Stage 1 of the Phase III Quality Assurance Project Plan
For
Installation Restoration Program Site 16

Former Naval Construction Battalion Center Davisville
North Kingstown, Rhode Island

Naval Facilities Engineering Command Mid-Atlantic
Contract Number N62472-03-D-0057

Contract Task Order 019

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STAGE 1 OF PHASE III
QUALITY ASSURANCE PROJECT PLAN
FOR
INSTALLATION RESTORATION
PROGRAM SITE 16

FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION – NAVY (CLEAN) CONTRACT

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1.0 INTRODUCTION

This section discusses the objectives and scope of the Phase III - Stage 1 investigation, the Work Plan organization, and background information on Site 16 at the former Naval Construction Battalion Center Davisville (NCBCD), North Kingstown, Rhode Island. The work performed during this stage of the Phase III Remedial Investigation (RI) includes the following:

- inventory, inspection, and minor repairs of over 100 existing monitoring wells at Site 16,
- inspection and minor repairs of bladder pumps contained in the wells above,
- installation of staff gauges along the shorelines of Davol Pond, two to four other ponds, and Allen Harbor, and
- measurement of groundwater elevations in over 100 monitoring wells and surface water elevations at the staff gauges during a single synoptic water level measuring event to be conducted in conjunction with the U.S. Army Corps of Engineers (USACE).

No samples of soil, water, or any other media will be collected or analyzed during Stage 1 of the Phase III RI. Therefore, this Work Plan contains no information related to sampling protocols, laboratory procedures, or analytical quality assurance.

1.1 OBJECTIVES AND SCOPE

Tetra Tech NUS, Inc. (TtNUS) prepared a Phase III RI Quality Assurance Project Plan (QAPP) for Installation Restoration Program (IRP) Site 16 for the United States Department of Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, under the Comprehensive Long-Term Environmental Action Navy (CLEAN) program, Contract Task Order (CTO) 049. This QAPP provides the basis and methods to be followed for the Phase III RI under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for Site 16. The scope of the investigation requires evaluation of select environmental media at the site that may have been contaminated by historical site uses. Additionally, this QAPP is designed to address the RI data gaps identified in Section 7 of the Supplemental Phase II RI Data Package Report (TtNUS, September 2006) so that all necessary data required to evaluate receptor risk will be available for the completion of the human health and ecological risk assessments planned for Site 16. Risks from exposure of humans and ecological receptors to the contaminants will be evaluated in the RI. The RI will also attempt to fully determine the nature and extent of contamination at Site 16.

The draft Phase III QAPP (TtNUS, July 2006) was submitted to the U.S. Environmental Protection Agency (EPA) in July 2006. Comments on the QAPP by the EPA were received by the Navy on September 20, 2006. Revisions to the draft QAPP have not yet been completed. On September 13, 2006, a conference call was held between the Navy, TtNUS, and the USACE. During the conference call, a plan to conduct a joint synoptic water level survey was suggested, which would include the monitoring wells and piezometers at the Nike PR-58 Site and Sites 03 and 16 of former NCBC Davisville. Such a comprehensive set of surface water and groundwater elevations has never been measured in this area. These data are needed to prepare area-wide potentiometric surface maps and to help refine the conceptual model of groundwater flow and contaminant migration in the area. The overall Site 16 QAPP is still being revised and not yet finalized. The synoptic water level survey is the first stage planned for the Phase III RI. In order to expedite the planning and preparations necessary to conduct the joint synoptic survey, the plans that are related to the first stage of work have been extracted from the draft Phase III QAPP and are included in this brief Work Plan. The bulk of the Phase III RI work (i.e., Stages 2 and 3) is still retained in the Phase III QAPP, which will be revised and finalized in the near future. The Stage 1 work will move forward as described in this abbreviated Work Plan.

All work described in this abbreviated Work Plan will be conducted in accordance with the Health and Safety Plan (HASP) attached as Appendix B.

1.2 REPORT ORGANIZATION

The Phase III – Stage 1 Work Plan consists of the following sections:

- Section 1.0 is this introduction and includes background information on NCBCD Site 16.
- Section 2.0 presents the project organization and responsibilities.
- Section 3.0 presents the details of the field investigation procedures.
- Section 4.0 presents information and requirements for project documentation, records, data management, and data usability.
- Appendix A contains TtNUS Standard Operating Procedures (SOPs) and field documentation forms to be used in the fieldwork. Specific requirements for certain portions of the work have also been incorporated into Section 3 of this document.
- Appendix B contains the company-specific HASP for the Phase III – Stage 1 work.

1.3 BACKGROUND INFORMATION

Background information concerning the NCBC Davisville facility and Site 16, including location, features, and history, are contained in the Supplemental Phase II RI Data Package Report (TtNUS, September 2006) and the draft Phase III QAPP for IR Program Site 16 (TtNUS, July 2006).

2.0 PROJECT ORGANIZATION

This section discusses the project organization and personnel responsibilities.

2.1 PROJECT ORGANIZATION CHART

A project organization chart depicting the agencies and contracting personnel involved with the review and implementation of the Phase III RI QAPP for Site 16 is shown on Figure 2-1. The Navy, who is the lead agency for this site, and the Navy's contractor (TtNUS) for the field investigation will implement this QAPP. Names are provided in the organization chart.

2.2 COMMUNICATION PATHWAYS

Pathways have been established to transfer information and to make alterations to project methods that may be required because of unforeseen circumstances. It will be the responsibility of the Project Manager (PM) to keep both the project team and the Navy informed of the following:

- Schedule, deliverables, meetings, and milestones
- Recent data collected from the site
- Technical changes made to the plans and specifications
- Developments that will cause changes in the schedule

The PM will be in frequent verbal and electronic mail communication with the Navy Remedial Project Manager (RPM). Any changes in the plans and specifications, field methodology, or data objectives will be communicated to the RPM in a timely manner. As appropriate, a field modification record will be used to identify the need for a change and a recommended course of action. The Navy will consult with EPA and the Rhode Island Department of Environmental Management (RIDEM) on any major scope changes that may occur while the fieldwork is proceeding.

The PM will, by telephone or electronic mail, communicate directly with the field team. The TtNUS Field Operations Leader (FOL) will be in daily contact with the PM. The FOL and the required subcontractors will communicate directly on site. During site activities, logbook notations and appropriate field forms will be completed in the field and maintained at the prime contractor's office.

Procedures are described below that will be followed when any project activity described in this Work Plan requires real-time modification to achieve the project goals. The Navy's contractor will present proposed changes to the Navy and follow up with a field modification record for significant changes. The

documentation will describe why the change is necessary, the nature of the proposed change, and the impacts of the change on the project. The change will be implemented after Navy concurrence. Minor changes will be documented in the field logbook.

When changes require immediate action, the proposed change will be briefly discussed internally by the Navy's contractor and approved, as appropriate, by the PM or designee (i.e., QA officer or technical lead). The Navy RPM will be notified as soon as possible. Concurrence from USEPA and RIDEM will be sought for any major scope changes, as determined by the Navy. In the event of conditions requiring a major scope change, the investigation will be put on hold until concurrence is obtained. The Navy will consult with USEPA and RIDEM on any major scope changes that may occur while fieldwork is proceeding.

2.3 PERSONNEL RESPONSIBILITIES

The Program Manager for the Navy's contractor will be responsible for the overall management and implementation of the Navy contract with the Navy's contractor. The PM will serve as the primary liaison between the Navy RPM and Navy's contractor for work at NCBCD. The PM will have the primary responsibility for the implementation and execution of the work assignment, including technical quality, oversight and review, control of costs and schedule, and implementation of appropriate QA procedures during all phases of the investigations scoped under the Phase III – Stage 1 Work Plan. The PM will maintain contact with the FOL to ensure that management of the acquired field data proceeds in an organized and expeditious manner.

The FOL will be the primary person who implements the field work activities outlined in this Work Plan. The FOL will report directly to the PM. Responsibilities of the FOL include supervising field staff and field operations, coordinating with the various subcontractors on site, ensuring the procedures specified in the Work Plan are properly implemented, identifying and documenting necessary field changes, maintaining daily schedules, and reporting to the PM on a regular basis regarding the status and progress of the field activities. Before starting field work, the FOL will ensure that field SOPs are consistent with the QAPP and that any questions affecting the quality of planned field work are resolved. The FOL will also be responsible for ensuring that the field personnel adhere to the primary duties of the HASP (attached as Appendix B), reporting any health and safety issues to the project health and safety officer, and reporting any hazards, injuries, or decisions to stop work to the PM. The FOL will supervise and check on a daily basis that the field measurements are made accurately, equipment is thoroughly decontaminated, and fieldwork is accurately and neatly documented. The FOL will update the PM on field activities on a daily basis.

An independent performance audit of field activities may be conducted at the discretion of and under the direction of the TtNUS QA officer. If a formal field audit is conducted, the QA officer will check

decontamination and field documentation procedures are being performed in accordance with the approved project planning documents and SOPs. The TtNUS QA officer will provide input on all aspects of adherence to the Work Plan to the PM as needed.

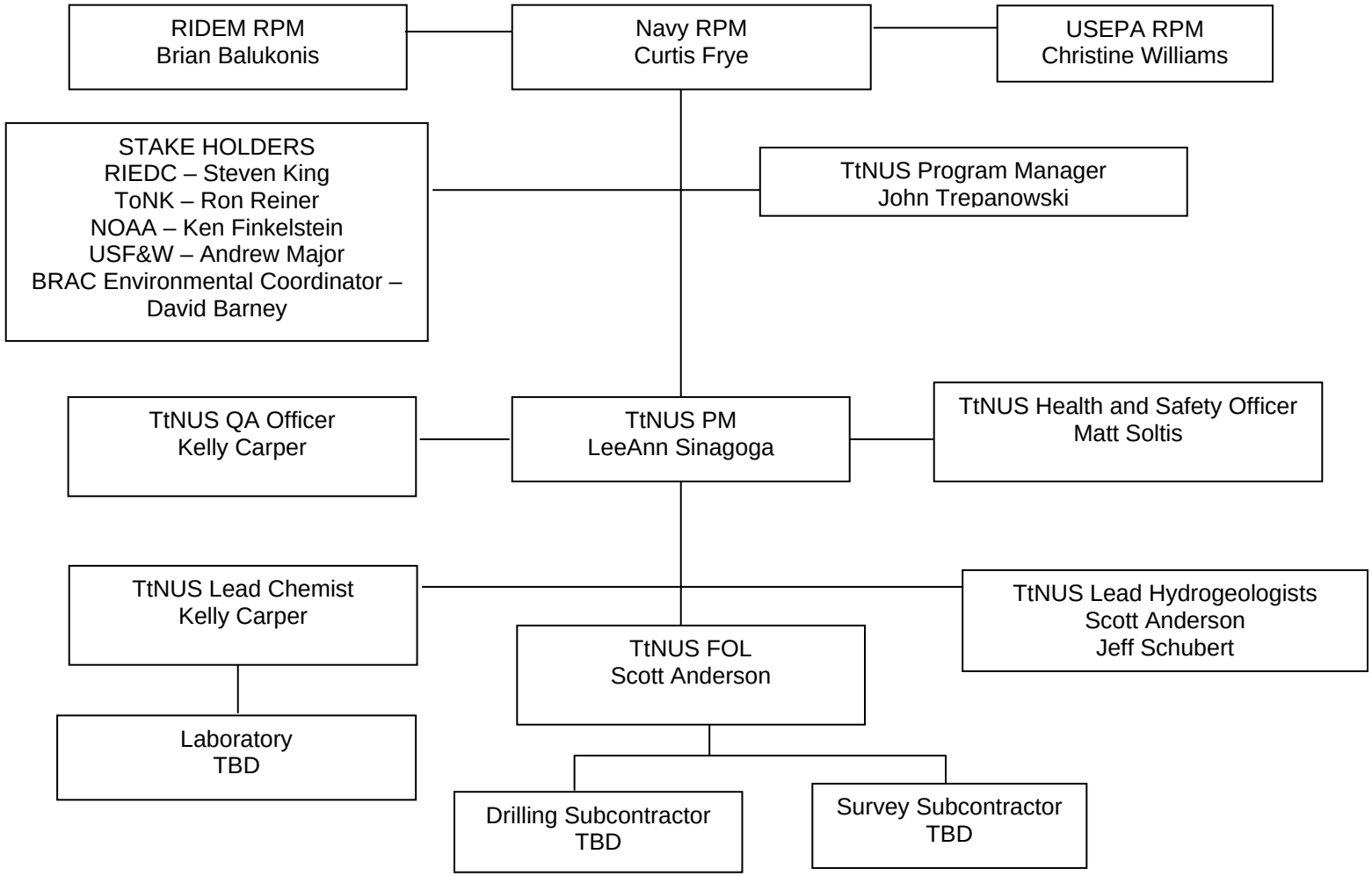
2.4 ASSESSMENT FINDINGS AND CORRECTIVE ACTION RESPONSES

Assessment findings that require corrective action initiate a sequence of events that include documentation of deficiencies, notification of findings, request for corrective action, implementation of corrective action, and follow-up assessment of the corrective action effectiveness.

Potential problems may involve nonconformance with the SOPs established for the project or other unforeseen difficulties. Any person identifying a condition adverse to project quality will notify the PM. The PM, with the assistance of the QA officer, will be responsible for developing and initiating appropriate corrective action through the FOL and verifying that the corrective action has been effective. If warranted by the severity of the problem (e.g., if a change in the approved plan is required), the Navy will be notified in writing, and the Navy's approval will be obtained before any change is implemented. USEPA and RIDEM will be consulted about any significant scope changes that may occur while fieldwork is underway. Communication and correspondence with the RAB will occur via mailing to the distribution list or updates at RAB meetings. Minor changes will be documented for the main file by the PM. Additional work that depends on a nonconforming activity will not be performed until the problem has been eliminated. The overall corrective action responsibility for system audits will reside with the PM. The overall corrective action responsibility for field audits will reside with the QA officer.

FIGURE 2-1

PROJECT ORGANIZATIONAL CHART
STAGE 1 OF PHASE III RI QAPP FOR INSTALLATION RESTORATION PROGRAM SITE 16
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND



* All contact with Tetra Tech NUS, Inc. (TtNUS) personnel and subcontractors by nonfield personnel should be made through Mr. Curtis Frye.

NOAA - National Oceanic and Atmospheric Administration
QA - Quality Assurance
RIDEM - Rhode Island Department of Environmental Management
RIEDC - Rhode Island Economic Development Corporation
RPM - Remedial Project Manager
TBD - To be determined
ToNK - Town of North Kingston
USEPA - United States Environmental Protection Agency
USF&W - U.S. Fish and Wildlife

3.0 GROUNDWATER/SURFACE WATER MONITORING PROGRAM

This section presents the elements of the groundwater monitoring well inspection, repair, and water level measurement program. These elements consist of an overview of the objectives, the well inventory and inspection process, staff gauge installations, water level measurements, surveying, maintenance, information management, equipment decontamination, and waste handling.

3.1 OVERVIEW

The primary objectives of the groundwater monitoring well program at Site 16 during Phase III – Stage 1 RI are:

- to inventory, inspect, record, and verify the physical locations of existing monitoring wells and piezometers,
- to assess the usefulness of these monitoring wells and piezometers scheduled for sampling and water level measurements,
- to install up to six staff gauges in ponds and Allen Harbor, and
- to measure water levels in over 100 monitoring wells, piezometers, and staff gauges in conjunction with USACE synoptic water level survey of Nike Site and Site 03.

Based on information collected during the well inventory and assessment and the water level data collected during the synoptic water level survey, new potentiometric surface maps will be prepared for Site 16 and areas to the west (i.e., Nike PR-58 Site and Site 03) and plans will be modified, if necessary, regarding specific wells to be sampled during Stage 3 of the Phase III RI. The existing monitoring wells that are scheduled for sampling during Stage 3 and are to be inventoried and inspected during Stage 1 (this stage) are listed in Table 3-1.

3.2 MONITORING WELL INVENTORY, INSPECTION, WATER LEVEL MEASUREMENTS, AND MINOR REPAIRS

All groundwater monitoring wells identified in Table 3-1 will be inventoried, inspected, and repaired (minor repairs only). Figure 3-1 shows locations of all known wells and piezometers that have been installed at Site 16. The wells and piezometers scheduled for inspection/repair during Stage 1 and sampling during Stage 3 are shown in red on Figure 3-1.

The monitoring well inventory and inspections will begin with a preliminary evaluation that includes a review of all available documented information concerning monitoring well construction and locations. Data will be compiled from the TtNUS database, Navy records, and historical records from previous contractors as needed to assemble the inventory in the office. At a minimum, the following physical features and history of each well will be identified if possible:

- Well identification number, permit number, location by referenced survey coordinates, distance from prominent site features, and location of the well on a map.

- Installation date, drilling method, well development method, and drilling contractor.

- Depth to bedrock (as applicable), where rock cores were not taken, auger refusal, drive casing refusal, or penetration test results (blow counts for split-barrel sampling) may be used to estimate the bedrock interface.

- Soil profile/stratigraphy and borehole depth/diameter.

- Elevations of the top of the protective casing, top of the well riser, and ground surface.

- Total depth of the well.

- Type of well materials – type, slot size, length and elevation/depth of the screen.

- Elevation/depth of the top and bottom of the filter pack and well seal and its type and size.

- Analytical results, plume/source location, and sensitive ecological areas near the well location.

- Any records or notes concerning damage to well, difficulty of sampling, high turbidity levels, high pH (which could indicate leakage of water through grout), or unusual chemistry of well samples.

When the inventory of existing records are complete, the database will be printed out and given to each field crew member. The field team will use this information to properly locate and identify wells in the field. They will also check the information in the database, when possible, to verify its accuracy.

When in the field, the inspection, maintenance, and minor repair of each well or piezometer will consist of up to eight steps for each well. These are discussed in Sections 3.2.1 through 3.2.8.

3.2.1 External Well Inspection

The field crew will visit each well and piezometer to document their physical conditions, as described in Standard Operating Procedure (SOP) GH-1.2. The preliminary evaluation will include an updated review of the existing monitoring well inventory database, which contains pertinent information about monitoring wells at Site 16. When in the field, all inventory information will be checked and inspection data will be recorded on standard Monitoring Well Inspection Sheets (see SOP GH-1.2). The inspection data for each well will be recorded on an individual form, which includes the following information:

- Date of Inspection
- Basic well information
- Location information
- Well construction data
- Well tag and identification
- Conditions of protective cap and lock
- Protective devices around well
- Condition of well pad
- Condition of the seal surrounding the protective casing
- Presence of depressions or standing water around the casing
- Presence of any electrical cables and connections
- Presence of grout between the riser and outer protective casing
- The existence of drain holes in the protective casing
- Presence of a riser cap, method of attachment to casing, and venting of the riser
- General notes during inspection
- Inspection photo(s) and captions

Personnel will perform field inspections to locate all known monitoring wells and to locate any wells present but not identified during the preliminary evaluation. Field personnel will record the physical characteristics of each monitoring well. The date, time, and name of the field inspector(s) will also be recorded during the inspection. The physical characteristics of the well and related features (i.e., well protection) will be recorded after any maintenance is performed on the well (see Section 3.2.8 for additional details on well maintenance).

3.2.2 Measurement of Organic Vapors Present Inside Well Riser

When opening each monitoring well, field personnel will first disconnect any wires, cables, or electrical sources and then remove the lock and open the cap. Next, field personnel will check for the presence of organic vapors with a photoionization detector (PID) to determine whether volatile organic vapors are at a concentration that may pose a risk to the field technician or may indicate elevated concentrations of volatile organic compounds (VOCs) in groundwater. If the well contains a dedicated bladder pump, the water level monitoring port will be opened and a PID reading will be collected by inserting the PID tip through the open port without removing the cap. All PID readings will be recorded for each well inspected.

3.2.3 Measurement of Water Levels

The static water level in each well and piezometer will be measured using an M-scope or similar electronic water-level meter. All groundwater level measurements will be made to the nearest 0.01 foot and recorded on the Groundwater Level Measurement Sheet, as presented in SOP GH-1.2. When measuring groundwater levels, there should be a clearly established reference point of known elevation, which is normally identified by a mark on the upper edge of the inner well casing. If no mark exists to identify the reference point for elevation data, the northern side of the well casing should be used. The reference point will be noted in the applicable data field within the Well Inspection and Well Inventory Logs. To be useful, the reference point should be tied in with an established USGS benchmark or other properly surveyed elevation datum.

For some wells where high concentrations of VOCs have been noted in past samples, a non-aqueous phase liquid (NAPL) interface probe will be used to measure depth to water and thickness of any light NAPL (LNAPL) or dense NAPL (DNAPL) layer that might be present at the top or the bottom of the water column, respectively. The interface probe will not be used to look for presence of DNAPL layer if a dedicated pump is present in the well.

To the extent possible, all groundwater level measurements at a given site should be collected within a reasonable time frame to minimize temporal differences in water level elevations due to rainfall, tide fluctuations, or change(s) in barometric pressure. Weather changes that occur over the period of time during which water levels are being taken (such as precipitation and barometric pressure changes) should be noted in the Well Inspection Log and/or Daily Activity Log as part of standard daily record keeping.

3.2.4 Inspection of Internal Pump Hangers and Tubing

After the cap of a well has been removed and a PID reading has been collected and recorded, the inside of the riser pipe will be inspected and information will be recorded regarding:

- Presence of a survey mark on the well casing
- Cap function, type, and condition
- Physical characteristics and composition of the inner casing or riser, including inner diameter and annular space
- Presence and conditions of dedicated sampling equipment tubing and hanger cables (as applicable)

If possible, the sampling equipment will be lifted a short distance upward and the type(s) of hangers and tubing associated with the sampling equipment and their physical conditions will be visually inspected. All information and observations will be recorded on the Well Inspection Log Sheet. (If equipment is removed from the well, static water levels should not be recorded for 24 hours to allow the well to equilibrate.)

3.2.5 Measure Total Depth of Well

The measurement of the total depth of the well may be accomplished using a weighted tape measure or weighted electronic water level indicator. If there is a dedicated bladder pump installed in well, the inspector will be careful not to tangle weighted tape with pump, pump hanger, and tubing. The weighted tape will be advanced slowly near the bottom of the well if sediment is present (the presence of sediment on the weight upon removal should be noted). The depth to the bottom of well or sediment interface will be recorded on the Well Inspection Log.

3.2.6 Test Dedicated Bladder Pump (for wells which contain dedicated pumps)

If a dedicated bladder pump is installed in the well, the pump will be tested for operating capabilities. The pump will be hooked up to controller unit (e.g., QED controller) and the compressed nitrogen tank per manufacturer's recommendations. The operational capabilities of the pump will be tested by operating the pump between 100 and 300 liters per minute for up to 10 minutes. Flow rate(s) will be measured using bucket of known capacity and a watch, a visual description of turbidity will be recorded. Any noticeable odors during the testing period will also be recorded. All information, including date, field personnel present, start time, end time, and total water pumped will be recorded on a Well Inspection Log Sheet. If the pump is pumping in an acceptable manner, then the well inspection will be considered complete and the well will be capped and locked. Otherwise, the inspection will proceed to Section 3.2.7.

3.2.7 Pump and Tubing Inspection

If a bladder pump does not appear to be functioning properly, clean sheet plastic will be laid on the ground, and the pump and tubing will be removed from the well, and laid on the clean plastic. The entire length of tubing and tubing attachment points will be inspected for cracks, leaks, and loose connections. The pump will also be inspected for external damage. The operation of the pump will be tested in tub of clean potable water. If pump still does not function properly or at an acceptable rate, the non-functioning unit will be placed in clean plastic bags which will be tied shut and properly labeled (including well number, pump serial no., date of removal, and operating problem). The well inspection information will be recorded in the field log book.

3.2.8 Minor Well Maintenance

Minor monitoring well maintenance will be performed as needed during the field inspection. Minor maintenance activities are those that can be completed with basic tools and supplies available during the field inspection. Such minor activities may consist of maintaining access and security to wells left in place. Specific minor well maintenance activities may include the following:

- Brush and vegetation clearing – Any small brush, limbs, roots, vines, and other vegetation will be cleared at the well location to allow clear and unobstructed access to the well. Clearing for vehicular access to the general well location is considered major maintenance and is not necessarily part of minor maintenance. However, major access obstructions will be noted on the Well Inspection Log for future action.

- Well Identification – Well tags or other permanent identification may not be present, may be damaged, or may not be legible. All wells should have at least a temporary well identification marking with the well identification, alias, or other discernable identification. If necessary, a permanent paint marker or similar tool will used during inspection to apply the well identification in a visible and protected location until a permanent well tag can be installed.

- Lock and well security devices – Individual locks will be replaced as coordinated with the Navy or other contact to determine lock type and key number to be used. Dry graphite will be used as a lubricant for the well locks in lieu of VOC/SVOC based lubricants. Locks that cannot be opened will be cut with bolt cutters and replaced with new locks. Replacement locks will be heavy-duty brass type.

The type of maintenance performed during the field inspection will be noted on the Well Inspection Log. The overall condition of the well and other features at the well will be recorded initially and after

maintenance is performed at the well (i.e., if the lock is missing and replaced, the Well Inspection Log will not record the current lock condition as "missing," but rather as "present and secure." However, the Well Inspection Log will also have an entry under "Actions Taken" to note that the lock was missing and was replaced).

The need for major well maintenance, such as repairing broken risers, welding lock hasps on outer well casings, installing new concrete well pads, reinstalling protective bollards, scraping and painting outer well casings, grouting well seals, etc. should be noted on the Well Inspection Log as appropriate. Major maintenance activities are not planned to be performed during this routine field inspection task. Such tasks will most likely be scoped and performed under a different work plan and performed at a later date.

3.4 INSTALLATION OF STAFF GAUGES AND MEASUREMENT OF SURFACE WATER LEVELS

Up to six surface water staff gauges will be installed in and near Site 16. Three of the gauges will be installed in Davol Pond and the two unnamed ponds east-northeast of Davol Pond. One staff gauge will be installed in Allen Harbor. The locations of these four staff gauges are shown on Figure 3-2. One or two other staff gauges may be installed in retention basins or small ponds, if they exist, at Site 16 or the area directly northwest of Site 16 and east of Building 224. Staff gauges will consist of a three-foot long, 2-in by 2-in wooden stake (or a similar implement) that is driven into the pond/harbor sediment near the shoreline of each water body. Each stake will have a large tack driven into the top of the stake and offset to one edge of the stake. All water level measurements will be "depth to water" and measured from the top edge of the stake (nearest to the tack) down to the waterline. The top of each stake will be surveyed during Phase III – Stage 3. The top elevation minus the depth to water will yield the surface water elevation on the day of measurement.

3.5 FIELD DOCUMENTATION

Specific documentation to be completed during this field event includes the following:

- Daily Activity Log [completed by the Field Operation Leader (FOL) and/or individual field inspectors if directed by the FOL]

- Monitoring Well Inspection Sheets (one sheet completed for each well)

- Well Inventory Database (viewable to all field personnel and updated as appropriate via the Well Inspection Log)

- Equipment Calibration Logs

- Groundwater Level Measurement Sheet

Details regarding field documentation requirements are described in SOP SA-6.3.

3.6 SURVEYING OF WELL AND STAFF GAUGE LOCATIONS

It is assumed that all existing wells and piezometers have already been surveyed and that the survey data are accurate. If a well or piezometer is not found at a location where horizontal coordinates show that it should be located, then the well will be resurveyed during Stage 3. If a well or piezometer is bent, broken, or in any way damaged and repairs are made to the well, then the elevation of the new water level measurement reference point will be surveyed during Stage 3. Any changes to the reference point elevation or horizontal location coordinates of a well or piezometer will be entered into the GIS well database, will be reported to the Navy and EPA, and will be explicitly described in the Phase III RI.

A laser auto-level will be used to obtain approximate elevations for the reference points for each staff gauge. Known top-of-riser elevations from nearby wells will be used as reference points in order to get an approximate elevation for the staff gauges during Stage 1. More precise locations and elevations of staff gauges will be obtained during Stage 3 via a licensed surveyor.

3.7 EQUIPMENT DECONTAMINATION

Decontamination of sampling equipment (e.g., water level indicators and interface probes) will be conducted prior to and between measurements at each well (SOPs GH-1.2 and SA-7.1). These instruments will be decontaminated using the following the procedures:

- Thoroughly rinse the equipment with potable water

- Wash/flush the equipment with non-phosphate detergent solution (e.g., Liquinox), using cloths if needed to rub down the surfaces to remove grit and film

- Flush the equipment with tap water to remove all of the detergent solution

- Flush the equipment with distilled/deionized water

Care will be taken to not get sensitive electronic components of the field equipment wet (see equipment owner's manuals for suggested cleaning procedures).

3.8 INVESTIGATION-DERIVED WASTE MANAGEMENT

This section addresses the procedures for handling, collection, and storage of investigation-derived waste (IDW) generated during the Stage 1 investigations. Three types of IDW will be generated: monitoring well purge water, equipment decontamination waste water, and discharge tubing/personal protective equipment (PPE) (solid wastes). Based on the historical site activities and types of contaminants present, none of these IDW materials is expected to present a significant risk to human health or the environment if properly managed.

Purge and decontamination waste water will be containerized in 55-gallon drums at the time of generation. All groundwater pumped from the wells during the testing of pumps will be collected in 5-gallon buckets and transported to Department of Transportation (DOT)-approved, 17H, 55-gallon drums. Detailed records will be kept regarding the amount of groundwater that was contributed from each well and which drums were used to contain the water. The drums will be marked as IDW and labeled with the description of the drum contents, site name, the date the drum was filled, and contact information consisting of name, address, and phone number of the generator. The drummed IDW water will be staged at a location designated by the Navy pending its proper disposal. A composite sample will be collected for analyses of volatile organic compounds, semi-volatile organic compounds, and metals to determine disposal requirements. A subcontractor will be acquired for proper disposing of the drum(s) and contents. It is presumed that liquid wastes will be non-RCRA and non-TSCA hazardous waste. It is presumed that the waste disposal subcontractor will conduct the characterization analyses. A letter will be prepared to describe the removal and disposal of IDW from the site.

Expendable personal protective clothing and equipment (PPE) to be used during the Phase III – Stage 1 Event is limited to nitrile gloves, work gloves, and Tyvek uniforms, unless unforeseen circumstances arise which may require more extensive or elaborate PPE (see HASP, Appendix B). All expendable clothing items, used polyethylene tubing from wells, and other trash will be collected and placed in 55-gallon plastic garbage bags. The solid wastes generated during sampling and decontamination activities will be disposed in on-site trash receptacles as directed by the Navy.

TABLE 3-1

MONITORING WELLS FOR WATER LEVEL MEASUREMENT EVENT
STAGE 1 OF PHASE III RI QAPP FOR INSTALLATION RESTORATION PROGRAM SITE 16
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well	Sample Number	Rationales for Sampling
EXISTING WELLS TO BE SAMPLED DURING PHASE III		
SHALLOW OVERBURDEN		
MW16-01S	MW16-01S-NWG-mmddyy	Well located along western edge; resampling will help delineate plume boundary.
MW16-03S	MW16-03S-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-04S	MW16-04S-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area).
MW16-05S	MW16-05S-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area).
MW16-06S	MW16-06S-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-07S	MW16-07S-NWG-mmddyy	Well located along northwestern edge of plume; resampling will help delineate plume boundary.
MW16-11S	MW16-11S-NWG-mmddyy	Well located along western edge; resampling will help delineate plume boundary.
MW16-15S	MW16-15S-NWG-mmddyy	Well located next to former Building 41; resample to verify contaminant concentrations.
MW16-17S	MW16-17S-NWG-mmddyy	Well located along southern edge; resampling will help delineate plume boundary.
MW16-23S	MW16-23S-NWG-mmddyy	Well located along centerline of plume; resampling will help refine understanding of extent of contamination.
MW16-25S	MW16-25S-NWG-mmddyy	Well located along southesterrn edge; resampling will help delineate plume boundary.
MW16-33S	MW16-33S-NWG-mmddyy	Well located along southern edge; resampling will help delineate plume boundary.
MW16-37S	MW16-37S-NWG-mmddyy	Well located next to former Building 41; had highest TCE concentration in shallow zone.
MW16-40S	MW16-40S-NWG-mmddyy	Well located along centerline of plume in north-central area; resample to verify concentrations and temporal trends.
MW16-44S	MW16-44S-NWG-mmddyy	Well located along centerline of plume in north-central area; resample to verify concentrations and temporal trends.
MW16-45S	MW16-45S-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-46S	MW16-46S-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-47S	MW16-47S-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-58S	MW16-58S-NWG-mmddyy	Well located along northeastern edge; resampling will help delineate plume boundary.
RMW-01S	RMW-01S-NWG-mmddyy	Well located west of Site 16; resampling will help determine if Site 3 contamination is migrating eastward to Site 16.
INTERMEDIATE OVERBURDEN		
MW16-04I	MW16-04I-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area).
MW16-05I	MW16-05I-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area).
MW16-13I	MW16-13I-NWG-mmddyy	Well located next to former Building 41; resample to verify contaminant concentrations.
MW16-17I	MW16-17I-NWG-mmddyy	Well located along southern edge of plume; resampling will help delineate plume boundary.
MW16-18I	MW16-18I-NWG-mmddyy	Well located along southeastern edge of plume; resampling will help delineate plume boundary.
MW16-19I	MW16-19I-NWG-mmddyy	Well located along southeastern edge of plume; resampling will help delineate plume boundary.
MW16-20I	MW16-20I-NWG-mmddyy	Well located along eastern edge of plume; resampling will help delineate plume boundary.
MW16-27I	MW16-27I-NWG-mmddyy	Well located east of Allens Harbor Road and may indicate that the plume travels slightly east before bending back to Allen Harbor.
MW16-28I	MW16-28I-NWG-mmddyy	Well located east of Allens Harbor Road and may indicate that the plume travels slightly east before bending back to Allen Harbor.
MW16-33I	MW16-33I-NWG-mmddyy	Southernmost well in intermediate zone, but still has detectable TCE. Note: well has moderately high concentration of PCE, unlike other intermediate wells around it.
MW16-37I	MW16-37I-NWG-mmddyy	Well located next to former Building 41 and has highest TCE concentration in intermediate zone.
MW16-39I	MW16-39I-NWG-mmddyy	Well located in eastern extension of plume; resample to verify contaminant concentrations.
MW16-41I	MW16-41I-NWG-mmddyy	Well located in north-central area and contains moderately high TCE concentration.
MW16-45I	MW16-45I-NWG-mmddyy	Well located in north-central area and contains moderately high TCE concentration.
MW16-48I	MW16-48I-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-49I	MW16-49I-NWG-mmddyy	Well located along northeastern edge; resampling will help delineate plume boundary.
MW16-50I	MW16-50I-NWG-mmddyy	Well located along northeastern edge; resampling will help delineate plume boundary.
MW16-57I	MW16-57I-NWG-mmddyy	Well located rail yard area on eastern side of Site 16; has relatively high TCE concentrations which may be eastern extension of primary plume.
MW16-58I2	MW16-58I2-NWG-mmddyy	Well located in north-central area and contains moderately high TCE concentration.

TABLE 3-1

MONITORING WELLS FOR WATER LEVEL MEASUREMENT EVENT
STAGE 1 OF PHASE III RI QAPP FOR INSTALLATION RESTORATION PROGRAM SITE 16
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

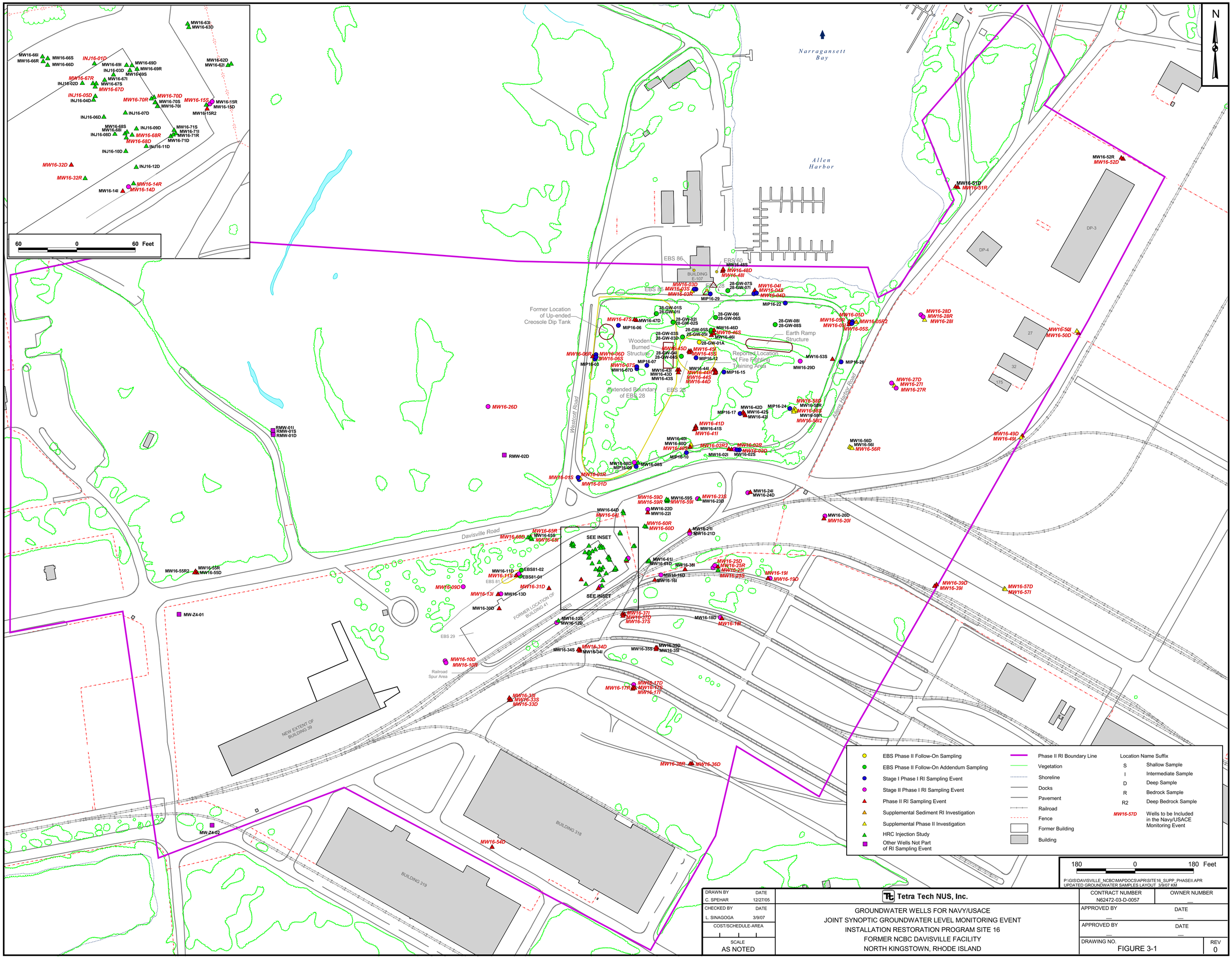
Well	Sample Number	Rationales for Sampling
MW16-59I	MW16-59I-NWG-mmddyy	Well located near centerline of plume and contains high concentration of TCE.
MW16-64I	MW16-64I-NWG-mmddyy	Well located near centerline of plume and contains high concentration of TCE.
MW16-65I	MW16-65I-NWG-mmddyy	Well located west of Site 16; resampling will help determine if Site 3 contamination is migrating eastward to Site 16.
RMW-01I	RMW-01I-NWG-mmddyy	Well located west of Site 16; resampling will help determine if Site 3 contamination is migrating eastward to Site 16.
DEEP OVERBURDEN		
INJ16-01D	INJ16-01D-NWG-mmddyy	Well located on northwestern side of former Building 41 and has high concentration of TCE.
INJ16-05D	INJ16-05D-NWG-mmddyy	Well located on northwestern side of former Building 41 and has high concentration of TCE.
MW16-01D	MW16-01D-NWG-mmddyy	Well located along western edge; resampling will help delineate plume boundary.
MW16-02D	MW16-02D-NWG-mmddyy	Well located near centerline of plume and contains high concentration of TCE.
MW16-03D	MW16-03D-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-04D	MW16-04D-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area) and has high concentration of TCE.
MW16-05D	MW16-05D-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area) and has high concentration of TCE.
MW16-06D	MW16-06D-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-09D	MW16-09D-NWG-mmddyy	Well located along southwestern edge; resampling will help delineate plume boundary.
MW16-10D	MW16-10D-NWG-mmddyy	Well located along southwestern edge; resampling will help delineate plume boundary.
MW16-14D	MW16-14D-NWG-mmddyy	Well located on southeastern side of former Building 41 and has high concentration of TCE.
MW16-17D	MW16-17D-NWG-mmddyy	Well located along southeastern edge; resampling will help delineate plume boundary.
MW16-19D	MW16-19D-NWG-mmddyy	Well located rail yard area on eastern side of Site 16; has relatively high TCE concentration that may be eastern offshoot of primary plume.
MW16-25D	MW16-25D-NWG-mmddyy	Well located east of former Building 41 and has high concentration of TCE.
MW16-26D	MW16-26D-NWG-mmddyy	Well located west of north-central area; resampling will help determine if Site 3 contamination is migrating eastward to Site 16
MW16-27D	MW16-27D-NWG-mmddyy	Well located along northeastern edge of plume.
MW16-28D	MW16-28D-NWG-mmddyy	Well located east of Allens Harbor Road and may indicate that the plume travels slightly east before bending back to Allen Harbor.
MW16-31D	MW16-31D-NWG-mmddyy	Well located beneath former Building 41 and has moderately high concentration of TCE.
MW16-32D	MW16-32D-NWG-mmddyy	Well located beneath former Building 41 and has moderately high concentration of TCE.
MW16-33D	MW16-33D-NWG-mmddyy	Well located south of former Building 41 and has very low concentration of TCE; resampling will help delineate plume boundary.
MW16-34D	MW16-34D-NWG-mmddyy	Well located along southeastern edge; resampling will help delineate plume boundary. Note: well has moderately high concentration of PCE, unlike other deep wells around it.
MW16-36D	MW16-36D-NWG-mmddyy	Well located along southeastern edge; resampling will help delineate plume boundary.
MW16-37D	MW16-37D-NWG-mmddyy	Well located on eastern side of former Building 41; resampling will help delineate plume boundary.
MW16-39D	MW16-39D-NWG-mmddyy	Well located rail yard area on eastern side of Site 16; has relatively low TCE concentrations which may be eastern extension of primary plume.
MW16-41D	MW16-41D-NWG-mmddyy	Well located in north-central area and contains moderately high TCE concentration.
MW16-44D	MW16-44D-NWG-mmddyy	Well located in north-central area and contains moderately high TCE concentration.
MW16-45D	MW16-45D-NWG-mmddyy	Well located in north-central area and contains moderately high TCE concentration.
MW16-48D	MW16-48D-NWG-mmddyy	Well located along northwestern edge; resampling will help delineate plume boundary.
MW16-49D	MW16-49D-NWG-mmddyy	Well located along northeastern edge; resampling will help delineate plume boundary.
MW16-50D	MW16-50D-NWG-mmddyy	Well located along northeastern edge; resampling will help delineate plume boundary.
MW16-52D	MW16-52D-NWG-mmddyy	Well located on far northeastern side of plume where TCE barely detectable.
MW16-54D	MW16-54D-NWG-mmddyy	Well located between Buildings 318 and 319; resampling will help to evaluate whether contaminants were released in this area.
MW16-57D	MW16-57D-NWG-mmddyy	Well located rail yard area on eastern side of Site 16; has detectable TCE concentrations which may be eastern extension of primary plume.
MW16-58D	MW16-58D-NWG-mmddyy	Well located in north-central area and contains high TCE concentration.
MW16-59D	MW16-59D-NWG-mmddyy	Well located along centerline of plume northeast of former Building 41 and contains high concentration of TCE.
MW16-60D	MW16-60D-NWG-mmddyy	Well located along centerline of plume northeast of former Building 41 and contains high concentration of TCE.

TABLE 3-1

MONITORING WELLS FOR WATER LEVEL MEASUREMENT EVENT
STAGE 1 OF PHASE III RI QAPP FOR INSTALLATION RESTORATION PROGRAM SITE 16
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well	Sample Number	Rationales for Sampling
MW16-65D	MW16-65D-NWG-mmddyy	Well located along northwestern side of Building 41; resampling will help delineate plume boundary.
MW16-67D	MW16-67D-NWG-mmddyy	Well located beneath former Building 41; TCE concentration relatively high; resampling will help characterize temporal trend of concentrations
MW16-68D	MW16-68D-NWG-mmddyy	Well located beneath former Building 41; TCE concentration relatively high; resampling will help characterize temporal trend of concentrations
MW16-70D	MW16-70D-NWG-mmddyy	Well located beneath former Building 41; TCE concentration relatively high; resampling will help characterize temporal trend of concentrations
MW-Z4-01	MW-Z4-01-NWG-mmddyy	Well located on far western side of Site 16; resampling will help determine if Site 3 contamination is migrating eastward to Site 16.
MW-Z4-02	MW-Z4-02-NWG-mmddyy	Well located on far southwestern side of Site 16; resampling will help determine if Site 3 contamination is migrating eastward to Site 16.
RMW-02D	RMW-02D-NWG-mmddyy	Well located west of north-central area; resampling will help determine if Site 3 contamination is migrating eastward to Site 16
BEDROCK		
MW16-01R	MW16-01R-NWG-mmddyy	Well located along northwestern edge of plume; resample to help delineate plume edge.
MW16-02R	MW16-02R-NWG-mmddyy	Well located in north-central area and contains high TCE concentration; resample to verify concentrations and refine understanding of extent of contamination.
MW16-03R	MW16-03R-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area).
MW16-05R	MW16-05R-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area).
MW16-06R	MW16-06R-NWG-mmddyy	Well located along northwestern edge of plume; resample to help delineate plume edge.
MW16-10R	MW16-10R-NWG-mmddyy	Well located along northwestern edge of plume; resample to help delineate plume edge.
MW16-14R	MW16-14R-NWG-mmddyy	Well located on eastern side of former Building 41. Identified by EPA as possible location of groundwater upwelling from bedrock.
MW16-17R	MW16-17R-NWG-mmddyy	Well located along southeastern edge; resampling will help delineate plume boundary.
MW16-25R	MW16-25R-NWG-mmddyy	Well located along southeastern edge of plume; resample to help delineate plume boundary.
MW16-27R	MW16-27R-NWG-mmddyy	Well located along northeastern edge of plume; resample to help delineate plume edge.
MW16-28R	MW16-28R-NWG-mmddyy	Well located along northeastern edge of plume; resample to help delineate plume edge.
MW16-32R	MW16-32R-NWG-mmddyy	Well located beneath former Building 41 and contains moderately high concentration of TCE.
MW16-36R	MW16-36R-NWG-mmddyy	Well located toward southeastern corner of Site 16; resample to confirm that contaminants are not migrating toward the southeast.
MW16-44R	MW16-44R-NWG-mmddyy	Well located in north-central area and contains moderately high TCE concentration.
MW16-51R	MW16-51R-NWG-mmddyy	Well located in northeastern corner of Site 16; resample to help delineate plume edge.
MW16-56R	MW16-56R-NWG-mmddyy	Well located along eastern edge of plume; resample to help delineate plume edge.
MW16-59R	MW16-59R-NWG-mmddyy	Well located along centerline of plume northeast of former Building 41 and contains high concentration of TCE.
MW16-60R	MW16-60R-NWG-mmddyy	Well located along centerline of plume northeast of former Building 41 and contains highest concentration of TCE in shallow bedrock zone.
MW16-65R	MW16-65R-NWG-mmddyy	Well located along western edge; resampling will help delineate plume boundary.
MW16-67R	MW16-67R-NWG-mmddyy	Well located beneath former Building 41 and contains moderately high TCE concentrations of TCE.
MW16-68R	MW16-68R-NWG-mmddyy	Well located beneath former Building 41. Identified by EPA as possible location of groundwater upwelling from bedrock.
MW16-70R	MW16-70R-NWG-mmddyy	Well located beneath former Building 41. Identified by EPA as possible location of groundwater upwelling from bedrock.
DEEP BEDROCK		
MW16-02R2	MW16-02R2-NWG-mmddyy	Well located in north-central area and contains highest TCE concentration in deep bedrock zone.
MW16-05R2	MW16-05R2-NWG-mmddyy	Well located near Allen Harbor (i.e., assumed groundwater discharge area) and has low concentration of TCE.

mm/dd/yy = the sampling date in month/day/year format (two digits for each segment of the data)

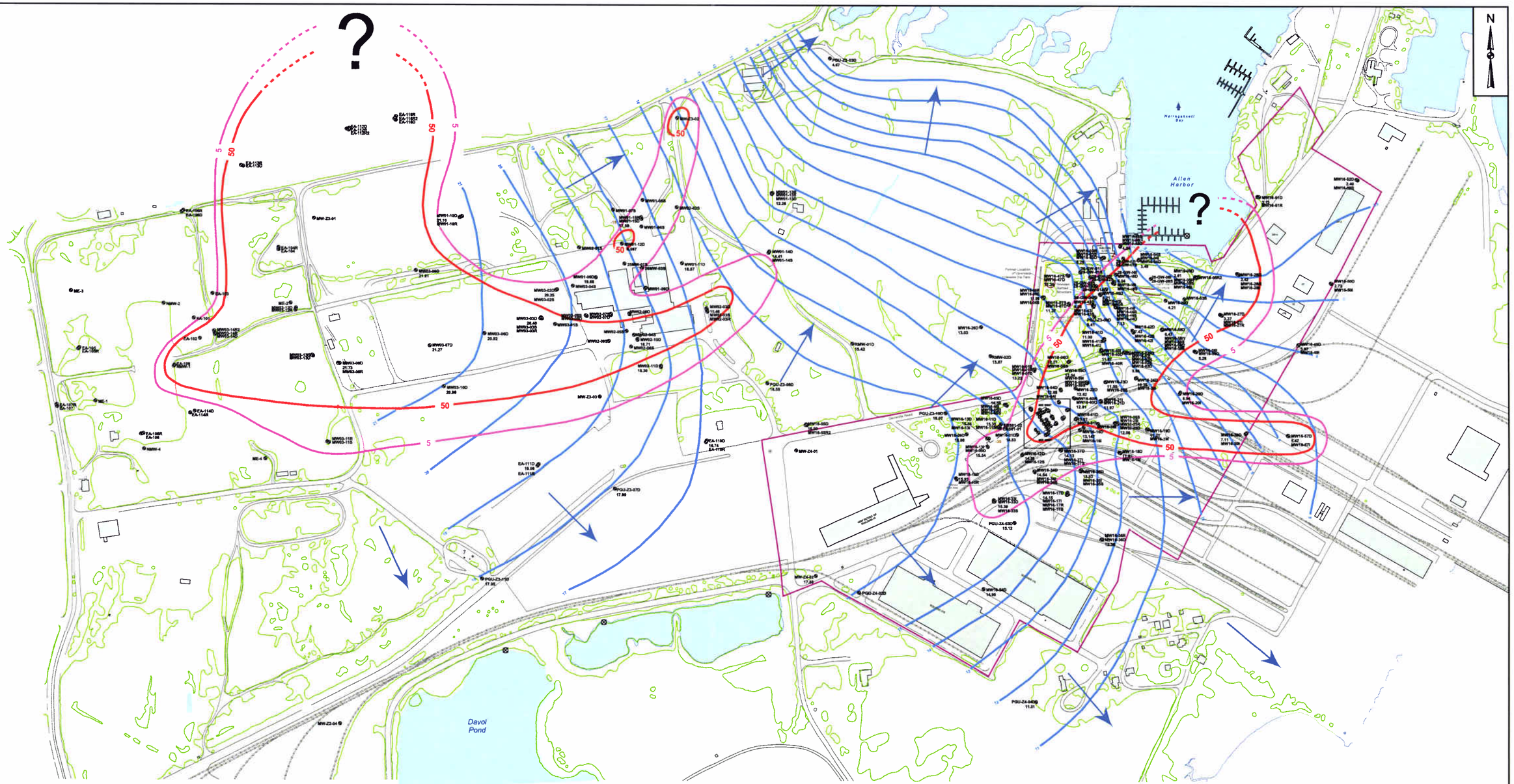


DRAWN BY: C. SPEHAR	DATE: 12/27/05
CHECKED BY: L. SINAGOGA	DATE: 3/9/07
COST/SCHEDULE-AREA	
SCALE: AS NOTED	

Tetra Tech NUS, Inc.

GROUNDWATER WELLS FOR NAVY/USACE
JOINT SYNOPTIC GROUNDWATER LEVEL MONITORING EVENT
INSTALLATION RESTORATION PROGRAM SITE 16
FORMER NCBC DAVISVILLE FACILITY
NORTH KINGSTOWN, RHODE ISLAND

CONTRACT NUMBER: N62472-03-D-0057	OWNER NUMBER: —
APPROVED BY: —	DATE: —
APPROVED BY: —	DATE: —
DRAWING NO.: FIGURE 3-1	REV: 0



DRAWN BY	DATE
S. PAXTON	10/16/06
CHECKED BY	DATE
LAS	3/9/07
COST/SCHEDULE-AREA	
SCALE	AS NOTED

Tetra Tech NUS, Inc.

APPROXIMATE STAFF GAUGE LOCATION
JOINT SYNOPTIC GROUNDWATER LEVEL MONITORING EVENT
INSTALLATION RESTORATION PROGRAM SITE 16
FORMER NCBC DAVISVILLE FACILITY
NORTH KINGSTOWN, RHODE ISLAND

CONTRACT NUMBER	OWNER NUMBER
N62472-03-D-0057	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV
FIGURE 3-2	0

4.0 DATA EVALUATION AND DECISION PROCESSES

Data collected from the site during Phase III – Stage 1 investigations will be used to:

- Determine if changes or additions need to be made to the list of wells that are scheduled to be sampled during Stage 3 (see Table 3-1).

- Determine if a well is so badly damaged that it should not be sampled, but might still be used to measure water levels in the future. (Even if a given well is maintained for water level measurements, it still may require some minor repairs.)

- Prepare comprehensive potentiometric surface maps for the shallow, intermediate, and deep overburden units and the bedrock (shallow and deep combined), which cover the Nike Site and Sites 03 and 16.

- Determine if groundwater might be flowing into surface water bodies and possible locations of discharge.

These results will be then be used to modify, if necessary, the conceptual site model and the Phase III investigative plans scheduled for Stages 2 and 3.

REFERENCES

Tetra Tech NUS, Inc. (TtNUS). July 2006. Phase III Quality Assurance Project Plan For Installation Restoration Program Site 16, Former Naval Construction Battalion Center Davisville, North Kingstown, Rhode Island (draft). Submitted to Naval Facilities Engineering Command Mid-Atlantic, Norfolk, Virginia. Contract No. N62472-03-D-0057.

Tetra Tech NUS, Inc. (TtNUS). September 2006. Supplemental Phase II Remedial Investigation Data Package Report For Installation Restoration Program Site 16, Former Naval Construction Battalion Center Davisville, North Kingstown, Rhode Island (draft). Submitted to Naval Facilities Engineering Command Mid-Atlantic, Norfolk, Virginia. Contract No. N62472-03-D-0057.

APPENDIX A

TtNUS STANDARD OPERATING PROCEDURES

TETRA TECH NUS, INC.	STANDARD OPERATING PROCEDURES	Number GH-1.2	Page 1 of 9
		Effective Date 09/03	Revision 2
		Applicability Tetra Tech NUS, Inc.	
		Prepared Earth Sciences Department	
Subject EVALUATION OF EXISTING MONITORING WELLS AND WATER LEVEL MEASUREMENT		Approved D. Senovich	

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1.0 PURPOSE

The purpose of this procedure is to provide reference information regarding the proper methods for evaluating the physical condition and project utility of existing monitoring wells and determining water levels.

2.0 SCOPE

The procedures described herein are applicable to all existing monitoring wells and, for the most part, are independent of construction materials and methods.

3.0 GLOSSARY

Hydraulic Head - The height to which water will rise in a well.

Water Table - A surface in an unconfined aquifer where groundwater pressure is equal to atmospheric pressure (i.e., the pressure head is zero).

4.0 RESPONSIBILITIES

Site Geologist/Hydrogeologist - Has overall responsibility for the evaluation of existing wells, obtaining water level measurements and developing groundwater contour maps. The site geologist/hydrogeologist (in concurrence with the Project Manager) shall specify the reference point from which water levels are measured (usually a specific point on the upper edge of the inner well casing), the number and location of data points which shall be used for constructing a contour map, and how many complete sets of water levels are required to adequately define groundwater flow directions (e.g., if there are seasonal variations).

Field Personnel - Must have a basic familiarity with the equipment and procedures involved in obtaining water levels and must be aware of any project-specific requirements or objectives.

5.0 PROCEDURES

Accurate, valid and useful groundwater monitoring requires that four important conditions be met:

- Proper characterization of site hydrogeology.
- Proper design of the groundwater monitoring program, including adequate numbers of wells installed at appropriate locations and depths.
- Satisfactory methods of groundwater sampling and analysis to meet the project data quality objectives (DQOs).
- The assurance that specific monitoring well samples are representative of water quality conditions in the monitored interval.

To insure that these conditions are met, adequate descriptions of subsurface geology, well construction methods and well testing results must be available. The following steps will help to insure that the required data are available to permit an evaluation of the utility of existing monitoring wells for collecting additional samples.

5.1 Preliminary Evaluation

A necessary first step in evaluating existing monitoring well data is the study and review of the original work plan for monitoring well installation (if available). This helps to familiarize the site geologist/hydrogeologist with site-specific condition, and will promote an understanding of the original purpose of the monitoring wells.

The next step of the evaluation should involve a review of all available information concerning borehole drilling and well construction. This will allow interpretation of groundwater flow conditions and area geology, and will help to establish consistency between hydraulic properties of the well and physical features of the well or formation. The physical features which should be identified and detailed, if available, include:

- The well identification number, permit number and location by referenced coordinates, the distance from prominent site features, or the location of the well on a map.
- The installation dates, drilling methods, well development methods, past sampling dates, and drilling contractors.
- The depth to bedrock -- where rock cores were not taken, auger refusal, drive casing refusal or penetration test results (blow counts for split-barrel sampling) may be used to estimate bedrock interface.
- The soil profile and stratigraphy.
- The borehole depth and diameter.
- The elevation of the top of the protective casing, the top of the well riser, and the ground surface.
- The total depth of the well.
- The type of well materials, screen type, slot size, and length, and the elevation/depths of the screen, interval, and/or monitored interval.
- The elevation/depths of the tops and bottom of the filter pack and well seals and the type and size.

5.2 Field Inspection

During the onsite inspection of existing monitoring wells, features to be noted include:

- The condition of the protective casing, cap and lock.
- The condition of the cement seal surrounding the protective casing.
- The presence of depressions or standing water around the casing.
- The presence of and condition of dedicated sampling equipment.
- The presence of a survey mark on the inner well casing.

If the protective casing, cap and lock have been damaged or the cement collar appears deteriorated, or if there are any depressions around the well casing capable of holding water, surface water may have infiltrated into the well. This may invalidate previous sampling results unless the time when leakage started can be precisely determined.

The routine physical inspection must be followed by a more detailed investigation to identify other potential routes of contamination or sampling equipment malfunction. Any of these occurrences may invalidate

previously-collected water quality data. If the monitoring well is to be used in the future, considerations shown in the steps described above should be rectified to rehabilitate the well.

After disconnecting any wires, cables or electrical sources, remove the lock and open the cap. Check for the presence of organic vapors with a photoionization detector (PID) or flame-ionization detector (FID) to determine the appropriate worker safety level. The following information should be noted:

- Cap function.
- Physical characteristics and composition of the inner casing or riser, including inner diameter and annular space.
- Presence of grout between the riser and outer protective casing and the existence of drain holes in the protective casing.
- Presence of a riser cap, method of attachment to casing, and venting of the riser.
- Presence of dedicated sampling equipment; if possible, remove such equipment and inspect size, materials of construction and condition.

The final step of the field inspection is to confirm previous hydraulic or physical property data and to obtain data not previously available. This includes the determination of static water levels, total well depth and well obstruction. This may be accomplished using a weighted tape measure which can also be used to check for sediment (the weight will advance slowly if sediment is present, and the presence of sediment on the weight upon removal should be noted). If sediment is present and/or the well has not been sampled in 12 or more months, it should be redeveloped before sampling.

Lastly, as a final step, the location, condition and expected water quality of the wells should be reviewed in light of their usefulness for the intended purpose of the investigation.

See Attachment A, Monitoring Well Inspection Sheet.

5.3 Water Level (Hydraulic Head) Measurements

5.3.1 General

Groundwater level measurements can be made in monitoring wells, private or public water wells, piezometers, open boreholes, or test pits (after stabilization). Groundwater measurements should generally not be made in boreholes with drilling rods or auger flights present. If groundwater sampling activities are to occur, groundwater level measurements shall take place prior to well purging or sampling.

All groundwater level measurements shall be made to the nearest 0.01 foot, and recorded in the site geologist/hydrogeologist's field notebook or on the Groundwater Level Measurement Sheet (Attachment B), along with the date and time of the reading. The total depth of the well shall be measured and recorded, if not already known. Weather changes that occur over the period of time during which water levels are being taken, such as precipitation and barometric pressure changes, should be noted.

In measuring groundwater levels, there shall be a clearly-established reference point of known elevation, which is normally identified by a mark on the upper edge of the inner well casing. To be useful, the reference point should be tied in with an established USGS benchmark or other properly surveyed elevation datum. An arbitrary datum could be used for an isolated group of wells, if necessary.

Cascading water within a borehole or steel well casings can cause false readings with some types of sounding devices (chalked line, electrical). Oil layers may also cause problems in determining the true water level in a well. Special devices (interface probes) are available for measuring the thickness of oil layers and true depth to groundwater, if required.

Water level readings shall be taken regularly, as required by the site geologist/hydrogeologist. Monitoring wells or open-cased boreholes that are subject to tidal fluctuations should be read in conjunction with a tidal chart (or preferably in conjunction with readings of a tide staff or tide level recorder installed in the adjacent water body); the frequency of such readings shall be established by the site hydrogeologist. All water level measurements at a site used to develop a groundwater contour map shall be made in the shortest practical time to minimize affects due to weather changes.

5.3.2 Water Level Measuring Techniques

There are several methods for determining standing or changing water levels in boreholes and monitoring wells. Certain methods have particular advantages and disadvantages depending upon well conditions. A general description of these methods is presented, along with a listing of various advantages and disadvantages of each technique. An effective technique shall be selected for the particular site conditions by the site geologist/hydrogeologist.

In most instances, preparation of accurate potentiometric surface maps require that static water level measurements be obtained to a precision of 0.01 feet. To obtain such measurements in individual accessible wells, electrical water level indicator methods have been found to be best, and thus should be utilized. Other, less precise methods, such as the popper or bell sound, or bailer line methods, should be avoided. When a large number of (or continuous) readings are required, time-consuming individual readings are not usually feasible. In such cases, it is best to use a pressure transducer.

5.3.3 Methods

Water levels can be measured by several different techniques, but the same steps shall be followed in each case. The proper sequence is as follows:

1. Check operation of recording equipment above ground. Prior to opening the well, don personal protective equipment, as required. Never remove an air-tight lock (such as a J-plug) with your face over the well. Pressure changes within the well may explosively force the cap off once loosened.

2. Record all information specified below in the geologist/hydrogeologist's field notebook or on the Groundwater Level Measurement Sheet (Attachment B):

    - Well number.
    - Water level (to the nearest 0.01 foot). Water levels shall be taken from the surveyed reference mark on the top edge of the inner well casing. If the J-plug was on the well very tightly, it may take several minutes for the water level to stabilize.
    - Time and day of the measurement.
    - Thickness of free product if present.

Water level measuring devices with permanently marked intervals shall be used. The devices shall be free of kinks or folds which will affect the ability of the equipment to hang straight in the well pipe.

5.3.4 Water Level Measuring Devices

Electric Water Level Indicators

These are the most commonly used devices and consist of a spool of small-diameter cable and a weighted probe attached to the end. When the probe comes in contact with the water, an electrical circuit is closed and a meter, light, and/or buzzer attached to the spool will signal the contact.

There are a number of commercial electric sounders available, none of which is entirely reliable under all conditions likely to occur in a contaminated monitoring well. In conditions where there is oil on the water, groundwater with high specific conductance, water cascading into the well, steel well casing, or a turbulent water surface in the well, measuring with an electric sounder may be difficult.

For accurate readings, the probe shall be lowered slowly into the well adjacent to the survey mark on the inner well casing. The electric tape is read (to the nearest 0.01 ft.) at the measuring point and recorded where contact with the water surface was indicated.

Popper or Bell Sounder

A bell- or cup-shaped weight that is hollow on the bottom is attached to a measuring tape and lowered into the well. A "plopping" or "popping" sound is made when the weight strikes the surface of the water. An accurate reading can be determined by lifting and lowering the weight in short strokes, and reading the tape when the weight strikes the water. This method is not sufficiently accurate to obtain water levels to 0.01 feet, and thus is more appropriate for obtaining only approximate water levels quickly.

Pressure Transducer

Pressure transducers can be lowered into a well or borehole to measure the pressure of water and therefore the water elevation above the transducer. The transducer is wired into a recorder at the surface to record changes in water level with time. The recorder digitizes the information and can provide a printout or transfer the information to a computer for evaluation (using a well drawdown/recovery model). The pressure transducer should be initially calibrated with another water level measurement technique to ensure accuracy. This technique is very useful for hydraulic conductivity testing in highly permeable material where repeated, accurate water level measurements are required in a very short period of time. A sensitive transducer element is required to measure water levels to 0.01 foot accuracy.

Borehole Geophysics

Approximate water levels can be determined during geophysical logging of the borehole (although this is not the primary purpose for geophysical logging and such logging is not cost effective if used only for this purpose). Several logging techniques will indicate water level. Commonly-used logs which will indicate saturated/unsaturated conditions include the spontaneous potential (SP) log and the neutron log.

5.3.5 Data Recording

Water level measurements, time, data, and weather conditions shall be recorded in the geologist/hydrogeologist's field notebook or on the Groundwater Level Measurement Sheet. All water level measurements shall be measured from a known reference point. The reference point is generally a marked point on the upper edge of the inner well casing that has been surveyed for an elevation. The exact reference point shall be marked with permanent ink on the casing since the top of the casing may not be entirely level. It is important to note changes in weather conditions because changes in the barometric pressure may affect the water level within the well.

5.3.6 Specific Quality Control Procedures for Water Level Measuring Devices

All groundwater level measurement devices must be cleaned before and after each use to prevent cross contamination of wells. Manufacturer's instructions for cleaning the device shall be strictly followed. Some devices used to measure groundwater levels may need to be calibrated. These devices shall be calibrated to 0.01 foot accuracy and any adjustments/corrections shall be recorded in the field logbook/notebook. After the corrections/adjustments are made to the measuring device and entered in the field logbook/notebook, the corrected readings shall be entered onto the Groundwater Level Measurement Sheet (Attachment B). Elevations will be entered on the sheet when they become available.

5.4 Equipment Decontamination

Equipment used for water level measurements provide a mechanism for potentially cross contaminating wells. Therefore, all portions of a device which project down the well casing must be decontaminated prior to advancing to the next well. Decontamination procedures vary based on the project objectives but must be defined prior to conducting any field activities including the collection of water level data. Consult the project planning documents and SA-7.1 Decontamination of Field Equipment.

5.5 Health and Safety Considerations

Groundwater contaminated by volatile organic compounds may release toxic vapors into the air space inside the well pipe. The release of this air when the well is initially opened is a health/safety hazard which must be considered. Initial monitoring of the well headspace and breathing zone concentrations using a PID or FID shall be performed to determine required levels of protection. Under certain conditions, air-tight well caps may explosively fly off the well when the pressure is relieved. Never stand directly over a well when uncapping it.

6.0 RECORDS

A record of all field procedures, tests and observations must be recorded in the site logbook or designated field notebook. Entries in the log/notebook should include the individuals participating in the field effort, and the date and time. The use of annotated sketches may help to supplement the evaluation.

ATTACHMENT A
MONITORING WELL INSPECTION SHEET

Monitoring Well Inspection Sheet

Project Name: _____ Date: _____

Location: _____ Time: _____

Tidally Influenced: Y / N Personnel: _____

Field Measurements				
Well ID	PID Reading PPM	Depth to Water *	Total Depth *	Flush Mt./ Stick-up

Well Construction Details (Taken from construction logs)		
Total Depth *	Ground Elev.	Top/Btm Screen *

Check List:

Riser Pipe Material:
Riser Notched for Surveyors:
Well ID Tag In-place:
Well security:
Photo taken:

Condition of Well:

Protective Case:
Riser:
Well Pad:
Other:

Presence/Evidence of:

Standing Water Around Well:
Existing Sampling Equipment:
Sediment build-up in Well Btm:

Comments:

** = Measurements are from the top of the inner case to the nearest 0.01'*

ATTACHMENT B
GROUNDWATER LEVEL MESUREMENT SHEET

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: _____ **Project No.:** _____
Location: _____ **Personnel:** _____
Weather Conditions: _____ **Measuring Device:** _____
Tidally Influenced: Yes ___ No ___ **Remarks:** _____

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Comments

* All measurements to the nearest 0.01 foot, from surveyed mark (unless noted)

Page ____ of ____

TETRA TECH NUS, INC.	STANDARD OPERATING PROCEDURES	Number SA-7.1	Page 1 of 8
		Effective Date 09/03	Revision 3
		Applicability Tetra Tech NUS, Inc.	
		Prepared Earth Sciences Department	
Subject DECONTAMINATION OF FIELD EQUIPMENT		Approved D. Senovich	

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1.0 PURPOSE

Decontamination is the process of removing and/or neutralizing site contaminants that have contacted and/or accumulated on equipment. The objective/purpose of this SOP is intended to protect site personnel, general public, and the sample integrity through the prevention of cross contamination onto unaffected persons or areas. It is further intended through this procedure to provide guidelines regarding the appropriate procedures to be followed when decontaminating drilling equipment, monitoring well materials, chemical sampling equipment and field analytical equipment.

2.0 SCOPE

This procedure applies to all equipment including drilling equipment, heavy equipment, monitoring well materials, as well as chemical sampling and field analytical equipment decontamination that may be used to provide access/acquire environmental samples. Where technologically and economically feasible, single use sealed disposable equipment will be employed to minimize the potential for cross contamination. This procedure also provides general reference information on the control of contaminated materials.

3.0 GLOSSARY

Acid - For decontamination of equipment when sampling for trace levels of inorganics, a 10% solution of nitric acid in deionized water should be used. Due to the leaching ability of nitric acid, it should not be used on stainless steel.

Alconox/Liquinox - A brand of phosphate-free laboratory-grade detergent.

Decontamination Solution - Is a solution selected/identified within the Health and Safety Plan or Project-Specific Quality Assurance Plan. The solution is selected and employed as directed by the project chemist/health and safety professional.

Deionized Water (DI) - Deionized water is tap water that has been treated by passing through a standard deionizing resin column. This water may also pass through additional filtering media to attain various levels of analyte-free status. The DI water should meet CAP and NCCLS specifications for reagent grade, Type I water.

Potable Water - Tap water used from any municipal water treatment system. Use of an untreated potable water supply is not an acceptable substitute for tap water.

Pressure Washing - Employs high pressure pumps and nozzle configuration to create a high pressure spray of potable water. High pressure spray is employed to remove solids.

Solvent - The solvent of choice is pesticide-grade Isopropanol. Use of other solvents (methanol, acetone, pesticide-grade hexane, or petroleum ether) may be required for particular projects or for a particular purpose (e.g. for the removal of concentrated waste) and must be justified in the project planning documents. As an example, it may be necessary to use hexane when analyzing for trace levels of pesticides, PCBs, or fuels. In addition, because many of these solvents are not miscible in water, the equipment should be air dried prior to use. Solvents should not be used on PVC equipment or well construction materials.

Steam Pressure Washing - This method employs a high pressure spray of heated potable water. This method through the application of heat provides for the removal of various organic/inorganic compounds.

4.0 RESPONSIBILITIES

Project Manager - Responsible for ensuring that all field activities are conducted in accordance with approved project plan(s) requirements.

Field Operations Leader (FOL) - Responsible for the onsite verification that all field activities are performed in compliance with approved Standards Operating Procedures or as otherwise dictated by the approved project plan(s).

Site Health and Safety Officer (SHSO) - The SHSO exercises shared responsibility with the FOL concerning decontamination effectiveness. All equipment arriving on-site (as part of the equipment inspection), leaving the site, moving between locations are required to go through a decontamination evaluation. This is accomplished through visual examination and/or instrument screening to determine the effectiveness of the decontamination process. Failure to meet these objectives are sufficient to restrict equipment from entering the site/exiting the site/ or moving to a new location on the site until the objectives are successfully completed.

5.0 PROCEDURES

The process of decontamination is accomplished through the removal of contaminants, neutralization of contaminants, or the isolation of contaminants. In order to accomplish this activity a level of preparation is required. This includes site preparation, equipment selection, and evaluation of the process. Site contaminant types, concentrations, media types, are primary drivers in the selection of the types of decontamination as well as where it will be conducted. For purposes of this SOP discussion will be provided concerning general environmental investigation procedures.

The decontamination processes are typically employed at:

- Temporary Decontamination Pads/Facilities
- Sample Locations
- Centralized Decontamination Pad/Facilities
- Combination of some or all of the above

The following discussion represents recommended site preparation in support of the decontamination process.

5.1 Decontamination Design/Constructions Considerations

5.1.1 Temporary Decontamination Pads

Temporary decontamination pads are constructed at satellite locations in support of temporary work sites. These structures are generally constructed to support the decontamination of heavy equipment such as drill rigs and earth moving equipment but can be employed for smaller articles.

The purpose of the decontamination pad is to contain wash waters and potentially contaminated soils generated during decontamination procedures. Therefore, construction of these pads should take into account the following considerations

- Site Location – The site selected should be within a reasonable distance from the work site but should avoid:

  - Pedestrian/Vehicle thoroughfares
  - Areas where control/custody cannot be maintained
  - Areas where a potential releases may be compounded through access to storm water transport systems, streams or other potentially sensitive areas.
  - Areas potentially contaminated.

- Pad – The pad should be constructed to provide the following characteristics

  - Size – The size of the pad should be sufficient to accept the equipment to be decontaminated as well as permitting free movement around the equipment by the personnel conducting the decontamination.

  - Slope – An adequate slope will be constructed to permit the collection of the water and potentially contaminated soils within a trough or sump constructed at one end. The collection point for wash waters should be of adequate distance that the decontamination workers do not have to walk through the wash waters while completing their tasks.

  - Sidewalls – The sidewalls should be a minimum of 6-inches in height to provide adequate containment for wash waters and soils. If splash represents a potential problem, splash guards should be constructed to control overspray. Sidewalls maybe constructed of wood, inflatables, sand bags, etc. to permit containment.

  - Liner – Depending on the types of equipment and the decontamination method the liner should be of sufficient thickness to provide a puncture resistant barrier between the decontamination operation and the unprotected environment. Care should be taken to examine the surface area prior to placing the liner to remove sharp articles (sticks, stones, debris) that could puncture the liner. Liners are intended to form an impermeable barrier. The thickness may vary from a minimum recommended thickness of 10 mil to 30 mil. Achieving the desired thickness maybe achieved through layering lighter constructed materials. It should be noted that various materials (rubber, polyethylene sheeting) become slippery when wet. To minimize this potential hazard associated with a sloped liner a light coating of sand maybe applied to provide traction as necessary.

  - Wash/drying Racks – Auger flights, drill/drive rods require racks positioned off of the ground to permit these articles to be washed, drained, and dried while secured from falling during this process. A minimum ground clearance of 2-feet is recommended.

  - Maintenance – The work area should be periodically cleared of standing water, soils, and debris. This action will aid in eliminating slip, trip, and fall hazards. In addition, these articles will reduce potential backsplash and cross contamination. Hoses should be gathered when not in use to eliminate potential tripping hazards.

5.1.2 Decontamination Activities at Drill Rigs/DPT Units

During subsurface sampling activities including drilling and direct push activities decontamination of drive rods, Macro Core Samplers, split spoons, etc. are typically conducted at an area adjacent to the operation. Decontamination is generally accomplished using a soap/water wash and rinse utilizing buckets and brushes. This area requires sufficient preparation to accomplish the decontamination objectives.

Buckets shall be placed within mortar tubs or similar secondary containment tubs to prevent splash and spills from reaching unprotected media. Drying racks will be employed as directed for temporary pads to permit parts to dry and be evaluated prior to use/re-use.

5.1.3 Decontamination Activities at Remote Sample Locations

When sampling at remote locations sampling devices such as trowels, pumps/tubing should be evacuated of potentially contaminated media to the extent possible. This equipment should be wrapped in plastic for transport to the temporary/centralized decontamination location for final cleaning and disposition.

5.2 Equipment Decontamination Procedures

The following represents procedures to be employed for the decontamination of equipment that may have contacted and/or accumulated contamination through site investigation activities.

5.2.1 Monitoring Well Sampling Equipment

5.2.1.1 Groundwater sampling pumps – This includes pumps inserted into the monitoring well such as Bladder pumps, Whale pumps, Redi-Flo, reusable bailers, etc.

1) Evacuate to the extent possible, any purge water within the pump.

2) Scrub using soap and water and/or steam clean the outside of the pump and tubing, where applicable.

3) Insert the pump and tubing into a clean container of soapy water. Pump a sufficient amount of soapy water through the pump to flush any residual purge water. Once flushed, circulate soapy water through the pump to ensure the internal components are thoroughly flushed.

4) Remove the pump and tubing from the container, rinse external components using tap water. Insert the pump and tubing into a clean container of tap water. Pump a sufficient amount of tap water through the pump to evacuate all of the soapy water (until clear).

5) Rinse equipment with pesticide grade isopropanol

6) Repeat item #4 using deionized water through the hose to flush out the tap water and solvent residue as applicable*.

7) Drain residual deionized water to the extent possible, allow components to air dry.

8) Wrap pump in aluminum foil or a clear clean plastic bag for storage.

5.2.1.2 Electronic Water Level Indicators/Sounders/Tapes

During water level measurements, rinsing with the extracted tape and probe with deionized water and wiping the surface of the extracted tape is acceptable. However, periodic full decontamination should be conducted as indicated below.

---

* - The solvent should be employed when samples contain oil, grease, PAHs, PCBs, and other hard to remove materials. If these are not of primary concern, the solvent step may be omitted. In addition, do not rinse PE, PVC, and associated tubing with solvents.

1) Wash with soap and water
2) Rinse with tap water
3) Rinse with deionized water

Note: In situations where oil, grease, free product, other hard to remove materials are encountered probes and exposed tapes should be washed in hot soapy water.

5.2.1.3 Miscellaneous Equipment

Miscellaneous equipment including analytical equipment (water quality testing equipment) should be cleaned per manufacturer's instructions. This generally includes wiping down the sensor housing and rinsing with tap and deionized water.

Coolers/Shipping Containers employed to ship samples are received from the lab in a variety of conditions from marginal to extremely poor. Coolers should be evaluated prior to use for

- Structural integrity – Coolers missing handles or having breaks within the outer housing should be removed and not used. Notify the laboratory that the risk of shipping samples will not be attempted and request a replacement unit.

- Cleanliness – As per protocol only volatile organic samples are accompanied by a trip blank. If a cooler's cleanliness is in question (visibly dirty/stained) or associated with noticeable odors it should be decontaminated prior to use.

  1) Wash with soap and water
  2) Rinse with tap water
  3) Dry

If these measures fail to clean the cooler to an acceptable level, remove the unit from use as a shipping container and notify the laboratory to provide a replacement unit.

5.2.2 Down-Hole Drilling Equipment

This includes any portion of the drill rig that is over the borehole including auger flights, drill stems, rods, and associated tooling that would extend over the borehole. This procedure is to be employed prior to initiating the drilling/sampling activity, then between locations.

1) Remove all soils to the extent possible using shovels, scrapers, etc. to remove loose soils.
2) Through a combination of scrubbing using soap and water and/or steam cleaning remove visible dirt/soils.
3) Rinse with tap water.
4) Rinse equipment with pesticide grade isopropanol
5) To the extent possible allow components to air dry.
6) Wrap or cover equipment in clear plastic until it is time to be used.

5.2.3 Soil/Sediment Sampling Equipment

This consists of soil sampling equipment including but not limited to hand augers, stainless steel trowels/spoons, bowls, dredges, scoops, split spoons, Macro Core samplers, etc.

1) Remove all soils to the extent possible.

2) Through a combination of scrubbing using soap and water and/or steam cleaning remove visible dirt/soils.

3) Rinse with tap water.

4) Rinse equipment with pesticide grade isopropanol

5) Rinse with deionized water

6) To the extent possible allow components to air dry.

7) If the device is to be used immediately, screen with a PID/FID to insure all solvents (if they were used) and trace contaminants have been adequately removed.

8) Once these devices have been dried wrap in aluminum foil for storage until it is time to be used.

5.3 Contact Waste/Materials

During the course of field investigations disposable/single use equipment becomes contaminated. These items include tubing, trowels, PPE (gloves, overboots, splash suits, etc.) broken sample containers.

With the exception of the broken glass, single use articles should be cleaned (washed and rinsed) of visible materials and disposed of as normal refuse. The exception to this rule is that extremely soiled materials that cannot be cleaned should be containerized for disposal in accordance with applicable federal state and local regulations.

5.3.1 Decontamination Solutions

All waste decontamination solutions and rinses must be assumed to contain the hazardous chemicals associated with the site unless there are analytical or other data to the contrary. The waste solution volumes could vary from a few gallons to several hundred gallons in cases where large equipment required cleaning.

Containerized waste rinse solutions are best stored in 55-gallon drums (or equivalent containers) that can be sealed until ultimate disposal at an approved facility. These containers must be appropriately labeled.

5.4 Decontamination Evaluation

Determining the effectiveness of the decontamination process will be accomplished in the following manner

- Visual Evaluation – A visual evaluation will be conducted to insure the removal of particulate matter. This will be done to insure that the washing/rinsing process is working as intended.

- Instrument Screening – A PID and/or an FID should be used to evaluate the presence of the contaminants or solvents used in the cleaning process. The air intake of the instrument should be passed over the article to be evaluated. A positive detection requires a repeat the decontamination process. It should be noted that the instrument scan is only viable if the contaminants are detectable within the instruments capabilities.

- Rinsate Blanks – It is recommended that Rinsate samples be collected to

  - Evaluate the decontamination procedure representing different equipment applications (pumps versus drilling equipment) and different decontamination applications.

  - Single use disposable equipment – The number of samples should represent different types of equipment as well as different Lot Numbers of single use articles.

The collection and the frequency of collection of rinsate samples are as follows:

- Per decontamination method
- Per disposable article/Batch number of disposable articles

It is recommended that an initial rinsate sample be collected early in the project to ensure that the decontamination process is functioning properly and in an effort to avoid using a contaminated batch of single use articles. It is recommended that a follow up sample be collected during the execution of the project to insure those conditions do not change. Lastly, rinsate samples collection may be driven by types of and/or contaminant levels. Hard to remove contaminants, oils/greases, some PAHs/PCBs, etc. may also support the collection of additional rinsates due to the obvious challenges to the decontamination process. This is a field consideration to be determined by the FOL.

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1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to identify and designate the field data record forms, logs and reports generally initiated and maintained for documenting Tetra Tech NUS field activities.

2.0 SCOPE

Documents presented within this procedure (or equivalents) shall be used for all Tetra Tech NUS field activities, as applicable. Other or additional documents may be required by specific client contracts or project planning documents.

3.0 GLOSSARY

None

4.0 RESPONSIBILITIES

Project Manager (PM) - The Project Manager is responsible for obtaining hardbound, controlled-distribution logbooks (from the appropriate source), as needed. In addition, the Project Manager is responsible for placing all field documentation used in site activities (i.e., records, field reports, sample data sheets, field notebooks, and the site logbook) in the project's central file upon the completion of field work.

Field Operations Leader (FOL) - The Field Operations Leader is responsible for ensuring that the site logbook, notebooks, and all appropriate and current forms and field reports illustrated in this guideline (and any additional forms required by the contract) are correctly used, accurately filled out, and completed in the required time-frame.

5.0 PROCEDURES

5.1 Site Logbook

5.1.1 General

The site logbook is a hard-bound, paginated, controlled-distribution record book in which all major onsite activities are documented. At a minimum, the following activities/events shall be recorded or referenced (daily) in the site logbook:

- All field personnel present
- Arrival/departure of site visitors
- Time and date of H&S training
- Arrival/departure of equipment
- Time and date of equipment calibration
- Start and/or completion of borehole, trench, monitoring well installation, etc.
- Daily onsite activities performed each day
- Sample pickup information
- Health and Safety issues (level of protection observed, etc.)
- Weather conditions

A site logbook shall be maintained for each project. The site logbook shall be initiated at the start of the first onsite activity (e.g., site visit or initial reconnaissance survey). Entries are to be made for every day

that onsite activities take place which involve Tetra Tech NUS or subcontractor personnel. Upon completion of the fieldwork, the site logbook must become part of the project's central file.

The following information must be recorded on the cover of each site logbook:

- Project name
- Tetra Tech NUS project number
- Sequential book number
- Start date
- End date

Information recorded daily in the site logbook need not be duplicated in other field notebooks (see Section 5.2), but must summarize the contents of these other notebooks and refer to specific page locations in these notebooks for detailed information (where applicable). An example of a typical site logbook entry is shown in Attachment A.

If measurements are made at any location, the measurements and equipment used must either be recorded in the site logbook or reference must be made to the field notebook in which the measurements are recorded (see Attachment A).

All logbook, notebook, and log sheet entries shall be made in indelible ink (black pen is preferred). No erasures are permitted. If an incorrect entry is made, the entry shall be crossed out with a single strike mark, and initialed and dated. At the completion of entries by any individual, the logbook pages used must be signed and dated. The site logbook must also be signed by the Field Operations Leader at the end of each day.

5.1.2 Photographs

When movies, slides, or photographs are taken of a site or any monitoring location, they must be numbered sequentially to correspond to logbook/notebook entries. The name of the photographer, date, time, site location, site description, and weather conditions must be entered in the logbook/notebook as the photographs are taken. A series entry may be used for rapid-sequence photographs. The photographer is not required to record the aperture settings and shutter speeds for photographs taken within the normal automatic exposure range. However, special lenses, films, filters, and other image-enhancement techniques must be noted in the logbook/notebook. If possible, such techniques shall be avoided, since they can adversely affect the accuracy of photographs. Chain-of-custody procedures depend upon the subject matter, type of camera (digital or film), and the processing it requires. Film used for aerial photography, confidential information, or criminal investigation require chain-of-custody procedures. Once processed, the slides of photographic prints shall be consecutively numbered and labeled according to the logbook/notebook descriptions. The site photographs and associated negatives and/or digitally saved images to compact disks must be docketed into the project's central file.

5.2 Field Notebooks

Key field team personnel may maintain a separate dedicated field notebook to document the pertinent field activities conducted directly under their supervision. For example, on large projects with multiple investigative sites and varying operating conditions, the Health and Safety Officer may elect to maintain a separate field notebook. Where several drill rigs are in operation simultaneously, each site geologist assigned to oversee a rig must maintain a field notebook.

5.3 Field Forms

All Tetra Tech NUS field forms (see list in Section 6.0 of this SOP) can be found on the company's intranet site (http://intranet.ttnus.com) under Field Log Sheets. Forms may be altered or revised for project-specific needs contingent upon client approval. Care must be taken to ensure that all essential information can be documented. Guidelines for completing these forms can be found in the related sampling SOP.

5.3.1 Sample Collection, Labeling, Shipment, Request for Analysis, and Field Test Results

5.3.1.1 Sample Log Sheet

Sample Log Sheets are used to record specified types of data while sampling. The data recorded on these sheets are useful in describing the sample as well as pointing out any problems, difficulties, or irregularities encountered during sampling. A log sheet must be completed for each sample obtained, including field quality control (QC) samples.

5.3.1.2 Sample Label

A typical sample label is illustrated in Attachment B. Adhesive labels must be completed and applied to every sample container. Sample labels can usually be obtained from the appropriate Program source electronically generated in-house, or are supplied from the laboratory subcontractor.

5.3.1.3 Chain-of-Custody Record Form

The Chain-of-Custody (COC) Record is a multi-part form that is initiated as samples are acquired and accompanies a sample (or group of samples) as they are transferred from person to person. This form must be used for any samples collected for chemical or geotechnical analysis whether the analyses are performed on site or off site. One carbonless copy of the completed COC form is retained by the field crew, one copy is sent to the Project Manager (or designee), while the original is sent to the laboratory. The original (top, signed copy) of the COC form shall be placed inside a large Ziploc-type bag and taped inside the lid of the shipping cooler. If multiple coolers are sent but are included on one COC form, the COC form should be sent with the cooler containing vials for VOC analysis or the cooler with the air bill attached. The air bill should then state how many coolers are included with that shipment. An example of a Chain-of-Custody Record form is provided as Attachment C. Once the samples are received at the laboratory, the sample cooler and contents are checked and any problems are noted on the enclosed COC form (any discrepancies between the sample labels and COC form and any other problems that are noted are resolved through communication between the laboratory point-of-contact and the Tetra Tech NUS Project Manager). The COC form is signed and copied. The laboratory will retain the copy while the original becomes part of the samples' corresponding analytical data package.

5.3.1.4 Chain-of-Custody Seal

Attachment D is an example of a custody seal. The Custody seal is an adhesive-backed label. It is part of a chain-of-custody process and is used to prevent tampering with samples after they have been collected in the field and sealed in coolers for transport to the laboratory. The COC seals are signed and dated by the sampler(s) and affixed across the lid and body of each cooler (front and back) containing environmental samples (see SOP SA-6.1). COC seals may be available from the laboratory; these seals may also be purchased from a supplier.

5.3.1.5 Geochemical Parameters Log Sheets

Field Analytical Log Sheets are used to record geochemical and/or natural attenuation field test results.

5.3.2 Hydrogeological and Geotechnical Forms

5.3.2.1 Groundwater Level Measurement Sheet

A Groundwater Level Measurement Sheet must be filled out for each round of water level measurements made at a site.

5.3.2.2 Data Sheet for Pumping Test

During the performance of a pumping test (or an in-situ hydraulic conductivity test), a large amount of data must be recorded, often within a short time period. The Pumping Test Data Sheet facilitates this task by standardizing the data collection format for the pumping well and observation wells, and allowing the time interval for collection to be laid out in advance.

5.3.2.3 Packer Test Report Form

A Packer Test Report Form must be completed for each well upon which a packer test is conducted.

5.3.2.4 Boring Log

During the progress of each boring, a log of the materials encountered, operation and driving of casing, and location of samples must be kept. The Summary Log of Boring, or Boring Log is used for this purpose and must be completed for each soil boring performed. In addition, if volatile organics are monitored on cores, samples, cuttings from the borehole, or breathing zone, (using a PID or FID), these readings must be entered on the boring log at the appropriate depth. The "Remarks" column can be used to subsequently enter the laboratory sample number, the concentration of key analytical results, or other pertinent information. This feature allows direct comparison of contaminant concentrations with soil characteristics.

5.3.2.5 Monitoring Well Construction Details Form

A Monitoring Well Construction Details Form must be completed for every monitoring well, piezometer, or temporary well point installed. This form contains specific information on length and type of well riser pipe and screen, backfill, filter pack, annular seal and grout characteristics, and surface seal characteristics. This information is important in evaluating the performance of the monitoring well, particularly in areas where water levels show temporal variation, or where there are multiple (immiscible) phases of contaminants. Depending on the type of monitoring well (in overburden or bedrock, stick-up or flush mount), different forms are used.

5.3.2.6 Test Pit Log

When a test pit or trench is constructed for investigative or sampling purposes, a Test Pit Log must be filled out by the responsible field geologist or sampling technician.

5.3.2.7 Miscellaneous Monitoring Well Forms

Monitoring Well Materials Certificate of Conformance should be used as the project directs to document all materials utilized during each monitoring well installation.

The Monitoring Well Development Record should be used as the project directs to document all well development activities.

5.3.2.8 Miscellaneous Field Forms - QA and Checklists

Container Sample and Inspection Sheet should be used as the project directs each time a container (drum, tank, etc.) is sampled and/or inspected.

QA Sample Log Sheet should be used at the project directs each time a QA sample is colleted, such as Rinsate Blank, Source Blank, etc.

Field Task Modification Request (FTMR) will be prepared for all deviations from the project planning documents. The FOL is responsible for initiating the FTMRs. Copies of all FTMRs will be maintained with the onsite planning documents and originals will be placed in the final evidence file.

The Field Project Daily Activities Check List and Field Project Pre-Mobilization Checklist should be used during both the planning and field effort to assure that all necessary tasks are planned for and completed. These two forms are not a requirement but a useful tool for most field work.

5.3.3 Equipment Calibration and Maintenance Form

The calibration or standardization of monitoring, measuring or test equipment is necessary to assure the proper operation and response of the equipment, to document the accuracy, precision or sensitivity of the measurement, and determine if correction should be applied to the readings. Some items of equipment require frequent calibration, others infrequent. Some are calibrated by the manufacturer, others by the user.

Each instrument requiring calibration has its own Equipment Calibration Log which documents that the manufacturer's instructions were followed for calibration of the equipment, including frequency and type of standard or calibration device. An Equipment Calibration Log must be maintained for each electronic measuring device used in the field; entries must be made for each day the equipment is used or in accordance with the manufacturer's recommendations.

5.4 Field Reports

The primary means of recording onsite activities is the site logbook. Other field notebooks may also be maintained. These logbooks and notebooks (and supporting forms) contain detailed information required for data interpretation or documentation, but are not easily useful for tracking and reporting of progress. Furthermore, the field logbook/notebooks remain onsite for extended periods of time and are thus not accessible for timely review by project management.

5.4.1 Daily Activities Report

To provide timely oversight of onsite contractors, Daily Activities Reports are completed and submitted as described below.

5.4.1.1 Description

The Daily Activities Report (DAR) documents the activities and progress for each day's field work. This report must be filled out on a daily basis whenever there are drilling, test pitting, well construction, or other related activities occurring which involve subcontractor personnel. These sheets summarize the work performed and form the basis of payment to subcontractors. The DAR form can be found on the TtNUS intranet site.

5.4.1.2 Responsibilities

It is the responsibility of the rig geologist to complete the DAR and obtain the driller's signature acknowledging that the times and quantities of material entered are correct.

5.4.1.3 Submittal and Approval

At the end of the shift, the rig geologist must submit the Daily Activities Report to the Field Operations Leader (FOL) for review and filing. The Daily Activities Report is not a formal report and thus requires no further approval. The DAR reports are retained by the FOL for use in preparing the site logbook and in preparing weekly status reports for submission to the Project Manager.

5.4.2 Weekly Status Reports

To facilitate timely review by project management, photocopies of logbook/notebook entries may be made for internal use.

It should be noted that in addition to summaries described herein, other summary reports may also be contractually required.

All Tetra Tech NUS field forms can be found on the company's intranet site at http://intranet.ttnus.com under Field Log Sheets.

6.0 LISTING OF TETRA TECH NUS FIELD FORMS FOUND ON THE TTNUS INTRANET SITE. HTTP://INTRANET.TTNUS.COM CLICK ON FIELD LOG SHEETS

Groundwater Sample Log Sheet
Surface Water Sample Log Sheet
Soil/Sediment Sample Log Sheet
Container Sample and Inspection Sheet
Geochemical Parameters (Natural Attenuation)
Groundwater Level Measurement Sheet
Pumping Test Data Sheet
Packer Test Report Form
Boring Log
Monitoring Well Construction Bedrock Flush Mount
Monitoring Well Construction Bedrock Open Hole
Monitoring Well Construction Bedrock Stick Up
Monitoring Well Construction Confining Layer
Monitoring Well Construction Overburden Flush Mount
Monitoring Well Construction Overburden Stick Up
Test Pit Log
Monitoring Well Materials Certificate of Conformance
Monitoring Well Development Record

Daily Activities Record
Field Task Modification Request
Hydraulic Conductivity Test Data Sheet
Low Flow Purge Data Sheet
QA Sample Log Sheet
Equipment Calibration Log
Field Project Daily Activities Checklist
Field Project Pre-Mobilization Checklist

ATTACHMENT A
TYPICAL SITE LOGBOOK ENTRY

START TIME: _____ DATE: _____

SITE LEADER: _____
PERSONNEL:

TtNUS	DRILLER	SITE VISITORS
_____	_____	_____
_____	_____	_____
_____	_____	_____

WEATHER: Clear, 68°F, 2-5 mph wind from SE

ACTIVITIES:

1. Steam jenney and fire hoses were set up.
2. Drilling activities at well ____ resumes. Rig geologist was _____. See Geologist's Notebook, No. 1, page 29-30, for details of drilling activity. Sample No. 123-21-S4 collected; see sample logbook, page 42. Drilling activities completed at 11:50 and a 4-inch stainless steel well installed. See Geologist's Notebook, No. 1, page 31, and well construction details for well _____.
3. Drilling rig No. 2 steam-cleaned at decontamination pit. Then set up at location of well _____.
4. Well _____ drilled. Rig geologist was _____. See Geologist's Notebook, No. 2, page ____ for details of drilling activities. Sample numbers 123-22-S1, 123-22-S2, and 123-22-S3 collected; see sample logbook, pages 43, 44, and 45.
5. Well _____ was developed. Seven 55-gallon drums were filled in the flushing stage. The well was then pumped using the pitcher pump for 1 hour. At the end of the hour, water pumped from well was "sand free."
6. EPA remedial project manger arrives on site at 14:25 hours.
7. Large dump truck arrives at 14:45 and is steam-cleaned. Backhoe and dump truck set up over test pit _____.
8. Test pit _____ dug with cuttings placed in dump truck. Rig geologist was _____. See Geologist's Notebook, No. 1, page 32, for details of test pit activities. Test pit subsequently filled. No samples taken for chemical analysis. Due to shallow groundwater table, filling in of test pit ___ resulted in a very soft and wet area. A mound was developed and the area roped off.
9. Express carrier picked up samples (see Sample Logbook, pages 42 through 45) at 17:50 hours. Site activities terminated at 18:22 hours. All personnel off site, gate locked.

_____

Field Operations Leader

ATTACHMENT B

Tetra Tech NUS, Inc. 661 Andersen Drive Pittsburgh, 15220 (412)921-7090	**Project:** **Site:** **Location:**	
Sample No:		**Matrix:**
Date:	**Time:**	**Preserve:**
Analysis:		
Sampled by:	**Laboratory:**	

ATTACHMENT C

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER 3413 | PAGE ____ OF _____

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
		CARRIER/WAYBILL NUMBER		CITY, STATE

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G)

PRESERVATIVE USED

TYPE OF ANALYSIS

DATE YEAR	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS									COMMENTS

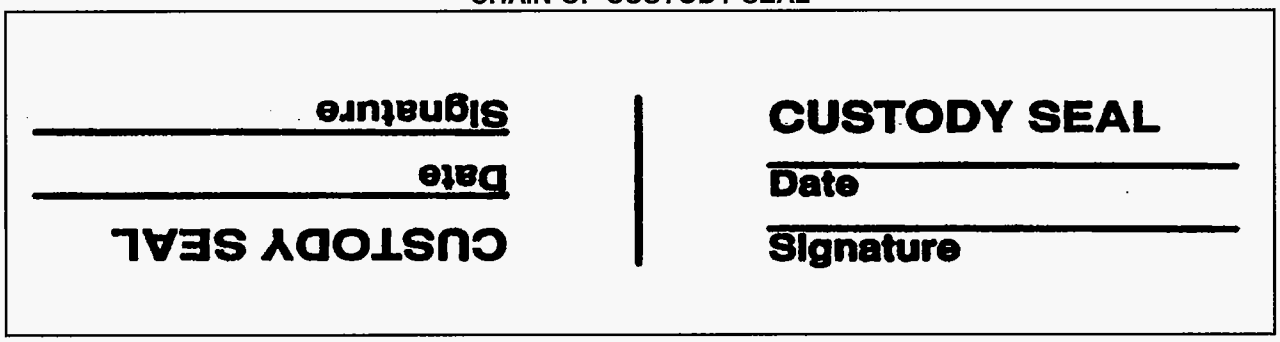
1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME
COMMENTS					

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

ATTACHMENT D

CHAIN-OF-CUSTODY SEAL



APPENDIX B

HEALTH AND SAFETY PLAN

Health and Safety Plan
Well Inspection Ground-Water Level Monitoring Event

at

IR Program Site 16

Former Naval Construction Battalion Center
Davisville
North Kingstown, Rhode Island

Naval Facilities Engineering Command
MidAtlantic

Contract Number N62472-03-D-00057
Contract Task Order 0019

February 2007

HEALTH AND SAFETY PLAN

FOR

WELL INSPECTION GROUND-WATER LEVEL MONITORING EVENT

AT

IR PROGRAM SITE 16

FORMER NAVAL CONSTRUCTION BATTALION
DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION - NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command MidAtlantic
9742 Maryland Avenue
Norfolk, Virginia 23511-3095

Submitted by:
Tetra Tech NUS, Inc.
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433

Contract Number N62472-03-D-0057
Contract Task Order 0019

FEBRUARY 2007

PREPARED UNDER THE SUPERVISION OF:

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PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMITTAL BY:

MATTHEW M. SOLTIS, CIH, CSP
CLEAN HEALTH AND SAFETY MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

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I INJURY/ILLNESS PROCEDURE AND REPORT FORM
II MEDICAL DATA SHEET
III SAFE WORK PERMITS
IV BOAT SAFETY CHECKLIST

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed to provide safe work practices and procedures for Tetra Tech NUS, Inc. (TtNUS) and subcontractor personnel conducting site activities in support of Well Inspection Ground-Water Level Monitoring Event at Site 16 at the Former Naval Construction Battalion Center (NCBC) Davisville, North Kingstown, Rhode Island. This HASP is to be used in conjunction with the TtNUS Health and Safety Guidance Manual, which provides supporting information pertaining to procedures detailed in the HASP as well as TtNUS Standard Operating Procedures (SOPs). The HASP and the TtNUS Health and Safety Guidance Manual were developed to comply with the requirements established by the Occupational Safety and health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120.

This HASP was developed using historical site background information regarding known or suspected chemical contaminants, previous site visits, and potential physical hazards that may be associated with the proposed work at the site. This HASP will be modified, as necessary, if new information becomes available, and changes will be made with the approval of the TtNUS Site Safety Officer (SSO) and the Comprehensive Long-Term Environmental Action Navy (CLEAN) Health and Safety Manager (HSM). Requests for modifications to the HASP will be directed to the SSO. The SSO will notify the HSM, who will then notify affected personnel of the changes.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibilities for site safety and health for TtNUS and subcontractor personnel engaged in on-site activities. These people will be the primary points of contact for questions regarding the safety and health procedures and the selected control procedures:

- The TtNUS Project Manager (PM) is responsible for the overall direction and implementation of health and safety for this project.

- The TtNUS HSM is responsible for ensuring this HASP is in accordance with applicable OSHA regulations. Specific responsibilities include:
  - Providing information regarding site contaminants and physical hazards associated with the site.
  - Establishing air monitoring and decontamination procedures.
  - Assigning personal protective equipment (PPE).
  - Determining emergency response procedures and emergency contacts.
  - Stipulating training requirements and reviewing appropriate training and medical surveillance certificates.

  - Providing standard work practices to minimize potential injuries and exposures associated with hazardous work.
  - Modifying this HASP, as it becomes necessary.

- The TtNUS Field Operations Leader (FOL) is responsible for the implementation of this HASP with the assistance of an appointed SSO.

- The Project Health and Safety Officer (PHSO) is responsible for developing this HASP in accordance with applicable OSHA regulations. Specific responsibilities include:
  - Providing information regarding site contaminants and physical hazards.
  - Establishing air monitoring and decontamination procedures.
  - Assigning PPE based on task and potential hazards.
  - Determining emergency response procedures and emergency contacts.
  - Stipulating training requirements and reviewing appropriate training and medical surveillance certificates.
  - Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste site work.
  - Modifying this HASP, as it becomes necessary.

- The SSO supports site activities by advising the FOL on the aspects of health and safety on site. These duties may include:
  - Coordinating health and safety activities with the FOL.
  - Selecting, applying, inspecting, and maintaining PPE.
  - Establishing work zones and control points.
  - Implementing air monitoring procedures for on-site activities.
  - Verifying the training and medical status of on-site personnel.
  - Implementing hazard communication, respiratory protection, and other associated safety and health programs.
  - Coordinating emergency services.
  - Providing site specific training to on-site personnel.
  - Investigating accidents and injuries (see Attachment I – Illness Reporting Form).
  - Providing input to the HSM regarding the need to modify this HASP or applicable health and safety associated documents as per site-specific requirements.

- Compliance with the requirements established in this HASP is monitored by the SSO and coordinated through the TtNUS HSM.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: NCBC Davisville

Address: Davisville Road
North Kingstown, Rhode Island

Client Contact: David Barney - South Weymouth NAS **Phone Number:** 617-753-4656

Navy RPM: Curt Frye - Philadelphia **Phone Number:** 215-897-4914 x 142

Effective Date: Spring 2007

Purpose: Well Inspection Ground-Water Level Monitoring Event this task includes groundwater sampling.

Project Team:

TtNUS Personnel	Discipline/Tasks Assigned	Phone Number
Lee Ann Sinagoga	Project Manager (PM)	(412) 921-8887
TBD	Field Operations Leader (FOL)	
Clyde J. Snyder	Project Health and Safety Officer (PHSO)	(412) 921-8904
Matthew M. Soltis, CIH, CSP	Health and Safety Manager (HSM)	(412) 921-8912
TBD	Site Safety Officer (SSO)	

Non-TtNUS Personnel	Affiliation/Discipline/Tasks Assigned	Phone Number
TBD	IDW Transportation & Disposal	TBD

Hazard Assessments (for purposes of 29 CFR 1910.132) and HASP preparation have been conducted by: Clyde J. Snyder

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. Site activities will be coordinated with the client and site contact, David Barney, as well as local fire protection and emergency services prior to commencement. In the event of an emergency that cannot be mitigated using on-site resources, site personnel will evacuate to a safe place of refuge and notify the appropriate emergency response agencies and the client/site contact. Because a majority of foreseeable emergency situations will require assistance from outside emergency responders, TtNUS and subcontractor personnel will provide emergency response support to the levels listed below. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of operations, which ensures adequate emergency response time. This Emergency Action Plan, therefore, conforms to the requirements of OSHA Standard 29 CFR 1910.38(a), as designated in OSHA 29 CFR 1910.120(l)(1)(ii).

TtNUS and subcontractor personnel will, through necessary services, provide the following response measures:

- Incipient stage fire fighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Initial medical support for injuries or illnesses requiring first-aid level support only
- Site control and security measures, as necessary

2.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, injuries resulting from exposure to physical hazards are the most probable emergencies that may be encountered during site activities.

To minimize and eliminate these potential emergency situations, emergency planning activities associated with this project include the following (and are the responsibility of the SSO and/or the FOL):

- Coordinating with local emergency response personnel to ensure that TtNUS emergency action activities are compatible with existing emergency response procedures.

- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:

  - List of phone numbers for local emergency services
  - Chemical inventory (used on site), with Material Safety Data Sheets (MSDSs)
  - On-site personnel medical records (Medical Data Sheets)
  - A logbook or sign-in log sheet identifying personnel on site
  - A hospital route map with directions in each support vehicle

The following emergency planning requirements are the responsibility of the TtNUS FOL:

- Identifying a chain of command for emergency action.

- Educating site workers as to the hazards and control measures associated with planned activities of the site and providing early recognition and prevention where possible.

- Periodically performing practice drills to ensure site workers are familiar with incidental response measures.

- Providing necessary equipment to safely accomplish identified tasks.

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

Foreseeable emergency situations will generally be recognized by visual observation. Visual observation is primarily relevant for physical hazards that may be associated with the proposed scope of work. Visual observation will also play a role in detecting some chemical hazards. To adequately recognize chemical exposures, site personnel will have a clear knowledge of signs and symptoms of exposure associated with site contaminants. This information is provided in Table 6-1 of this HASP. Tasks to be performed at the site, potential hazards associated with those tasks, and the recommended control methods are discussed in detail in Section 5.0 and 6.0. Additionally, early recognition of hazards will be supported by daily site surveys to eliminate any situation predisposed to an emergency. The FOL and the SSO will be responsible for performing these surveys. Site surveys will be conducted at work locations prior to the commitment of resources and personnel. This will be done for the purpose of removing or barricading identified physical hazards. Additionally, site surveys will be conducted at least once a week at resource/staging areas. Site surveys conducted during this effort will be documented in the field logbook.

2.3.2 Prevention

TtNUS and subcontractor personnel will minimize the potential for emergencies by following this HASP and the TtNUS Health and Safety Guidance Manual and by complying with applicable OSHA regulations. Daily site surveys of work areas and correction of any identified deficiencies by the FOL and SSO prior to the commencement of that day's activities will assist in the prevention of illness/injuries when hazards are recognized early and control measures initiated.

2.4 SAFE PLACES OF REFUGE

In the event that the site must be evacuated, personnel will immediately stop activities and report to the designated safe place of refuge. Safe places of refuge will be identified prior to the commencement of site activities and will be conveyed to personnel as part of the safety meeting conducted each morning. Maps should also be posted showing designated meeting areas. Whenever possible, the safe place of refuge will also serve as the telephone communications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the TtNUS FOL or SSO. The FOL or the SSO will perform a head count at this location to account for and to confirm the location of site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel.

2.5 EVACUATION ROUTES AND PROCEDURES

An evacuation will occur whenever the health, safety, or welfare of site workers is compromised. Some specific examples of conditions that may initiate an evacuation include: severe weather conditions; the occurrence of a fire or explosion; readings on monitoring instrumentation indicating levels of contamination greater than instituted action levels; or personnel showing signs or symptoms of overexposure to potential site contaminants. In the event of an evacuation, personnel will proceed immediately to the designated safe place of refuge unless doing so would further jeopardize the welfare of workers. In such an event, personnel will proceed to a designated alternate location and remain until further notification from the TtNUS FOL. Evacuation procedures will be discussed before the initiation of any work at the site. Evacuation routes from the site and safe places of refuge are dependent on the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) may affect evacuation routes. As a result, assembly points will be selected in an upwind direction from the site and away from water bodies and then communicated to workers relative to the site location where work is being performed.

2.6 DECONTAMINATION PROCEDURES/EMERGENCY MEDICAL TREATMENT

During an evacuation, decontamination procedures will be performed only if the welfare of site workers can be maintained. Decontamination will delayed if the incident warrants immediate evacuation. However, it is unlikely that an evacuation would occur that would require workers to evacuate the site without first performing decontamination procedures.

TtNUS personnel will perform removal of personnel from emergency situations and may provide initial medical support for injury/illnesses requiring only first-aid level support. Personnel identified within the field crew with bloodborne pathogen and first-aid training will be the only personnel permitted to offer first-aid assistance. Medical attention above that level will require assistance and support from the designated emergency response agencies. Any pertinent information regarding allergies to medications or other special conditions must be provided to medical service personnel. This information is listed on Medical Data Sheets kept on site (See Attachment II). If an exposure to hazardous materials has occurred, provide hazard information from Table 6-1 to medical service personnel. Contact David Barney, the client/site contact, in the event that any incident or accident requires medical attention. Attachment I provides the procedure to follow when reporting an injury/illness and the form to be used for this purpose. If the emergency involves personnel exposures to chemicals, follow the steps provided in Figure 2-1.

2.7 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

TtNUS and subcontractor personnel will be working in proximity to each other during planned site activities. Site personnel will initiate emergency notification to on-site personnel by hand signals, voice commands, or air horns to alert other personnel of an emergency. Two-way radios may also be used between site workers to communicate emergency situations and request assistance. If an emergency warranting evacuation occurs, the following steps are to be taken:

- Initiate an evacuation by hand signals, voice commands, air horn, or two-way radios. Report to the designated safe place of refuge.

- Describe to the FOL (who will serve as the Incident Coordinator) what has occurred and include as many details as possible. After personnel are evacuated, appropriate response procedures will be enacted to control the situation.

FIGURE 2-1

POTENTIAL EXPOSURE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations. In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e., ambulance for serious events).
- Obtain as much exposure history as possible (a Potential Exposure Protocol form is attached).
- If the injured person is a TtNUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing that may be appropriate. WorkCare physicians will monitor the care of the victim.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, or follow the voice prompt for after hours and weekend notification, and being prepared to provide:
  - Any known information about the nature of the injury.
  - As much of the exposure history as was feasible to determine in the time allowed.
  - Name and phone number of the medical facility to which the victim(s) has/have been taken.
  - Name(s) of the involved TtNUS employee(s).
  - Name and phone number of an informed site officer who will be responsible for further investigations.
- Fax appropriate information to WorkCare at (714) 456-2154.
- Contact the TtNUS Corporate Health and Safety Department (Matt Soltis) and Human Resources Manager Marilyn Duffy at 1-800-245-2730.

As data are gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare. WorkCare will compile the results of data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

FIGURE 2-1 (continued)
POTENTIAL EXPOSURE PROTOCOL

Name: _____ Date of Exposure: _____

Social Security No.: _____ Age: _____ Sex: _____

Client Contact: _____ Phone No.: _____

Company Name: _____

I. Exposing Agent

Name of Product or Chemicals (if known): _____

_____

Characteristics (if the name is unknown)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing? _____

How long did individual work in area before signs/symptoms developed? _____

Was protective gear being used? If yes, what was the PPE? _____

Was their skin contact? _____

Was the exposing agent inhaled? _____

Were other persons exposed? If yes, did they experience symptoms? _____

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat	Chest Tightness / Pressure
Tearing	Nausea / Vomiting
Headache	Dizziness
Cough	Weakness
Shortness of Breath	

Delayed Symptoms:

Weakness	Loss of Appetite
Nausea / Vomiting	Abdominal Pain
Shortness of Breath	Headache
Cough	Numbness / Tingling

IV. Present Status of Symptoms (check off appropriate symptoms)

Burning of eyes, nose, or throat	Nausea / Vomiting
Tearing	Dizziness
Headache	Weakness
Cough	Loss of Appetite
Shortness of Breath	Abdominal Pain
Chest Tightness / Pressure	Numbness / Tingling
Cyanosis	

Have symptoms: (please check off appropriate response and give duration of symptoms)

Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicated: _____ Physician Treated: _____

In the event that site personnel cannot control the incident through offensive and defensive measures, the FOL and SSO will enact emergency notification procedures to secure additional assistance in the following manner:

- Call the emergency contacts (Table 2-1) and report the emergency. Give the operator the location of the emergency, the type of emergency, the number of people injured, and a brief description of what occurred. Stay on the phone and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

2.8 EMERGENCY EQUIPMENT

A first-aid kit, eye wash units or bottles of disposable eyewash solution, and fire extinguishers will be maintained on site in either the field office or site vehicle and shall be immediately available for use in the event of an emergency.

2.9 EMERGENCY CONTACTS

Prior to performing field activities, personnel will be thoroughly briefed on the emergency procedures that are to be followed in the event of an accident. Table 2-1 provides a list of emergency contacts and their associated telephone numbers. This table must be posted where it is readily available to site personnel.

TABLE 2-1
EMERGENCY REFERENCE
SITE 16 NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

CONTACT	PHONE NUMBER
EMERGENCY Fire and Rescue Police	**911** **(401) 294-3344** **(401) 294-3311**
Kent Hospital General Emergency Department	 (401) 373-7000 (401) 736-4288
Chemtrec	(800) 424-9300
National Response Center	(800) 424-8802
Poison Control Center	(800) 222-1222
NCBC Davisville Contact: David Barney	(617) 753-4656
TtNUS PM: Lee Ann Sinagoga	(412) 921-8887
TtNUS PHSO: Clyde J. Snyder	(412) 921-8904
TtNUS CLEAN HSM: Matt Soltis	(412) 921-8912

2.10 EMERGENCY ROUTE TO HOSPITAL

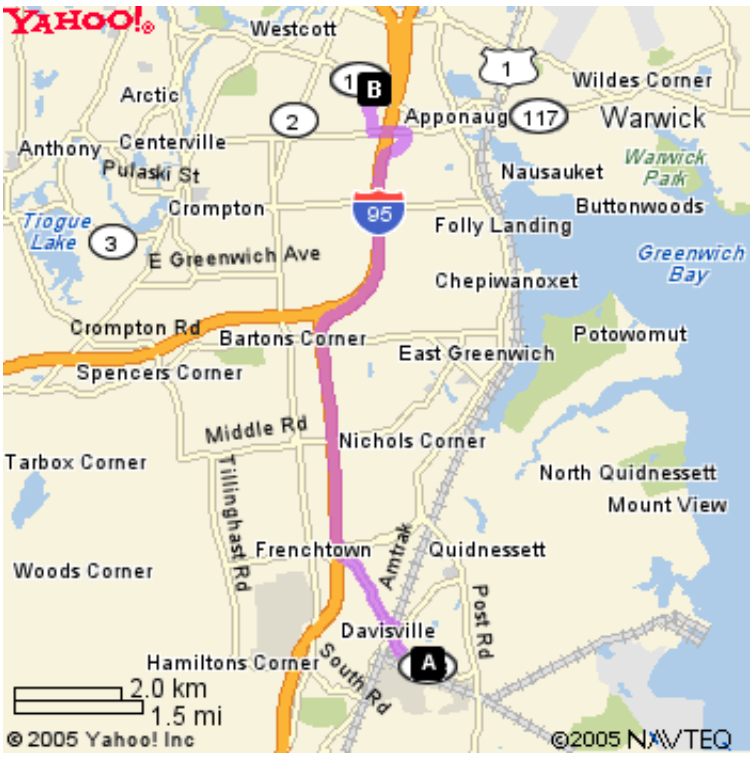
Directions to the Hospital:

Kent Hospital
455 Toll Gate Road
Warwick, RI 02886
Telephone: (401) 253-7000 (general number)
(401) 845-1120 (emergency)

- Exit NCBC Davisville by traveling west on Davisville Road.
- Proceed under Route 2 overpass onto Devil's Foot Road.
- Continue approximately 2 miles on Devil's Foot Road.
- Right onto Route 4 North to Route 95 North.
- Take the first exit off Route 95 onto Route 117.
- Left onto Route 117.
- Proceed one block to a traffic light and turn right.
- Follow road and bear right at first intersection.
- Follow road to the end and take a left onto Toll Gate Road.
- Hospital is on right.

FIGURE 2-2

ROUTE TO KENT HOSPITAL



3.0 SITE BACKGROUND

3.1 SITE CONDITIONS

The former NCBC Davisville, located 18 miles south of Providence in North Kingstown, Rhode Island covers approximately 900 acres. Serving as a military installation since 1942, its primary mission was to provide mobilization support to Naval Construction Forces. Much of the NCBC Davisville site is contiguous with Narragansett Bay and consists of four areas including the Main Center, the West Davisville storage area, the Allen Harbor area, and the Pier Support area. Camp Fogarty, a training facility 4 miles west of the Main Center in the Town of East Greenwich, was transferred to the Army in 1993 is also part of the listing. Adjoining NCBC Davisville's southern boundary is the decommissioned Naval Air Station Quonset Point, which was sold to the Rhode Island Port Authority between 1978 and 1980. The Navy disposed of wastes in all areas.

NCBC Davisville's mission was to provide mobilization support to the active Naval Construction Force; to act as a mobilization base for the rapid assembly, outfitting, and readying of Reserve Construction Battalions; to store, preserve, and ship advanced base and mobilization stocks; and to procure, receive, pack, and ship collateral equipment for Atlantic, European, and Caribbean military construction projects. NCBC Davisville was comprised primarily of warehouse space and freight yards, most of which are currently demolished, redeveloped, or empty.

3.1.1 Site 16

The Site 16 investigation area covers approximately 70 acres. The north-central portion is primarily wooded with the exception of an asphalt-paved area in the center. This area is generally bounded by Westcott Road, Davisville Road, Allens Harbor Road, and the Allen Harbor southern shoreline. A unnamed asphalt-paved road circles the outer perimeter of this portion of the site and was formerly used by the Navy for the purpose of training construction equipment operators. In the past, this area was extensively bulldozed and disrupted during training exercises, but now has a vegetative cover of shrubs and grasses. The site topography slopes from an elevation of approximately 33 feet above mean sea level (msl) in the southwestern corner to msl along the Allen Harbor shoreline in the northeastern portion of the site. The area immediately around Building E-107 is also paved for parking. The area west of Building WE-107 (east of Westcott Road) is grass covered. The area west of Westcott Road is the eastern portion of a former NCBC gravel borrow pit and is densely overgrown. The area south of Davisville Road slopes gently toward the east and includes former railroad spurs located south and east of Former Building 41. The area east of Allens Harbor Road is an asphalt-paved lot where new cars are temporarily stored after delivery by ships.

4.0 SCOPE OF WORK

4.1 SUMMARY OF PROPOSED ACTIVITIES

The field activities scoped under this HASP include the following:

- Mobilization/demobilization
- Well Investigation
  - Minor well repair
- Ground-water Level Monitoring
- Installation of Staff Gauges
- Multimedia sampling
  - Groundwater
  - Investigation derived waste (IDW)
- Management of IDW

Refer to the QAPP Addendum for more detailed information regarding the sampling activities.

Any field modifications that will require work other than that described in this section will be brought to the attention of the HSM to determine what health and safety procedures will be required. The PM or designated representative will submit requested modifications to this document to the HSM.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES

Table 5-1 of this section summarizes the potential hazards, by task, and their associated control measures for the work addressed by this site-specific HASP. This table is intended to assist project personnel in the recognition of hazards and recommended procedures necessary to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which PPE and decontamination procedures to be used, as well as appropriate air monitoring techniques and other requirements/restrictions. The evaluation of each task provides detailed information including anticipated hazards, recommended control measures, air monitoring recommendations, required PPE, and decontamination measures. This table will be updated if the scope of work, contaminants of concern, or pertinent conditions change.

This HASP, including Table 5-1, is meant to be used in conjunction with the TtNUS Health and Safety Guidance Manual. This manual is designed to further explain supporting elements for any site-specific operations as required by 29 CFR 1910.120. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of TtNUS's SOPs are also provided in the Guidance Manual.

Safe Work Permits will be issued (See Section 10.9 and Attachment III). The FOL and/or SSO will use the elements defined in Table 5-1 as the primary reference for completing the permits. The Safe Work Permit is used to add additional site-specific information. In situations where the Safe Work Permit is more conservative than the direction provided in Table 5-1 due to the incorporation of site-specific elements, the Safe Work Permit will be followed.

5.1 GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices identified on Table 5-1, the following safe work practices establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations when conducting work involving known and unknown site hazards:

- Eating, drinking, chewing gum or tobacco, or taking medication, is permitted in the support zone only.

- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.

- Avoid contact with potentially contaminated substances by walking around puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on equipment.

- Avoid placing monitoring equipment on potentially contaminated surfaces.

- Be familiar with and adhere to the instructions in this site-specific HASP.

- Be aware of the location of the nearest telephone and emergency telephone numbers.

- Attend briefings on anticipated hazards, equipment requirements, Safe Work Permits, emergency procedures, and communication methods before going on site.

- Rehearse unfamiliar operations prior to implementation.

- Maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.

- Establish appropriate safety zones including support, contamination reduction, and exclusion zones.

- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Non-essential vehicles and equipment should remain within the support zone.

- Establish appropriate decontamination procedures for leaving the site.

- Immediately report injuries, illnesses, and unsafe conditions, practices, and equipment to the SSO.

- Observe co-workers for signs of toxic exposure and heat or cold stress.

- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES
NAVAL CONSTRUCTION BATTALION DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO require.)*	Decontamination Procedures
Mobilization/ Demobilization	***Physical hazards:*** 1) Lifting (strain/muscle pulls) 2) Pinches and compressions 3) Slips, trips, and falls 4) Vehicular and foot traffic 5) Ambient temperature extremes (cold/heat stress) ***Natural hazards:*** 6) Insect/animal bites and stings, poisonous plants, etc. 7) Inclement weather	1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 2) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. 3) Preview work locations for unstable/uneven terrain. 4) Traffic and equipment considerations are to include the following: - Establish safe zones of approach. - Secure all loose articles. - All activities are to be conducted consistent with the site requirements. 5) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat/cold stress is provided in Section 4 of the Health and Safety Guidance Manual. 6) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Section 4 of the Health and Safety Guidance Manual. 7) Suspend or terminate operations until directed otherwise by SSO.	Not required	Level D - (Minimum Requirements): - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes/boots - *Safety glasses* - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Reflective vest for high traffic areas* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.*	Not required
Decontamination of Sampling Equipment	***Chemical hazards:*** 1) The contaminants of concern that have been identified in site ground-water are VOCs including 1,1-dichloroethene and trichloroethylene (TCE). Refer to Table 6-1 for additional information on site contaminants of concern. 2) Decontamination fluids - Liquinox (detergent), acetone or isopropanol ***Physical hazards:*** 3) Ambient temperature extremes (heat/cold stress) 4) Slips, trips, and falls ***Natural hazards:*** 5) Inclement weather	1) and 2) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Obtain manufacturers' MSDSs for any decontamination fluids used on-site. These must be used in well-ventilated areas, such as outdoors. Use appropriate PPE as identified on MSDSs. Chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication section of the Health and Safety Guidance Manual (Section 5). 3) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat/cold stress concerns is provided in the Health and Safety Guidance Manual. 4) Preview work locations for unstable/uneven terrain. 5) Suspend or terminate operations until directed otherwise by SSO.	Use visual observation, and real-time monitoring instrumentation to ensure equipment has been properly cleaned of contamination and dried. After decontamination is completed, screen equipment with a PID or FID. If any elevated readings (i.e., greater than background) are observed, perform decontamination again and re-screen. Repeat until no elevated PID/FID readings are noted.	For sampling equipment (trowels, MacroCore samplers, bailers, etc.), the following PPE is required: Note: Consult MSDSs for PPE guidance. Otherwise, observe the following. Level D Minimum requirements - - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes/boots - Nitrile outer gloves - Safety glasses	**Personnel Decontamination** This will consist of a soap/water wash and rinse for reusable outer protective equipment if applicable. The decon function will take place at an area adjacent to the site activities. This procedure will consist of the following: - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged. **Sampling Equipment Decontamination** Sampling equipment will be decontaminated as per the requirements in the QAPP Addendum. MSDSs for any decon solutions (Alconox, isopropanol, etc.) will be obtained and used to determine proper handling / disposal methods and protective measures (PPE, first-aid, etc.). Equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site.

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES
NAVAL CONSTRUCTION BATTALION DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO require.)*	Decontamination Procedures
Groundwater Sampling This task includes: • Well Inspections and minor repairs. • Water level measurements • Staff Gauge installation	***Chemical hazards:*** 1) The contaminants of concern that have been identified in site ground-water are VOCs including 1,1-dichloroethene and trichloroethylene (TCE). Refer to Table 6-1 for additional information on site contaminants of concern. 2) Transfer of contamination into clean areas. ***Physical hazards:*** 3) Lifting (strain/muscle pulls) 4) Slips, trips, and falls 5) Ambient temperature extremes (cold/heat stress) 6) Vehicular and foot traffic ***Natural hazards:*** 7) Water hazards 8) Insect/animal bites and stings, poisonous plants, etc. 9) Inclement weather	1) Avoid contact with potentially contaminated media (ground-water). The use of safe work practices and protective equipment (PPE) will be adequate to prevent potential exposures via contact and incidental ingestion. Real-time monitoring instrumentation (PID or FID) will be used to detect the presence of airborne contaminants that would indicate an unanticipated condition. 2) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site. 3) Use multiple personnel for heavy lifts. Use proper lifting techniques when handling heavy objects (sample coolers, instrument cases, sampling equipment, etc). 4) Preview work locations for unstable/uneven terrain. 5) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress is provided in Section 4 of the Health and Safety Guidance Manual. 6) Traffic and equipment considerations are to include the following: - Establish safe zones of approach. See Section 9 of the HASP for specific safety zones based on media being sampled. - All activities are to be conducted consistent with the site requirements. 7) When working near water, within 4 ft. of the waters edge, used a Personal Floatation Device (PFD), if necessary, or lifelines, safety harnesses, and other personal safety devices. .Follow safety guidelines for boating in Section 6.4 of this HASP. Use the Boat Safety Checklist in Attachment IV. 8) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Section 4 of the Health and Safety Guidance Manual. 9) Suspend or terminate operations until directed otherwise by the SSO.	A direct reading Photoionization Detector (PID) with a 10.6 eV lamp or higher, or a Flame Ionization Detector (FID), will be used to screen samples and to detect the presence of any potential VOCs. The following procedures will be followed when air monitoring: - Screen source areas (monitoring wells and sample media) to evaluate the presence of VOCs. Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) greater than 5 ppm above established background levels in the breathing zone of the at-risk employees requires site activities to be suspended and site personnel to retreat to an unaffected area. Work may only resume if airborne readings in the worker breathing zone return to background levels. If elevated readings in worker breathing zone are present or frequently noted, contact the PHSO for additional guidance.	Level D protection will be utilized for the initiation of all sampling activities. Level D - (Minimum Requirements): - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes/boots - Surgical style gloves *(double-layered if necessary)* - *Reflective vest for high traffic areas* - *PFD* **Note:** The Safe Work Permit(s) for this task (see Attachment III) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.	**Personnel Decontamination** This will consist of removal and disposal of non-reusable PPE (gloves, coveralls, etc., as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of the following: - Equipment drop - Outer glove removal (as applicable) - Removal, segregation, and disposal of non-reusable PPE in bags/containers provided - Soap/water wash and rinse of reusable PPE (e.g., hardhat) if potentially contaminated - Wash hands and face or use hand wipes, leave contamination reduction zone.
IDW Management	***Chemical hazards:*** Site contaminants present in ground-water are expected to be at concentrations that are unlikely to be present in air. Avoid contact with potentially contaminated ground-water through the use of safe work practices and PPE. The primary hazard associated with IDW management is handling heavy drums and the potential for a spill. ***Physical hazards:*** 1) Lifting hazards/back injuries 2) Loading bulk transport containers ***Natural hazards:*** 3) Inclement weather 4) Insect/animal bites or stings, poisonous plants, etc.	1) Strains and sprains (lifting hazards)/back injuries - Use multiple personnel for heavy lifts. - Use proper lifting techniques. - Lift with your legs, not your back, bend your knees and move as close to the load as possible, and ensure good hand holds are available. - Minimize the horizontal distance from the center of the lift to your center of gravity. - Minimize turning and twisting when lifting as the lower back is especially vulnerable at this time. - Break lifts into steps if the vertical distance (from the start point to the placement of the lift) is excessive. - Plan lifts – Place heavy items on shelves between the waist and chest; lighter items on higher shelves. - Periods of high frequency lifts or extended duration lifts should provide sufficient breaks to guard against fatigue and injury. 2) Material-handling devices shall be used for moving drums. This includes drum dollies with pneumatic tires, drum grapplers, etc. These pieces of equipment are engineered to allow placement of these containers while removing hands from the point of operation. 3) Suspend or terminate operations until directed otherwise by SSO. 4) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Section 4 of the Health and Safety Guidance Manual.	None required, unless spill containment provisions are invoked. Then monitoring will proceed as described in the activity associated with the task when the materials were generated such as soil boring or well installation.	Level D - (Minimum Requirements): - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes/boots - Leather or cotton work gloves - *Safety glasses (when utilizing cables or slings to move containers)* - *Hardhat (when overhead hazards exists or when identified as a operation requirement)* PPE changes may be made with the implementation of the Spill Containment Program. This represents the only anticipated modification to this level of protection.	Not required, unless the implementation of the Spill Containment Program is required due to a spill and/or release. At that point, the decontamination procedures for those activities such as soil borings and/or well installation should be used. The reference reflects the tasks conducted when the materials were generated.

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical and physical hazards associated with the groundwater sampling and the activities to be conducted as part of the scope of work. Table 6-1 provides information on the most common and significant substances likely to be present at the site, based on review of available data. Specifically, toxicological information, exposure limits, symptoms of exposure, and physical properties are discussed in the table. Section 6.1 provides a general list of contaminants that may be present at the site. Section 6.2 lists the physical hazards that may be present at the site or associated with site activities.

6.1 CHEMICAL HAZARDS

The potential health hazards associated with the field activities to be conducted include inhalation, ingestion, and dermal contact of various contaminants that are known to be or may be potentially present on site. Analytical data from previous ground-water sampling indicate that the primary contaminants of concern include VOCs and, in particular, 1,1-dichloroethene and trichloroethylene (TCE).

It is anticipated that the greatest potential for exposure to site contaminants is during well investigation and ground-water sampling activities. Exposure to these compounds is most likely to occur through ingestion and inhalation of contaminated soil or hand-to-mouth contact. PPE and basic hygiene practices (e.g., washing face and hands before leaving site) will be extremely important. Inhalation exposure will be avoided by using appropriate PPE and engineering controls where necessary.

6.2 PHYSICAL HAZARDS

The physical hazards that may be present during the performance of site activities are as follows:

- Working around heavy equipment
- Uneven or unstable terrain (slip, trip, and fall hazards)
- Ambient temperature extremes (heat or cold stress)

These physical hazards are discussed in Table 5-1 as applicable to each site task. Furthermore, many of these hazards are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual. A specific discussion of ambient temperature extremes is presented below.

TABLE 6-1

CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
SITE 16 - NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Substance	CAS No.	Air Monitoring	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
1,1-Dichloroethene See also vinylidene chloride	75-34-4	PID: I.P. 10.00 eV, relative response ratio is 80%. FID: Relative response ratio for detection with the FID is 40%.	ACGIH: 5 ppm NIOSH & OSHA have not established exposure limits.	Odor threshold - 190 ppm. An air purifying respirator equipped with an organic vapor filter is acceptable for escape purposes only. For exposure greater than the exposure limits, use supplied air respirators. **Recommended glove:** Butyl, nitrile, or neoprene.	**Boiling Pt:** 89°F (32°C) **Melting Pt:** -188°F (-122°C) **Solubility:** Slight (0.04%) **Flash Pt:** -2°F (-19°C) **LEL/LFL:** 6.5% **UEL/UFL:** 15.5% **Vapor Density:** 3.25 **Vapor Pressure:** 500 mmHg @ 68°F (20 °C) **Specific Gravity:** 1.21 @ 20°F (4°C) **Incompatibilities:** Aluminum, air, copper, and heat. Polymerization may occur if exposed to oxidizers. **Appearance and Odor:** Colorless liquid with a slight sweet chloroform odor.	Overexposure to this substance may result in irritation to the eyes, nose, throat, and respiratory system. Dermal contact with concentrated solutions may cause slight irritation, redness and inflammation. Systemically, headaches, dizziness, nausea, and difficulty in breathing. Chronic effects may include kidney and liver dysfunction and pneumonitis. This material has expressed cancer-causing potential in laboratory animals including liver and kidney tumors.
Trichloroethylene	79-01-6	PID: I.P. 9.45 eV, High response with PID and 10.2 eV lamp. FID: 70% Response with FID.	OSHA: 50 ppm; 200 ppm (Ceiling) ACGIH: 50 ppm; 100 ppm STEL NIOSH: 25 ppm IDLH: 1000 ppm	Inadequate - Odor threshold 82 ppm. APRs with organic vapor/acid gas cartridges may be used for escape purposes. Exceedances over the exposure limits require the use of positive pressure-demand supplied air respirator. **Recommended gloves:** PV Alcohol unsupported >16.00 hrs; Silver shield >6.00 hrs; Teflon >24.00 hrs; or Viton >24.00 hrs; Nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection)	**Boiling Pt:** 188°F; 86.7°C **Melting Pt:** -99°F; -73°C **Solubility:** 0.1% @ 77°F; 25°C **Flash Pt:** 90°F; 32°C **LEL/LFL:** 8% @ 77°F; 25°C **UEL/UFL:** 10.5 @ 77°F; 25°C **Vapor Density:** 4.53 **Vapor Pressure:** 100 mmHg @ 90°F; 32°C **Specific Gravity:** 1.46 **Incompatibilities:** Strong caustics and alkalis, chemically active metals (barium, lithium, sodium, magnesium, titanium, and beryllium) **Appearance and Odor:** Colorless liquid with a chloroform type odor. Combustible liquid, however, burns with difficulty.	Central nervous system effects including euphoria, analgesia, anesthesia, paresthesia, headaches, tremors, vertigo, and somnolence. Damage to the liver, kidneys, heart, lungs, and skin have also been reported. Contact may result in irritation to the eyes, skin, and mucous membranes. Ingestion may result in GI disturbances including nausea, and vomiting NIOSH lists this substance a potential human carcinogen.

6.2.1 Ambient Temperature Extremes

Ambient temperature extremes (heat or cold stress) may exist during performance of this work depending on the project schedule. Work performed when temperatures are below 50 degrees Fahrenheit (^{o}F) may result in varying levels of cold stress (frost nip, frost bite, etc.) depending on factors such as temperature, wind speed, and humidity; psychological factors such as metabolic rate and moisture content of the skin; and other factors such as the protective clothing being worn. Work performed when ambient temperatures exceed 70^{o}F may result in varying levels of heat stress (heat rash, heat cramps, heat exhaustion, and/or heat stroke) depending on factors similar to those presented for cold stress.

For more information concerning the effect of and controls for cold and heat stress, see Section 4.0 of the TtNUS Health and Safety Guidance Manual.

6.3 NATURAL HAZARDS

6.3.1 Insect/Animal Bites and Stings/Poisonous Plants

Because proposed work will be conducted outdoors and sometimes in brush, marsh, and other natural areas, various animals, insects, or poisonous plants indigenous to the area may be encountered. During warm months (spring through early fall), tick-borne Lyme Disease may be a potential health hazard in the region. Specific information on Lyme Disease is included in Section 4.0 of the Health and Safety Guidance Manual. In general, avoidance of areas of known insect infestation or poisonous plant growth will be the preferred exposure control. Wearing long sleeve shirts and long pants may decrease the ability of insects (specifically ticks) and poisonous plants of coming into contact with skin. Body checks for ticks during and after potential exposure may reduce the number of ticks becoming attached for the long term. If a tick is attached to the skin, procedures to remove the tick are presented Section 4.0 of the Guidance Manual. In addition, individuals with known allergic reactions to insect bites and poisonous plants should notify the FOL and SSO prior to engaging in activities where these hazards may be encountered. Information regarding any medical condition or allergy must be listed on the Medical Data Sheet (see Attachment II).

Mosquito-Borne Illnesses

Mosquitoes may carry diseases including St. Louis Encephalitis, Eastern Equine Encephalitis, La Crosse Encephalitis, and West Nile Virus. Mosquitoes become infected after biting infected birds. The symptoms of mosquito-borne illnesses may include headache, moderate to high fever, stiff neck, and confusion. In serious cases, coma, seizures, or paralysis can result. Symptoms usually appear between 5 to 15 days after exposure to infected mosquitoes. Mosquito-borne illnesses may be mild or serious and can lead to death.

Precautions include the following:

- Limit outdoor activities during peak mosquito times – at dusk and dawn.
- Avoid standing water.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Apply insect repellent according to manufacturer's instruction to exposed skin. An effective repellent will contain 20 to 30 percent DEET (N,N-diethyl-meta-toluamide). Avoid products containing more than 30 percent DEET.
- Spray clothing with repellents containing permethrin or DEET; mosquitoes may bite through thin clothing.

6.3.2 Inclement Weather

The project tasks in this scope of work will be performed outdoors. As a result, inclement weather may be encountered. In the event that adverse weather (electrical storms, hurricanes, etc.) conditions arise, the SSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

6.4 WATER HAZARDS

Planned activities involve locations that are near bodies or on bodies of water. When working out of a boat, U.S. Coast Guard (USCG) approved personal flotation devices (PFD) will be used. Refer to the TtNUS Boat Safety Checklist in Attachment IV of this HASP. Due to the obvious hazards associated with working on or near water edge during inclement weather, field activities may be temporarily suspended or terminated at the discretion and direction of the Navy contact.

U.S.C.G. Flotation Device Types

Use the following information to determine the proper type of U.S.C.G. PFD.

Device	Type	Description
Off Shore Life Jacket	Type I 22lbs buoyancy	Best in rough or open waters. Floats best especially in long time rescue. Will turn unconscious upright. Bulky but highly visible.
Near Shore Buoyant Vest	Type II, 15.5lbs buoyancy	Good in calmer waters. Will turn most unconscious face-up. Less bulky. Not for long time rescue.
Flotation Aid	Type III 15.5lbs buoyancy	Most comfortable device offering more freedom of movement. Not intended for rough water. Unconscious may end up face-down
Throwable Devices	Type IV	Throwable devices for calm waters with heavy boat traffic where help is always close. Not for unconscious, non-swimmers or long hours. Good backups for the other devices.

Site personnel shall wear Type III personal flotation devices in the event someone falls overboard, boats sinks or capsizes. Type IIIs were selected as they offer the most flexibility for working while still meeting minimum requirements for buoyancy. In situations where personal flotation devices cannot be worn due to the task to be conducted, the flotation devices shall be immediately available/accessible. It is recommended that personal flotation devices be continually worn during colder months due to the potential for hypothermia to restrict muscle movement and therefore, self rescue and maintaining buoyancy. In addition, a single Type IV Throwable Flotation Device shall be maintained on board the boat with at least 90 feet of 3/8 polypropylene line.

7.0 AIR MONITORING

Direct read instruments (DRIs) will be used to screen samples and source areas (sample locations, monitoring wells, etc.) as well as worker breathing zones for VOCs. However, other potential contaminants of concern, metals and semivolatile organic compounds (SVOCs), are not readily detected with traditional field instrumentation. The presence of elevated instrument readings, particularly in worker breathing zones, will indicate the presence of airborne concentrations of VOCs that may pose an exposure concern. This will alert workers of an unanticipated condition that will require site activities to be suspended until readings return to background levels.

Exposure to metals is most likely to occur as a result of inhalation of airborne dusts containing these contaminants or incidental ingestion as a result of hand to mouth activities. Observations of airborne dust will require that area wetting methods be used to control the material. The use of PPE and the observance of the other control requirements presented in this HASP will minimize the potential for exposure to metals and SVOCs.

7.1 INSTRUMENTS AND USE

Instruments will be used primarily to monitor source points and worker breathing zone areas, while observing instrument action levels. Action levels are discussed in Table 5-1 as they may apply to a specific task or location.

7.1.1 Photoionization or Flame Ionization Detector

A photoionization (PID) with a 10.6 electron volt (eV) source or a flame ionization detector (FID) will be used to screen source areas (sampling locations, monitoring wells, etc.) to detect the presence of VOCs. This instrument will also be used to monitor the breathing zones of employees during site activities in the event that elevated readings are present at a source area. The PID/FID has been selected because it is capable of detecting a large array of VOCs.

Prior to the commencement of any field activities, background levels of VOCs and the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (i.e., weather, temperature, humidity), and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies that hazard monitoring will be performed as well as the action levels that will initiate the use of elevated levels of protection. The SSO may decide to increases these frequencies based on instrument responses and site observations. The frequency at which monitoring is performed will not be reduced without the prior consent of the PHSO or HSM.

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

Operational checks and field calibration will be performed on each instrument every day prior to use. Field calibration will be performed on instruments according to manufacturers' recommendations (for example, the PID/FID must be field calibrated daily, and an additional field calibration must be performed at the end of each day to determine any significant instrument drift). These operational checks and calibration efforts will be performed in a manner that complies with the employee's health and safety training, the manufacturer's recommendations, and with the applicable manufacturer SOP. Calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration efforts. This information may instead be recorded in a field operations logbook, provided that the information specified in Figure 7-1 is recorded. This required information includes the following:

- Date calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant instrument settings and resultant readings (before and after) calibration
- Identification of the calibration standard (lot number, source concentration, supplier)
- Any relevant comments or remarks

7.3 DOCUMENTING INSTRUMENT READINGS

The SHSO is responsible for ensuring that air monitoring instruments are used in accordance with the specifications of this HASP and with manufacturers' specifications/recommendations. In addition, the SHSO is also responsible for ensuring that instrument use is documented. This requirement can be satisfied either by recording instrument readings on pre-printed sampling log sheets or in a field logbook**.** This includes the requirement for documenting instrument readings that indicate no elevated readings greater than noted daily background levels (i.e., no-exposure readings). At a minimum, the SHSO must document the following information for each use of an air monitoring device:

- Date, time, and duration of the reading.
- Site location where the reading was obtained.

- Instrument used [e.g., PID, FID, lower explosive limit/oxygen (LEL/0_2) meter, etc.].
- Personnel present at the area where the reading was noted.
- Other conditions that are considered relevant by the SHSO (e.g., weather conditions, possible instrument interferences, etc.).

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: _____ **PROJECT NO.:** _____

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

This section is included to specify health and safety training and medical surveillance requirements for both TtNUS and subcontractor personnel participating in site activities.

8.1.1 Requirements for TtNUS Personnel

TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at the site. Additionally, TtNUS personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before they can be cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel.

Documentation of TtNUS introductory, supervisory, and refresher training, as well as site-specific training, will be maintained at the TtNUS field office location. Copies of certificates or other official documentation will be used to fulfill this requirement. TtNUS personnel must verify that in addition to their own training documentation, the subcontract personnel have provided legible copies of their current training and medical surveillance documentation.

TtNUS will also conduct a brief meeting daily to discuss operations planned for that day. At the end of the workday, a short meeting will be held to discuss the operations completed and any problems encountered.

8.1.2 Requirements for Subcontractors

TtNUS subcontractor personnel must have completed the 40-hour introductory hazardous waste site training or have equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e). Additionally, personnel who have had the introductory training more than 12 months ago are required to have 8 hours of refresher training meeting the requirements of 29 CFR 1910.120(e)(8) prior to performing field work at the site. TtNUS subcontractors must certify that each employee has had such training by sending TtNUS a letter, on company letterhead, containing the information in the example letter shown in Figure 8-1 and by providing copies of certificates for subcontractor personnel participating in site activities. Subcontractor personnel shall provide a legible copy of their complete training documentation to the TtNUS site representative upon arrival at the job site.

FIGURE 8-1

TRAINING LETTER

The following statements must be typed on company letterhead and signed by an officer of the company and accompanied by copies of personnel training certificates:

LOGO
COMPANY NAME
Street/Mailing Address
Town, State Zip code

Month, day, year

Ms. Lee Ann Sinagoga
Project Manager
Tetra Tech NUS, Inc.
661 Andersen Drive
Pittsburgh, Pennsylvania 15220-2745

Subject: HAZWOPER Training

Dear Ms. Sinagoga:

As an officer of XYZ Corporation, I hereby state that I am aware of the potentially hazardous nature of the subject project. I also understand that it is our responsibility to comply with the applicable occupational safety and health regulations, including those stipulated in Title 29 of the Code of Federal Regulations (CFR), Parts 1910 and Part 1926.

I also understand that Title 29 CFR 1910.120, entitled "Hazardous Waste Operations and Emergency Response," requires an appropriate level of training for certain employees engaged in hazardous waste operations. In this regard, I hereby state that the following employees have had 40 hours of introductory hazardous waste site training or equivalent work experience as requested by 29 CFR 1910.120(e) and have had 8 hours of refresher training as applicable and as required by 29 CFR 1910.120(e)(8). I further state that site supervisory personnel have had training in accordance with 29 CFR 1910.120(e)(4).

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name and Title of Company Officer)

8.2 SITE-SPECIFIC TRAINING

TtNUS personnel will provide site-specific health and safety training to TtNUS employees and subcontractor personnel who will perform work on this project. Site-specific training will also be provided to personnel [United States Environmental Protection Agency (EPA), Navy, Rhode Island Department of Environmental Management (RIDEM), etc.] who may enter the site to perform functions that may be directly related to site operations. Site-specific training will last approximately 1 hour and include an overview of the following:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of PPE
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the HASP
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Contents of relevant Material Safety Data Sheets (MSDSs)
- Review of the use of Safe Work Permits

Site-specific documentation will be verified through the use of Figure 8-2. Site personnel and visitors must sign this document upon receiving site-specific training.

8.3 MEDICAL SURVEILLANCE

8.3.1 Medical Surveillance Requirements for TtNUS Team Personnel

TtNUS personnel participating in project field activities will have had a physical examination meeting the requirements of TtNUS' medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection.

Documentation for medical clearances will be maintained in the TtNUS Pittsburgh, Pennsylvania office and made available as necessary.

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potentially hazardous nature of performing site activities at Site 16, NCBC Davisville, Rhode Island and that I have received site-specific training that included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Review of contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

My signature below indicates that I have been given the opportunity to ask questions, that my questions have been answered to my satisfaction, and that the dates of my training and medical surveillance indicated below are accurate.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam

8.3.2 Medical Surveillance Requirements for Subcontractors

Subcontractors are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The Subcontractor Medical Approval Form provided in Figure 8-3 shall be used to satisfy this requirement, provided it is properly completed and signed by a licensed physician.

Subcontractors who have a company medical surveillance program meeting the requirements of paragraph (f) of OSHA 29 CFR 1910.120 can substitute the Subcontractor Medical Approval Form with a letter, on company letterhead, containing the information in the example letter presented in Figure 8-4 of this HASP. Completed copies of these forms will be provided to TtNUS personnel at the start of the job.

8.3.3 Medical Data Sheets

Each field team member (including subcontractors and visitors) entering the exclusion zone(s) shall be required to complete and submit a copy of the Medical Data Sheet presented in Attachment II of this HASP. This shall be provided to the SSO prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

8.4 SUBCONTRACTOR EXCEPTIONS

Subcontractors who will not enter the exclusion zone during intrusive operations and whose activities involve no potential for exposure to site contaminants will not be required to meet the requirements for training/medical surveillance other than site-specific training as stipulated in Section 8.2.

FIGURE 8-3

SUBCONTRACTOR MEDICAL APPROVAL FORM

For employees of _____

Company Name

Participant Name: _____ Date of Exam: _____

Part A

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f), and was found to be medically -

   ( ) qualified to perform work at the site
   ( ) not qualified to perform work at the site and

2. Undergone a physical examination in accordance with OSHA 29 CFR 1910.134(b)(10) and was found to be medically -

   ( ) qualified to wear respiratory protection
   ( ) not qualified to wear respiratory protection

My evaluation has been based on the following information, as provided to me by the employer:

( ) A copy of OSHA Standard 29 CFR 1910.120 and appendices.

( ) A description of the employee's duties as they relate to the employee's exposures.

( ) A list of known/suspected contaminants and their concentrations (if known).

( ) A description of any personal protective equipment used or to be used.

( ) Information from previous medical examinations of the employee that is not readily available to the examining physician.

Part B

I, _____, have examined _____
Physician's Name (print) Participant's Name (print)

and have determined the following information:

FIGURE 8-3

SUBCONTRACTOR MEDICAL APPROVAL FORM
PAGE TWO

1. Results of the medical examination and tests (excluding finding or diagnoses unrelated to occupational exposure):

   _____
   _____
   _____

2. Any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health:

   _____
   _____
   _____

3. Recommended limitations on the employee's assigned work:

   _____
   _____
   _____

I have informed this participant of the results of this medical examination and any medical conditions that require further examination of treatment.

Based on the information provided to me, and in view of the activities and hazard potentials involved at the site, this participant

( ) may
( ) may not

perform his/her assigned task.

Physician's Signature _____

Address _____

Phone Number _____

NOTE: Copies of test results are maintained and available at:

_____

_____
Address

FIGURE 8-4

MEDICAL SURVEILLANCE LETTER

The following statements must be typed on company letterhead and signed by an officer of the company:

LOGO
COMPANY NAME
Street/Mailing Address
Town, State Zip code

Month, day, year

Ms. Lee Ann Sinagoga
Project Manager
Tetra Tech NUS, Inc.
661 Andersen Drive
Pittsburgh, Pennsylvania 15220 - 2745

Subject: Medical Surveillance

Dear Ms. Sinagoga:

As an officer of XYZ Corporation, I hereby state that the persons listed below have participated in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations (CFR), Part 1910.120, entitled "Hazardous Waste Operations and Emergency Response: Final Rule." I further state that the persons listed below have had physical examinations under this program within the past 12 months and that they have been cleared, by a licensed physician, to perform hazardous waste site work and to wear positive- and negative-pressure respiratory protection. I also state that, to my knowledge, no person listed below has any medical restriction that would preclude him/her from working at the NCBC Davisville Site.

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name and Title of Company Officer)

9.0 SPILL CONTAINMENT PROGRAM

9.1 SCOPE AND APPLICATION

It is not anticipated that quantities of bulk potentially hazardous materials (greater than 55 gallons) will be handled during the site activities conducted as part of the scope of work. Small quantities of IDW including purge water and decontamination fluids may be generated as part of site activities. It is not anticipated, however, that spillage of these materials would constitute a significant danger to human health or the environment. Furthermore, it is possible that as the job progresses, disposable PPE and other non-reusable items may be generated. IDW will be containerized in 55-gallon drums. If needed, samples will be collected and analyzed to characterize the material and to determine appropriate disposal measures. Once characterized, the waste can be removed from the staging area and disposed of in accordance with federal, State and local regulations.

9.2 POTENTIAL SPILL AREAS

Potential spill areas will be periodically monitored in an ongoing attempt to prevent and control further potential contamination of the environment. The areas vulnerable to this hazard include the central staging area, the waste transfer area, if there is one, and decontamination area.

9.2.1 Site Drums/Containers

Containers used for IDW liquids will be sealed, labeled, and staged in a centralized area in a secure storage box awaiting disposal.

9.3 LEAK AND SPILL DETECTION

For early detection of potential spills or leaks, a periodic walk-around by the SSO will be conducted during working hours to visually determine containers are not leaking. If a leak is detected, the first approach will be to transfer the container contents into a new container by using a sump pump or other device. In most instances, leaks will be collected and contained using absorbents such as spill pads, oil-dry, vermiculite, or sand, which will be stored at the staging area in a conspicuously marked drum. This used material will also be containerized for disposal pending analyses. Inspections will be documented in the project logbook.

9.4 PERSONNEL TRAINING AND SPILL PREVENTION

Personnel will be instructed on the procedures for spill prevention and containment and collection of hazardous materials in the site-specific training. The FOL and/or the SSO will serve as the Spill Response Coordinator for this operation should the need arise.

9.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the minimum equipment that will be maintained at the staging area for the purpose of supporting this Spill Prevention/Containment Program:

- Sand, clean fill, vermiculite, or other noncombustible absorbent (oil-dry);
- 55-gallon drums with sealing lids [Department of Transportation (DOT) 17-E or 17-H]
- Shovels, rakes, and brooms
- Hand-operated drum pump with hose
- Labels

9.6 SPILL CONTROL PLAN

The following describes the procedures that TtNUS field crew members will employ upon the detection of a spill or leak:

1) Notify the SSO or FOL immediately upon the detection of a leak or spill.

2) Employ PPE stored at the staging area including gloves (appropriate for the spill medium), tyvek, steel toe boots with covers, etc. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point on the container. Spread absorbent material in the area of the spill so that the area is covered completely.

3) Transfer the material to a new container and collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment or disposal options.

4) Re-containerize spills, including 2 inches of top cover impacted by the spill. Await test results for treatment or disposal options.

It is not anticipated that a spill will occur that the field crew cannot handle. Should this occur, notification of appropriate emergency response agencies will be carried out by the FOL or SSO.

10.0 SITE CONTROL

This section outlines the means by which TtNUS and subcontractor personnel will delineate work zones and use these work zones in conjunction with decontamination procedures in order to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site. This three-zone approach includes an exclusion zone, a contamination reduction zone (CRZ), and a support zone. It is also anticipated that this control measure will be used to control access to site work areas. Use of such controls will restrict the general public, minimize the potential for the spread of contaminants, and protect individuals who are not cleared to enter work areas.

10.1 EXCLUSION ZONE

The exclusion zone will be considered those areas of the site which known or suspected contamination. It is not anticipated that significant amounts of surface contamination are in the proposed work areas of this site. The exclusion zones for this project will be limited to those areas of the site where active work is being performed plus an established safety zone depending on the task, as follows:

- Ground-water sampling – 5 feet surrounding the sample collection point

10.2 CONTAMINATION REDUCTION ZONE

The CRZ will be a buffer area between the exclusion zone and any area of the site where contamination is not suspected. Personnel and equipment decontamination will take place in this area at a central location to facilitate and support field activities. When necessary, the CRZ will be delineated using barrier tape and/or cones to inform and direct personnel.

10.3 SUPPORT ZONE

The support zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and food and drink containers will be maintained. The support zone will be established at an area of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

10.4 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by TtNUS
- Regulatory personnel (EPA, RIDEM, OSHA, etc.)
- Naval personnel

People requiring site access into active work areas will be required to obtain permission from the FOL or designee. Upon gaining access to the site, site visitors who contact the field team and are interested in observing operations in progress will be escorted by a TtNUS representative (arranged for by the FOL) and shall be required to meet the following minimum requirements:

- Site visitors will be routed to the FOL, who will sign them into the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), the entity that they represent, and the purpose of the visit.

- Site visitors will be required to produce the necessary information supporting clearance onto the site. This includes information attesting to applicable training [40 hours of Hazardous Waste Operations (HAZWOPER) training for Navy personnel] and medical surveillance, as stipulated in Section 8 of this document. To enter the site's operational zones during planned activities, visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this document. Site visitors not associated with the sampling team will be required to maintain a safe distance from the active sampling location as determined by the SSO.

After the site visitors have completed the above items, they will be permitted to enter the operational zone. Visitors are required to observe the protective equipment and site restrictions in effect at the site at the time of their visit.

Visitors not meeting the requirements stipulated in this plan will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause the termination of on-site activities until the unauthorized visitor is removed from the premises. Removal of unauthorized visitors will be accomplished with support from the NCBC Davisville client/site contact, if necessary.

10.5 SITE SECURITY

Security at each active sampling location will be the responsibility of TtNUS personnel and their subcontractors, as necessary. TtNUS personnel will retain control over active sample locations. The first line of security consists of visual barriers (e.g., safety cones, barrier tape) that restrict the general public

and Naval personnel. The second line of security will take place at the work site referring interested parties to the FOL. In addition, the FOL will serve as a focal point for non-project interested parties and will serve as the final line of security and the primary enforcement contact.

10.6 BUDDY SYSTEM

Personnel engaged in on-site activities will practice the "buddy system" to ensure the safety of the personnel involved in this operation.

10.7 MATERIAL SAFETY DATA SHEET REQUIREMENTS

TtNUS and/or subcontractor personnel will provide MSDSs for the chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. A chemical inventory of the chemicals used on site will be developed using Figure 1 (Section 5.0) of the Health and Safety Guidance Manual. The MSDSs will then be maintained at the field office and will be available for anyone to review upon request.

10.8 COMMUNICATION

If personnel are not working in proximity to one another during field activities, a supported means of communication between field crews may be necessary. As a result, two-way radio communication devices may be used by field personnel while at the site.

External communication will be accomplished by using provided cellular telephones.

10.9 SAFE WORK PERMITS

Exclusion zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task-by-task basis. An example of the Safe Work Permit to be used is illustrated in Figure 10-1. The daily meetings conducted at the site will further support these Work Permits. This effort will ensure that site-specific considerations and changing conditions are incorporated into the planning effort.

Use of these permits will provide the communication line for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The Safe Work Permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

The FOL and/or the SSO will be responsible for completing the Safe Work Permits and issuing them to the appropriate parties. At the end of each day's activity, site personnel will turn in the permit(s) used for that day to the SSO. Permits will be maintained as part of the permanent project files attesting to safety and health measures employed for a given task at a given time and place. Any problems encountered with the protective measures required should be documented on the permit and brought to the attention of the SSO. Partially completed Safe Work Permits are included in Attachment III.

FIGURE 10-1
SAFE WORK PERMIT

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): _____

II. Primary Hazards: Potential hazards associated with this task: _____

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____TtNUS

V. Protective equipment required
Level D ☐ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☐

Modifications/Exceptions: _____

VI. Chemicals of Concern	**Hazard Monitoring**	**Action Level(s)**	**Response Measures**

Primary Route(s) of Exposure/Hazard: _____

(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety Glasses	☐ Yes	☐ No	Safety belt/harness	☐ Yes	☐ No
Chemical/splash goggles	☐ Yes	☐ No	Radio/Cellular Phone	☐ Yes	☐ No
Splash Shield	☐ Yes	☐ No	Barricades	☐ Yes	☐ No
Splash suits/coveralls	☐ Yes	☐ No	Gloves (Type – Work)	☐ Yes	☐ No
Impermeable apron	☐ Yes	☐ No	Work/rest regimen	☐ Yes	☐ No
Steel toe work shoes or boots	☐ Yes	☐ No	Chemical Resistant Boot Covers	☐ Yes	☐ No
High Visibility vest	☐ Yes	☐ No	Tape up/use insect repellent	☐ Yes	☐ No
First Aid Kit	☐ Yes	☐ No	Fire Extinguisher	☐ Yes	☐ No
Safety Shower/Eyewash	☐ Yes	☐ No	Other	☐ Yes	☐ No

Modifications/Exceptions: _____

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: _____

Permit Issued by: _____ Permit Accepted by: _____

11.0 CONFINED SPACE ENTRY

It is not anticipated, under the proposed scope of work, that permit-required confined space activities will be conducted. Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces. A confined space is defined as an area that has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

A permit-required confined space is one that:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential to engulf an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.
- Contains any other recognized and serious safety or health hazard.

For further information on confined space, consult the PHSO or HSM. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed.

12.0 MATERIALS AND DOCUMENTATION

The TtNUS FOL shall ensure the following materials/documents are taken to the project site and used when required:

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports forms (blank)
- Medical Data Sheets
- MSDSs for chemicals brought on site, including decontamination solutions, fuels, sample preservatives, calibration gases, etc.
- A full-size OSHA Job Safety and Health Poster (to be posted in the site trailers)
- Training/Medical Surveillance Documentation Form (blank)
- Emergency reference information (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED AT THE SITE

The following documentation is to be posted or maintained at the site for quick reference purposes. In situations where posting these documents is not feasible, (such as at sites with no office trailer), these documents should be separated and immediately accessible.

Chemical Inventory Listing (posted) - This list represents chemicals brought on site, including decontamination solutions, sample preservations, fuel, etc. This list should be posted in a central area.

MSDSs (maintained) - The MSDSs should also be in a central area accessible to site personnel. These documents should match the listings on the chemical inventory list for substances used on site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

The OSHA Job Safety & Health Protection Poster (posted) - This poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaced, altered, or covered by other material.

Site Clearance (maintained) - This list is found within the training section of the HASP (see Figure 8-2) and identifies site personnel, dates of training (including site-specific training), and medical surveillance. The list indicates clearance and status. Personnel must meet these requirements to enter the site while site personnel are engaged in activities.

Emergency Phone Numbers and Directions to the Hospital(s) (posted) - This list of numbers and directions will be maintained at the phone communications points and in each site vehicle.

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be filled out by on-site personnel and filed in a central location. For any injury or illness requiring medical attention, the site worker's Medical Data Sheet will accompany him/her to the medical facility. A copy of this sheet or a wallet card will be given to personnel to be carried on their person.

Hearing Conservation Standard (29 CFR 1910.95) (posted) - This standard will be posted anytime hearing protection or other noise abatement procedures are employed.

Personnel Monitoring (maintained) - The results generated through personnel sampling (levels of airborne toxins, noise levels, etc.) will be posted to inform individuals of the results of that effort.

Placards and Labels (maintained) - Where chemical inventories have been separated because of quantities and incompatibilities, these areas will be conspicuously marked using DOT placards and acceptable [Hazard Communication 29 CFR 1910.1200(f)] labels.

The purpose of maintaining or posting this information, as stated above, is to allow site personnel quick access. Variations concerning location and methods of presentation are acceptable, providing the objective is accomplished.

13.0 ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
CRZ	Contamination reduction zone
DRI	Direct read instruments
DOT	Department of Transportation
EPA	United States Environmental Protection Agency
eV	Electron volts
FID	Flame ionization detector
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
IDW	Investigative-Derived Wastes
LEL	Lower explosive limit
LFL	Lower flammable limit
MSDS	Material Safety Data Sheets
MSL	Mean sea level
N/A	Not Available
NCBC	Naval Construction Battalion Center
NIOSH	National Institute for Occupational Safety and Health
O_2	Oxygen
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PHSO	Project Health and Safety Officer
PID	Photoionization detector
PM	Project Manager
PPE	Personal protective equipment
QAPP	Quality Assurance Project Plan
RIDEM	Rhode Island Department of Environmental Management
SOP	Standard Operating Procedure
SSO	Site Safety Officer

SVOC	Semivolatile organic compound
TtNUS	Tetra Tech NUS, Inc.
UEL/UFL	Upper Explosive Limit/Upper Flammable Limit
VOC	Volatile organic compound

ATTACHMENT I

INJURY REPORT FORM

TETRA TECH, INC.
Safety Excellence

TETRA TECH, INC.
INCIDENT REPORT

Report Date	Report Prepared By	Incident Report Number

INSTRUCTIONS:

All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form.

Complete any additional parts to this form as indicated below for the type of incident selected.

TYPE OF INCIDENT (Check all that apply)	Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	☐ Complete IR Form Only
Injury or Illness	☐ Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	☐ Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	☐ Complete Form IR-C; Motor Vehicle

INFORMATION ABOUT THE INCIDENT

Description of Incident

_____

_____

_____

_____

Date of Incident	Time of Incident
	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐
Weather conditions at the time of the incident	**Was there adequate lighting?**
	_____ Yes ☐ No ☐

Location of Incident

_____ Was location of incident within the employer's work environment? Yes ☐ No ☐

Street Address	City, State, Zip Code and Country
Project Name	**Client:**
Tt Supervisor or Project Manager	**Was supervisor on the scene?**
	Yes ☐ No ☐

WITNESS INFORMATION (attach additional sheets if necessary)

Name	Company
Street Address	**City, State and Zip Code**
Telephone Number(s)	

CORRECTIVE ACTIONS

Corrective action(s) immediately taken by unit reporting the incident:

_____

_____

_____

_____

Corrective action(s) still to be taken (by whom and when):

_____

_____

_____

_____

ROOT CAUSE ANALYSIS LEVEL REQUIRED

Root Cause Analysis Level Required: Level - 1 ☐ Level - 2 ☐ None ☐

Root Cause Analysis Level Definitions

Level - 1	**Definition:** A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office. The following events may trigger a Level 1 RCA: ▪ Work related fatality ▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability ▪ Property damage in excess of $75,000 ▪ When requested by senior management
Level - 2	**Definition:** A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided. The following events will require a Level 2 RCA: ▪ OSHA recordable lost time incident ▪ Near miss incident that could have triggered a Level 1 RCA ▪ When requested by senior management

Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.

NOTIFICATIONS

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.

INSTRUCTIONS:

Complete all sections below for incidents involving injury or illness.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

EMPLOYEE INFORMATION

Company Affiliation

Tetra Tech Employee? ☐ TetraTech subcontractor employee (directly supervised by Tt personnel)? ☐

Full Name	**Company (if not Tt employee)**

Street Address, City, State and Zip Code	**Address Type**
_____	Home address (for Tt employees) ☐
_____	Business address (for subcontractors) ☐

Telephone Numbers

Work: _____	Home: _____	Cell: _____

Occupation (regular job title)	**Department**

Was the individual performing regular job duties?	**Time individual began work**
Yes ☐ No ☐	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐

Safety equipment

Provided? Yes ☐ No ☐

Used? Yes ☐ No ☐ If no, explain why

_____

_____

_____

Type(s) provided:

☐ Hard hat ☐ Protective clothing
☐ Gloves ☐ High visibility vest
☐ Eye protection ☐ Fall protection
☐ Safety shoes ☐ Machine guarding
☐ Respirator ☐ Other (list)

_____

NOTIFICATIONS

Name of Tt employee to whom the injury or illness was first reported	**Was H&S notified within one hour of injury or illness?**
	Yes ☐ No ☐

Date of report	**H&S Personnel Notified**

Time of report	**Time of Report**

If subcontractor injury, did subcontractor's firm perform their own incident investigation?

Yes ☐ No ☐ If yes, request a copy of their completed investigation form/report and attach it to this report.

INJURY / ILLNESS DETAILS

What was the individual doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the individual was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from a hand sprayer"; "Daily computer key-entry"

What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor and worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; Worker developed soreness in wrist over time"

Describe the object or substance that directly harmed the individual: Examples: "Concrete floor"; "Chlorine"; "Radial Arm Saw". If this question does not apply to the incident, write "Not Applicable".

MEDICAL CARE PROVIDED

Was first aid provided at the site: Yes ☐ No ☐ If yes, describe the type of first aid administered and by whom?

Was treatment provided away from the site: Yes ☐ No ☐ If yes, provide the information below.

Name of physician or health care professional	**Facility Name**
Street Address, City State and Zip Code	**Type of Care?**
	Was individual treated in emergency room? Yes ☐ No ☐
	Was individual hospitalized overnight as an in-patient? Yes ☐ No ☐
Telephone Number	Did the individual die? Yes ☐ No ☐ If yes, date: _____
	Will a worker's compensation claim be filed? Yes ☐ No ☐

NOTE: Attach any police reports or related diagrams to this report.

SIGNATURES

I have reviewed this report and agree that all the supplied information is accurate

Affected individual (print)	**Affected individual (signature)**	**Telephone Number**	**Date**

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

INSTRUCTIONS:

Complete all sections below for incidents involving property/equipment damage, fire, spill or release.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

TYPE OF INCIDENT (Check all that apply)

Property Damage ☐ Equipment Damage ☐ Fire or Explosion ☐ Spill or Release ☐

INCIDENT DETAILS

Results of Incident: Fully describe damages, losses, etc.

_____

_____

_____

Response Actions Taken:

_____

_____

_____

Responding Agency(s) (i.e. police, fire department, etc.)	**Agency(s) Contact Name(s)**

DAMAGED ITEMS (List all damaged items, extent of damage and estimated repair cost)

Item:	**Extent of damage:**	**Estimated repair cost**

SPILLS / RELEASES (Provide information for spilled/released materials)

Substance	**Estimated quantity and duration**	**Specify Reportable Quantity (RQ)**
		_____ Exceeded? Yes ☐ No ☐ NA ☐

FIRES / EXPLOSIONS (Provide information related to fires/explosions)

Fire fighting equipment used? Yes ☐ No ☐ If yes, type of equipment: _____

NOTIFICATIONS

Required notifications	**Name of person notified**	**By whom**	**Date / Time**
Client: _____ Yes ☐ No ☐			
Agency: _____ Yes ☐ No ☐			
Other: _____ Yes ☐ No ☐			

Who is responsible for reporting incident to outside agency(s)? Tt ☐ Client ☐ Other ☐ Name: _____

Was an additional written report on this incident generated? Yes ☐ No ☐ If yes, place in project file.

INSTRUCTIONS:

Complete all sections below for incidents involving motor vehicle accidents. Do NOT leave any blanks. Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

INCIDENT DETAILS

Name of road, street, highway or location where accident occurred	**Name of intersecting road, street or highway if applicable**

County	**City**	**State**

Did police respond to the accident?	**Did ambulance respond to the accident?**
Yes ☐ No ☐	Yes ☐ No ☐
Name and location of responding police department	**Ambulance company name and location**
Officer's name/badge #	

Did police complete an incident report? Yes ☐ No ☐ If yes, police report number: _____
Request a copy of completed investigation report and attach to this form.

VEHICLE INFORMATION

How many vehicles were involved in the accident? _____ (Attach additional sheets as applicable for accidents involving more than 2 vehicles.)

Vehicle Number 1 – Tetra Tech Vehicle		**Vehicle Number 2 – Other Vehicle**	
Vehicle Owner / Contact Information		**Vehicle Owner / Contact Information**	
Color		**Color**	
Make		**Make**	
Model		**Model**	
Year		**Year**	
License Plate #		**License Plate #**	
Identification #		**Identification #**	
Describe damage to vehicle number 1		**Describe damage to vehicle number 2**	
Insurance Company Name and Address		**Insurance Company Name and Address**	
Agent Name		**Agent Name**	
Agent Phone No.		**Agent Phone No.**	
Policy Number		**Policy Number**	

DRIVER INFORMATION

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Driver's Name		**Driver's Name**	
Driver's Address		**Driver's Address**	
Phone Number		**Phone Number**	
Date of Birth		**Date of Birth**	
Driver's License #		**Driver's License #**	
Licensing State		**Licensing State**	
Gender	Male ☐ Female ☐	**Gender**	Male ☐ Female ☐
Was traffic citation issued to Tetra Tech driver? Yes ☐ No ☐		Was traffic citation issued to driver of other vehicle? Yes ☐ No ☐	
Citation #		**Citation #**	
Citation Description		**Citation Description**	

PASSENGERS IN VEHICLES (NON-INJURED)

List all non-injured passengers (excluding driver) in each vehicle.
Driver information is captured in the preceding section.
Information related to persons injured in the accident (non-Tt employees) is captured in the section below on this form.
Injured Tt employee information is captured on FORM IR-A

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
How many passengers (excluding driver) in the vehicle? _____		How many passengers (excluding driver) in the vehicle? _____	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	

INJURIES TO NON-TETRATECH EMPLOYEES

Name of injured person 1				Address of injured person 1		
Age	**Gender**	**Car No.**	**Location in Car**	**Seat Belt Used?**	**Ejected from car?**	**Injury or Fatality?**
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐
Name of injured person 2				**Address of injured person 2**		
Age	**Gender**	**Car No.**	**Location in Car**	**Seat Belt Used?**	**Ejected from car?**	**Injury or Fatality?**
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐

OTHER PROPERTY DAMAGE

Describe damage to property other than motor vehicles	
Property Owner's Name	**Property Owner's Address**

COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED

ATTACHMENT II

MEDICAL DATA SHEET

MEDICAL DATA SHEET

This Medical Data Sheet must be completed by on-site personnel and kept in a central location during the execution of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Name of Next Kin _____

Drug or other Allergies _____

_____

Particular Sensitivities _____

_____

Do You Wear Contacts? _____

Provide a Checklist of Previous Illnesses or Exposure to Hazardous Chemicals _____

_____

_____

_____

What medications are you presently using? _____

_____

_____

_____

Do you have any medical restrictions? _____

_____

_____

_____

Name, Address, and Phone Number of personal physician: _____

_____

_____

I am the individual described above. I have read and understand this HASP.

_____ _____

Signature Date

ATTACHMENT III

SAFE WORK PERMITS

SAFE WORK PERMIT
MOBILIZATION/DEMOBILIZATION ACTIVITIES
NAVAL CONSTRUCTION BATTALION DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Mobilization and demobilization activities not associated with typical hazardous waste site activities.

II. Primary Hazards: Lifting; pinches and compressions; vehicular and foot traffic; slips/trips/falls, and ambient temperature extremes; insect/animal bites and stings; poisonous plants; and inclement weather

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ TtNUS

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: _____

VI. Chemicals of Concern	**Hazard Monitoring**	**Action Level(s)**	**Response Measures**
None anticipated			

Primary Route(s) of Exposure/Hazard: _____

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☐ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☐ No	Barricades	☐ Yes ☒ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – leather/cotton)	☐ Yes ☐ No
Impermeable apron	☐ Yes ☐ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes/boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☒ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☒ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: PPE selection is dependent upon tasks being performed. In general, site activities require the use of basic safety equipment (field clothing and steel-toe footwear). Work gloves (cotton or leather) will be used when necessary to protect against cut or abrasions.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Site contaminants are unlikely to be encountered during this site activity. Material Safety Data Sheets (MSDS) will be provided for all chemicals used on site (sample preservatives, decon solutions, fuels, etc.). Refer to MSDS for additional guidance including use of PPE and safe handling procedures. Obtain assistance when handling heavy equipment (sample coolers, instrument cases, sampling equipment, etc.).

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
GROUNDWATER LEVELS,SAMPLING AND STAFF GAUGE INSTALLATION
NAVAL CONSTRUCTION BATTALION DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. **Work limited to the following (description, area, equipment used):** Groundwater levels, sampling and staff gauge installation.

II. **Primary Hazards:** contact with contaminants; transfer of contamination; lifting; slip/trips/falls; ambient temperature extremes; vehicular and foot traffic; insect/animal bites and stings, poisonous plants, inclement weather and water hazards.

III. **Field Crew:** _____

IV. **On-site Inspection conducted** ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ TtNUS

V. **Protective equipment required**
Level D ☒ Level B ☐
Level C ☐ Level A ☐
Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒
Modifications/Exceptions: _____

VI. Chemicals of Concern	**Hazard Monitoring**	**Action Level(s)**	**Response Measures**
1,1-dichlorethene, TCE	PID or FID	any sustained reading above 5 ppm in breathing zone	evacuate area and resume when levels return to normal

Primary Route(s) of Exposure/Hazard: Contact with contaminated media, incidental ingestion. Airborne concentrations of site contaminants are unlikely to be present.

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. **Additional Safety Equipment/Procedures**

Hard-hat	☐ Yes ☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☒ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☐ No
Chemical/splash goggles	☐ Yes ☒ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☒ No	Barricades	☐ Yes ☒ No
Splash suits/coveralls	☐ Yes ☒ No	Gloves (Type – Nitrile)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☒ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes or boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☒ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☒ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Other PPE as identified in Table 5-1 may be necessary based on observed hazards (safety glasses, high visibility reflective vests, etc.

VIII. **Site Preparation**

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. **Special instructions, precautions:** Significant airborne concentrations of potential site contaminants are unlikely to be encountered during this site activity. Use of safe working practices and PPE will prevent potential contact/exposure to site contaminants. Obtain assistance when handling heavy equipment (sample coolers, instrument cases, sampling equipment, etc.). Refer to the Boat Safety Checklist Attachment IV for staff gauge installation from a boat.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PRACTICES
DECONTAMINATION ACTIVITIES
NAVAL CONSTRUCTION BATTALION DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): Decontamination of sampling equipment used during groundwater sampling tasks.

II. Primary Hazards: decontamination fluids; vehicular and foot traffic, ambient temperature extremes, slips, trips and falls; inclement weather

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ TtNUS

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: _____

VI. Chemicals of Concern	**Hazard Monitoring**	**Action Level(s)**	**Response Measures**
1,1-dichlorethene, TCE	PID or FID	any reading	decontaminate equipment again and re-screen

Primary Route(s) of Exposure/Hazard: Contact with contaminated media, incidental ingestion. Airborne concentrations of site contaminants are unlikely to be present.

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☐ No
Safety Glasses	☒ Yes ☐ No	Safety belt/harness	☐ Yes ☐ No
Chemical/splash goggles	☐ Yes ☐ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☐ No	Barricades	☐ Yes ☐ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – Nitrile)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☐ No	Work/rest regimen	☐ Yes ☐ No
Steel toe Work shoes/boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☐ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☒ Yes ☐ No	Fire Extinguisher	☐ Yes ☐ No
Safety Shower/Eyewash	☒ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Other PPE as identified in Table 5-1 may be necessary based on observed hazards (safety glasses, high visibility reflective vests, etc.

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Significant concentrations of potential site contaminants are unlikely to be encountered during this site activity. Use of safe working practices and PPE will prevent potential contact/exposure to site contaminants.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
IDW MANAGEMENT ACTIVITIES
NAVAL CONSTRUCTION BATTALION CENTER
NORTH KINGSTOWN, RHODE ISLAND

Permit No. _____ Date: _____ Time: From _____ to _____

I. Work limited to the following (description, area, equipment used): IDW management activities.

II. Primary Hazards: Site contaminants; lifting; loading bulk transport containers; inclement weather and insect/animal bites or stings, poisonous plants, etc.

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____ TtNUS

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☒

Modifications/Exceptions: _____

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
1,1-dichlorethene, TCE	None required unless spill provisions are involved.	None	If concentrations are suspected contact the PHSO.

Primary Route(s) of Exposure/Hazard: Contact with contaminated media, incidental ingestion. Airborne concentrations of site contaminants are unlikely to be present.

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes ☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes ☒ No
Safety Glasses	☐ Yes ☐ No	Safety belt/harness	☐ Yes ☒ No
Chemical/splash goggles	☐ Yes ☐ No	Radio/Cellular Phone	☐ Yes ☐ No
Splash Shield	☐ Yes ☐ No	Barricades	☐ Yes ☒ No
Splash suits/coveralls	☐ Yes ☐ No	Gloves (Type – leather or cotton)	☒ Yes ☐ No
Impermeable apron	☐ Yes ☐ No	Work/rest regimen	☐ Yes ☐ No
Steel toe work shoes or boots	☒ Yes ☐ No	Chemical Resistant Boot Covers	☐ Yes ☒ No
High Visibility vest	☐ Yes ☐ No	Tape up/use insect repellent	☐ Yes ☐ No
First Aid Kit	☒ Yes ☐ No	Fire Extinguisher	☐ Yes ☒ No
Safety Shower/Eyewash	☒ Yes ☐ No	Other	☐ Yes ☐ No

Modifications/Exceptions: Other PPE as identified in Table 5-1 may be necessary based on observed hazards (safety glasses, chemical resistant coveralls, etc).

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: Significant concentrations of potential site contaminants are unlikely to be encountered during this site activity. Use of safe working practices and PPE will prevent potential contact/exposure to site contaminants. Obtain assistance or use material handling when handling heavy equipment (sample coolers, instrument cases, sampling equipment, etc.).

Permit Issued by: _____ Permit Accepted by: _____

ATTACHMENT IV

BOAT SAFETY CHECKLIST

TETRA TECH NUS, INC.
SAFE BOATING CHECKLIST

Owner/Operator Name:_____

Registration Number_____

Location _____ County: _____State: _____HIN:_____

Length of Boat:	<16 ❑	16-25 ❑	26-39 ❑	40-65 ❑	> 65 ❑
Area of Operations:	Inland ❑	Coastal ❑			
Powered by:	Gas ❑	Diesel ❑	Sail ❑	Other ❑	
Type:	PWC ❑	Open ❑	Cabin ❑	Other ❑	

VESSEL SAFETY CHECK REQUIREMENTS				**RECOMMENDED AND DISCUSSION ITEMS**			
Item	Yes	No	NA	Item	Yes	No	NA
1. Display of Numbers				**(While encouraged, items below are not requirements)**			
2. Registration / Documentation				**I.** Marine Radio			
3. Personal Flotation Devices (PFD)				**II.** Dewatering Device & Backup			
4. Visual Distress Signals (VDS)				**III.** Mounted Fire Extinguishers			
5. Fire Extinguishers				**IV.** Anchor & Line for Area			
6. Ventilation				**V.** First Aid and PIW Kits (**over)			
7. Backfire Flame Control				**VI.** Inland Visual Distress Signals			
8. Sound Producing Devices / Bell				**VII.** Capacity / Cert. of Compliance			
9. Navigation Lights				**VIII.** Discussion Items: (as applies)			
10. Pollution Placard				a. Accident reporting/owner responsibility			
11. MARPOL Trash Placard				b. Offshore operations			
12. Marine Sanitation Devices				c. Nautical charts / navigation aids			
13. Navigation Rules				d. Survival tips / first Aid			
14. State and/ or Local Requirements				e. Fueling / fuel management			
15. Overall Vessel Condition:				f. Float plan / weather & sea conditions			
a. Deck free of hazards / clean bilge				g. Insurance considerations			
b. Electrical / fuel systems				h. Boating check list			
c. Galley / heating systems				i. Safe boating classes			

This checklist has been modified for use from the United States Coast Guard Auxiliary Vessel Safety Check (VSC) Program. USCG AUX. Form 204 (7-2000)

Explanation of Required Items

- ❑ **1. NUMBERING:** The boat's registration number must be permanently attached to each side of the forward half of the boat. Characters must be plain, vertical, block style, not less than three (3) inches high, and in a color contrasting with the background. A space or hyphen must separate the letters from the numbers.

- ❑ **2. REGISTRATION / DOCUMENTATION:** Registration or Documentation papers must be on board and available. Documentation numbers must be permanently marked on a visible part of the interior structure. The documented boat's name and hailing port must be displayed on the exterior hull in letters not less than 4 inches in height.

- ❑ **3. PERSONAL FLOTATION DEVICES (PFDs):** Acceptable PFDs (also known as Life Jackets) must be U.S. Coast Guard approved and in good, serviceable condition. A wearable PFD of suitable size is required for the each person on the boat. Wearable PFDs shall be *"readily accessible*." Boats 16 Feet or longer, must also have one Type IV (throwable) device, which shall be " *immediately available*." PFDs shall NOT be stored in unopened plastic packaging.

- ❑ **4. VISUAL DISTRESS SIGNALS:** Boats 16 feet and over or the are required to carry a minimum of either:
  1) three day and three night pyrotechnic devices
  2) one day non-pyrotechnic device (flag) and one night non-pyrotechnic device (auto SOS light)
  3) a combination of 1) and 2).

Boats less than 16 feet need only carry night visual distress signals when operating from sunset to sunrise. It is recommended, but not required, that boats operating on inland waters should have some means of making a suitable day and night distress signal. The number and type of signals is best judged by considering conditions under which the boat will be operating.

- ❑ **5. FIRE EXTINGUISHERS:** Fire extinguishers are required if one of the following conditions exists:
  1) Inboard engine(s)
  2) Double bottom hulls not completely sealed or not completely filled with flotation materials
  3) Closed living space
  4) Closed stowage compartments that contain flammable materials or
  5) Permanently installed fuel tanks. Boats less than 26 feet, and propelled by outboard motors are NOT required to have fire extinguishers unless one or more of the conditions (2-5) listed above applies.

Coast Guard Classification of Fire Extinguishers		
Classification (type size)	**B-I**	**B-II**
Foam (minimum gallons)	1.25	2.5
Carbon Dioxide (minimum lbs.)	4	15
Dry Chemical (minimum lbs.)	2	10
Halon (minimum lbs.)	2.5	10

NOTE: Fire extinguishers must be readily accessible and verified as serviceable.

MINIMUM NUMBER OF EXTINGUISHERS REQUIRED		
Boat Length	*No Fixed System*	*With Fixed System*
Less than 26'	one B-1	0
26' to less than 40'	two B-1 or one B-2	one B-1
40' to 65'	three B-1 or one B-1 & one B-2	two B-1 or one B-2

- ❑ **6. VENTILATION:** Boats with gasoline engines in closed compartments, built after 1 August 1980 must have a powered ventilation system. Those built prior to that date must have natural or powered ventilation. Boats with closed fuel tank compartments built after 1 August 1978 must meet requirements by displaying a "certificate of compliance." Boats built before that date must have either natural or powered ventilation in the fuel tank compartment.

- ❑ **7. BACKFIRE FLAME ARRESTER:** All gasoline powered inboard/outboard or inboard motor boats must be equipped with an approved backfire flame control device.

- ❑ **8. SOUND PRODUCING DEVICES:** To comply with Navigation Rules and for distress signaling purposes all boats must carry a sound producing device (whistle, horn, siren, etc.) capable of a 4-second blast audible for ½ mile. Boats larger than 39.4 ft. are also required to have a bell (see Navigation Rules.)

- ❑ **9. NAVIGATION LIGHTS:** All boats must be able to display navigation lights between sunset and sunrise and in conditions of reduced visibility. Boats 16 feet or more in length must have properly installed, working navigation lights and an all-around anchor light capable of being lit independently from the red/green/white "running" lights.

- ❑ **10. POLLUTION PLACARD:** Boats 26 feet and over with a machinery compartment must display an oily waste "pollution" placard.

- ❑ **11. MARPOL TRASH PLACARD:** Boats 26 feet and over in length, operating in U.S. navigable waters, must display a "MARPOL" trash placard. Oceangoing boats 40 feet and over must also have a written trash disposal plan available onboard.

- ❑ **12. MARINE SANITATION DEVICE:** Any installed toilet must be a Coast Guard approved device. Overboard discharge outlets must be capable of being sealed.

- ❑ **13. NAVIGATION RULES:** Boats 39.4 feet and over must have on board a current copy of the Navigation Rules.

- ❑ **14. STATE AND LOCAL REQUIREMENTS:** A boat must meet the requirements of the state in which it is being examined.

- ❑ **15. OVERALL BOAT CONDITION: As it applies to this Vessel. Including, but not limited to:**

  a. Deck free of hazards and clean bilge - The boat must be free from fire hazards, in good overall condition, with bilges reasonably clean and visible hull structure generally sound. The use of automobile parts on boat engines is not acceptable. The engine horsepower must not exceed that shown on the capacity plate.

  b. Electrical and Fuel Systems: The electrical system must be protected by fuses or manual reset circuit breakers. Switches and fuse panels must be protected from rain or water spray. Wiring must be in good condition, properly installed and with no exposed areas or deteriorated insulation. Batteries must be secured and terminals covered to prevent accidental arcing. If installed**,** self-circling or kill switch mechanism must be in proper working order.

  Fuel Systems - Portable fuel tanks (normally 7 gallon capacity or less) must be constructed of non-breakable material and free of corrosion and leaks. All vents must be capable of being closed. The tank must be secured and have a vapor-tight, leak-proof cap. Each permanent fuel tank must be properly ventilated.

  c. Galley and Heating Systems - System and fuel tanks must be properly secured with no flammable materials nearby.