backfilled. All backfill from a borrow source will have a TCLP analysis for the specific parameters in Table 5-1.

Backfill, consisting of the treated soil, will be used for the remaining areas of excavation once sampling of the treated soil meets cleanup criteria. Stormwater and/or groundwater seepage that may be present in the excavation will be removed by pumping and disposed of properly. Once sampling results indicate particular units of soil (e.g., one soil windrow) have been successfully treated, the treated soil will be used to backfill the open excavations. Sampling will be conducted in accordance with Section 5.0. All material placed within the excavation at Site 5 will be field compacted a minimum of four passes with the tracks of earth moving equipment. Material shall be compacted in lifts of approximately 1 ft.

4.10 SITE RESTORATION

After all disturbed areas of excavation have been successfully backfilled, the site will be graded to drain as required. The excavation grade will be raised above surrounding elevations and sloped from the center outward to a minimum slope of 50 horizontal to 1 vertical so that runoff will flow away from the backfill area. Runoff controls will be installed, as necessary, to control runoff into adjacent streams. If additional material is required to grade the area, general fill will be used from approved sources. At the completion of finish grading, all disturbed areas will be seeded.

4.11 TREATABILITY STUDY

As part of this interim action, a treatability study is presently being conducted by ABB-ES to optimize bioremediation treatment parameters at Site 5. Testing will involve simulation of bioremediation of the Site 5 soils. Test results will be used to determine if conditions exist that inhibit bacterial activity and if windrow treatment is capable of reducing the levels of TRPH in soil. Treatability testing is not included as part of this Work Plan.

4.12 POST CLOSURE REPORTING

BEI will provide a final construction documentation regarding the remedial action to Cecil Field personnel. This documentation will include as-built drawings of the excavation, sampling and analysis data, treatment results, etc. ABB-ES will prepare a final Remedial Action Report.

5.0 SAMPLING AND ANALYSIS PLAN

This section describes the sampling and analysis for field screening and biological treatment of contaminated soils at the Site 5, Former Oil Disposal Area, Northwest. Sampling methodology and procedures described in this Sampling and Analysis Plan (SAP) are based on FDEP requirements as found in the Florida Department of Environmental Protection *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities* (DERQA-001/92) (see Appendix F) and *Quality Assurance Standard Operating Procedures for Petroleum Storage System Closure Assessments* (see Appendix G).

As outlined in FDEP's *Quality Assurance Standard Operating Procedures for Petroleum Storage System Closure Assessments* (Appendix G), field screening techniques (EPA DQO Level I) using an OVA will be used to delineate the area where soil remediation is required. EPA DQO Level III data will be required for post-excavation and biological treatment to determine that remediation and/or treatment goals have been achieved.

5.1 SAMPLING PROTOCOL

5.1.1 Decontamination

Sampling equipment will be decontaminated prior to collection of each sample. Decontamination will be completed in accordance with Section 4.1, "Decontamination," of FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities* (see

Appendix F). Used decontamination fluids will be containerized, stored and disposed of in accordance with the Navy Public Works Department.

5.1.2 Collection

Sampling, with the exception of field screening, will be performed in accordance with Section 4, "Sampling Procedures," of FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities* (see Appendix F). Field screening will be performed in accordance with Section IV, "Field Measurements," of FDEP's *Quality Assurance Standard Operating Procedures for Petroleum Storage System Closure Assessments* (see Appendix G).

5.1.3 Sample Identification

Sample identification will be in accordance with NAVRAC Project Procedure 6003, "Sample Identification and Data Encoding."

5.1.4 Logbooks

Field logbooks will be used for recording all field activities. Entries will include sufficient detail to reconstruct all significant activities. Logbook entries will be completed in accordance with the minimum requirements for recordkeeping included in Section 5.0, "Sample Custody and Documentation," of the FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*, included in Appendix F. This SOP includes the minimum requirements for recordkeeping.

5.1.5 Chain-of-Custody Records

In order to maintain sample traceability, each sample for offsite analysis will be properly documented on a chain-of-custody record. Chain-of-custody documentation will be completed in accordance with Section 5.3, "Custody Documentation Requirements for Field Operations," of the FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*, included in Appendix F.

5.1.6 Packaging and Holding Times

Sample volume requirements, frequencies, preservation techniques, minimum holding times, and container material requirements for samples are given in Tables 5-1 (unsaturated soil), and 5-2 (saturated soil associated with free product and decontamination water). The BEI Field Engineer is responsible for ensuring that a sufficient volume of each sample is collected and placed in the appropriate container with the proper preservation.

The preparation of all sampling containers and the container types, preservatives, and holding times are specified in the FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities* (Appendix F). Section 4.4, "Sample Handling," of the FDEP standard operating procedures contains the recommended container, preservation, and holding times for water, wastewater, soil, and sediment samples. Sample containers will meet all specifications outlined in the above-mentioned procedures.

Table 5-1
Data Requirements for Site 5
Unsaturated Soil (Vadose Zone) Sampling

Sample Event	Analytical Method	DQO Level	Sample Frequency	Sample Volume	Sample Container	Preservative	Holding Time	QC Samples Required[1]
Field Screening Sampling								
TVOC[2]	Head Space	I	As required during excavation	fill jar ½ full	16 oz. canning jar	None	Analyze immediately following temperature equilibration	Dup: 1/10
Confirmatory Sampling								
TRPH[3] (< or > 50 ppm)	modified EPA 418.1	III	12	fill jar	Glass, 8 oz. widemouth w/Teflon lined cap	Cool @ 4°C	14 days	Dup: 1/10[4] or 5 samples (whichever is >) Dup: 1/20 (TRPH) RB: 1/20 or weekly
Biological Treatment Soil Sampling[5] (of windrows)								
soil pH	Standard field method	N/A	4/wk	N/A	N/A	N/A	N/A	None
nutrients	HACH Method[a]	N/A	4/wk	TBD[8]	TBD[8]	TBD[8]	TBD[8]	None
moisture level	TBD[8]	N/A	4/wk	TBD[8]	TBD[8]	TBD[8]	TBD[8]	None
TRPH	modified EPA 418.1	III	1/wk	fill jar	Glass, 8 oz. widemouth w/Teflon lined cap	Cool @ 4°C	14 days	Dup: 1/20 TB: 1/cooler shipment RB: 1/20 or weekly MS/MSD: 1/20
TVOC[2]	Head Space	I	As required during excavation	fill jar ½ full	16 oz. canning jar	None	Analyze immediately following temperature equilibration	Dup: 1/10
PCBs[6]	EPA 8080	III	4/batch	fill jar	Glass, 8 oz. widemouth w/Teflon lined cap	Cool @ 4°C	14 days (to extraction) 40 days (to analyze)	Dup: 1/10 RB: 1/10 or weekly MS/MSD: 1/10
PAH[7]	modified EPA 3550/8100	III	4/two wks	fill jar	Glass, 8 oz. widemouth w/Teflon lined cap	Cool @ 4°C	14 days	
Bacteria enumeration (total and petroleum specific bacteria)	plate count technique	None	4/two wks	fill jar (1 gram)	Glass, 4 oz. widemouth w/Teflon lined cap	Cool @ 4°C	within 8 hrs of collection within 30 hrs of receipt (if preserved)	None
Backfill Sampling								
TCLP[9]-Inorganics	EPA Method 1311/6000-7000	III	1/wk	800 g	16 oz. clear widemouth	None	6 months	N/A
Biological Treatment Completion Soil Sampling								
TRPH	modified EPA 418.1	III	1/200 yd^3	fill jar	Glass, 8 oz. widemouth w/Teflon lined cap	Cool @ 4°C	14 days	Dup: 1/20 RB: 1/20 or weekly
PCBs (< or > 1 ppm)	EPA 8080	III	1/200 yd^3	fill jar	Glass, 8 oz. widemouth w/Teflon lined cap	Cool @ 4°C	14 days (to extraction) 40 days (to analyze)	Dup: 1/20 RB: 1/20 or weekly MS/MSD: 1/20

[a] HACH method assumed and is subject to change.
[1] TB: Trip Blank, RB: Equipment Rinsate Blank, FB: Field Blank, Dup: Duplicate, MS/MSD: Matrix Spike/Matrix Spike Duplicate
[2] TVOCs: Total Volatile Organic Compounds
[3] TRPH: Total recoverable petroleum hydrocarbons
[4] Target compound list (TCL) VOCs, TCL Semi-volatile Organic Compounds, and Inorganics
[5] Total time for treatment is approximately 120 days per batch (total of 3 batches)
[6] PCBs: Polychlorinated Biphenyls
[7] PAH: Polynuclear Aromatic hydrocarbons
[8] TBD: To Be Determined
[9] TCLP Toxicity Characteristic Leachate Procedure

Table 5-2
Data Requirements for Site 5
Saturated Soil and Decontamination Water Sampling

Sample Event	Analytical Method	DQO Level	Sample Volume	Sample Container	Preservative	Holding Time	QC Samples Required[1]
Saturated Soil							
TCLP Volatile Organics	SW-846	III	150 gms	4 oz. jar	Cool 4°C	14 days until extraction	N/A
TCLP BNAES	SW-846	III	800 gms	16 oz. jar	Cool 4°C	14 days until extraction	N/A
Flash Point	EPA 1010	I, III	400 gms	8 oz. jar	None	28 days	N/A
Paint Filter Test	EPA 9095	I, III	400 gms	8 oz. jar	None	None	N/A
PCBs	EPA 8080	III	150 gms	4 oz. jar	Cool 4°C	14 days until extraction	N/A
Decontamination Water							
TCLP Metals	EPA 6010 and 7471 (Hg only)	III	fill container	1-gal amber glass w/Teflon lined cap	Cool at 4°C	180 days to TCLP extraction; and 180 days to analysis	N/A
TCLP Extractable Organics	EPA 8270 (extractables) and EPA 8080/8150 (pest./herb.)	III	fill container	1-gal amber glass w/Teflon line cap	Cool @ 4°C	7 days to TCLP extraction; 7 days to solvent extraction of leachate; and 40 days to analysis	N/A
TCLP Volatile Organics	EPA 8240	III	fill container	(3) 40-ml vials w/Teflon septum seal	Cool @ 4°C	14 days to TCLP extraction; and 14 days to analysis	N/A

5.1.7 Verification

All confirmation and biological treatment sample data will be subject to a 100 percent verification. This includes data generated by field activities or as a result of laboratory analyses. The verification process will begin with manual entry or electronic loading of the data. Printouts of this information from the project database will be compared with the original hard copy of the data and resolved.

Documentation of all verification activities will be performed by the individual performing the verification. This documentation will consist of a signature of the person who performed the verification in the hard copy printouts from the project database. These signed verification printouts will be forwarded to the database manager or designee.

5.2 FIELD SAMPLING AND ANALYSIS

Samples identified in this section will be collected in accordance with FDEP's standard operating procedures as outlined in Section 4.3.4, "Soil Sampling Procedures." Analysis of these samples will be in accordance with FDEP's *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities*, Sections 5.0 through 10.0, included in Appendix F. Tables 5-1 and 5-2 provide a summary of the data requirements and analytical parameters for samples to be collected from the Site 5, Former Oil Disposal Area, Northwest.

5.2.1 Field Screening Sampling

Field screening of samples for the VOC component of TRPHs will be used to guide remediation activities. Soil samples will be collected and analyzed using a flame ionization detector (FID) in accordance with Section IV, "Field Measurements," of FDEP's SOPs (see Appendix F).

Each sample will be obtained in the vadose zone and screened with and without a carbon filter so a determination can be made whether naturally occurring organic (methane) vapors are having an effect on the FID levels detected. A Photoionization Detector (PID) may be used after a determination is made of that instrument's equivalent response to a FID.

During mobilization and prior to excavation activities, soil samples as specified in Table 5-1 will be collected and screened onsite using an FID detector as well as sent offsite for laboratory VOC analyses. The offsite analysis will have a two day turnaround. Laboratory and field screening results will be compared to determine an equivalence factor to the 50 ppm cleanup level, prior to actual field screening activities.

Field screening will be performed at locations as specified in Section 4.6, to aid in establishing limits of excavation of soil over 50 ppm for TRPHs. Soil will be excavated in the areas identified as contaminated with over 50 ppm as discussed in Section 4.6, after which field screening will be used to guide additional excavation activities. If necessary, additional field sampling may be completed in the field, at the discretion of the BEI Field Representative.

5.2.2 Biological Treatment Sampling

Biological treatment sampling includes samples collected during and following biological treatment. Grab samples will be collected and analyzed for parameters shown in Table 5-1. During biological treatment, soil pH, nutrient content, moisture level, and TRPH will be completed four times a week. TRPH sampling will be completed using an OVA. One sample per month will be sent off site for TRPH analysis using the modified method 418.2.

Since the treatment system for Site 5 is probably not conducive to PCB contamination, PCB sampling throughout the biological treatment process will not be performed; however, two PCB samples will be taken at the start and completion of biological treatment. Bacteria enumeration and polynuclear aromatic hydrocarbons (PAH) sampling will be completed throughout the biological treatment at the frequency of four every two weeks.

Each sample will be collected (composited) from locations equally distributed throughout the soil windrows and from a depth of at least 6 in. below the surface.

After biological treatment, soil samples will be collected from the treated soil at least once every 200 yd^3. Each sample will be analyzed for TRPHs and PCBs (Table 5-1) to determine whether soil treatment is complete, (i.e., if reduction in TRPH and PCB is below the action levels has been achieved).

5.2.3 Confirmatory Soil Sampling

To confirm that soils contaminated with greater than 50 ppm TRPHs have been excavated, confirmatory soil sampling will be conducted. Samples will be collected on the sidewalls and at the bottom of the excavation above the water table. An estimated 16,300 yd^3 of soil contaminated with TRPH concentrations greater than 50 ppm will be excavated from Site 5.

For confirmatory sampling, the number of required samples for the estimated 56,190 ft^2 (ABB-ES 1994) of the area to be excavated is twelve (*Michigan Department of Natural Resources, Guidance Document for Verification of Soil Remediation*, April 1994). A biased approach, based on the source areas and preferential pathways of contamination, will be used to select the twelve (including a minimum of one sample from each of the sideslopes) sampling locations. Using this approach, samples will be collected where TRPH contamination exceeding 50 ppm will most likely be encountered. This minimizes the number of samples necessary to verify that a site is remediated. Table 5-1 includes the sample confirmation and analysis requirements for soils.

6.0 WASTE MANAGEMENT

Waste management will be performed as directed by the Navy. Waste management practices, as defined in the Program Hazardous Waste Management Plan, will be used as guidance and appropriately followed for this work.

Hazardous waste, if identified, will be managed in accordance with RCRA, 40 CFR Parts 260, 261, 262, 264, 265, 270, 271, and 761. Hazardous waste will not be offered to any transporters or treatment, storage, or disposal facilities that do not have an EPA identification number.

To minimize the amount of materials that must eventually be disposed, waste minimization practices will be implemented during operations. These practices will include, but not be limited to:

- No extraneous materials taken into contamination control areas
- Decontamination and free release of equipment used to support onsite activities, to the extent practicable
- Use of consumables that can be compacted or otherwise volume reduced, to the extent practicable

Personal protective equipment (PPE) that is not visibly soiled will be disposed of as conventional waste. Contaminated portions of PPE will be managed as hazardous waste.

Stormwater runon and runoff controls will be implemented to prevent offsite migration of sediment or contaminated stormwater during site activities.

Water generated during decontamination activities will be containerized in a temporary holding tank. Prior to release of the water, a representative sample for offsite laboratory analyses of TCLP parameters will be collected (Section 5.0, Table 5-2). If the analytical results indicate that the water is not toxic (i.e., passes the TCLP), the water would be transported to the NAS Cecil Field wastewater treatment plant for management. If the analytical results indicate that the water is toxic (i.e., fails the TCLP), the water would be transported offsite for treatment in accordance with appropriate regulations.

All contaminated soil (unsaturated) excavated from Site 5 will be loaded into loose conveyance transport trucks and transported onsite to the windrow treatment pad for treatment.

Free product encountered during the excavation will be pumped into a portable tank and will be transported offsite for disposal. Any free product that is recovered with absorbent media will be containerized in lined 55-gallon drums for subsequent transportation and disposal offsite. Saturated soil associated with free product will be placed on a drainage pad to separate as much as practicable, the free liquid from the soil. The saturated soil will be sampled in accordance with Table 5-2 and then transported and disposed of offsite. The saturated contaminated soil will be tested for RCRA waste characteristics, paint filter test, and PCBs.

If the contaminated soil passes the tests (i.e., is not a RCRA and/or TSCA waste), then the soil can undergo bio-treatment or thermal treatment. If the saturated contaminated soil fails the RCRA test (i.e., is a RCRA waste), then the soil must be disposed of in a RCRA landfill. If the saturated contaminated soil fails the PCB test (i.e., has greater than 50 ppm PCB contamination), then the soil must be disposed of at a TSCA landfill.

Any nonhazardous solid waste that is generated as a result of mobilization and clearing activities will be properly disposed onsite or offsite as directed by the Navy.

7.0 SAFETY AND HEALTH

A Program Safety and Health Plan (PSHP) defines policies for work on the Navy RAC Project. A Site Safety and Health Plan (SSHP) has been prepared for Navy RAC bases. Addendum No. 6 to the SSHP, which is provided separately, defines task-specific requirements for remediation at Site 5.

8.0 QUALITY CONTROL PLAN

Quality control (QC) samples will be collected during sampling activities and will be used as a means of evaluating data quality in terms of precision and accuracy. QC checks also verify that sampling, handling, and analysis does not introduce contaminants in the sampling process. Section 5.0, Sampling and Analysis Plan, addresses the minimum field QC sampling frequency. A task specific quality control plan is provided separately.

APPENDIX A

FIGURES AND DATA OF EXISTING CONDITIONS AT SITE 5 AND PROPOSED INTERIM REMEDIAL ACTION

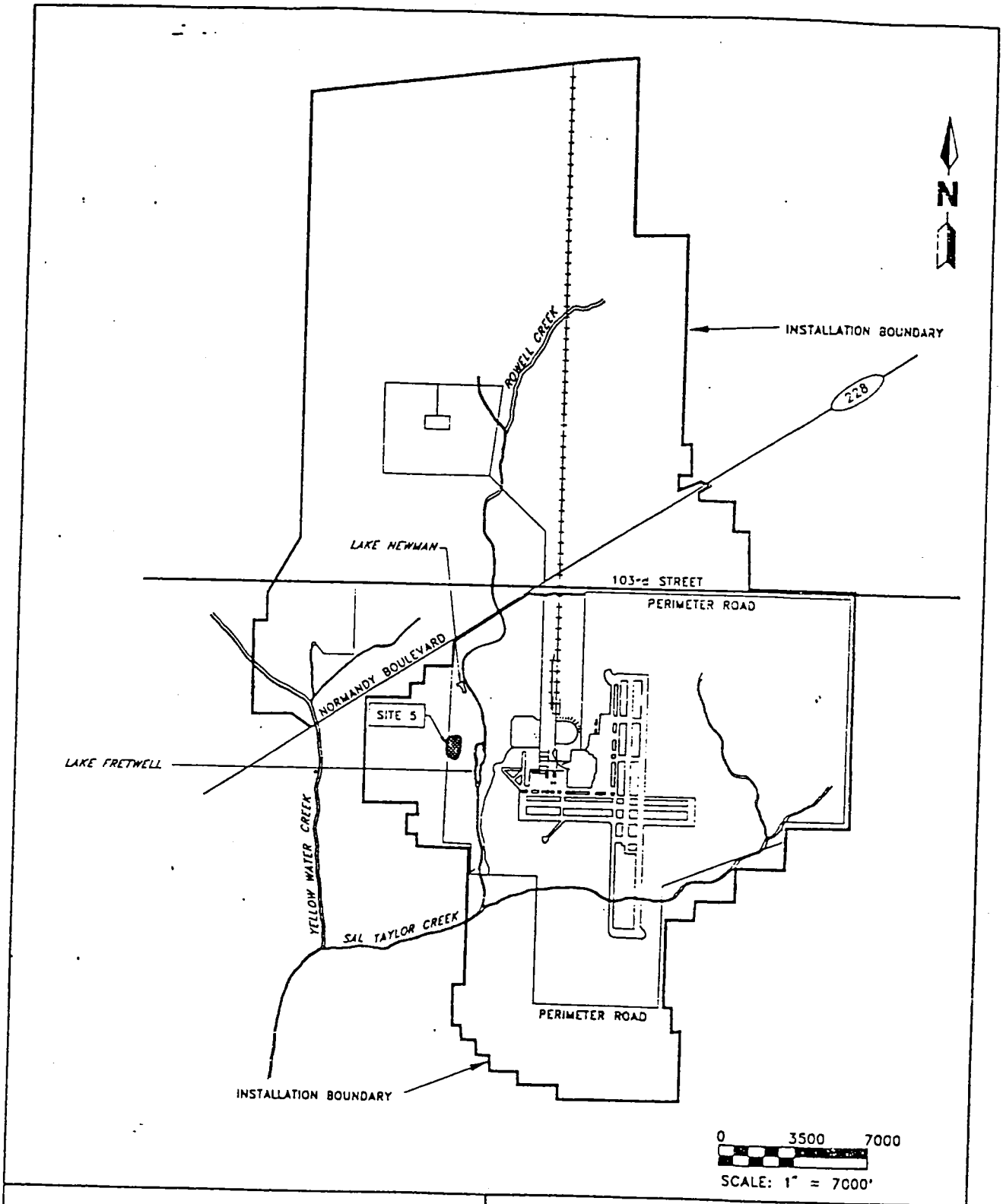

FIGURE 1-1
FACILITY MAP WITH LOCATION OF SITE 5

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FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CFSite5.FFS
MVL04.94

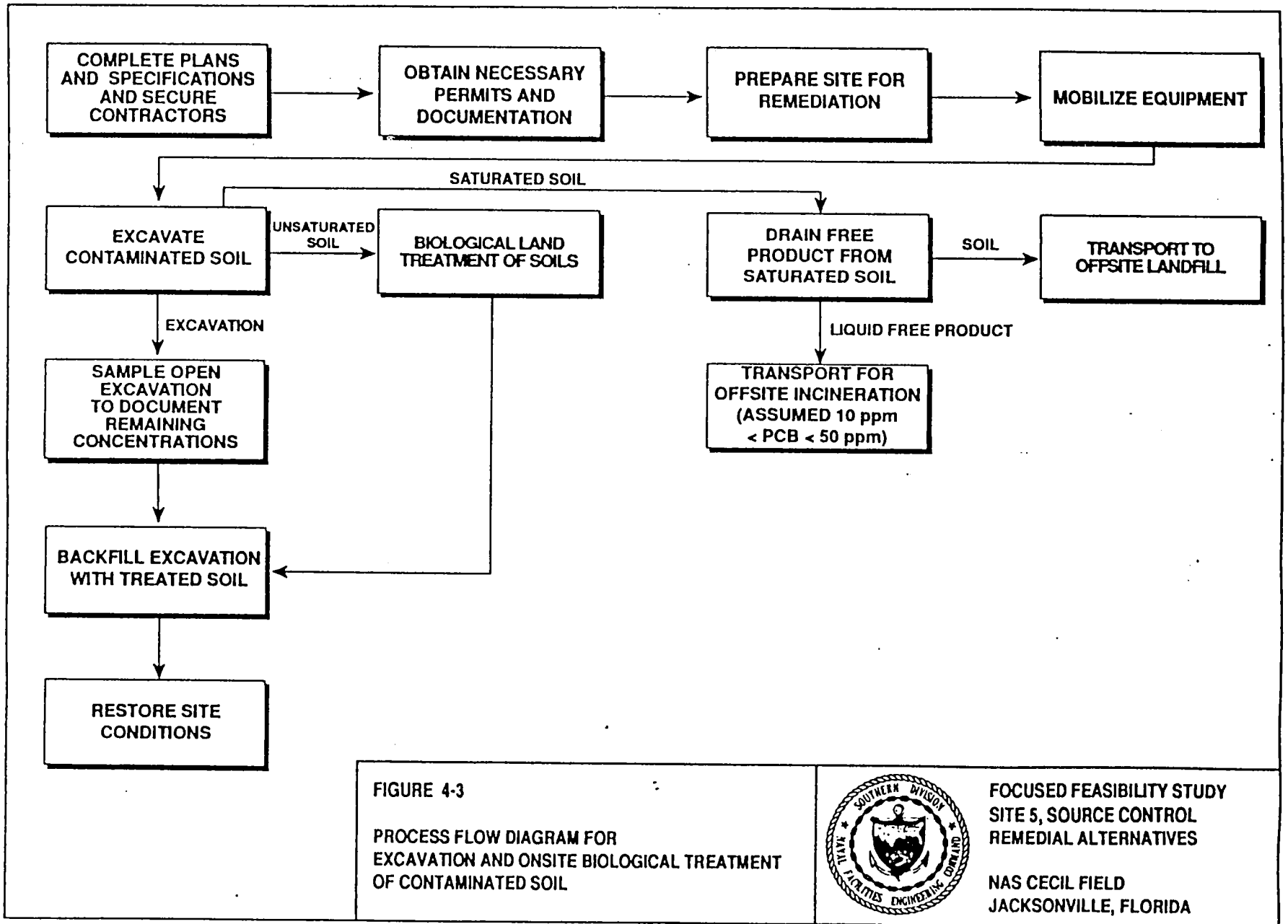

FIGURE 4-3

PROCESS FLOW DIAGRAM FOR
EXCAVATION AND ONSITE BIOLOGICAL TREATMENT
OF CONTAMINATED SOIL

FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

8520-25 940407WEM

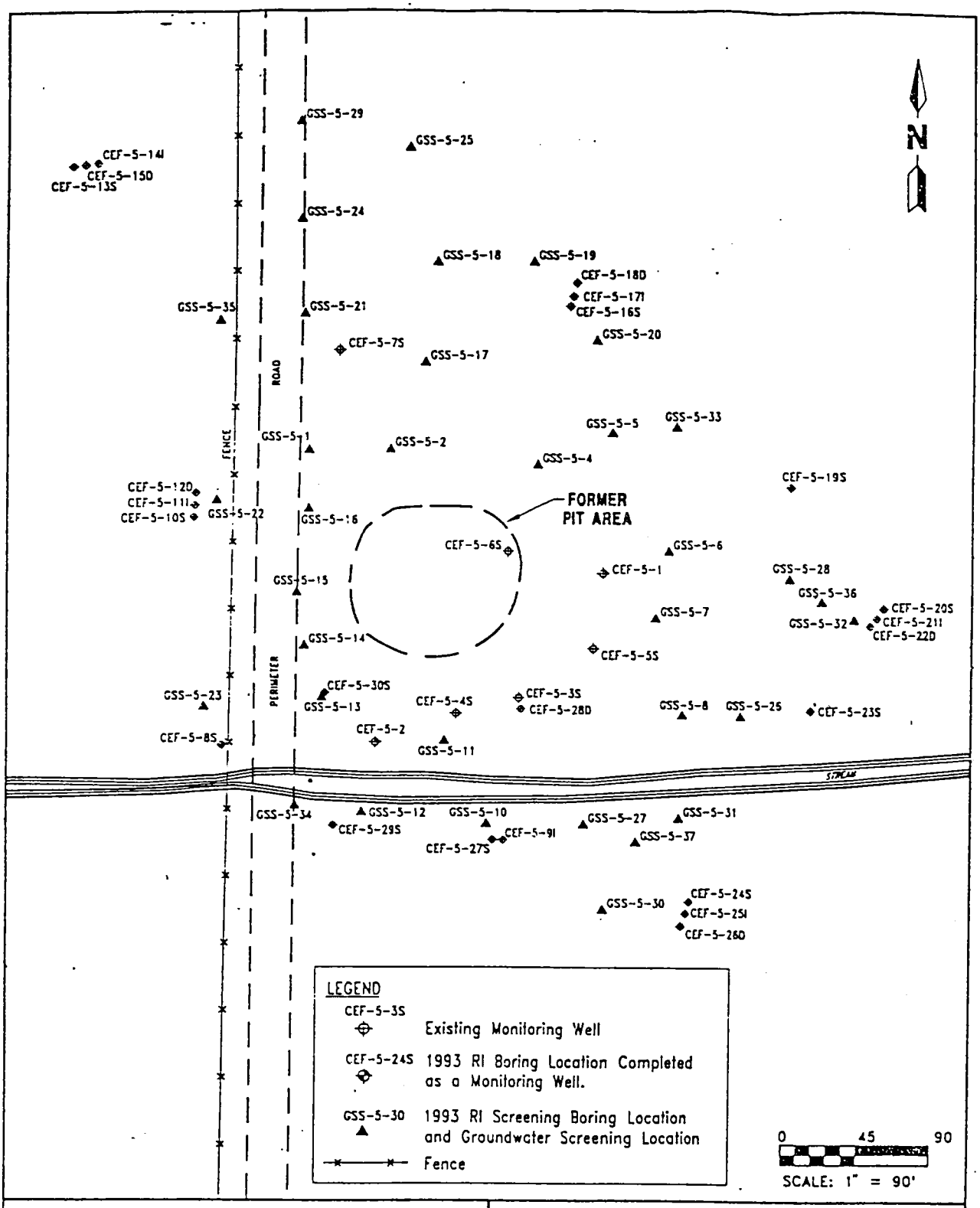

FIGURE 1-4
GROUNDWATER INVESTIGATION LOCATIONS

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FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

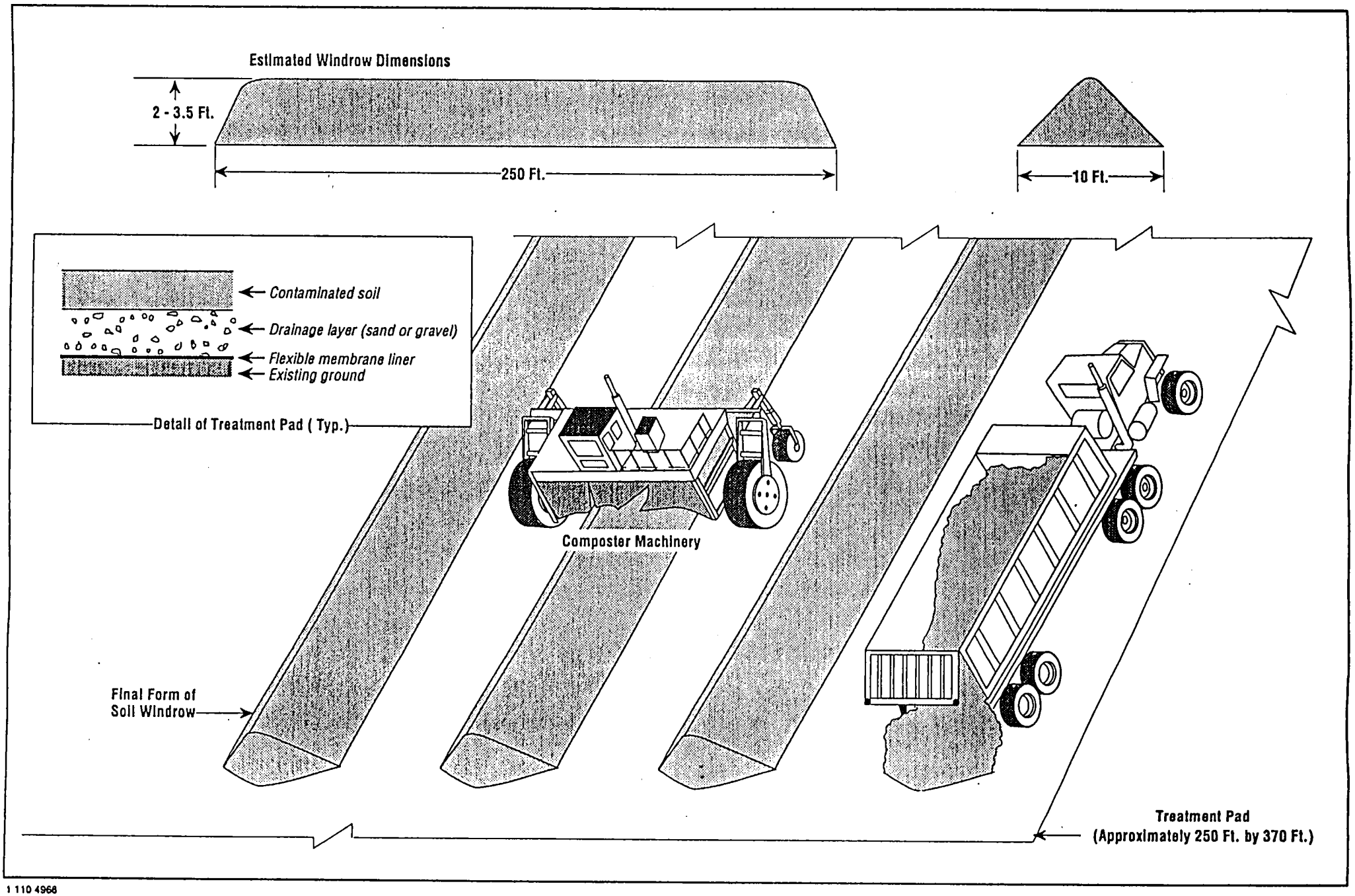

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Figure 4
Windrow Composting Operation

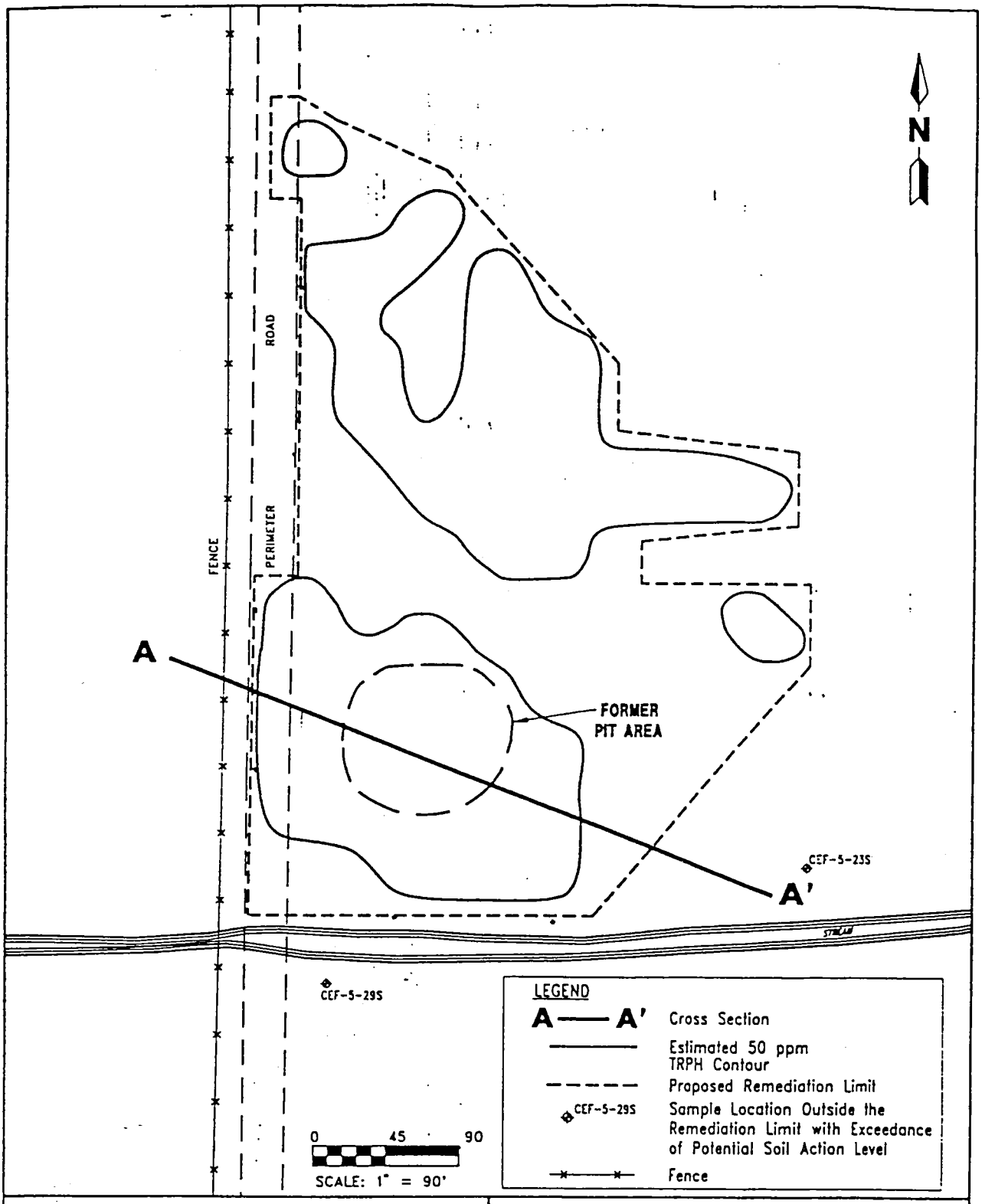

FIGURE 2-1
REMEDIAL LIMITS,
0 TO 2 FEET BELOW LAND SURFACE

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FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CFSite5.FFS
MVL.04.94

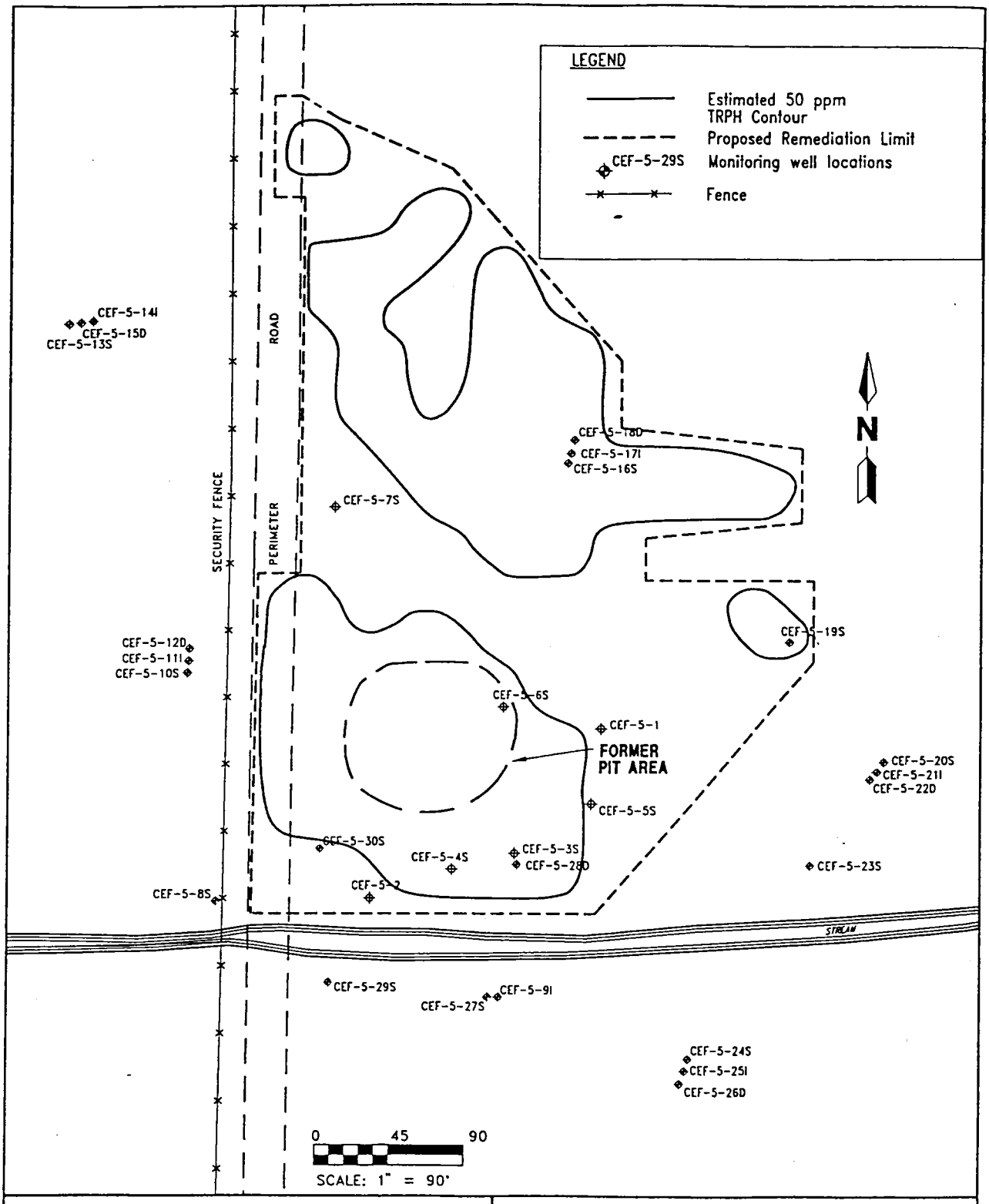

FIGURE 2-1
REMEDIAL LIMITS,
0 TO 2 FEET BELOW LAND SURFACE

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FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

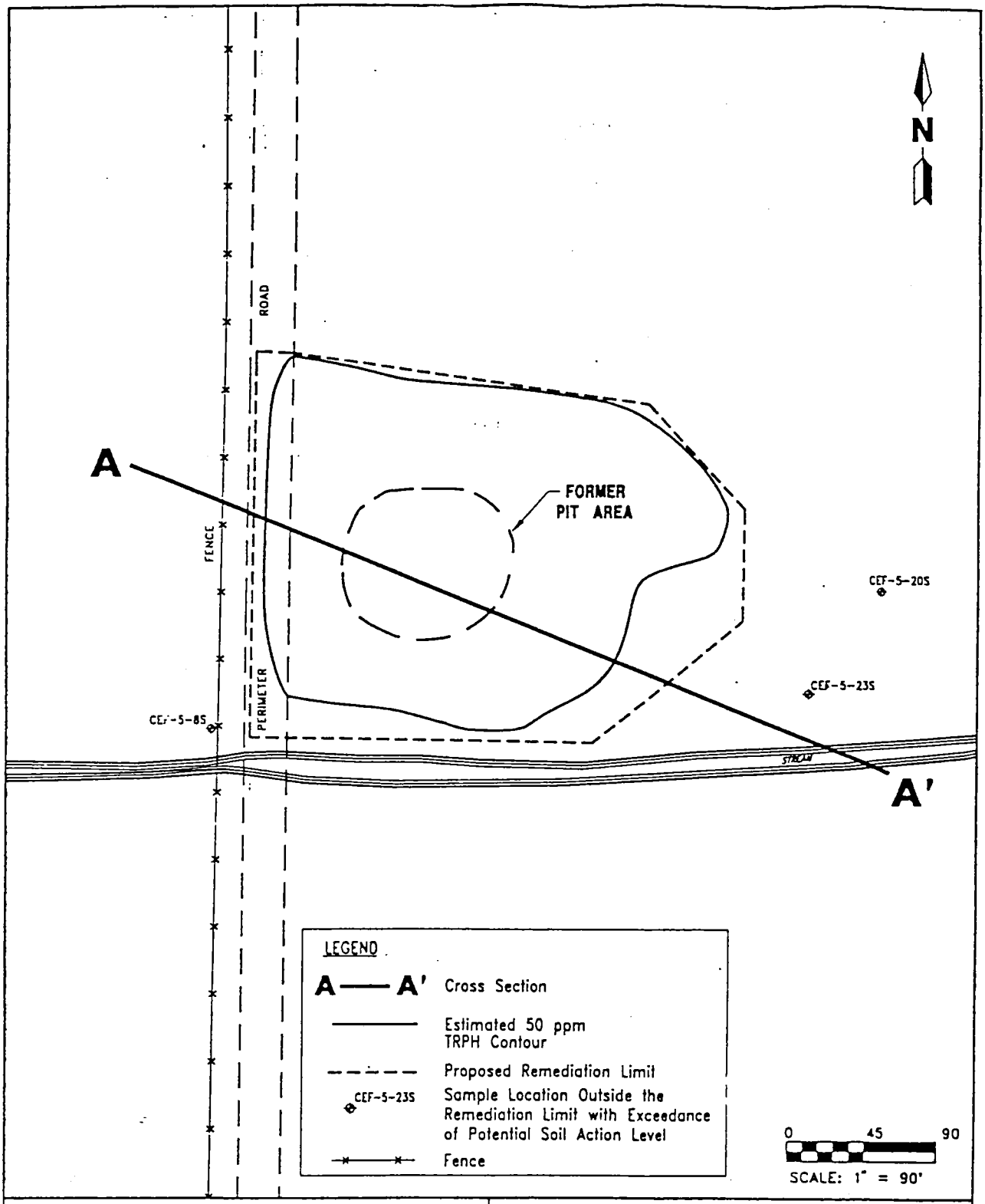

FIGURE 2-2
REMEDIAL LIMITS,
2 TO 4 FEET BELOW LAND SURFACE

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FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

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MVL.04.94

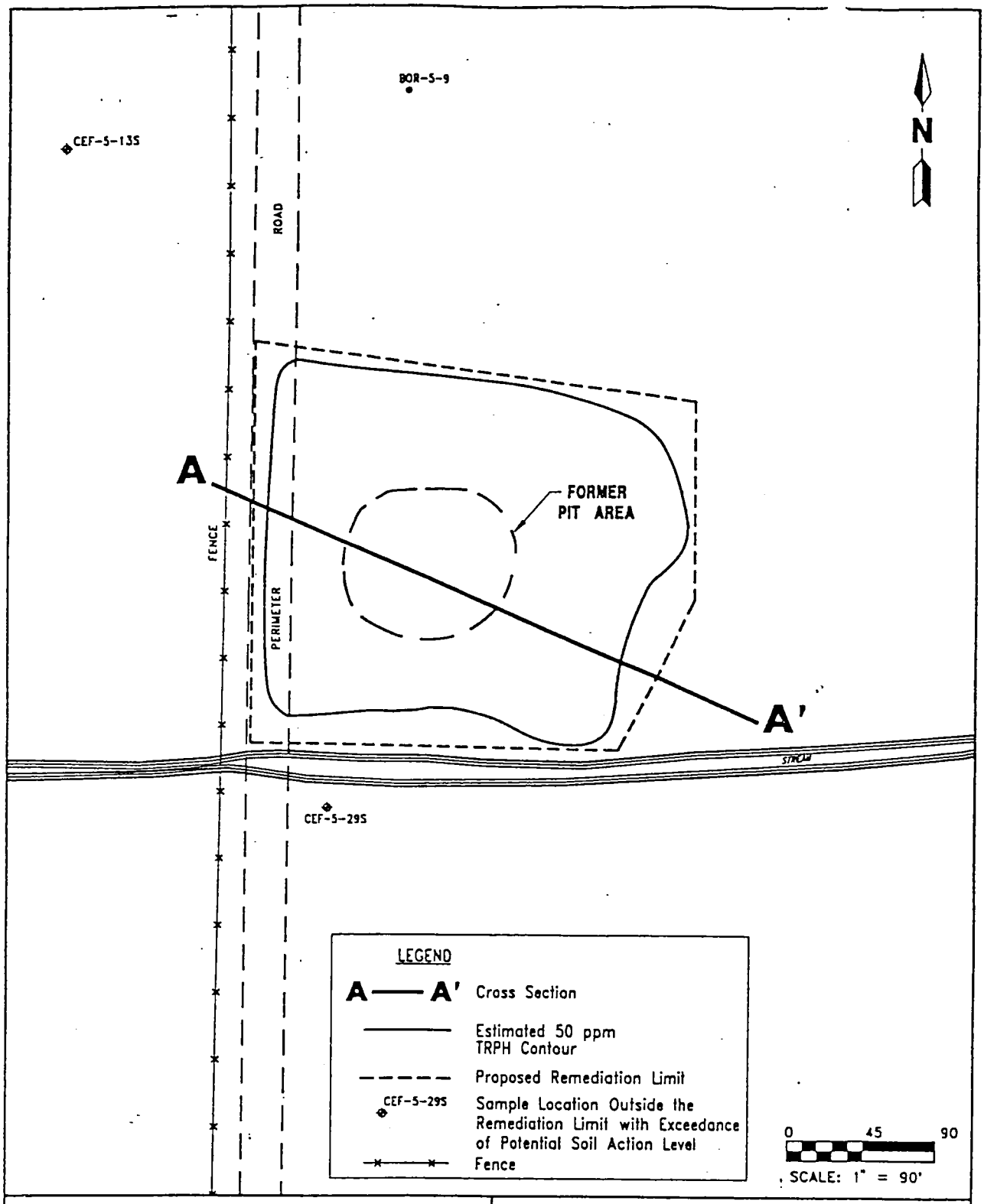

FIGURE 2-3
REMEDIAL LIMITS,
4 TO 6 FEET BELOW LAND SURFACE

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FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CFSite5.FFS
MVL 04.94

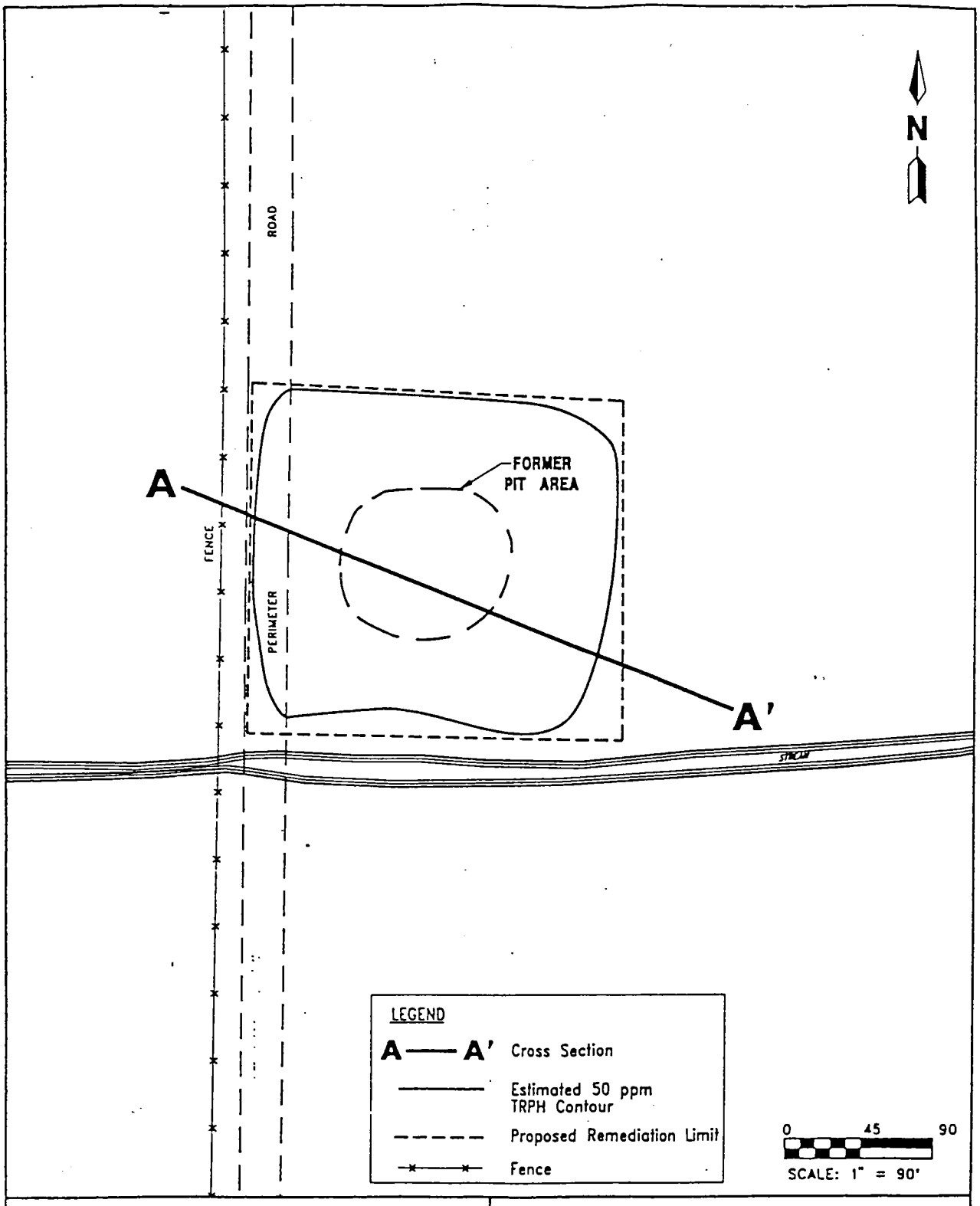

FIGURE 2-4
REMEDIAL LIMITS,
6 TO 8 FEET BELOW LAND SURFACE

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FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

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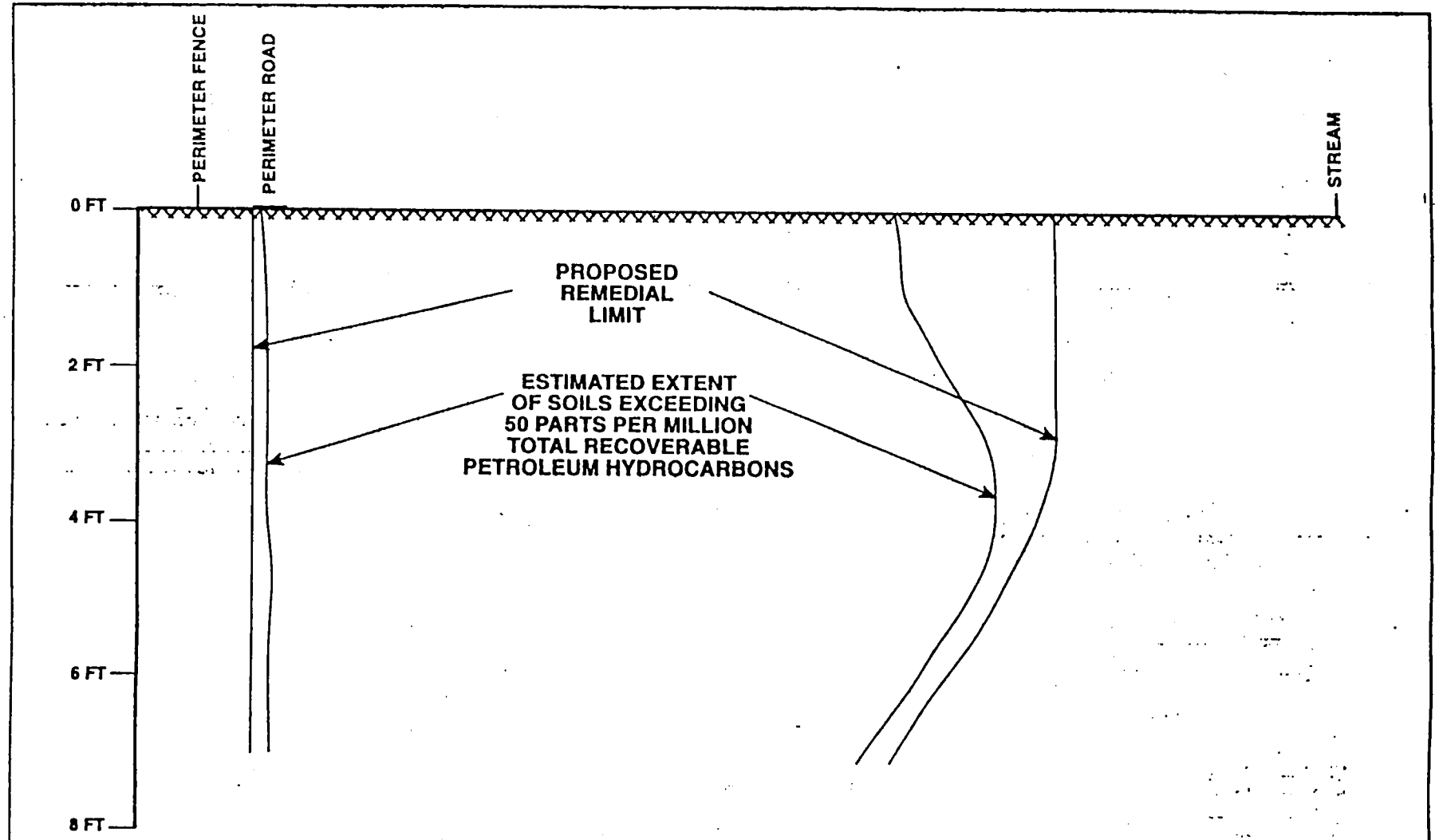
MVL 04.94

CFSite5.FFS
MVL 04.94



HORIZONTAL SCALE 1" = 50'
VERTICAL SCALE 1" = 2'

FIGURE 2-5

CROSS SECTION OF REMEDIAL LIMITS

FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

8520-25 940407WEM

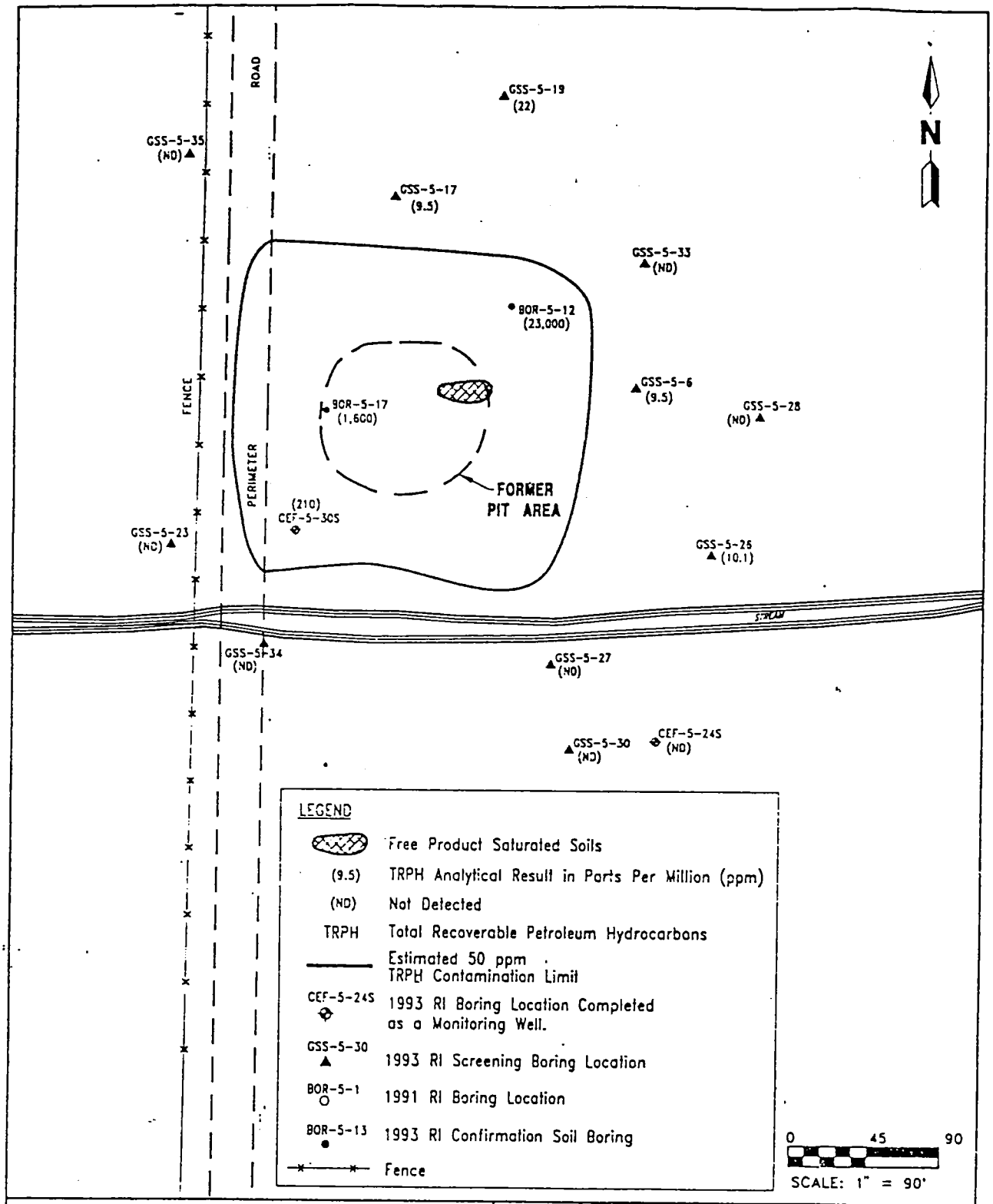


FIGURE 1-11
TRPH RESULTS,
6 TO 8 FEET BELOW LAND SURFACE

FOCUSED FEASIBILITY STUDY
SITE 5, SOURCE CONTROL
REMEDIAL ALTERNATIVES

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

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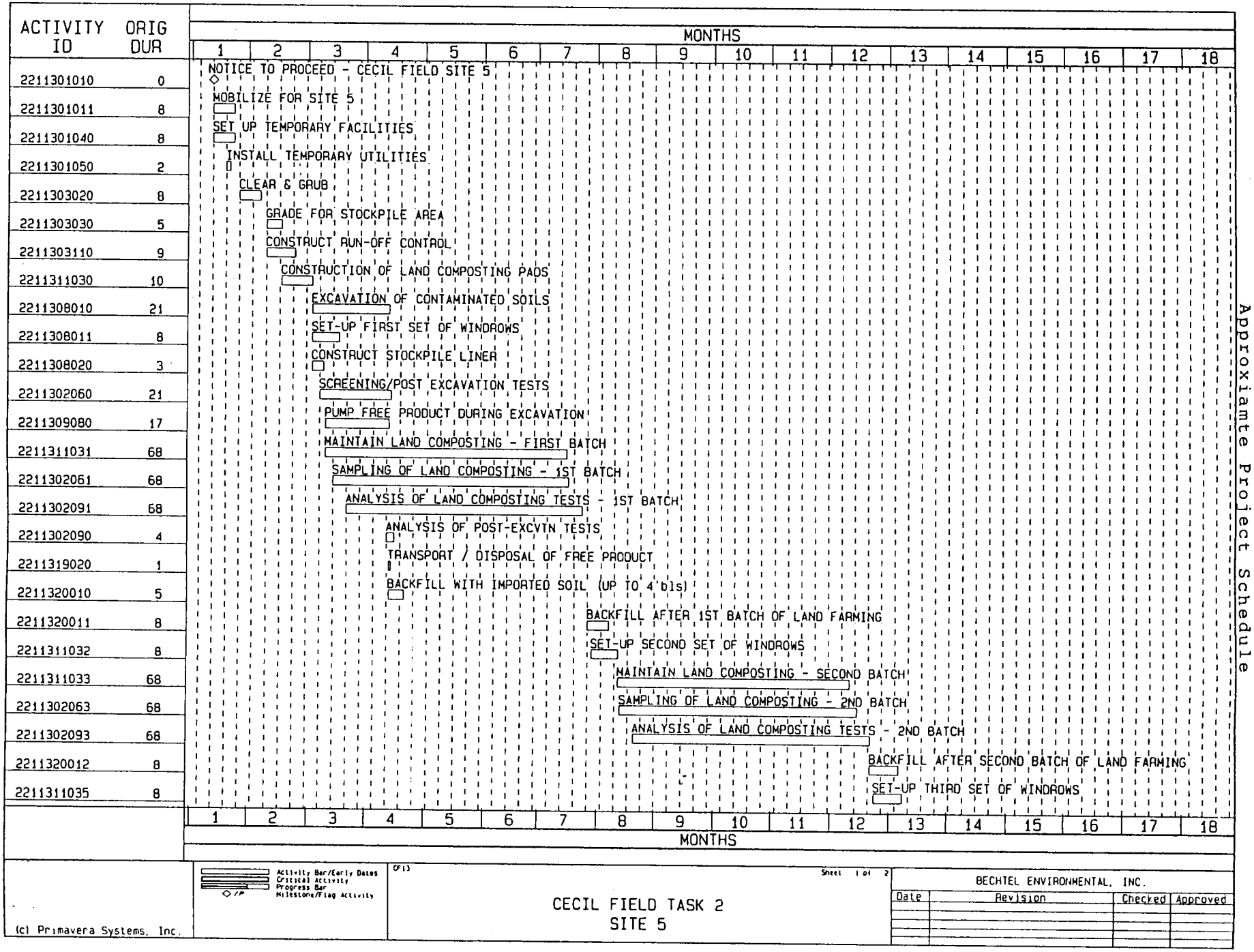
CFSite5.FFS
MVL.04.94



Approxiamte Project Schedule

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

CF13

Sheet 1 of 2

CECIL FIELD TASK 2
SITE 5

BECHTEL ENVIRONMENTAL, INC.

Date	Revision	Checked	Approved

TECHNICAL SPECIFICATION FOR CLEARING AND GRUBBING

1.0 GENERAL

This specification defines the technical requirements and establishes the quality and workmanship required for clearing and grubbing. Not all operations defined herein may be required. Reference is directed to applicable subcontract Scope of Work and engineering drawings for specific services required.

2.0 ABBREVIATIONS

None.

3.0 CODES AND STANDARDS

The Subcontractor shall control the quality of items and services to meet the requirements of this specification, applicable codes and standards, and other Subcontract documents.

4.0 SUBMITTALS

4.1 Engineering documentation requirements are summarized on the Subcontractor Submittal Requirements Summary, Exhibit F, and are augmented by detailed requirements listed herein. Bechtel Environmental, Inc., (BEI) will determine if documentation is complete as submitted by the Subcontractor, and reserves the right to reject and require resubmittal of any submittal that does not meet the Subcontract requirements.

4.2 Unless noted otherwise, all Subcontractor submittals shall be made to BEI at least two (2) weeks prior to use, fabrication, or implementation.

4.3 For those submittals needed within the two (2) weeks following Subcontract award, submittals shall be made no later than commencement of work; BEI will notify the Subcontractor of the status of the submittal by telephone within three (3) work days following receipt of the submittal.

5.0 FIELD OPERATIONS

5.1 CLEARING

5.1.1 Clearing shall consist of removing and disposing of only designated trees and shrubs, and mowing grass inside the work area. Trees and shrubs designated for removal shall be cut to no more than 2 inches high, measured on the side adjacent to the highest ground. Grass within the work area shall be mowed to a maximum height of one inch prior to excavation.

5.1.2 The Subcontractor shall clear only areas designated on the engineering drawings or as directed by BEI in the field. The Subcontractor shall protect all trees, shrubs, or plants which are not specified for removal. The Subcontractor shall be responsible for restoring any unauthorized removal or damage to trees, shrubs, or plants at no additional cost to BEI.

5.1.3 All removed trees and shrubs shall be cut or otherwise suitably reduced in size for safe transport. Grass clippings shall be placed in heavy duty garbage bags.

5.1.4 All above-ground cleared materials shall be hauled and disposed of at a licensed local sanitary landfill or stockpiled as directed by BEI.

5.1.5 All stumps with a trunk diameter exceeding 6 inches shall be treated by one of the following methods:

a. Stumps shall be ground in place with a stump cutter.

b. Stumps shall be uprooted, broken down, and checked for contamination. Stump debris shall be disposed of at a licensed local sanitary landfill or stockpile as directed by BEI.

5.2 GRUBBING

5.2.1 Material to be grubbed, together with logs and other organic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below original surface level of the ground in areas indicated to be grubbed. Depressions made by grubbing shall be filled with a suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

5.2.2 Subcontractor shall verify that grubbed material is uncontaminated as directed by BEI.

APPENDIX C

TECHNICAL SPECIFICATION FOR CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

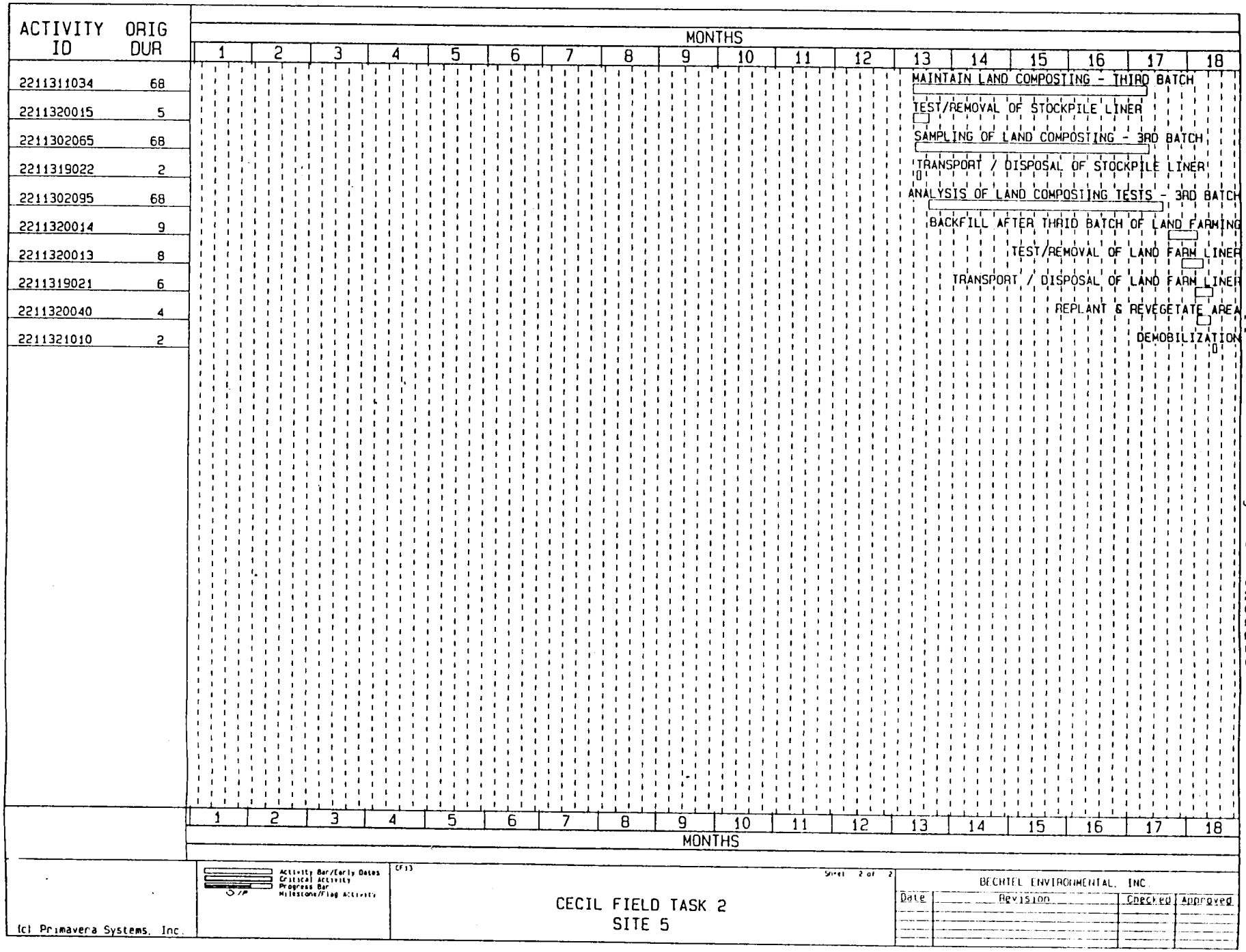
FOR

CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION

0	7/21/94	Issued for Use	KK	RD		
NO.	DATE	REASON FOR REVISION	BY	CHECK	SUPV	PE

ORIGIN	CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION	JOB NO. 22567	
		TECHNICAL SPECIFICATION	REV
		001-SP000-005	0
		SHEET 1 OF 11	

CONTENTS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2211319021 6
2211320040 4
2211321010 2
MONTHS
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
MAINTAIN LAND COMPOSTING - THIRD BATCH
TEST/REMOVAL OF STOCKPILE LINER
SAMPLING OF LAND COMPOSTING - 3RD BATCH
TRANSPORT / DISPOSAL OF STOCKPILE LINER
ANALYSIS OF LAND COMPOSTING TESTS - 3RD BATCH
BACKFILL AFTER THRID BATCH OF LAND FARMING
TEST/REMOVAL OF LAND FARM LINER
TRANSPORT / DISPOSAL OF LAND FARM LINER
REPLANT & REVEGETATE AREA
DEMOBILIZATION
Approximate Project Schedule
(c) Primavera Systems, Inc.
Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity
CF13
Sheet 2 of 2
CECIL FIELD TASK 2
SITE 5
BECHTEL ENVIRONMENTAL, INC.
Date
Revision
Checked
Approved

APPENDIX B

TECHNICAL SPECIFICATION FOR CLEARING AND GRUBBING

CONTENTS

APPENDIX D

TECHNICAL SPECIFICATION FOR TRANSPORTATION OF CONTAMINATED MATERIALS

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

TRANSPORTATION OF CONTAMINATED MATERIALS

0	8/2/94	Issued for Use	KCN			
No.	Date	REASON FOR REVISION	BY	CHECK	SUPV	PE

ORIGIN	Transportation of Contaminated Material	JOB NO. 22567	
		TECHNICAL SPECIFICATION	REV.
		001-SP000-003	0
		SHEET 1 OF 20	

CONTENTS

TECHNICAL SPECIFICATIONS
FOR
TRANSPORTATION OF CONTAMINATED MATERIALS

1.0 GENERAL

1.1 PURPOSE

This Specification addresses requirements and conditions that apply to transportation of hazardous material(s) (HM), hazardous waste(s) (HW), and contaminated material(s) (CM) at U.S. Department of Navy sites under the Naval Facilities Engineering Command, Southern Division. The Subcontractor, Common Motor Carrier (if different), and motor vehicle operator(s) shall be knowledgeable of and comply with Federal Department of Transportation (DOT) regulations (49 CFR), and Environmental Protection Agency (EPA) regulations (40 CFR). Not all transport operations defined herein may be required. Reference is directed to applicable Subcontract Scope of Work and Design Drawings for specific services required.

1.2 ABBREVIATIONS

The abbreviations listed below, when used in this Specification, have the following meanings:

AAR	Association of American Railroads
BEI	Bechtel Environmental, Inc.
CDL	Commercial Driver's License
CFR	Code of Federal Regulations
CM	Contaminated Material
COFC	Container on flat car
DOT	Department of Transportation
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
HM	Hazardous Material
HW	Hazardous Waste
ICC	Interstate Commerce Commission
ISO	International Standards Organization
LSA	Low Specific Activity
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
RCRA	Resource Conservation and Recovery Act
RQ	Reportable quantity
TSCA	Toxic Substance Control Act
TSDF	Treatment, Storage, and Disposal Facility

1.3 QUALITY STANDARDS

The quality standards, as defined by Bechtel Environmental, Inc. (BEI) and Federal DOT and EPA regulations [i.e., Code of Federal Regulations (CFRs)] applicable to this Specification are identified herein and are applicable directly or indirectly to:

- roll-on/roll-off bimodal containers
- transporting vehicle (also referred to as motor vehicle)
- rail cars (flat, box, gondola)
- equipment and material
- packaging, labeling, marking, placarding, handling, and transporting of HM, HW, and CM
- qualifications of Subcontractor provided personnel.

The following CFRs, which are a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government, are identified in this Specification for the purpose of quality standards. Failure to identify an applicable CFR does not imply elimination of required Subcontractor knowledge and compliance.

Title	No.	CFR Regulations Title
40	262	"Standards Applicable to Generators of Hazardous Waste"
40	263	"Standards Applicable to Transporters of Hazardous Waste"
40	761	"Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions"
49	171	"General Information, Regulations and Definitions"
49	172	"Hazardous Materials Table, Special Provisions, Communications, Emergency Response Information and Training Requirements"
49	173	"Shippers - General Requirements for Shipments and Packagings"
49	174	"Carriage by Rail"
49	177	"Carriage by Public Highway"
49	178	"Specifications for Packagings"
49	215	"Railroad Freight Car Safety Standards"
49	383	"Commercial Driver's License Standards; Requirements and Penalties"
49	385	"Safety and Fitness"
49	387	"Minimum Levels of Financial Responsibility for Motor Carriers"
49	391	"Qualifications of Drivers"

49 392 "Driving of Motor Vehicles"

49 393 "Parts and Accessories Necessary for Safe Operation"

49 395 "Hours of Service of Drivers"

49 396 "Inspection, Repair, and Maintenance"

49 397 "Transportation of Hazardous Materials; Driving and Parking Rules"

49 1300 "Passenger and Freight Tariffs and Schedules (of Subtitle B, "Other Regulations Relating to Transportation"; Subchapter D, "Tariffs and Schedules")

Quality, where standards are not identified in this Specification, will be reviewed by BEI for approval on a case-by-case basis. Replacement of material, equipment, or personnel (including time lost) due to failure to meet the Subcontract specified quality standards, or BEI approval when standards are not identified, shall be at the Subcontractor's expense. When requested, and at no cost to BEI, the Subcontractor shall provide material samples, manufacturer specifications, and documentation in support of quality standards.

1.4 EQUIPMENT, MATERIAL, AND PERSONNEL REQUIRED

Equipment, material, and personnel provided to BEI by the Subcontractor shall be as follows:

1.4.1 Transportation by Highway

- Transport vehicles (e.g., dry van, flatbed, roll-off, lowboy, and ocean style trailers; truck tractors; and roll-off and ocean style containers) that meet the requirements of Title 49 CFR 393 and 396.

- Securement systems, especially tiedown assemblies (e.g., chains, cables, steel straps, and fiber webbing); load binders and hardware (e.g., hooks, bolts, welds, or other connectors); and winches or other fastening devices that are without visual damage from wear or misuse and that meet the requirements of Title 459 CFR 393, Subpart I.

- Weatherproof tarpaulins that are without visual damage from wear or misuse and of a quality highly resistant to tears, rips, snags, punctures, abrasion, cracking, peeling, weathering, and that are suitable for use as an external cargo wrap.

- Side boards that are suitable as a frame for use with tarpaulins to form a closed transport vehicle.

- Motor vehicle operators who meet the requirements of Title 49 CFR 383, 391, 392, 395, 397, and 172 Subpart H, and 177. A signed affidavit stating that all vehicle operators handling Navy waste are HAZMAT trained in accordance with 49 CFR Part 172, Subpart H; and an outline of the course program may be submitted.

1.4.2 Roll-On/Roll-Off Bimodal Containers

Delivery

The Subcontractor shall deliver to Navy job sites roll-on/roll-off bimodal containers for BEI use. BEI will order containers through use of work releases which identify the job site, delivery rate (e.g., two per day), and the date of the first delivery. At least 10 work days of advance notice will be given by BEI to the Subcontractor.

Design, Construction, and Testing

All Subcontractor roll-on/roll-off bimodal containers provided for BEI use shall be designed, constructed, and tested in accordance with the Association of American Railroads (AAR) Specification M-930-90 and shall be capable of meeting the DOT requirements as a strong-tight container. Each container offered to BEI shall be identified with a certification plate as prescribed in Section 6.13 of AAR Specification M-930-90. The Subcontractor shall provide BEI with a drawing of the roll-on/roll-off bimodal container that displays the materials of construction, door closure and fastener details, and hold down and lifting pad details.

Size of Roll-On/Roll-Off Bimodal Containers

The roll-on/roll-off bimodal container to be provided by the Subcontractor shall be either 20 cubic yard or 25.5 cubic yard capacity. Quantity and identification of container size shall be identified in the work release. The Subcontractor shall provide BEI, on the same drawing identified in 1.4.2.2, the external and internal dimensions and the tare weight and gross weight rating of the container.

Condition of Containers

At the time of delivery, the Subcontractor shall provide containers janitorially clean (broom clean), free of extraneous debris, and free of excess scale and corrosion which could be an impediment to decontamination in the event the containers should become contaminated.

Liners

The Subcontractor shall provide polyethylene bag liners that have a polyethylene nominal thickness of at least 6 mils. The polyethylene used in fabrication of the liner shall be prime virgin resins. The bag liner shall be fabricated to fit squarely in the corners to virtually eliminate tearing on filling and shall be watertight. The Subcontractor shall provide manufacturer's data sheets and certifications that bag liners provided meet the Specification's requirements.

Alternate materials and thicknesses for the liner may be offered by the Subcontractor, but the proposed change must be approved in advance by BEI as an equivalent bag liner.

The Subcontractor shall provide written procedures for the bag liner installation and proper assembly of roll-on/roll-off bimodal containers to meet DOT requirements as strong-tight containers during transport.

1.4.3 Rail Freight Cars and Siding Requirements

Defects and Restrictions

The Subcontractor shall provide BEI with rail freight cars consisting of mainly gondola cars, some flat cars, and a few box cars. All rail freight shall be in good order and shall contain no defects in accordance with 49 CFR Part 215, Subpart B, or any restrictions at time of delivery as defined in 49 CFR Part 215, Subpart C.

Freight Car Load Ratings

The Subcontractor shall provide rail freight cars having a load capacity of not less than 75 tons nor more than 100 tons. The ratings of the rail gondola cars shall be mainly 95- and 100-ton cars. Written approval, in advance, shall be obtained from BEI in order to supply rail gondola cars having a load capacity rating of less than 90 tons.

Qualification of Rail Transportation Crew

All Subcontractor personnel who handle and process BEI loaded rail freight cars and intermodal packages shall be HAZMAT trained in accordance with 49 CFR 172.700, Subpart H. A signed affidavit stating that all railroad crew members handling rail freight cars containing Navy waste are HAZMAT trained and an outline of the course program may be submitted.

Freight Car Cleanliness

The rail freight cars provided by the Subcontractor shall be free of loose debris and be janitorially clean (broom clean).

Rail Gondola Car

The Subcontractor shall provide to BEI rail gondola cars that are free of internal appurtenances which could affect the integrity of sift-proof liners that BEI will provide and install.

The Subcontractor-provided rail gondola cars shall have an internal height of not less than 4.5 feet nor greater than 5.75 feet.

The Subcontractor shall provide cars whose internal surfaces, in BEI's opinion, are free of major rust or scale which could affect the ability to easily decontaminate the car in the event it became contaminated.

Rail Siding Maintenance

Subcontractor provided rail sidings (i.e., frogs, switches, ballast, crossties, rails, fastenings) shall be maintained to at least a Class 1 standard throughout any shipping campaign in accordance with 49 CFR Part 213. The Subcontractor shall notify BEI in writing of the names and qualifications of persons designated to inspect track.

1.5 PACKAGING, LABELING, MARKING, AND PLACARDING

1.5.1 Transportation by Highway

Packaging, labeling, marking, and placarding will be performed by BEI [or Treatment, Storage, and Disposal Facility (TSDF)] in compliance with Title 49 CFR 172, 173, 178, and Title 40 CFR 262, 263, and 761. The motor vehicle operator(s) shall perform an inspection to verify, based on his training in accordance with Title 49 CFR 172, Subpart H, and experience, the packaging, labeling, marking, and placarding are in accordance with the requirements listed above and the accompanying shipping documents. Upon acceptance of the load for transport, the Subcontractor shall be responsible for maintaining the integrity of BEI's packaging, labeling, marking, placarding, and the accompanying shipping documents in compliance with 49 CFR 177.800, Subpart A. BEI shall be notified immediately (see Section 6.0, Accidents Involving Transport Vehicles, for notification procedures) upon the Subcontractor's discovery of a change in the condition of BEI's packaging, labeling, marking, or placarding (e.g., changes due to equipment failure, packaging failure, accident, adverse weather conditions, vandalism, or theft). Concerns or questions related to the inspection, maintenance, or notification procedures are to be addressed to the BEI site manager or his designee prior to the motor vehicle operator's load acceptance.

1.5.2 Roll-On/Roll-Off Bimodal Containers

BEI will inspect the roll-on/roll-off bimodal container in accordance with the Specification at the time of Subcontractor delivery and, upon acceptance, will direct where to place the container.

BEI may elect to survey the roll-on/roll-off bimodal container at the time of delivery for the presence of hazardous materials. BEI will install the Subcontractor provided bag liner, fill the container, and seal it for shipment in accordance with Subcontract provided packaging procedures. BEI will mark, label, placard, certify the packaging, and prepare required shipping documents in accordance with DOT requirements.

1.5.3 Rail Freight Cars

BEI will offer strong-tight packages to be used for packaging of some waste. These packages will be designed to meet AAR Specification M-930-90, "Closed Van-Type Dry Cargo Containers for Domestic Container-on-Flat-Car (COFC) Service." BEI will mark, label, certify, and provide shipping papers describing the packaged container contents in full compliance with 49 CFR Parts

171, 172, and 173. These containers will be turned over to the Subcontractor for loading and shipment.

Schedule adjustments shall be made by BEI, when needed, that result from weather conditions that prevent loading of Navy waste into or onto rail freight cars. The BEI Site Superintendent or designee will notify the Subcontractor of all necessary schedule adjustments due to inclement weather.

The Subcontractor shall provide equipment, such as but not limited to, clevis, slings, cranes and bridges, lifting and handling procedures, training of workers and supervision in order to transfer BEI packages to rail flat cars and to provide blocking, bracing, and load securement for the packages such that the packages will not move or fall during conditions normally incident to transportation.

The Subcontractor shall provide BEI copies of the latest certification of load testing of all lifting equipment used for COFC services for BEI packages. The Subcontractor shall also provide BEI with copies of each load test of the equipment and reason for load test (e.g., maintenance repair, periodic retest).

BEI shall placard the rail freight cars and intermodol packages in accordance with 49 CFR Part 172, Subpart F. Subcontractor rail crew members shall replace placards and car certificates that become lost in transit at the next inspection point in accordance with 49 CFR Part 174.59.

2.0 MOTOR VEHICLE REQUIREMENTS

2.1 GENERAL

The Subcontractor shall provide equipment that is appropriate to accomplish successful transportation of HM, HW, or CM either from Navy sites or to or from the TSDF. Motor vehicles shall be maintained and operated in accordance with the manufacturer's recommendations, Occupational Safety and Health Administration (OSHA) requirements, federal regulations as specified in Title 49 CFR 393, 396, and 397, and applicable state and local regulations. The Subcontractor shall take all precautions necessary for safe operation of his equipment/vehicle and to safeguard the public and the environment from injury or accidental release of HM, HW, or CM.

The Subcontractor shall provide to BEI a list of the transport vehicles to be used, broken down by identification number, type, and size.

2.2 MOTOR VEHICLE INSPECTIONS

All vehicles shall be inspected by the Subcontractor in accordance to Title 49 CFR 393, "Parts and Accessories Necessary for Safe Operation," and shall conform to all applicable local, state, and federal requirements for registration, insurance, inspection, certification, and performance.

All motor vehicle inspections shall be performed by qualified inspectors as required by Title 49 CFR 396.19, "Inspector Qualifications." The Subcontractor shall submit a copy of the current certificate of commercial motor vehicle inspection and the inspector's certificate of training to BEI prior to any transportation activities (or may provide a statement certifying that all motor vehicles supplied to BEI have been inspected in accordance with the requirements of Title 49 CFR 396.17, 396.19, and 396.23).

Brake inspections shall be performed by a certified brake inspector for commercial motor vehicles as described in Title 49 CFR 396.25, "Qualifications of Brake Inspectors." The Subcontractor shall submit a copy of the current certificate of brake inspection and the inspector's certification of training to BEI prior to transportation activities (or may provide a statement certifying that all motor vehicles supplied to BEI have been inspected in accordance with the requirements of Title 49 CFR 396).

Prior to being placed into use, and at least once each day, in accordance with the requirements of Title 49 CFR 396.11, "Driver Vehicle Inspection Report," and 396.13, "Driver Inspection," the motor vehicle operator shall perform a safety inspection of the motor vehicle. The vehicle operator upon arrival, shall provide BEI with a copy of the current signed daily safety inspection report. BEI will confirm that the transporting vehicle has been inspected in accordance with 49 CFR 396, "Inspection, Repair, and Maintenance."

All motor vehicles (and equipment) provided to BEI shall be subject to a quality surveillance by BEI prior to loading to determine that the motor vehicle (and equipment) in accordance with Title 49 CFR 393 and 396. Such inspection and approval shall not relieve the Subcontractor of responsibility for the use of proper equipment. **INSPECTION OF VEHICLES BY BEI DOES NOT IMPLY CERTIFICATION.** The Subcontractor shall allow six hours for motor vehicle inspection, loading/unloading, and release from a BEI site (or TSDF).

Motor vehicles determined by BEI to be potentially unsafe and/or unsuitable for their intended use shall be removed from the site until repaired by the Subcontractor at his expense or replaced with a different motor vehicle. Repaired or replaced motor vehicles will receive new inspections to determine if repairs are correct and meet inspection standards. Time lost due to reinspection shall be at the Subcontractor's expense.

3.0 MOTOR VEHICLE OPERATOR REQUIREMENTS

3.1 QUALIFICATION OF MOTOR VEHICLE REQUIREMENTS

Before transportation services are rendered, motor vehicle operators (drivers) shall meet the requirements, including all required endorsements (and shall provide evidence of such) specified in Title 49 CFR 383, " Commercial Driver's License Standards: Requirements and Penalties"; 391, "Qualifications of Drivers"; and 172, Subpart H, "Training."

The following information must be submitted to BEI prior to any transportation activity:

- A medical examiner's certificate, or a legible photographic copy of a certificate, or a statement attesting to a record on file with the Subcontractor of a medical examiner's certificate on each motor vehicle operator's physical qualifications to operate a motor vehicle in accordance with Title 49 CFR 391.43, "Medical examination; Certification of Physical Examination," and Title 49 CFR 391.41, "Physical Qualifications for Drivers."

- A statement certifying the Subcontractor, at least once every 12 months, reviews the driving record of each motor vehicle operator it employs in accordance with Title 49 CFR 391.25, "Annual Review of Driving Record." Included in this review shall be a list of all violations of motor vehicle traffic laws in accordance with Title 49 CFR 391.27, "Record of Violations."

- A valid commercial driver's license (CDL) for each motor vehicle operator provided to BEI (and a legible photographic copy of the CDL to be retained by BEI).

3.2 MOTOR VEHICLE OPERATORS NOT QUALIFIED

Motor vehicle operators may not be deemed qualified or acceptable in accordance with Title 49 CFR 391.51, "Disqualification of Drivers." Motor vehicle operators deemed not acceptable for transporting HW, HM, or CM shall be replaced at Subcontractor's expense, including time lost.

4.0 OTHER REQUIREMENTS

4.1 MOTOR VEHICLE WEIGHT REQUIREMENTS

Prior to arrival for loading, all Subcontractor motor vehicles provided to BEI, shall be weighed at an offsite certified (certified calibrated) scale. Upon arrival for loading, each vehicle operator shall provide BEI a legible copy of the certified tare (light) weight receipt for that motor vehicle.

Prior to releasing the loaded motor vehicle for transport, BEI will verify motor vehicle and load weight by requiring all loaded motor vehicles (truck, trailer, and load) to be weighed at an offsite certified scale located within 30 miles of the Navy site. The Subcontractor shall provide BEI with a legible copy of the certified loaded weight receipt for each motor vehicle.

BEI will only accept certified tare and loaded weight receipts containing the following information:

- Motor Vehicle identification number

- Date motor vehicle was weighed

- Name, address, and telephone number of offsite certified scale

- Weigh master's signature

Gross weight of loaded motor vehicles (tractor, trailer, and load) released from the site(s) shall not exceed 80,000 pounds (except for BEI authorized permitted over-dimension/over-weight shipments). If a motor vehicle (tractor, trailer, and load) exceeds 80,000 pounds, or the maximum axle weight limits, the motor vehicle is to return to the site to off-load the excess weight.

4.2 TRANSPORTATION SAFETY RATING

The Subcontractor shall submit to BEI a current copy of his Federal Motor Carrier Safety Rating assigned by the Federal Highway Administration (FHWA) as set forth in Title 49 CFR 385, "Determination of Safety Rating." A Subcontractor receiving notification by the FHWA of a "conditional" or "unsatisfactory" rating will be ineligible to transport HM, HW, or CM for BEI.

4.3 CONTROLLED SUBSTANCE TESTING

The Subcontractor shall submit to BEI proof of compliance with Title 49 CFR 391, Subpart H, "Controlled Substance Testing." (The Subcontractor may provide an affidavit attesting that in compliance with Title 49 CFR 391, Subpart H, a controlled substance testing program is in place with a copy of the program available to BEI by request.)

4.4 TRANSPORTER EPA ID NUMBER

The Subcontractor shall submit to BEI his EPA ID number and the EPA ID numbers of each railroad it is subcontracting with, if applicable, as specified per the Toxic Substances Control Act (TSCA) or Resource Conservation and Recovery Act (RCRA). If polychlorinated biphenyls (PCBs) are being transported, the Subcontractor is also required to have submitted a separate "Notification of PCB Activity" Form 7710-53 to the EPA as required by Title 40 CFR 761.202 and 761.205. A legible copy shall be provided to BEI prior to BEI's release of the load.

4.5 CARRIER SURETY BOND OR POLICIES OF INSURANCE

The Subcontractor shall submit to BEI proof of insurance on DOT Form MCS-82 or MCS-90, as required in Title 49 CFR 387.

4.6 TRANSPORTATION REPRESENTATIVE

The Subcontractor shall designate a competent, authorized representative, acceptable to BEI, that is knowledgeable in DOT hazardous materials regulations to represent and act for the Subcontractor. The Subcontractor shall inform BEI in writing of the name and address of such a representative. A background statements of the representative's qualifications, along with copies of training certificates or any other documented source of training or establishment of knowledge of the DOT hazardous materials regulations, shall be submitted to BEI in writing.

4.7 REQUIRED PERMITS AND LICENSES

The Subcontractor shall obtain all required permits and/or licenses and shall make all required notifications for transporting HM, HW, or CM from Navy sites to the TSDF (or to another Navy site), including any over-dimension/over-weight permits and/or notifications. The Subcontractor shall submit to BEI a legible copy of all required permits, licenses, and/or notifications made (or the Subcontractor may provide an affidavit attesting that all permits, licenses, and/or notifications shall be obtained or made with copies available at BEI's request).

4.8 DOCUMENTATION

The Subcontractor shall be responsible for all documents/shipping papers provided by BEI prior to shipment in accordance with 49 CFR 177.817 or 49 CFR 174.24, "Shipping Papers." The Subcontractor shall comply with the directions provided by BEI prior to shipment regarding documents/shipping papers. All documents/shipping papers shall be kept with BEI's shipments at all times. BEI documents will include the following when applicable:

- Signed Uniform Hazardous Waste Manifest/Bill of Lading
- Exclusive Use Control Instruction
- Vehicle Survey Release Form (completed at the site prior to vehicle release)
- TSDF specific forms
- Emergency Response Guide Information

A copy of the signed Bill of Lading, the Uniform Hazardous Waste Manifest (when required), and any TSDF specific forms shall be included with the Subcontractor's invoice for payment of transportation services.

4.9 TRANSPORTATION ROUTES AND EMERGENCY RESPONSE PLAN

4.9.1 Transportation by Highway

The Subcontractor shall meet all existing federal, state, and local regulations for traffic control and motor vehicle operation for transportation of HM, HW, or CM on public roads and highways.

The Subcontractor shall submit a written transportation Emergency Response Plan, which includes instructions for compliance with Title 49 CFR 171.15, "Immediate Notice of Certain Hazardous Materials Incidents," and 172, Subpart G, "Emergency Response Information." The plan shall include all aspects and considerations for HM, HW, or CM transportation hazards that may arise during transportation operations, and shall be submitted to BEI for review ten working days prior to any waste hauling. The plan shall include, at a minimum:

- Procedures for incident response

- Methods to contain and clean up releases
- Details of manpower and equipment available
- The coordination necessary to mobilize the above forces in an emergency
- Traffic maintenance/warning procedures
- List of emergency numbers for information and notification on HM, HW, or CM for each applicable state
- Name of emergency response coordinator

The Subcontractor shall notify BEI immediately upon learning that a transportation-related accident has occurred as stated in Section 6.0, "ACCIDENTS INVOLVING TRANSPORT VEHICLES" of this Specification.

The Subcontractor shall be responsible for providing BEI with the proposed transportation route that is in compliance with Title 49 CFR 397, "Transportation of Hazardous Materials; Driving and Parking Rules [397.9, "Routes," and 397, Subpart D, "Routing of Class 7 (Radioactive) Materials"] to be used between the Navy site (or TSDF) and TSDF (or another Navy site) prior to transport. Except for authorized deviations due to city hazardous material by-pass routes or detours mandated by powers of authority (e.g., detours due to construction, emergency situations, or inclement weather conditions), deviations from the submitted routes are not permitted without prior written approval by BEI. Transportation routes may be shown on BEI Design Drawings, when drawings are provided.

The cleanup cost for any release of HM, HW, or CM by the Subcontractor shall be the responsibility of the Subcontractor. The cleanup operations shall be performed at the expense of the Subcontractor. Cleanup shall be performed immediately.

A shipment that is designated by BEI to be a RCRA HW will require the Subcontractor to submit to BEI a current EPA ID# as proof of being an EPA-approved transporter of RCRA waste.

4.9.2 Railroad Routing Map

The subcontractor shall provide to BEI a map showing the proposed routing of rail freight cars from point of origin to the disposal facility. The routing map should identify all utilized railroads and indicate key milestones expressed in travel days from the time leaving the point of origin.

4.10 TRACKING AND NOTIFICATION

4.10.1 Transportation by Highway

The Subcontractor shall have in operation a satellite tracking system to be used on all BEI shipments. At least once a day, the motor vehicle/load shall be located with the time and location recorded. In conjunction with the satellite tracking system, the Subcontractor shall implement a procedure for daily contact with the motor vehicle operator. BEI will not consider messages forwarded, left with answering services, or on answering machines as daily contact. As an alternative, the Subcontractor may implement a scheduled daily telephone call-in/call-back location verification system and the call-in/call-back system require the Subcontractor to notify BEI immediately if the Subcontractor is unable to verify the motor vehicle/load location, or if the motor vehicle operator fails to make scheduled daily contacts. Motor vehicle/load location verification and motor vehicle operator daily contact information must be made available to BEI by telephone or facsimile transmittal with one hour of request. A written description of the tracking and notification system shall be submitted to BEI for approval.

The Subcontractor shall provide the capability to recall or reroute a shipment due to unforeseen events which may require the motor vehicle/load to return to the origination point or be rerouted to an alternate TSDF. This capability may be provided through the use of the satellite tracking/daily call-in system or the telephone call-in/call-back system. BEI shall be notified immediately if the Subcontractor is unable to recall or reroute a shipment.

The Subcontractor shall notify BEI immediately upon learning that a scheduled time of arrival, at either the TSDF or at a Navy site, has changed. BEI shall be notified immediately if the Subcontractor's motor vehicle is delayed due to equipment failure, accident, inclement weather, or any condition that prevents the motor vehicle/load from continuing on the approved route and/or transportation schedule. BEI shall be informed of the exact location and condition of the Subcontractor's motor vehicle and of BEI's load when a change of schedule or delay as described above occurs.

The Subcontractor shall contact the TSDF, or other destination, 24 hours in advance to schedule an arrival time. The Subcontractor shall be responsible for contacting the pickup and destination facilities before shipments begin, to identify appropriate procedures at the individual facilities (i.e., opening and closing times, pass requirements, etc.). Any cost incurred due to failure to comply with these procedures, or due to lack of appropriate planning, shall be the responsibility of the Subcontractor. The contact and telephone number for the pickup and destination facilities will be provided with the Work Release or as otherwise provided. BEI shall be notified within 24 hours of the scheduled delivery date if the shipment was not delivered to the TSDF on the scheduled delivery date.

If, during BEI's business day, the Subcontractor becomes aware of an inability to track, recall, or reroute BEI loads, or that the Subcontractor's motor vehicle is unable to maintain the approved transportation route and/or schedule, the Subcontractor shall notify BEI immediately, and if initially

unsuccessful, shall continue to attempt to notify BEI. If, after the close of BEI's business day, the Subcontractor becomes aware of a condition as described above, notification of such condition shall be made at the start of BEI's next business day. BEI will provide a contact telephone number for such notification prior to each shipment.

In addition to immediate notification by telephone, the Subcontractor shall submit to BEI within five days of loss of verified daily contact with the motor vehicle/load, a written report which shall include:

- Time, date, and location of last daily contact.
- Time, date, location, and condition of the motor vehicle/load when contact was reinstated.
- A description of the methods/agencies used to reinstate contact and to verify location of the motor vehicle/load.
- A description of the methods used to reinstate transportation services, if an interruption of services occurred.
- Any additional pertinent information concerning the incident.

4.10.2 Transportation by Rail

The Subcontractor shall notify BEI of any abnormal occurrences identified in the following subsections or any similar, but not identified, occurrences.

Location Tracking and Notification

The Subcontractor shall have in operation a system which identified the location of each BEI rail freight car grouping in transit from the Navy site to the designated TSDF. At least once per work day, the Subcontractor shall notify BEI as to the location of each rail freight car grouping. This may be accomplished by facsimile.

The Subcontractor system may be automated using bar coding reader stations, satellite tracking, or manual telephone call-in/call-back systems. Daily location verification information must be made available to BEI by telephone, computer, or facsimile transmittal within one hour of request.

The Subcontractor shall contact the disposal site 24 hours in advance of the scheduled arrival time.

Movement of Defective Cars for Repair

The Subcontractor shall notify BEI as soon as practical whenever a loaded rail freight car has been determined to have a defective component. The Subcontractor shall relay to BEI's Subcontractor

Administrator the related information and restrictions imposed by the designated inspector in accordance with 49 CFR Part 215.9.

Reporting Hazardous Material Incidents and Abnormal Occurrences

The term *abnormal occurrences* means any of, or similar to, the following conditions noted during transport of hazardous materials, substances, or wastes:

- failure of the watertight, sift-proof liner
- broken tamper-indicating devices or package seals
- deviation from the designated routing maps
- any transportation condition that is not normally incident to transportation

As soon as practical, the Subcontractor shall notify BEI of an incident which occurs during transportation in which Navy wastes are involved, whether a report is or is not required by 49 CFR Parts 171.15 and 171.16.

Leaking Rail Freight Cars and/or Intermodal Packages

The Subcontractor shall notify BEI immediately of any noted leakage of Navy waste material from any rail freight car or intermodol package during transportation.

Emergency Response Plan

The Subcontractor shall submit a written transportation Emergency Response Plan. The plan shall include instructions for compliance with 49 CFR Part 171.15, "Immediate Notice of Certain Hazardous Material Incidents." The plan shall include all aspects and considerations arising from transport incidents involving hazardous substances, materials, or wastes. The plan shall be submitted to BEI for review at least 10 working days in advance of any waste transportation as scheduled. The plan shall include the name of the Subcontractor emergency response coordinator.

4.11 PUBLISHED TARIFF RATES

The Subcontractor shall submit to BEI proof that each subcontracted item listed in Part III, Pricing and Data, b. Schedule of Quantities and Prices, of the Subcontract has been submitted and published through the Interstate Commerce Commission (ICC) tariff system as defined in Title 49 CFR 1300 through 1319.

4.12 ADDITIONAL REQUIREMENTS FOR LOOSE CONVEYANCE LOADS

Vehicles used for loose conveyance transport of soil shall meet the following requirements:

(1) The truckbed shall be free of drain holes, cracks, or other conditions that may allow leakage of soil.

(2) If the vehicle has a tailgate for dumping, the Subcontractor vehicle operator shall demonstrate to the BEI site superintendent or designee that the tailgate can maintain a seal. A vehicle that cannot maintain a seal will be repaired or replaced by the Subcontractor before being placed into service. If seals fail after the vehicle is placed into service, they are to be repaired immediately, and BEI shall be notified.

(3) Vehicles are not to be equipped with side boards while transporting loose conveyances.

(4) Material shall not be loaded higher than one foot below the top of the vehicle side walls.

(5) Tarpaulin covers shall be installed and used on all vehicles. Before being installed, sharp objects and/or protrusions are to be eliminated to prevent cutting or puncture of the tarpaulin.

(6) Tarpaulins are to be firmly secured over the soil with sufficient overlap so that the material will not be blown from the vehicle during transport. BEI will inspect the tarpaulin for adequate installation.

5.0 MOTOR VEHICLE LOADING AND UNLOADING OPERATIONS

All areas and buildings of the Navy sites (or TSDF) are off limits to Subcontractor motor vehicles (and motor vehicle operators) except those areas and buildings designated by BEI (or TSDF). Motor vehicle operators will be supervised by BEI (or TSDF) at all times while at BEI (or TSDF) sites and shall remain inside the tractor cab at all times, unless directed otherwise by BEI (or TSDF).

All Subcontractor motor vehicles will be monitored by BEI for external contamination prior to being allowed onto Navy sites. Subcontractor motor vehicles shall arrive at the site sufficiently clean to allow accurate monitoring. Motor vehicles shall be free of dried mud, dirt, grease, or other accumulations. If accurate monitoring is unsuccessful, due to excess mud, dirt, grease, or other accumulations, the motor vehicle shall be removed from the site and cleaned. Motor vehicle cleaning and time lost will be at the Subcontractor's expense. Only motor vehicles determined to be free of contamination will be allowed onto Navy sites.

Loading and unloading operations will be the responsibility of BEI (or TSDF) and will be conducted in a highly controlled manner that prevents contamination of motor vehicles. BEI (or TSDF) will verify that motor vehicles are free of contamination before their release from the loading/unloading area. Subcontractor motor vehicles will be checked for contamination as appropriate prior to leaving the loading/unloading area.

Motor vehicles that become contaminated during loading/unloading operations will be decontaminated by BEI (or TSDF). After decontamination, the motor vehicle will be checked again by BEI (or TSDF) to verify that it is free of contamination prior to its release for transport.

Load configurations shall be a joint effort of BEI and the motor vehicle operator(s). After loading, and prior to leaving the site (or TSDF), the motor vehicle operator(s) shall perform an inspection to verify the load is arranged and secured properly (based on experience and training, and in accordance with Title 49 CFR 393, Subpart I, "Protection Against Shifting or Falling Cargo," and 392.9, "Safe Loading").

Upon acceptance of the load for transport, the Subcontractor shall be responsible for maintaining the integrity of the load, the load arrangement, and any security seals. The motor vehicle operator shall examine and periodically reexamine the load (load inspections during transit do not apply to sealed trailers, only to the inspection of security seals) and its load-securing devices as may be necessary to maintain the integrity of the load and the load arrangement in accordance with Title 49 CFR 392.9.

The Subcontractor shall be in compliance with the requirements of Section 6.0, "Accidents Involving Transport Vehicles," of the Specification upon discovery of a change in the condition of BEI's load, load arrangement, or security seals (e.g., changed due to equipment/packaging failure, motor vehicle accident, adverse weather conditions, vandalism, or theft) which involves a release of HM, HW, or CM.

6.0 ACCIDENTS INVOLVING TRANSPORT VEHICLES

In the event of an accident, the Subcontractor shall follow the procedures outlined in his Emergency Response Plan and shall be in compliance with the requirements of Title 49 CFR 390.15, "Assistance in Investigations and Special Studies, Subpart E, Accidents and License Revocation: Duties of Driver," and 172, Subpart G, "Emergency Response Information."

In the event of an accident involving a release of HM, HW, or CM, the Subcontractor shall notify BEI immediately upon learning of the accident, and if initially unsuccessful, will continue to attempt to contact BEI. The Subcontractor shall use a 24-hour telephone contact number for accident notification, when notification attempts are outside BEI's business day. BEI will provide the 24-hour telephone contact number for such notification prior to each shipment.

Notification of an accident shall include location, date and time of the accident, resultant damage or injury, person(s) involved, probable cause, condition of the load, if HM, HW, or CM was released and the amount, and any other pertinent information concerning the accident. Also to be included if applicable, are weather conditions, distance to water sources, government agencies on the scene and a telephone number where communications can be maintained.

The motor vehicle operator shall comply with all directions provided by BEI, unless counter to FHWA regulations, and/or the laws and ordinances of the jurisdiction in which the motor vehicle was in operation at the time of the accident. BEI will issue instructions regarding continued transportation of the load. The motor vehicle operator shall remain with the motor vehicle until assistance arrives or until otherwise directed.

The Subcontractor shall submit to BEI within five days of an accident or incident involving a release of HM, HW, or CM a written report which shall include the location, date and time of the accident or incident, resultant damage or injury, person(s) involved, probable cause, the amount of HM, HW, or CM released, government agencies involved, and any other pertinent information concerning the accident or release. In addition, when an accident or incident occurs involving the release of HM, HW, or CM, the Subcontractor shall submit to BEI copies of any accident/incident reports required by State or other governmental entities.

7.0 SUBMITTALS

BEI engineering documentation requirements are summarized in the Subcontractor Submittal Requirements Summary of the issued Subcontract package. BEI will determine if documentation is complete as submitted by the Subcontractor, and reserve the right to reject and require resubmittal of any submittal that in BEI's opinion does not meet the Subcontract requirements.

Submittals that are specific to each individual motor vehicle operator (e.g., Brake Inspection Certificate, Brake Inspector's Certification, copy of CDL, Medical Examiner's Certificate) must be received and accepted by BEI within five working days of BEI's notification to the Subcontractor for motor vehicles. Nonshipment specific submittals (e.g., Motor Carrier Safety Rating, Carrier Surety Bond, or Policies of Insurance) required upon acceptance of the Subcontract award, must be received within five working days from time of Subcontract award notification and acceptance. Status of the submittals will be made to the Subcontractor by BEI within three working days following the receipt of required submittals. Rejected submittals must be corrected and received by BEI within three working days of notification of submittal rejection. All submittals must be accepted by BEI prior to the start of onsite work.

Affidavits submitted in lieu of specific Subcontract submittal certificates, licenses, or permits must be signed using the Subcontractor representative's full name and his/her company title. The affidavit must be dated, notarized, and have a reference to the submittal number found in BEI's Subcontractor Submittal Requirements Summary. The CFR number, if applicable, must be referenced with its relationship to the specific submittal requirement. The affidavit must be in statement form with an explanation of how the affidavit fulfills the submittal requirement. Acceptance of an affidavit in lieu of certificates, licenses, or permits is at the direction of BEI.

APPENDIX E

TECHNICAL SPECIFICATION FOR UNCONTAMINATED EARTHWORK

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

TECHNICAL SPECIFICATION

FOR

UNCONTAMINATED EARTHWORK

0	7/21/94	Issued for Use	KK	PD		
NO.	DATE	REASON FOR REVISION	BY	CHECK	SUPV	PE

ORIGIN	Uncontaminated Earthwork	JOB NO. 22567	
		TECHNICAL SPECIFICATION	REV
		001-SP000-006	0
		SHEET 1 OF 20	

CONTENTS

TECHNICAL SPECIFICATION FOR UNCONTAMINATED EARTHWORK

1.0 GENERAL

This specification defines the technical requirements for uncontaminated earthwork. Not all operations defined herein are necessarily required for this Subcontract; reference is directed to the contract Scope of Work for specific services required.

This specification includes requirements for

a) Filling and backfilling for general site work
b) Building perimeter and site structure backfilling
c) Consolidation and compaction
d) Miscellaneous earthwork
e) Trenching and backfilling for utilities

This specification does not provide requirements for construction of low-permeability clay liners and closure caps, roadway and railroad earthwork, and contaminated earthwork, except as referenced by specifications for those activities.

2.0 QUALITY STANDARDS

Publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The latest edition at the time of bid, including addendums, shall be effected as a part of this specification.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1556 (1990) Density of Soil in Place by the Sand-Cone Method

ASTM D 1557 (1991) Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop

ASTM D 2167 (1984) Density and Unit Weight of Soils in Place by the Rubber Balloon Method

ASTM D 2216 (1992) Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures

ASTM D 2487 (1992) Classification of Soils for Engineering Purposes

ASTM D 2922 (1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 3017 (1988) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ASTM D 4253 (1988) Minimum Index Density of Soils Using A Vibratory Table

ASTM D 4254 (1983) Minimum Index Density of Soils and Calculation of Relative Density

ASTM D 4318 (1984) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

OSHA 29 CFR 1910 Occupational Safety and Health Regulations for General Industry

OSHA 29 CFR 1926 Occupational Safety and Health Regulations for Construction Industry

3.0 DEFINITIONS

3.1 COHESIONLESS MATERIALS

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

3.2 COHESIVE MATERIALS

Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH.

3.3 DEGREE OF COMPACTION

Degree of compaction required is expressed as a percentage of the maximum density obtained in accordance with ASTM D 1557 for cohesive materials and as a percentage of relative density obtained in accordance with ASTM D 4253 and ASTM D 4254 for cohesionless materials.

3.4 EXPANSIVE SOILS

Soils that have a plasticity index equal to or greater than 20 when tested in accordance with ASTM D 4318.

3.5 UNYIELDING MATERIAL

Unyielding materials are rock and gravelly soils with stones greater than 6 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

3.6 UNSTABLE MATERIAL

Unstable materials are materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

3.7 ROCK

Rock shall consists of (1) boulders measuring approximately 1/2 cubic yard or more, (2) materials that cannot be removed without systematic drilling and blasting, such as rock material in ledges, bedded deposits, unstratified masses, and conglomerate deposits, and (3) below-grade concrete or masonry structures, exceeding 1/2 cubic yard in volume and greater than 9 inches in thickness. Asphaltic or portland cement pavements will not be considered as rock.

3.8 UNSATISFACTORY FILL AND BACKFILL

Unsatisfactory fill and backfill material is defined as material that is (1) too wet or too soft to properly support the associated construction as determined by Bechtel, (2) expansive soils (Section 1.3.4), (3) contaminated, or (4) materials classified in accordance with ASTM D 2487 as PT, OH, and OL (5) stones larger than 3 inches in any dimension, or (6) man-made fills, refuse, or backfills from previous construction.

3.9 BEDDING MATERIAL FOR UTILITIES

Bedding material for utilities shall consist of select granular material or satisfactory materials free from rocks 2 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 1 inch in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

4.0 SUBMITTALS

4.1 GENERAL

Not all submittals defined herein may be required. Only engineering document requirements as summarized in Exhibit F, Subcontractor Submittals Requirements Summary (SSRS), shall apply. Submittals identified shall meet the detailed requirements herein. Bechtel will determine if

documentation is complete as submitted by the Subcontractor and reserves the right to disapprove and require the resubmittal of any submittal that does not meet the specified requirements. Unless indicated otherwise submittals shall be made to Bechtel at least two weeks prior to delivery, use, or implementation.

4.2 TESTING REPORTS

Submit testing reports within 24 hours of conclusion of physical tests. Submittals shall include two unbound copies of test results, including calibration curves and results of calibration.

4.3 TESTING LABORATORY CERTIFICATIONS AND QUALIFICATIONS

Submit qualifications and certifications of the commercial testing laboratory.

4.4 LIST OF EQUIPMENT

Submit a list of equipment proposed for use. This list shall include the type, size, and rating of the equipment proposed to be used. For compactive rollers, the weight, drum, or wheel size and cleat size, if any, shall also be given.

4.5 ONSITE BORROW PIT OPERATION

Bechtel will provide the information on onsite borrow pit location and available test reports on the borrow material. Proposed operation plans for any onsite borrow pit(s) shall be submitted. The operation plan shall include proposed procedures and plans for water control, erosion and dust control, access road construction and maintenance, equipment type and purpose, and borrow excavation.

4.6 OFFSITE BORROW PIT MATERIALS

Submit the following information on the proposed offsite borrow pit: (1) borrow pit location and address, (2) owner's name and state permit/licensing number, and (3) reports of the ASTM tests required to satisfy requirements listed in Section 5.0.

4.7 AGGREGATE SOURCE

Submit the following information on the proposed offsite aggregate source: (1) aggregate source location and address, (2) owner's name and state permit/licensing number, and (3) reports of the ASTM tests required to satisfy the requirements listed in Section 5.0.

4.8 PROTECTION OF EXISTING FOUNDATIONS

Submit proposed modifications to protect existing foundations in accordance with Section 6.7.4.

4.9 SHORING DESIGN AND CALCULATIONS

Submit proposed shoring design or alternate slope protection methods in accordance with Section 6.7.4.

4.10 SOILS LABORATORY TEST RESULTS

Submit the following laboratory tests results (1) Proctor curves, (2) soil classification test results, (3) relative density test results.

5.0 PRODUCTS

5.1 COARSE AGGREGATE

Coarse aggregate shall consist of clean, well-graded crushed stone with all particles passing the 3" sieve and no more than 5% passing the $1^1/_2$" sieve. Fines shall be limited to not more than 2 percent by weight passing the No. 4 size sieve.

5.2 BACKFILL

5.2.1 General Backfill

General backfill shall include cohesive or cohesionless materials free of trash, debris, roots or other organic matter, frozen material, stones or other material larger than 4 inches in any dimension, and contamination.

5.2.2 Structural Backfill

Structural backfill shall include materials classified in accordance with ASTM D 2487 as GW, SW, GC, GM, SC, and SM and shall be free of trash, debris, roots or other organic matter, frozen material, and contamination. It shall have no more than 15 percent of the material passing a number 200 sieve, and no material shall exceed 2 inches in any dimension.

5.3 TEMPORARY SEDIMENT BARRIERS

Materials used for sediment barriers shall consist of straw bales, synthetic sediment fencing, geotextile filter fabric made expressly for use as a silt screen, or other suitable materials

reviewed by Bechtel prior to use. Straw bales shall not be used for permanent sediment barriers unless specifically required by Bechtel.

5.4 SELECT GRANULAR MATERIAL

Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone, or crushed slag composed of hard, tough, and durable particles and shall contain not more than 10 percent by weight of material passing a No. 200 mesh sieve and no less than 95 percent by weight passing the 1-inch sieve. The maximum allowable aggregate size shall be 3/4-inch or the maximum size recommended by the pipe manufacturer, whichever is smaller.

5.5 PLASTIC MARKING TAPE

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6-inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactured with integral wires, foil backing, or other means to enable detection by a metal detector when the tape is buried in soil up to 3 feet deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other metallic core type to protect it from corrosion. Tape color shall be as specified below and shall bear a continuous printed inspection describing the specific utility.

Tape Color	Utility
Red	Electric
Yellow	Gas, Oil, Dangerous Materials
Orange	Telephone, Telegraph, Television, Police, Fire and Communication
Blue	Water Systems
Green	Sewer Systems

6.0 FIELD OPERATIONS

6.1 PRE-EARTHWORK EVALUATION

Before beginning any earthwork, carefully examine the work area to identify any pre-existing conditions (e.g., overhead power lines, access, etc.) that could impact the performance and completion of work. Bechtel will provide available information concerning the location of underground utilities, and the Subcontractor shall verify those locations, coordinate any required inspection with utility companies, provide support to utility companies, and provide structural support to utility lines. Unless noted otherwise, the Subcontractor shall maintain the services of all underground utilities encountered during excavation activities and shall restore the services to

their original condition. The Subcontractor shall obtain all applicable permits prior to commencing work, unless noted otherwise in the contract documents.

6.2 EROSION AND SEDIMENT CONTROL

Erosion and sediment control shall be provided and maintained in accordance with the engineering drawings.

Temporary sediment barriers shall be installed and maintained during the construction period until permanent sediment barriers are in place. Permanent sediment barriers shall be installed in accordance with the engineering drawings.

6.3 CLEARING AND GRUBBING

Clearing and grubbing shall be performed in accordance with specification 22567-001-SP000-002.

6.4 TOPSOIL REMOVAL

Topsoil within the designated excavations and grading lines shall be stripped and stockpiled in the designated onsite areas. The actual depth of stripping will be determined in the field by Bechtel. Measures (e.g., erosion control, stable slopes, adequate compaction, etc.) shall be taken to prevent loss of stockpiled topsoil.

6.5 DRAINAGE, DEWATERING, AND STREAM DIVERSION

6.5.1 Drainage

Surface water shall be directed away from excavation and construction areas. Diversion ditches, check dams, dikes, and/or grades shall be developed and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing.

6.5.2 Dewatering

Unless noted otherwise, all excavations shall be kept in a dewatered condition. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls; boils, uplift, and heave in the excavation; and to eliminate any interference with the orderly progress of excavation. French drains, sumps, ditches, or trenches will not be permitted within three feet of the foundation of any existing structure, and only with written Bechtel approval. Water control measures shall be taken prior to excavating to groundwater level in

order to maintain the integrity of the in situ material. Water collected during dewatering shall be pumped or collected and transported to designated onsite discharge points.

6.5.3 Stream Diversion

Stream diversion(s) shown on engineering drawings shall be developed and maintained.

6.6 BLASTING

Blasting will not be permitted.

6.7 EXCAVATION

6.7.1 General

Excavations shall include the removal of materials to the lines, grades, and elevations indicated on contract documents. Grading shall conform with the typical sections shown on the engineering drawings and the tolerances specified herein. Positioning of heavy equipment, stockpiles, etc. shall be outside the edges of excavation a distance equal to or greater than the full depth of the excavation, unless otherwise allowed by Bechtel.

Excavations shall be maintained until final acceptance of the work by Bechtel.

6.7.2 Classification of Excavation Materials

Materials from uncontaminated excavations shall be unclassified regardless of the nature encountered. Disintegrated rock will not be considered as rock excavation. Excavation materials shall include all materials encountered (e.g., soils, concrete, rock, asphalt, stumps, rubbish, etc.).

6.7.3 Excavation Slopes

Excavation slopes shall be established in strict accordance with OSHA 2207, specifically 29 CFR 1926, Subpart P, "Excavation, Trenching, and Shoring." Slopes shall be protected to prevent erosion or sloughing. Remove and handle any additional material caused by erosion or sloughing.

6.7.4 Shoring

Shoring, including temporary sheet piling, shall be furnished and installed as necessary to protect workers, slopes, adjacent paving, structures, and utilities. Shoring design and installation plans, including engineering calculations, shall be developed in accordance with OSHA 2207,

specifically 29 CFR 1926 Subpart P, and submitted to Bechtel for review. Shoring, bracing, and sheeting shall be removed as excavations are backfilled in a manner to prevent cave-ins.

Alternate slope protection methods (e.g., benching, sloping, trench boxes, etc.) may be used where applicable. Proposed alternate methods, including plans and calculations, shall be developed by the Subcontractor in accordance with 29 CFR 1926 Subpart P and submitted to Bechtel for review prior to implementation.

Shoring inspections, including qualifications and frequency, shall be in accordance with 29 CFR 1926 Subpart P.

6.7.5 Excavation for Foundation Systems of Structures

Excavations shall extend a sufficient distance from walls and footings to allow for placement and removal of forms. Excavation to final grade shall be performed within 48 hours of subsequent concrete placement. Only excavation methods that will leave the foundation soils in a solid condition shall be used.

6.7.6 Excavation for Utilities

Trench Excavation

Trench walls below the top of the pipe shall be sloped or made vertical as recommended by the manufacturer of the pipe to be installed subject to conformance to OSHA 2207, specifically 29 CFR 1926, Subpart P, "Excavation, Trenching, and Shoring." Trench walls more than 5 feet deep shall be shored, cut back to a stable slope at least equal to the angle of repose, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Special attention shall be given to slopes that may be adversely affected by construction vibration forces, weather conditions, or moisture content. Slopes shall be protected to prevent erosion or sloughing. Remove and handle any additional material caused by erosion or sloughing.

Excavation Widths

The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter (I.D) and shall not exceed 36 inches plus pipe (O.D.) for pipes larger than 24 inches (I.D). Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized.

Rock

Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 9 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock faces shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown on the engineering drawings or as directed by Bechtel. Loose disintegrated rock and thin strata shall be removed.

Excavation for Appurtenances

Excavation for manholes, catch-basins, inlets, or similar structures shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members of sufficient size to allow the placement and removal of forms for the full length and width of structure footings and foundations as shown on the engineering drawings. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown on the engineering drawings or as directed by Bechtel. Loose disintegrated rock and thin strata shall be removed. Removal of unstable material shall be as specified herein. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the structure is to be placed.

Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe.

Replacement of Unstable and Unyielding Material

Where unstable and/or unyielding material is encountered in the bottom of the trench, such material shall be removed to 6 inches below the required grade and replaced with select granular material or initial backfill material. The select granular backfill shall be compacted as specified in Section 6.10.

6.7.7 Ditches, Gutters, and Channels

Ditches, gutters, and channel changes shall be cut accurately to the cross sections and grades indicated on the engineering drawings. All roots, stumps, rock, and foreign matter in the sides

and or bottom of ditches, or gutters, and channel changes shall be trimmed and dressed or removed to conform to the slope, grade, and shape of the section indicated.

6.7.8 Overexcavation

Care shall be taken not to excavate outside the elevations, grades, and lines indicated. Overexcavation shall be backfilled to design grade with general backfill and compacted to a density equal to or greater than that required for the subsequent fill material.

6.7.9 Boulders

Unless otherwise directed by Bechtel, boulders shall be removed from excavations for drainage routes and areas of structural backfill.

6.7.10 Stockpiling and Stockpiles

Excavated materials satisfying the requirements of Section 5.2 for backfill shall be transported to and placed in designated fills or stockpiled at Bechtel designated onsite locations. All materials to be stockpiled (e.g., soil and aggregate from offsite sources) shall be placed in areas that have been cleared and grubbed.

Stockpiles shall be kept in a neat and well-drained condition, giving due consideration to drainage. Excavated satisfactory and unsatisfactory materials shall be stockpiled separately. Stockpiles of satisfactory materials shall be protected from contamination. If the material in the stockpile becomes unsatisfactory for use as backfill, such material shall be removed and replaced with satisfactory material from approved sources. Locations of stockpiles of satisfactory materials shall be subject to prior approval of Bechtel.

6.8 SUBGRADE PREPARATION

Subgrades in structural areas shall be proof-rolled prior to placement of fill. Unsatisfactory material identified by proof-rolling shall be removed and replaced with general backfill and compacted in accordance with this specification to meet the compaction requirements for subsequent fill material.

Slopes steeper than 1 vertical to 4 horizontal shall be stepped or benched during placement of lifts so that the fill material will bond with the existing material.

The subgrade material shall be scarified in accordance with Section 6.10.2.

6.9 BORROW AND AGGREGATE MATERIAL

Unless directed otherwise, all borrow material shall be obtained from onsite areas designated by Bechtel. Subcontractor shall clear, grub, dispose of all debris, and control surface water flow and erosion of borrow areas. All work shall be considered operations related to onsite borrow excavation and shall be performed in accordance with applicable portions of this specification.

If required by Bechtel, the Subcontractor shall identify offsite borrow and/or aggregate sources, provide to Bechtel for review certification that borrow/aggregate material meets the requirements of this specification, and transport material to the fill area. No borrow and/or aggregate shall be brought from an offsite source without prior written approval by Bechtel.

6.10 BACKFILLING

6.10.1 General

Unless noted otherwise in contract documents, general fill and backfill shall be used in bringing fills and excavations to the lines and grades indicated and for replacing unsatisfactory subgrade materials. Compaction shall be accomplished by segmented pad foot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other Bechtel reviewed equipment suited to the type of material being compacted. Backfill shall be placed in horizontal layers not exceeding 8 inches in loose thickness when using conventional compaction equipment or 6 inches when using hand-operated compaction equipment. Backfill shall not be placed on unsatisfactory materials.

Each lift shall be moisture conditioned or aerated as necessary and compacted to not less than the percentage of maximum density specified below:

a) General and trench fill using cohesionless material (e.g., cover soil) shall be compacted to at least 70% relative density.

b) General and trench fill using cohesive material (e.g., cover soil) shall be compacted to at least 85% maximum density.

c) Structural fill using cohesionless material (e.g., buildings, steps, paved areas, sidewalks, footings, trenches, etc.) shall be compacted to at least 85% relative density.

d) Structural fill using cohesive material (e.g., buildings, steps, paved areas, sidewalks, footings, trenches, etc.) shall be compacted to at least 95% maximum density.

e) Bedding material for utilities shall be compacted to at least 85% relative density.

Compacted subgrades that are disturbed by the Subcontractor's operations shall be repaired as specified herein to the required density prior to further construction thereon.

6.10.2 Scarifying

All subgrades and compacted lifts in the following applications shall be scarified 3 to 4 inches prior to placement of the subsequent lift: (a) embankments, (b) roadway routes, (c) railway routes, and (d) fill areas adjacent to and immediately below structural foundations.

In lieu of scarifying, compaction may be performed by sheepsfoot roller or similar equipment designed to compact the lift from the bottom to the top.

6.10.3 Additional Requirements for Structural Backfilling

Structural backfilling shall not begin until construction below finish grade has been inspected by Bechtel, forms removed, and the excavation cleaned of trash and debris.

Backfill adjacent to structures shall be placed and compacted uniformly in such manner as to prevent wedging action or eccentric loading upon or against the structures. Backfill shall not be placed against concrete or masonry foundation walls prior to 7 days after completion of the walls. To the extent practical, backfill shall be brought up evenly on both sides of walls and sloped to drain away from the wall. Construction equipment and methods that will overload immediate and adjacent structures during backfilling and embankment formation operations shall not be used.

6.10.4 Additional Requirements For Trench Backfilling

General

Trenches shall be backfilled to the grades shown on engineering drawings and in the following order. The bedding material shall be placed, followed by the initial backfill, and completed by the final backfill. Lift thickness shall be as specified in Section 6.10.1.

In compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Construction machinery shall not be moved over a culvert or storm drain at any stage of construction in a manner that might damage the culvert or drain. Any damaged pipe shall be repaired or replaced.

Bedding

Bedding shall be select granular material as described in Section 5.4. Care shall be taken to ensure thorough compaction of the bedding under the haunches of the pipe. Bedding material

shall be placed and compacted with approved tampers to a height of 1 foot above the utility pipe or as specified on the engineering drawings. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. The joints and/or couplings shall be left uncovered during pressure tests.

Final Backfill

Final backfill shall not be placed until all specified tests are satisfactorily performed. The remainder of the trench, except at roadways and railroads shall be filled with satisfactory material. Backfill material shall be placed and compacted to grade in accordance with Section 6.10.

Backfill for Appurtenances

Manholes, catch basins, inlets, or similar structures shall be placed in such a manner that the structure will not be damaged by the shock of falling earth while backfilling. Backfill material shall be deposited and compacted as specified for final backfill and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

Plastic Marking Tape

Plastic marking tape per Section 5.5 shall be installed directly above the pipe, at a depth of approximately 18 inches below finished grade unless otherwise shown on the engineering drawings.

6.11 AGGREGATE BASES

Aggregate bases shall be constructed under pavements, foundations, and slabs-on-grade and placed directly on the subgrade. The aggregate base shall be placed in 4 inch lifts and compacted with a minimum of two passes of a hand-operated plate-type vibratory compactor or equivalent compactive effort. Minimum compacted thickness of the aggregate base is 4 inches unless noted otherwise.

6.12 GRADING

Graded areas shall be constructed true-to-grade, shaped to drain, and maintained free of trash and debris until final inspection has been completed and the work has been accepted. The surfaces of embankments and excavations shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown on engineering drawings. Unless indicated otherwise, tolerances for all graded areas shall be $\pm$ 0.1 foot for the grades and elevations indicated.

6.13 PROTECTION OF WORK

Settlement or erosion that occurs in backfilled, filled, graded, or topsoiled areas prior to acceptance of the work shall be repaired to required conditions at Subcontractor's expense.

6.14 SECURITY

When necessary and practical, as determined by Bechtel, work areas shall be secured using barriers (e.g. rope, snow fence) to prevent inadvertent entry to work areas.

7.0 QUALITY CONTROL AND VERIFICATION

7.1 RESPONSIBILITY

The Subcontractor shall verify that placement of backfill meets the requirements of this specification. Unless noted otherwise, testing shall be the responsibility of the Subcontractor and shall be considered part of earthwork.

7.2 TESTING LABORATORY

Testing shall be performed by a Bechtel approved commercial testing laboratory.

7.3 MOISTURE-DENSITY RELATION

Moisture-density relation shall be determined in accordance with ASTM D 1557 for each type of material or source of material, including borrow materials, to determine the optimum moisture and laboratory maximum density values.

7.4 IN-PLACE MOISTURE CONTENT

In-place moisture content of soil backfill shall be determined in accordance with ASTM D 3017. Accuracy of the ASTM D 3017 tests shall be checked by performing ASTM D 2216 test for every ten ASTM D 3017 tests performed.

7.5 IN-PLACE DENSITY

Field in-place density shall be determined in accordance with ASTM D 2922. Accuracy of the ASTM D 2922 tests shall be checked by performing one ASTM D 1556 or ASTM D 2167 test for every ten ASTM D 2922 tests performed.

When ASTM D 2922 is used, the calibration curves shall be checked and adjusted if necessary by the procedure described in ASTM D 2922, paragraph ADJUSTING CALIBRATION CURVE. The calibration curves furnished with the moisture gauges shall also be checked, along with density calibration checks, as described in ASTM D 3017. The calibration checks of the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at the beginning and ending of each day that the equipment is used.

Additional compaction and/or moisture conditioning shall be performed if the compaction or slope stability do not satisfy the requirements of this specification.

7.6 TESTING FREQUENCY

The following number of tests, if performed at the appropriate time, shall be the minimum acceptable for each type operation.

7.6.1 Moisture-Density Relation

a) One representative test per 5,000 cubic yards of fill and backfill or when any change in material occurs that may affect the optimum moisture content or laboratory maximum density.

b) One representative test per 1,500 cubic yards of bedding, fill and backfill for the utility excavation or when any change in material occurs that may affect the optimum moisture content or laboratory maximum density.

7.6.2 In-Place Density of Subgrades

a) One test per 40,000 square feet or a minimum of 2 tests per area, whichever is greater, for subgrades of general backfill.

b) One test per 20,000 square feet or a minimum of 2 tests per area, whichever is greater, for subgrades of structural backfill.

c) The in-place density of subgrades of trenches and other areas less than 10 feet in width, shall be tested with 1 test per 1,000 square feet or one test for each 100 linear feet of length, whichever yields the greater number of tests.

7.6.3 In-Place Density and Moisture Content of Fills and Backfills

a) One test per 20,000 square feet or minimum of 1 test per lift, whichever is greater, for general backfill areas compacted by other than hand or hand-operated machines.

b) One test per 10,000 square feet or minimum of 1 test per lift, whichever is greater, for general backfill areas compacted by hand or hand-operated machines.

c) One test per 2,000 square feet or minimum of 2 tests per lift, whichever is greater, for structural backfill areas compacted by other than hand or hand-operated machines.

d) One test per 1,000 square feet or minimum of 2 tests per lift, whichever is greater, for structural backfill areas compacted by hand or hand-operated machines.

e) The density of each lift of backfill materials for trenches, pits, building perimeters, or other structures or areas less than 10 feet in width, and compacted with hand or hand-operated machines shall be tested with 1 test per each area less than 1,000 square feet, or one test for each 100 linear foot of length, whichever is greater.

7.6.4 Particle-Size Analysis

A minimum of one particle-size analysis shall be performed or data shall be provided for each different type of material to be used for bedding and backfill.

7.7 TEST RESULTS

Test results for a lift shall be submitted for review prior to placement of the next lift above that area. Approved lifts shall be covered by subsequent lifts within 24 hours of testing to protect the compacted condition of the fill. Any lift left exposed for longer than 24 hours shall be removed and replaced.

APPENDIX F

FDEP'S STANDARD OPERATING PROCEDURES FOR LABORATORY OPERATIONS AND SAMPLE COLLECTION ACTIVITIES

APPENDIX G

FDEP'S QUALITY ASSURANCE STANDARD OPERATING PROCEDURES FOR PETROLEUM SYSTEM CLOSURE ASSESSMENTS

TECHNICAL SPECIFICATION
FOR
CONTAMINATED EARTHWORK AND MISCELLANEOUS DEMOLITION

1.0 GENERAL

This Specification provides the technical requirements for the excavation of contaminated earthwork and miscellaneous demolition. Not all work defined herein is necessarily required for this contract; reference is directed to the Scope of Work and engineering drawings for specific services required.

Contaminated earthwork includes excavating, loading, placing, and compacting contaminated materials. Transporting and unloading of contaminated materials is covered in Specification 001-SP000-003, "Transport of Contaminated Material." Backfilling of excavation is covered in Specification 001-SP000-006, "Uncontaminated Earthwork".

2.0 QUALITY STANDARDS

Unless otherwise specified or shown, the latest edition at the time of bid of the following Codes and Standards shall apply to the extent indicated herein:

OSHA 29 CFR 1910 Occupational Safety and Health Regulations for General Industry

OSHA 29 CFR 1926 Occupational Safety and Health Regulations for Construction

3.0 SUBMITTALS

3.1 GENERAL

Not all submittals defined herein may be required. Only engineering document requirements as summarized in Exhibit F, Subcontractor Submittals Requirements Summary (SSRS), shall apply. Submittals identified shall meet the detailed requirements herein. BEI will determine if documentation is complete as submitted and reserves the right to require the resubmittal of any submittals that do not meet specified requirements. Unless indicated otherwise, submittals shall be made to BEI at least 2 weeks prior to delivery, implementation, or use.

3.2 LIST OF EQUIPMENT

Submit list of equipment for use in contaminated earthwork. The list shall include the type, size, and rated capacity of the equipment proposed.

3.3 TESTING REPORTS

Submit testing reports within 24 hours of conclusion of physical tests. Submittals shall include 2 unbound copies of test results, including calibration curves and results of calibration.

3.4 TESTING LABORATORY CERTIFICATIONS AND QUALIFICATIONS

Submit qualifications and certifications of the commercial testing laboratory.

3.5 DRAINAGE DESIGN

Submit proposed drainage design in accordance with this specification.

3.6 SHORING DESIGN AND CALCULATIONS

Submit proposed shoring design and engineering calculations or alternate slope protection measures, in accordance with this specification.

4.0 MATERIALS

4.1 INSPECTION AND TESTING OF MATERIALS

BEI reserves the right to inspect and test any and all materials in order to verify conformance with requirements.

4.2 NONCONFORMANCE

Materials not in conformance with the Specification requirements shall be removed from the site and replaced.

4.3 SEDIMENT BARRIERS

Materials used for sediment barriers shall consist of straw bales, hay bales, geotextile filter fabric made expressly for use as a silt screen, or other materials approved by BEI prior to their use. Straw and hay bales shall not be used for permanent sediment barriers unless approved by BEI.

4.3.1 Hay/Straw Bales and Reinforcing Bars

Baled hay or straw shall be laid end to end such that no gap exists between bales. Reinforcing bars shall be #4 bar and a minimum of $2^1/_2$ feet long.

4.3.2 Filter Fabric

Filter fabric shall be a material made expressly for the purpose of sediment control such as Exxon GTF 101S Silt Screen or approved equal.

4.4 EROSION CONTROL BLANKETS

Erosion control blankets shall be Curlex Blankets manufactured by American Excelsior Company, or approved equal.

5.0 FIELD OPERATIONS

5.1 EROSION AND SEDIMENT CONTROL

Potentially contaminated material shall be prevented from being eroded or otherwise transported into an uncontaminated area or an area that has a lower level of contamination.

Install temporary sediment barriers in accordance with the contract documents and shall be maintain during construction until permanent sediment barriers are in place.

Permanent sediment barriers shall be installed in accordance with the engineering drawings.

Erosion and sediment shall be controlled by the following techniques subject to BEI review on a case-by-case basis:

- Covering with synthetic liner material
- Covering with uncontaminated soil material
- Sediment barriers

5.2 DUST CONTROL

Dust shall be controlled by the following techniques subject to BEI review:

- Wetting with water
- Wetting with BEI-approved synthetic dust suppressant
- Establishing temporary vegetative cover
- Compaction
- Sealing by rolling with a smooth drum
- Maintaining slopes of exposed surfaces within defined limits

5.3 CLEARING AND GRUBBING

Clearing and grubbing shall be performed in accordance with Specification 001-SP000-002.

5.4 DRAINAGE, DEWATERING, AND STREAM DIVERSION

5.4.1 Drainage

Surface water shall be directed away from excavation and construction areas. Diversion ditches, check dams, dikes, and/or grading shall be developed and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be sloped at a minimum of 3% to promote runoff and shall be protected to prevent erosion and sloughing. Submit a proposed design to BEI for review prior to constructing any drainage systems not indicated by the engineering drawings.

5.4.2 Dewatering

Unless noted otherwise, all excavations shall be kept in a dewatered condition. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls; boils, uplift, and heave in the excavation; and to eliminate any interference with excavation progress. Water which has come in contact with contaminated material shall be collected and transported to an onsite location in accordance with Specification 001-SP000-003, "Transport of Contaminated Material."

5.4.3 Stream Diversion

Stream diversion(s) shall be developed as shown on the engineering drawings and maintained to prevent the spread of contamination. Blasting is not permitted.

5.6 EXCAVATION

5.6.1 General

All excavation shall conform to lines, grades, and depths defined on the engineering drawings and field verified by BEI.

Rocks 6 inches or greater in any dimension shall be separated from the soil and given a gross decontamination (i.e., removal of most soil material by scrapers, brushes, etc.). These rocks shall be left in the excavation area.

Areas being excavated shall be maintained in a clean condition, free from leaves, brush, sticks, trash and other debris. Excavations shall be inspected in accordance with OSHA 29 CFR 1910 and 1926 prior to commencing work each day. All daily inspections shall be documented.

5.6.2 Contamination Control

Dust generated during construction shall be controlled by water spraying with potable water or other approved methods.

Excavation shall be performed in such a manner that the spread of contamination is prevented. Unless indicated otherwise, the cutting edge of the excavator(s) shall be toothless and the excavation performed in the direction of surface run-off (i.e., from higher to lower elevation). Contamination spread through the improper execution of the subcontract documents shall be cleaned up to the satisfaction of BEI at the Subcontractor's expense.

Barriers (draped plastic sheeting, plastic mounted on wooden frame, or plywood) shall be placed against the sides of truckbeds to prevent contamination of the exteriors of transport vehicles while being loaded.

When transport vehicles are loaded in uncontaminated areas, those areas shall be protected from contamination with plastic overlain with plywood adjacent to the vehicle or with other BEI approved materials and arrangement.

Transport vehicles shall be maintained and used in accordance with Specification 001-SP000-003, "Transport of Contaminated Material."

At least 1 ft of freeboard shall be maintained between top of soil and sideboards on loaded haul trucks.

5.6.3 Excavation Slopes

Excavation slopes shall be established in strict accordance with Subpart P, "Excavation, Trenching, and Shoring," of 29 CFR 1926. Side slopes shall be protected to prevent materials from eroding or sloughing. Any additional material removal and handling caused by erosion or sloughing shall be performed at the expense of the Subcontractor.

5.6.4 Shoring

Shoring, including temporary sheet piling, shall be furnished and installed as necessary to protect workers, slopes, and adjacent paving, structures, and utilities. Shoring design and installation plans including engineering calculations shall be developed by the Subcontractor in accordance

with 29 CFR 1926 Subpart P and submitted to BEI for review. Shoring, bracing, and sheeting shall be removed as excavations are backfilled in a manner to prevent cave-ins.

Alternate methods (e.g., benching, sloping, trench boxes, etc.) may be used where applicable. Alternate methods proposed by the Subcontractor shall be developed in accordance with 29 CFR 1926 Subpart P and submitted to BEI for review.

Provide a shoring inspector that is qualified in accordance with 29 CFR 1926, Subpart P. The scope and frequency of inspections shall be in accordance with 29 CFR 1926 Subpart P.

Care shall be taken to minimize exposure of shoring or other slope protection devices to contamination. These items shall not be released from the site until they have been decontaminated in accordance with this specification.

5.6.5 Excavation Sequence

The sequence for excavation of contaminated material shall be as follows:

(1) Define and isolate exclusion zones per engineering drawings.

(2) Construct haul roads per engineering drawings.

(3) Perform initial excavation to indicated lines and grades indicated on engineering drawings.

(4) Allow excavated area to be sampled to determine if the area meets the remedial cleanup standards. Sampling is outside the scope of this Specification.

(5) Continue excavation as directed by BEI, if an area within the excavation does not meet cleanup standards. Allow the excavated area to be resampled after each lift of material is removed. Repeat the process until all areas within the excavation meet the cleanup standards as directed by BEI.

(6) Cease excavation upon direction by BEI.

(7) Load contaminated material in accordance with this specification.

5.7 DEMOLITION

5.7.1 General

Demolition shall consist of demolishing, rubblizing or scabbling and/or disposing of asphalt, concrete, or bituminous concrete surfaces within the limits to be excavated as shown on the engineering drawings and/or as directed by BEI.

Construction joints shall be saw cut in existing concrete or asphalt where new concrete or asphalt will be placed.

Demolished debris shall be reduced to a size no larger than 2 feet long, 2 feet wide and 2 feet thick.

Reinforcing bars encountered during concrete removal shall be cut with an approved method.

5.7.2 Inspection

Work areas shall be inspected in accordance with OSHA 29 CFR 1910 and 1926 when fuel powered tools are used indoors. No personnel shall enter the work area until required corrective measures are completed. Inspections shall include review of administrative and engineering controls and measurement of air quality in confined spaces. These daily inspections shall be documented.

5.8 LOADING

5.8.1 Onsite Disposal or Storage

All excavated materials shall be transported to and placed in areas indicated on the engineering drawings or as directed by BEI. Material shall be loaded into designated haul trucks using the contamination control techniques defined in this specification.

5.8.2 Offsite Disposal

Excavated contaminated soils designated for offsite disposal shall be loaded into designated haul trucks using the contamination control techniques defined in this specification. Haul trucks for offsite disposal will be provided by others.

5.9 TEMPORARY STORAGE OF CONTAMINATED MATERIALS

Material designated for temporary storage shall be off loaded at the temporary storage pad unless directed otherwise by BEI. Material shall be positioned with rubber-tired equipment (e.g., bobcat or front-end loader).

Compaction shall be performed with rubber-tired equipment well suited to the type of material being compacted. Material compaction and slope stability shall be sufficient to support the equipment and earthwork activities, as determined by BEI. Compacted material should not remain deformed under foot traffic. Activities shall be conducted in a manner that will prevent contact of contaminated materials with areas outside the asphalt pad.

In the event a permanent disposal area is used for temporary storage of contaminated material, placement shall comply with requirements for temporary storage. In addition, the area used for temporary storage shall be clearly identified by fencing, sediment barriers, or other BEI-approved methods.

5.10 EQUIPMENT DECONTAMINATION

Where discussed below, the term decontamination facility shall mean both the site decontamination facility and portable decontamination facilities, if any.

5.10.1 Procedure

All equipment and tools used in contaminated areas shall be decontaminated by the Subcontractor in accordance with field procedure EP-003, "Procedures for Equipment Decontamination."

5.10.2 Authorization

The Subcontractor shall obtain authorization from BEI before entering or exiting the decontamination facility.

5.10.3 Operations

Operation of a decontamination facility is outside the scope of this Specification. Subcontractor(s) or person(s) responsible for operating the decontamination facility are identified elsewhere in the control documents.

5.10.4 Decontamination

Equipment that has been in contaminated areas shall be decontaminated. The decontamination facility shall be used only for light and final decontamination and not for operations that would require gross decontamination (i.e., removal of most visible materials by scrapers, brushes, etc). Gross decontamination, if required, shall be performed as part of the specified earthwork at the area where trucks are loaded or unloaded. Decontamination shall be repeated as required.

5.10.5 Inspection

Following decontamination, all equipment shall be made available for inspection by BEI. Equipment shall be cleaned to the satisfaction of BEI.

5.11 VEHICLE RELEASE

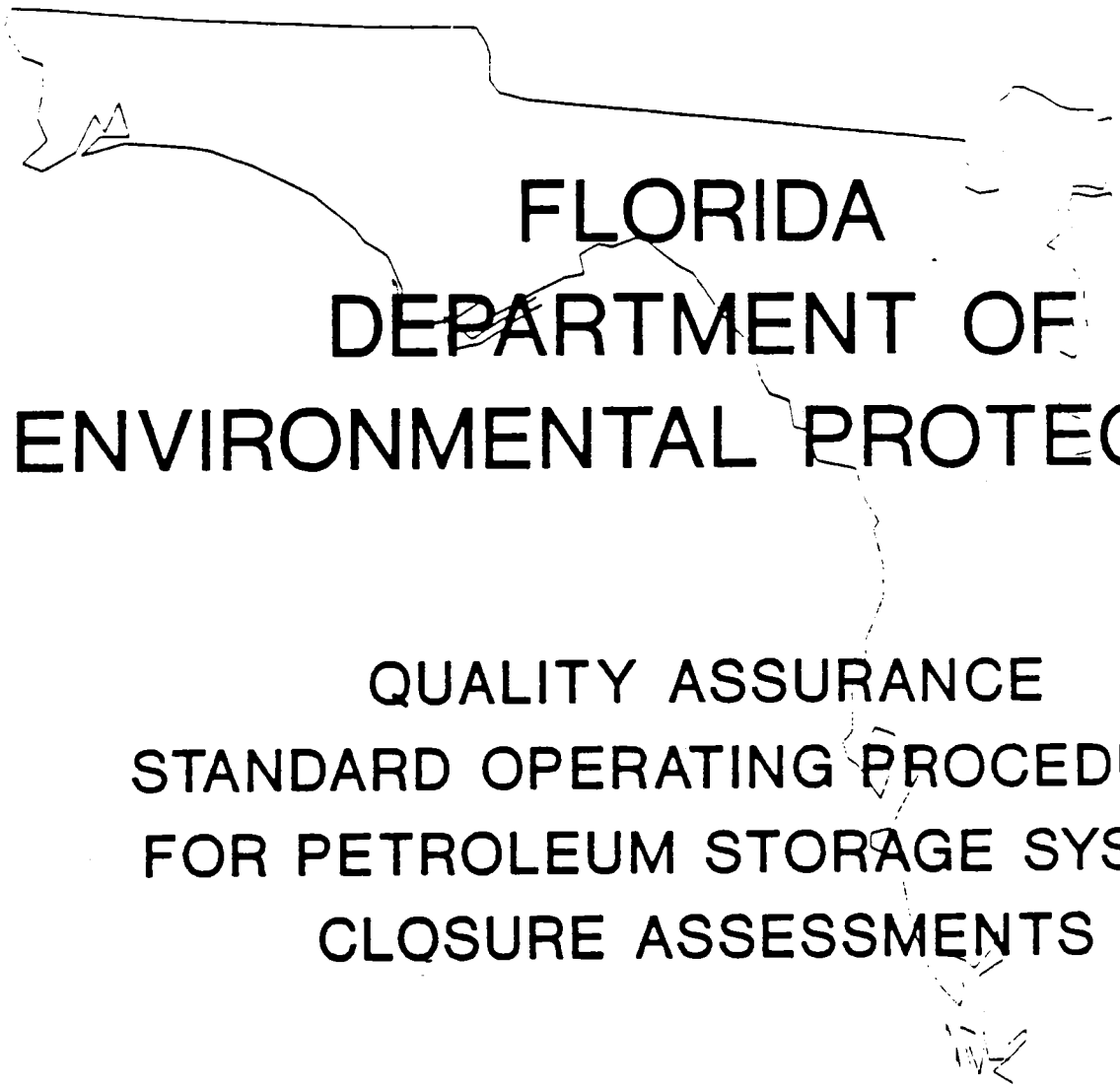
Subcontractor shall obtain written approval from BEI prior to removing trucks from the site.

5.12 PROTECTION OF WORK

Settlement or erosion that occurs in compacted materials prior to acceptance of the work shall be repaired to required conditions at Subcontractor's expense.

5.13 SECURITY

When necessary and practical, as determined by BEI, work areas shall be secured using barriers (e.g. rope, snow fence) to prevent inadvertent entry to work areas.



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

QUALITY ASSURANCE STANDARD OPERATING PROCEDURES FOR PETROLEUM STORAGE SYSTEM CLOSURE ASSESSMENTS

DIVISION OF WASTE MANAGEMENT
BUREAU OF WASTE CLEANUP
STORAGE TANK REGULATION SECTION

FEBRUARY 1994

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I. INTRODUCTION

The purpose of this manual is to provide quality assurance procedures to personnel sampling and taking measurements for petroleum storage system closure assessments pursuant to Chapters 17-761 and 17-762, Florida Administrative Code (F.A.C.). This manual is intended to be used in conjunction with the FDEP Pollutant Storage Tank Closure Assessment Requirements to maintain quality assurance while sampling during closure assessments. This manual should be available in the field for reference.

II. NOTIFICATION AND DOCUMENTATION

A. Notification

The following is a list of documents required for storage tank system closures:

1. Closure Assessment Form (DEP Form 17-761.900(6) - This form must be completed and the additional information requested submitted to the FDEP district office or the contracted county program.

2. Discharge Reporting Form (DEP Form 17-761.900(1) - This form must be filed with the FDEP district office or the contracted county program within one working day, if evidence of a discharge is discovered pursuant to Chapter 17-761.460, F.A.C.

3. Storage Tank Registration Form (DEP Form 17-761.900(2) - This form must be completed and filed with the FDEP Tallahassee office 30 days prior to the closure of any storage tank system.

B. Documentation

1. Field Log

A field log must be maintained for all storage system closures. The information is to be entered in a bound, consecutively numbered notebook. All entries should be made in the field, not back at the office. Entries should be made in waterproof ink and all mistakes should have one line drawn through and initialed. The information must be made available to the reviewing agency upon request. The log should include the following information:

a. General Information:

1) Site name and address and FDEP facility number
2) Dates and times of all closure assessment activities
3) Names of all personnel on-site and company affiliation
4) Ambient field conditions (e.g. weather)
5) Signature of sampler(s)
6) Site sketch indicating location of tanks, piping, dispensers, and sampling points

b. Sampling Information:

1) Date and time of sample collection
2) Specific description of sample location (e.g. depth, sample taken, MW#)
3) Field ID# for each sample to be analyzed
4) Type and depth of soils encountered in borings and the excavation

5) Field measurement data (e.g. soil vapor readings, water level measurements)
6) Field meter calibration data (e.g. date, time of calibration, gases used)
7) Sampling sequence (order samples were taken)
8) Purging and sampling equipment used
9) Field decontamination procedures

2. Chain of Custody Record

a. The possession or custody of samples must be traceable from the time they are obtained until the time the data is submitted to the applicable agency for review. Sample custody is being followed if:

1) The sample container is secured to prevent tampering, or is placed in a designated, secured area, or
2) The sample is in actual physical possession of the sampler.

b. The sampler must label the sample container with a sample tag (usually an adhesive label), which must include the following information:

1) Sample Identification (e.g. MW# or use a unique number)
2) Collection date and time (military time)
3) Analysis required
4) Preservative used

c. The label is to be filled out using waterproof ink at the time of sample collection, prior to placing it with other samples.

d. The next step of COC is to complete a chain of custody record. A COC record must be completed for all samples that will be analyzed by a state approved laboratory. COC records are not required for field analyzed samples (e.g. soil vapor readings). The COC must be filled out in the field concurrent with the sampling event. Correct COC must continue when the sample(s) is(are) transferred to the laboratory or to the person responsible for the delivery of the sample(s) to the laboratory. Upon transfer of the sample, each person handling the sample must sign, date and note the time they received the sample(s) on the COC record. A COC record must include the following information:

1) Sample identification (e.g. MW# or use a unique number)
2) Name and address of the site
3) Date and time of sample collection
4) Location of sample
5) Number of samples
6) Preservative used
7) Analysis to be performed
8) Comments or remarks section (e.g. field conditions)
9) Appropriate places for signatures of sampler and person(s) assuming custody of sample and the identification of common carriers

III. EQUIPMENT DECONTAMINATION

All field sampling equipment should be precleaned in-house (at the laboratory or base of field operations) prior to arrival on-site. Enough clean equipment should be transported to the field so that an entire study can be conducted without the need for field cleaning.

A. **Teflon and Stainless Steel Equipment and Will Sounders or Measuring Tapes**

1. The following procedures are to be followed when cleaning equipment in-house:

   a. Disassemble equipment (if possible)
   b. Wash thoroughly with reagent grade detergent (Alconox, Liquinox or equivalent) and hot water using a brush to remove any particulate matter or surface film.
   c. Rinse thoroughly with hot tap water.
   d. Rinse thoroughly with deionized water.
   e. Rinse twice with an isopropanol and allow to air dry.
   f. Wrap equipment completely with suitable material (e.g. aluminum foil, plastic wrap, polyethylene bag) to prevent contamination during storage and/or transport to the field.

2. If enough precleaned sampling equipment is not available, the following field cleaning steps must be performed between sample locations to avoid cross contamination:

   a. Wash thoroughly with tap water and reagent grade detergent (Alconox, Liquinox, or equivalent) using a brush to remove particulate matter or surface film. (See Note #1 below).
   b. Rinse thoroughly with tap water.
   c. Rinse thoroughly with deionized water.
   d. Rinse twice with isopropanol.
   e. Rinse thoroughly with deionized water and allow to air dry (See Note #2 below).

3. If no further sampling is to be performed, equipment should be rinsed with tap water immediately after use (thorough cleaning is then performed in-house at a later time).

NOTES:

1. **The DEP Quality Assurance Section recommends not cleaning equipment exposed to free product in the field.** Such rigorous cleaning procedures should be performed at the base of operations. If cleaning must be attempted in the field, the following solvents in the order given should be used for prerinsing: an acetone rinse followed by a hexane rinse and again with an acetone rinse. These rinses must precede the soap and water wash described in Item 1 of this section. In extreme cases, it may be necessary to steam clean the equipment before decontamination.

2. Deionized (DI) water may be used for the final water rinse in Closure Assessments. Be aware that prepackaged DI water may contain contaminants, such as phthalates, may show up during an EPA Method 610 analysis (PAH's) or during an EPA Method 625 analysis (Base/Neutral extractable organics). Consider having the DI water analyzed (referred to as a reagent blank) on a regular basis to address this problem.

B. Pump Tubing

1. Teflon tubing should be cleaned by the following procedure:

   a. This cleaning procedure is intended for use in the laboratory or office and should not be attempted in the field. We recommend that enough (precut and precleaned) teflon tubing for purging or sampling be brought to the field as will be needed. After the sampling event, the tubing can be brought back to the main office to be decontaminated. The reagents needed for this procedure are listed below.

1) Laboratory grade detergent (Alconox, Liquinox, or equivalent)
2) Isopropanol
3) DI water

b. The exterior of the tubing should be decontaminated first. In a stainless steel sink (or equivalent), soak the teflon tubing in hot, soapy water and use a brush to remove any particulates. Take a small bottle brush and clean the inside of the tubing ends. Rinse the tubing exterior and the ends liberally with tap water, methanol or isopropanol, and finally DI water.

c. Place the tubing on fresh aluminum foil or a contaminant-free surface.

d. Pump one or two liters of hot, soapy water through the tubing lengths. Follow this with tap water. During the solvent rinses (isopropanol and DI water), turn the pump off and allow the contents to remain in the tubing for 15 minutes.

e. After the interior has been cleaned, the exterior will need a final rinse with DI water. The tubing should then be wrapped in a suitable material to prevent contamination and stored in a clean, dry area until use. A log should be maintained at the laboratory or base of operations for all decontamination procedures.

2. Plastic Tubing

a. Plastic tubing may be used if, during purging, the portion of tubing in contact with the ground water is made of an inert material and the purge water is not allowed to reenter the well. Precleaning of reusable plastic tubing should be conducted at the base of operations. Transport enough new or precleaned tubing to the field as will be needed for all wells. Preclean inside and the outside of the tubing by:

1) Washing with soapy tap water
2) Rinsing with tap water
3) Rinsing with DI water

C. **Soil Boring and Drilling Equipment**

1. Auger flights, drilling rods, drill bits, hollow stem augers, or other parts of the drilling equipment that will contact the soil or groundwater should be cleaned as follows:

a. Clean with a pressurized power washer, steam cleaner, or hand wash using tap water and a reagent grade detergent (Alconox, Liquinox, or equivalent) using a brush if necessary to remove any particulate matter and surface film.
b. Rinse thoroughly with tap water.
c. Rinse thoroughly with deionized water.

NOTE:

Any solvent waste (excluding soap and water) generated during field cleaning of equipment must not be allowed to flow into pervious areas or storm water drainage structures.

IV. FIELD MEASUREMENTS

A. Calibration

1. Field Meters

a. All calibrations should be done in the field, not in the office. Calibrations should be performed before each sampling event. If ambient temperatures vary throughout the day, more frequent calibrations should be performed. All calibration procedures must follow those specified in the owners manual. The following procedures should be followed in addition to the procedures in the owner's manual.

1) **pH:** Before each use, calibrate with the pH 7 buffer first and then one other standard (pH 4 or 10) in order to bracket the expected range of the sample pH.
2) **Temperature:** Field temperature meters/thermistors should be calibrated before each use.
3) **Conductivity:** Conductivity/specific conductance meters should be calibrated before each use with at least one potassium chloride (KCL) standard in the expected range of the sample. Do not use sodium chloride (NaCl). The meter must be adjusted for temperature or be temperature compensated because conductance is temperature dependent.

b. When calibrating each instrument in the field, entries should be made in the field log. They should include: calibration standards used, date and time, meter reading, temperature adjustment, final check, duplicate measurements, and the technician's initials.

2. Organic Vapor Analyzers

a. Vapor detectors, flame ionization detectors (FID's) or photoionization detectors (PID's) used for headspace analysis should be maintained and calibrated as per the manufacturer's instructions. The instrument should be calibrated before each use in the field.

b. Soil contamination levels specified in Chapter 17-770.200(2), F.A.C. are based on data from FID readings. PID's will not give the same reading from the same sample as a FID. The PID requires additional calibration so that it will read equivalent to a FID. The PID must be calibrated by measuring several gas concentrations with the PID and a FID. These readings are plotted on graph paper (e.g. plot PID readings on Y-axis and FID readings on X-axis) to generate a calibration curve. These correlation numbers should be documented. The relative responses will vary between instruments, but 40 ppm to 125 ppm on a PID generally corresponds to 500 ppm on a FID. The date, time of calibration, calibration techniques, and the gases used should be recorded in the field log.

B. Soil Contamination Headspace Analysis Technique

1. Technique

a. Headspace analysis consists of filling a 16 ounce jar half full with soil and tightly sealing it. After the temperature of the jar and its contents has equilibrated, the probe of the FID is inserted through the seal to measure the concentration of organic vapors in the space between the soil and the seal (headspace).

2. Preparation

a. To perform organic vapor headspace analysis, the following materials will be needed:

1) Two or more cases of 16 oz. canning jars and the sealing rings that come with them. The lids should not be used.
2) A roll of aluminum foil. Tear about 6 inches off the roll and fold it in half to form a square. Have plenty of foil seals ready before starting.
3) A marking pen.
4) A thermometer. A common refrigerator thermometer purchased in most grocery stores works well and is inexpensive.

3. Obtaining Samples

a. Have clean jars and foil seals close to the source of the sample. Wear disposable sampling gloves when obtaining the soil sample.

b. The soil should be a representative sample, with as little debris as possible. When sampling from split spoons, obtain a representative sample over the length of the spoon and crumble the sample while placing it in the sample jar.

c. Place the soil sample in the jar and seal it with the aluminum foil and security ring, before examining it and taking notes. Any delay or further disturbance to the sample before sealing the jar will cause incorrect readings as the lighter volatiles will be lost. Immediately after the sample is sealed, label it before placing it with other samples. **Never mix or composite samples from different sampling locations for headspace analysis.**

d. Take at least one duplicate sample per site.

e. Headspace samples should not be taken from the capillary fringe (transition zone from the soil column to the water table) or below the water table. Elevated headspace readings from the capillary fringe or lower, may indicate groundwater contamination rather than soil contamination.

4. Holding Samples

This section is entitled "Holding Samples" rather than "Storing Samples" because soil samples should not be stored before analysis. The intent of headspace analysis is a quick field screening technique. To prevent the loss of volatiles, the samples should be measured as soon as possible out in the field and not brought back to the office or the laboratory.

a. While holding the samples prior to analysis, do not subject them to heat. Don't set the samples out in the sun, on hot asphalt or concrete, or on the hood of your vehicle. Set the samples in the shade, a cardboard box, or in an ice chest and use a thermometer to ensure the correct temperature range. Do not break the seal prior to the headspace analysis. You may check the temperature after analysis or use a dummy sample.

b. The temperature of the sample must be allowed to equilibrate for a minimum of 5 minutes prior to testing. The original guidelines specified testing at 20°C (68°F). Recognizing the difficulty of trying to maintain the samples at one specific

temperature, Chapter 17-770, F.A.C., was revised establishing a temperature range of 20°C to 32°C (68°F to 90°F). Testing at the low end of this range from 20°C to 24°C (68°F to 75°F) is preferred.

c. While testing during temperature extremes, it may be necessary to use a water bath to adjust the temperature.

5. Measuring Headspace

a. Have the organic vapor analyzer ready. The instrument should be turned on several minutes before testing, to bring the electronics and detection chamber up to operating temperature.

b. If the instrument has more than one detection scale, then make your best estimate as to which scale to start sampling with. The sample volume in the jar is limited, therefore, if the instrument's meter pegs (goes full scale) at a lower scale, resample and use the next higher scale.

c. Record the peak value that is observed, because when the probe of the analyzer is inserted through the seal, fresh air is immediately drawn into the sample jar to replace the headspace vapors being drawn into the analyzer. As this occurs, the headspace becomes increasingly diluted resulting in lower and lower readings.

d. Methane is a common background gas, in decaying organics and soils containing organic material, especially those from swampy or low lying areas, that can interfere with FID readings. This means any background methane concentration in the atmosphere or in the soil will be included in the FID response. Since we are not interested in methane, its contribution to the FID response must be subtracted. This is easily accomplished by analyzing another sample obtained from the same sampling point through a granular activated carbon (GAC) filter. The GAC filter allows only methane (and some ethane) to reach the detector. The methane reading is then subtracted from the unfiltered reading to determine the petroleum hydrocarbon vapor concentration. When a duplicate is required and an FID is used, a total of four samples for headspace analysis are obtained from the sampling point and screened as follows:

1) Original sample measurement without filter
2) Duplicate sample measurement without filter
3) Original sample measurement with filter
4) Duplicate sample measurement with filter

6. Recording the Data

a. Record the sampling data as follows:

1) Site Name
2) Instrument type
3) Location of sample (e.g. depth, excavation or borehole)
4) Source of sample (e.g. split spoon, hand auger)
5) Temperature of sample
6) Date and time the reading was taken
7) Sample ID#

8) FID or PID reading
9) Methane reading (if a FID is used)
10) Corrected vapor reading (methane subtracted out if a FID is used)

7. Decontamination of Soil Jars

a. After discarding the soil, the sample jars should be washed and dried for reuse. Washing the jars with tap water and ordinary dishwashing detergent followed by a water rinse and allowed to dry, is sufficient. Small amounts of contaminants left behind will have little or no effect on the next sample.

V. SOIL SAMPLING AT GASOLINE AND KEROSENE (DIESEL) SITES DURING STORAGE TANK REMOVALS AND ABANDONMENTS

The analysis of soil samples obtained during closure assessments at gasoline and kerosene (diesel) sites must be conducted using an organic vapor meter as outlined in Section IV of this manual. Sampling locations and intervals are outlined in the FDEP Pollutant Storage Tank Closure Assessment Requirements.

A. Sampling Devices

1. Underground Storage Tank (UST) Removals

a. Soil samples can be obtained from:

1) The bucket of the backhoe used for the tank removal, or
2) A stainless or carbon steel hand auger/corer/shovel

2. Aboveground Storage Tank (AST) Removals and AST and UST Abandonments

a. Soil samples can be obtained from soil borings using:

1) stainless or carbon steel hand augers/corers, or
2) stainless or carbon steel split spoon samplers.

B. Sampling Methodology

1. Transfer the soil sample directly from the sampling equipment with with a stainless steel spoon or shovel to a 16 ounce jar. Proceed with the vapor analysis outlined in Section IV of this manual. (Do not mix or composite the sample with soil from other sampling locations.)

2. When using a backhoe to excavate soil, the soils may be placed into discrete piles so that the origin of the sample is known. The sample must be taken immediately after the soil is transferred from the bucket to the sampling location. Samples should not be taken from the surface of the pile, but rather from a point at least six (6) inches into the pile. Sampling from composite piles is not acceptable. When sampling directly from the backhoe bucket, be certain to sample from the middle of the bucket and not the sides, since soils may have adhered to the sides from previous bucket loads.

C. Quality Control

1. Quality control should be maintained while conducting soil sampling by following these procedures:

   a. Clean sampling equipment between sample locations as outlined in Section III of this manual.
   b. Wash the soil sample jars between samples.
   c. Wear disposable sampling gloves when obtaining soil samples.

VI. SOIL SAMPLING AT USED OIL SITES

Contamination levels in soil samples obtained during closure assessments at used oil sites are determined by visual inspection only. The technique using an organic vapor analyzer outlined in Section IV of this manual is not an appropriate method when dealing with used oil sites. Sampling locations for storage tank removals and abandonments are outlined in the FDEP Pollutant Storage Tank Closure Assessment Requirements.

A. Sampling Devices

1. Storage Tank Removals and Abandonments

   a. The soils should be visually inspected during used oil storage tank removals using one of the following sampling devices:

      1) The bucket of the backhoe
      2) Stainless or carbon steel hand augers/corers/shovels
      3) Stainless or carbon steel split spoon samplers or Shelby tubes

B. Sampling Methodology

1. Remove the sample from the sampling device and visually observe to determine if staining or discoloration is present that appears to be used oil.

C. Quality Control

1. Quality control should be maintained while conducting soil sampling by following these procedures:

   a. Clean off the particulate material from the boring equipment between sample locations. Decontamination of the equipment as outlined in Section III is not required for visual inspections.
   b. Wear disposable sampling gloves when obtaining and examining soil samples.

VII. WATER SAMPLING

The analysis of water samples obtained for closure assessments must be conducted by a laboratory with an FDEP approved Comprehensive Quality Assurance Plan. Water sampling requirements are discussed in the FDEP Pollutant Storage Tank Closure Assessment Requirements.

A. Sampling Devices

1. Monitoring Well Sampling

   a. A Teflon or stainless steel bailer should be used to sample a monitoring well. Disposable Teflon bailers are acceptable, but the field log must reflect that a disposable piece of equipment was used.

B. Sampling Methodology

1. Monitoring Well Sampling

   a. Well Purging

   1) Several well volumes must be removed (purged) before taking a ground water sample. Purging the well is performed in order to clear the well of stagnant water so that a sample can be obtained that is representative of aquifer conditions. The equation for calculating the volume of standing water in a well is:

$$V = \pi r^2 h$$

V = volume

π = 3.14159

r = well radius (inches or feet)

h = height of water in the well (same units as r, inches or feet)
(depth to the the well bottom from the top of the well casing) (minus)
(depth to the water level from the top of the well casing)

Example: Volume of a 4 inch monitoring well with 10.5 feet of water.
(10.5 ft = 126 inches) (radius = 2 inches)(the conversion factor for converting cubic inches to gallons is 0.004329)

$V = (3.14159)(2^2)(126)$
$= 1583.36$ cubic inches
$= (1583.36)(0.004329)$
$= 6.85$ gallons

   2) The water level in the well and the depth to the well bottom should be measured with a precleaned measuring device to at least 0.1 inches. Both measurements should be made from the same reference point.

   b. The three acceptable methods of purging a well are as follows:

   1) Remove five volumes of standing water in the well, or
   2) Remove at least three well volumes and measure (with field meters calibrated as outlined in Section IV) the pH, conductivity and temperature until they stabilize (stabilized when 2 consecutive readings are within 5%), or
   3) Wells with in place, dedicated samplers should be purged at least 15 minutes (minimum purge rate should be 500 ml/min or 0.13 gal/min).

NOTE:

1. If a well is pumped dry (called a dry purge), purging can be considered complete. The well can be sampled following recovery.

2. The method of measuring the volume of water removed must be either by:

   a. Purging into a container of known volume, or
   b. Timing the pumping rate(must have constant flow velocity).

C. Well Purging Equipment

1. Pumps

   Pumps are only allowed for purging the well and not sampling because volatile organic samples are being obtained.

   a. Aboveground Pumps

   1) Any surface pump may be used for purging monitoring wells, but the limit on depth seems to be approximately 20 feet. Since organics are to be sampled for, all tubing should be inert (Teflon or Stainless Steel). A tailpipe arrangement may be employed with the portion in contact with the water column being inert and the upper portion of any material (e.g. PVC, HDPE, Tygon). A foot valve should be used to preclude purge water from reentering the well.
   2) Aboveground pumps with plastic tubing may be used to purge monitoring wells, if the portion of tubing in contact with the ground water is made of an inert material and the purge water is not allowed to reenter the well.

   b. Submersible Pumps

   1) Submersible pumps seem to be the most popular choice for large diameter (4" or greater) and/or deep wells (>25 ft.). These pumps should have an internal check valve to keep purged water from reentering the well. The Tubing should also be of an inert material. The portion of the tubing above the water column can be made of a non-inert material.

2. Bailers

   a. Purging a well with a bailer tends to create a turbulence in the water column that can stir up any sediment at the bottom of the well. Care must be taken to minimize disturbance by slowly lowering the bailer into the water column.

   b. The maximum time between purging and sampling a well is six hours (or for slow recovery wells, 10 hours). Follow the instructions from the lab when sampling for volatile organics (EPA Method 602 and EPA Method 624).

D. Procedure for Filling the Sample Vials

Sample containers vary in size and material depending upon the parameter(s) to be analyzed. Coordinate with the laboratory that will be analyzing the samples to have the appropriate containers available. Water samples that are to be analyzed for EPA Method 602 and EPA Method 624 should be stored in 40 ml septum vials with a screw cap and Teflon-silicon disk

in the cap. The Teflon side of the cap must be placed in contact with the sample. Never mix or composite samples from different sampling locations. The procedures for filling the vials are as follows:

1. Slowly fill the 40 ml vial with the sample avoiding physical agitation of the sample.
2. Slightly overfill the vial so that the surface is convex (called an inverse meniscus).
3. Gently cap the vial.
4. Invert the sample vial and gently tap against the palm of your hand to check for air bubbles.
5. If air bubbles are present, uncap the vial and add more sample to form an inverse meniscus. If, upon the second try, bubbles are still present, the vial should be discarded and the sample collected in a new vial. Never discard the sample and reuse the vial.
6. Label the sample and place it in a cooler with ice (not dry ice).
7. Prepare a chain of custody record.

E. Sample Preservation and Holding Times

Samples for some analysis methods must be preserved in order to maintain their integrity. Additionally, the time between sample collection and initiation of laboratory analysis must be within a prescribed timeframe. The timeframe varies depending upon the parameter(s) to be analyzed. Attachment 1 lists the preservatives and the holding times for several EPA Methods. All sample containers must be obtained precleaned and prepreserved (if applicable) from an FDEP approved laboratory.

F. Quality Control

1. Quality Control should be maintained while conducting water sampling by following these procedures:

   a. Clean all sampling equipment between sample locations following the procedures outlined in Section III.
   b. Sample from the least contaminated area to the most contaminated area (if known) to reduce the risk of cross contamination.
   c. Place aluminum foil or plastic sheeting around the well head when sampling to prevent contaminating the equipment when it is placed on the ground.
   d. Use only disposable material (e.g. cotton string or nylon) or reusable stainless steel/Teflon coated wire as bailer cord for sampling. The bailer cord should not be allowed to touch the ground and should be either cleaned or disposed of between sampling locations.
   e. Wear a new pair of disposable sampling gloves at each new sampling location.
   f. To ensure that the melted ice in a cooler does not cross-contaminate the samples, put the samples in plastic bags before placing them in the ice chest.

SPECIAL NOTE ON HEALTH AND SAFETY

Do not enter the tank excavation. If it becomes necessary, the oxygen and vapor concentrations should be monitored continuously and consider factors such as requirements for entering an enclosed or confined space, the method of escape, and tie a rope around the sampler's waist for a quick rescue or to assist in locating the person should the excavation collapse. Learn the safety requirements that apply to any hazardous situation that may be encountered as specified by the Occupational Safety and Health Administration (O.S.H.A.)

ATTACHMENT 1

PARAMETER GROUP	ANALYSIS METHOD	CONTAMINANT GROUP	PRESERVATIVE REQUIRED	HOLDING TIME
Volatile Organic Aromatics	EPA 602	Gasoline & Kerosene	HCL, pH < 2, cool, 4° C, or No HCL, Cool, 4° C	14 Days 7 Days
Polynuclear Aromatic Hydrocarbons	EPA 610 EPA 8100/8310	Kerosene	Store in the dark, Cool, 4° C	7/40 Days
Priority Pollutant Volatile Organics	EPA 624, or EPA 5030/8240	Used Oil	HCL, pH < 2 Cool, 4° C, or No HCL, Cool, 4° C	14 Days 7 Days
Priority Pollutant Extractable Organics	EPA 625, or EPA 3510/8250 EPA 3510/8270	Used Oil	Store in the dark, Cool, 4° C	7/40 Days
Non-Priority Pollutant Organics	EPA 624, or EPA 5030/8240	Used Oil	HCL, pH < 2 Cool, 4° C, or No HCL, Cool, 4° C	14 Days 7 Days
Non-Priority Pollutant Organics	EPA 625, or EPA 3510/8250 EPA 3510/8270	Used Oil	Store in the dark, Cool, 4° C	7 40 Days
Total Recoverable Petroleum Hydrocarbons	EPA 418.1	Used Oil	HCL, pH < 2 Cool, 4° C	28 Days
Metals: Arsenic	EPA 206.2, 206.3, 7060, or 7061	Used Oil	HNO3, pH < 2	180 Days
Cadmium	EPA 200.7, 213.1, 213.2, 6010, 7130, or 7131	Used Oil	HNO3, pH < 2	180 Days
Chromium	EPA 200.7, 6010, or 7191	Used Oil	HNO3, pH < 2	180 Days
Lead	EPA 239.2 or 7421	Used Oil	HNO3, pH < 2	180 Days

* 7 days to extract, 40 days to analyze extract

APPENDIX H

FIGURES