Work Plan – Revision 2

INSTALLATION RESTORATION (IR) SITE 08, NUSC
DISPOSAL AREA SOIL REMOVAL ACTION
NAVAL UNDERSEA WARFARE CENTER, MIDDLETOWN, RI

CONTRACT NO: N62472-01-D-0807 DELIVERY ORDER 006

Prepared for

U.S. NAVY FIELD ACTIVITY – NORTHEAST NAVAL FACILITIES ENGINEERING COMMAND

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1.0 INTRODUCTION

1.1 General

The Navy Engineering Field Activity, Northeast Naval Facilities Engineering Command has requested TN & Associates, Inc. to provide the services necessary for the Soil Removal Action at the Installation Restoration (IR) Site 08 – NUSC Disposal Area, located at the Naval Undersea Warfare Center in Middletown, Rhode Island. The scope of services shall be performed in accordance with the plans and specifications and Solicitation (N62472-04-Q-EM52 dated 20 August 2004) for Contract N62472-01-D-0807, Delivery Order 006, dated 29 September 2003.

All fieldwork activities, identified in the Base Bid of the solicitation, will be performed and completed prior to 20 April 05 and followed by a Removal Action Closeout Report, which must be completed and submitted before 30 June 2005.

1.2 Scope

The following are the activities necessary to address the soil removal action at the IR Site 08 – NUSC Disposal Area:

- Preparation and Submission of Site Specific Plans including, but not limited to a Work Plan, Health & Safety Plan, Quality Control Plan, Soil Erosion and Sediment Control Plan
- Mobilization and Demobilization
- Site Preparation including clearing and grubbing
- Establishment of temporary support facilities including a small office trailer and portable sanitation units
- Site Management
- Quality Control
- Utility Location, Identification and Dig Permits
- Installation of Soil Erosion Control Measures
- Demarcation of the two excavation areas (buried drum and metal container areas)
- Construction of soil, drum and debris staging areas
- Excavation of the buried drum area to the dimensions required (15’ from center of TP02 - 96 CY estimated)
    - Uncovering, removal and overpacking of any drums encountered (2 previously identified drums, 8 additional drums estimated).
    - Removal and staging (in the soil, drum and debris staging area) of soils deemed “contaminated” via “field screening” (8 tons ~ 5.6 CY - estimated).
    - Removal and staging (adjacent to the excavation) of soils not deemed “contaminated” via “field screening” (90.4 CY - estimated).
- Excavation of the buried metal debris drum area to the dimensions required (200 CY ~ 284 tons – estimated)
    - Excavation and staging (adjacent to the excavation) overlying “clean” soils.

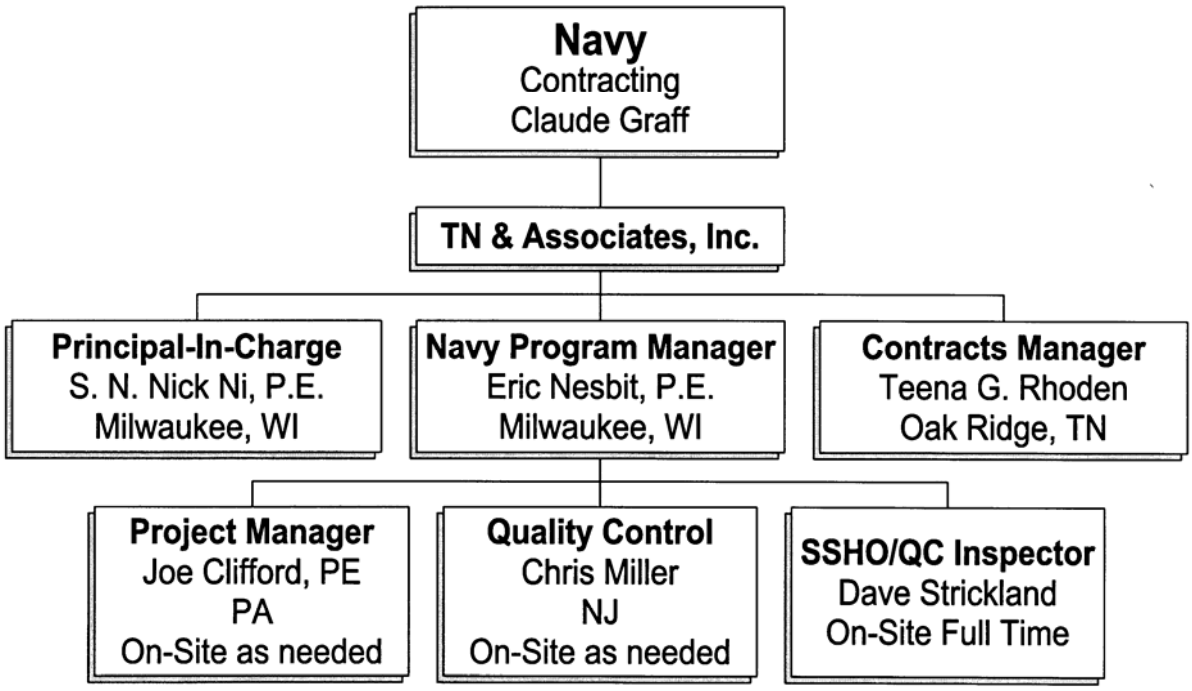
  - Uncovering, removal and staging of buried metal debris and associated soils.
  - Staging debris/soils in maximum 50 CY stockpiles.
- Sampling and Analyses
  - Removed and overpacked drums to be sampled for RCRA Characteristics, Full TCLP, PCBs, Total Petroleum Hydrocarbons and any other analyses required in support of offsite disposal.
  - Staged "contaminated" soils and debris stockpiles (<50 CY) to be sampled via collection of a 4-point composite sample. Samples to be analyzed for Full TCLP, PCBs, Total Petroleum Hydrocarbons and any other analyses required for offsite disposal.
  - Proposed fill and topsoil materials to be sampled and analyzed for the same above components in order to "certify" that the proposed materials are "clean" as compared to the RIDEM Direct Exposure Criteria for residential use soils. 1 sample per source required.
- Load-out of Drums, soils and debris
- Grading, Backfill, and Compaction
  - Backfill of excavations with excavated soils staged adjacent to the excavation.
  - Installation of demarcation barrier (filter fabric) between existing soils and imported certified clean backfill materials (where appropriate, not to be used on steep slopes).
  - Backfill of the remainder of the excavations with imported "certified clean" fill.
  - Backfill materials compacted to 90% of the maximum dry density.
- Topsoil Placement
  - Excavation areas covered with a 4-inch thick layer of topsoil.
- Seeding, Fertilizing and Mulching
  - All disturbed areas to be restored with a grass seed mix closely matching the existing species.
  - All disturbed areas to be limed, mulched and fertilized as required.
  - Soil erosion control blanket to be installed along slope at Buried Metal Container Area.
- Punch List
- Demobilization of contractor personnel, equipment, materials and temporary facilities.
- Preparation of Post-Construction Deliverables as per EMAC SOW (Close-out Report, As-Built Drawings/sketches, H&S Closeout Report, Certificates of Disposal/Destruction, etc.).

2.0 PROJECT ORGANIZATION

Based on requirements and on our understanding of the project, TN&A has developed a proposed project organization strategy to manage this project. The organizational chart provided in Figure 2-1 identifies the key personnel required to manage and successfully complete the identified project elements. This proposed organization provides supporting staff located in Raleigh, NC and other TN&A offices.

The names of the individuals filling the key positions have been identified. If any of the personnel assigned to these key positions become unavailable before the project is completed, they will be replaced with other TN&A personnel possessing similar qualifications.

FIGURE 2-1
Organizational Chart
Navy EFA, Northeast



2.1 Program Manager

The Program Manager (PM), Mr. Eric Nesbit, P.E., is responsible for the quality of all work performed under this contract. He will monitor the overall progress of the DO to ensure that adequate resources are available and that major problems are prevented or minimized. Mr. Nesbit will concentrate on the technical quality, schedule, and cost for all work performed.

2.2 Project Manager

The Project Manager (PM), Mr. Joe Clifford, P.E., will be the direct point of contact for the issues relating directly to the IR Site 08 – NUSC Disposal Area Soil Removal Project. He will function as the immediate supervisor of the QC Manager and SSHO at the project site. He will administer the subcontracts required for the successful completion of the project and will be responsible for invoicing and other administrative functions directly related to the IR Site 08 – NUSC Disposal Area Project.

Mr. Clifford will visit the site as needed and attend important project meetings. He will assist the QC Manager and SSHO/QC Inspector with enforcement and application of the HASP and QC Plan at an authority level above the site project team. He will monitor the progress of the "work" and offer assistance when and wherever needed. As a licensed Civil Engineer, he will prepare and "seal" the required Soil Erosion and Sediment Control Plan and any other project related plans that require a "PE Seal". Mr. Clifford is based out of the Raleigh, NC office and is located in a satellite office in southeastern, PA; only 5+/- hours from the project site.

2.3 Quality Control Manager

The project's Quality Control Manager, Mr. Chris Miller, will be assigned to the project full time. The application and enforcement of the requirements set forth in the Contract Specifications, Contract Drawings and Quality Control Plan will be Mr. Miller's primary responsibility. He will work hand in hand with the Project Manager and SSHO/QC Inspector to ensure that the projects requirements and goals, set forth by the Navy and TN&A, are realized.

Mr. Miller is scheduled to be at the project site during the initial phases of the "work" and when ever a new task is initiated. He will attend all project meetings and provide daily support to the SSHO/QC Inspector. Mr. Miller is based out of the Raleigh, NC office and is located in a satellite office in southern, NJ; only 5+/- hours from the project site. The QC Manager will prepare and/or review all project submittals and transmit them to the Navy with the appropriate forms. He will also be responsible for implementing the 3-phase Inspection System as defined by the U.S. Army Corps of Engineers.

2.4 SSHO/QC Inspector

The project's Site Safety and Health Officer (SSHO) will also function as the Quality Control (QC) Inspector. Mr. Dave Strickland has been selected to fulfill this role at the IR Site 08 – NUSC Disposal Area Soil Removal Project. Mr. Strickland will be responsible

for daily implementation and enforcement of the site specific Health and Safety Plan (HASP).

He will also assist the QC Manager with the daily implementation and enforcement of the QC Plan. Mr. Strickland is based out of TN&A's Raleigh, NC, office and will be onsite full time during all phases of the project. He will conduct the daily "toolbox" safety meetings and perform the Preparatory, Initial and Follow-up Quality Control Inspections in the absence of the QC Manager.

3.0 DESCRIPTION OF THE "WORK" AND TECHNICAL APPROACH

The list of activities in Section 1.2 – Scope are important aspects of the IR Site 08 – NUSC Disposal Area Soil Removal Project. Those activities are described in detail below:

3.1 Plan Preparation and Submission

Plan Preparation and Submission includes the preparation of the various Plans required for the completion of the project. Copies of all of the approved Plans will be maintained onsite and will be reviewed by all project team personnel. The Plans required for the IR Site 08 – NUSC Disposal Area Soil Removal Project are as follows:

- Work Plan which includes:
  - Erosion and Sediment Control
  - Excavation and Materials Handling
  - Sampling and Analysis
  - Decontamination
  - Spill Prevention and Response
  - Construction Schedule

- Quality Control Plan*

- Site Specific Health and Safety Plan (HASP)*

* Plans listed are bound separate from this Work Plan for ease of review.

3.2 Mobilization and Site Preparation

Mobilization involves the movement of personnel, temporary facilities, equipment and materials to the IR Site 08 – NUSC Disposal Area Soil Removal Project Site at the Naval Undersea Warfare Center located in Middletown, Rhode Island. Site Preparation involves the acts of preparing the site for execution of the work. Tasks that support "site preparation" will be the clearing grubbing of brush, trees and vegetation from the work areas.

TN&A will make the initial call to the "Dig Safe" network requesting a utility "mark out" and will also file the required "Dig Safe Form" with the ROICC at the Naval Station Newport.

The delivery and setup of a small temporary office trailer and portable sanitation units will also be addressed during the Mobilization and Site Preparation phase of the project.

During site preparation and prior to excavation work, appropriate warning and traffic control signs will be erected around the NUSC Disposal Area. Warning signs will be erected around the excavation areas warning of the associated hazards, indicating that entry is permitted for "authorized personnel only" and that all visitors are to check in at the office trailer. These signs will be 8.5"x11" plastic laminated signs and will be erected in conspicuous locations. If necessary, "Truck Route" signs will be erected to direct truck drivers to the site. As the volume of imported materials required and the volume of exported waste materials is relatively small, a formal and posted "Truck Route" may be unnecessary and the limited number of trucks can be escorted, by TN&A personnel, to the Site from the Security Gate. A copy of TN&A's proposed "Truck Route" (Figure 2) is included in Appendix D.

3.3 Temporary Facilities

The temporary facilities required for the IR Site 08 – NUSC Disposal Area Project, due mainly to the short duration of fieldwork (4-5 weeks), are minimal. The temporary facilities will include a small office trailer equipped with electricity (either tied into an existing source or from a small portable generator), potable water, tables and chairs with room for the field crew to assemble for the morning safety meeting and eat lunch. It is anticipated that a small box trailer, like the ones typically used to transport racecars and pulled by a pickup truck, will be used for the temporary office facilities. A small self-contained decon trailer, with lockers and shower facilities, will also be set up on the site. This decon trailer will be a self-contained unit with holding tanks for clean and dirty water. It will be equipped with a water heater for showering and washing as well as heat and air conditioning. Electricity will be provided to the decon trailer by either a portable diesel powered generator or by being tied into the NUSC Disposal Area electrical system, if available.

The temporary facilities will also include portable sanitation units that can be relocated as necessary to keep them in a convenient location for use by the site workers. Portable hand wash stations will also be employed to assist the site workers with proper hygiene while conducting the "work".

Potable water for use in dust control and the shower/decon facilities for the field personnel will be available at the Naval Undersea Warfare Center. Water will be transported to the work area in containers as needed.

3.4 Site Management

Site Management will be a team effort, performed by a combination of persons from the Navy, TN&A and TN&A's subcontractors. Site Management, by TN&A, will commence upon mobilization. This will include, but is not limited to, oversight of site workers, subcontractors and vendors. Site Management will also involve the preparation and maintenance of the various forms of documentation, photographic and written, required to adequately depict the activities being performed at the site. Documentation will be

performed on a daily basis. Site Management will also involve required administrative functions such as purchasing, paying, directing, discussing progress with the RIOCC and his personnel as well as the management of TN&A.

Site Security also falls under the "Site Management" task. Limiting access to the site, to persons immediately involved with the project, will be the norm and will be accomplished through the use of barricades such as orange safety fencing and yellow caution tape. Proper signage and postings will also assist with maintaining proper site security.

3.5 Quality Control

Effective Quality Control is paramount to the successful completion of any project, excavation, construction, or demolition. Quality Control not only addresses the "quality" of the finished product, but also influences the degree at which work is "completed", it influences the accuracy, timing and safety of what is being done. Quality Control is everyone's responsibility, just as Safety is everyone's responsibility.

Although, as with Safety, overall Quality Control is assigned to one or more individuals. For the IR Site 08 – NUSC Disposal Area Soil Removal Action Project, the Quality Control (QC) Manager will have the most direct responsibility for establishing and maintaining appropriate Quality Control as detailed in the approved Quality Control Plan prepared by TN&A specifically for the project. He will be assisted by the SSHO/QC Inspector and supported by the Project Manager.

The Three-Phase Inspection System, established by the U.S. Army Corps of Engineers, will be employed at the IR Site 08 Project. The three-phase inspection system utilizes a system of Preparatory Meetings, Initial and Follow-up Inspections. Preparatory Meetings are conducted at the work site prior to the initiation of work on each definable feature of work. They are designed to review the safety aspects of each task, the required materials and equipment and details of the task being initiated. The meetings are attended by representatives of all relevant parties such as the ROICC, TN&A's QC Manager and SSHO/QC Inspector and the Supervisor or Foreman of the field crew. Crewmembers are also invited and attendance is suggested, providing that other ongoing work is not interrupted. The Initial Phase Inspection is conducted during the initial phases of the work in order to establish the level of workmanship and to ensure that all crew members are clear on the particulars of what they are doing including, but not limited to, required safety procedures, PPE, and materials. If adjustments in procedures or PPE are required, they are identified during the Initial Inspection. Follow-up inspections are performed daily on all ongoing tasks. They are performed to ensure that the level of workmanship established in the Initial Phase Inspection is being maintained and that no deviation from the requirements set forth in the Contract Specifications and/or the QC Plan (provided under separate cover) have been made.

3.6 Utility Identification, Location, Mark-out and Dig Permits

The initial task that will take place in the field will be the identification, locating and "marking-out" of any utilities such as water and gas pipes, electrical conductors, telephone and cable lines, etc. that are present in the work area(s). Contacting the

underground utility notification and locating service is the responsibility of the Contractor and required by law in most States. ***The dig safe call number for Rhode Island is 1-888-DIG-SAFE (344-7233).*** The Dig Safe Confirmation number will be required in order to complete the Navy's *Naval Station Dig Safe Form.*

TN&A will contact Dig Safe and complete and submit the *Naval Station Dig Safe Form* a minimum of one (1) week prior to the scheduled start of site work in order to ensure that the required period of time (3 to 5 business days) is allotted for the utility locating and marking service providers to visit the site and perform the marking.

3.7 Soil Erosion and Sediment Control Measures

After utility mark-out and prior to soil disturbance, it will be necessary to install the required soil erosion and sediment control measures. As the area of soil disturbance for this project is small (less than 5,000 square feet), a formal Soil Erosion and Control Plan certification is not required by the Rhode Island Department of Environmental Management (RIDEM). However, due to the close proximity of Deerfield Creek, comprehensive erosion control measures will be implemented for the project duration. These "measures" will include installation of hay bales and silt fence around all excavations and soil staging areas (see Figure 1 – Proposed Site Layout – Appendix D). The typical measures will also include protection of any storm water inlets and drains through the use of filter fabric covering the inlet and hay bales (place around the inlet) to filter out and settle any sediment traveling with flowing water. These controls will be installed in accordance with the *Rhode Island Soil Erosion and Sediment Control Handbook* as described below.

3.7.1 BMPs For Prevention of Soil Erosion

The following BMPs will be used to prevent soil erosion and sedimentation for this project:

- Limit clearing and disturbance to the approved work area only;
- Wait until just before beginning construction to clear vegetation and to disturb the soil;
- Minimize the area of bare soil within the approved work zone as much as possible;
- Maintain a buffer of natural vegetation to slow runoff and trap sediments; and
- Complete construction and restoration as quickly as possible to minimize the duration of disturbance.

3.7.2 Sedimentation Controls

Hay bales will be set in a clean squared trench, butted firmly together, and securely seated on the ground. The hay bales will be solidly staked to the ground (with 1" by 1" wooden stakes) and backfilled on both sides of the bale immediately after installation. The bottom edge of the silt fence will be installed in a clean, squared (6" by 6") trench so that sediment cannot go beneath it. The posts for the silt fence will be driven into the ground until secure (at least 6" below the ground surface). The trench should be

backfilled thereby burying the bottom of the silt fence. For maximum sediment control, hay bales may be used in conjunction with silt fences along Deerfield Creek.

Hay bales and silt fences will be inspected and maintained routinely and accumulated sediment should be removed and disposed of in a proper upland location. The hay bales and silt fence will be replaced as needed. When construction is completed and the soil is stabilized (as evidence by the re-establishment of a minimum of 85% vegetation) the erosion and sediment controls will be removed entirely.

3.7.3 Stabilizing Exposed Soil

Stockpiles will be covered with plastic sheeting and enclosed with hay bales or a silt fence as necessary to prevent erosion and sedimentation.

3.8 Work Area Layout

After installation of the required soil erosion and sediments control measures and prior to excavation work, the work areas have to be demarcated or “laid out”. The Scope of Work for the IR Site 08 – NUSC Disposal Area Soil Removal Action has two specific areas where soil, debris and buried drums are to be removed from. In order to facilitate management of soils and wastes removed from these two locations, a portion of the existing fence will be temporarily removed as shown on Figure 1 in Appendix D.

The location of the drum that had previously been removed from the “Buried Drum Area” was staked at the time and the stake was “located” by a surveyor, who in turn documented the coordinates of the location. The stake that was used to mark the location of the removed drum will be re-installed. The planned excavation limits for the “buried drum area” is within a 15-foot radius of this stake to a depth of 6 feet below ground surface.

The “buried metal container area” dimensions are a little more involved with the following limits:

- 3 feet from the asphalt parking lot to the northeast of TP-14,
- 10 feet from the light pole located to the southeast of TP-14,
- up to the temporary erosion control structures installed along Deerfield Creek to the southwest of TP-14.

Excavation shall not extend below the groundwater table in either of the areas, except as necessary to remove a drum(s) or metal container(s). Absorbent pads will be on hand to address any limited LNAPL free product that is encountered in the excavations. The work areas will be “laid out” by TN&A. A proposed Site Layout Diagram is provided as Figure 1 in Appendix D.

3.9 Soil/debris Excavation and Drum Removal

The purpose of this project is to remove two (2) potential contamination source areas that were identified during the SASE that was performed in August of 2003. Those two areas are the “buried drum area” and the “buried metal container area”. The buried drum area, as the name implies, contains buried drums and the Buried Metal Container Area contains metal containers which may include aerosol paint cans.

3.9.1 Buried Drum Area

During the SASE completed in August 2003, one (1) drum containing a tar like substance (manifested as a State Regulated Oily Solid) was removed from Test Pit 02 and shipped off-site for disposal. Two (2) other drums were observed in the test pit, but not removed. It is estimated that up to 8 other unknown drum may be present within the limits of the buried drum area (15’ from staked location of the initial drum down 6 feet bgs). Soils will be carefully removed from within the predetermined limits with an excavator.

Excavated soils will be “field screened” using a visual inspection, monitoring with a PID, and olfactory (from a distance) to determine the presence of contamination. If contamination is suspected, the soils will be transferred to the Soils Staging Area (see Figure 1) for further evaluation, sampling and offsite disposal. A level of 10 PPM will be used for monitoring with the PID. If the limited “field screening” process does not determine that the soil is obviously contaminated, it will be staged adjacent to the excavation area, in compliance with OSHA requirements (minimum of two (2) feet away from excavation), and reused as backfill.

The sidewalls of the excavation are to be excavated at a 1:1 slope. If a drum is encountered, it will be removed from the excavation with the excavator (equipped with a bucket and thumb). Drums will be set in a staging area adjacent to the excavation for evaluation by trained personnel. If there are no signs of bulging, or leaking, any excess soils will be scraped from the outside of the drum(s) using non-sparking tools (i.e.: Beryllium). If a drum is uncovered and is apparently leaking, an 85-gallon overpack drum will be placed in the excavation as close to the leaking drum as practical. The leaking drum will be lifted up and placed into the overpack drum as quickly and carefully as possible. By containing the leaking drum within the limits of the excavation, cross-contaminating adjacent areas and increasing the volume of contaminated soils, by moving a leaking drum, will be avoided. If a drum is uncovered and appears to be “bulging”, the drum will be visually inspected (from a distance) and efforts will be made to ascertain if it is “bulging” due to internal pressure or possibly from having been frozen prior to burial. If it appears to be “bulging” from internal pressure, after the immediate work area has been evacuated, the pressure will be vented, from the safety of the excavator cab, by puncturing the top of the drum with a non-sparking tool.

After removal of excess soils, drums will be visually inspected for any markings. Drums will be labeled with a unique number, date of removal and project site and photographed for the project record. Drums with contents will be placed into 85-gallon overpack drums and transferred to the Drum Staging Area. The “label” information from

each drum will be transferred to the outside of the overpack drum. Drums that are RCRA Empty will be crushed and consolidated with the other metal debris.

3.9.2 Buried Metal Container Area

Other findings of the SASE included a large number of buried deteriorated metal containers that are possible empty aerosol paint cans in the stream embankment in the south west portion of the site (Buried Metal Container Area), confirmed through test pit excavation (TP14) in this area. Elevated concentrations of lead were found co-located with these containers and in the stream sediments downstream as far as the NUWC Pond. The horizontal extent of the buried metal container area is unknown, but the vertical extent is anticipated to be less then 8 feet below ground surface. The planned excavation area is as follows:

- 3 feet from the asphalt parking lot to the northeast of TP-14,
- 10 feet from the light pole located to the southeast of TP-14,
- up to the temporary erosion control structures installed along Deerfield Creek to the southwest of TP-14.

Overlying “clean” soils, with no debris present, will be field screened and staged accordingly. Excavated soils will be “field screened” using a visual inspection, monitoring with a PID, and olfactory (from a distance) to determine the presence of contamination. If contamination is suspected, the soils will be transferred to the Soils Staging Area (see Figure 1) for further evaluation, sampling and offsite disposal. A level of 10 PPM will be used for monitoring with the PID. If the limited “field screening” process does not determine that the soil is obviously contaminated, it will be staged adjacent to the excavation area, in compliance with OSHA requirements (minimum of two (2) feet away from excavation), and reused as backfill. Soils with debris will be transferred to the soil/debris staging pad and placed into stockpiles (each less than 50 cubic yards). The buried metal container area will be excavated to the lines and depth planned (8’ below grade) unless additional debris and metal containers are encountered. If additional “waste” is encountered, efforts will be made to substantially removal all debris and metal containers encountered.

The excavation shall not extend below the groundwater table in either of the areas, except as necessary to remove a drum(s) or metal container(s). Absorbent pads will be on hand to address any limited LNAPL free product that is encountered in the excavations.

3.9.3 Unknowns

There is the potential that additional unknown items, such as USTs, compressed gas cylinders, asbestos-containing materials and used torpedo engine oil containing residual Otto Fuel II and corresponding HCN could be encountered in either of the excavations. If any unknown items are encountered, TN&A onsite personnel will halt activities and contact the ROICC representative. TN&A will document the presence of these unknowns in field notes and with photographs and coordinate any reporting requirements through the ROICC office.

Once the unknowns have been documented, TN&A will develop written procedures and make modifications to the HASP prior to initiating removal. These procedures may include mobilization of specialty equipment.

3.9.4 Otto Fuel II

In addition to the chemical hazards identified during the Study Area Screening Evaluation, the Navy has, and continues to use, Otto Fuel II at the facility. Otto Fuel II is used as fuel for torpedoes and other weapons systems and is routinely used and stored at the Naval Undersea Warfare Center. Another potential chemical hazard exists due to the presence of heavy concentrations of HCN in used oil from torpedo engines. The NUWC tests torpedo engines and may have stored used torpedo engine oil at the NUSC Storage Area.

Otto Fuel II is a distinct-smelling reddish-orange, oily liquid that is a mixture of three synthetic substances: propylene glycol dinitrate (major component – nitrated ester), 2-nitrodiphenylamine and dibutyl sebacate. Propylene glycol dinitrate is a colorless liquid with an unpleasant odor and is explosive. 2-Nitrodiphenylamine is an orange solid used to control the explosion of propylene glycol dinitrate. Dibutyl sebacate is a clear liquid used for making plastics, many of which are used for food packaging. Otto Fuel II is classified as a stable, liquid monopropellant composed of a nitrate ester in solution with a desensitizing agent and a stabilizer. It is a red free-flowing liquid that is heavier then water. When in a thin layer, such as a spill, stin or leak, Otto Fuel II is a yellow-orange color. Otto Fuel II is non-corrosive, has an extremely low vapor pressure and high flash point minimizing explosive and toxic hazards. It is classified as a low fire hazard material. Otto Fuel II typically enters the environment in wastewater from Naval Facilities that produce it or are involved in torpedo operations (NUWC). Propylene glycol dinitrate evaporates rapidly and is believed to be the major cause of symptoms associated with exposure. 2-Nitrodiphenylamine does not dissolve easily in water and may be found in soils and sediments.

Another possible chemical hazard that may be encountered during the execution of the work is Hydrocyanic Acid or Hydrogen Cyanide. HCN is found in high concentrations in used motor oil from torpedo engines. Used motor oil from torpedo testing operations has been stored at the NUSC Disposal Area and there exists a possibility that the unknown buried drums may contain used motor oil. Hydrogen cyanide is a colorless gas or bluish-white liquid with a bitter almond odor. An air odor threshold concentration for hydrogen cyanide of 0.58 parts per million (ppm) parts of air has been reported. Exposure to hydrogen cyanide can occur through inhalation, ingestion, eye or skin contact, and absorption through the skin, eyes, and mucous membranes.

Additional information on Otto Fuel II and Hydrogen Cyanide is located in the site specific Health and Safety Plan that has been prepared for the Project (Section 4.4.3.C & D, pages 19 to 22).

3.9.5 Cultural Resource Protection

Protection of Cultural Resources will be required during the execution of the required "work" as provided in the *National Historic Preservation Act of 1966.* "Cultural Resources" cover a broad spectrum of items including historical and archeological items such as former building sites, foundations, pottery, glassware, tools and human skeletal remains. Cultural Resources also address historical architecture, paintings, etc. The Contractor shall carefully protect in-place and report immediately to the Contracting Officer the discovery of any items that may be "Cultural Resources". If an item of potential historical or cultural value is encountered during excavation, grading or demolition, the worker(s) will immediately stop work and notify TN&A's onsite QC Inspector. He will in turn contact the ROICC who will notify the Contracting Officer. The immediate area will be cordoned off with "caution" tape and the workers and contractor will stop work in the immediate area of the discovery until directed by the Contracting Officer to resume work.

Due to the limited excavation work required and the history of the fill areas, the discovery of any Cultural Resources is unlikely. Although, all crewmembers will be made aware of the requirement to actively protect any items uncovered and this will be emphasized to the heavy equipment operators. If something of Cultural significance is discovered, the Contracting Officer will be notified immediately.

3.10 Soil and Drum Staging

As required by Rhode Island Department of Environmental Management, the soil and drum staging area will be located a minimum of 100 feet away from any surface water feature. As shown on Figure 1, this area will be constructed upon existing asphalt surface using 10-mil reinforced plastic sheeting and berms constructed of hay bales or clean soils.

Individual soil piles within the staging area will be 50 cubic yards or less. Care will be taken to maintain segregation of materials from each of the two excavations. All materials staged in this area will be covered with plastic sheeting at the end of each work day.

3.11 Materials Sampling and Analysis

Waste Characterization Samples of drum contents, contaminated soils excavated from the buried drum area and contaminated soils/debris and metal containers excavated from the buried metal container area will be collected in support of offsite transportation and disposal. Details for the collection of samples and analyses to be performed can be found in Appendix E - "Sampling and Analysis Plan" of this Work Plan.

3.12 Restoration

After excavation and removal of drums, soils and debris to the planned limits of excavation described in the Contract Documents, restoration will begin. Restoration will

consist of importing and placing backfill and topsoil, and re-establishing vegetation to existing conditions as described below.

3.12.1 Backfill

After the required excavation has been completed, the excavation areas will be immediately backfilled. Prior to placement of backfill, the final dimensions of the excavations will be measured and documented in sketches to be included in the Close-out Report. In addition, the limits of the excavations will be "staked" using PVC piping. Excavations will be initially backfilled with staged materials that were removed during the excavation phase, and based on field screening, were determined to be free from debris and/or obvious contamination. Backfill materials will be placed in loose lifts not to exceed 12 inches in thickness and compacted to 90% of the maximum dry density of the material. The balance of the excavation will be filled in with "certified clean" fill imported from an offsite source. Prior to placement of imported fill materials, a layer of geotextile fabric will be deployed to segregate the imported material from the existing soils. This fabric layer will not be placed on any slopes as it may promote failure and/or subsidence of the slope. The imported fill will also be placed in 12" loose lifts and compacted to 90% of the maximum dry density. Samples from the proposed fill source(s) will be collected prior to site work and tested for chemical contamination (full TCLP, TPH, BTEX) and geophysical properties (Proctor, gradation, classification). All fill materials shall be "certified clean", with contaminant levels not exceeding the RIDEM Direct Exposure Criteria for residential use soils (DEM DSR-01-93, amended February 2004, Section 8.02). In addition, imported soils shall not contain more then 100 ppm total petroleum hydrocarbons and less then 10 ppm total BTEX. A copy of the applicable sections of the RIDOT Specs are attached in **Appendix B.** Fill materials shall not be brought to the site until test results are approved by the Navy ROICC.

3.12.2 Topsoil

All disturbed areas will be covered with a 4-inch layer of "certified clean" topsoil imported from an offsite source. Topsoil will be spread and compacted with the dozer. Samples from the proposed topsoil source(s) will be collected prior to site work and tested for chemical contamination (full TCLP, TPH, BTEX) and geophysical properties (gradation, classification, pH, organic content). Topsoil will conform to the requirements of Section M.18.02 *Plantable Soil; Landscaping Material* of the RIDOT Standard Specifications for Road and Bridge Construction. A copy of the applicable sections of the RIDOT Specs are attached in **Appendix C**

3.12.3 Seeding

All disturbed areas, following topsoil placement, will be restored with the required seed mixture. For this project, that will be according to the RIDOT requirements for a Type I Area (General Highway Seeding) as per Section L.02 *Seeding* of the RIDOT Standard Specifications for Road and Bridge Construction. A copy of the applicable sections of the RIDOT Specs are attached in **Appendix C**. Seed shall be spread at a rate of 150 pounds per acre and along with fertilizer (<850 lbs/acre) and mulch. Lime will be required as necessary to condition the soil according to the Specs.

For restoration of the slope along Deerfield Creek, mulch will be substituted for with a biodegradable erosion control blanket/mat system. The erosion control blanket/mat system will consist of a biodegradable erosion control blanket (ECB) (i.e. coir, straw) overlain with a biodegradable erosion control mat (ECM) (i.e. Jute, coir). The erosion control mat/blanket system shall be installed and anchored as per the manufacturer's installation instructions.

Newly planted seed shall be watered within 72 hours of sowing and watered a second time approximately 72 hours after the first watering. Grass shall be mowed one time after the grass has reached a height of four (4) inches. Erosion and sediment controls will be maintained until 85% of the vegetation is re-established.

3.13 Offsite Transportation and Disposal

All drums, metal debris, contaminated soils and used PPE shall be properly disposed of offsite in licensed, permitted and Navy-approved facilities. Transportation vehicles will be inspected prior to loading. Driver's license, proof of insurance and proper permits will be thoroughly checked for each vehicle that arrives at the site prior to loading. Any vehicle(s) in a state of disrepair or generally poor condition will be rejected and not loaded. Truck drivers will be required to install a liner in the truck bed prior to loading and will also be required to cover the bed with a suitable tarp prior to be permitted to leave the site.

3.13.1 T&D Facilities

The ultimate disposal of drums and soil/debris will be determined by the results of the analytical testing performed. Soils, debris and drums will be transported to either a RCRA Subtitle C or Subtitle D Permitted facility.

TN&A will submit information on proposed disposal facilities prior to mobilization to the site. The information will include:

- Carrier:
  - USDOT motor carrier safety rating
  - A list of any and all notices of violations in the last 3 years
  - Solid and Hazardous Waste Transportation Permits (DOT) as appropriate for each state in which the material will be transported
  - Overweight Permits, as appropriate, for each state in which the material will be transported

- Disposal Facilities:
  - Type of Facility
  - Location of Facility (address)
  - EPA ID Number
  - Facility Point of Contact and Phone Number
  - Facility Hours of Operation
  - State and/or Federal Agency Point of Contact
  - A list of any and all notices of violations in the last 3 years
  - Date of last inspection
  - Copies of Environmental Permits

- Copies of facility's weight scale certificate
- Analytical requirements and frequencies for each facility

3.13.2 Shipping Documents

TN&A personnel will prepare all of the shipping documents necessary. A minimum of 48-hours prior to scheduling transportation and disposal services, completed *Waste Profiles* and draft waste Manifests will be submitted, for review and approval, to the Navy's Northeast Region Hazardous Waste & Spill Program Manager, Mr. Mark Rielly. Mr. Rielly's office is located at the Naval Station Newport ROICC Office and will sign all Waste Profiles, Manifests and provide waste tracking numbers for each shipment.

3.14 Haul Route and Traffic Control

Transport vehicles will be required to follow the NUWC approved "**HAUL ROUTE**" (Figure 2 – Proposed Haul Route - Appendix D). The **HAUL ROUTE** for the project will be the most direct way through Naval Undersea Warfare Center and out to the main road (Rt. 114). Trucks will leave the security gate 25 and turn **LEFT** onto Northgate Road. Trucks will travel **EAST** on Northgate Road approximately ¾ of a mile to the intersection with West Main Road (Rt. 114) as shown on Figure 3-1 below.

Figure 3-1 Map of Local Area

Both the onsite and off-site haul routes will be routinely monitored several times per day for any debris, mud, rocks or any other item tracked or dropped onto the road surface. Debris, rocks, mud etc will be removed from the road surface immediately. Care will be taken when loading transport vehicles to ensure that loose "objects or materials" are not present on the outside of the trucks. Transport vehicles will also be required to have a

tarp installed prior to leaving the work area. These measures should greatly reduce the potential for foreign objects on the roadways.

3.15 Decontamination

Personnel and equipment entering the "exclusion zone" will require appropriate decontamination to ensure that contaminants do not migrate from the excavation areas to the surrounding environment due to the Contractor's activities. A personnel decontamination station will be set up in a "*contaminant reduction zone*", which will be established at the edge of the "*exclusion zone*". The "*exclusion zone*" will be the limits of the excavation area (see Figure 1 – Proposed Site Layout – Appendix D). The personnel decon station will consist of a series of buckets with a soap and water wash and a clean water rinse. Buckets will have brushes for removing soils from boots, etc. Buckets for washing gloves will also be provided. A container for depositing used PPE (Tyvek suits, boots, gloves) will be at the decon station and used PPE will be disposed of along with the soils and debris. Disposable PPE (coveralls, booties, gloves) will be used on this project so the extent of required decon of PPE will be minimized. Proper decon of respiratory protection, tools and other reusable items taken into the "exclusion zone" will be in full effect.

Efforts will be made to limit equipment entering the excavation area. The excavation areas are small enough that the excavator will be able to sufficiently "excavate" the target area(s) while sitting outside of the excavation limits on "clean" soils. The excavation work will be executed in a manner to ensure that the excavator tracks remain on clean soil. Therefore, the only portion of the excavator requiring decontamination will be the bucket and the portion of the stick section of the boom that comes in contact with excavated soils, drums and debris. Loose soils will be brushed from the surface of the bucket and stick prior to removing the machine from the excavation area. The surface of the bucket and stick will be decontaminated with a high-pressure water wash. The decontamination of the excavator bucket will take place in the soil/debris staging area and the minimal amount of rise water that will be generated will be allowed to fall upon staged soils where it will be absorbed and ultimately disposed of offsite along with the soils. The bucket of the loading equipment will be decontaminated in a similar manner and will be pressure washed after loading the last transport vehicle and the rinsate allowed to drain into the vehicle.

3.16 Cleanup and Demobilization

Site cleanup and demobilization is the last of the field activities that will be performed under this project. Site cleanup, as the phrase implies, will involve the collecting of all trash and debris generated as a result of the site activities. All trash and non-contaminated debris will be disposed of in a dumpster. Cleanup also involves removal of any extra materials and equipment.

Demobilization involves removal of the Contractor's "presence" from the site. This involves removal of all equipment, tools, supplies and personnel and leaving the site in the proper condition. This entails removal of all trash, ruts and disturbances to the site surface and access roads created by the Contractors personnel, equipment and

activities. As the final activity, the section of fence removed between the two areas will be restored to the satisfaction of the ROICC.

3.17 Site Closeout and As-Built Drawings

Site Closeout and As-Built Drawings are and important part of the project. No activities can be completely finished if proper documentation is not completed and maintained during all phases of the project. As-Built Record Drawings will be maintained on site in the temporary office trailer. It will be the responsibility of the QC Inspector to keep the Record Drawings up to date and indicate daily progress on the drawings. The Record Drawings will be a duplicate set of the Contract Drawings and will be marked up daily. Locations of any utilities encountered, drums found and the extent of the buried metal containers will be noted on the Record Drawings. The Record Drawings will be provided to TN&A's CADD department for preparation of the As-Built Drawings, which will be submitted to the Navy as part of the Closeout Report. The Closeout Report is a comprehensive document that chronicles all of the activities that took place at the site. Also included in the Closeout Report are copies of all waste manifests, construction photographs (pre and post demolition), analytical testing results and any other pertinent documents.

3.18 Construction Photographs

TN&A's site manager will photo document the progress of the work from the initial day of site mobilization to the final day of site cleanup. All relevant project tasks will be thoroughly documented using a digital camera. Initial site conditions, the surrounding area and periodic progress photographs will be taken. Prior to bringing any type of camera or recording equipment onto NUWC property, a pass must be acquired from NUWC Security in accords with NUWC Policy.

3.19 Construction Schedule

The duration of fieldwork for the project will be short as the Scope of Work is fairly limited baring any unforeseen obstacles and significant weather impacts. The anticipated construction schedule is as follows:

- Mobilization and Site Preparation – 3 days starting in late February 2005
- Excavation, handling and staging of soils, debris and drums – 5 days
- Sampling of drum contents, soils and debris (ongoing with staging) – 5 days
- Backfill of excavations, placement of topsoil and restoration – 3 days (immediately following excavation – no post-ex sampling required)
- Waste Profiling and Disposal Approvals – 10 days
- Waste Loadout and Site Cleanup – 2 days (following disposal approvals)
- Demobilization – 1 day

Based upon the above anticipated durations, the total number of days onsite is expected to be approximately 23 working days. The above schedule does not account for any significant weather delays. Although the nature of the "work" is not significantly weather dependent with the exception of the restoration work, which can not be performed during periods of inclement weather.

4.0 Sampling and Analysis

A comprehensive "*Sampling and Analysis Plan*" (SAP), which is attached in Appendix E, has been developed to comply with the Contract Specifications and Solicitation for the Installation Restoration (IR) Site 08 – NUSC Disposal Area Soil Removal Action, Naval Undersea Warfare Center, Middletown, RI, Contract No. N62472-01-D-0807, Delivery Order No. 005.

The SAP outlines all environmental sampling activities to be performed during the project including: waste characterization sampling, imported fill sampling and topsoil sampling. The objective of the project-specific SAP is to provide clear project requirements for utilization by the project team as well as ensuring that the work is performed properly and that the fill materials incorporated into the site do not compromise the integrity of the site. The SAP (Appendix E) also provides the data quality objectives, reporting requirements and specific on required sampling, analyses collection and handling of samples and reporting to be performed.

The requirements of the SAP are to be performed in conjunction within the framework of the Site-Specific Health and Safety Plan and the Site Specific Work Plan.

4.1 Clean Fill and Topsoil Sampling

All fill and topsoil materials brought to the site must be "certified" to be clean and free from contamination exceeding the RIDEM Direct Exposure Criteria for residential use soils (DEM DSR-01-93, amended February 2004, Section 8.02). The latest version of the RIDEM Direct Exposure Criteria (February 2004) can be located in Appendix B. In addition, offsite soils shall not contain more than 100 ppm total petroleum hydrocarbons (TPH; EPA Method SW-846 Method 8015M) and less than 10 ppm of the sum of benzene, toluene, ethylbenzene and xylenes (BTEX; EPA Method SW-846 Method 5030/8020). Proposed sampling and analytical methods for clean fill and topsoil are described in Section 2.0 of the *"Sampling and Analysis Plan",* which is included in Appendix E.

In addition to the chemical sampling and analyses described above, it will be necessary for fill materials to undergo a battery of geophysical test to document compliance with the requirements of the Plans and Specs. Geophysical testing for fill materials will include the following:

- Soil Classification and Gradation
- Proctor

A minimum of one (1) representative sample, per proposed fill and topsoil source, will be required for the project.

4.2 Waste Material Sampling

Samples of materials requiring offsite disposal will be collected and analyzed as per the Contract Documents and the *"Sampling and Analysis Plan",* which is included in Appendix E.

The materials that will require sampling and offsite disposal will include drums, contaminated soils from "Buried Drum Area" and the soils and debris from the "Buried Metal Container Area". Sampling procedures and analyses required are described in Section 2 of the *"Sampling and Analysis Plan" (*Appendix E).

4.2.1 Drums

Drums removed from the "Buried Drum Area" that contain material will be sampled individually. Liquid contents will be sampled using a glass drum thief and the material will be placed directly into sample containers provided by the analytical laboratory. For solid and semi-solid materials, pre-cleaned sampling tools (i.e.: stainless steel trowels) will be used to remove material and place it into the sample jars provided. Individual drum content samples will be analyzed for hazardous characteristics (HAZCAT) identification in addition to Full TCLP, PCBs, TPHs and any other disposal facility specific requirements. At a minimum, all drum content samples will be individually tested for the following constituents:

- Ignitability,& Corrosivity
- Water solubility & Water reactivity
- Cyanide reactivity & Sulfide reactivity
- Oxidizing potential
- TCLP VOCs, TCLP SVOCs, TCLP Pesticides &TCLP Metals
- PCBs & Total Petroleum Hydrocarbons (Total C9-C36 hydrocarbons)

The goal of the drum contents characterization and analysis is to obtain the data necessary to determine how to safely and efficiently package, transport and properly dispose of the wastes. Analytical results will be submitted with waste characteristic profiles to an approved facility for ultimate disposal.

4.2.2 Soils and Debris

Soils and debris samples will be collected as described in the project Plans and Specs. Soils and debris will be staged in piles not exceeding 50 cubic yards. The piles will be divided into 4 quadrants and one (1) 4-point composite sample will be collected from each stockpile. Composite samples will be collected from each quadrant and one (1) overall composite sample, representative of the stockpile, will be prepared from the individual quadrant samples. The required sample containers will be filled and supplied to the analytical laboratory.

The samples will be collected with a stainless steel or Teflon®-lined hand trowel or spoon in accordance with TN & A's standard operating procedure for sampling the corresponding media (see Appendix A for TNASOP006B (Surface Soil)). Samples will be homogenized, if possible, to ensure representativeness prior to containerization.

Samples will be analyzed for hazardous characteristics (HAZCAT) identification in addition to Full TCLP, PCBs, TPHs and any other disposal facility specific requirements. At a minimum, soil and debris samples will be individually tested for the following constituents:

- Ignitability & Corrosivity
- Water solubility & Water reactivity
- Cyanide reactivity & Sulfide reactivity
- Oxidizing potential
- TCLP VOCs, TCLP SVOCs, TCLP Pesticides, TCLP Metals
- PCBs & Total Petroleum Hydrocarbons (Total C9-C36 hydrocarbons)

The goal of the soil and debris characterization and analysis is to obtain the data necessary to determine how to safely and efficiently package, transport and properly dispose of the wastes. Analytical results will be submitted with waste characteristic profiles to an approved facility for ultimate disposal. One week turnaround time is anticipated for all waste characterization analyses.

4.3 Analytical Laboratory

Laboratory services will be provided by Mitkem Corporation in Warwick, RI. Mitkem's certification letter from the Navy is in Appendix F.

4.4 Reporting

Formal reports will be prepared and submitted to the ROICC in accordance with the plans and specifications. Summary reports of analytical results will be provided along with electronic copies of all of the supporting sample analyses data. The details of the required reporting for the Project can be found in Section 1.6 of the *"Sampling and Analysis Plan" (*Appendix E).

After completion of waste disposal operations and receipt of completed disposal documentation (manifests, certificates of treatment, disposal and/or destruction), TN&A will prepare and submit a Waste Disposal Report fully documenting all disposal activities.

5.0 SPILL PREVENTION AND RESPONSE PLAN

Given the proximity to environmentally sensitive areas, Spill Prevention will be critical in every construction activity performed. Pursuant to the applicable requirements under the Clean Water Act (CWA) or CERCLA as amended, the following reporting procedures for any spill (discharge or release) of hazardous substances and wastes in a quantity equal to or exceeding the reportable quantity will be implemented:

(a) Where a spill directly contaminates surface water, sewers, or drinking water supplies, TN&A will immediately notify the Spill Hotline, other appropriate Federal, state and local agencies and obtain guidance for appropriate clean-up measures in the shortest possible time after discovery, but in no case later than 24 hours after discovery.

(b) Where a spill directly contaminates grazing lands or vegetable gardens, TN&A will notify the Spill Hotline and other appropriate federal, state and local agencies and proceed with the immediate requirements specified in this section, in the shortest possible time after discovery, but in no case later than 24 hours after discovery.

In addition to the immediate notification of spills to appropriate agencies, all spills shall be immediately notified to the ROICC.

5.1 Determination of Spill Boundaries in Absence of Visible Traces

For spills where there are insufficient visible traces yet there is evidence of a leak or spill, the boundaries of the spill will be determined by using a statistically based sampling scheme. Details of the scheme will be developed by TN&A and will be approved by the ROICC on an as needed, case by case basis.

5.2 Spill Prevention

All wastes and environmentally dangerous materials will be dealt with in a responsible manner to minimize the potential for release and the risk of worker injury. Daily inspections conducted as part of the CQC system will include waste storage containers and spill prevention measures.

The following is a list of the major categories of environmentally dangerous materials associated with this site:

- Drum Containers. It is anticipated that up to ten drums will be excavated and staged on site. These drums will be placed upright in a bermed area to minimize the potential for an accidental release.

- Stock Piles. Excavated soil to be disposed offsite will be managed within the bermed Soil and Drum Staging Area. Transport of these materials by wind or rain erosion poses a potential hazard for dust and nearby surface water bodies. Erosion will be mitigated by placing the stock piles on plastic sheeting and

covering the piles with plastic sheeting. Regular inspections and maintenance of the sheeting will be conducted to ensure it is maintained in good working order.

- Vehicle and Equipment Fluids. Environmentally dangerous materials will be present in radiators, fuel tanks, hydraulic reservoirs, engine crank cases, fuel cans, and oil cans during this project. Vehicles and equipment will be inspected daily and immediately taken out of service in the event of leaks. Cans containing fuels or oils will be labeled and stored appropriately. Non-emergency maintenance of heavy equipment or vehicles will not be performed on site. In the event on site equipment maintenance is required, precautions such as buckets and plastic sheeting shall be used to ensure contaminants are not released to the environment.

5.3 Spill Response

In general, there are seven basic steps that must be taken in response to any release of materials:

1. Evaluation of safety hazards and need for notification of emergency response services.
2. Shut off and secure source of spill.
3. Containment of spilled material.
4. Recovery of spilled material.
5. Inspection of site for similar situations that could result in a spill.
6. Notify Navy ROICC of the spill.
7. Notify RIDEM of spill (if required).

All field personnel shall be trained in proper spill response at the start of the project. The following equipment will be on site and available for spill response use: excavator, plastic sheeting, drums, absorbent pads, shovel, and sump pump and generator. This equipment is not necessarily response-dedicated and may be used for other tasks during the project.

5.4 Project Emergency Contacts

IMMEDIATELY CONTACT <u>one</u> of the following personnel starting at the top of the list:

Name	Work Tel. No.	Home Tel. No.	Pager/Mobile No.
1. Chris Miller	(609) 296-0952	(609) 296-3529	(609) 709-7395
2. Joe Clifford	(610) 431-9584	(610) 431-9584	(610) 505-9315
3. William Fink	(414) 607-6779	(414) 476-8379	(888) 662-5705

If the incident is reportable to outside regulatory agencies, notify the individuals listed in items #1 or #2 in the table above.

The primary client contact is: Mr. Martin Kawa - ROICC
Naval Station Newport, Newport, RI
(401) 841-1569

The alternate client contact is: Mr. Robert Krivinskas – Project Manager
Naval Facilities Engineering Command (NAVFAC)
Naval Station Newport, Newport, RI
(401) 841-1761

5.5 Local Emergency Contacts

The local emergency contacts are:

- Emergency requiring Police, Fire or Ambulance **911**
- Newport Hospital (401) 846-6400
- LEPC, District 7 (Lt. Tom Geoff) (401) 846-7888
  MFD Middletown, RI
- Navy On-Scene Coordinator (Commanding Officer - Captain Robert McLaughlin) (401) 841-3715
- National Response Center Oil/Chemical Spills (800) 424-8802
- Rhode Island Poison Control (401) 444-5727
- National Poison Control Center (800) 222-1222
- Chemtrec (800) 424-9300

APPENDIX A

STANDARD OPERATING PROCEDURES

SOIL SAMPLING
DRUMMED WASTE SAMPLING

STANDARD OPERATING PRACTICE TNFLD006B

Sampling of Surface Soils and Other Surficial Materials

TABLE OF CONTENTS

STANDARD OPERATING PRACTICE TNFLD006B

Sampling of Surface Soils and Other Surficial Materials

1.0 OBJECTIVE

The objective of this Standard Operating Practice (SOP) is to define the techniques and requirements for collecting grab surface-soil and other surficial material samples.

2.0 BACKGROUND

Surface soil is usually referred to as the soil extending from the ground surface to a depth of approximately 1 foot (ft) below land surface. For human health risk assessment purposes (soil ingestion, inhalation of particulates), surface soil samples are typically collected from the upper six inches of soil. The project Sampling and Analysis Plan (SAP) or comparable document should specify the depth at which surface soil samples are to be collected.

Surface-soil samples are collected to determine the type(s) and level(s) of contamination, to define the area affected by contaminants, and to determine background concentrations. These samples may be collected as part of an investigative plan, site-specific sampling plan, and/or as a screening method for "hot spots" that may require more extensive sampling. Surface-soil samples will be collected at trench or pit sites after the excavation is completed and in conjunction with the subsurface-soil sampling.

Sediment(s) and sludge(s) exposed by evaporation, stream rerouting, etc., will be sampled by procedures stated in this document. Wipe samples to determine potential contamination on nonporous surfaces (e.g., floors, walls, and equipment) also will be described in this procedure.

3.0 SAMPLING EQUIPMENT

3.1 REQUIRED EQUIPMENT

Equipment necessary for sampling surface soils and other surficial materials includes:

- site-specific SAP,
- field logbook,
- indelible (waterproof) ink pen, blue or black,
- indelible (waterproof) markers,
- sample tags/labels and the appropriate forms/documentation (including chain-of-custody forms) as described in TN&A Standard Operating Practice (SOP) 010C,
- appropriate sample containers,
- insulated cooler,

- latex gloves,
- plastic zip-top bags and waterproof sealing tape,
- decontamination equipment (e.g., rinse bottles and pressurized spray tanks) and supplies [e.g., American Society for Testing Materials (ASTM) Type II organic-free water, Alconox®, etc.] SOP 011A,
- protective clothing and gear,
- Health and Safety Plan,
- security seals, and
- ice.

3.2 OPTIONAL EQUIPMENT (DEPENDENT ON SAMPLING MEDIA)

Optional equipment for sampling surface soils and other surficial materials includes:

- appropriate equipment and meters for obtaining field measurements as specified in the site-specific SAP,
- linear measuring device (e.g., tape measure),
- sampling device (e.g., bucket auger, slide-hammer sampling assembly, or trier); [if sampling for volatile organic compounds (VOCs), the sampling device can be Teflon®-lined or constructed of stainless steel, brass, or mild steel. When sampling for metals, the construction material of the sampling device must be stainless steel or Teflon lined],
- stainless steel, brass, Lexan® or Teflon inserts for the auger,
- plastic end caps for the sleeves, aluminum foil, and Teflon or silicon tape,
- stainless steel and/or Teflon-lined pans, trays, or bowls,
- stainless steel and/or Teflon-lined scoops, shovels, trowels, spoons, or spatulas,
- sampling template, marking pencil, or masking tape for wipe-sample area delineation,
- stainless steel tweezers or forceps,
- individual, sterile gauze pads made of cotton or filter paper, and
- solvent, if necessary, to mobilize contaminants for wipe sample (see the site-specific SAP for the appropriate solvent).

4.0 PROCEDURES

4.1 PREPARATION

The following steps must be adhered to when preparing for sample collection.

1. Personnel will be appropriately attired in protective clothing and equipment as required by the site-specific Health and Safety Plan.
2. Spread plastic sheeting on a portable table or level ground surface near the sampling area (if possible), and place decontaminated sampling equipment, sampling containers, and cooler on it. This area will form a clean work space for sample preparation, storage, and documentation. If equipment is to be decontaminated in the field, place another plastic sheet

on the ground for decontamination equipment and supplies. This will serve as a decontamination area for sampling equipment after sampling is completed.

3. Record all information in the field logbook. Document all deviations from procedure(s) and rationale for changes in the field logbook and on additional forms, as required by the SAP.

4.2 COLLECTION OF SAMPLES

4.2.1 Collection of Surface-Soil, Sediment, and Sludge Samples for Nonvolatile Organic Compounds or Inorganic Analyses

1. Follow the sampling pattern outlined in the site-specific SAP. When known or suspected contamination exists (e.g., spill area or dumping site), attempt to collect samples from the least-contaminated to the most-contaminated locations.
2. Change gloves when necessary and use decontaminated equipment at each site to minimize cross-contamination.
3. Label each container with the appropriate information.
4. Carefully remove or excavate loose debris and exposed material from the top 1 to 2 centimeters (cm) or to the desired sampling depth.
5. Using a clean scoop, trowel, shovel, bucket auger, or trier, place sufficient material into a clean stainless steel or Pyrex® bowl or tray and thoroughly mix the sample with a clean spoon or spatula.
6. Fill the sample container(s) directly from the tray or bowl with the spatula or spoon; remove stones, twigs, grass, etc., from the sample by hand (gloved) or forceps.
7. If the sample is water saturated, carefully decant the water from the container(s) with minimal disturbance to the sample.
8. Immediately wipe any dirt and grit from the threads of sample containers with the gloved hand. Secure and seal the Teflon-lined cap.
9. Rinse the outside of the filled sample container(s) and wipe dry.
10. Wrap the container in bubble pack (if necessary) and seal it into zip-top or other resealable plastic bag.
11. Samples for nonvolatile organics or inorganics can also be collected using liners following the procedures described in Section 4.2.2.
12. Place the sample in the cooler and cool to 4°± 2°C Celsius (C). Refer to SOP 010C for the proper shipping procedures.
13. Collect appropriate location, sample-depth, and/or field measurements and record these data in the field logbook.

4.2.2 Collection of Sludge, Surface-Soil and Sediment Samples for Volatile Organic Compounds Analysis

1. Follow steps 1 through 5 from Section 4.2.1.
2. Assemble a clean slide-hammer sampling assembly, hand auger, or sludge sampler with a stainless steel, brass, or Teflon liner. The type and material of the liner will be specified in the SAP.
3. Collect the sample by advancing the slide hammer, auger, or sampler into the subsurface.
4. Withdraw the slide hammer, auger, or sampler from the subsurface and extract the sleeve.
5. If the sample is water saturated, carefully decant the water from the sleeve with minimal disturbance to the sample.
6. Place a Teflon or aluminum foil (shiny side away from sample) patch around the ends and the plastic caps on the sleeve; wipe any excess dirt from the cap/sleeve area and secure the caps with inert tape (e.g., silicon or Teflon).
7. Wipe the sleeve or insert clean with a deionized water-moistened towel.
8. Seal the sleeve into a zip-top or other sealable plastic bag.
9. Place the sample in the cooler and cool to 4°± 2°C. Refer to SOP 010C for the proper shipping procedures.
10. Collect appropriate location, sample-depth, and/or field measurements and record these data in the field logbook.
11. Backfill the sample hole.
12. If samples cannot be obtained by sleeved augers or samplers (after reasonable effort), these samples will be collected by the method described in Section 4.2.1. When this procedure is necessary, the VOC sample will be collected first. The sample will be directly transferred into the sample container with a spatula. Note: Do not composite or homogenize the VOC sample.

The requirements outlined also apply to any other specified sample that can be degraded by aeration.

4.2.3 Collection and Homogenization of Composite Samples

Composite samples consist of a series of discrete grab samples that are mixed together to characterize the average composition of a given material. The discrete samples used to make up a composite sample are of equal volume and are collected in an identical fashion. A composite sample of surface soil, sediment or other surficial material is generally an areal composite. Areal composites are composed from grab samples of equal volume collected in an identical manner. The site-specific SAP should specify the basis (random grid, targeted, etc.) for collection of the grab samples.

It is important that a composite sample be truly representative if the various sample locations making up the composite. Therefore, proper homogenization techniques should be followed to

generate a composite sample. In addition, the equipment used to composite the sample must not affect the sample quality. A stainless steel bowl and stainless steel or Teflon® or PFTE spoon, properly decontaminated (SOP 011A), are typically used for field compositing of soil samples.

The following steps must be followed when compositing surface soil, sludge, and sediment samples:

1. Determine where composite sample(s) will be obtained as indicated in the site-specific SAP.
2. VOCs—and in some cases, semivolatile organic compounds—must be collected and contained immediately as stand-alone samples and, therefore, cannot be composited.
3. Collect a minimum of three equal-volume samples from the specified sample location. The volume of each sample must be at least the amount required for a single sample.
4. Place the samples in an appropriate mixing tray or bowl.
5. Divide the soil in the sample tray or bowl into quarters. Each quarter is mixed, then all quarters are mixed into the center of the pan. Follow this procedure several times until the sample is adequately mixed. If a round bowl is used, stir the material in a circular fashion and occasionally turn the material over. The extent of mixing will depend on the nature of the material and should be done to achieve a consistent physical appearance prior to filling sample containers.
6. Once mixing is completed, divide the sample material in half and fill containers by scooping sample material alternately from each half. Transfer subsamples of the composited sample into the appropriate sample containers. Seal, wipe clean, and label sample containers. Use the same care in handling these samples as that used for other samples from the site.

4.2.4 Collection of Wipe Samples for Nonporous Surfaces

1. Place wipe-collection pads into a wide-mouth reservoir jar using gloved hands. If a solvent will be used on the pads, saturate them with the solvent before placement into the jar. Wipe sampling may not be appropriate if the surface to be sampled is soluble in the solvent used (e.g., a painted surface).
2. Collect an equipment blank as necessary by submitting a clean or solvent-saturated pad for analysis.
3. Locate the area to be sampled and either measure and mark it using a non-interfering device (e.g., pencil or masking tape) or temporarily secure a pre-measured template over the area.
4. With gloved hands, select a pad from the reservoir jar with stainless steel tweezers or forceps and draw the pad lightly over the sample area with straight, even strokes. Change the wiping direction by 90° and repeat the pattern until confidant that the entire surface has been covered. Use new pads as necessary, and ensure the pad does not touch any surface outside the sampling area. If a single surface does not provide a sufficient sample, smaller areas of equal size from the same general location may be sampled and composited into one sample.
5. Place the gauze pad into a sample container. If solvent is used, a Teflon-lined lid will be used with the cap of the container.

6. Label each container with the appropriate information. Wrap the container(s) in bubble pack (if necessary) and seal it into zip-top or other sealable plastic bag.

7. Pack the sample in the cooler and cool to 4°± 2°C. Complete and attach the chain-of-custody forms and security seals to the cooler as detailed in SOP 010C.

5.0 RESTRICTIONS/LIMITATIONS

None.

6.0 REFERENCES

Addiscott, T. M., and Wagenet, J. R., "A Simple Method for Combining Soil Properties That Show Variability," *Soil Sci. Soc. of A.J.*, **49**, 1365–69, 1985.

Department of Energy, *Environmental Survey Manual*, DOE/EH-0053, October 1987.

Department of Labor, *Sampling for Surface Contamination*, Industrial Hygiene Technical Manual 680 (OSHA), pp. VIII-1, May 24, 1984.

STANDARD OPERATING PROCEDURE TNFLD012B
DRUMMED WASTE SAMPLING

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STANDARD OPERATING PROCEDURE

DRUMMED WASTE SAMPLING

1.0 INTRODUCTION

The objective of this SOP is to describe procedural guidelines for the sampling wastes in drums. Waste characterization analyses will be performed on composite/representative samples from all waste streams (solid and liquid) containerized in drums.

The wastes shall be initially characterized through the use of existing information (preliminary assessments, manifests, Material Safety Data Sheets (MSDS)), previous test results, knowledge of the waste generation process, other relevant records, client knowledge, and best professional judgment. Based on this initial characterization, the wastes will be properly assessed, re-containerized and managed, as discussed below. If no information is available, the drummed waste will not be directly sampled by TN&A until proper procedures have been identified.

2.0 OBJECTIVE

The objective of drum sampling is to determine which wastes pose an immediate threat to human health or the environment, and to remove those wastes from the site. All drum sampling and waste management procedures will comply with federal, state and local laws and regulations.

3.0 DRUMMED WASTE SAMPLING PROCEDURES

Prior to sampling any waste stored in drums, an initial determination of the type of waste will be made. The type and number of drums, condition of drums, associated labeling, volume of waste, and drum storage location will be recorded and evaluated prior to any sampling activities. Volatiles within the breathing zone should also be monitored for. This information will also be used to determine the appropriate level of PPE and tools required to complete the sampling event.

- Vent the drum slowly until internal atmosphere is equalized with ambient air pressure,
- Perform real-time monitoring of air quality while opening and/or venting the drum. Real time monitoring may include VOCs, LEL, O_2, CO, and H_2S monitoring depending on the information discovered during the initial characterization,
- Perform real-time monitoring during sampling and whenever the drum bung or lid has been removed,
- Visually inspect the inside and outside of the container and contained material,
- Measure pH of liquid contained in the drum.

All monitoring information, visual inspections, generation dates/locations and labeling information will be recorded on a drum worksheet. The wastes stored in drums will be grouped into two types, solid and liquid.

3.1 SOLID WASTE

Sample aliquots of compatible drummed material should be taken from several locations and depths from within several drums, using the appropriate tools. Any solid drummed waste that is not compatible will be sampled separately with other compatible material. These compatible samples should then be placed into a decontaminated stainless steel bowl, and homogenized using stainless steel spoons and/or trowels. Transfer the homogenized material to the appropriate sampling containers/jars supplied by the laboratory. The sources of each homogenized soil sample will be recorded in the field logbook.

3.2 LIQUID WASTE

Liquid samples will be composited by inserting a drum thief or COLIWASA tube into each drum and obtaining a representative sample of the drummed liquid. The representative sample is obtained by allowing both ends of the drum thief or COLIWASA to be open when inserting into the drum. Using a gloved hand, place thumb over up end of tube and withdraw, discharge tube contents to appropriate sample containers. Liquid wastes that are deemed compatible will be sampled together. Volatile organic compound samples will be collected first. For these samples it is important to limit volatilization while collecting sample aliquots, so these samples should be composited in a clean screw top container. The lid of the container should only be removed when sample aliquot is being added to the jar and then replaced while collecting additional sample. All of the other compatible composite samples will then be homogenized in a decontaminated stainless steel bowl with a stainless steel spoon or trowel. The homogenized sample will then be evenly distributed into the appropriate sampling containers and/or jars as supplied by the laboratory. The sources of each composite sample will be recorded in the field logbook.

4.0 WASTE CHARACTERIZATION

Waste characterization analyses will be performed on representative samples collected from each of the compatible waste types, and strict chain of custody (COC) procedures will be followed for all waste characterization samples. Solid and liquid drum samples for waste characterization analysis will be documented on COC forms separate from the project samples. The drum samples will be stored and shipped on ice in coolers under COC protocol to the analytical laboratory. The TN&A Project Manager (PM) will notify the client regarding the waste characterization test results within 10 days of receipt of the test results.

A self adhesive, weather resistant, white background label material shall be used to label each drum. The size shall be at least 6 x 6 inches. The words “Test Pending”, sample code, date filled, contact name, and telephone number shall be written on the label. For RCRA hazardous and non-hazardous waste, drums shall be labeled in accordance with local, state, and federal regulatory hazardous waste management requirements. Any shipping of hazardous waste that is necessary will be further discussed in the project work plan.

5.0 TRAINING

TN&A employees and subcontractors who perform tasks referenced in the Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120, are required to attend training prior to engaging in hazardous waste operations. Certification of training of the subcontractor personnel must be made available to the Project Manager prior to field activities. In addition, all operations regarding identification, storage, transportation, and disposal of waste shall be accomplished in a safe manner as per OSHA 29 CFR 1910 and the Site Safety and Health Plan.

6.0 REFERENCES

AFDTC/EM, *Standard Operating Procedures for Investigation Derived Materials,* August 1, 1996.

AFDTC/EMC 32-5, AFI 32-70-42, *Hazardous Waste Management Plan,* July 1995.

U.S. Environmental Protection Agency, *Management of Investigation-Derived Waste During Site Investigations,* EPA/540/G-91/009, May 1991.

U.S. Environmental Protection Agency, *Guide to Management of Investigation-Derived Wastes,* EPA Publication 9345.3-03FS, January 1992

U.S. Environmental Protection Agency, *Test Methods for Evaluating Solid Waste,* EPA Publication, SW-846, November 1986

APPENDIX B

RIDEM DIRECT EXPOSURE CRITERIA

RESIDENTIAL SOILS

FEBRUARY 2004

State of Rhode Island and Providence Plantations

Department of Environmental Management

Office of Waste Management

AS AMENDED

August 1996
February 2004

Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases

Short Title: Remediation Regulations

DEM-DSR-01-93

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B. The remedial objective for each non-carcinogenic substance does not exceed a hazard index of 1 and the cumulative hazard index posed by the contaminated-site does not exceed 1 for any target organ;

C. The remedial objective will not significantly contribute to adverse effects to any environmentally sensitive areas at or in the vicinity of the contaminated-site;

D. The remedial objective will be protective of the natural resources of the State, including but not limited to groundwater; and

E. The remedial objective shall address the requirements of Rule 8.07 (Upper Concentration Limits).

Specific requirements for the development and application of concentration-based soil and groundwater objectives are presented throughout the remainder of this Section. Concentration-based soil and groundwater objectives may consider background conditions.

8.02 **Soil Objectives:** Unless otherwise specified in these regulations, soil contaminated as a result of a release of hazardous materials shall be remediated in a manner which meets the direct exposure and leachability criterion for each hazardous substance established in Rule 8.02.B (Method 1 Soil Objectives: Tables 1 and 2), Rule 8.02.C (Method 2 Soil Objectives) or Rule 8.04 (Method 3 Remedial Objectives); or the background concentration of the hazardous substance as established by Rule 8.06 (Background Concentrations for Soils). All soil objectives must be consistent with Rule 8.01 (Remedial Objectives) and Rule 8.02.A (General Requirements for Soil Objectives).

A. General Requirements for Soil Objectives:

i. General Requirements for Direct Exposure Criteria:

1. With respect to any hazardous substance in soil at a contaminated-site, the Director may approve the application of a direct exposure criterion provided it is demonstrated to the satisfaction of the Director that the application of such direct exposure criterion at the contaminated-site will be protective of current and reasonably foreseeable future human exposure.

2. Regardless of the method employed for determining the direct exposure criterion, the residential direct exposure criterion shall be applied throughout the vadose zone for each hazardous substance in soil, except as otherwise provided in this Rule.

The industrial/commercial direct exposure criterion may be applied to a depth of at least 2 feet below ground surface for each hazardous substance in soil if all of the following conditions are met:

a. The contaminated-site is currently limited to industrial/commercial activity;

b. Access to the property containing the contaminated-site is limited to individuals working at or temporarily visiting the subject parcel;

c. The current and reasonably foreseeable future human exposure to soils at the contaminated-site is not expected to occur beyond a depth of 2 feet below ground surface; and

d. An environmental land usage restriction consistent with Rule 8.09 (Institutional Controls) is in effect with respect to the property, or to the portion of the property containing the contaminated-site; such an environmental land usage restriction shall ensure that the property or restricted portion thereof is not used for any residential activity in the future and that any future use of the property or restricted portion thereof is limited to industrial/ commercial activity.

ii. General Requirements for Leachability Criteria:

1. With respect to any hazardous substance in soil at a contaminated-site, the Director may approve a leachability criterion provided it is demonstrated to the satisfaction of the Director that the application of such leachability criterion at the contaminated-site is protective of the following:

a. The actual and potential uses of the groundwater at the contaminated-site by ensuring that, at a minimum, the leachability criterion will not contribute to an exceedance of the applicable groundwater objective for the hazardous substance as described in Rule 8.03 (Groundwater Objectives); and

b. Surface water at or in the vicinity of the contaminated-site from potential migration of groundwater.

2. Regardless of the method employed for determining the leachability criterion, the GA leachability criterion shall be applied throughout the

vadose zone for each hazardous substance in soil, except as otherwise provided in this Rule.

The GB leachability criterion may be applied throughout the vadose zone for each substance in soil if both of the following conditions are met:

a. The GB groundwater objective is applicable to the groundwater of concern underlying and downgradient of the contaminated-site in accordance with Rule 8.03 (Groundwater Objectives); and

b. The application of the GB leachability criterion will not contribute to actual or potential impacts to surface water and/or sediments as described in the policies and regulations of the Division of Water Resources.

iii. Method Requirements for Soil Objectives:

For each of the hazardous substances at a contaminated-site, the Director shall approve the application of a Method 1 Soil Objective established in Rule 8.02.B (Method 1 Soil Objectives) provided that the application of the Method 1 Soil Objective is consistent with Rule 8.01 (Remedial Objectives), Rule 8.02.A (General Requirements for Soil Objectives) and the objective is specified in Tables 1 and 2, as appropriate.

If no Method 1 Soil Objective has been promulgated for one or more hazardous substances in soil at a contaminated-site, then the following options are available:

1. Method 2 may be used to develop soil objectives for the contaminated-site as described in Rule 8.02.C (Method 2 Soil Objectives). Method 2 Soil Objectives may be used alone or in combination with other Method 1 Soil Objectives. A combined Method 1 and Method 2 approach shall be considered to result in Method 2 Soil Objectives; or

2. Method 3 may be used to develop soil objectives for the contaminated-site as described in Rule 8.04 (Method 3 Remedial Objectives).

If a Method 1 Soil Objective has been promulgated for one or more hazardous substances in soil at a contaminated-site, then the following options are available:

1. The performing party may only propose Method 2 to develop leachability criteria, as described in Rule 8.02.C (Method 2 Soil Objectives). Method 2 Leachability Criteria may be used alone or in combination with other Method 1 Leachability Criteria. A combined Method 1 and Method 2 approach shall be considered to result in Method 2 Soil Objectives; or

2. Method 3 may be used to develop soil objectives for the contaminated-site as described in Rule 8.04 (Method 3 Remedial Objectives).

For hazardous substances in soil that are determined by either the Department or the performing party to have a potential to significantly contribute to adverse effects to any environmentally sensitive area at or in the vicinity of the contaminated-site, a Method 3 Ecological Risk Assessment shall be performed in accordance with Rule 8.05 (Ecological Protection).

iv. Soil Objectives for Total Petroleum Hydrocarbons (TPH):

Although not a single hazardous substance, TPH can be useful as an indicator of potential adverse impacts to human health from a release of hazardous materials. TPH Soil Objectives shall be applied to a contaminated-site for which jurisdiction has been established through the discovery of a release as described in Section 5 (NOTIFICATION). The Department will utilize these objectives for non-virgin petroleum/weathered petroleum situations as they occur at contaminated-sites.

Accordingly, the Department shall require that soil objectives for TPH as described in this Rule be applied to a contaminated-site in conjunction with soil objectives for the hazardous substances established pursuant to this Section. The Director shall approve the application of the functional equivalent of a direct exposure criterion and leachability criterion for TPH provided that the application of the criteria is consistent with Rule 8.01 (Remedial Objectives) and Rule 8.02.A (General Requirements for Soil Objectives). The performing party may apply the soil objectives for TPH described below or may develop soil objectives for TPH under Method 3, as described in Rule 8.04 (Method 3 Remedial Objectives).

1. The following shall be considered the Method 1 Direct Exposure Criteria for TPH, subject to the provided requirements:

   a. The Method 1 Residential TPH Direct Exposure Criterion shall be 500 ppm; or

b. The Method 1 Residential TPH Direct Exposure Criterion may be 1000 ppm contingent upon field-verification by Department personnel to ensure that short-term risks are managed appropriately prior to approval as a final remedial objective; and

c. The Method 1 Industrial/Commercial TPH Direct Exposure Criterion shall be 2500 ppm.

2. The following shall be considered the Method 1 Leachability Criteria for TPH, subject to the provided requirements:

a. The Method 1 GA TPH Leachability Criterion shall be 500 ppm; or

b. The Method 1 GA TPH Leachability Criterion may be 1000 ppm and may be field-verified at the discretion of the Department to ensure that short-term risks are managed appropriately prior to approval as a final remedial objective; and

c. The Method 1 GB TPH Leachability criterion shall be 2500 ppm.

For clarity, any reference to concentrations of hazardous substances in the following Rules shall be considered by the Department to be in addition to the appropriate concentrations of TPH as described herein: Rule 8.02 (Soil Objectives), Rule 8.04 (Method 3 Remedial Objectives), Rule 8.06 (Background Concentrations for Soils), Rule 8.08.A (Points of Compliance for Soils), Rule 8.09 (Institutional Controls) and Rule 8.10 (Compliance Sampling).

B. Method 1 Soil Objectives:

Unless otherwise prohibited by the Director, the Method 1 Soil Objectives specified in Tables 1 and 2 may be applied to a contaminated-site provided that the conditions set forth in Rule 8.01 (Remedial Objectives) and Rule 8.02.A (General Requirements for Soil Objectives) are met.

i. Method 1 Direct Exposure Criteria:

The Method 1 Direct Exposure Criteria are listed in Table 1.

ii. Method 1 Leachability Criteria:

The Method 1 Leachability Criteria are listed in Table 2.

With respect to the Method 1 Leachability Criteria for inorganic hazardous substances, the performing party shall conduct a laboratory test that demonstrates that the inorganic hazardous substance will not leach to groundwater at levels which exceed the applicable groundwater objective for the inorganic hazardous substance. Accordingly, the resulting leachate concentration must not exceed the leachability criteria for the associated inorganic hazardous substance listed in Table 2.

The performing party may perform the Synthetic Precipitation Leaching Procedure (SPLP; EPA Method 1312), the Toxicity Characteristic Leaching Procedure (TCLP; EPA Method 1311) or other procedures pre-approved by the Department to estimate potential leaching of inorganic hazardous substances at the contaminated-site.

TABLE 1

DIRECT EXPOSURE CRITERIA

Substance	Residential (mg/kg)	Industrial/Commercial (mg/kg)
Volatile Organics		
Acetone	7,800	10,000
Benzene	2.5	200
Bromodichloromethane	10	92
Bromoform	81	720
Bromomethane	0.8	2900
Carbon tetrachloride	1.5	44
Chlorobenzene	210	10,000
Chloroform	1.2	940
Dibromochloromethane	7.6	68
1,2- Dibromo-3-chloropropane (DBCP)	0.5	4.1
1,1-Dichloroethane	920	10,000
1,2-Dichloroethane	0.9	63
1,1-Dichloroethene	0.2	9.5
cis-1,2-Dichloroethene	630	10,000
Trans-1,2-Dichloroethene	1,100	10,000
1,2-Dichloropropane	1.9	84
Ethylbenzene	71	10,000
Ethylene dibromide (EDB)	0.01	0.07
Isopropyl benzene	27	10,000
Methyl ethyl ketone	10,000	10,000
Methyl isobutyl ketone	1200	10,000
Methyl tertiary-butyl ether (MTBE)	390	10,000
Methylene chloride	45	760

TABLE 1

DIRECT EXPOSURE CRITERIA

Substance	Residential (mg/kg)	Industrial/Commercial (mg/kg)
Styrene	13	190
1,1,1,2-Tetrachloroethane	2.2	220
1,1,2,2-Tetrachloroethane	1.3	29
Tetrachloroethene	12	110
Toluene	190	10,000
1,1,1-Trichloroethane	540	10,000
1,1,2-Trichloroethane	3.6	100
Trichloroethene	13	520
Vinyl chloride	0.02	3.0
Xylenes (Total)	110	10,000
Semivolatiles		
Acenaphthene	43	10,000
Acenaphthylene	23	10,000
Anthracene	35	10,000
Benzo(a)anthracene	0.9	7.8
Benzo(a)pyrene[a]	0.4	0.8
Benzo(b)fluoranthene	0.9	7.8
Benzo(g,h,i)perylene	0.8	10,000
Benzo(k)fluoranthene	0.9	78
1,1-Biphenyl	0.8	10,000
Bis(2-ethylhexyl)phthalate	46	410
Bis(2-chloroethyl)ether	0.6	5.2
Bis(2-chloroisopropyl)ether	9.1	82
4-Chloroaniline (p-)	310	8200

TABLE 1

DIRECT EXPOSURE CRITERIA

Substance	Residential (mg/kg)	Industrial/Commercial (mg/kg)
2-Chlorophenol	50	10,000
Chrysene	0.4	780
Dibenzo(a,h)anthracene[a]	0.4	0.8
1,2-Dichlorobenzene (o-DCB)	510	10,000
1,3-Dichlorobenzene (m-DCB)	430	10,000
1,4-Dichlorobenzene (p-DCB)	27	240
3,3-Dichlorobenzidine	1.4	13
2,4-Dichlorophenol	30	6,100
Diethyl phthalate	340	10,000
2,4-Dimethyl phenol	1,400	10,000
Dimethyl phthalate	1900	10,000
2,4-Dinitrophenol	160	4,100
2,4-Dinitrotoluene	0.9	8.4
Fluoranthene	20	10,000
Fluorene	28	10,000
Hexachlorobenzene	0.4	3.6
Hexachlorobutadiene	8.2	73
Hexachloroethane	46	410
Indeno(1,2,3-cd)pyrene	0.9	7.8
2-Methyl naphthalene	123	10,000
Naphthalene	54	10,000
Pentachlorophenol	5.3	48
Phenanthrene	40	10,000
Phenol	6,000	10,000
Pyrene	13	10,000

TABLE 1

DIRECT EXPOSURE CRITERIA

Substance	Residential (mg/kg)	Industrial/Commercial (mg/kg)
1,2,4-Trichlorobenzene	96	10,000
2,4,5-Trichlorophenol	330	10,000
2,4,6-Trichlorophenol	58	520
Pesticides/PCBs		
Chlordane	0.5	4.4
Dieldrin	0.04	0.4
Polychlorinated biphenyls (PCBs)[b]	10	10
Inorganics		
Antimony	10	820
Arsenic[c]	7.0	7.0
Barium	5,500	10,000
Beryllium[c]	0.4	1.3
Cadmium	39	1,000
Chromium III (Trivalent)	1,400	10,000
Chromium VI (Hexavalent)	390	10,000
Copper	3,100	10,000
Cyanide	200	10,000
Lead[d]	150	500
Manganese	390	10,000
Mercury	23	610
Nickel	1,000	10,000
Selenium	390	10,000
Silver	200	10,000
Thallium	5.5	140

TABLE 1

DIRECT EXPOSURE CRITERIA

Substance	Residential (mg/kg)	Industrial/Commercial (mg/kg)
Vanadium	550	10,000
Zinc	6,000	10,000

[a] Estimated quantitation limits
[b] Direct exposure criteria for PCBs consistent with the Toxic Substance Control Act (TSCA)
[c] Background Levels of Priority Pollutant Metals In Rhode Island Soils, T. O'Connor, RIDEM – For arsenic, see Section 12.0
[d] Direct exposure criteria for Lead consistent with the Rhode Island Department of Health Rules and Regulations for Lead Poisoning Prevention [R23-24.6-PB], as amended

TABLE 2

LEACHABILITY CRITERIA

Substance	GA Leachability (mg/kg except as otherwise noted)	GB Leachability (mg/kg)
Volatile Organics		
Benzene	0.2	4.3
Carbon tetrachloride	0.4	5.0
Chlorobenzene	3.2	100
1,2-Dichloroethane	0.1	2.3
1,1-Dichloroethene	0.7	0.7
cis-1,2-Dichloroethene	1.7	60
Trans-1,2-Dichloroethene	3.3	92
1,2-Dichloropropane	0.1	70
Ethylbenzene	27	62
Ethylene dibromide (EDB)	5E-04	-
Methyl –tertiary-butyl-ether (MTBE)	0.9	100
Styrene	2.9	64
Tetrachloroethene	0.1	4.2

TABLE 2

LEACHABILITY CRITERIA		
Toluene	32	54
1,1,1-Trichloroethane	11	160
1,1,2-Trichloroethane	0.1	-
Trichloroethene	0.2	20
Vinyl chloride	0.3	-
Xylenes	540	-
Semivolatiles		
Benzo(a)pyrene	240	-
Dichlorobenzene (all isomers)	41	-
Diethylhexyl phthalate	120	-

TABLE 2

LEACHABILITY CRITERIA

Substance	GA Leachability (mg/kg except as otherwise noted)	GB Leachability (mg/kg)
Naphthalene	0.8	-
Pentachlorophenol	7.1	-
1,2,4-Trichlorobenzene	140	-
Pesticides/PCBs		
Chlordane	1.4	-
Polychlorinated biphenyls (PCBs)[a]	10.0	10.0
Substance	**GA Leachability (mg/l)**	
Inorganics		
Antimony (TCLP/SPLP)	0.05	-
Barium (TCLP/SPLP)	23	-
Beryllium (TCLP/SPLP)	0.03	-
Cadmium (TCLP/SPLP)	0.03	-
Chromium (TCLP/SPLP)	1.1	-
Cyanide (TCLP/SPLP)	2.4	-
Lead (TCLP/SPLP)	0.04	-
Mercury (TCLP/SPLP)	0.02	-
Nickel (TCLP/SPLP)	1	-
Selenium (TCLP/SPLP)	0.6	-
Thallium (TCLP/SPLP)	0.005	-

"-" No Method 1 GB Leachability Criteria promulgated

[a] Leachability criteria for PCBs consistent with the Toxic Substance Control Act (TSCA)

C. Method 2 Soil Objectives:

Method 2 allows for the consideration of limited site-specific information to modify Method 1 Soil Objectives or to calculate soil objectives for hazardous substances not listed in Table 1 or Table 2. For the purposes of these regulations, a Method 2 Soil Objective shall refer to any soil objective which addresses site-specific conditions established pursuant to this Rule and in accordance with the appropriate information presented in Appendix D and Appendix E.

The Department reserves the right to require the development of Method 2 Soil Objectives based on complicated conditions at a contaminated-site, including, but not limited to potential adverse impacts to adjacent surface water bodies or other potential impacts to human health and/or the environment.

Method 2 Soil Objectives shall be consistent with Rule 8.01 (Remedial Objectives), Rule 8.02.A (General Requirements for Soil Objectives) and shall meet all of the following conditions in Rules 8.02.C.i through iv listed below:

i. Direct exposure criteria shall only be developed under Method 2 for those hazardous substances which are not specified under Method 1 in Table 1. Method 2 Direct Exposure Criteria shall be developed using the default assumptions provided in Appendix D. The chemical-specific inputs used to develop the Method 2 Direct Exposure Criteria are subject to the approval of the Director for each proposed application;

ii. Method 2 Soil Objectives shall be developed for hazardous substances on the basis of the following assumptions and procedures:

1. Based upon non-cancer health risk, a concentration of the hazardous substance associated with 100% of the Reference Dose shall be calculated consistent with residential or industrial/commercial activity as appropriate pursuant to Rule 8.02 A.i (General Requirements for Direct Exposure Criteria) using the algorithm specific to the ingestion pathway provided in Appendix D. For a contaminated-site which impacts one or more properties utilized for any residential activity, a concentration of the hazardous substance associated with acute ingestion and the inhalation pathway shall also be calculated using the appropriate algorithms in Appendix D;

2. A concentration of the hazardous substance associated with an Excess Lifetime Cancer Risk equal to no more than one excess cancer case in one million people exposed to the hazardous substance shall be calculated consistent with residential or industrial/commercial activity as appropriate pursuant to Rule 8.02.A.i (General

Requirements for Direct Exposure Criteria) using the algorithm specific to the ingestion pathway provided in Appendix D. For a contaminated-site which impacts one or more properties utilized for any residential activity, a concentration of the hazardous substance associated with the inhalation pathway shall be calculated using the appropriate algorithm in Appendix D;

3. For a contaminated-site impacting one or more properties utilized for any residential activity, the soil saturation concentration (Csat) of the hazardous substance above which pure liquid-phase contaminant is expected in the vadose zone shall be calculated using the equation provided in Appendix D and appropriate chemical-specific and/or soil specific data collected from the contaminated-site;

4. For each concentration of hazardous substance calculated consistent with residential or industrial/commercial activity as appropriate pursuant to Rule 8.02.A.i (General Requirements for Direct Exposure Criteria), the lowest non-zero concentration estimated in Rule 8.02.C.ii.1 through 3 above shall be the Method 2 Direct Exposure Criterion for the hazardous substance;

5. Considering the groundwater classification at the contaminated-site, the Method 2 Leachability Criterion shall be developed utilizing a Department-approved leaching model or test method which demonstrates that the concentrations of the hazardous substance in soil at a contaminated-site now and in the reasonably foreseeable future will result in compliance with all applicable groundwater objectives for that hazardous substance. Therefore, the Department shall approve the target groundwater objective for each hazardous substance established in accordance with this Section prior to the development of the associated Method 2 Leachability Criterion.

   Specifically, Method 2 Leachability Criteria shall be determined by performing the following:

   a. Method 2 Leachability Criteria for Organic Hazardous Substances:

      The performing party may provide a leaching-to-groundwater compliance demonstration with a Department-approved fate and transport model such as that discussed in Appendix E which incorporates site-specific information such as physical and chemical properties of the hazardous substances including, but not limited to toxicity and mobility, source

quantity, subsurface hydrogeological conditions and net precipitation; and

b. Method 2 Leachability Criteria for Inorganic Hazardous Substances:

The performing party shall conduct a laboratory test consistent with that described in Rule 8.02.B.ii (Method 1 Leachability Criteria). The performing party may develop a Method 2 Leachability Criterion for an inorganic hazardous substance by calculating a site-specific dilution/attenuation factor using the algorithm in Appendix E to be multiplied by the appropriate groundwater objective;

6. A site-specific background concentration of the hazardous substance in soil may be calculated and considered for the hazardous substance pursuant to Rule 8.06 (Background Concentrations for Soils); and

7. The Practical Quantitation Limit (PQL) of the hazardous substance using an appropriate analytical method for quantifying the concentration of the chemical in soil may be calculated and considered;

iii. If the development of a Method 2 Soil Objective results in a concentration of a hazardous substance which exceeds any Upper Concentration Limit as described in Rule 8.07 (Upper Concentration Limits), then the Department reserves the right to require that the modification be adjusted downward to a concentration which prevents the exceedance; and

iv. The development of Method 2 Soil Objectives shall be based upon information which is scientifically justified and completely documented with site data collected from the contaminated-site. At a minimum, Method 2 Soil Objective development shall be documented with sufficient information to allow the Director to evaluate the following factors:

1. The appropriateness and validity of any chemical-specific and/or site-specific input parameters used;

2. Whether the calculations were correctly performed;

3. The potential for soils at the contaminated-site to pose a significant risk to human health and the environment after the proposed Method 2 Soil Objectives are applied to the contaminated-site as part of a remedial action; and

4. Background levels for the applicable hazardous substances, if determined.

8.03 **Groundwater Objectives:** Unless otherwise specified in these regulations or otherwise provided by the Director, groundwater contaminated as a result of a release of hazardous materials located in a GA/GAA area shall be remediated to a concentration which meets the groundwater objective for each hazardous substance established in Rule 8.03.B.i (Method 1 GA Groundwater Objectives) and specified in Table 3 or Rule 8.04 (Method 3 Remedial Objectives); the Groundwater Quality Regulations, or the background concentration of the hazardous substance. Any Method 3 GA Groundwater Objective which deviates from the Method 1 GA Groundwater Objective shall meet the requirements of Rule 13.04 of the Groundwater Quality Regulations.

Groundwater contaminated as a result of a release of hazardous materials located in a GB area shall be remediated to a concentration which meets the groundwater objective for each hazardous substance established in Rule 8.03.B.ii (Method 1 GB Groundwater Objectives) and specified in Table 4, Rule 8.03.C (Method 2 GB Groundwater Objectives) or Rule 8.04 (Method 3 Remedial Objectives); or the background concentration of the hazardous substance.

All groundwater objectives must be consistent with Rule 8.01 (Remedial Objectives) and Rule 8.03.A (General Requirements for Groundwater Objectives).

A. General Requirements for Groundwater Objectives:

i. General Requirements for GA Groundwater Objectives:

1. GA Groundwater Objectives may not be set at levels, except within an approved discharge zone or residual zone (as provided for in Rules 13.03 and 13.04, respectively, of the Groundwater Quality Regulations) which will adversely affect the groundwater as a source of potable water or which will adversely affect other beneficial uses of groundwater, including but not to be limited to recreational, agricultural and industrial uses and the preservation of fish and wildlife habitat through the maintenance of surface water quality; and

2. GA Groundwater Objectives may not be set at levels which exceed or have reasonable potential to cause exceedance of surface water quality standards established by the Rhode Island Water Quality Regulations for Water Pollution Control, October 1988, and amendments thereto.

ii. General Requirements for GB Groundwater Objectives:

APPENDIX C

RIDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION

PART L – LANDSCAPING

PART M – LANDSCAPING MATERIALS

FEBRUARY 2004

RHODE ISLAND

DEPARTMENT
OF
TRANSPORTATION

Standard Specifications
for
Road and Bridge Construction

2004 EDITION

SECTION L.02

SEEDING

L.02.01 DESCRIPTION. This work consists of the preparation of the seed bed, furnishing and placing materials, and the establishing of grassed areas as shown on the Plans, in accordance with these Specifications or as directed by the Engineer. Work shall consist of the following six types:

Type 1. Plantable Soil areas, either flats, to be seeded with a Park Seed Mix or slopes, to be seeded with a Slope Seed Mix;

Type 2. Loamed areas adjacent to lawns or sidewalks, seeded with a Residential Seed Mix;

Type 3. Temporary seeding using a Temporary Seed Mix on sloped and flat areas of embankments or excavation sites, to provide temporary vegetative cover for erodible soils;

Type 4. Plantable Soil areas, either flats or slopes, seeded with a Native Seed Mix;

Type 5. Wetland Areas and High Organic Soil, seeded with a Wetland Seed Mix;

Type 6. Plantable Soil areas, either flats or slopes seeded with a Wildflower Seed Mix.

Slope areas shall be defined as being 3:1 or greater.

L.02.02 MATERIALS. Lime, fertilizer, mulch, water and seed mixtures shall conform to the applicable requirements of **SECTION M.18; LANDSCAPING MATERIALS**.

L.02.03 CONSTRUCTION METHODS.

L.02.03.1 Seeding Dates. Full advantage shall be taken of time and weather conditions best suited for seeding. The normal dates for seeding shall be as follows:

Type 1, Type 2, and Type 4 dates shall be:

Spring Seeding:	April 1 to May 31.
Fall Seeding:	August 15 to October 15.

Type 3 seeding may be done at anytime between March 15 and November 15 with approval of the Engineer. Type 3 seeding shall not be permitted on frozen ground.

Type 5 seeding dates shall be as follows:

Spring Seeding:	May 1 to June 15
Fall Seeding:	August 15 to September 30

Type 6 seeding dates shall be as follows:

Spring Seeding:	April 1 to May 1
Fall Seeding:	September 1 to September 30

Seeding at other than the above time will be allowed only with the written permission of the Engineer. The Engineer may suspend work when he/she determines that soil or weather conditions are unsuitable for raking and/or seeding. The Contractor may resume work when directed by the Engineer.

The Contractor shall notify the Engineer at least 48 hours in advance of the time intended for commencement of seeding. No payment will be made for work performed when the Engineer is not present. In cases where there is existing or new plant material, care shall be taken to insure that no lime, fertilizer, mulch and/or seed mix comes in contact with the plant material or their mulched areas.

L.02.03.2 Preparation of Areas for Seeding.

a. Type 1 (General Highway Seeding). Type 1 areas shall be raked, either by hand or mechanically (i.e. power rake), so as to produce a loose, friable seed bed. Slopes 3:1 and greater shall be tracked with a dozer. The resulting track imprints shall be perpendicular to the flow of water.

All sticks, litter, wire, weeds, cable, cobbles or stones larger than 1 inch in any dimension shall be removed and legally disposed of.

Where the seed bed has become compacted, it shall be scarified to a depth of 5 inches prior to raking. No seeding of this type will be permitted on areas where the seed bed has not been properly prepared or where the soil is compacted.

b. Type 2 (Residential Seeding). Type 2 areas shall be hand raked to a finished grade. All sticks, litter, wire, weeds, cable, cobbles and stones larger than ½-inch in any dimension shall be removed and legally disposed of. After hand raking, and at the discretion of the Engineer, the Contractor shall roll, with a hand roller, the entire area. The finish grade of the proposed area shall blend into the adjacent lawns (when applicable).

Where the seed bed has become compacted, it shall be scarified to a depth of 5 inches prior to fine raking. No seeding of this type will be permitted on areas where the seed bed has not been properly prepared or where the soil is compacted.

c. Type 3 (Temporary Seeding). Type 3 areas to be seeded shall be free of depressions and unprotected channels where runoff may cause erosion.

d. Type 4 (Native Grass Seeding). Type 4 areas shall be prepared in accordance with **Para. a**, above.

e. Type 5 (Wetland Seeding). Type 5 areas shall not be raked. All sticks, litter, wire, weeds, cable, cobbles or stones larger than 4 inches in any dimension shall be removed and legally disposed of without disturbing the finish grade.

f. Type 6 (Wildflower Seeding). Type 6 areas shall be prepared in accordance with **Para. a**, above, except as designated below.

Type 6 areas previously seeded or having existing vegetation shall have all sod removed from the site proposed for wildflower seeding. Plantable soil, as designated on the Plans or as directed by the Engineer, shall be applied to raise the planting bed to final grade (after sod removal). Areas shall be raked to produce a loose friable soil.

L.02.03.3 Application of Lime. Lime (ground or pelletized) shall be applied dry and spread evenly over the entire surface to be seeded. Unless otherwise specified, the application rate shall be 1 ton per acre. Raking shall be completed after the fertilizer has been applied. NO LIME WILL BE APPLIED ON TYPE 3, TYPE 4, AND TYPE 5 AREAS.

L.02.03.4 Application of Fertilizer. After the application of lime, fertilizer shall be spread at the following rates:

Type 1 and 2 -	Eight hundred-fifty pounds (850 lbs.) per acre.
Type 3 -	Six hundred-fifty pounds (650 lbs.) per acre.
Type 4 -	Five hundred pounds (500 lbs.) per acre.
Type 5 -	No fertilizer shall be applied.
Type 6 -	One hundred-fifty pounds (150 lbs.) per acre.

Both the lime and fertilizer shall be thoroughly incorporated into the soil by raking. Raking shall be in accordance with the applicable requirements of **Subsection L.02.03.2**, above.

L.02.03.5 Sowing of Seed. After the seed beds have been prepared as outlined in **Subsections L.02.03.2** through **L.02.03.4**, above, grass seed conforming to the respective formula specified in **Subsection M.18.10; Seed Mixtures**, shall be applied according to the specified rates. Application of fertilizer, grass seed, and cellulose fiber mulch for Type 1, Type 2, Type 3, Type 4, Type 5, and Type 6 may be accomplished in one operation by the use of a hydroseeder.

a. Type 1 (General Highway Seeding). Type 1 areas shall be seeded with Park Mix on flats and with Slope Seed Mix on slopes. Both mechanical and hydroseeding methods may be used.

b. Type 2 (Residential Seeding). Type 2 areas shall be seeded with a Residential Seed Mix. Additional hand raking and rolling with a light roller shall be employed in lieu of mulch. Such areas will not be accepted until a generally weed-free, 3-inch stand of grass is established.

c. Type 3 (Temporary Seeding). Type 3 areas shall be seeded with a Temporary Seed Mix on flats and slopes. Both mechanical and hydroseeding methods may be used.

d. Type 4 (Native Grass Seeding). Type 4 areas shall be seeded with a Native Seed Mix. Both mechanical and hydroseeding methods may be used.

e. Type 5 (Wetland Seeding). Type 5 areas shall be seeded with a Wetland Seed Mix. In areas where there is access for a hydroseeder, the Wetland Seed Mix shall be spread using

this method only. In areas where there is no access for a hydroseeder, the wetland seed mix shall be spread by a hand held spreader.

f. Type 6 (Wildflower Seeding). Type 6 areas shall be seeded with a Wildflower Seed Mix. Seeds may be mechanically applied by overseeding the area with a slit seeder or broadcast with the use of a drop or broadcast spreader. A hydroseeder may be used. When hydroseeding method is used, the seed, fertilizer, and 10 percent of the mulch shall be used in the first application followed by the remaining 90 percent of mulch to be used in a second application.

If a slit seeder is used, seed disbursement shall be 3 inches on center and 1/4-inch deep. Two passes, the second perpendicular to the first shall be made. Small seeds shall be seeded separately from larger seed.

If a drop or broadcast seeding method is used, large seed shall be spread separately from small seeds. Each seed type (large or small) disbursement shall be applied in two passes, the second perpendicular to the first. The area shall be hand raked to provide a soil coverage of a 1/4-inch.

L.02.03.6 Mulching. All seeded areas shall be covered with a suitable mulch at the time of the application of the seed. Unless otherwise specified, cellulose fiber mulch shall be used. Cellulose fiber mulch shall conform to **Subsection M.18.07.1** of these Specifications.

Cellulose fiber mulch may be employed separately or as part of a hydroseeding operation. If cellulose fiber mulch is applied separately, it shall be applied immediately after the seeding operation.

Cellulose fiber mulch that becomes adhered to signs, sign posts, lighting standards, new or existing plant materials and/or walls shall be removed.

L.02.03.7 Care During Construction. Any areas which fail to show a uniform growth of grass for any reason whatsoever shall be reseeded until the areas are covered with a satisfactory growth of grass as approved by the Engineer.

The seed, fertilizer, etc. used in the reseeding operations shall be at the same application rates and during appropriate seeding dates as those previously specified unless otherwise directed by the Engineer.

a. Watering. The Contractor shall water all Type 1, Type 2, Type 4, and Type 6 seeded areas within 72 hours of the seeding operation. One additional watering may be required and such will be at the discretion of the Engineer.

Water shall be applied at a controlled rate and in such a manner to insure the water reaches the root zone. Watering operations shall not flood adjacent areas, erode soil or cause any damage to the seeded areas.

b. Mowing. Mowing for Type 1 seeded areas shall be accomplished in two mowings per year on areas flatter than 3:1. Mowing on Type 2 seeded areas shall be performed when the grass has obtained a height of 4 inches and shall be maintained at a 4-inch height until accepted.

Mowing will be performed for Type 1 and Type 2 only.

Each cutting shall result in a stand of evenly mowed grass, 3 inches tall immediately following the cutting. Neat trimming shall be necessary around all poles, trees, ledges, delineators, curbs, piers, abutments and other structures falling within the seeded areas; this trimming will be conducted simultaneously with the mowing during each cutting operation. All curbs shall be trimmed and exposed; all gutters will be left free of all grass clippings.

c. Failure to Perform Care During Construction. If the Engineer decides that the Care During Construction tasks as specified in the Contract have not been performed, the daily charge set forth in **Special Provision Code L.02.1000** will be deducted from monies due the Contractor as a charge for failure to comply with this Specification. The daily charge will continue each consecutive calendar day until the deficiencies have been corrected to the satisfaction of the Engineer.

L.02.04 METHOD OF MEASUREMENT. "Seeding" will be measured by the number of square yards actually seeded in accordance with the Plans, and/or as directed by the Engineer.

L.02.05 BASIS OF PAYMENT. The accepted quantity of "Seeding" will be paid for at the contract unit price per square yard as listed in the Proposal. The price so-stated constitutes full and complete compensation for preparation of seed beds, for furnishing and applying all lime, fertilizer, mulch, seed, raking, mowing, watering, and care during construction of the seeded areas, for all labor, materials and equipment, and for all incidentals required to finish the work, complete and accepted by the Engineer.

Payment for all types shall be made as follows:

Eighty-five percent of the total contract price will be paid at the time of initial seeding. The remainder, 15 percent, will be paid when the newly seeded areas have been accepted.

If seeding is done at a time other than the specified seeding date, the entire payment for seeding will be withheld until a uniform acceptable stand of turf, as determined by the Engineer, has been obtained.

SECTION L.03

SODDING

L.03.01 DESCRIPTION. This work consists of the preparation of the sod bed and of furnishing, placing and caring for sod as indicated on the Plans, in accordance with these Specifications or as directed by the Engineer.

L.03.02 MATERIALS. Sod, lime, fertilizer, water, and wooden pegs shall conform to the applicable requirements of **SECTION M.18; LANDSCAPING MATERIALS**.

b. Certified Test Reports. The manufacturer shall furnish certified test reports for each batch delivered for application at the project site. Reports shall reference batch number and physical characteristics outlined above. Application shall not commence until the proposed epoxy materials are verified by submitting this Certificate to the Engineer.

M.17.04.3 Packaging. The epoxy materials shall be shipped in appropriate, durable, and substantial containers. Individual containers shall be plainly marked with the following information: manufacturer's name and address; name of product; lot number; batch number; color; net weight and volume of contents; date of manufacture; date of expiration; statement of content (i.e., Part A - contains pigment and epoxy resin; Part B - contains catalyst); mixing proportions, application temperatures and instructions; and safety information.

SECTION M.18

LANDSCAPING MATERIALS

M.18.01 LOAM. The material to be furnished shall consist of screened loose, friable, fine sandy loam or sandy loam, as defined by the USDA's Soil Conservation Service in the Soil Survey Manual issued in 1993, free of subsoil, refuse, stumps, roots, rocks, cobbles, stones, brush, noxious weeds, litter and other materials which are larger than ½-inch in any dimension and which will prevent the formation of a suitable seed bed. Organic matter shall constitute not less than 5 percent nor more than 20 percent of the loam as determined by loss-on-ignition of oven dried samples that have been drawn by the Engineer, unless otherwise specified or directed. The loam shall have an acidity range of 5.5 pH to 7.6 pH. The Contractor shall notify the Department of the intended source of loam to be employed at least two weeks prior to the intended time of use to allow time for sampling.

M.18.02 PLANTABLE SOIL. The material to be furnished shall consist of loose, friable topsoil free of refuse, brush, stumps, roots, rocks, cobbles, stones, noxious weeds, litter, and other materials which are longer than 1 inch in any dimension and which will prevent the formation of a suitable seed bed. Organic matter shall constitute not less than 4 percent nor more than 20 percent of the plantable soil as determined by loss-on-ignition of oven dried samples that have been drawn by the Engineer, unless otherwise specified or directed. The plantable soil shall have an acidity range of approximately 5.5 pH to 7.5 pH.

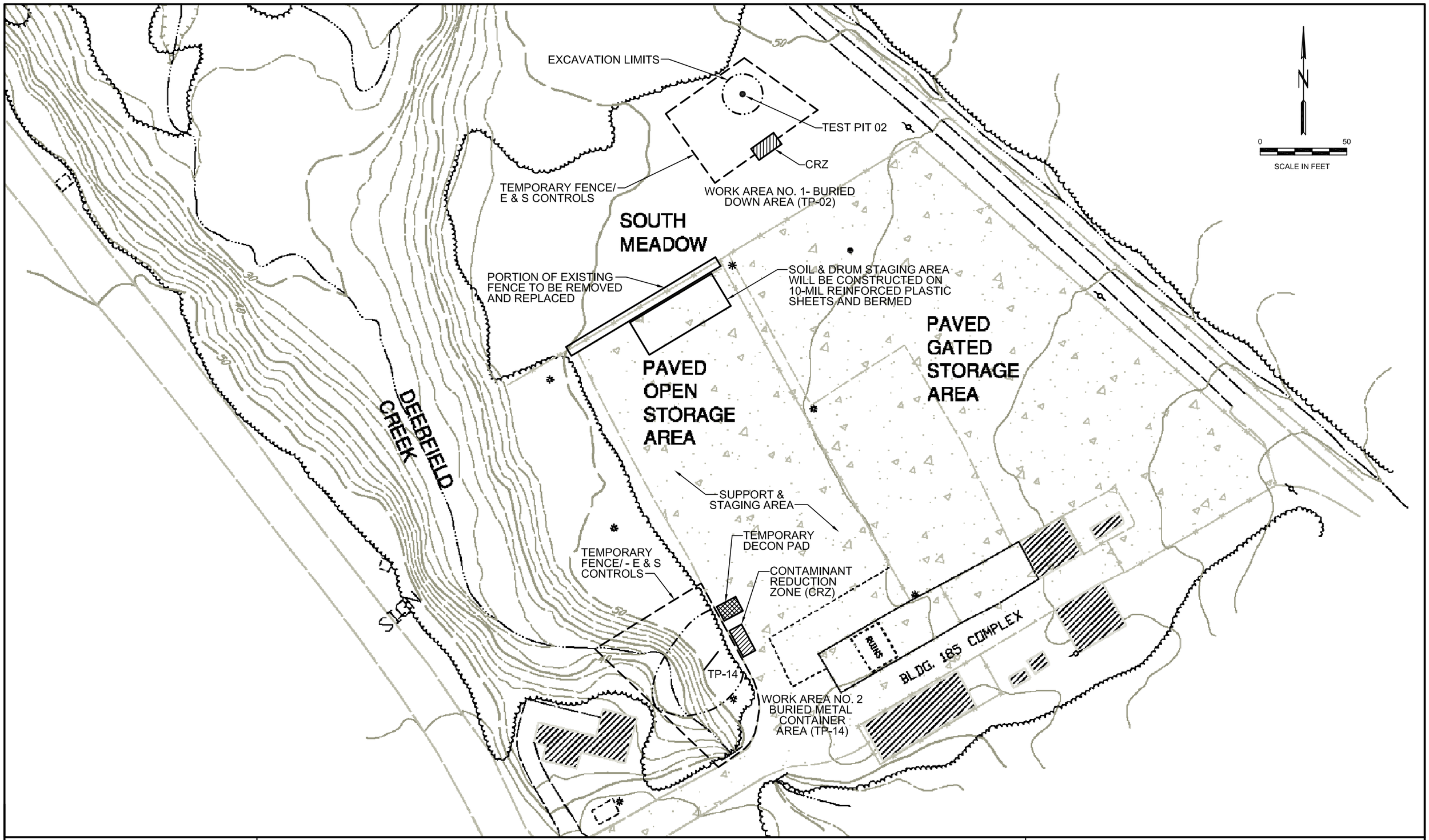
The composition of plantable soil can also be arrived at by thoroughly mixing a suitable organic soil with a suitable subsoil. The resulting mix shall be a homogeneous material free from hard lumps, other materials specified above and be capable of supporting plant growth. This soil mixture must meet the above specified requirements for organic matter content and pH. The Contractor shall notify the Department of the intended source of plantable soil to be employed at least two weeks prior to the intended time of use to allow for sampling.

M.18.03 COMPOST. The material shall be a well decomposed, stable, weed free organic matter source. It shall be derived from agricultural, food, and/or yard trimmings. The product shall contain no substances toxic to plants and shall be reasonably free (less than 1 percent by dry weight) of man-made foreign matter. The compost will possess no objectionable odors and shall not resemble the raw material from which it was derived. Compost shall have a pH between 5.5 pH and 8.0 pH

APPENDIX D

FIGURES

Proposed Site Layout
Proposed "Haul Route"



TN & Associates, Inc.
Engineering and Science

FIGURE 1
PROPOSED SITE LAYOUT

IR SITE 08 - NUSC DISPOSAL AREA
NAVAL WARFARE CENTER
MIDDLETON, RI

FILE NAME: NEWPORT.DWG

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FIGURE 2
HAUL ROUTE

IR SITE 08 - NUSC DISPOSAL AREA
NAVAL WARFARE CENTER
MIDDLETON, RI

FILE NAME: NUWC_ROUTE.DWG

APPENDIX E

SAMPLING AND ANALYSIS PLAN
(FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN)

SAMPLING AND ANALYSIS PLAN
(FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN)

INSTALLATION RESTORATION SITE 08 – NUSC DISPOSAL AREA
NAVAL UNDERSEA WARFARE CENTER
MIDDLETOWN, RHODE ISLAND

Contract Number N62472-01-D-0807
Task Order 0006

Prepared for:

U.S. Department of the Navy
EFA Northeast
Naval Facilities Engineering Command
10 Industrial Highway
Lester, Pennsylvania 19113-2090

May 2005

Prepared by:

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Tables

ACRONYMS AND ABBREVIATIONS

A2LA	American Association for Laboratory Accreditation
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, xylenes
°C	Degrees Celsius
c.y.	Cubic yard
CAP	Corrective Action Plan
CBCPH	Construction Battalion Center Port Hueneme
cc	Cubic centimeter
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
cm/sec	Centimeters per second
COPC	Chemicals of potential concern
CPR	Cardiopulmonary resuscitation
CTO	Contract task order
DHS	Department of Health Services
DQA	Data quality assessment
DON	Department of the Navy
DQO	Data quality objective
DTW	Depth to water
EDD	Electronic data deliverable
EE/CA	Engineering evaluation/cost analysis
ELAP	Environmental Laboratory Accreditation Program
EMAC	Environmental Multiple Award Contract
EPA	U.S. Environmental Protection Agency
FS	Feasibility study
FSP	Field sampling plan
FTL	Field team leader
GC/MS	Gas chromatograph/mass spectrometer
HSP	Health and safety plan
ID	Identification
IDL	Instrument detection limit
IDW	Investigation-derived waste
IR	Installation restoration
IRP	Installation Restoration Program
IWL	Industrial wastewater line
IWTP	Industrial wastewater treatment plant
LARWQCB	Los Angeles Regional Water Quality Control Board
LCS	Laboratory control spike
LIMS	Laboratory information management system

ACRONYMS AND ABBREVIATIONS (Continued)

MCAWW	Methods for Chemical Analysis of Water and Waste
MDL	Method detection limit
MTBE	Methyl tert-butyl ether
MS	Matrix spike
MSD	Matrix spike duplicate
MSR	Monthly status report
NAS	Naval Air Station
NCTC	Naval Construction Training Center
NEDTS	Navy Environmental Data Transfer Standards
NEX	Naval Exchange
NFESC	Naval Facilities Engineering Service Center
OD	Outer diameter
OHSC	On-site health and safety coordinator
OSHA	Occupational Safety and Health Administration
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PE	Performance evaluation
PPE	Personal protective equipment
PRRL	Project-required reporting limit
QA	Quality assurance
QA/QC	Quality assurance and quality control
QAO	Quality assurance officer
QAPP	Quality assurance project plan
QC	Quality control
QCSR	Quality control summary report
RAOs	Remedial Action Objectives
RI	Remedial investigation
RPD	Relative percent difference
RPM	Remedial project manager
SDG	Sample delivery group
SI	Site inspection
SOP	Standard operating procedure
SOW	Statement of work
SQL	Sample quantitation limit
SWDIV	Naval Facilities Engineering Command Southwest Division
TN&A	T N & Associates, Inc.
TSA	Technical systems audit
UST	Underground storage tank
VOCs	Volatile organic compounds

1.0 PROJECT DESCRIPTION AND MANAGEMENT

T N & Associates Inc. (TN&A) has received delivery order (DO) 0006 from the Department of the Navy, Engineering Field Activity (EFA), Northeast, Naval Facilities Engineering Command, under the Environmental Multiple Award Contract (EMAC), Contract No. N62472-01-D-0807. TN&A has prepared this Sampling and Analysis Plan (SAP) consisting of Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) under DO 0006 for the excavation, transportation, and disposal of contaminated soils and debris at the Installation Restoration Site 08, NUSC Disposal Area of the Navel Undersea Warfare Center located in Middletown, Rhode Island.

Table 1 demonstrates how this SAP addresses all QAPP elements currently required by the U.S. Environmental Protection Agency (EPA) QA/R-5 guidance document (EPA 2001).

1.1 PROBLEM DEFINITION AND BACKGROUND

This section describes the following:

- Purpose of the Investigation (Section 1.1.1)
- Facility Background (Section 1.1.2)
- Project Site Background (Section 1.1.3)
- Principal Decision Makers (Section 1.1.4)
- Technical or Regulatory Standards (Section 1.1.5)

1.1.1 Purpose of the Remedial Action

TN&A is subcontracted to provide for the excavation, transportation, and disposal activities of contaminated soil and drum removal actions at Installation Restoration Site 08, the NUSC Disposal Area. Two potential contamination source areas named the Buried Drum Area and the Buried Metal Container Area within the NUSC Disposal Area will be excavated and removed from the site, and the removal areas will be graded and seeded. This removal action will include:

- Excavation of the areas, segregating the drums, soil and soil/debris into no larger than 50-cubic yard stockpiles or smaller of like materials,
- Characterization of each drum and stockpile,
- Loading, transportation, and disposal of each drum and stockpile,
- Site Cleanup and Site Restoration.

1.1.1.1 Buried Drum Area

A corroded 55-gallon drum containing a tar-like substance was removed and disposed of off site from Test Pit 02 (TP02). The drum was located approximately 6 feet below the ground surface. Two additional drums were observed in the test pit but not removed. The total number of drums remaining is unknown. TCE was also found in soil gas at this area, although only low concentrations of TCE were detected in soils and groundwater in this area.

1.1.1.2 Buried Metal Container Area

A large number of what appear to be deteriorated aerosol paint cans and related debris in the stream embankment in the south west portion of the site, confirmed through test pit 14 (TP14) excavations in this area. Elevated concentrations of lead were found co-located with these containers. The horizontal extent of the buried metal containers is unknown, but the vertical extent is anticipated to be less than 8 feet below ground surface.

1.1.2 Facility Background

The Naval Undersea Warfare Center (NUWC) is located in Middletown, Rhode Island adjacent to the Naval Station Newport. The facility is involved with under sea warfare systems, specifically torpedoes, among other things. The NUSC storage area has been used to store used oils and materials generated during the testing of torpedo engines and propellant systems.

1.1.3 Project Site Background

The NUSC Disposal Area occupies approximately 8 acres north of Building 185 and Cunningham Street. The Wanumetonomy Golf & Country Club borders the site to the north. Building No. 185, consisting of a series of four open-sided, covered sheds, with 2-foot concrete berms are considered the southeastern extent of the site. These sheds are used for the storage of drummed oils and torpedo propellants. A small stream, termed Deerfield Creek, and the surrounding wetlands make up the southwestern site boundary. The NUSC Disposal Area extends west-northwest to the small pond known as “Deerfield Pond” or “NUWC Pond.” Major transportation routes are State Routes 138 and 114, west and north.

The uplands portions were used as a fill area and storage areas since the Navy developed the area in the early 1950’s. Currently there is a secured storage area and open storage area (both paved – approximately 2.3 acres) as well as open fields (1.6 acres) and brush covered areas (4.2 acres). The storage areas are used by NUWC for the temporary storage of large equipment.

Site topography is highly variable, with topographic relief of approximately 33 feet from the northern to the southern portions of the site. Elevations range from approximately 58 feet at the southeast corner of the study area to 25 feet, which were the measured elevations for the pond water at the north end of the study area.

There is limited available historical information on the NUSC Disposal Area. The site is reported to have been used for the disposal of scrap lumber, tires, wire, cable, and empty paint cans for an unspecified period of time between the 1950's and 1988. Possible chemical hazards may include VOCs and heavy metals from paint residues, as well as methane produced from the natural decomposition of organic materials.

A Study Area Screening Evaluation (SASE) for the NUSC Disposal Area was conducted in June-November 2003. The SASE found some areas where elevated VOCs were present, and these, along with other target areas were investigated with a series of test pits, soil borings, and groundwater monitoring wells. Chlorinated solvents trichloroethene (TCE) and tetrachloroethene (PCE) were found in groundwater at the north (downgradient) end of the site. TCE was also found in soil gas in the central portion of the site, near buried drums (Buried Drum Area), although only low concentrations of TCE were detected in soils and groundwater in this area.

Other findings included a large number of buried deteriorated metal containers that are possibly empty aerosol paint cans in the stream embankment in the south west portion of the site (Buried Metal Container Area), confirmed through test pit excavation in this area. Elevated concentrations of lead were found co-located with these containers and in the stream sediments downstream as far as the NUWC pond.

Additional information for the NUSC Disposal Area including its history, investigation activities, soil samples, cross sections, investigation findings, limited chemical analysis of soils, and other pertinent information is described in the Study Area Screening Evaluation Report, (TtNUS, April 2004).

1.1.4 Principal Decision Makers

Principal decision makers are the Navy, regulatory agencies, and disposal facilities operators. Data will be used to obtain the data necessary to determine how to safely and efficiently package, transport and properly dispose of the wastes.

1.1.5 Technical or Regulatory Standards

Specific regulatory action levels established at NUSC Disposal Area include the Rhode Island Department of Environmental Management (RIDEM) Direct Exposure Criteria for residential use soils (DEM DSR-01-93) and the Maximum Concentration of Contaminants for Toxicity Characteristics (40 CFR §261.24).

Project-required reporting limits (PRRLs) were compared to the regulator action limits to assure that PRRLs are sufficiently low to meet this project DQOs. The list of regulatory action levels and the laboratory Project Detection Limits (PDLs) are listed for RIDEM Direct Exposure Criteria (Table 2) and for the Maximum Concentration of Contaminants (Table 3).

1.2 PROJECT DESCRIPTION

As stated in Section 1.1.1, the objectives of field activities at NUSC Disposal Area are to excavate and remove contaminated soils and drums from the site. In order to meet these objectives, the major work activities and technical approaches are described in Section 3.0 of the project Work Plan.

1.3 QUALITY OBJECTIVES AND CRITERIA

The following sections present the data quality objectives (DQOs) and quality assurance (QA) objectives identified for the proposed field activities at NUSC Disposal Area.

1.3.1 Data Quality Objectives

Data Quality Objectives (DQOs) are statements that specify the quantity and quality of the data required to support project decisions. DQOs were developed for this project using the seven-step process listed in *Data Quality Objectives Process for Hazardous Waste Site Investigations* (EPA, 2000). The DQOs are presented in Table 4. The QC procedures as well as the associated field sampling procedures for this project will be focused on achieving these DQOs in a timely, cost-effective, and safe manner. Deviations from the DQOs will require defining the cause or causes for noncompliance and will initiate the process of determining whether additional sampling and analyses will be required to attain project goals.

1.3.2 Project Quality Assurance Objectives

All analytical results will be evaluated in accordance with precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters to ensure the attainment of project specific DQOs. Of these PARCC parameters, precision and accuracy will be evaluated quantitatively through the

collection of the quality control (QC) samples listed in Table 5. Precision and accuracy goals for these QC samples are listed in the subcontract laboratory Quality Assurance Plan, which can be furnished under separate cover, if required. The subsections below detail the objectives relating to each of the PARCC parameters.

1.3.2.1 Precision

Precision is a measure of the reproducibility among a set of replicate results or the agreement among repeat observations made under the same conditions. *Analytical* precision is the measurement of the variability associated with duplicate or replicate analyses. *Total* precision is the measurement of the variability associated with the entire sampling and analysis process. It is determined by analysis of duplicate field samples and measures variability introduced by both the laboratory and field operations. Field duplicate samples and matrix duplicate spiked samples will be analyzed to assess field and analytical precision. The precision measurement is determined using the relative percent difference (RPD) between the duplicate sample results. The RPD is calculated according to the following formula:

where: A = first duplicate concentration
B = second duplicate concentration

$$RPD = \frac{|A - B|}{(A + B)/2} \times 100\%$$

For this project the parameters evaluated to assess precision are duplicate samples, and matrix spike/matrix spike duplicate (MS/MSD) samples.

For this project, project-specific field duplicates and MS/MSD samples will be not collected for the backfill, excavated soil, and drum contents media. The laboratory QAPP presents precision goals for required analyses based on %RPD for extraction batch MS/MSD. The precision acceptability limits for duplicate samples are 35% RPD for all soil analyses.

1.3.2.2 Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. A program of sample spiking will be conducted to evaluate laboratory accuracy. This program consists of the MS and MSD samples, laboratory control spikes (LCS) or blank spikes, and surrogate standards. The results of the spiked samples are used to calculate the percent recovery for evaluating accuracy according to the following formula:

$$\text{Percent Recovery} = \frac{S - C}{T} \times 100$$

where S = Measured spike sample concentration

C = Sample concentration

T = True or actual concentration of the spike

MS and MSD samples will be prepared and analyzed at a frequency of 5 % for samples. LCS or spike blanks are also analyzed at a frequency of 5%, when MS and MSD samples are not available. Surrogate standards are added to every sample analyzed for organic constituents.

The laboratory Quality Assurance plan presents accuracy goals for the samples based on the percent recovery of matrix spike, laboratory control, and surrogate spike samples. Results that fall outside the accuracy goals will be further evaluated on the basis of other QC samples.

1.3.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point, or an environmental condition that they are intended to represent. For this project, representative data will be obtained through careful selection of sampling locations and analytical parameters. Representative data will also be obtained through proper collection and handling of samples to avoid interference and minimize contamination.

Representativeness of data will also be ensured through established field and laboratory procedures and their consistent application. To aid in evaluating of the representativeness of the sample results, field and laboratory blank samples, and background samples will be evaluated for the presence of contaminants. Data determined to be non-representative, by comparison with existing data, will be used only if accompanied by appropriate qualifiers and limits of uncertainty.

1.3.2.4 Completeness

Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with QC procedures outlined in this SAP, and when none of the QC criteria that affect data usability are exceeded. When all data validation is

completed, the percent completeness value will be calculated by dividing the number of useable sample results by the total number of sample results planned for this investigation.

As discussed further in Section 4.2, completeness will also be evaluated as part of the data quality assessment process (EPA, 2000c). This evaluation will help determine whether any limitations are associated with the decisions to be made based on the data collected.

1.3.2.5 Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability of data will be achieved by consistently following standard field and laboratory procedures and by using standard measurement units in reporting analytical data. Analytical methods selected for each of the project sites are consistent with the methods used during previous projects at these sites.

1.3.2.6 Detection and Quantitation Limits

The method detection limit (MDL) is the minimum concentration of an analyte that can be reliably distinguished from background noise for a specific analytical method. The quantitation limit represents the lowest concentration of an analyte that can be accurately and reproducibly quantified in a given sample matrix. PRRLs are contractually specified maximum quantitation limits for a sample matrix and are typically several times the MDL to allow for matrix effects. PRRLs are set liberally to establish minimum criteria for laboratory performance; actual laboratory quantitation limits may be substantially lower.

Tables 2 and 3 contain a comparison of the PRRLs for the selected analytical methods in comparison to the previous detection limits (PDLs). The purpose of this comparison is to show that the selected analytical methods, and associated PRRLs, are capable of quantifying contaminants of potential concern at or below the applicable action level. In comparing the PRRLs to PDLs, however, it is important to note that actual laboratory quantitation limits may be lower than PRRLs and that estimates of analyte concentrations down to MDLs can typically be provided in order to allow comparisons to screening levels that are below PRRLs.

Analytical results may be reported as estimated values if concentrations are less than PRRLs, but greater than MDLs. The MDL for each analyte will be listed as the detection limit in the laboratory's electronic data deliverable (EDD). This procedure is being adopted to help ensure that effective comparisons of analyte results to regulatory limits can be performed for certain compounds where the PRRL is near or below the regulatory limit and to ensure that subsequent evaluations of the data will not be biased by high-value nondetect results.

1.4 PROJECT ORGANIZATION

Section 2.0 of the project Work Plan presents the responsibilities and contact information for key personnel involved in removal actions at NUSC Disposal Area. In some cases, more than one responsibility has been assigned to a person. Additionally, project chemistry responsibilities are shown in Table 6.

1.5 SPECIAL TRAINING AND CERTIFICATION

This section outlines the training and certification required to complete the activities described in this SAP. The following sections describe the requirements for TN&A and subcontractor personnel working on site.

1.5.1 Field Work Training

Field team members will be adequately trained in field methods and sampling procedures outlined in this plan and following TN&A's SOP (Appendix A of the project Work Plan). Specifically, field team members will have training in the following field activities:

- Soil and waste material sampling, sample handling, packaging, and shipping,
- Use of related field equipment, and
- Handling of IDW.

Training will be provided by the field team leader that is required to have a minimum of 3 years of direct field experience with groundwater sampling, sample handling, sample packaging and sample shipping, field equipment operation, and handling of hazardous and non-hazardous waste.

1.5.2 Health and Safety Training

TN&A personnel who work at hazardous waste project sites are required to meet the Occupational Safety and Health Administration (OSHA) training requirements defined in Title 29 Code of Federal Regulations

(29 CFR §1910.120(e)). These requirements are: (1) 40 hours of formal off-site instruction; (2) a minimum of 3 days of actual on-site field experience under the supervision of a trained and experienced field supervisor; and (3) 8 hours of annual refresher training.

Field personnel who directly supervise employees engaged in hazardous waste operations also receive at least 8 additional hours of specialized supervisor training. The supervisor training covers EMAC health and safety program requirements, training requirements, personal protective equipment (PPE) requirements, spill containment program, and health-hazard monitoring procedures and techniques. At least one member of every TN&A field team will maintain current certification in the American Red Cross "Multimedia First Aid" and "Cardiopulmonary Resuscitation (CPR) Modular," or equivalent.

Copies of TN&A's health and safety training records, including course completion certifications for the initial and refresher health and safety training, specialized supervisor training, and first aid and CPR training, are maintained in project files and will be included in the Health and Safety Plan, which will be onsite at all times while work is being done.

Before work begins at a specific hazardous waste project site, TN&A personnel are required to undergo site-specific training that thoroughly covers the following areas:

- Names of personnel and alternates responsible for health and safety at a hazardous waste project site,
- Health and safety hazards present on site,
- Selection of the appropriate personal protection levels,
- Correct use of PPE,
- Work practices to minimize risks from hazards,
- Safe use of engineering controls and equipment on site,
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazardous substances, and
- Contents of the basewide health and safety plan (HSP).

1.6 DOCUMENTS AND RECORDS

Documentation is critical for evaluating the success of any environmental data collection activity. The following sections discuss the requirements for documenting field activities and for preparing laboratory data packages.

1.6.1 Field Logbook

Complete and accurate documentation is essential to demonstrate that field measurement and sampling procedures are carried out as described in the SAP. Field personnel will use permanently bound field logbooks with sequentially numbered pages to record and document field activities. The logbook will list the contract name and number, the DO number, the project name and number, the site name and location, and the names of subcontractors, the service client, and the project manager. At a minimum, the following information will be recorded in the field logbook:

- Name and affiliation of all on-site personnel or visitors,
- Weather conditions during the field activity,
- Summary of daily activities and significant events,
- Information regarding sample collection including collection date and time, sample ID, sample location, sample matrix (e.g., water or soil), sample type (e.g., regular, duplicate, blank, grab, composite), and sampling depth,
- Notes of conversations with coordinating officials,
- References to other field logbooks or forms that contain specific information,
- Discussions of problems encountered and their resolution,
- Discussions of deviations from the SAP or other governing documents, and
- Description of all photographs taken.

Changes or corrections will be made by crossing out the item with a single line, initiating by the person performing the correction, and dating the correction. The original item, although erroneous, will remain legible beneath the cross-out. The new information will be written above the crossed-out item. Corrections will be written clearly and legibly with indelible ink.

1.6.2 Summary Data Package

Laboratory subcontractors will prepare summary data packages in accordance with the instructions provided in the EPA Contract Laboratory Program (CLP) statements of work (SOW) (EPA, 1999a, 2000a). The summary data package will consist of a case narrative, copies of all associated chain-of-custody forms, sample results, and quality assurance and quality control (QA/QC) summaries. The case narrative will provide the following information:

- Subcontractor name, project name, CTO number, project order number, sample delivery group (SDG) number, and a table that cross-references client and laboratory sample identification numbers (ID)

- Detailed documentation of all sample shipping and receiving, preparation, analytical, and quality deficiencies, including analyses performed without an American Association for Laboratory Accreditation (A2LA)-certified standard
- Thorough explanation of all instances of manual integration
- Carbon ranges for TPH for all samples, as needed
- Copies of all associated nonconformance and corrective action forms that will describe the nature of the deficiency and the corrective action taken
- Copies of all associated sample receipt notices

Additional summary data package requirements are outlined in Table 7. The laboratory subcontractor will provide TN&A with two copies of the summary data package within 21 calendar days after they receive the samples.

1.6.3 Full Data Package

Full data package are not anticipated for this effort.

1.6.4 Electronic Data Deliverables Format

EDDs are required for all analytical results. An automated laboratory information management system (LIMS) must be used to produce the EDD. Manual creation of the deliverable (data entry by hand) is unacceptable. The laboratory will verify EDDs internally before they are issued. The EDD will correspond exactly to the hard-copy data. No duplicate data will be submitted. Results that should be provided in all EDDs are as follows:

- Target analyte results for each sample and associated analytical methods requested on the chain-of-custody form,
- Method and instrument blanks and preparation and calibration blank results reported for the SDG,
- Percent recoveries for the spike compounds in the MS, MSDs, blank spikes, or LCSs, and
- Matrix duplicate results reported for the SDG.

Electronic and hard copy data must be retained for a minimum of 3 and 7 years, respectively, after final data have been submitted. The subcontractor will use an electronic storage device capable of recording data for long-term, off-line storage. Raw data will be retained on an electronic data archival system.

2.0 DATA GENERATION AND ACQUISITION

This section describes the requirements for the following:

- Sampling Process Design (Section 2.1)
- Sample Collection Methodology (Section 2.2)
- Sample Handling and Custody (Section 2.3)
- Analytical Methods (Section 2.4)
- Quality Control (Section 2.5)
- Equipment Testing, Inspection, and Maintenance (Section 2.6)
- Instrument Calibration and Frequency (Section 2.7)
- Inspection and Acceptance of Supplies and Consumables (Section 2.8)
- Non-Direct Measurements (Section 2.9)
- Data Management (Section 2.10)

2.1 SAMPLING PROCESS DESIGN

The following subsections present the proposed sample locations and planned chemical analyses. Sample IDs, estimated sample depth, and rationale for selecting sampling locations are presented in Table 8. The proposed analyses, analytical methods, and QC samples for samples collected at all the project sites are summarized Table 9.

2.1.1 Clean Fill and Topsoil

All fill and topsoil materials brought to the site must be "certified" to be clean and free from contamination exceeding the RIDEM Direct Exposure Criteria for residential use soils (DEM DSR-01-93, amended February 2004, Section 8.02). The latest version of the RIDEM Direct Exposure Criteria (February 2004) can be located in Appendix B of the project Work Plan. In addition, offsite soils shall not contain more than 100 ppm total petroleum hydrocarbons and less than 10 ppm of the sum of benzene, toluene, ethylbenzene and xylenes. Analytical results will be submitted to the Navy Representative prior to use as a backfill or topsoil.

2.1.2 Drums

Drums removed from the "Buried Drum Area" that contain material will be individually sampled to obtain the data necessary to determine how to safely and efficiently package, transport and properly dispose of the wastes. Liquid contents or solid and semi-solid materials will be tested for hazardous

characteristics and other disposal facility specific requirements. Analytical results will be submitted with waste characteristic profiles to an approved facility for ultimate disposal.

2.1.3 Soils and Debris

Soils and debris samples will be collected from materials staged in piles not exceeding 50 cubic yards. The goal of the soil and debris characterization and analysis is to obtain the data necessary to determine how to safely and efficiently package, transport and properly dispose of the wastes. Analytical results will be submitted with waste characteristic profiles to an approved facility for ultimate disposal.

2.2 SAMPLE COLLECTION METHODOLOGY

This section describes the procedures for sample collection, including sampling methods and equipment, sample preservation requirements, decontamination procedures, and management of investigation derived waste.

The appropriate sample containers, holding times, and preservation methods associated with VOC analysis method are listed in Table 10. The analytes, reporting limits, and screening levels required for groundwater samples are listed in Tables 2 and 3.

2.2.1 Clean Fill and Topsoil

A single grab sample will be collected from each source of backfill material following TNA SOP006B Surface Soil Sampling.

The material will be collected using a clean stainless-steel spoon and placed into a stainless steel mixing bowl. The contents will be mixed and transferred to the laboratory supplied sampling containers. VOC samples will be collected directly into EnCore™ sampling devices.

2.2.2 Drum Sampling

Drums removed from the "Buried Drum Area" that contain material will be sampled individually following TNA SOP012B Drum Sampling (Work Plan Appendix A).

2.2.2.1 Solid Waste

Sample aliquots of compatible drummed material should be taken from several locations and depths from within several drums, using the appropriate tools. Any solid drummed waste that is not compatible will be sampled separately with other compatible material. These compatible samples should then be placed into

a decontaminated stainless steel bowl, and homogenized using stainless steel spoons and/or trowels. Transfer the homogenized material to the appropriate sampling containers/jars supplied by the laboratory. The sources of each homogenized soil sample will be recorded in the field logbook.

2.2.2.2 Liquid Waste

Liquid samples will be composites generated by inserting a drum thief or COLIWASA tube into each drum and obtaining a representative sample of the drummed liquid. The representative sample is obtained by allowing both ends of the drum thief or COLIWASA to be open when inserting into the drum. Using a gloved hand, place thumb over up end of tube and withdraw, discharge tube contents to appropriate sample containers. Liquid wastes that are deemed compatible will be sampled together. Volatile organic compound samples will be collected first. For these samples it is important to limit volatilization while collecting sample aliquots, so these samples should be added to a clean screw top container. The lid of the container should only be removed when sample aliquot is being added to the jar and then replaced while collecting additional sample. All of the other compatible composite samples will then be homogenized in a decontaminated stainless steel bowl with a stainless steel spoon or trowel. The homogenized sample will then be evenly distributed into the appropriate sampling containers and/or jars as supplied by the laboratory. The sources of each composite sample will be recorded in the field logbook.

2.2.3 Soil and Debris Sampling

A single grab sample will be collected from each segregated pile following TNA SOP006B Surface Soil Sampling. In addition to the SOP procedures, each 50-yd excavation pile will be divided into 4 quadrants and one 4-point composite sample will be collected from each stockpile. Composite samples will be collected from each quadrant and one overall composite sample, representative of the stockpile, will be prepared from the individual quadrant samples.

The material will be collected using a clean stainless-steel spoon and placed into a stainless steel mixing bowl. The contents will be mixed and transferred to the laboratory supplied sampling containers. VOC samples will be collected directly into EnCore™ sampling devices.

2.2.4 Decontamination

Decontamination of the sampling equipment will follow general practices described in Section 3.1.5 of the project Work Plan.

2.2.5 Sample Containers and Holding Times

The type of sample containers to be used for VOC analysis, the sample volumes required, the preservation requirements, and the maximum holding times for sample extraction and analysis are presented in Table 10.

2.3 SAMPLE HANDLING AND CUSTODY

The following subsections describe sample handling procedures, including sample identification and labeling, documentation, chain-of-custody, and shipping.

2.3.1 Sample Identification

Each sample collected will be given unique sample identification (ID). The sample ID is project specific and a record of all sample IDs will be kept with the field records and recorded on a chain of custody form. The labeling scheme for sample identification will remain consistent with previous sampling events and will consist of site number and a sequential sample number (i.e., Site08-25). Sample IDs are listed in Table 8.

2.3.2 Sample Labels

A sample label will be affixed to all sample containers. The label will be completed with the following information written in indelible ink:

- Project name and location
- Sample identification number
- Date and time of sample collection
- Preservative used
- Sample collector's initials
- Analysis required

After labeling, each sample will be placed in a cooler that contains ice to maintain the sample temperature at 4±2 degrees Celsius (ºC).

2.3.3 Sample Documentation

Documentation during sampling is essential to ensure proper sample identification. TN&A personnel will adhere to the following general guidelines for maintaining field documentation:

- Documentation will be completed in permanent black ink

- All entries will be legible
- Errors will be corrected by crossing out with a single line and then dating and initialing the lineout
- Any serialized documents will be maintained at TN&A and referenced in the site logbook
- Unused portions of pages will be crossed out, and each page will be signed and dated

Section 1.6.1 provides additional information on how TN&A will use logbooks to document field activities. The TN&A field team leader (FTL) is responsible for ensuring that sampling activities are properly documented.

2.3.4 Chain of Custody

TN&A will use standard sample custody procedures to maintain and document sample integrity during collection, transportation, storage, and analysis. A sample will be considered to be in custody if one of the following statements applies:

- It is in a person's physical possession or view.
- It is in a secure area with restricted access.
- It is placed in a container and secured with an official seal such that the sample cannot be reached without breaking the seal.

Chain-of-custody procedures provide an accurate written record that traces the possession of individual samples from the time of collection in the field to the time of acceptance at the laboratory. The chain-of-custody record also will be used to document all samples collected and the analysis requested. The field personnel will record the following information on the chain-of-custody record:

- Project name and number
- Sampling location
- Name and signature of sampler
- Destination of samples (laboratory name)
- Sample identification number
- Date and time of collection
- Number and type of containers filled
- Analysis requested

- Preservatives used (if applicable)
- Filtering (if applicable)
- Sample designation (grab or composite)
- Signatures of individuals involved in custody transfer, including the date and time of transfer
- Airbill number (if applicable)
- Project contact and phone number

Unused lines on the chain-of-custody record will be crossed out. Chain-of-custody records that are initiated in the field will be signed by field personnel and the airbill number will be recorded. The record will be placed in a waterproof plastic bag and taped to the inside of the shipping container used to transport the samples. Signed airbills will serve as evidence of custody transfer between field personnel and the courier, and between the courier and the laboratory. Copies of the chain-of-custody record and the airbill will be retained and filed by field personnel before the containers are shipped.

Laboratory chain of custody begins with sample receipt and continues until samples are discarded. Laboratories analyzing samples on the EMAC contract must follow custody procedures at least as stringent as are required by the EPA CLP SOWs (EPA 1999a, 2000a). The laboratory should designate a specific individual as the sample custodian. The custodian will receive all incoming samples, sign the accompanying custody forms, and retain copies of the forms as permanent records. The laboratory sample custodian will record all pertinent information concerning the samples, including the persons delivering the samples, the date and time received, sample condition at the time of receipt (sealed, unsealed, or broken container; temperature; or other relevant remarks), the sample identification numbers, and any unique laboratory identification numbers for the samples. This information should be entered into a computerized LIMS. Once the sample transfer process is complete, the custodian is responsible for maintaining internal logbooks, tracking reports, and other records necessary to maintain custody throughout sample preparation and analysis.

The laboratory will provide a secure storage area for all samples. Access to this area will be restricted to authorized personnel. The custodian will ensure that samples requiring special handling, including samples that are heat- or light-sensitive, radioactive, or have other unusual physical characteristics, will be properly stored and maintained prior to analysis.

2.3.5 Sample Shipment

The following procedures will be implemented when shipping groundwater and water samples (field blanks) collected during this project:

- The cooler will be filled with bubble wrap, sample bottles, and packing material. Sufficient packing material will be used to prevent sample containers from breaking during shipment. Enough ice will be added to maintain the sample temperature at 4±2°C.
- The chain-of-custody records will be placed inside a plastic bag. The bag will be sealed and taped to the inside of the cooler lid. The air bill, if required, will be filled out before the samples are handed over to the carrier. The laboratory will be notified if the sampler suspects that the sample contains any substance that would require laboratory personnel to take safety precautions.
- The cooler will be closed and taped shut with strapping tape around both ends. If the cooler has a drain, it will be taped shut both inside and outside of the cooler.
- Signed and dated custody seals will be placed on the front and side of each cooler. Wide clear tape will be placed over the seals to prevent accidental breakage.
- The chain-of-custody record will be transported within the taped sealed cooler. When the cooler is received at the analytical laboratory, laboratory personnel will open the cooler and sign the chain-of-custody record to document transfer of samples.

Multiple coolers may be sent in one shipment to the laboratory. The outside of the coolers will be marked to indicate the number of coolers in the shipment.

2.4 ANALYTICAL METHODS

Table 10 presents the analytical methods that will be used to analyze samples collected during the field activities at NUSC Disposal Area, and the laboratory Quality Assurance pland presents the project QA objectives and control limits for sample analyses established as part of the DQO process (Section 1.3). Tables 2 and 3 presents the individual target analytes required for this investigation and their associated PRRLs. The analytical laboratories will attempt to achieve the PRRLs for all the investigative samples collected. If problems occur in achieving the PRRLs, the laboratories will contact the TN&A project chemist immediately and other alternatives will be pursued (such as analyzing an undiluted aliquot and allowing nontarget compound peaks to go off-scale) to achieve acceptable reporting limits. In addition, results below the reporting limit but above the MDL will be reported with appropriate flags to indicate the greater uncertainty associated with these values.

2.4.1 Project Analytical Requirements

The analytical method selected for the CBCPH investigation is a standard EPA method that is described

in TN&A's laboratory SOW (TN&A, 2004). Proposed method SW 846 8260B for analyzing VOCs is from EPA's SW–846 "Test Methods for Evaluating Solid Waste" (EPA, 1996).

This SAP documents project-specific QC requirements for the selected analytical method. Sample volume, preservation, and holding time requirements are specified in Table 10.

2.5 QUALITY CONTROL

TN&A will assess the quality of field data through regular collection and analysis of field QC samples. Laboratory QC samples will also be analyzed in accordance with referenced analytical method protocols to ensure that laboratory procedures and analyses are conducted properly and that the quality of the data is known.

2.5.1 Field Quality Control Samples

QC samples are collected in the field and analyzed to check sampling and analytical precision, accuracy, and representativeness. The following section discusses the types and purposes of field QC samples that will be collected for this project. Table 5 provides a summary of the types and frequency of collection of field QC samples.

2.5.1.1 Field Duplicates

Field duplicate samples are collected at the same time and from the same source and then submitted as separate samples to the laboratory for analysis. The main purpose of field duplicate analysis is to measure the consistency of field sampling procedures; however, the results are also affected by precision of the laboratory operations. Field duplicates will be collected at a frequency of 10 percent for groundwater samples. Both samples will be assigned a unique sample identification number that is blind to the laboratory.

2.5.1.2 Matrix Spike and Matrix Spike Duplicates

MS/MSD samples require the collection of an additional volume of material for laboratory spiking and analysis. MS/MSD samples will be collected at a frequency of 5 percent. Matrix spike samples measure the efficiency of all the steps in the analytical method in recovering target analytes from an environmental matrix. The percent recoveries will be calculated for each of the spiked analytes and used to evaluate analytical accuracy. The RPD between spiked samples will be calculated to evaluate precision.

2.5.1.3 Trip Blanks

Contamination can be introduced from many external sources during collection of field samples. A trip blank is intended to assess potential external sources of contamination introduced during sample shipping and handling procedures and if cross-contamination in the form of volatile organic migration occurs between the collected samples. Trip blanks are applicable field QC blanks for analyses of volatile organics, which for this project include VOCs (by SW 846 Method 8260B).

Trip blanks are prepared by the laboratory using analytically certified, organic-free, high performance liquid chromatography-grade water or equivalent. Trip blanks are shipped to the field site and remain unopened. These blanks are packed and sealed in the manner described for the environmental samples. A separate sample number and station number will be assigned to each sample, and it will be submitted blind to the laboratory. A minimum of one trip blank with every shipment of groundwater samples for VOCs analyses will be submitted to the laboratory for analysis.

If any contaminant is present in the blank samples above the MDL, the result for associated field samples that contain the same contaminant will be qualified as potentially not detected if the concentration of the field sample is less than five times the concentration found in the blank. The same criterion applies to the presence of the following common laboratory contaminants when they are present in the associated field sample at less than 10 times the concentration found in the blank sample: methylene chloride, acetone, 2-butanone, and phthalate esters.

2.5.1.4 Equipment Rinsate Samples

Equipment rinsate samples demonstrate whether decontamination procedures are effective in removing contaminants from the field sampling equipment. The presence of contamination in equipment rinsate samples indicates that cleaning procedures were not effective, allowing for the possibility of cross-contamination. Equipment rinsate samples will be collected at a frequency of once per sampling day per sampling equipment. An equipment rinsate is a sample collected after a sampling device is subjected to standard decontamination procedures. Water will be poured over or through the sampling equipment into a sample container and sent to the laboratory for analysis. Analytically certified, organic-free, high performance liquid chromatography-grade water or equivalent will be used for organic parameters; deionized or distilled water will be used for inorganic parameters.

Equipment rinsate samples will be sent blind to the laboratory. During data validation, the results for the equipment rinsate samples will be used to qualify data or to evaluate the levels of analytes in the field

samples collected on the same day.

2.5.1.5 Source Blank Samples

Source-water blanks will be used to assess the potential for sample contamination from the source water. One source-water blank from each water source will be collected and analyzed for the target analytes.

2.5.2 Laboratory Quality Control Samples

Laboratory QC samples are prepared and analyzed at the laboratory to evaluate the effectiveness of sample preparation and analysis and to assess analytical precision and accuracy. The types of laboratory QC samples that will be used for this project are discussed in the following sections. Table 5 presents the required frequencies for laboratory QC samples.

2.5.2.1 Method Blanks

Method blanks are prepared to evaluate whether contamination is originating from the reagents used in sample handling, preparation, or analysis. They are critical in distinguishing between low-level field contamination and laboratory contamination. A method blank consists of laboratory analyte-free water and all of the reagents used in the analytical procedure. It is prepared for every analysis in the same manner as a field sample and is processed through all of the analytical steps. Method blanks will be prepared at the frequency prescribed in the individual analytical method or at a rate of 5 percent of the total samples if a frequency is not prescribed in the method.

2.5.2.2 Laboratory Control Samples or Blank Spikes

A laboratory control sample (LCS), or blank spike, originates in the laboratory as deionized or distilled water that has been spiked with standard reference materials of a known concentration. A LCS is analyzed to verify the accuracy of the calibration standards. These internal QC samples are also used to evaluate laboratory accuracy in the presence of matrix interference for field samples. LCSs are processed through the same analytical procedure as field samples. LCSs will be analyzed at the frequency prescribed in the analytical method or at a rate of 5 percent of the total samples if a frequency is not prescribed in the method. If percent recovery results for the LCS or blank spike are outside of the established goals, laboratory-specific protocols will be followed to gauge the usability of the data.

2.5.2.3 Surrogate Standards

Surrogates are chemical compounds with properties that mimic analytes of interest, but that are unlikely

to be found in environmental samples. Surrogates will be added to all field and quality control samples analyzed for organic compounds. The surrogate standard measures the efficiency the analytical method in recovering the target analytes from an environmental sample matrix. Percent recoveries for surrogate compounds are evaluated using laboratory control limits. Surrogate standards provide an indication of laboratory accuracy and matrix effects for every field and QC sample that is analyzed for volatile and extractable organic constituents. Surrogate compounds are used in the analysis of VOCs to monitor purge efficiency and analytical performance, whereas surrogates are used in the analysis of extractable organic compounds to monitor the extraction process and analytical performance.

Factors such as matrix interference and high concentrations of analytes may affect surrogate recoveries. The effects of the sample matrix are frequently outside the control of the laboratory and may present unique problems. Laboratory personnel are required to re-extract (when applicable) and re-analyze samples when associated surrogates are outside of control limits. Data from both analyses of the samples in question are reported.

During validation, data will be qualified as estimated for any result that fails to meet surrogate criteria. SVOC data will be qualified as estimated if two or more surrogates from each fraction (base/neutral and acid) are outside the control limits. The tables in the laboratory's Quality Assurance Plan provide the guidelines for surrogate recovery for analyses that are planned for this project.

2.5.2.4 Internal Standards

Similarly to the surrogate standard, internal standard is a chemical compound unlikely to be found in environmental samples that is added to each field and QC sample as a reference compounds for sample quantification. Internal standard procedures are used for the analysis of volatile organics and extractables organics using gas chromatography/mass spectrometry (GC/MS) and also can be used for other GC and high-performance liquid chromatography (HPLC) analytical methods. The purpose of applying internal standard analysis is to quantify target compounds and ensure that the analytical instrumentation sensitivity and response are stable during the analytical run. An internal standard is used to evaluate the efficiency of the sample introduction process and monitors the efficiency of the analytical procedure for each sample matrix encountered. Internal standards are also used in the analysis of organic compounds by GC to monitor retention-time shifts. Validation of internal standards data will be based on EPA protocols presented in guidelines for evaluating organic analyses (EPA 1999b).

2.6 EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

This section outlines the testing, inspection, and maintenance procedures that will be used to keep both field and laboratory equipment in good working condition.

2.6.1 Maintenance of Field Equipment

Preventive maintenance for most field equipment is carried out in accordance with procedures and schedules recommended in (1) the equipment manufacturer's literature or operating manual, or (2) SOPs that describe equipment operation associated with particular applications of the instrument. However, more stringent testing, inspection, and maintenance procedures and schedules may be required when field equipment is used to make critical measurements.

A field instrument that is out of order will be segregated, clearly marked, and not used until it is repaired. The field team leader will be notified of equipment malfunctions so that prompt service can be completed quickly or substitute equipment can be obtained. When equipment condition is suspect, unscheduled testing, inspection, and maintenance should be conducted. Any significant problems with field equipment will be reported in the daily field QC report.

2.6.2 Maintenance of Laboratory Equipment

Subcontractor laboratories will prepare and follow a maintenance schedule for each instrument used to analyze samples collected from CBCPH. All instruments will be serviced at scheduled intervals necessary to optimize factory specifications. Routine preventive maintenance and major repairs will be documented in a maintenance logbook.

An inventory of items to be kept ready for use in case of instrument failure will be maintained and restocked as needed. The list will identify equipment parts subject to frequent failure, parts that have a limited lifetime of optimum performance, and parts that cannot be obtained in a timely manner.

The laboratory's QA plan and written SOPs will describe specific preventive maintenance procedures for equipment maintained by the laboratory. These documents identify the personnel responsible for major, preventive, and daily maintenance procedures, the frequency and type of maintenance performed, and procedures for documenting maintenance activities.

Laboratory equipment malfunctions will require immediate corrective action. Actions should be documented in laboratory logbooks. No other formal documentation is required unless data quality is adversely affected or further corrective action is necessary. On-the-spot corrective actions will be taken as necessary in accordance with the procedures described in the laboratory QA plan and SOPs.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

The following sections discuss calibration procedures that will be followed to ensure the accuracy of measurements made using field and laboratory equipment.

2.7.1 Calibration of Field Equipment

Field equipment will be calibrated at the beginning of the field effort and at prescribed intervals. The calibration frequency depends on the type and stability of equipment, the intended use of the equipment, and the recommendation of the manufacturer. Detailed calibration procedures for field equipment are available from the specific manufacturers' instruction manuals, and general guidelines are included in TN&A's SOPs. All calibration information will be recorded in a field logbook or on field forms. A label that specifies the scheduled date of the next calibration will be attached to the field equipment. If this type of identification is not feasible, equipment calibration records will be readily available for reference.

2.7.2 Calibration of Laboratory Equipment

Laboratory equipment calibration procedures and frequencies will follow the requirements in the reference method in Section 2.4.2 of this SAP. Qualified analysts will calibrate laboratory equipment and document the procedures and results in a logbook.

The laboratory will obtain calibration standards from the EPA repository or commercial vendors for both inorganic and organic compounds and analytes. Stock solutions for surrogate parameters and other inorganic mixes will be made from reagent-grade chemicals or as specified in the analytical method. Stock standards will also be used to make intermediate standards that will be used to prepare calibration standards. Special attention will be paid to expiration dating, proper labeling, proper refrigeration, and freedom from contamination. Documentation on receipt, mixing, and use of standards will be recorded in the appropriate laboratory logbook. Logbooks must be permanently bound. Additional specific handling and documentation requirements for the use of standards may be provided in subcontractor laboratory QA plans.

2.8 INSPECTION AND ACCEPTANCE OF SUPPLIES AND CONSUMABLES

TN&A project manager have primary responsibility for identifying the types and quantities of supplies and consumables needed to complete EMAC projects and are also responsible for determining acceptance criteria for these items.

Supplies and consumables can be received either at a TN&A's office or at a work site. When supplies are received at an office, the project manager or field team leader will sort them according to vendor, check packing slips against purchase orders, and inspect the condition of all supplies before they are accepted for use on a project. If an item does not meet the acceptance criteria, deficiencies will be noted on the packing slip and purchase order and the item will then be returned to the vendor for replacement or repair.

Procedures for receiving supplies and consumables in the field are similar. When supplies are received, the TN&A project manager or field team leader will inspect all items against the acceptance criteria. Any deficiencies or problems will be noted in the field logbook, and deficient items will be returned for immediate replacement.

Analytical laboratories are required to provide certified clean containers for all analyses. These containers must meet EPA standards described in "Specifications and Guidance for Obtaining Contaminant-Free Sampling Containers" (EPA 1992).

2.9 NON-DIRECT MEASUREMENTS

No data for project implementation or decision-making were obtained from non-direct measurement sources.

2.10 DATA MANAGEMENT

Field and analytical data collected from this project and other environmental investigations at CBCPH project sites are critical to site characterization and monitoring efforts and implementation of remedial actions to protect human health and the environment. An information management system is necessary to ensure efficient access so that decisions based on the data can be made in a timely manner.

After the field and laboratory data reports are reviewed and validated, the data will be entered into TN&A's database for CBCPH. The database contains data for (1) summarizing observations on contamination and geologic conditions, (2) preparing reports and graphics, and (3) transmitting in an electronic format compatible with NEDTS. The following sections describe TN&A's data tracking procedures, data pathways, and overall data management strategy for CBCPH project sites.

2.10.1 Data-Tracking Procedures

All data that are generated in support of the EMAC program at CBCPH are tracked through a database created by TN&A. Information related to the receipt and delivery of samples, project order fulfillment,

and invoicing for laboratory and validation tasks is stored in the TN&A's database.

2.10.2 Data Pathways

Data are generated from three primary pathways at CBCPH - data derived from field activities, laboratory analytical data, and validated data. Data from all three pathways must be entered into the CBCPH database. To evaluate whether the data have been accurately loaded into the database in a timely manner, data pathways must be established and well documented.

Data generated during field activities are recorded using field forms and/or field log books. These forms and/or log books are reviewed for completeness and accuracy by field team leader. Data from the field forms, including the chain-of-custody form, are entered into a database.

Data generated during laboratory analysis are recorded in hardcopy and in EDDs after the samples have been analyzed. The laboratory will send the hardcopy and EDDs records to the project chemist. The project chemist reviews the data deliverable for completeness, accuracy, and format. After the format has been approved, the electronic data are manipulated and downloaded into the CBCPH database. TN&A's data entry personnel will then update database with the total number of samples received and number of days required to receive the data.

After validation, the project chemist reviews the data for accuracy. TN&A will then update the CBCPH database with the appropriate data qualifiers. The associated laboratory and data validation costs are also updated.

2.10.3 Data Management Strategy

TN&A's short- and mid-term data management strategies require that the database for CBCPH be updated per each data delivery. The data consist of chemical and field data entered into a MS Access database. The database can be used to generate reports. All electronic data from this database will be transmitted in a format compatible with NEDTS.

To satisfy long-term data management goals, the data will be loaded into the database for storage, further manipulation, and retrieval after the off-site laboratory and field reports are reviewed and validated. The database will be used to provide data for chemical and geologic analysis and for preparing reports and tabular and/or graphic representations of the data. Additional data acquired from field activities is recorded on field forms and/or in log books that are reviewed for completeness and accuracy by the field

team leader. Hard copies of forms, data, and chain-of-custody forms are filed in a secure storage area according to project number. Laboratory data packages and reports will be archived at TN&A or Navy offices. Laboratories that generated the data will archive hard-copy data for a minimum of 5 years.

3.0 ASSESSMENT AND OVERSIGHT

This section describes the field and laboratory assessments that may be conducted during this project, the individuals responsible for conducting assessments, corrective actions that may be implemented in response to assessment results, and how quality-related issues will be reported to TN&A and Navy management.

3.1 ASSESSMENT AND RESPONSE ACTIONS

Environmental data collection using will be overseen by the assessment and audit activities described below. Any problems encountered during an assessment of field investigation or laboratory activities will require appropriate corrective action to ensure that the problems are resolved. This section describes field and laboratory assessments that may be completed and corrective action procedures to address problems identified during an assessment.

3.1.1 Field Assessments

TN&A can schedule field assessments at any time to support data quality and encourage continuous improvement in the systems that support environmental data collection. TN&A procedures for conducting field assessments are documented using checklist developed for the project.

Technical systems audits (TSA) are the type of field assessment most frequently conducted. TN&A personnel conducting TSAs use personnel interviews, direct observations, and reviews of project-specific documentation to evaluate and document whether procedures specified in the approved SAP are being implemented. The following specific items may be observed during the TSA:

- Availability of project plans such as the SAP and HSP
- Documentation of personnel qualifications and training
- Sample collection, identification, preservation, handling, and shipping procedures
- Sampling equipment decontamination
- Equipment calibration and maintenance

- Completeness of logbooks and other field records (including nonconformance documentation)
- Health and safety procedures

During the TSA, the lead TN&A assessor verbally communicates any significant deficiencies to the FTL for immediate correction. These and all other observations and comments are documented in a draft TSA report. The draft TSA report is issued to the TN&A project manager, TN&A engineer lead, and FTL in electronic (e-mail) format within 7 days after the TSA is completed. Project teams are required to respond to the draft report within 3 days, and a final TSA report is issued within 7 days after the project team responds.

The Navy QA officer may also independently conduct a field assessment of any TN&A project. Items reviewed by the Navy QA officer during a field assessment would be similar to those described above.

3.1.2 Laboratory Assessments

The laboratory selected to perform the analyses must have successfully completed the NFESC laboratory evaluation process and must maintain that status throughout the project. To determine the status of the laboratory, a laboratory QA plan review, performance evaluation sample analysis, and data package review may be conducted. TN&A will not perform on-site audits or visits unless deemed necessary by the DON.

TN&A's Laboratory oversight will consist of monitoring laboratory performance and reviewing the preliminary report and hardcopy data packages. The information that may be obtained from the data packages consists of the following:

- Correctness of chain-of-custody procedures
- Adherence to method or QAPP holding times
- Adequacy of method detection limits and reporting limits
- Correctness of spiking levels, frequency, and recovery
- Accuracy of analytical operations based on the LCS.

Oversight findings will be included in the quality control summary report for the project (see Section 3.2.3).

3.1.3 Field Corrective Action Procedures

Field corrective action procedures will depend on the type and severity of the finding. TN&A classifies assessment findings as either deficiencies or observations. Deficiencies are findings that may have a significant impact on data quality and that will require corrective action. Observations are findings that do not directly affect data quality, but are suggestions for consideration and review.

As described in Section 3.1.1, project teams are required to respond to deficiencies identified in TSA reports. The project manager, project lead engineer, FTL, and project chemist will meet to discuss the deficiencies and the appropriate steps to resolve each deficiency by:

- Determining when and how the problem developed
- Assigning responsibility for problem investigation and documentation
- Selecting the corrective action to eliminate the problem
- Developing a schedule for completing the corrective action
- Assigning responsibility for implementing the corrective action
- Documenting and verifying that the corrective action has eliminated the problem
- Notifying the Navy of the problem and the corrective action taken

In responding to the TSA report, the project team will include a brief description of each deficiency, the proposed corrective action, the individual responsible for determining and implementing the corrective action, and the completion dates for each corrective action.

The TN&A program QA manager is responsible for reviewing proposed corrective actions and verifying that they have been effectively implemented. The program QA manager can require data acquisition to be limited or discontinued until the corrective action is complete and a deficiency is eliminated. The program QA manager can also request the reanalysis of any or all data acquired since the system was last in control.

3.1.4 Laboratory Corrective Action Procedures

Internal laboratory procedures for corrective action and descriptions of out-of-control situations that require corrective action are contained in laboratory QA plans. At a minimum, corrective action will be

implemented when any of the following three conditions occurs: control limits are exceeded, method QC requirements are not met, or sample-holding times are exceeded. The laboratory will report out-of-control situations to the TN&A project chemist within 2 working days after they are identified. In addition, the laboratory project manager will prepare and submit a corrective action report to the TN&A project chemist. This report will identify the out-of-control situation and the steps that the laboratory has taken to rectify it.

3.2 REPORTS TO MANAGEMENT

Effective management of environmental data collection requires (1) timely assessment and review of all activities and (2) open communication, interaction, and feedback among all project participants. TN&A will use the reports described below to address any project-specific quality issues and to facilitate timely communication of these issues.

3.2.1 Daily Progress Reports

TN&A will prepare a daily progress report to summarize activities throughout the field investigation. This report will describe sampling and field measurements, equipment used, TN&A and subcontractor personnel on site, QA/QC and health and safety activities, problems encountered, corrective actions taken, deviations from the SAP, and explanations for the deviations. The daily progress report is prepared by the field team leader and submitted to the project manager and to the Navy RPM, if requested. The content of the daily reports will be summarized and included in the final report submitted for the field investigation.

3.2.2 Project Monthly Status Report

The TN&A project manager will prepare a monthly status report (MSR) to be submitted to the Navy RPM. Monthly status reports address project-specific quality issues and facilitate their timely communication. The MSR will provide the following quality-related information:

- Project status
- Instrument, equipment, or procedural problems that affect quality and recommended solutions
- Objectives from the previous report that were achieved
- Objectives from the previous report that were not achieved
- Work planned for the next month

If appropriate, TN&A will obtain similar information from subcontractors participating in the project and will incorporate the information within the MSR.

3.2.3 Quality Control Summary Report

TN&A will prepare a QC summary report (QCSR) that will be submitted to the Navy RPM with the final report for the field investigation. Data collected during the field efforts will be reconciled with the project DQOs by preparing summary tables, charts, figures, or performing other types of data analyses that facilitate direct comparison of data collected through the entire extent of the project. Comparisons will be made on a parameter-specific basis, concentrating on the contaminants of concern. Comparisons also will facilitate an analysis of contaminant concentration trends through time and space.

4.0 DATA VALIDATION AND USABILITY

This section describes the procedures that are planned to review, verify, and validate field and laboratory data. This section also discusses procedures for verifying that the data are sufficient to meet DQOs for the project.

4.1 DATA REVIEW, VERIFICATION, AND VALIDATION

Validation and verification of the data generated during field and laboratory activities are essential to obtaining data of defensible and acceptable quality. Verification and validation methods for field and laboratory activities are presented below.

4.1.1 Field Data Verification

Project team personnel will verify field data through reviews of data sets to identify inconsistencies or anomalous values. Any inconsistencies discovered will be resolved as soon as possible by seeking clarification from field personnel responsible for data collection. All field personnel will be responsible for following the sampling and documentation procedures described in this SAP so that defensible and justifiable data are obtained.

Data values that are significantly different from the population are called "outliers." A systematic effort will be made to identify any outliers or errors before field personnel report the data. Outliers can result from improper sampling or measurement methodology, data transcription errors, calculation errors, or natural causes. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in sampling, measurement, transcription, or calculation will be clearly identified in project reports.

4.1.2 Laboratory Data Verification

Laboratory personnel will verify analytical data at the time of analysis and reporting and through subsequent reviews of the raw data for any non-conformances to the requirements of the analytical method. Laboratory personnel will make a systematic effort to identify any outliers or errors before they report the data. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in analysis, transcription, or calculation will be clearly identified in the case narrative section of the analytical data package.

4.1.3 Laboratory Data Validation

An independent third-party contractor will validate all laboratory data in accordance with current EPA national functional guidelines (EPA 2002a, 1999b). The data validation strategy will be consistent with Navy guidelines. For this project, 90 percent of the data will undergo cursory validation and 10 percent of the data will undergo full validation. Requirements for cursory and full validation are listed below.

4.1.3.1 Cursory Data Validation

Cursory validation will be completed for 90% of the summary data packages for analysis of groundwater samples. The data reviewer is required to notify TN&A and request any missing information needed from the laboratory. Elimination of the data from the review process is not allowed. All data will be qualified as necessary in accordance with established criteria. The content of the data summary packages is described in Section 1.6.2 and Table 7.

4.1.3.2 Full Data Validation

Full validation is not anticipated for samples collected for this effort.

4.1.3.3 Data Validation Criteria

Table 11 lists the QC criteria that will be reviewed for cursory data validation. The data validation criteria selected from Table 11 will be consistent with the project-specific analytical methods listed in Section 2.4.2.

4.2 RECONCILIATION WITH USER REQUIREMENTS

After environmental data have been reviewed, verified, and validated in accordance with the procedures described in Section 4.1, the data must be further evaluated to determine whether DQOs have been met. To the extent possible, TN&A will follow EPA's data quality assessment (DQA) process to verify that the type, quality, and quantity of data collected are appropriate for their intended use. DQA methods and procedures are outlined in EPA's "Guidance for Data Quality Assessment, Practical Methods for Data Analysis" (EPA, 2000c). The DQA process consists of five steps: (1) review the DQOs and sampling design; (2) conduct a preliminary data review; (3) select a statistical test; (4) verify the assumptions of the statistical test; and (5) draw conclusions from the data.

When the five-step DQA process is not completely followed because the DQOs are qualitative in nature, TN&A will systematically assess data quality and data usability. This assessment will consist of:

- A review of the sampling design and sampling methods to verify that these were implemented as planned and are adequate to support project objectives

- A review of project-specific data quality indicators for precision, accuracy, representativeness, completeness, comparability, and quantitation limits (defined in Section 1.3.2) to determine whether acceptance criteria have been met
- A review of project-specific DQOs to determine whether they have been achieved by the data collected
- An evaluation of any limitations associated with the decisions to be made based on the data collected. For example, if data completeness is only 90 percent compared to a project-specific completeness objective of 95 percent, the data may still be usable to support a decision, but at a lower level of confidence.

The QCSR (see Section 3.2.3) and final report for the project will discuss any potential impacts of these reviews on data usability and will clearly define any limitations associated with the data.

5.0 REFERENCES

U.S. Environmental Protection Agency (EPA). 1992. "Specifications and Guidance for Obtaining Contaminant-Free Sampling Containers." OSWER Directive No. 9240.0-05A. April.

EPA. 1996. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Update III." Office of Solid Waste and Emergency Response. Washington, DC. December.

EPA. 1999b. "National Functional Guidelines for Organic Data Review." Office of Emergency and Remedial Response. Washington, DC. EPA-540/R-99-008. October.

EPA. 2000a. "U.S. EPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration." Document Number ILM04.1. January.

EPA. 2000b. "Data Quality Objectives Process for Hazardous Waste Site Investigations (EPA QA/G-4HW)." Office of Environmental Information. Washington, D.C. EPA/600/R-00/007. January.

EPA. 2000c. "Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9, QA00 Update." Office of Environmental Information. Washington, D.C. EPA/600/R-96-084. July.

EPA. 2001. "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5." Office of Environmental Information. Washington, DC. EPA/240/B-01/003. March.

EPA. 2002a. "National Functional Guidelines for Inorganic Data Review." Office of Emergency and Remedial Response. Washington, DC. EPA-540/R-01/008. July.

EPA. 2002c. "Guidance for the Data Quality Objectives Process, EPA QA/G-4." Office of Environmental Information. Washington, DC. EPA/600/R-96/055. December.

Table 1

EPA QA/R-5 QAPP Elements
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

U.S. EPA QA/R-5 QAPP ELEMENT		CORRESPONDING TN&A SAP SECTION	
A1	Title and Approval Sheet	Title and Approval Sheet	
A2	Table of Contents	Table of Contents	
A3	Distribution List	Distribution List	
A4	Project/Task Organization	1.4	Project Organization
A5	Problem Definition/Background	1.1	Problem Definition and Background
A6	Project/Task Description	1.2	Project Description
A7	Quality Objectives and Criteria	1.3	Quality Objectives and Criteria
A8	Special Training/Certification	1.5	Special Training and Certification
A9	Documents and Records	1.6	Documents and Records
B1	Sampling Process Design	2.1	Sampling Process Design
B2	Sampling Methods	2.2	Sample Collection Methodology
B3	Sample Handling and Custody	2.3	Sample Handling and Custody
B4	Analytical Methods	2.4	Analytical Methods
B5	Quality Control	2.5	Quality Control
B6	Instrument/Equipment Testing, Inspection, and Maintenance	2.6	Equipment Testing, Inspection, and Maintenance
B7	Instrument/Equipment Calibration and Frequency	2.7	Instrument Calibration and Frequency
B8	Inspection/Acceptance of Supplies and Consumables	2.8	Inspection and Acceptance of Supplies and Consumables
B9	Non-direct Measurements	2.9	Non-Direct Measurements
B10	Data Management	2.10	Data Management
C1	Assessment and Response Actions	3.1	Assessment and Response Actions
C2	Reports to Management	3.2	Reports to Management
D1	Data Review, Verification, and Validation	4.1	Data Review, Verification, and Validation
D2	Validation and Verification Methods		
D3	Reconciliation with User Requirements	4.2	Reconciliation with User Requirements

Table 2

Clean Backfill Parameters and Action Levels
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Analysis Group and Parameter	Action Level	Unit of Measure	Basis	Lab Limits	
				RL	MDL
Volatile Organics (SW846 Method 8260)					
Acetone	7800	mg/Kg	RIDEM RSDEC	0.005	0.0017
Benzene	2.5	mg/Kg	RIDEM RSDEC	0.005	0.00034
Bromodichloromethane	10	mg/Kg	RIDEM RSDEC	0.005	0.00067
Bromoform	81	mg/Kg	RIDEM RSDEC	0.005	0.0024
Bromomethane	0.8	mg/Kg	RIDEM RSDEC	0.005	0.0013
Carbon Tetrachloride	1.5	mg/Kg	RIDEM RSDEC	0.005	0.00072
Chlorobenzene	210	mg/Kg	RIDEM RSDEC	0.005	0.00037
Chloroform	1.2	mg/Kg	RIDEM RSDEC	0.005	0.0004
Dibromochloromethane	7.6	mg/Kg	RIDEM RSDEC	0.005	0.00064
1,2-Dibromo-3-chloropropane (DBCP)	0.5	mg/Kg	RIDEM RSDEC	0.005	0.0017
1,1-Dichloroethane	920	mg/Kg	RIDEM RSDEC	0.005	0.0003
1,2-Dichloroethane	0.9	mg/Kg	RIDEM RSDEC	0.005	0.00057
1,1-Dichloroethene	0.2	mg/Kg	RIDEM RSDEC	0.005	0.0015
Cis-1,2-Dichloroethene	630	mg/Kg	RIDEM RSDEC	0.005	0.00047
Trans-1,2-Dichloroethene	1100	mg/Kg	RIDEM RSDEC	0.005	0.00066
1,2-Dichlropropane	1.9	mg/Kg	RIDEM RSDEC	0.005	0.0006
Ethylbenzene	71	mg/Kg	RIDEM RSDEC	0.005	0.00067
Ethylene dibromide (EDB)	0.01	mg/Kg	RIDEM RSDEC	0.005	0.00042
Isopropyl benzene	27	mg/Kg	RIDEM RSDEC	0.005	0.0003
Methyl ethyl ketone	10000	mg/Kg	RIDEM RSDEC	0.005	0.0015
Methyl isobutyl ketone	1200	mg/Kg	RIDEM RSDEC	0.005	0.0051
Methyl tertiary-butyl ether (MTBE)	390	mg/Kg	RIDEM RSDEC	0.005	0.00043
Methylene chloride	45	mg/Kg	RIDEM RSDEC	0.005	0.00082
Styrene	13	mg/Kg	RIDEM RSDEC	0.005	0.0005
1,1,1,2-Tetrachloroethane	2.2	mg/Kg	RIDEM RSDEC	0.005	0.00053
1,1,2,2-Tetrachloroethane	1.3	mg/Kg	RIDEM RSDEC	0.005	0.00093
Tetrachloroethene	12	mg/Kg	RIDEM RSDEC	0.005	0.00064
Toluene	190	mg/Kg	RIDEM RSDEC	0.005	0.00032
1,1,1-Trichloroethane	540	mg/Kg	RIDEM RSDEC	0.005	0.00035
1,1,2-Trichloroethane	3.6	mg/Kg	RIDEM RSDEC	0.005	0.00068
Trichloroethene	13	mg/Kg	RIDEM RSDEC	0.005	0.00086
Vinyl Chloride	0.02	mg/Kg	RIDEM RSDEC	0.005	0.00095
Xylenes (total)	110	mg/Kg	RIDEM RSDEC	--	--
m,p-Xylene	--	--	--	0.005	0.00066
o-Xylene	--	--	--	0.005	0.00044

Table 2

Clean Backfill Parameters and Action Levels
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Analysis Group and Parameter	Action Level	Unit of Measure	Basis	Lab Limits	
				RL	MDL
Semivolatile Organics (SW846 Method 8270)					
Acenaphthene	43	mg/Kg	RIDEM RSDEC	0.33	0.035
Acenaphthylene	23	mg/Kg	RIDEM RSDEC	0.33	0.035
Anthracene	35	mg/Kg	RIDEM RSDEC	0.33	0.056
Benzo(a)anthracene	0.9	mg/Kg	RIDEM RSDEC	0.33	0.06
Benzo(a)pyrene	0.4	mg/Kg	RIDEM RSDEC	0.33	0.048
Benzo(b)fluoranthene	0.9	mg/Kg	RIDEM RSDEC	0.33	0.064
Benzo(g,h,i)perylene	0.8	mg/Kg	RIDEM RSDEC	0.33	0.083
Benzo(k)fluoranthene	0.9	mg/Kg	RIDEM RSDEC	0.33	0.045
1,1-Biphenyl	0.8	mg/Kg	RIDEM RSDEC	0.33	0.039
Bis(2-ethylhexyl)phthalate	46	mg/Kg	RIDEM RSDEC	0.33	0.05
Bis(2-chloroethyl)ether	0.6	mg/Kg	RIDEM RSDEC	0.33	0.047
Bis(2-chloroisopropyl)ether	9.1	mg/Kg	RIDEM RSDEC	0.33	0.036
4-Chloroaniline	310	mg/Kg	RIDEM RSDEC	0.33	0.029
2-Chlorophenol	50	mg/Kg	RIDEM RSDEC	0.33	0.04
Chrysene	0.4	mg/Kg	RIDEM RSDEC	0.33	0.059
Dibenzo(a,h)anthracenea	0.4	mg/Kg	RIDEM RSDEC	0.33	0.067
1,2-Dichlorobenzene (o-DCB)	510	mg/Kg	RIDEM RSDEC	0.33	0.046
1,3- Dichlorobenzene (m-DCB)	430	mg/Kg	RIDEM RSDEC	0.33	0.041
1,4-Dichlorobenzene (p-DCB)	27	mg/Kg	RIDEM RSDEC	0.33	0.048
3,3-Dichlorobenzidine	1.4	mg/Kg	RIDEM RSDEC	0.33	0.053
2,4-Dichlorophenol	30	mg/Kg	RIDEM RSDEC	0.33	0.036
Diethyl phthalate	340	mg/Kg	RIDEM RSDEC	0.33	0.048
2,4-Dimethyl phenol	1400	mg/Kg	RIDEM RSDEC	0.33	0.054
Dimethyl phthalate	1900	mg/Kg	RIDEM RSDEC	0.33	0.038
2,4-Dinitrophenol	160	mg/Kg	RIDEM RSDEC	0.67	0.11
2,4-Dinitrotoluene	0.9	mg/Kg	RIDEM RSDEC	0.33	0.044
Fluoranthene	20	mg/Kg	RIDEM RSDEC	0.33	0.047
Fluorene	28	mg/Kg	RIDEM RSDEC	0.33	0.036
Hexachlorobenzene	0.4	mg/Kg	RIDEM RSDEC	0.33	0.043
Hexachlorobutadiene	8.2	mg/Kg	RIDEM RSDEC	0.33	0.056
Hexachloroethane	46	mg/Kg	RIDEM RSDEC	0.33	0.053
Indeno(1,2,3-cd)pyrene	0.9	mg/Kg	RIDEM RSDEC	0.33	0.069
2-Methyl naphthalene	123	mg/Kg	RIDEM RSDEC	0.33	0.045
Naphthalene	54	mg/Kg	RIDEM RSDEC	0.33	0.042
Pentachlorophenol	5.3	mg/Kg	RIDEM RSDEC	0.67	0.064
Phenanthrene	40	mg/Kg	RIDEM RSDEC	0.33	0.044
Phenol	6000	mg/Kg	RIDEM RSDEC	0.33	0.047
Pyrene	13	mg/Kg	RIDEM RSDEC	0.33	0.049
1,2,4-Trichlorobenzene	96	mg/Kg	RIDEM RSDEC	0.33	0.054
2,4,5-Trichlorophenol	330	mg/Kg	RIDEM RSDEC	0.67	0.056
2,4,6-Trichlorophenol	58	mg/Kg	RIDEM RSDEC	0.33	0.026

Table 2

Clean Backfill Parameters and Action Levels
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Analysis Group and Parameter	Action Level	Unit of Measure	Basis	Lab Limits	
				RL	MDL
OC Pesticides (SW846 Method 8081)					
Chlordane	0.5	mg/Kg	RIDEM RSDEC	--	--
alpha-Chlordane	--	--	--	0.0017	0.00047
gamma-Chlordane	--	--	--	0.0017	0.00039
Dieldrin	0.04	mg/Kg	RIDEM RSDEC	0.0033	0.00046
PCBs (SW846 Method 8082)					
Polychlorinated biphenyls (PCBs)[a]	10	mg/Kg	RIDEM RSDEC	--	--
Aroclor-1016	--	--	--	0.033	0.0037
Aroclor-1221	--	--	--	0.033	0.0027
Aroclor-1232	--	--	--	0.033	0.0016
Aroclor-1242	--	--	--	0.033	0.0026
Aroclor-1248	--	--	--	0.033	0.0013
Aroclor-1254	--	--	--	0.033	0.0026
Aroclor-1260	--	--	--	0.033	0.0035
Metals (SW846 Method 6010 & 7471) [b]					
Antimony	10	mg/Kg	RIDEM RSDEC	1	0.056
Arsenicc	7	mg/Kg	RIDEM RSDEC	1	0.076
Barium	5500	mg/Kg	RIDEM RSDEC	10	0.13
Berylliumc	0.4	mg/Kg	RIDEM RSDEC	0.25	0.0061
Cadmium	39	mg/Kg	RIDEM RSDEC	0.25	0.0055
Chromium III (Trivalent)	1400	mg/Kg	RIDEM RSDEC	Note (c)	Note (c)
Chromium VI (Hexavalent)	390	mg/Kg	RIDEM RSDEC	Note (c)	Note (c)
Chromium (total)	--	--	--	1	0.014
Copper	3100	mg/Kg	RIDEM RSDEC	1.5	0.21
Lead[d]	150	mg/Kg	RIDEM RSDEC	0.5	0.041
Manganese	390	mg/Kg	RIDEM RSDEC	25	0.81
Mercury	23	mg/Kg	RIDEM RSDEC	0.033	0.007
Nickel	1000	mg/Kg	RIDEM RSDEC	2.5	0.026
Selenium	390	mg/Kg	RIDEM RSDEC	1.5	0.067
Silver	200	mg/Kg	RIDEM RSDEC	1.5	0.019
Thallium	5.5	mg/Kg	RIDEM RSDEC	1	0.079
Vanadium	550	mg/Kg	RIDEM RSDEC	2.5	0.021
Zinc	6000	mg/Kg	RIDEM RSDEC	2.5	0.056
Cyanide (SW846 Method 9014)					
Cyanide	200	mg/Kg	RIDEM RSDEC	0.12	1

Table 2

Clean Backfill Parameters and Action Levels
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Analysis Group and Parameter	Action Level	Unit of Measure	Basis	Lab Limits	
				RL	MDL

Footnotes:

a) Direct exposure criteria for PCBs consistent with the Toxic Substance Control Act (TSCA)

b) Background Levels of Priority Pollutant Metals in Rhode Island Soils, T. O'Connor, RIDEM

c) Total chromium will be tested. If the total concentrations are less then the trivalenet and hexavalent standards, then the sample is considered to absent of the trivalent and hexavalent chromium at the RIDEM RSDEC criterion.

d) Direct exposure criteria for Lead consistent with the Rhode Island Department of Health Rules and Regulations for Lead Poisoning Prevention [R23-24.6-PCB], as amended.

Acronyms:

RIDEM Rhode Island Dept. of Environmental Management
RSDEC Residential Soil Direct Exposure Criterion.
RL Reporting Limit
MDL Method Detection Limit

Table 3

Waste Disposal Parameters and Action Levels
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Analysis Group and Parameter	Action Level	Unit of Measure	Basis	Lab Limits	
				RL	MDL
Volatile Organics (Zero Headspace SW846 Method 1311\8260)					
Benzene (as D018)	0.5	mg/L	TCLP Rule	5	0.5
Carbon Tetrachloride (as D019)	0.5	mg/L	TCLP Rule	5	0.56
Chlorobenzene (as D021)	100	mg/L	TCLP Rule	5	0.53
Chloroform (as D022)	6	mg/L	TCLP Rule	5	0.35
1,2-Dichloroethane (as D028)	0.5	mg/L	TCLP Rule	5	0.45
1,1-Dichloroethene (as D029)	0.7	mg/L	TCLP Rule	5	0.76
2-Butanone (MEK) (as D035)	200	mg/L	TCLP Rule	5	1.2
Tetrachloroethene (as D039)	0.7	mg/L	TCLP Rule	5	0.52
Trichloroethene (as D040)	0.5	mg/L	TCLP Rule	5	0.5
Vinyl Chloride (as D043)	0.2	mg/L	TCLP Rule	5	0.51
Semivolatile Organics (SW846 Method 1311\8270) [a]					
o-Cresol (as D023)	200	mg/L	TCLP Rule	0.03	0.001
m-Cresol (as D024)	200	mg/L	TCLP Rule	0.03	0.00078
p-Cresol (as D025)	200	mg/L	TCLP Rule	0.03 [b]	0.00078
Total Cresol # (as D026)	200	mg/L	TCLP Rule	0.03	0.001
Pentachlorophenol (as D037)	100	mg/L	TCLP Rule	0.06	0.00043
2,4,5-Trichlorophenol (as D041)	400	mg/L	TCLP Rule	0.06	0.0012
2,4,6-Trichlorophenol (as D042)	2	mg/L	TCLP Rule	0.03	0.00087
1,4-Dichlorobenzene (as D027)	7.5	mg/L	TCLP Rule	0.03	0.00043
2,4-Dinitrotoluene (as D030)	0.13	mg/L	TCLP Rule	0.03	0.00032
Hexachlorobenzene (as D032)	0.13	mg/L	TCLP Rule	0.03	0.00027
Hexachloro-1,3-butadiene (as D033)	0.5	mg/L	TCLP Rule	0.03	0.00067
Hexachloroethane (as D034)	3	mg/L	TCLP Rule	0.03	0.00081
Nitrobenzene (as D036)	2	mg/L	TCLP Rule	0.03	0.00071
Pyridine (as D038)	5	mg/L	TCLP Rule	0.03	0.0032
Pesticides (SW846 Method 1311\8081) [a]					
Chlordane (as D020)	0.03	mg/L	TCLP Rule	0.0075	0.00047
Endrin (as D012)	0.02	mg/L	TCLP Rule	0.0003	0.000018
Heptachlor (& its Epoxide) (as D031)	0.008	mg/L	TCLP Rule	--	--
Heptachlor	--	--	--	0.00015	0.000007
Heptachlor epoxide	--	--	--	0.00015	0.0000079
Lindane (gamma-BHC) (as D013)	0.4	mg/L	TCLP Rule	0.00015	0.0000068
Methoxychlor (as D014)	10	mg/L	TCLP Rule	0.0015	0.00013
Toxaphene (as D015)	0.5	mg/L	TCLP Rule	0.015	0.00041
Herbicides (SW846 Method 1311\8151) [a]					
2,4-D (as D016)	10	mg/L	TCLP Rule	0.003	0.0001
2,4,5-TP (Silvex) (as D017)	1	mg/L	TCLP Rule	0.0003	0.00001

Table 3

Waste Disposal Parameters and Action Levels
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Analysis Group and Parameter	Action Level	Unit of Measure	Basis	Lab Limits	
				RL	MDL
Metals (SW846 Method 1311\6010 & 7470) [\a]					
Arsenic (as D004)	5	mg/L	TCLP Rule	0.2	1.6
Barium (as D005)	100	mg/L	TCLP Rule	2	2.1
Cadmium (as D006)	1	mg/L	TCLP Rule	0.05	0.1
Chromium (as D007)	5	mg/L	TCLP Rule	0.2	0.38
Lead (as D008)	5	mg/L	TCLP Rule	0.1	0.46
Mercury (as D009)	0.2	mg/L	TCLP Rule	0.002	0.047
Selenium (as D010)	1	mg/L	TCLP Rule	0.3	0.98
Silver (as D011)	5	mg/L	TCLP Rule	0.3	0.91
Total Petroleum Hydrocarbons (SW846 Method 8015M)					
TPH	100	mg/Kg	RIDEM RSDEC	12	0.12
PCBs (SW846 Method 8082)					
Polychlorinated biphenyls (PCBs)[\c]	10	mg/Kg	RIDEM RSDEC	--	--
Aroclor-1016	--	--	--	0.033	0.0037
Aroclor-1221	--	--	--	0.033	0.0027
Aroclor-1232	--	--	--	0.033	0.0016
Aroclor-1242	--	--	--	0.033	0.0026
Aroclor-1248	--	--	--	0.033	0.0013
Aroclor-1254	--	--	--	0.033	0.0026
Aroclor-1260	--	--	--	0.033	0.0035

Footnotes:

a) RLs are adjusted for pre-analysis dilutions; whereas MDL are not. Laboratory planned dilutions are SVOC (1:3), Pesticides (1:3), Herbicides (1:3), Metals (1:10)

b) p-Cresol and m-Cresol coelute and are reported as the sum of the isomers.

c) Direct exposure criteria for PCBs consistent with the Toxic Substance Control Act (TSCA)

Acronyms:

RIDEM Rhode Island Dept. of Environmental Management
RSDEC Residential Soil Direct Exposure Criterion.
RL Reporting Limit
MDL Method Detection Limit

Table 4

Data Quality Objectives
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

STEP 1: State the Problem

- In the Buried Drum Area, a corroded 55-gallon drum containing a tar-like substance was removed and disposed of off site from Test Pit 02 (TP02). The drum was located approximately 6 feet below the ground surface. Two additional drums were observed in the test pit but not removed. The total number of drums remaining is unknown. TCE was also found in soil gas at this area, although only low concentrations of TCE were detected in soils and groundwater in this area.
- In the Buried Metal Container Area a large number of what appear to be deteriorated aerosol paint cans and related debris in the stream embankment in the south west portion of the site, confirmed through test pit 14 (TP14) excavations in this area. Elevated concentrations of lead were found co-located with these containers. The horizontal extent of the buried metal containers is unknown, but the vertical extent is anticipated to be less than 8 feet below ground surface.

STEP 2: Identify the Decisions

- Is the content of buried drums considered to be a contaminated or hazardous material?
- Is the excavated soil material contaminated requiring offsite disposal or can it be used to backfill the excavation holes?
- If offsite disposal is needed, what are the hazardous characteristics of the material and what disposal options will be used for final disposal of the contaminated material?
- Is offsite backfill material absent of contaminants?

STEP 3: Identify Inputs to the Decisions

- Field observations such as visual inspection, monitoring with a PID, and olfactory (from a distance) sufficient will be used to consider an excavated material to be contaminated or hazardous?
- Offsite laboratory results will document whether an excavated material to be contaminated or hazardous?
- Offsite laboratory results will document whether offsite fill material is certified to be absent regulated constituents?

STEP 4: Define Study Boundaries

- Soils will be carefully removed from within the predetermined limits.
- Temporal boundaries extend through the period of performance.

STEP 5: Develop Decision Rules

- Soil materials and drum contents exhibiting hazardous characteristics will be transported for final disposal at a RCRA Subtitle C landfill.
- Soil materials and drum contents exhibiting the presence of contamination but not hazardous characteristics will be transported for final disposal at a RCRA Subtitle D landfill.
- Backfill materials the can be certified to contain less that the Rhode Island Direct Exposure Limit for residential soils can be used as backfilling the excavation holes.

Table 4

Data Quality Objectives
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

STEP 6: Specify Tolerable Limsts on Decision Errors

- Null Hypothesis: Analytical results for regulated constituents in excavated soils or drum contents indicate the contaminant concentration levels and establish the presence of a hazard characteristic.

  Alternative Hypothesis: Analytical results for regulated constituents in excavated soils or drum contents indicate the contaminant concentration levels and establish the absence of a hazard characteristic.
- False Positive Decision Error (Type I Error): Analytical results indicate the presence of a regulated material when, in reality, the material is not regulated.
- False Negative Decision Error (Type II Error): Analytical results indicate the absence of a regulated material when, in reality, the material is not regulated.
- Decision Error Limits**:** For the excavated soil and drum contents data, the consequence of making a false negative decision error is more severe than a false positive decision error. The false negative decision error would result in the improper disposal of regulated material. A false positive decision error would increase the cost of final disposal.
- Statistically-derived error limits are not quantifiable because a judgmental sampling design will be used. However, procedures of review, verification, and validation of the data (Section 4.1) are sufficiently stringent that misidentifying the contaminant containment at concentrations that would impact disposal decisions is unlikely.

STEP 7: Optimize the Sampling Design

- Analytical data will be reviewed, verified, and validated following procedures described in Section 4.1. Concentration levels will be compared to regulator levels to determine whether regulatory action levels have been exceeded
- Sample collection described in Section 2.0 will satisfy the DQOs specified in the proceeding 6 steps.

Table 5

Quality Control Samples For Precision And Accuracy

IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

QC TYPE	Precision	Accuracy	Frequency
Field QC	Field duplicate RPD MS/MSD RPD	Trip Blank Equipment Rinsate Source Blank	Field Duplicate = none anticipated Trip Blank = 1/cooler with samples for VOCs analysis Equipment Rinsate = none anticipated Source Blank = none anticipated
Laboratory QC	MS/MSD RPD Field Duplicate RPD	MS/MSD %R Method Blanks LCS or Blank Spikes Surrogate Standards %R Internal Standards %R	MS/MSD = 1/20 samples (Batch QC) Method Blank = 1/20 samples LCS or Blank Spikes = 1/20 samples Field duplicate = none anticipated Surrogate = every sample Internal Standard = every sample

Footnotes:

%R	Percent recovery
LCS	Laboratory control sample
MS/MSD	Matrix spike/matrix spike duplicate
RPD	Relative percent difference

Table 6

Key Personnel
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Name	Organization	Role	Responsibilities	Contact Information
Christopher Ohland	TN&A	Project Chemist & Database Manager	Responsible for defining analytical requirements and developing SAP May conduct laboratory evaluations Coordinates with laboratory project manager on analytical requirements, delivery schedules, and logistics Coordinates independent validation of laboratory data Reviews laboratory data and validation reports before release to project team Prepares and supports report preparation Responsible for developing, monitoring, and maintaining project database under guidance of project manager	TN&A, Raleigh NC cohland@tnainc.com (919) 981-6444
Ben Dodge	Mitkem	Laboratory Project Manager	Responsible for delivering analytical services that meet SAP requirements Reviews SAP to understand analytical requirements Works with TN&A project chemist to confirm sample delivery schedules Reviews laboratory data package before delivery to TN&A	Mitchem Corp, Warwick RI ben.dodge@mitken.com (401) 732-3400

Table 7

Requirements For Summary Data Packages
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Requirements for Summary Data Packages – Organic Analysis	Requirements for Summary Data Packages – Inorganic Analysis
Section I Case Narrative	**Section I Case Narrative**
1. Case narrative	1. Case narrative
2. Copies of nonconformance and corrective action forms	2. Copies of nonconformance and corrective action forms
3. Chain-of-custody forms	3. Chain-of-custody forms
4. Copies of sample receipt notices	4. Copies of sample receipt notices
5. Internal tracking documents, as applicable	5. Internal tracking documents, as applicable
Section II Sample Results - Form I for the following:	**Section II Sample Results - Form I for the following:**
1. Environmental samples	1. Environmental samples
2. Tentatively identified compounds (TIC) (VOC and SVOC only)	
Section III QA/QC Summaries - Forms II through XI for the following:	**Section III QA/QC Summaries - Forms II through XIV for the following:**
1. System monitoring compound and surrogate recoveries (Form II)	1. Initial and continuing calibration verifications (Form II)
2. MS and MSD recoveries and RPDs (Forms I and III)	2. PRRL standard (Form II)
3. Blank spike or LCS recoveries (Forms I and III-Z)	3. Detection limit standard (Form II-Z)
4. Method blanks (Forms I and IV)	4. Method blanks, continuing calibration blanks, and preparation blanks (Form III)
5. Performance check (Form V)	5. Inductively coupled plasma (ICP) interference-check samples (Form IV)
6. Initial calibrations with retention time information (Form VI)	6. MS and post-digestion spikes (Forms V and V-Z)
7. Continuing calibrations with retention time information (Form VII)	7. Sample duplicates (Form VI)
8. Internal standard areas and retention times (Form VIII)	8. LCSs (Form VII)
9. Analytical sequence (Forms VIII-D and VIII-Z)	9. Method of standard additions (Form VIII)
10. Matrix-specific method detection limit (MDL) (Form XI-Z)	10. ICP serial dilution (Form IX)
	11. IDL (Form X)
	12. ICP interelement correction factors (Form XI)
	13. ICP linear working range (Form XII)

Table 8

Proposed Samples, Rationale, And Analysis
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Sample IDs / Well IDs	Laboratory Analysis	Rationale
BACKFILL-01	VOC, SVOC, OC Pesticides, PCBs, TPH, Metals, Cyanide,	Certify "Clean" backfill materials
BACKFILL-XX, where XX is a sequential number	VOC, SVOC, OC Pesticides, PCBs, TPH, Metals, Cyanide,	Certify "Clean" backfill materials
EXSOIL-01	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
EXSOIL-02	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
EXSOIL-03	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
EXSOIL-04	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
EXSOIL-05	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
EXSOIL-06	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
EXSOIL-XX, where XX is a sequential number	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-01	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-02	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-03	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-04	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-05	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-06	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-07	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-08	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-09	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-10	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal
DRUM-XX, where XX is a sequential number	Full TCLP (VOC, SVOC, OC Pesticides, OC Herbicides, Metals), PCBs, TPH	Evaluate hazardous characteristics for disposal

Table 9

Summary of Field And QC Sample Analysis
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Analysis Group	Matrix	Field Samples	Trip Blank	Equipment Rinsate	Duplicates (at 10%)	Total Number of Samples	MS/MSD (at 5%)[a]
Clean Fill Material	Solid	1	0	0	0	1	Batch QC
Drum Contents	Solid	10	0	0	0	10	Batch QC
Excavated Soil and Debris	Solid	6	0	0	0	6	Batch QC
	TOTAL	**17**	**0**	**0**	**0**	**17**	**0**

Notes:

[a] Matrix spike and matrix spike duplicate are not considered additional samples.

Table 10

Sample Container, Holding Time, and Preservative Requirements
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Parameter	Method Number	Sample Container	Sample Volume	Preserve	Holding Time
Waste Characterization Analyses (Soil and Liquid Waste)					
TCLP VOC	1311/5035, 8260B	1 2 oz glass jar with Teflon lining	25 g	4°C	14 days TCLP, then 7 day analysis
TCLP SVOC TCLP Pest TCLP Herb	1311/3550B, 8270C 1311/3550B, 8081A 1311/3550B, 8081A	1- 8 oz glass jar with Teflon lining	100 g	4°C	14 days TCLP, then Extraction within 14 days Analysis within 40 days
TCLP Metals TCLP Hg	1311/3050B, 6010B 1311/7471A	1 – 4 oz glass jar with Teflon lining	100 g	4°C	14 days TCLP, then 180 days, 28 days (Hg)
PCBs	3550B, 8082	Amber glass jar with Teflon lining	30gram	4°C	Extraction within 14 days Analysis within 40 days
TPH	3550B, 8015M	Amber glass jar with Teflon lining	30gram	4°C	Extraction within 14 days Analysis within 40 days
Cyanide	9012	Amber glass jar with Teflon lining	1g	4°C	14 days
Clean Fill Material (Soil)					
VOC	5035, 8260B	3 – Encore (or equivalent)	5.0gram ± 0.5	4°C, unpreserved	48 hours
SVOC OC Pesticides PCBs TPH	3550B, 8270C 3550B, 8081A 3550B, 8082 3550B, 8015M	1 – 8 oz glass jar with Teflon lining	30gram 30gram 30gram 30gram	4°C	Extraction within 14 days Analysis within 40 days
Metals Mercury	3050B, 6010B 7471A	1 – 4 oz glass jar with Teflon lining	10g	4°C	180 days, 28 days
Cyanide	9012	Combine with metals container	1g	4°C	14 days

Table 11

Data Validation Criteria
IR Site 08 - NUSC Disposal Area, NUWC, Middletown, RI

Cursory Data Validation Criteria
Method compliance
Holding times
Calibration
Blanks
Surrogate recovery
Matrix spike and matrix spike duplicate recovery
Laboratory control sample or blank spike
Internal standard performance (organics)
Interference Checks (metals)
Field duplicate sample analysis
Other laboratory QC specified by the method
Overall assessment of data for an SDG

APPENDIX F

MITKEM'S NAVY CERTIFICATION LETTER

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING SERVICE CENTER
1100 23RD AVE
PORT HUENEME CA 93043-4370

IN REPLY REFER TO:

NFESC 413
May 5, 2005

Ms. Karen Gavitt
QA/QC Director
Mitkem Corporation
175 Metro Center Boulevard
Warwick, RI 02886

Dear Ms. Gavitt,

This correspondence addresses the status of Mitkem Corporation of Warwick, RI in the Navy Installation Restoration (IR) Quality Assurance (QA) Program as administered by the Naval Facilities Engineering Service Center (NFESC).

Your laboratory is accepted to perform sample analysis for the methods listed in Table 1. The period of acceptance expires August 31, 2005. This acceptance does not guarantee the delivery of any analytical samples. Acceptance is facility specific and can not be transferred to an affiliated or subcontract laboratory.

The Navy's review included a review of the laboratory's QA manual, selected standard operating procedures (SOPs) and SOP master list, list of major analytical instrumentation, performance test (PT) results and Army onsite audit documentation[1].

The Navy reserves the right to conduct additional laboratory assessments or to suspend or revoke acceptance status for any or all of the listed parameters if deemed necessary.

Table 1

METHOD	PARAMETER	MATRIX
9058/300 Series	Anions: Chloride, Fluoride, Sulfate, Nitrate, Nitrite, and Ortho-phosphate	Water
9012A	Cyanide	Water/Solid
1664A	Oil and Grease	Water
8260B	Volatile Organic Compounds	Water/Solid
8270C	Semivolatile Organic Compounds	Water/Solid
8151A	Herbicides	Water/Solid

[1] The State of New York conducted an on-site assessment under the National Environmental Laboratory Accreditation Program (NELAP) on April 3, 2003.

NFESC 413
May 5, 2005

8015B	Total Petroleum Hydrocarbon (GRO/DRO)	Water/Solid
8021	Volatile Organics (BTEX)	Water/Solid
8081A	Organochlorine Pesticides	Water/Solid
8082	Polychlorinated Biphenyls (PCBs)	Water/Solid
6010B/7000A	TAL Metals: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc	Water/Solid

Acceptance for use for parameters not identified on the table will be determined by Navy project personnel.

The laboratory should notify NFESC if there are parameters not presented on Table 1 that the laboratory expects to run on a routine basis in support of Navy installation restoration projects. In these circumstances the laboratory's capability to run the tests will be reviewed and the table will be modified accordingly.

Questions concerning the information provided should be directed to the NFESC IR QA Program coordinator, Ms. Patricia Moreno at (805) 982-1659, or via email at morenop@nfesc.navy.mil.

Sincerely,

for Robert J. Kratzke
Supervisor, Consultation/Information
Management Branch