

**VOLUNTARY-CORRECTIVE ACTION WORK PLAN
RCRA FACILITY INVESTIGATION
NAVAL SUPPORT ACTIVITY MEMPHIS**

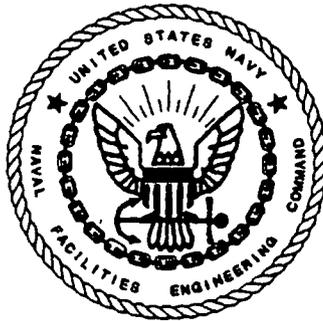
**SWMU 17
REMOVAL OF UNDERGROUND WASTE TANK S-9**

Revision: 02

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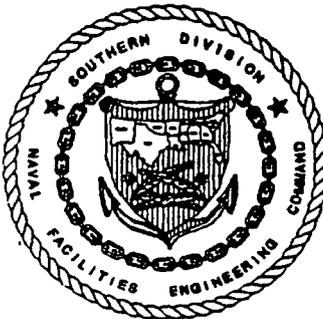
**CTO-106
Contract No. N62467-89-D-0318**

1D-00639



Prepared for:

**Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina**



Prepared by:

**EnSafe/Allen & Hoshall
5720 Summer Trees Drive, Suite 8
Memphis, Tennessee 38134
(901) 383-9115**

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1.0 INTRODUCTION

As part of the U.S. Navy's Comprehensive Long Term Environmental Action Navy program, the following Resource Conservation and Recovery Act (RCRA) Voluntary Corrective Action Work Plan has been prepared for the removal of Solid Waste Management Unit (SWMU) 17, the Underground Waste Tank (UWT) S-9 from the Building S-9 (Public Works Transportation Department) area at Naval Support Activity (NSA) Memphis, Millington, Tennessee (Figure 1). The primary references for this work plan are the *Comprehensive RCRA Facility Investigation (RFI) Work Plan, NAS Memphis, Millington, Tennessee* (E/A&H, 1994) and the *RCRA Facility Assessment (RFA), NAS Memphis, Millington, Tennessee* (ERC/EDGE, 1990) (Appendix A). Appendix B provides a time line schedule for this project.

2.0 ENVIRONMENTAL SETTING

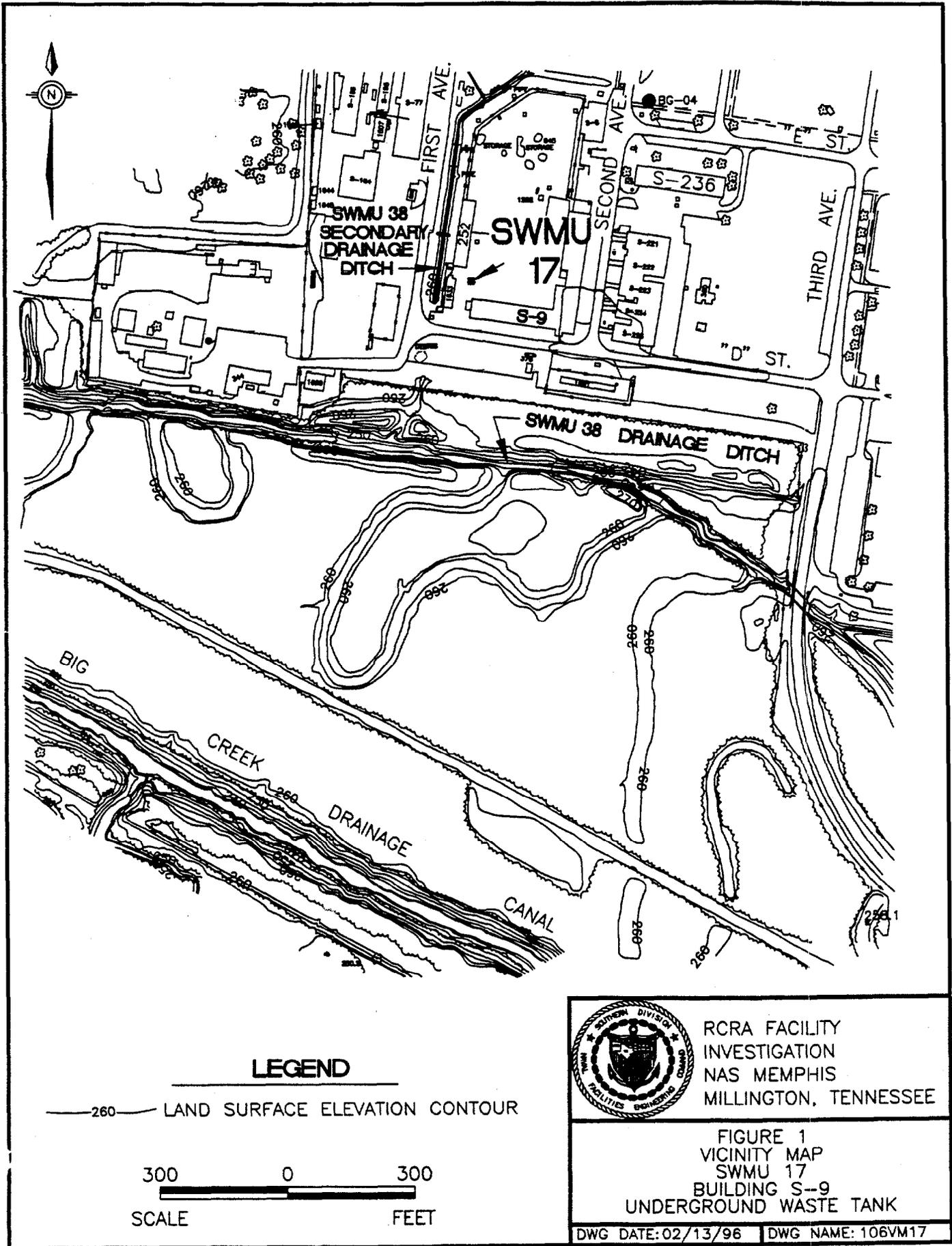
SWMU 17 is approximately 100 feet east of First Avenue on the NSA Memphis Southside in the S-9 complex (Figure 2), which is used for vehicle maintenance. The S-9 Hazardous Waste Accumulation Point (SWMU 48) is also in the complex, approximately 200 feet to the east-northeast of SWMU 17.

2.1 Topography and Drainage

SWMU 17 and its surrounding area are characterized by relatively level, low-relief topography. The immediate area is covered by gravel/asphalt and descends slightly to the south and west toward a north-south oriented drainage ditch (SWMU 38) which flows southward into the Big Creek Drainage Canal.

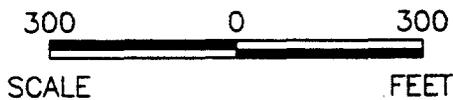
2.2 Hydrogeologic Information

The regional and local hydrogeology are described in Sections 2.11 and 2.12 of the *Comprehensive RFI Work Plan*.



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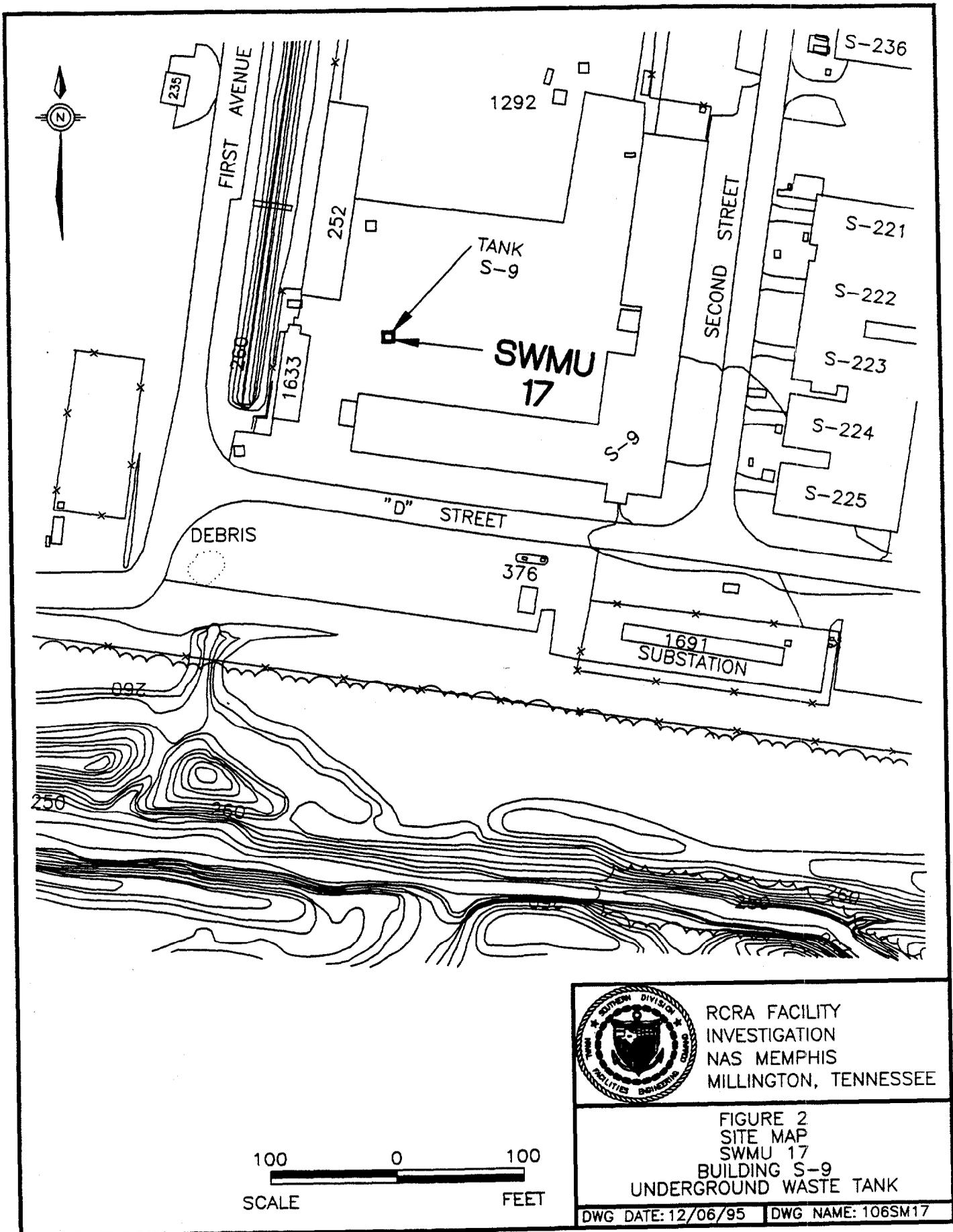
— 260 — LAND SURFACE ELEVATION CONTOUR



RCRA FACILITY
 INVESTIGATION
 NAs MEMPHIS
 MILLINGTON, TENNESSEE

FIGURE 1
 VICINITY MAP
 SWMU 17
 BUILDING S-9
 UNDERGROUND WASTE TANK

DWG DATE: 02/13/96 DWG NAME: 106VM17



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NAS MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 2
SITE MAP
SWMU 17
BUILDING S-9
UNDERGROUND WASTE TANK

DWG DATE: 12/06/95 | DWG NAME: 106SM17

Stratigraphy

Site-specific stratigraphic data are not currently available for SWMU 17. However, lithological information was obtained while installing background monitoring well cluster BG-04 (500 feet northeast of SWMU 17) (See Table 1 and Figure 1). Based on the lithologies encountered at BG-04, this area consists of a complex shallow geology of low to very low permeability silty clays and clays (loess) overlying a sand and gravel horizon. SWMU 17 is believed to be situated in a transitional zone of alluvium deposits associated with the Big Creek area (300 feet to the south). Limited stratigraphic data are also available from a previous investigation at Building S-376, which is 250 feet southeast of SWMU 17. Borings logs from the installation of monitoring wells indicated clayey-silt and silty-clay from the surface to approximately 14 feet bls, a soft gray clay was encountered from 14 feet below land surface (bls) to the terminal depth of the borings (18 ft. bls, maximum depth).

**Table 1
 Stratigraphic Data**

Stratigraphic Unit	BG-04
Alluvium	Not present
Loess	Silt and clayey silt 0 to 38 feet bls (38')
Fluvial Deposits	Sand, gravel, and silt 38 feet bls to 71 feet bls (33')
Cockfield Formation	Sand and clay from 71 feet bls to termination depth of the boring at 76 feet bls.
Cook Mountain	

Shallow Groundwater

No groundwater wells exist at SWMU 17. However, data collected from background well BG-04, approximately 500 feet to the northeast of SWMU 17, indicate that groundwater is typically first encountered at the interface between the silt-clay and silt units in the loess.

Groundwater measurements taken on March 30, 1995, indicate static groundwater levels in the wells are approximately 5 ft bls in the loess deposits, and 10 to 11 feet in the upper and lower fluvial deposits. Water level data collected during the Building S-376 investigation indicate a static water level in the loess/alluvium deposits ranging from 7 to 9 ft bls. Based on the topography and the information contained in the conceptual model of the NSA Memphis hydrogeology (Section 2.12 of the *Comprehensive RFI Work Plan*), groundwater is presumed to flow in a southwesterly direction in the fluvial deposits. Within the NSA Memphis Southside, groundwater in the loess/shallow alluvium most likely moves primarily downward to recharge the fluvial deposits/deeper alluvium. In the immediate vicinity of SWMU 17, some water in the loess may move laterally and discharge to the SWMU 38 drainage ditch west of the site.

2.3 Climatological Data

Regional climatological data are provided in Section 2.8 of the *Comprehensive RFI Work Plan*.

3.0 SOURCE CHARACTERIZATION

There are no records of any previous investigations relating to SWMU 17 or adjacent SWMU 48. UWT S-9, a 550-gallon tank, reportedly receives waste automotive oil and hydraulic fluid generated during automobile maintenance performed at Building S-9. Neither the installation date nor when the tank was initially used for waste oil storage is known.

SWMU 48 (an accumulation point for used automobile batteries, waste paints, containerized waste mineral spirits, and tires) is adjacent to SWMU 17 and may have impacted the area. Surface staining was observed near SWMU 48 during past inspections.

4.0 CHARACTERIZATION OF HAZARDOUS CONSTITUENT RELEASES

4.1 Previous Investigations

There are no known previous investigations of SWMU 17 or SWMU 48. SWMU 17 will be included in the Assembly F Confirmatory Sampling Investigation (CSI) scheduled for the Spring of 1996; SWMU 48 will be included in the Assembly G CSI scheduled for the Fall of 1996.

4.2 Tank Removal

The tank will be removed by a Navy Underground Storage Tank (UST) program contractor according to the specifications shown in Section 02082 of *UST Removals and Replacement Projects at the Naval Air Station Memphis* (Appendix C). In accordance with Section 3.6 of Appendix C, the UST contractor will be 40-hour OSHA trained (29 CFR 1910.120). The specifications prepared by the NSA Memphis Public Works Office and a private environmental consulting contractor (ETI) are summarized below.

- Before tank removal activities begin, EnSafe/Allen & Hoshall personnel will sample the tank contents. If multiple phases (i.e., sludge, oil, water) are present, each phase will be sampled. The samples will be analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Toxicity Characteristic Leachate Procedure (TCLP) benzene, TCLP metals, pH, and flash point to determine if the contents should be considered hazardous waste. Samples will be submitted to a local laboratory for analysis within a normal turn-around time (10-days). This will allow receipt of analytical results before tank removal.
- After the tank is sampled, all potential fill ports will be secured to prevent the introduction of additional wastes.

- Any material remaining in the tank will be removed by the tank removal contractor. Any material removed from the tank will be containerized in U.S. Department of Transportation (DOT)-approved 55-gallon drums, properly labeled based on the characterization, and transported to Building N-1694 for storage pending disposal through the Navy's Defense Reutilization and Marketing Office.
- All overlying asphalt will be segregated and stockpiled by the removal contractor for disposal by the NSA Memphis Public Works Office, Environmental Division.
- The tank will be washed out using water and detergent and rinsed to remove any dirt, sludge, or waste oil remaining in the tank (see Subsections 3.16.7 of Section 02082 [Appendix C]). The tank will then be removed and the piping secured as described in Subsections 3.21 and 3.22 of Section 02082, (Appendix C). After removal, the tank will be rendered unserviceable and labeled according to the specifications outlined in Subsection 3.22.4 of Section 02082, Appendix C, then properly disposed of by the contractor. All wash water generated during this process will be containerized, sampled, and analyzed for Oil & Grease. The number and types of analyses performed on the wash water could be modified based on the results of the testing of the tank contents. The results of these analyses will be submitted (within 24 hours of receipt) to the NSA Memphis Public Works Office and the City of Millington contracted engineers prior to discharge of the wash water to an onsite oil/water separator. EnSafe/Allen & Hoshall (E/A&H) personnel will collect samples of any wash water generated.
- Excavated material will be sampled using the procedures outlined in Subsection 3.18.1 of Section 02082, (Appendix C). A field screening sample will be collected for every 10 cubic yards of excavated material and analyzed using an organic vapor analyzer. The field screening results will be used to separate "clean" material from potentially

contaminated material. All field screening activities will be performed by the removal contractor.

- A sample of any visibly contaminated soil will be collected prior to excavation and submitted for FSA to characterize the released material.
- All excavated materials will be containerized in two covered, lined roll-off boxes. One roll-off will be designated to receive any materials exhibiting organic vapor concentrations above background, while the second roll-off box will be designated for "clean" material. A composite sample will be collected by E/A&H from each roll-off for disposal characterization. Analyses will include an F001-F005 solvent scan, PCBs, TCLP-TPH, and a full TCLP analysis less pesticides. Samples for VOC analysis will not be homogenized.
- E/A&H will submit an Voluntary Corrective Action Report to the Navy within two weeks of receipt of confirmation sample data.
- A Closure Report is to be submitted by the removal contractor, as specified in Subsection 3.24 of Section 02082, (Appendix C). This report shall be submitted to the BRAC Clean-up Team via NSA Memphis Public Works Office.

4.3 Confirmation Sampling

Two confirmation soil samples will be collected by E/A&H personnel from each end of the bottom of the tank pit. Composite samples will not be collected. Soils from the tank pit will be analyzed for VOCs, SVOCs, Appendix IX metals, and PCBs due to the type of wastes stored in the UWT and possible impacts from SWMU 48.

Confirmation samples will be collected from the pit floor down to a depth of 1 foot into the native soil using a backhoe bucket. Grab soil samples will be collected from the center of the bucket to avoid sample contamination from the bucket wall. The samples will be collected with a plastic scoop in accordance with the procedures described in Section 4.4.3 of the *Comprehensive RFI Work Plan*. A normal 28-day turnaround will be requested for all analytical results.

Any water encountered in the tank pit will be containerized and sampled to determine proper disposal options.

4.4 Backfilling

The tank pit will be backfilled immediately after the tank is removed. The decision to further investigate the tank pit at a later date will be made by the Base Realignment and Closure (BRAC) Cleanup Team after data review. The UWT will be replaced with a 500-gallon aboveground tank.

4.5 Analytical Requirements

Analytical requirements for the samples scheduled to be collected at SWMU 17 are summarized in Table 2. Level IV or equivalent Data Quality Objectives will be used for all confirmation sample analyses. Two samples of excavated soil (one "clean" and one potentially contaminated) will be submitted to a local laboratory for waste characterization. Analyses will include an F001-F005 solvent scan, PCBs, TCLP-TPH, and a full TCLP analysis less pesticides. Samples collected from water generated during decon activities (equipment and/or tank) will be submitted for oil and grease analysis.

Table 2
Sample Summary and Analytical Requirements

Sample Type	Matrix	No.	Composite/ Grab	Analytical Parameters	Turn-around Time	Laboratory
Waste Characterization	Liquid/Sludge (Tank Contents)	1	Composite	VOCs SVOCs PCBs TCLP Benzene TCLP Metals pH Flash Point	10 days	ETC
Release Characterization	Soil	1	Grab	VOCs SVOCs Appendix IX Metals PCBs	28 days	NET
Confirmation	Soil (Tank Pit)	2	Grab	VOCs SVOCs Appendix IX Metals PCBs	28 days	NET
Soil Disposal	Soil (Excavated Material)	2	Composite	F001-F005 Solvent Scan PCBs TCLP-TPH TCLP-Metals TCLP-VOC TCLP-SVOC	28 days	NET
Water Disposal	Water (Tank Rinse/Decon Water)	1	Composite	Oil/Grease	10 days	ETC

Notes:

NET — National Environmental Testing, Inc. — Cambridge Division
 ETC — Environmental Testing and Consulting, Inc.

Field measurements at SWMU 17 will be conducted in accordance with Section 4.10.1 of the *Comprehensive RFI Work Plan*. Field measurements will include organic vapor detection for soil samples.

4.6 Sample Management

Samples will be managed in accordance with Sections 4.12 and 5 of the *Comprehensive RFI Work Plan*.

4.7 Sample Custody

Sample custody will be maintained in accordance with Section 4.12.5 of the *Comprehensive RFI Work Plan*.

4.8 Quality Assurance/Quality Control

Quality assurance/quality control procedures to be followed during sampling activities will be in accordance with Section 4.14.2 of the *Comprehensive RFI Work Plan*.

4.9 Decontamination Procedures

Decontamination will be performed in accordance with Section 4.11 of the *Comprehensive RFI Work Plan*.

4.10 Investigation Derived Waste

Investigation-derived waste will be handled in accordance with Section 4.13 of the *Comprehensive RFI Work Plan* and the *NSA Memphis IDW Management Plan, (E/A&H, 1995)*.

5.0 POTENTIAL RECEPTORS

SWMU 17 is approximately 750 feet southeast of the nearest offsite residence, which is in Millington Heights residential area. The nearest base office personnel are the employees of the Building S-9 Maintenance Shop.

Surface-water drainage from SWMU 17 enters Big Creek Drainage Canal via a series of drainage ditches (SWMU 38) west of SWMU 17. Big Creek Drainage Canal is a water and

food source for various animals; human exposure is possible through direct contact activities such as wading. The direction of groundwater flow in the alluvium deposits is unknown, as is any the potential for impact on receptors. There are five production wells on base which are used for drinking water. The nearest production well, PW-5, is approximately 1,500 feet north of SWMU 17 and is screened in the Fort Pillow Aquifer at a depth of 1,450 feet. A more detailed analysis of potential receptors will be conducted and presented in the RFI Report if contamination is found at SWMU 17.

6.0 QUALITY ASSURANCE PLAN

The Quality Assurance Plan presented in Section 4.14 of the *Comprehensive RFI Work Plan* will be followed for sampling activities at SWMU 17.

7.0 DATA MANAGEMENT PLAN

The Data Management Plan presented in Section 5 of the *Comprehensive RFI Work Plan* will be followed for sampling activities at SWMU 17.

8.0 HEALTH AND SAFETY PLAN

Because E/A&H does not have responsibility for the tank removal, SOUTHDIV's tank removal contractor shall provide a written health and safety plan for tank removal activities for its employees. The Health and Safety Plan shall meet, at a minimum, the requirements specified in the *Comprehensive Health and Safety Plan (CHASP)* and include all site-specific information concerning types of activities, site contaminants, etc. During confirmation sampling, E/A&H personnel will comply with the CHASP (Section 7 of the *Comprehensive RFI Work Plan*), included as Appendix D and the Site-Specific Health and Safety Plan (included as Appendix E).

9.0 REFERENCES

- EnSafe/Allen & Hoshall. (September 1995). *Investigation Derived Waste (IDW) Management Plan (NSA Memphis RFI)*. E/A&H: Memphis, Tennessee.
- EnSafe/Allen & Hoshall (October 1994). *Comprehensive RCRA Facility Investigation Work Plan*, Naval Air Station Memphis. E/A&H: Memphis, Tennessee.
- EnSafe (October 1992). *Environmental Assessment Report, NAS Memphis, Building S-376*. Naval Air Station Memphis. EnSafe: Memphis, Tennessee.
- ERC/EDGE (September 1990). *RCRA Facility Assessment (RFA), NAS Memphis*. ERC/EDGE: Nashville, Tennessee.

APPENDIX A
RCRA FACILITY ASSESSMENT - SWMU 17

7.17 SWMU NO. 17: BUILDING S-9 UNDERGROUND WASTE TANKS

7.17.1 UNIT CHARACTERISTICS

7.17.1.1 TYPE OF UNIT

Active underground storage tanks.

7.17.1.2 DESIGN FEATURES

Tank 1657 is a 550 gallon tank. The other tank located inside S-9 is presumed to be approximately the same size.

7.17.1.3 OPERATING PRACTICE (PAST AND PRESENT)

Waste oil storage.

7.17.1.4 PERIOD OF OPERATION

Currently in use. The date the tanks were converted to waste oil usage is not known.

7.17.1.5 AGE OF UNIT

Unknown.

7.17.1.6 LOCATION OF UNIT

Building S-9. See Figure 7-17.

7.17.1.7 GENERAL PHYSICAL CONDITIONS

Not determined.

7.17.1.8 CLOSURE METHOD

Not applicable.

7.17.2 WASTE CHARACTERISTICS

7.17.2.1 TYPE OF WASTE

Primarily waste oil, including waste hydraulic fluid.

7.17.2.2 MIGRATION CHARACTERISTICS

Wastes such as those previously characterized are reasonably mobile in the environment. Preliminary investigation of this SWMU indicates the most likely release mechanism to be leaking underground tanks or product lines. Therefore, the release point is likely to be low grade. Surface infiltration of rain water can transport these wastes into the soil and groundwater.

7.17.2.3 TOXICOLOGICAL CHARACTERISTICS

Used engine oil and hydraulic fluid toxic constituents include toxic volatile and semivolatile organics, toxic polynuclear aromatic hydrocarbons, and heavy metals (lead, cadmium). Organic constituents include known and suspected carcinogens, and toxic liquids and vapors. Acute effects of exposure may include nausea, vomiting, dizziness, drowsiness, central nervous system, depression, or damage to nerves, liver, or kidney.

7.17.2.4 PHYSICAL/CHEMICAL CHARACTERISTICS

Substances remaining in the tanks would be in the form of liquids or semiliquids/sludges. Substances that may have leaked from the tanks could exist as waste-saturated soils or soil moisture/groundwater contaminants.

7.17.3 MIGRATION PATHWAYS

7.17.3.1 GEOLOGIC SETTING

See Section 3.2.

7.17.3.2 HYDROGEOLOGIC SETTING

See Sections 3.3 and 3.4.

7.17.3.3 ATMOSPHERIC CONDITIONS

See Sections 3.3 and 3.4.

7.17.3.4 TOPOGRAPHIC CHARACTERISTICS

See Section 3.1 for general information. Except for buildings, the topography in the immediate area is flat, with paved and unpaved areas.

7.17.3.5 PATHWAYS

AIR

Not applicable to this unit.

SOIL

Not applicable.

SURFACE WATER/SEDIMENT

Not applicable.

GROUNDWATER

Not applicable.

SUBSURFACE GAS

Not applicable.

7.17.4 CONTAMINANT RELEASE IDENTIFICATION

7.17.4.1 PRIOR INSPECTION REPORTS

None available.

7.17.4.2 PUBLIC COMPLAINTS

None.

7.17.4.3 MONITORING/SAMPLING DATA

Waste oil is tested for PCBs prior to disposal.

7.17.4.4 EVIDENCE OF RELEASE

None available.

7.17.5 EXPOSURE POTENTIAL

7.17.5.1 PROXIMITY TO AFFECTED POPULATION

None expected based on available information.

7.17.5.2 PROXIMITY TO SENSITIVE ENVIRONMENTS

No known sensitive environments are located in the vicinity of the site.

7.17.5.3 LIKELIHOOD OF MIGRATION TO POTENTIAL RECEPTORS

Migration to potential receptors is unlikely due to limited waste volume, limited waste mobility and distance to nearest receptors.

7.16.6 DOCUMENTS REVIEWED

See PRD.

7.17.7 SUMMARIZED DATA GAP

7.17.7.1 SOIL

No data.

7.17.7.2 GROUNDWATER

No data.

7.17.7.3 SURFACE WATER/SEDIMENT

Not applicable.

7.17.7.4 AIR

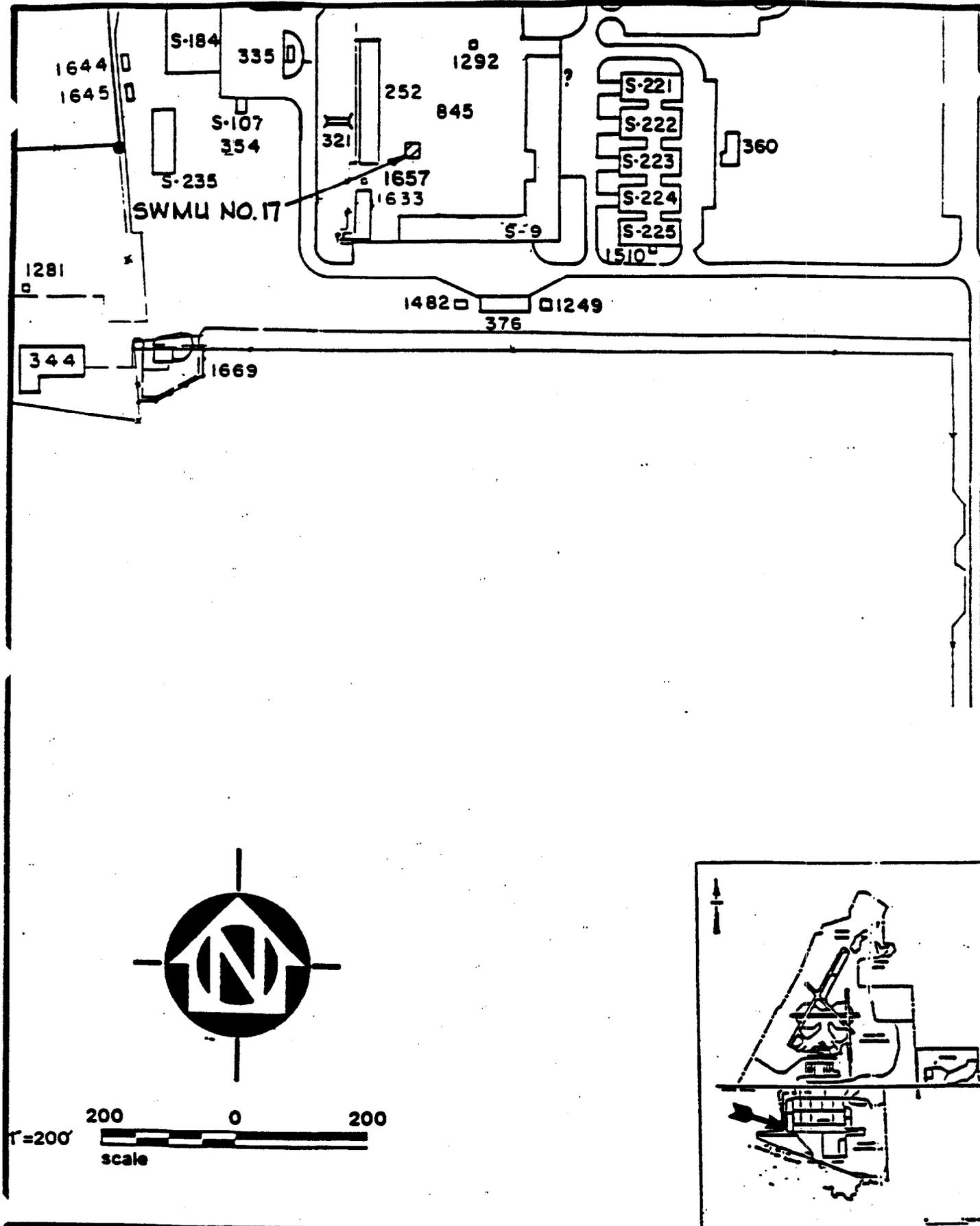
Not applicable.

7.17.7.5 SUBSURFACE GAS

Not applicable.

7.17.8 RECOMMEND ACTIONS

This site has been determined to require a RCRA Facility Investigation (preliminary sampling and analysis) by SOUTHDIIV NAVFACENGCOM, EPA Region IV, and the Tennessee Department of Health and Environment.



**SWMU NO. 17
FIGURE 7-17**

**S-9 UNDERGROUND WASTE TANK
LOCATION MAP**

APPENDIX B
PROJECT TIME LINE SCHEDULE

APPENDIX C
SECTION 02082 OF UST REMOVALS AND REPLACEMENTS
AT THE NAVAL AIR STATION MEMPHIS, MILLINGTON, TENNESSEE

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SECTION 02082

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SECTION 02082

REMOVAL AND DISPOSAL OF UNDERGROUND STORAGE TANKS

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN PETROLEUM INSTITUTE (API)

- | | |
|----------------|--|
| API RP 1604 | 1987 (Supp. 1989) Removal and Disposal of Used Underground Petroleum Storage Tanks |
| API PUBL 1628 | 1989 Assessment and Remediation of Underground Petroleum Releases |
| API PUBL 2015 | 1991 Safe Entry and Cleaning of Petroleum Storage Tanks |
| API PUBL 2015A | A Guide for Controlling the Lead Hazard Associated with Tank Entry and Cleaning (Supplement to API 2015) |

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- | | |
|-------------|--|
| ASTM D 4397 | 1991 Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications |
|-------------|--|

CODE OF FEDERAL REGULATIONS (CFR)

- | | |
|-------------|--|
| 40 CFR 280 | Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks |
| 29 CFR 1910 | Occupational Safety and Health Standards |

CORPS OF ENGINEERS (COE)

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

ENVIRONMENTAL PROTECTION AGENCY (EPA)

- | | |
|-----------------|-----------------------------|
| EPA SW-846 | 1986 Evaluating Solid Waste |
| EPA 600-4-79-20 | 1976 Contaminant Monitoring |

TENNESSEE DEPT. OF ENVIRONMENT AND CONSERVATION (TDEC)

Rule 1200-1-15 Division of Underground Storage Tanks, Underground Storage Tank Program

1.2 DESCRIPTION OF WORK

The work includes removing and disposing of underground storage tanks and related work.

1.2.1 Tank Closure

Perform work to close, remove, and dispose of underground storage tank systems, connecting piping and other appurtenances; including but not limited to dewatering (if approved); collection, sampling and testing of excavated soils, tank cleaning residuals, and tank sludges; providing reports, permits and approvals which are required by regulatory agencies; and backfilling and restoration. Other than the decontaminated (cleaned) tanks, piping, concrete rubble, and recyclable fuel not removed from the tanks by the Government, the Contractor shall not be responsible for the off-site disposal of excavated contaminated soils, tank cleaning residuals, and tank sludges or other wastes generated by tank closure activities. The Contractor shall provide appropriate laboratory analysis for these wastes and deliver wastes to the Government as scheduled and directed by the Contracting Officer for disposal.

1.2.2 Regulations

Perform work in accordance with local, State, and Federal regulations including 40 CFR 280 and TDEC Rule 1200-1-15, including Closure Assessment Guidelines dated January 1994 and other applicable TDEC Technical Guidelines.

1.3 SUBMITTALS

1.3.1 Plans

1.3.1.1 Site Safety and Health Plan

Describe safety and health plan and procedures as related to underground tank removal and pipe removal, and as related to operations associated with petroleum contaminated soils, waters, residual fuels and waste sludges. Furnish the name and qualifications based on education, training, and work experience of the proposed Site Safety and Health Officer.

1.3.1.2 Excavation and Material Handling Plan

Describe methods, means, equipment, sequence of operations and schedule to be employed in excavation, transport, handling, and stockpiling of soil during underground tank removal. Fifteen days before beginning tank removal work, submit to the Contracting Officer for approval a material handling plan that describes phases of dealing with the contaminated soils, waters, residual fuels and waste sludges as it relates to the proposed tanks and piping removal, including methods of excavating, a material handling plan for the contaminated material, soil and waste testing requirements, safety precautions and requirements, and water pumping and collection requirements.

1.3.1.3 Field Sampling and Laboratory Testing Plan

Describe field sampling methods and quality control procedures. Identify laboratory and laboratory methods to be used for contamination testing. Sample reports shall show sample identification for location, date, time, sample method, contamination level, name of individual sampler, identification of laboratory, and quality control procedures.

1.3.1.4 Tank and Piping Removal and Disposal Plan

Describe methods, means, sequence of operations, and schedule to be employed in the testing, pumping, cleaning, de-vaporizing, inspecting, removal, and disposal of underground storage tanks and piping.

1.3.1.5 Qualification

Prior to start of work, submit documentation of recent experience and resumes of personnel working on the project.

1.3.1.6 Spill and Discharge Control Plan

Describe procedures and plan related to potential spills and discharge of contaminated soils, waters or other wastes.

1.3.2 SD-09, Reports

- a. Identification of tanks removed and disposed of, including site map showing location of tank and piping
- b. Starting and ending dates of reporting period
- c. Closure report in accordance with paragraph titled "CLOSURE REPORT" in this Section. Incorporate reports, records, and data into a single binder with the title "SITE ASSESSMENT REPORT" on the cover of the binder

- d. Laboratory testing reports, including location of soil excavated and associated OVA/FID (organic vapor analyzer/flame ionization device) readings, TPH (total petroleum hydrocarbons), and BTEX (benzene, toluene, ethylbenzene, and xylene), and possibly TCLP (toxicity characteristic leaching procedure) sampling and test results. If BTEX indicates gasoline, then provide TCLP analysis results
- e. Cumulative quantities of soil excavated, beginning with start date for each tank and associated piping

1.3.3 SD-18, Records

- a. Building permit, inspection permits, and other permits required for underground tank removal
- b. Results of excavation including sketch showing location of underground storage tank, sampling locations, and extent of excavation
- c. Tank disposal paperwork, such as copy of UST Notification Form and method of conditioning tank for disposal
- d. Contaminated soil disposal paperwork, such as laboratory testing reports
- e. Contaminated water disposal paperwork, such as laboratory testing results
- f. Contaminated sludge disposal paperwork, such as laboratory testing results
- g. Residual fuel recycling paperwork, such as laboratory testing results if necessary.
- h. Respiratory protection records, such as medical qualifications and respiratory fit test data of personnel.

1.4 AREAS OF CONTAMINATION

Assume for bidding purposes that soil, bituminous pavement, concrete slabs, and water encountered during the removal of the underground tanks are contaminated with JP-5, fuel oil, waste oil, diesel fuel, and/or gasoline, and shall be handled as specified herein. Bituminous pavement and concrete slabs shall be washed and disposed of as demolition debris. Wash water shall be collected, stored, and managed in accordance with Section 13219, "Cleaning Petroleum Storage Tanks."

1.5 QUALIFICATION (CONTRACTOR EXPERIENCE)

Prior to start of work, submit data for approval showing that the tank removal Contractor, subcontractors, and personnel employed on the project have been engaged in removal, transportation, and disposal of underground tanks and associated piping, are familiar with and shall abide with the following:

- a. API RP 1604.
- b. 40 CFR 280, TDEC Rule 1200-1-15, and other applicable State and local regulations and procedures.
- c. Applicable safety rules and regulations.
- d. Use of equipment and procedures for testing and vapor-freeing tanks.

- e. Handling and disposal of types of wastes encountered in underground tank and pipe removal including disposal of underground tanks and associated piping.
- f. Excavation, testing, and disposal of petroleum contaminated soils, liquids, and sludge.
- g. Provide documentation that tank removers are certified if locality of project has this requirement. In addition, furnish data proving experience on at least three prior projects which included types of activities similar to those in this project. Provide project titles, dates of projects, owners of projects, point of contact for each project, and phone numbers of each point of contact.

1.6 COMPLIANCE

Comply with applicable local, State, and Federal regulations, procedures, 40 CFR 280, and TDEC Rule 1200-1-15.

PART 2 PRODUCTS

2.1 PLASTIC SHEETING

ASTM D 4397.

PART 3 EXECUTION

3.1 REMOVAL AND DISPOSAL OF TANKS

After fuel has been removed from the tanks to the extent possible with the existing in-place pumps, furnish labor; materials; necessary permits, closure applications, and other documents required by TDEC Rule 1200-1-15; laboratory tests; and reports and equipment to remove any remaining recyclable waste fuel and transport to permitted off-site fuel recycling facility; remove, containerize, and deliver to the Government wash products and sludge remaining in the underground tanks; clean and vapor free the underground tanks and connecting piping; excavate, remove underground tanks and associated piping, and backfill to the level of the adjacent ground; sample soils, waters and sludges to determine if contaminated; dispose of tanks and associated piping. Provide work in accordance with 40 CFR 280, TDEC rule 1200-1-15, and in accordance with appropriate Federal, State, and local regulations.

3.2 SITE SAFETY AND HEALTH PLAN (SSHP)

Furnish safety, health, and accident prevention provisions and develop a Site Safety and Health Plan (SSHP). The SSHP shall incorporate the requirements of 29 CFR 1910 and COE EM-385-1-1. Site work shall not start until the SSHP is approved by the Contracting Officer.

3.3 SITE SAFETY AND HEALTH OFFICER

Identify an individual to serve as the Site Safety and Health Officer (SSHO) or Certified Industrial Hygienist (CIH). The SSSH (or CIH) shall report problems and concerns

regarding health and safety to the Contracting Officer. The SSHO shall have a working knowledge of local and Federal occupational safety and health regulations, and shall provide training to Contractor employees in air monitoring practices and techniques. The SSHO shall also provide day to day industrial hygiene support, including air monitoring, training, and daily site safety inspections. The SSHO shall be trained in the use of the monitoring and sampling equipment, interpretation of data required to implement the SSHP, and to administer the elements of the SSHP. The SSHO shall remain on site during project operations and may be assigned other duties, such as project foreman or quality control manager.

3.4 SPILL AND DISCHARGE CONTROL PLAN

Develop, implement, and maintain a comprehensive spill and discharge control plan. The plan shall provide contingency measures for potential spills and discharges from handling and transportation of contaminated soils and water. A possible source of guidance for assessment and remediation is API PUBL 1628.

3.5 EXCLUSION ZONE (EZ) AND CONTAMINATION REDUCTION ZONE (CRZ)

Do not permit personnel not directly involved with the project to enter work zones, called the EZ and CRZ. The EZ shall be an area around the tank a minimum of 10 feet from the limits of the tank excavation. At the perimeter of the EZ, establish a CRZ. Limits of the CRZ shall be established by the Contractor. Within the CRZ, equipment and personnel shall be cleaned as stated in the paragraph entitled "Personnel and Equipment Decontamination." The Contractor's site office, parking area, and other support facilities shall be located outside the EZ and CRZ. Boundaries of the EZ and CRZ shall be clearly marked and posted. Include a site map, outlining the extent of work zones and location of support facilities, in the SSHP.

3.6 TRAINING

Provide health and safety training in accordance with 29 CFR 1910 prior to starting work. Furnish copies of current training certification statements for personnel prior to initial entry into the work site.

3.6.1 On-Site Training

Prior to starting on-site work, a health and safety training class shall be held by the SSHO to discuss the implementation of the SSHP. Notify the Contracting Officer 24 hours prior to beginning the training class.

3.6.2 Training Outline

Provide the following:

- a. Health and safety organization, including discussion of distribution of functions and responsibilities

- b. Organization and components of the SSHP
- c. Physical and chemical site hazard identification
- d. Basic toxicology and toxicity information
- e. Discussion of the EZ and CRZ
- f. Protective clothing
- g. Respiratory protection
- h. Air quality monitoring
- i. Personnel exposure guidelines
- j. Decontamination procedures
- k. Basic first aid review
- l. Emergency procedures and contingency plan
- m. Site entry and exit procedures
- n. Sampling procedures

3.7 PERSONNEL PROTECTION

Furnish appropriate personal safety equipment and protective clothing to personnel and ensure that safety equipment and protective clothing is kept clean and well maintained. Furnish three clean sets of protective clothing for use by the Contracting Officer and authorized visitors per shift as required for entry into the EZ.

3.8 RESPIRATORY PROTECTION PROGRAM

Develop a respiratory protection program, addressing respirator usage and training, in accordance with 29 CFR 1910 and COE EM-385-1-1.

3.9 DECONTAMINATION

Decontaminate or properly dispose of personal protective equipment and clothing worn in contaminated areas at the end of the work day. The SSHO shall be responsible for ensuring that personal protective clothing and equipment are decontaminated before being reissued.

3.10 FIRST AID AND EMERGENCY RESPONSE EQUIPMENT AND PROCEDURES

Provide appropriate emergency first aid equipment for treatment of exposure to site physical and chemical hazards. Provide and post a list of emergency phone numbers and points of contact for fire, hospital, police, ambulance, and other necessary contacts. Provide and post a route map detailing the directions to the nearest medical facility.

3.11 IGNITION SOURCES

Do not permit ignition sources in the EZ and CRZ.

3.12 PERSONNEL AND EQUIPMENT DECONTAMINATION

Decontaminate personnel and equipment before exiting the work zones.

3.13 WASTE DISPOSAL

The SSHP shall detail the practices and procedures to be utilized to dispose of wastes. Upon completion of the project, certify that equipment and materials were properly decontaminated prior to being removed from the site.

3.14 EMERGENCY RESPONSE REQUIREMENTS

Furnish emergency response and contingency plan in accordance with 29 CFR 1910. In an emergency, take action to remove or minimize the cause of the emergency, alert the Contracting Officer, and institute necessary measures to prevent repetition of the emergency. Equip site-support vehicles with route maps providing directions to the medical treatment facility.

3.15 UNFORESEEN HAZARDS

Notify the Contracting Officer of any unforeseen hazard or condition which becomes evident during work.

3.16 ADDITIONAL REQUIREMENTS

Provide additional requirements for cleaning and vapor freeing tank as specified in Section 13219, "Cleaning Petroleum Storage Tanks."

3.16.1 Table of Tank History

A tabular summary of UST's is not utilized here, in lieu of information on the project UST demolition drawings summarizing Tank No., Capacity, and Contents.

3.16.2 Fuel Removal

The Government will remove fuel from the tanks to the extent possible with the in-place pumps, except as indicated in the "General Description" paragraphs of Section 01010 "General Paragraphs", where the Contractor has responsibility for transferring fuel from the UST to the new replacement tank. The Contractor shall remove and segregate remaining fuels, water, waste sludges and all other materials and transfer into 55 gallon drums or other suitable, DOT-approved containers. The Contractor shall manage residual products and sludges in accordance with paragraphs "Water, Waste Fuels, Sediment, and Sludge Analysis", "Residual Product Removal and Disposal" and "Sludge and Sediment Removal and Disposal" of this Section.

3.16.3 Identification of Tanks with Waste Sludge and Residue

The following tanks are known or suspected to contain waste sludges and residues. These sludges and residues shall be removed and analyzed by the Contractor in accordance with paragraphs "Water, Waste Fuels, Sediment and Sludge Analysis" and "Sludge and Sediment Removal and Disposal" of this Section.

Tank No.	Product	Suspected Waste Types and Characteristics
N-1	#2 Fuel Oil	Sludge residue; ignitability and lead
N-12	Diesel	Sludge residue; ignitability and lead
301	Diesel	Sludge residue; ignitability and lead
1242	Gasoline	Sludge residue; ignitability and lead
1243	Gasoline	Sludge residue; ignitability and lead
N-112	Waste Oil	Sludge residue; ignitability, lead and other RCRA metals
1637	Waste Oil	Sludge residue; ignitability, lead and other RCRA metals
378	Diesel	Sludge residue; ignitability and lead
383	Diesel	Sludge residue; ignitability and lead
890	Diesel	Sludge residue; ignitability and lead
1490	JP-5	Sludge residue; ignitability and lead
1491	JP-5	Sludge residue; ignitability and lead
S-9	Waste Oil	Sludge residue; ignitability, lead and other RCRA metals
1593	#2 Fuel Oil	Sludge residue; ignitability and lead
S-89	#2 Fuel Oil	Sludge residue; ignitability and lead
S-240A	Diesel	Sludge residue; ignitability and lead
S-240B	Diesel	Sludge residue; ignitability and lead
S-240C	Diesel	Sludge residue; ignitability and lead
114	#2 Fuel Oil	Sludge residue; ignitability and lead
599	#2 Fuel Oil	Sludge residue; ignitability and lead
771	#2 Fuel Oil	Sludge residue; ignitability and lead
106	#2 Fuel Oil	Sludge residue; ignitability and lead
107	#2 Fuel Oil	Sludge residue; ignitability and lead

3.16.4 Water, Waste Fuels, Sediment, and Sludge Analysis

The Contractor shall analyze any water, waste fuels, sediment, and sludge removed from the tanks to determine their hazardous characteristics. Waste removed from fuel tanks shall be analyzed for flash point, TCLP for benzene and TCLP for lead. Waste removed from waste oil tanks shall be analyzed for flash point, TCLP for benzene and TCLP for eight (8) RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver). Hazardous wastes shall be packaged, labeled, stored and transported in DOT-approved containers in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, and 40 CFR 266. Deliver hazardous waste to the Government at Building N-1694 for disposal (by the

Government) as directed by the Contracting Officer. Nonhazardous or hazardous wastes shall be managed as described below.

3.16.5 Residual Product Removal and Disposal

After the existing product has been removed from the tank to the extent possible, pump or otherwise remove remaining fuel from the tank. Package, label, accumulate, analyze and transport hazardous waste fuels in DOT-approved containers in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, and 40 CFR 266. Transport recyclable fuels to an EPA and/or State permitted off-site facility for recycling. Provide the Contracting Officer with a copy of the manifest and other appropriate records for all recycled waste fuels. Deliver non-recyclable waste fuels to the Government at Building N-1694 for disposal (by the Government) as directed by the Contracting Officer. For bidding purposes, each tank is assumed to contain the following estimated quantities of residual product to be removed by the Contractor:

Tank No.	Product	Estimated Quantity of Residual Product
N-1	#2 Fuel Oil	< 5 gallons
N-12	Diesel	< 5 gallons
301	Diesel	225 gallons
1242	Gasoline	450 gallons
1243	Gasoline	450 gallons
N-112	Waste Oil	Not Applicable (residual wastes assumed to be sludge only; see paragraph 3.16.6 below)
1637	Waste Oil	Not Applicable (residual wastes assumed to be sludge only; see paragraph 3.16.6 below)
378	Diesel	15 gallons
383	Diesel	15 gallons
890	Diesel	< 10 gallons
1490	JP-5	50 gallons
1491	JP-5	50 gallons
S-9	Waste Oil	Not Applicable (residual wastes assumed to be sludge only; see paragraph 3.16.6 below)
1593	#2 Fuel Oil	540 gallons
S-89	#2 Fuel Oil	60 gallons
S-240A	Diesel	< 5 gallons
S-240B	Diesel	< 5 gallons
S-240C	Diesel	< 5 gallons
114	#2 Fuel Oil	90 gallons
599	#2 Fuel Oil	60 gallons
771	#2 Fuel Oil	30 gallons
106	#2 Fuel Oil	360 gallons
107	#2 Fuel Oil	360 gallons

3.16.6 Sludge and Sediment Removal and Disposal

Squeegee or brush any sludge, sediment, or other loose material into piles, shovel into buckets or other suitable containers, and remove from the tank.

3.16.6.1 Removal of Sludge

For bidding purposes, each tank is assumed to contain the following estimated quantities of sludge to be removed by the Contractor:

Tank No.	Product	Estimated Quantity of Sludge
N-1	#2 Fuel Oil	< 5 gallons
N-12	Diesel	< 5 gallons
301	Diesel	75 gallons
1242	Gasoline	150 gallons

1243	Gasoline	150 gallons
N-112	Waste Oil	< 55 gallons
1637	Waste Oil	< 55 gallons
378	Diesel	< 10 gallons
383	Diesel	< 10 gallons
890	Diesel	< 5 gallons
1490	JP-5	< 20 gallons
1491	JP-5	< 20 gallons
S-9	Waste Oil	< 55 gallons
1593	#2 Fuel Oil	180 gallons
S-89	#2 Fuel Oil	20 gallons
S-240A	Diesel	< 5 gallons
S-240B	Diesel	< 5 gallons
S-240C	Diesel	< 5 gallons
114	#2 Fuel Oil	30 gallons
599	#2 Fuel Oil	20 gallons
771	#2 Fuel Oil	10 gallons
106	#2 Fuel Oil	120 gallons
107	#2 Fuel Oil	120 gallons

3.16.6.2 Delivery of Sludge to the Government

Package, label, accumulate, analyze and transport hazardous sludge and sediment removed from the tanks in DOT-approved containers in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, and 40 CFR 266. Deliver waste sludge to the Government at Building N-1694 for disposal (by the Government) as directed by the Contracting Officer.

3.16.7 Wash Water, Detergent Solution, and Sediment Removal

During the washing process, operate a portable pump continuously with suction hose extended to the tank bottom to remove water, detergent, dirt, oil, or other loose materials washed off. Following the final rinse, pump, squeegee, and mop the tank dry.

- a. With the approval of the Public Works Department - Environmental Division, and in accordance with the following procedures, the water and detergent solution may be disposed of into the municipal sewer system through an on-site oil/water separator (OWS) at the direction of the Contracting Officer. The Contractor shall provide analysis of the accumulated wash waters for the following parameters:

Wastewater Parameters for Discharge to Oil/Water Separators

- (1) BTEX

- (2) TPH (GRO, DRO or Method 418.1, as applicable)
- (3) pH
- (4) Surfactant (MBAS)
- (5) Lead

The Contractor shall submit the results of the wash water analysis to the Contracting Officer within 24 hours after the results are obtained. The Contractor shall only discharge the wash waters into an on-site OWS with the approval of the Contracting Officer, and in the presence of the Contracting Officer or his designee. The Contractor shall notify the Contracting Officer within 24 hours prior to any planned OWS discharge. The Contractor shall also notify the Contracting Officer if there is any reason to believe that the introduction of these wastewaters may cause the discharge from NAS-Memphis not to comply with the provisions set forth by the Public Works Department - Environmental Division. Prior to discharge the Contractor shall visually inspect the wastewater for the presence of free product or visible sheen. Any free product or visible sheen shall be removed prior to discharge. Prior to discharge the Contractor shall test the vapor space of the wastewater storage tank or container(s) with an explosion hazard meter to determine the concentration of explosive gases based on percentage (%) of the Lower Explosive Limit (LEL). The wastewater shall not be discharged into the OWS if the %LEL is above 20% or an alternate limit established by the Contracting Officer on a case-specific basis. Prior to or during discharge, the Contractor shall screen the wastewater to remove any particles larger than ½ inch in any dimension. The discharge rate shall not exceed the capacity of the OWS and no more than 1,000 gallons of wastewater shall be discharged in any 24 hour period.

- b. If the discharge of wash waters is not approved by the Public Works Department - Environmental Division and the Contracting Officer, the Contractor shall analyze the water and detergent solution in accordance with paragraph titled "Water, Waste Fuels, Sediment, and Sludge Analysis" of this Section. The Contractor shall manage the wash waters in accordance with paragraph entitled "Sludge and Sediment Removal and Disposal" as directed by the Contracting Officer. The Contractor shall furnish temporary tanks to hold water and detergent solution until testing is completed.

3.17 TEMPORARY CONTAINMENT OF EXCAVATED SOIL

Provide temporary containment area(s) near the excavated area as shown on the project drawings. Cover containment area with 30 mil polyethylene sheeting. Place excavated soil on the impervious barrier and cover with 6 mil polyethylene sheeting. Provide straw bale berm around the outer limits of the containment area and cover with polyethylene sheets. Secure edges of sheets to keep the polyethylene sheeting in place. The Contractor shall provide a temporary security fence around the tank removal work area or, at a minimum, around the soils stockpile area. The temporary security fence shall be equipped with a

lockable gate. The Contractor shall post a wooden or metal sign at each segregated pile of excavated soil. The Contractor shall mark or label each sign to identify the contents of each pile of soil as directed by the Contracting Officer.

3.18 EXCAVATION

Provide Contracting Officer with written documentation, no later than 30 days before work begins, that proper State or local authorities have been notified, including the "Application for Permanent Closure of Underground Storage Tank Systems" as required by TDEC Closure Assessment Guidelines. Notify the Contracting Officer at least 48 hours prior to start of tank removal work. Stage operations to minimize the time that tank excavation is open and the time that contaminated soil is exposed to the weather. Provide protection measures around the excavation area to prevent water runoff and to contain the soil within the excavation area.

3.18.1 Excavation Procedures

Excavate soils and other materials (i.e., sand, pea gravel or other backfill material) as required to remove existing tanks and piping as shown on the project drawings. Stockpile soil removed from the excavation in a temporary containment area. Overexcavate areas of obvious contamination and store in a segregated containment area or pile. Notify the Contracting Officer within 24 hours if over 100 cubic yards of soils are overexcavated due to obvious contamination. No contaminated soil materials may be used as backfill for tank and pipe excavations. To determine soil contamination levels, field screen one sample for every ten (10) cubic yards of soils excavated to remove tanks with an OVA/FID in accordance with TDEC Technical Guidance Document 005 (TGD-005). The OVA/FID shall be capable of detecting volatile organic vapors to a minimum of one (1) ppm. Contaminated soils with the highest OVA/FID readings shall be further tested for TPH and BTEX as specified herein (see paragraph "Stockpiled Soils" in this Section).

Contaminated soils shall be segregated from other soils and shall be stored in bulk stockpiles awaiting removal, transportation and disposal by the Government. As an alternative, the Contractor shall provide unit costs for transferring contaminated soils into 55 gallon drums or other suitable, DOT-approved containers and for delivery of containers to Building N-1694 for disposal (by the Government) in accordance with Federal, State, and local regulations.

The Contractor shall collect and temporarily store water encountered in tank excavations and runoff from stockpiled soils, and shall manage these waters in accordance with "Wash Water, Detergent Solution, and Sediment Removal" in this Section.

3.18.2 Excavation Methods

Select methods and equipment to remove soil to minimize disturbance to areas beyond the limits of the excavation area. Material that becomes contaminated as a result of the Contractor's operations shall be sampled, removed, and containerized by the Contractor at the Contractor's expense. The Contractor shall deliver the contaminated material to the Government for disposal through the Government at no additional cost to the Government. Where excavation extends into groundwater levels, dewatering methods shall be employed on a localized basis to facilitate excavation operations. Water generated by dewatering during excavation required for removal of tanks or piping, surface water collected in open excavation, or water used for washing equipment or existing concrete or bituminous surfaces, shall be collected, analyzed and managed in accordance with "Wash Water, Detergent Solution, and Sediment Removal" of this Section.

3.18.3 Structures

During excavation activities, if asphalt pavement, concrete slabs, or other structures are encountered, remove and wash with high pressure water cleaning equipment. Remove and dispose of the pavement, concrete, and other structures as specified in Section 02050, "Demolition and Removal."

3.19 SOILS TESTING

3.19.1 Stockpiled Soils

Excavated and stockpiled soils with the highest OVA/FID field screen readings (see paragraph "Excavation Procedures" in this Section) shall be analyzed for TPH and BTEX in accordance with EPA SW-846 and EPA 600-4-79-20. The minimum number of field screen samples to be analyzed shall be as required by TDEC Technical Guidance Document 005. Soils excavated around fuel tanks shall be analyzed for TPH (GRO or DRO as applicable) and BTEX. Soils excavated around waste oil tanks shall be analyzed for TPH using EPA Method 418.1 and BTEX. In order to minimize the amount of time that an excavation is open, laboratory testing of excavated soils shall be expedited to make test results available within 48 hours of submittal. Furnish results to the Contracting Officer within 24 hours after results are obtained.

Excavated soils which contain total TPH and BTEX concentrations less than 100 ppm and 10 ppm, respectively, may be used as clean backfill. Soils that contain 100 ppm or more TPH, 10 ppm or more BTEX, or virgin petroleum products are considered contaminated materials and cannot be used as backfill. Soils that are determined to be contaminated shall be further analyzed using TCLP for benzene, TCLP for TPH and TCLP for lead.

Contaminated soils shall be segregated from other soils and shall be stored in bulk stockpiles awaiting removal, transportation and disposal by the Government. As an alternative, the Contractor shall provide unit costs for transferring contaminated soils into 55 gallon drums or other suitable, DOT-approved containers and for delivery of containers to Building N-1694 for disposal (by the Government) in accordance with Federal, State, and local regulations.

3.19.2 Testing Under Tank After Removal of Tank

Soils under fuel tanks shall be sampled and analyzed for TPH and BTEX in accordance with TDEC UST System Closure Assessment Guidelines, EPA SW-846 and EPA 600-4-79-20. The minimum number and the proposed locations of soil samples in the bottom of the tank excavation(s) shall be as shown on the project drawings. In order to minimize the amount of time that an excavation is open, laboratory testing of soils under fuel tanks shall be expedited to make test results available within 48 hours of submittal. Furnish results to the Contracting Officer within 24 hours after results are obtained. Along with the results furnish a sketch showing the underground tank(s), sampling locations, and extent of excavations. The Contractor shall not backfill the tank removal excavation prior to receiving approval from the Contracting Officer.

Soils under waste oil tanks shall be analyzed for TPH using EPA Method 418.1, BTEX and TCLP for eight (8) RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver). Furnish results to the Contracting Officer within 24 hours after results are obtained. The Contractor shall not backfill the tank removal excavation prior to receiving approval from the Contracting Officer. Along with the results furnish a sketch showing the underground tank(s), sampling locations, and extent of excavations.

3.19.3 Testing Along Piping

For every 25 linear feet of product delivery piping, and at every mechanical joint take one soil sample and analyze for TPH and BTEX. Sampling and analysis of soil materials shall conform to standards specified above in the paragraph entitled "Stockpiled Soils."

3.20 WATER DISPOSAL

Water generated by dewatering of the tank excavations or from runoff of stockpiled soils during removal of tanks and piping shall be temporarily stored, analyzed and managed in accordance with "Wash Water, Detergent Solution, and Sediment Removal" of this Section.

3.21 SECURING TANK SYSTEM

- a. **API PUBL 2015.** Remove stored product from the tank using one of the following methods:
 - (1) Drain product lines into the tanks.
 - (2) Remove liquids and sludge from tanks. Hydrocarbon products, sludge, and wastewater recovered from the tanks shall be handled according to Section 3.16.2
 - (3) Remove flammable or combustible liquids.
- b. Cap the fill pipe, gage pipe, tank vapor recovery fitting, and vapor return.
- c. Cap the product piping at the service station island, at associated buildings, or where indicated if pumps are removed.
- d. Disconnect electric power to the pumps.
- e. Leave vent piping open.

3.22 REMOVAL OF UNDERGROUND TANKS ANCHORS, SLABS, AND ASSOCIATED PIPING

3.22.1 Preparation

API PUBL 2015. Remove the fill pipe, gage pipe, vapor recovery truck connection, submersible pumps, and drop tube. Cap or remove non-product piping, except vent piping. Plug tank openings so that vapors will exit through vent piping during the vapor-freeing process.

3.22.2 Purging

Remove flammable vapors in accordance to API PUBL 2015. Tanks shall be certified as "vapor free" prior to further work.

3.22.3 Cleaning and Testing

Cleaning and tank atmosphere testing shall be in accordance with Section 13219, "Cleaning Petroleum Storage Tanks," specification, and with API PUBL 2015. Distribution (product delivery) piping shall be cleaned and removed unless noted otherwise on the demolition drawings. Test the tank atmosphere and the excavation area for flammable or combustible vapor concentrations, with a combustible gas indicator until the tank is removed from the excavation and from the site.

3.22.4 Tank Removal

Plug or cap accessible holes. One plug shall have a minimum 1/8-inch vent hole. Excavate around the tank to uncover it for removal. Remove the tank from the excavation and place it on a level surface and render it useless in accordance with API RP 1604. Provide warning labels on tank if tank contained leaded fuels. Warning shall read as follows or similar wording:

"TANK HAS CONTAINED LEADED GASOLINE

NOT VAPOR FREE

**NOT SUITABLE FOR STORAGE OF FOOD OR
LIQUIDS INTENDED FOR HUMAN OR ANIMAL
CONSUMPTION**

DATE OF REMOVAL: MONTH/DAY/YEAR"

Make tank unusable for future use, then transport and dispose of tank in accordance with Federal, State, and local regulations.

3.23 INSPECTIONS

Arrange for and perform required inspections. Provide copies of inspections to Contracting Officer.

3.24 CLOSURE REPORT (SITE ASSESSMENT REPORT)

Provide the Contracting Officer a Site Assessment Report in a single binder notebook which shall contain a collection of reports, records, inspections, documentation, and data as required by the TDEC Closure Assessment Guidelines, including but not limited to, the following:

- a. Complete UST Notification Form including "Permanent Closure Report" as required by TDEC Closure Assessment Guidelines (within 30 days of closure).
- b. Description of work, including removal procedures, number of tanks removed, identification of tanks removed and disposed of, cubic yards of excavated soil, location of disposal sites, and dates of excavation.
- c. Site plan, including location of tanks and piping, limits of excavation, sampling points, results of excavation, and depths.
- d. Laboratory testing reports, copies of data and test results from testing laboratory.
- e. Tank disposal paperwork, contaminated soil disposal paperwork, and contaminated water disposal paperwork.
- f. Certifications required by implementing agency.
- g. Building permit, inspection permits, and other permits required for underground tank removal, notifications, and inspection reports.
- h. Cumulative quantities of soil excavated, beginning with start date for each tank and associated piping.

3.25 SPILLS OF CONTAMINATED SOILS

Use appropriate vehicles and operating practices to prevent spillage or leakage of contaminated materials from occurring during operations. Inspect vehicles leaving the area of contamination to ensure that no contaminated materials adhere to the wheels or undercarriage.

3.26 BACKFILL

Provide backfill, compaction, grading, and seeding in accordance with Section 02220, "General Excavation, Filling, and Backfilling" and Section 02930, "Turf."

--End of Section--

7.0 COMPREHENSIVE HEALTH AND SAFETY PLAN (CHASP)

A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) is being conducted at the Naval Air Station (NAS) Memphis, Tennessee. The purpose of this program is to assess the nature and extent of contamination at the site and to determine if follow-up action is required to maintain compliance with environmental regulations.

This Comprehensive Health and Safety Plan (CHASP) is applicable to field operations to be conducted during the RFI at NAS Memphis. The Navy project contract number with EnSafe/Allen & Hoshall (E/A&H) is N62467-89-D-0318. A Site-Specific Health and Safety Plan (SSHSP) will be developed and implemented to address site-specific activities and hazards.

The provisions of this plan are mandatory for E/A&H personnel and those personnel under contract to E/A&H or the Navy e.g., the United States Geological Survey (USGS) whose work responsibilities call for them to enter a work zone (See 7.3 Work Areas). Such personnel must read this plan and sign the plan acceptance form (See Attachment C) before starting site activities. In addition, such personnel will operate in accordance with the most current requirements of 29 CFR 1910.120, *Standards for Hazardous Waste Workers and Emergency Responders (HAZWOPER)*. These regulations include the following provisions for employees exposed to hazardous substances, health hazards, or safety hazards: training as described in 120(e), medical surveillance as described in 120(f), and personal protective equipment (PPE) described in 120(g).

All non-E/A&H personnel present in E/A&H work areas shall either adopt and abide by this CHASP and the corresponding SSHSP or shall have their own safety plan which, at a minimum, meets the requirements of the E/A&H CHASP and SSHSP.

At least one person certified in CPR and First Aid will be present during field activities. In addition, the E/A&H employees that are onsite will be certified in CPR and First Aid.

7.1 Site Characterization

Upon review of available information, the following chemicals are representative of the types of chemical hazards (contamination) known or suspected to be present on NAS Memphis: benzene, toluene, ethylbenzene, xylene, polychlorinated biphenyls (PCBs), naphtha, waste oils, and cleaning solutions. SSHSPs shall be designed to protect workers from chemical hazards known or suspected to be present at a specific location. The following information will be included in the SSHSP:

- A site map displaying the location of planned work areas within the site
- The expected site-specific contaminants of concern and the (suspected) magnitude and scope of the situation
- Decontamination procedures
- A material safety data sheet (MSDS) for each contaminant known or expected of being present

7.1.1 Work Areas

Site control for all work areas will be established and maintained according to the recommendations in the EPA's *Interim Standard Operating Safety Guides*, Revised September, 1982. Three general zones of operation, each described below, will be established to reduce the potential for contaminant migration and risk of personnel exposure:

- The exclusion zone (EZ) or "hot zone"

- contamination reduction zone (CRZ), and the
- support zone (SZ)

Field personnel shall enter the SZ and don their PPE, then they will move through the CRZ and into the EZ. After completing their work or when taking a break they will leave the EZ through the CRZ, decontaminate themselves and their equipment, and leave the area through the SZ.

The exclusion zone is the area being investigated, sampled, or otherwise of interest. It is where chemical contamination is known or suspected to exist. The EZ includes the work area except for areas set aside as either the CRZ or SZ. The EZ will be defined and demarcated in the field; in the case of drilling, the EZ is typically about 50 feet in diameter with the borehole located in the middle.

Only authorized personnel that meet the training requirements of OSHA 29 CFR 1910.120 (40 hour HAZWOPER course/8-hour annual refresher course/24-hour supervised onsite training or equivalent) are permitted within the exclusion and contamination reduction zones. Documentation of these certifications will be maintained on site, as well as in the site trailer, at all times. Prior to entering the EZ, and at all times when in the EZ, all personnel shall be outfitted in and properly use all required PPE. A checkpoint may be established at the edge of the EZ to regulate the flow of personnel and equipment in and out of the area.

When using Level A, B, or C PPE, all personnel entering the EZ must use the "buddy system". All persons entering the EZ must be able to:

- Provide his or her partner with assistance
- Observe his or her partner for signs of chemical or heat exposure
- Periodically check the integrity of his or her partner's protective clothing
- Notify the shift supervisor, his representative, or others if emergency help is needed

Additionally, at least one person shall remain outside the EZ and have available at least the same level of PPE as those who entered the EZ. The person outside the EZ will provide logistical and safety support as needed.

The contamination reduction zone serves as a buffer between the EZ and the SZ and is intended to prevent the spread of contaminants from the work areas. All decontamination procedures will be conducted in this area. The CRZ shall be adjacent to and upwind of the EZ and include all decontamination stations. When leaving the SZ and entering the CRZ, personnel must be wearing the prescribed PPE. Exiting the CRZ requires the removal of all contaminants through compliance with established decontamination procedures as contained herein and in the corresponding SSHSP.

The support zone is the outermost area and is considered a non-contaminated or clean area. The support area will be equipped with an appropriate first-aid station and equipment to perform gross decontamination of health and safety equipment (e.g., air monitoring equipment). The SZ is adjacent to and upwind of the CRZ.

The actual location and boundary of work zones will be determined and demarcated in the field. Existing site conditions such as prevailing wind direction, location of utilities, roads, security, etc., shall be considered when determining zone locations.

Changes in meteorologic conditions or site conditions may necessitate relocating the CRZ or SZ. These conditions (e.g., wind direction, surface water run-off patterns, etc.) will be monitored at all times. A wind sock or similar device will be placed in a location visible to all site workers.

7.1.2 Work Area Access

A file will be maintained onsite that includes a current OSHA initial HAZWOPER training certificate (or copy) and an up-to-date refresher certificate for all employees involved in field activities. Employees that are unsure that a copy of their certificate is onsite shall bring a copy of their certificate with them and present it to the Site Health and Safety Officer before beginning field work. Personnel that fail to meet or abide by the criteria established in the CHASP or SSHSP shall be restricted from entering work areas.

Subcontractors, DOD oversight personnel, and other site visitors must provide the Site Health and Safety Officer with documentation showing that their HAZWOPER training is current and must agree to comply with this CHASP and the corresponding SSHSP or equivalent health and safety requirements prior to site entry. Personnel that fail to meet or abide by the criteria established in the CHASP or SSHSP shall be restricted from entering work areas.

The Site Health and Safety Officer may suspend site work and may instruct personnel to evacuate the area. Examples of situations when this may happen are:

- Site conditions have changed, for whatever reason, such that the SSHSP does not adequately address the current situation,
- Safety precautions being used are inadequate for the situation, or
- Personnel including E/A&H, subcontractors, visitors, or DOD are or may be exposed to an immediate health hazard.

7.1.3 Site History and Description

A review of the existing site data will be conducted to assess the potential hazards to be encountered by E/A&H and contractor personnel and addressed in the SSHSP. The location of NAS Memphis is shown on Figure 2-1, Vicinity Map.

7.2 Site Activities

Field activities to be conducted as part of this RFI (e.g., soil borings, well installations, and well development) are described in the E/A&H Comprehensive Sampling and Analysis Plan (CSAP). Specific health and safety procedures associated with specific activities, hazards, and/or sites are addressed in the appropriate SSHSP.

The Site Supervisor will manage the day-to-day field operations which includes assigning field staff to specific work tasks and coordinating any required logistical support. The Site Supervisor has the authority to suspend or postpone specific field operations if he or she believes that worker health and safety concerns have not been adequately addressed.

Certain activities present a level of hazard that must be dealt with on a case by case basis. These activities are neither covered by this CHASP nor by a SSHSP. Examples of such activities are: confined space entry; moving or sampling of unknown drums or containers; and entering excavations, trenches, or test pits that are more than three feet deep. Should the Project Manager or Site Supervisor deem it necessary to perform an activity such as those listed above, it is that person's responsibility to contact the Project Health and Safety Officer and request an addendum to the SSHSP specifying the health and safety procedures, training, and conditions necessary for undertaking that task. These activities are prohibited until the SSHSP addendum is reviewed, accepted, and implemented.

7.3 Chemical Hazards

Information about specific site chemical hazards will be provided in each SSHSP. Such information will include National Fire Protection Association (NFPA) ratings, symptoms of acute and chronic exposure, carcinogenicity, and OSHA permissible exposure limits (PELs). A table of exposure guidelines for expected site chemicals will be provided. Information in this table will include odor thresholds, OSHA PELs, American Conference of Governmental Industrial Hygienists threshold limit values (ACGIH TLVs), National Institute for Occupational Safety and

Health recommended exposure limits (NIOSH RELs), auto-ignition temperatures, and flammability ranges. Material Safety Data Sheets for these materials will be included in Attachment A of each SIP.

7.4 Operations and Physical Hazards

Field personnel should be aware of and act in a manner to minimize the dangers associated with physical hazards typically encountered during environmental investigations. These hazards include heat-related illnesses, uneven terrain, slippery surfaces, lifting, and use of heavy equipment. Electrical lines may be present either above or below ground, and underground gas lines may be present. Prior to the initiation of drilling activities, drilling locations must be cleared by the Naval Public Works Center (PWC).

Heavy equipment and drill rig operations will be conducted in accordance with the procedures outlined in Attachment A — *Drilling Safety Guide*, provided in this plan. Personnel conducting drill rig operations shall keep clear of all moving parts. To prevent entanglement with the drill rig, loose clothing shall not be worn. The Site Supervisor and Site Health and Safety Officer shall be aware of the potential for heat stress and other weather-related illnesses, and shall implement appropriate work regimens to minimize the likelihood of field personnel becoming ill. When conducting operations or survey work on foot, personnel will walk at all times. Running greatly increases the probability of slipping, tripping, and falling. When working in areas that support habitat for poisonous snakes, personnel shall wear protective chaps made of a heavy material designed to prevent snake bites to the legs.

7.5 Employee protection

Employee protection for this project includes standard safe work practices, NAS Memphis rules of conduct, PPE, personal decontamination procedures, equipment for extreme weather conditions, work limitations, and exposure evaluation.

7.5.1 Standard Safe Work Practices:

- **Eating, drinking, chewing gum or tobacco, smoking, or any activity that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated, unless authorized by the Site Health and Safety Officer.**
- **Hands and face must be thoroughly washed upon leaving the work area.**
- **No contact lenses will be worn in work areas while invasive actions are conducted.**
- **Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.**
- **Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, or discolored surfaces, or lean, sit, or place equipment on drums, containers, or on soil suspected of being contaminated.**
- **Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel on cleanup or response operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Consumption of alcoholic beverages is prohibited.**
- **Due to the possible presence of overhead power lines, adequate side and overhead clearance should be maintained to ensure that the drill rig boom does not touch or pass close to any overhead lines.**

- Due to the possible presence of underground utilities (including electric, natural gas, water, sewer, telephone, etc.), the activity and local utility representatives should be contacted and requested to identify all lines at the ground surface using characteristic spray paint or labeled stakes. A 3-yard buffer zone should be maintained during all subsurface investigations.
- Due to the flammable properties of some of the potential chemical hazards, all spark or ignition sources should be bonded and/or grounded or mitigated before soil boring advancement or other site activities begin.

7.5.2 NAS Memphis General Rules of Conduct:

- Liquor, firearms, narcotics, tape recorders, and other contraband items are not permitted on the premises.
- Any violation of local, state, or federal laws, or conduct which is outside the generally accepted moral standards of the community is prohibited.
- Violation of the Espionage Act, willfully hindering or limiting production, or sabotage is not permitted.
- Willfully damaging or destroying property or removing government records is forbidden.
- Misappropriation or unauthorized altering of any government records is forbidden.
- Securing government tools in a personal or contractor's tool box is forbidden.
- Gambling in any form, selling tickets or articles, taking orders, soliciting subscriptions, taking up collections, etc., is forbidden.

- Doing personal work in government shop or office, using government property or material for unauthorized purposes, or using government telephones for unnecessary or unauthorized local or long distance telephone calls is forbidden.
- Compliance with posted signs and notices is required.
- Boisterousness and noisy or offensive work habits, abusive language, or any verbal, written, symbolic, or other communicative expression which tends to disrupt the work or morale of others is forbidden.
- Fighting or threatening bodily harm to another is forbidden.
- Defacing any government property is forbidden.
- Wearing shorts of any type and/or offensive logos, pictures, or phrases on clothing is forbidden. Shirts, shoes, and pants or slacks or coverall-type garments will be worn at all times on government property.
- All persons operating motor vehicles will obey all NAS Memphis traffic regulations.

7.5.3 Selection of Personal Protective Equipment

It is important that PPE be appropriate to protect against the potential or known hazards at each cleanup or investigation site. Protective equipment will be selected based on the types, concentrations, and routes of personal exposure that may be encountered. In situations where the types of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the PPE required, based on past experiences and sound safety practices.

**Table 7-1
 Level of Protection and Criteria**

Level of Protection	Criteria for Use	Equipment
Level A	<ul style="list-style-type: none"> • When atmospheres are "immediately dangerous to life and health" (IDLH in the NIOSH/OSHA Pocket Guide to Chemical Hazards or other guides.) • When known atmospheres or potential situations exist that would affect the skin or eyes or be absorbed into the body through these surfaces. Consult standard references to obtain concentrations hazardous to skin, eyes, or mucous membranes. • Potential situations include those where immersion may occur, vapors may be generated, or splashing may occur through site activities. • Where atmospheres are oxygen deficient. • When the type(s) and or potential concentration of toxic substances are not known. 	<ul style="list-style-type: none"> • Positive-pressure full facepiece self-contained breathing apparatus (SCBA) or positive-pressure supplied air respirator with escape SCBA. • Fully-encapsulating chemical protective suit. • Chemical-resistant inner and outer gloves. • Steel toe and shank chemical resistant boots. • Hard hat under suit. • Two-way radios worn inside suit. • Optional: coveralls, long cotton underwear, disposable protective suit, gloves and boots, over fully encapsulating suit.
Level B	<ul style="list-style-type: none"> • When respiratory protection is warranted and cartridge respirators are not appropriate. Examples of these conditions are: When work areas contain less than 19.5 percent oxygen, When expected contaminants do not have appropriate warning properties e.g. vinyl chloride, or When cartridges are not available to protect against all contaminants of concern. 	<ul style="list-style-type: none"> • Chemical resistant clothes, long sleeves, hooded, one or two pieces. • Positive-pressure full facepiece supplied air breathing apparatus or airline system with a 30-minute escape bottle. • Hard hat. • Inner gloves and chemical resistant gloves. • Steel toe and shank boots. • Optional: coveralls and disposable outer boots.
Level C	<ul style="list-style-type: none"> • When respiratory protection is warranted and cartridge respirators are appropriate. • When work areas contain at least 19.5 percent oxygen. 	<ul style="list-style-type: none"> • Chemical resistant clothes, long sleeves, hood optional, one or two pieces. • Full-facepiece, air purifying respirator equipped with cartridges suitable for the hazard. • Hard hat. • Inner gloves and chemical resistant gloves. • Steel toe and shank boots. • Coveralls and disposable outer boots.

Table 7-1 Level of Protection and Criteria		
Level of Protection	Criteria for Use	Equipment
Level D	<ul style="list-style-type: none"> • When level B or C is not indicated. • When airborne particulates do not warrant respiratory protection. • When work areas contain at least 19.5 percent oxygen. 	<ul style="list-style-type: none"> • Inner gloves and chemical-resistant gloves needed to handle soil or water samples. • Steel toe and shank boots. • Hard hat (ANSI Z89.1-1969 standard). • Eye protection (ANSI Z87.1-1968) standard. • Optional: coveralls and disposable outer boots.

Notes:

Level A protection will be selected when the highest available level of respiratory, skin, and eye protection is needed.

Contraindications for use of Level A:

- Environmental measures contiguous to the site indicate that air contaminants do not represent a serious dermal hazard.
- Reliable, accurate historical data do not indicate the presence of severe dermal hazards.
- Open, unconfined areas.
- Minimal probability of vapors or liquids (splash hazards) present which could affect or be absorbed through the skin.
- Total vapor readings indicate 500 ppm to 1,000 ppm.

Level B protection will be selected when the highest level of respiratory protection is needed, but cutaneous exposure to the small unprotected areas of the body, (neck and back of head) is unlikely, or where concentrations are not known to be within acceptable standards. Additionally, the permissible limit for exposure to mixtures of all site gases will be checked using the requirements of 1910.1000(d)(2)(i) to ensure that PEL is not exceeded. If the value calculated using this method exceeds 1.0, Level B PPE is required.

Level C protection will be selected when the types and concentrations of inseparable material are known, or reasonably assumed to be no greater than the protection factors associated with air-purifying respirators, and exposure to the unprotected areas of the body is unlikely to cause harm. Dust concentrations require Level C PPE, where the respirable fractions exceed the PEL of 5 mg/m³ or the total concentrations exceed the PEL of 15 mg/m³.

Level D protection will be chosen when measurements of atmospheric concentrations are less than 2 ppm above background levels and work functions preclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemicals.

The Project Health and Safety Officer will determine the appropriate level of PPE prior to the initial entry based on the best available information. PPE requirements are subject to change as site information is updated or changes. The decision to upgrade or downgrade levels of PPE shall be made by the Project Health and Safety Officer.

Field activities which disturb soils will be initiated in Modified Level D protection except when stated otherwise in the SSHSP or site conditions (e.g., sampling results from previous studies) indicate that modified Level D is inappropriate. Modified Level D protection consists of a hard hat, appropriate chemical-resistant gloves (vinyl or nitrile), eye protection, and chemical-resistant, steel-toed and shank boots. Work coveralls (full length sleeves and pants) will be worn if free product or contaminants identified as skin irritants are encountered. This level of protection was selected because the levels of contamination detected in previous studies were low and free product was not detected.

PPE upgrades to Level C will be initiated if airborne concentrations exceeds 2 ppm above the background concentration in the breathing zone or if concentrations of any contaminant exceeds 50 percent of the OSHA PEL. See Table 7-1 for the specific criteria for use and the equipment required for each level of protection.

7.5.4 Air Monitoring

Previous site work indicates that workers may potentially be exposed to low concentrations of numerous chemicals including volatile organic compounds (VOCs), halogenated compounds, and combustible gases/vapors. Based on site history and existing sampling data, "worst case" contaminated areas will be identified prior to initiation of field activities.

Air monitoring using a photoionization detector (PID) and/or other appropriate sampling equipment will be conducted prior to beginning field activities at a new EZ and during ground disturbing activities. The PID will be field calibrated to measure VOCs relative to a 100 ppm

isobutylene standard. If VOCs are detected downhole, colorimetric detector tubes and/or other sampling media may be used to determine the identification and approximate concentration of these compounds.

A combustible gas indicator (CGI) will be used during all soil borings and well installations. The CGI will be field calibrated to measure flammable gases relative to a 23 percent lower explosive limit (LEL) methane standard. Downhole CGI readings will be collected continuously during all soil disturbing operations. Field activities will immediately cease if downhole readings exceed 10 percent LEL. If CGI readings do not subside, a careful investigation and mapping of the area will be made. Operations may not proceed until readings are below 10 percent LEL. The area will be immediately evacuated and the situation re-evaluated to determine how to proceed.

If breathing zone levels exceed 2 ppm or site conditions indicate that additional health and safety precautions are needed, field activities in the area shall stop. Field staff shall notify the Site Supervisor of the situation and he/she shall contact both the Project Manager and the Project Health and Safety Officer. The Project Health and Safety Officer will be responsible for reassessing the hazards and prescribing revised health and safety requirements as necessary, including upgraded PPE requirements, revised work schedules, and revised decontamination procedures. (Typically, PPE will be upgraded to Level C assuming that cartridge respirators are appropriate, otherwise Level B.) See Table 7-1 for specific criteria for each protection level. Work shall not proceed until breathing zone levels return to background levels, and it is reasonably anticipated that breathing zone samples will stay approximately at background levels; or the chemical constituent(s) are identified and appropriate PPE is donned.

Field monitoring values will be recorded in a field logbook and copies must be posted for field personnel review.

On a daily basis, PIDs, CGIs, and other monitoring equipment shall be calibrated or their proper function verified before being used. Throughout the day this equipment shall be periodically checked to ensure that it is working properly. A final calibration shall be conducted at the end of the work day at which time each instrument will be checked to ensure that it is free from surface contamination. Field staff shall record in their field notebooks the fact that they conducted these calibrations and checks and note whether the equipment was or was not functioning properly. When equipment is not functioning properly, it should be brought to the attention of the Site Supervisor or Site Health and Safety Officer who will arrange for repairs and/or replacement of that equipment as needed.

7.5.5 Procedures and Equipment for Extreme Weather Conditions

The seasonal climate in Memphis can be expected to be hot with high relative humidity in the summer months and moderately cold to extremely cold in the winter months. Therefore, heat-and-cold stress will be of concern for all personnel. Adverse weather conditions are important considerations in planning and conducting site operations. Extremes in hot and cold weather can cause physical discomfort, loss of efficiency, and personal injury.

7.5.5.1 Exposure to Hot Weather

Heat stress can result when the protective clothing decreases natural body ventilation even when temperatures are moderate. Various levels of personal protection may require wearing low permeability disposable suits, gloves, and boots which will prevent most natural body ventilation. Discomfort due to increased sweating and body temperature (heat stress) will be expected at the work site.

Heat stress is the metabolic and environmental heat to which an individual is exposed. The manifestations of heat strain are the adjustments made by an individual in response to the stress. The three most important categories of heat-induced illness are: heat exhaustion, heat cramps, and heat stroke. These disorders can occur when the normal responses to increased sweat

production are not adequate to meet the needs for body heat loss or when the temperature regulating mechanisms fail to function properly.

Heat exhaustion is a state of collapse brought about by an insufficient blood supply to the cerebral cortex portion of the brain. The crucial event is low blood pressure caused by inadequate heart output and widespread dilation of blood vessels.

Heat Exhaustion Factors — Factors which can lead to heat exhaustion are as follows:

- Increased dilation of blood vessels causing a decreased capacity of circulation to meet the demands for heat loss to the environment from exercise and from digestive activities.
- Decreased blood volume due to dehydration.
- Reduced blood volume due to lack of physical training, infection, intoxication (from industrial contaminants as well as from drinking alcohol), or heart failure.

Heat Exhaustion Symptoms — The symptoms include extreme weakness or fatigue, dizziness, nausea, or headache. More severe cases may also involve vomiting and possible unconsciousness. The skin becomes clammy and moist, the complexion pale, and the oral temperature stays normal or low, yet the rectal temperature is usually elevated (99.5°F - 101.3°F). Workers who are unacclimated run the highest risk.

Heat Exhaustion Treatment — In most cases, treatment of heat exhaustion is fairly simple. The victim will be moved to a cool place. If the victim is unconscious, medical assistance must be sought. Mild cases may experience immediate recovery; however, more severe cases may require several days care. No permanent effects have ever been reported.

Heat cramps result when the working muscles go into painful spasms. This may occur in people who perspire profusely in heat and who drink large quantities of water, but who fail to replace their bodies' salt. It is the low salt content in the blood that causes the cramping. The abdominal muscles as well as the muscles in the arms and legs may be affected. The cramps may appear during or even after work hours. Persons on a low sodium diet should not be given salt. A physician must be consulted for care of people with this condition.

Heat stroke is the most serious of the health problems that can arise while working in hot environments. It is caused by the breakdown of the thermo-regulatory system under conditions of stress. When this happens, perspiration stops, and the body can no longer regulate its own temperature.

Heat Stroke Symptoms — A heat stroke victim may be identified by hot, dry, and unusually red or spotted skin. The body core temperature can exceed 105°F. Mental confusion, irritability, and chills are common. These are all early warning signs of heat stroke; if the sufferer is not removed from the hot environment at once, more severe symptoms can follow, including unconsciousness, delirium, and convulsions, possibly ending in death.

Heat Stroke Treatment — Heat stroke must be treated as a major medical emergency; medical assistance must be summoned immediately.

Additional treatment:

- First aid must be administered.
- Individual must be moved to a cool location.
- Individual must be cooled through wetting, fanning, or immersion.

Care should be taken to avoid over-cooling and to begin treatment for shock by raising the legs. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

To reduce the potential for heat strokes:

- Drink plenty of fluids (to replace loss through sweating).
- Wear cotton undergarments to act as a wick to absorb moisture.
- Make adequate shelter available for taking rest breaks to cool off.

Additional Measures for Extremely Warm Weather:

- Wear cooling devices to aid in ventilation. (NOTE: the additional weight may affect efficiency.)
- Install portable showers or hose down facilities to cool clothing and body.
- Shift working hours to early morning and early evening. Avoid the hottest time of the day.
- Frequently rotate crews wearing protective clothing (if required).

7.5.5.2 Exposure to Cold Weather

Persons working outdoors in temperatures at or below freezing may experience frostbite or hypothermia. Extreme cold for a short time may cause severe injury to the surface of the body. Areas of the body that have a high surface-area-to volume ratio, such as fingers, toes, and ears, are the most susceptible.

Two factors influence the development of cold injury: ambient temperature and wind velocity. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air, thus, on a cold day the body can cool quickly when PPE is removed and if a person has wet clothing underneath.

Frostbite is a condition in which the cold temperature forms ice crystals in the cells and tissues, dehydrating protoplasm and killing tissues. At the same time, circulation of the blood is blocked. Frostbite could lead to gangrene and amputation.

Frostbite damage occurs in several degrees:

- **Frost nip, or incipient frostbite is characterized by sudden whitening of the skin.**
- **When superficial frostbite occurs, the skin has a waxy or whitish look and is firm to the touch; however, the tissue underneath has retained its resiliency.**
- **In deep frostbite, the tissues are cold, pale, and solid. The injury is severe. In addition to frostbite, other physiological reactions to cold may be experienced as well. Trench foot, for example, may result from prolonged exposure to low temperatures near, though possibly above, freezing. Walking on the foot is very painful. In very severe cases, the flesh dies and the foot may have to be amputated. Immersion foot is very similar although it is less severe. Although amputation is unusual, some mobility of the limb is lost. Blisters may occur around the lips, nostrils, and eyelids.**

Chilblain (pernio), which is an inflammation of the hands and feet caused by exposure to cold and moisture, is characterized by a recurrent localized itching, swelling, and painful inflammation on the fingers, toes, or ears, produced by mild frostbite. Such a sequence produces severe spasms and is accompanied by pain.

Hypothermia occurs when the body loses heat faster than it can produce it. The initial reaction involves the constriction of blood vessels in the hands and feet in an attempt to conserve the heat. After the initial reaction, involuntary shivering begins in an attempt to produce more heat.

Temperature is only a relative factor in cases of hyperthermia. Cases of exposure have occurred in temperatures well above freezing. Humidity is another important factor. Moisture on the skin and clothing will allow body heat to escape many times faster than when the skin and clothing are dry.

Hypothermia occurs when the body's core temperature drops below 96°F. When this happens, the affected person becomes exhausted. He may begin to behave irrationally, move more slowly, stumble, and fall. The speech becomes weak and slurred. If these preliminary symptoms are allowed to pass untreated, stupor, collapse, and unconsciousness occur, possibly ending in death.

To reduce effects of cold exposure:

- **Stay dry.** When the temperature drops below 40°F, change perspiration soaked clothes frequently. When clothes get wet, they lose about 90 percent of their insulating value.
- **Beware of the wind.** A slight breeze carries heat away from bare skin much faster than still air. Wind drives cold air under and through clothing. Wind refrigerates wet clothes. Wind multiplies the problems of staying dry.
- **Understand cold.** Most hypothermia cases develop in temperatures between 30°F and 50°F. Cold water running down the neck and legs or cold water held against the body by wet clothes causes hypothermia.
- **Have shelter available.** Make adequate dry, warm shelter available.
- **Provide warm drinks.**

- **Never ignore shivering.** Persistent shivering is a clear warning that a person is on the verge of hypothermia. Allow for the fact that exposure greatly reduces normal endurance. Warmth generated by physical activity may be the only factor preventing hypothermia.

7.5.6 Personal Decontamination

A CRZ will be established immediate to each sampling/boring site and will include a station for decontaminating equipment and personnel. The CRZ will be covered with sheets of 6-mil polyethylene (typically an area 20-feet by 20-feet is sufficient) with specific stations that will accommodate the removal and disposal of the protective clothing, boot covers, gloves, and respiratory protection if required.

As a general rule, equipment will be decontaminated using a soap and clean water wash solution. Equipment decontamination will be completed by personnel in Level D PPE. In the event of inclement weather (e.g., lightning) or an emergency requiring immediate evacuation, all contaminated equipment will be wrapped and taped in 6-mil polyethylene sheeting and tagged as "contaminated" for later decontamination.

Personnel working in the CRZ will be in one Level of PPE lower than personnel in the EZ. For example, if personnel in the EZ are in Level B, decon workers will be in Level C.

7.5.6.1 Personal Decontamination Procedures

The decontamination procedures, based on Level D protection, will consist of the following:

- Brushing heavily soiled boots and rinsing outer gloves and boots with soap and water.
- Removing outer gloves and depositing them in a plastic-lined container.
- Removing outer chemical protective clothing.

- Washing and rinsing inner gloves.
- Hard hats and eye protection should be washed thoroughly at the end of each work day with a soap and water solution.
- Disposable gloves and any disposable clothing will be disposed of in sealable bags and placed in a clearly labeled 55-gallon drum for disposal by the Navy.
- All field personnel are to be instructed to shower as soon as possible after leaving the site.

Decontamination procedures will be conducted at the lunch break and at the end of each work day. If higher levels of PPE are needed, adjustments will be made to these procedures and an amendment will be made to this CHASP.

All wastes (soil and water) generated during personal decontamination will be collected in clearly labelled 55-gallon drums. The drums will be labeled and characterized by E/A&H or USGS personnel for final disposal by the Navy.

7.5.6.2 Closure of the Personal Decontamination Station

All disposable clothing and plastic sheeting used during site activities will be double-bagged and disposed of in a refuse container. Decontamination and rinse solutions will be placed in a clearly labeled 55-gallon drum for later analysis and disposal. All washtubs, pails, buckets, etc., will be washed, rinsed, and dried at the end of each workday.

7.5.7 Work Limitations

All site activities will be conducted during daylight hours only. All personnel scheduled for these activities will have completed initial health and safety training and actual field training as

specified in 29 CFR 1910.120(e). All supervisors must complete an additional 8 hours of training in site management. All personnel must complete an 8-hour refresher training course on an annual basis in order to continue working at the site.

7.5.8 Exposure Evaluation

All personnel scheduled for site activities will have had a baseline physical examination which includes a stressing exam of the neurologic, cardiopulmonary, musculoskeletal and dermatological systems, pulmonary function testing, multi-chemistry panel and urinalysis, and will have been declared fit for duty. An exposure history form will be completed for each worker participating in site activities. An examination and updated occupational history will be repeated on an annual basis and upon termination of employment, as required by 29 CFR 1910.120(f). The content of the annual or termination examination will be the same as the baseline physical. A qualified physician will review the results of the annual examination and exposure data and request further tests or issue medical clearances as appropriate.

After any job-related injury or illness, there will be a medical examination to determine fitness for duty or any job restrictions. The Site Health and Safety Manager will review the results with the examining physician before releasing the employee for work. A similar examination will be performed if an employee has missed at least three days of work due to a non-job related injury or illness requiring medical attention. Medical records shall be maintained by the employer or the physician for at least 30 years following the termination of employment.

7.6 Medical Monitoring Program

All E/A&H or USGS personnel who enter hazardous-waste/spill sites or have the potential for exposure to hazardous materials from these sites must participate in the E/A&H Medical Monitoring Program or an equivalent program. The program is conducted by E/A&H's company doctor with the company Health and Safety Officer. The purpose of the program is to identify any pre-existing illnesses or problems that would put an employee at unusual risk

from certain exposures or respirators, and to monitor and evaluate exposure-related events where workers are involved in handling hazardous materials. Project managers should consult with the Health and Safety Officer and/or the company doctor concerning the scope of work and known or anticipated chemical hazards associated with each project.

- E/A&H maintains the right to exclude certain individuals from particular jobs based on reports from the company doctor. The program will be reviewed on an annual basis to determine its effectiveness. The company doctor has been employed as an independent contractor to provide medical monitoring for E/A&H.

The doctor is responsible for the following aspects of the Medical Monitoring Program:

- Selection and quality assurance of medical and laboratory services involved in carrying out the monitoring program.
- Development of a uniform medical record.
- Record retention.
- Employee notification of examination results.
- Determination of content of the medical and biological monitoring programs.
- Record review and correlation between potential exposure and effect.
- Monitoring job-related illness and injury for each employee.

7.6.1 Preplacement Examinations

Each E/A&H employee will be given a preplacement examination: to identify any preexisting illness or problem that would put the employee at an unusual risk from certain exposures; to assure that each employee can safely use negative-pressure respirators; and to develop a database to assess any exposure-related events detected during periodic medical monitoring. Data accumulation will include variables such as age, sex, race, smoking history, prior employment history, and other conditions that might bear upon the occurrence of subsequent events once employment begins.

The preplacement examination includes:

- Occupational history including previous chemical and carcinogenic exposures.
- Medical history including demographic data, family history, personal habits, past medical history, and a review of current systems.
- Fertility history.
- Physical examination stressing the neurologic, cardiopulmonary, musculoskeletal, and dermatological systems.
- Physiological parameters including blood pressure and visual acuity testing.
- Pulmonary function testing including FVC, FEV₁, and FEV₂₅₋₇₅.
- Electrocardiogram.
- PA and lateral chest X-ray.

- A multi-chemistry panel including tests of kidney and liver function.
- Red blood cell cholinesterase.
- Audiogram.

The history, physiological parameters, X-ray, screening tests, and laboratory studies will be conducted before the physical examination. After the physical examination, the medical examiner will review the results of the examination and special studies with each employee and facilitate referral for further evaluation of abnormalities detected during this examination. The Site Health and Safety Officer will provide each employee with a written summary and detailed results of the examination along with identification of any job restrictions. Additional medical testing procedures (e.g., ophthalmology/optometric assessment, specialized audiometric testing, etc.) may be required at the discretion of E/A&H's attending physician.

7.6.2 Periodic and Exit Examinations

An examination and updated occupational history will be repeated annually and include:

- Updated occupational and medical history.
- Physical examination stressing the neurologic, cardiopulmonary, musculoskeletal, and dermatological systems.
- Pulmonary function testing including FVC, FEV1, and FEV 25-75.
- Multi-chemistry panel including tests of kidney and liver function.
- Urinalysis.

The company doctor will review the results of annual examination and exposure data and request further tests or issue medical clearances as appropriate. An examination will also be administered when an employee leaves the company. The company doctor will be consulted for the contents of the exam except when the employee has had an exam within 6 months, or when there has been no site work since the last examination.

7.6.3 Return-to-Work Examinations

After any job-related injury or illness, a medical examination is required to determine fitness for duty or to identify any job restrictions. The medical examiner will review the results of this back-to-work examination with the company doctor before releasing the employee for work. A similar examination will be performed if an employee has missed at least three days of work due to a non-job-related injury requiring medical attention.

7.6.4 Confidentiality

Medical records will be maintained in a confidential manner so that only authorized persons will have access to the records. The authorized personnel will include medical staff of the joint venture or contract medical personnel, the individual, the individual's personal physician, or the individual's designated representative. Upon written request, the individual may obtain a copy of the medical file which will be provided within 15 days of the receipt of the written request. Information used for research, testing, statistical, or epidemiologic purposes will have all identifying data removed including the identity of the individual. Any medical information or findings obtained which do not affect the individual's job performance will not be made available to E/A&H in order to maintain the patient-physician confidentiality. Upon death, retirement, resignation, or other termination of services, the records will be retained by E/A&H or contracting physician.

7.7 Authorized Personnel

Personnel anticipated to be onsite at various times during site activities include:

- **Principal-In-Charge — Dr. James Speakman (E/A&H)**
- **Task Order Manager — Mr. Lawson Anderson (E/A&H)**
- **Project Manager — Ms. Ginny Gray (E/A&H)**
- **Project Health & Safety Officer — Mr. Doug Petry (E/A&H)**
- **Field Environmental Scientist — Mr. Robert Smith (E/A&H)**
- **Field Geologist — Mr. Ben Brantley (E/A&H)**
- **Site Supervisor — To Be Determined**
- **Site Health & Safety Officer — To Be Determined**
- **Engineer-in-Charge — Mr. Mark Taylor (SOUTHDIV)**
- **Naval Air Station Memphis, Tennessee Site Contact — Ms. Tonya Barker**

7.7.1 Responsibilities of Site Supervisor

The Site Supervisor will direct the site operations and, relative to health and safety, is responsible for assuring that:

- **Field staff follow the CHASP, SSHSP, and other safety and health standard operating procedures (SOPs). Personnel that do not comply are retrained and/or instructed to leave the site and not allowed to return.**
- **Field staff have current HAZWOPER training.**
- **Field staff know who the Site Health and Safety Officer is.**
- **Field staff know the site-specific safety and health concerns.**
- **There is an adequate onsite supply of health and safety equipment.**

- Field staff participate in the E/A&H Medical surveillance program (or in the case of subcontractors, an equivalent program).
- Field staff attend safety and health "kick-off" orientation and other site safety briefings.
- The Site Supervisor is also responsible for assuring that field staff who may be exposed to unique or special hazards have the training or experience necessary to safely conduct their work.

7.7.2 Responsibilities of Site Health and Safety Officer

The responsibilities of the Site Health and Safety Officer include:

- Providing the Site Supervisor with technical input on site health and safety issues.
- Observing field personnel and reporting to the Site Supervisor on the effectiveness of the CHASP and SSHSP, and observing whether field staff are utilizing proper work practices and decontamination procedures.
- Reporting significant safety violations to the Project Manager and/or Project Health and Safety Officer.
- Conducting safety briefings during field activities.
- Assuring that a copy of the Health and Safety Plan is maintained onsite during all field activities.
- Maintaining a file of HAZWOPER training certificates and appropriate refresher training certificates for onsite personnel.

The Site Health and Safety Officer will have the following qualifications: (1) 40 hours OSHA training or equivalent experience, (2) 24 hours of supervisory training or equivalent experience, (3) knowledge of the health and safety concerns for the specific work tasks being conducted, and (4) shall be trained to use the air monitoring equipment; be able to interpret the data collected with the instruments; be familiar with symptoms of chemical exposure, heat stress, and cold exposure; and know the location and proper use of onsite safety equipment. He will also be familiar with this CHASP.

The position of Site Health and Safety Officer may rotate. Often, particularly on small projects, this function is not a full time responsibility. Rather, a member of the field team is selected to serve as the Site Health and Safety Officer during a particular task. When that task is completed and/or field staff change, the Site Health and Safety Officer may change as well.

The following criteria outline when the Site Health and Safety Officer will be replaced: (1) termination of employment, (2) end of work task, (3) end of shift, (4) sickness, (5) injury, or (6) death. The SAP calls for one work shift per day. If circumstances arise that require multiple work shifts, an alternate Site Health and Safety Officer will be designated.

7.7.3 Responsibilities of Onsite Field Staff

The health and safety responsibilities of field staff include:

- Being familiar with and complying with the CHASP and SSHSP.
- Attending site health and safety briefings and being aware of anticipated chemical, physical, and biological hazards and knowing what to do when these hazards are encountered.
- Being properly trained on PPE use, safe work practices, decontamination procedures to be followed, and emergency procedures and communications.

- Properly utilizing required PPE, including respiratory protective equipment.
- Having up to date HAZWOPER training and then providing the Site Supervisor with documentation that their training is current.
- Being an up to date participant in an acceptable medical surveillance program.
- Using the buddy system when wearing respiratory protective equipment. When working in Level C or higher, a third person shall be at the work area. This person shall be suitably equipped to provide logistical and safety support to the entry team.
- Being fit-tested and physically capable of using a respirator. Should the use of respiratory protection be required, then field workers shall not have facial hair which interferes with achieving a proper fit.

In addition, field staff should always be alert and use their senses (sight, smell, etc.) to identify and react to potentially dangerous situations. When working in the EZ, visual contact should be maintained between personnel and field personnel should be close enough to assist each other during an emergency. Procedures for leaving a contaminated area must be planned and implemented before going onsite in accordance with the SSHSP.

The number of personnel and equipment in the contaminated area should be kept to a minimum in order to achieve effective site operations. All visitors to the job site must comply with the SSHSP procedures. PPE may be modified for visitors depending on the situation. Modifications must be approved by the Project Health and Safety Officer.

7.8 Emergency Information

All hazardous-waste site activities present a potential risk to onsite personnel. During routine operations risk is minimized by establishing good work practices, staying alert, and by using proper PPE. Unpredictable events such as physical injury, chemical exposure, or fire may occur and must be anticipated.

If any situation or unplanned occurrence requires outside or support service, Ms. Tonya Barker, NAS Memphis Site Contact, will be informed and the appropriate contact from the following list will be made:

Contact	Agency or Organization	Telephone
Tonya Barker	Naval Air Station, Memphis	(901) 873-5461/5462
Mark Taylor	SOUTHDIV Engineer-in-Charge	(803) 743-0573
Law Enforcement	NAS Memphis Base Security	9-911
Fire Department	NAS Memphis	9-911
Ambulance Service	Naval Hospital, Millington Navy Road	(901) 873-5801/5802 or 9-911
Hospital	Methodist North Hospital 3960 Covington Pike	(901) 372-5211 or 9-911
Southern Poison Control Center	—	(901) 528-6048
Lawson Anderson	EnSafe/Allen & Hoshall Memphis, Tennessee	(901) 372-7962
Doug Petty	EnSafe/Allen & Hoshall	(901) 372-7962

Mark Taylor, SOUTHDIV Engineer-in-Charge will be contacted after appropriate emergency measures have been initiated onsite.

7.8.1 Site Resources

Cellular telephones will be used for emergency use and communication/coordination with NAS Memphis. First aid and eye wash equipment will be available at the work area.

7.8.2 Emergency Procedures

Conditions which may constitute an emergency include any member of the field crew being involved in an accident or experiencing any adverse effects or symptoms of exposure while onsite, or if a condition is discovered that suggests the existence of a situation more hazardous than anticipated.

The following emergency procedures should be followed:

- Site work area entrance and exit routes will be planned and emergency escape routes delineated by the Site Health and Safety Officer.
- If any member of the field team experiences any effects or symptoms of exposure while on the scene, the entire field crew will immediately halt work and act according to the instructions provided by the Site Health and Safety Officer.
- For applicable site activities, wind indicators visible to all onsite personnel will be provided by the Site Health and Safety Officer that indicate possible routes for upwind escape.

- The discovery of any conditions that would suggest the existence of a situation more hazardous than anticipated will result in the suspension of work until the Site Health and Safety Officer has evaluated the situation and provided the appropriate instructions to the field team.
- If an accident occurs, the Project Manager is to complete an Accident Report Form (See Attachment C) for submittal to the managing principal-in-charge of the project.
- If a member of the field crew suffers a personal injury, the Site Health and Safety Officer will call (901) 372-5211 or 9-911 (serious injury) to alert appropriate emergency response agencies, or administer onsite first aid (minor injury) as the situation dictates. An Accident Report Form will be completed for any such incident.
- If a member of the field crew suffers chemical exposure, the affected body areas should be flushed immediately with copious amounts of clean water, and if the situation dictates, the Site Health and Safety Officer should alert appropriate emergency response agencies or personally ensure that the exposed individual is transported to the nearest medical treatment facility for prompt treatment. (See Attachment B for directions to the emergency medical facility.) An Accident Report Form will be completed for any such incident.

Additional information on appropriate chemical exposure treatment methods will be provided through MSDS in Attachment A of each SIP. Directions to the nearest emergency medical facility capable of providing general emergency medical assistance and treating chemical burns

are provided in Attachment B of this CHASP. Directions from individual sites to the NAS Memphis South Gate will be provided as Attachment B of each SIP.

7.9 Forms

The following forms will be used in implementing this CHASP:

- Plan Acceptance Form**
- Plan Feedback Form**
- Exposure History Form**
- Accident Report Form**

A SSHSP Plan Acceptance Form will be filled out by all employees working on the site before site activities begin. The Plan Feedback Form will be filled out by the Site Health and Safety Officer and any other onsite employee who wishes to fill one out. The Exposure History Form will be completed by both the Project Manager and the individual(s) for whom the form is intended. Examples of each form are provided in Attachment C of this plan.

All completed forms must be returned to the Task Order Manager at EnSafe/Allen & Hoshall, Memphis, Tennessee.

ATTACHMENT A

ENSAFE CORPORATE *HEALTH AND SAFETY MANUAL*

DRILLING SAFETY GUIDE

Appendix B

Drilling Safety Guide

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Drilling Safety Guide

EnSafe is concerned about employee safety while working on or around drill rigs as well as when traveling to and from a drilling site, moving the drill rig and tools from location to location on a site, and during maintenance of the drill rig. Every drill crew will have a designated safety supervisor. The safety supervisor will have the responsibility for ensuring that all drilling operations are conducted in a safe manner. All personnel working on, with, or around a drill rig will be under the jurisdiction of the rig safety supervisor.

Drill Rig Safety Supervisor

The safety supervisor for the drill crew will be the drill rig operator. However, the EnSafe safety officer still maintains the overall safety responsibility for the site. The drill crew safety supervisor is a direct representative of the site health and safety supervisor and will report any safety problems directly to the site health and safety officer. The drill rig safety supervisor will:

- Be the leader in using proper personal protective equipment. He/she will set an example for other personnel to follow.
- Enforce the requirements of the health and safety plan and take appropriate actions when other personnel are not following the requirements of the health and safety plan.
- Ensure that all drill rig and associated drill rig equipment is properly maintained.
- Ensure that all drill rig operating personnel are thoroughly familiar with the drill operations.
- Inspect the drill rig and associated drill rig equipment for damage before starting drilling operations. Check for structural damage, loose bolts or nuts, correct tension in chains and cables, loose or missing guards or protective covers, fluid leaks, damaged hoses and/or damaged pressure gauges and pressure relief valves.
- Test all emergency and warning devices such as emergency shut-down switches at least daily (prior to starting drilling operations). Drilling will not be permitted until all emergency and warning devices are functioning.
- Conduct a safety briefing daily before starting drilling operations. Any new employee will receive a copy of the drilling operations safety manual, and the drill rig manufacturer's operating and maintenance manual.
- Ensure that each employee reads and understands the drill rig manufacturer's operating and maintenance manual.
- Observe the mental, emotional, and physical capabilities of each worker.
- Ensure that each drill rig has a first aid kit and fire extinguisher.
- Maintain a list of emergency contact telephone numbers. This list will be posted in a prominent location and each drill rig employee will be informed of the list's location.

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Drill Rig Personnel Protective Equipment

For most geotechnical, mineral, and/or groundwater drilling, drill rig personal protective equipment will include the following:

- Hard hat
- Safety shoes with steel toe and steel shank (or equivalent)
- Gloves
- Safety glasses with side shields
- Close-fitting but comfortable clothes
- Hearing protection

It is important that clothing does not have loose ends, straps, drawstrings or belts, or other unfastened parts that might become caught in or on a rotating or translating part of the drill rig.

Rings, necklaces, or other jewelry will not be worn during drilling operations.

Additional protective equipment may be required by the Site-Specific Health and Safety Plan.

Drill Rig Housekeeping

The following housekeeping measures must be taken for all drilling operations.

- Suitable storage locations will be provided for all tools, materials, and supplies. The storage should be conveniently located and will provide for safe handling of all supplies.
- Drill tools, supplies, and materials will not be transported on the drill rig unless the drill rig is designed and equipped to carry drill tools, supplies, and materials.
- Pipe, drill rods, casing, augers, and similar drilling tools when stored will be stacked in a manner that will prevent spreading, rolling, or sliding.
- Penetration or other driving hammers will be secured to prevent movement when not in use.
- Work areas, platforms, walkways, scaffolding, and other access ways will be kept free of materials, debris and obstructions and substances such as ice, grease, or oil that could cause a surface to become slick or otherwise hazardous.
- Never store gasoline in a nonapproved container. Red, nonsparking, vented containers marked with the word gasoline will be used. The fill spout will have a flame arrester.
- Prior to drilling, adequate site clearing and leveling will be performed to accommodate the drill rig and supplies and to provide a safe working area. Drilling will not be started when tree limbs, unstable ground or site obstructions cause unsafe tool handling conditions.

Maintenance Safety

Well maintained drilling equipment makes drilling operations safer. When performing equipment/tool maintenance, the follow safety precautions will be followed:

- Safety glasses will be worn when maintenance is performed on drill rigs or drilling tools.
- Shut down the drill rig engine to make repairs or adjustments to the rig or to lubricate fittings (except to make repairs or adjustments that can only be made while the engine is running).
- Always block the wheels or lower the leveling jacks or both. Set the hand brake before working under a drill rig.
- Release all pressure on hydraulic systems, the drilling fluid system, and the air operating system of the drill rig prior to performing maintenance.
- Use extreme caution when opening drain plugs and radiator caps and other pressurized plugs and caps.
- Allow time for the engine and exhaust to cool before performing maintenance on these systems.
- Never weld or cut on or near the fuel tank.
- Do not use gasoline or other volatile or flammable liquids as a cleaning agent.
- Follow the manufacturer's recommendations for quantity and type of lubricants, hydraulic fluids and coolants.
- Replace all caps, filler plugs, protective guards or panels, and high pressure hose clamps and chains or cables that have been removed during maintenance.
- Perform a safety inspection prior to starting drilling equipment after maintenance is performed.

Safe Use of Hand Tools

There are a large number of hand tools that can be used on or around a drill rig. The most important rule of hand tools is to use a tool for its intended purpose. The following are a few general and specific safety rules to follow when using hand tools.

- When using a hammer, wear safety glasses and require all others around you to wear safety glasses.
- When using a chisel, wear safety glasses and require all others around you to wear safety glasses.
- Keep all tools cleaned and stored in an orderly manner.
- Use wrenches on nuts, not pliers.
- Use screwdrivers with blades that fit the screw slot.
- When using a wrench on a tight nut, use some penetrating oil, use the largest wrench available that fits the nut, when possible pull on the wrench handle rather than pushing, and apply force to the wrench with both hands when possible and with both feet firmly placed. Do not push or pull with one or both feet on the drill rig or the side of a mud pit or some other blocking-

off device. Always assume that you may lose your footing. To avoid serious injury if you fall, remove sharp objects from the area near you.

- Keep all pipe wrenches clean and in good repair. The jaws of pipe wrenches will be wire brushed frequently to prevent accumulation of dirt and grease which cause wrenches to slip.
- Never use pipe wrenches in place of a rod holding device.
- Replace hock and heel jaws when visibly worn.
- When breaking tool joints on the ground or on a drilling platform, position hands so that fingers will not be smashed between the wrench handle and the ground or the platform if the wrench were to slip or the joint suddenly to let go.

Safety During Drilling Operations

- Do not drive a drill rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast, look up to check for overhead obstructions.
- Before raising the mast, all drill rig personnel (except the person raising the mast) and visitors will be cleared from the area immediately to the rear and sides of the mast. All drill rig personnel and visitors will be informed that the mast is being raised prior to raising the mast.
- All drill rig personnel and visitors will be instructed to stand clear of the drill rig immediately prior to and during starting of the engine.
- All gear boxes will be in the neutral position, all hoist levers will be disengaged, all hydraulic levers will be in the nonactuating positions, and the cathead rope will not be on the cathead before starting the drill rig engine.
- The drill rig must be leveled and stabilized with leveling jacks and/or solid cribbing before the mast is raised. The drill rig will be leveled if settling occurs after initial setup.
- The mast will be lowered only when the leveling jacks are down. The leveling jacks must be in the down position until the mast is completely lowered.
- Secure and/or lock the mast according to the drill rig manufacturer's recommendations before starting drilling operations.
- The drill rig must only be operated from the control position. If the operator must leave the control position, the rotary drive and the feed control must be placed in the neutral position. The drill engine will be shut down when the operator leaves the vicinity of the drill rig.
- Throwing or dropping of tools is not permitted. All tools will be carefully passed by hand between personnel or a hoist line will be used.
- When drilling within an enclosed area, ensure that fumes are exhausted out of the area. Exhaust fumes can be toxic and may not be detected by smell.
- Clean mud and grease from boots before mounting the drill platform. Use hand holds and railings. Watch for slippery ground when dismounting from the drill platform.
- Do not touch any metal parts of the drill rig with exposed flesh during freezing weather. Freezing of moist skin to metal can occur almost instantaneously.
- All unattended boreholes must be covered or otherwise protected to prevent drill rig personnel, site visitors, or animals from stepping or falling into the hole.

- Do not attempt to use one or both hands to carry tools when climbing ladders.

Working on Derrick Platforms

- When working on a derrick platform, use a safety belt and a lifeline. The safety belt will be at least 4 inches wide and will fit snugly but comfortably. The lifeline, will be less than 6 feet long and attached to the derrick.
- The safety belt and lifeline will be strong enough to withstand the dynamic force of a 250-pound weight falling 6 feet.
- A safety climbing device will be used when climbing to a derrick platform that is higher than 20 feet.
- The lifeline will be fastened to the derrick just above the derrick platform to a structural member that is not attached to the platform or to other lines or cables supporting the platform.
- Tools will be securely attached to the platform with safety lines. Do not attach a tool to a line attached to the wrist or other body part.
- When working on a derrick platform, do not guide drill rods or pipe into racks or other supports by taking hold of a moving hoist line or a traveling block.
- Derrick platforms over 4 feet above the ground will have toe boards and safety railings.

Working on the Ground

- Workers on the ground must avoid going under elevated platforms.
- Terminate drilling operations and, if possible, lower the mast during an electrical storm.
- Overhead and buried utilities must be located and marked on all boring location plans and boring assignment sheets.
- When there are overhead electrical power lines at or near a drilling site or project, consider all wire to be charged and dangerous.
- Watch for sagging power lines before entering a site. Do not lift power lines to gain entry. Call the utility to have them lift the power lines or to deenergize the power.
- Operations adjacent to overhead lines are prohibited unless one of the following conditions is satisfied:

- Power has been shut off and positive means taken to prevent the lines from being energized.
- Equipment, or any part, does not have the capability of coming within the following minimum clearance from energized overhead lines, or the equipment has been positioned and blocked to assure no part, including cables, can come within the minimum clearances listed in the adjacent table.

Power lines nominal system kv	Minimum required clearance
0-50	10 feet
51-100	12 feet
101-200	15 feet
201-300	20 feet
301-500	25 feet
501-750	35 feet
751-1000	45 feet

- While in transit with boom lowered and no load, the equipment clearance will be a minimum of 4 feet for voltages less than 50kv, 10 feet for voltages 51kv to 345kv, and 16 feet for voltages over 345kv.
- Before working near transmitter towers where an electrical charge can be induced in the equipment or materials being handled, the transmitter will be de-energized. The following precautions will be taken to dissipate induced voltages:
 - The equipment will be provided with an electrical ground to the upper rotating structure supporting the boom.
 - Ground jumper cables will be attached to materials being handled by boom equipment when electrical charge may be induced while working near energized transmitters. Crews will be provided nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load. Insulating gloves will be used.
- Continue to watch overhead power lines. Both hoist lines and overhead power lines can be moved toward each other by the wind.
- If there are any questions concerning drill rig operations on a site in the vicinity of overhead power lines, call the power company. The power company will provide expert advice as a public service.
- Look for warning signs indicating underground utilities. Underground utilities may be located a considerable distance away from the warning sign. Call the utility and jointly determine the precise location of all underground utility lines, mark and flag the locations, and determine the specific precautions to be taken to ensure safe drilling operations.

Wire Rope Safety

- All wire ropes and fittings will be visually inspected at least once a week for abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper reeving, jamming, crushing, bird caging, kinking, core protrusion, and damage to lifting hardware.
- Wire ropes must be replaced when inspection indicates excessive damage. The *Wire Rope User's Manual* may be used as a guide for determining excessive damage.
- Wire ropes that have not been used for a period of a month or more will be thoroughly inspected before being returned to service.
- All manufactured and end fittings and connections must be installed according to the manufacturer's specifications.
- Swivel bearings on ball-bearing type hoisting swivels must be inspected and lubricated daily to ensure that the swivel rotates freely under load.
- Do not drill through or rotate drill through a slipping device, do not hoist more than 10 feet of the drill rod column above the top of the last (mast), do not hoist a rod column with loose tool joints, and do not make up, tighten, or loosen tool hoists while the rod column is being supported by a rod slipping device.

- Do not attempt to brake the fall of a drill rod column with your hands or by increasing tension on the rod slipping device.
- Wire ropes must be properly matched with each sheave. The sheave will pinch wire rope that is too large. Wire rope that is too small will groove the sheave. Once a sheave is grooved, it will severely pinch and damage larger sized wire rope.
- Use tool handling hoists only for vertical lifting of tools. Do not use tool handling hoists to pull on objects away from the drill rig.
- All hoisting hooks will be equipped with safety latches.
- When tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the tools directly to the feed mechanism of the drill. Do not use hydraulic leveling jacks for added pull for the hoist line or the feed mechanism of the drill.
- Minimize shock loading of a wire rope; apply loads smoothly and steadily.
- Avoid sudden loading in cold weather.
- Never use frozen ropes.
- Protect wire rope from sharp corners or edges.
- Replace faulty guides and rollers.
- Replace worn sheaves or worn sheave bearings.
- Know the safe working load of the equipment and tackle. Never exceed safe working limits.
- Periodically inspect clutches and brakes of hoists.
- Always wear gloves when handling wire ropes.
- Do not guide wire rope onto hoist drums with your hands.
- After installation of a new wire rope, the first lift must be a light load to allow the wire rope to adjust.
- Never leave a load suspended when the hoist is unattended.
- Never use a hoist line to ride up the mast.

Cathead and Rope Hoist Safety

- Keep the cathead clean and free of rust and oil and/or grease. The cathead must be cleaned with a wire brush when it becomes rusty.
- Check the cathead for rope-wear grooves. If a rope groove forms that is deeper than 1/8-inch, the cathead must be replaced.
- Always start work with a clean, dry, sound rope. A wet or oily rope may grab the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast. If the rope grabs the cathead or otherwise becomes tangled in the drum, release the rope and sound the alarm for all personnel to clear the area rapidly.
- The rope must not be permitted to contact chemicals.
- Never wrap the rope from a cathead around a hand, wrist, arm, foot, ankle, leg, or any other body part.
- Attach the hammer to the ropeusing a knot that will not slip, such as a bowline.

9/92

- A minimum of 18 inches must be maintained between the operating hand and the cathead drum when driving samplers, casing, or other tools. Be aware that the rope advances toward the cathead with each hammer blow as the sampler or other drilling tool advances into the ground. Loosen grip on the rope as the hammer falls. Maintaining a tight grip on the rope increases the chances of being pulled into the cathead.
- Do not use a rope that is longer than necessary. A rope that is too long can form a ground loop or otherwise become entangled with the operator's legs.
- Do not leave a cathead unattended with the rope wrapped on the drum.
- Position all other hoist lines to prevent contact with the operating cathead rope.
- The cathead operator must be on a level surface with good, firm footing conditions.

Auger Safety

- The drill rig must be level, the clutch or hydraulic rotation control disengaged, the transmission in low gear and the engine running at low RPM when starting an auger boring.
- Seat the auger head below the ground surface with an adequate amount of downward pressure prior to rotation.
- Observe the auger head while slowly engaging the clutch or rotation control and start rotation. Stay clear of the auger.
- Slowly rotate the auger and auger head while continuing to apply downward pressure. Keep one hand on the clutch or the rotation control at all times until the auger has penetrated about one foot or more below the surface.
- Follow manufacturer's recommended methods for securing the auger to the power coupling.
- Never place hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never place feet under the auger section that is being hoisted.
- Stay clear of rotating augers and other rotating components of the drill rig.
- Never reach behind or around a rotating auger.
- Use a long-handle shovel to move auger cuttings away from the auger.
- Augers will be cleaned only when the drill rig is in neutral and the augers have stopped rotating.

Rotary and Core Drilling Safety

- Water swivels and hoist plugs must be lubricated and checked for frozen bearings before use.
- Drill rod chuck jaws must be checked periodically and replaced as necessary.
- The weight of the drill rod string and other expected hoist loads must not exceed the hoist and sheave capacities.
- Only the operator of the drill rig will brake or set a manual chuck to ensure that rotation of the chuck will not occur prior to removing the wrench from the chuck.

-
- The drill rod chuck jaws will not be used to brake drill rods during lowering into the hole.
 - Drill rods will not be held or lowered into the hole with pipe wrenches.
 - Do not attempt to grab falling drill rods with hands or wrenches.
 - In the event of a plugged bit or other circulation blockage, the high pressure in the piping and hose between the pump and the obstruction must be relieved or bled down prior to breaking the first tool joint.
 - Use a rubber or other suitable rod wiper to clean rods during removal from the hole. Do not use hands to clean drilling fluids from the drill rods.
 - Do not lean unsecured drill rods against the mast.

ATTACHMENT B
DIRECTIONS TO EMERGENCY MEDICAL FACILITIES

DIRECTIONS TO THE NEAREST MEDICAL FACILITIES

The nearest hospital and the nearest facility capable of treating chemical burns are the same facility, which is located at Methodist North Hospital. Therefore, there is only one set of directions.

Nearest Hospital

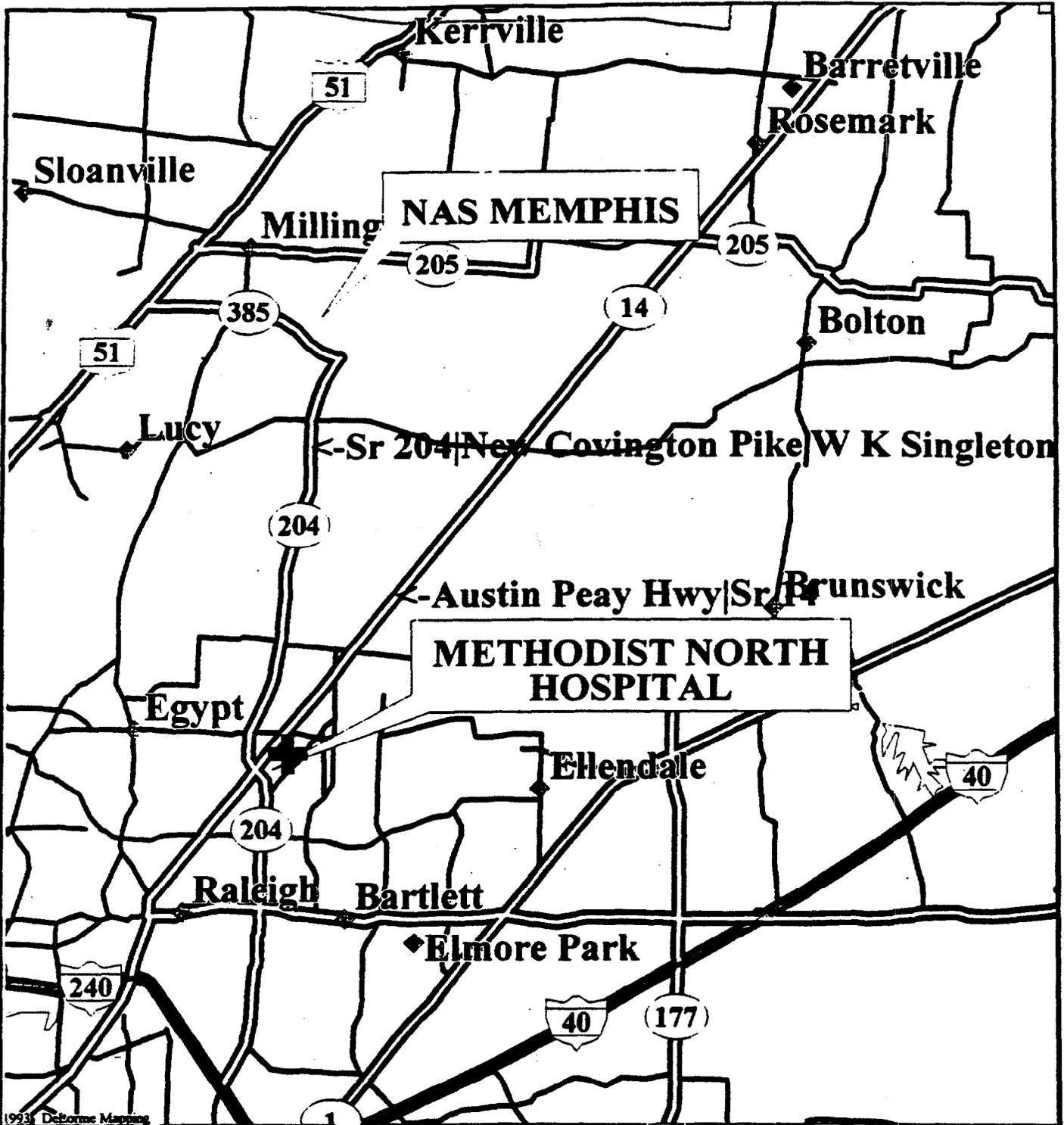
**Methodist North Hospital
3960 Covington Pike
Memphis, Tennessee**

Emergency Room Telephone Number - (901) 372-5211

Directions to Methodist North Hospital from NAS Memphis Main Gate:

1. Exit base through South Gate (Singleton Parkway).
2. Continue on Singleton Parkway through the stop signs.
4. Singleton Parkway and Covington Pike will intersect at a red light (about 5 miles).
4. You will see the entrance to the emergency room 700 feet past this light on the left.

Also, refer to the Route to Hospital Map on the following page.



HEALTH & SAFETY PLAN
 NAS MEMPHIS
 MILLINGTON, TN

DIRECTIONS TO THE HOSPITAL

DWG DATE: 10/04/94 | DWG NAME: BOARD

ATTACHMENT C
HEALTH AND SAFETY PLAN FORMS

PLAN ACCEPTANCE FORM

PROJECT HEALTH AND SAFETY PLAN

INSTRUCTIONS: This form is to be completed by each person working on the project work site and returned to EnSafe/Allen & Hoshall, Memphis, Tennessee.

Job No: 2151-016

Contract No: N62467-89-D-0318

Project: Comprehensive Health and Safety Plan

I represent that I have read and understand the contents of the above plan and agree to perform my work in accordance with it.

Signed

Print Name

Company

Date

EMPLOYEE EXPOSURE HISTORY FORM

Employee: _____

Job Name: _____

Date(s) From/To: _____

Hours Onsite: _____

Contaminants (Suspected/Reported):

(See Attached Laboratory Analysis)

PLAN FEEDBACK FORM

Problems with plan requirements:

Unexpected situations encountered:

Recommendations for revisions:

ACCIDENT REPORT FORM

SUPERVISOR'S REPORT OF ACCIDENT		DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENTS	
TO		FROM	
		TELEPHONE (include area code)	
NAME OF INJURED OR ILL WORKER AND COMPANY			
WORKER'S SOCIAL SECURITY NUMBER			
DATE OF ACCIDENT		TIME OF ACCIDENT	EXACT LOCATION OF ACCIDENT
NARRATIVE DESCRIPTION OF ACCIDENT			
NATURE OF ILLNESS OR INJURY AND PART OF BODY INVOLVED			LOST TIME YES <input type="checkbox"/> NO <input type="checkbox"/>
PROBABLE DISABILITY (Check one)			
FATAL <input type="checkbox"/>	LOST WORK DAY WITH ___ DAYS AWAY FROM WORK	LOST WORK DAY WITH ___ DAYS OF RESTRICTED ACTIVITY	NO LOST WORK DAY <input type="checkbox"/> FIRST-AID ONLY <input type="checkbox"/>
CORRECTIVE ACTION RECOMMENDED (By whom and by when)			
NAME OF SUPERVISOR		TITLE	
SIGNATURE		DATE	

APPENDIX E

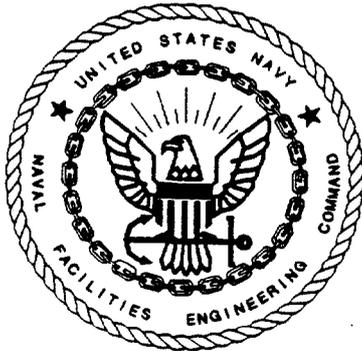
SWMU 17 SITE-SPECIFIC HEALTH AND SAFETY PLAN

**VOLUNTARY CORRECTIVE ACTION WORK PLAN
RCRA FACILITY INVESTIGATION
NAVAL SUPPORT ACTIVITY MEMPHIS**

**SITE SPECIFIC HEALTH AND SAFETY PLAN
SWMU 17 — REMOVAL OF
UNDERGROUND WASTE TANK S-9**

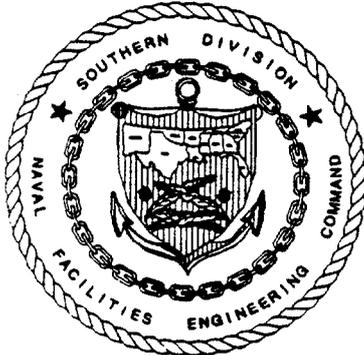
Revision: 02

**CTO-106
Contract No. N62467-89-D-0318**



Prepared for:

**Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina**



Prepared by:

**EnSafe/Allen & Hoshall
5720 Summer Trees Drive, Suite 8
Memphis, Tennessee 38134
(901) 383-9115**

February 27, 1996

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Attachment A Map to Hospital

1.0 INTRODUCTION

As part of the U.S. Navy's Comprehensive Long Term Environmental Action Navy program, E/A&H is implementing the attached Resource Conservation and Recovery Act (RCRA) Voluntary Corrective Action Work Plan (VCAWP) for the removal of Solid Waste Management Unit (SWMU) 17, the Underground Waste Tank (UWT) S-9 from the Building S-9 (Public Works Transportation Department) area at Naval Support Activity (NSA) Memphis, Millington, Tennessee (Figure 1).

This plan is to be used in conjunction with the approved NSA Memphis *Comprehensive Health and Safety Plan (CHASP)*. Copies of both this plan and the CHASP should be onsite during all field operations.

Applicability

Current Hazardous Waste and Emergency Response Operators (HAZWOPER) training certificates for E/A&H and E/A&H subcontractors anticipated to be conducting field work onsite, will be filed onsite and available for review. Individuals whose certifications are not on file, or those who have a more recent certificate (have attended a refresher course), will provide the Onsite Supervisor with a copy of their certificate before being allowed to enter a work area.

Current OSHA refresher training certificates will be available onsite for all employees involved in field activities if their refresher course requirements come up for renewal before the project begins. All subcontractors, DOD oversight personnel, and any other site visitors must provide health and safety certification with appropriate refresher course documentation prior to site entry.

2.0 SITE CHARACTERIZATION

2.1 Site Description

SWMU 17 is approximately 100 feet east of First Avenue on the NSA Memphis Southside in the S-9 complex (Figure 1), which is used for vehicle maintenance. The S-9 Hazardous Waste

Accumulation Point (SWMU 48) is also in the complex, approximately 200 feet to the east-northeast of SWMU 17.

2.2 Work Areas

See Section 7.1.1 of the CHASP for a description of the following work zones:

- Exclusion Zone (EZ)
- Contaminant Reduction Zone (CRZ), and
- Support Zone (SZ).

For a description of field activities to be conducted at the site and within each work area see the Voluntary Corrective Action Work Plan (VCAWP).

2.3 Work Area Access

Authorized personnel will be allowed access to work areas as long as they follow the requirements of this SSHSP and the CHASP. See also Work Area Access, Section 7.1.2 of the CHASP.

2.4 Site Map and Work Zones

The location and tentative layout of the site is shown in Figure 1. The actual EZ, CRZ, and SZ locations will be based on physical layout of the site, work task requirements, and current meteorological conditions.

3.0 SITE ACTIVITIES

Site activities conducted by E/A&H will include the collection of soil samples as described in the VCAWP. Field work is described in the Comprehensive RFI Work Plan.

4.0 CHEMICAL HAZARDS

Site history show a potential for exposure to various chemical contaminants. Table 4-1 lists exposure guidelines for potential site chemicals.

**Table 4-1
 Exposure Guidelines For Expected Site Chemical Hazards**

Chemical Name	Odor ^(a) Threshold (ppm)	OSHA PEL ^(b) (ppm)	ACGIH TLV ^(c) (ppm)	NIOSH REL ^(d) (ppm)	Action Level ^(e) (ppm)	Flammable Range ^(f) (% by Volume)
Toluene	40	100 150 STEL	50	100 150 STEL	25	1.1 to 7.1%
Ethylbenzene	140	100 125 STEL	100 125 STEL	N.A.	50	1.0 to 6.7%
Benzene	4.68	1 5 STEL	0.1 Confirmed Human Carc.	0.1 1 STEL Potential Occupational Carcinogen	0.05	1.3 to 7.1%
Xylene	Not Listed	100 150 STEL	100 150 STEL	100 150 STEL	50	1.0 to 7.0%
Arsenic	Not Listed	0.010 mg/m ³	0.001 mg/m ³	0.002 mg/m ³	0.0005 mg/m ³	Not Listed
Cadmium	Not Listed	0.005 mg/m ³	0.002 mg/m ³	0.002 mg/m ³ Potential Occupational Carcinogen	0.001 mg/m ³	Not Listed
Chromium	Not Listed	0.1 mg/m ³	0.001 mg/m ³	0.5 mg/m ³	0.05 mg/m ³	Not Listed
Lead	Not Listed	0.050 mg/m ³	0.100 mg/m ³	0.15 mg/m ³	0.025 mg/m ³	Not Listed

**Table 4-1
 Exposure Guidelines For Expected Site Chemical Hazards**

Chemical Name	Odor ^(a) Threshold (ppm)	OSHA PEL ^(b) (ppm)	ACGIH TLV ^(c) (ppm)	NIOSH REL ^(d) (ppm)	Action Level ^(e) (ppm)	Flammable Range ^(f) (% by Volume)
Diesel Fuel	Not Listed	Not Listed	Not Listed	Not Listed	Not Listed	Not Listed

Notes:

- a = Odor Thresholds for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association, 1989, Range of All Reference Values
 - b = 29 CFR 1910.1000, Table Z-1-A. Limits For Air Contaminants, as amended through 1/15/91. (PEL = Permissible Exposure Limit)
 - c = 1990 - 1991 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference for Governmental Industrial Hygienist. (STEL = Short Term Exposure Limit)
 - d = NIOSH Pocket Guide to Chemical Hazards, June 1990. (REL = Recommended Exposure Limit)
 - e = Action Levels set at %50 of the lowest exposure limit for that compound.
 - f = Flamability Range presented as lower explosive limit (LEL) to upper explosive limit (UEL)
- N.A. = Substance information not available, or substance unlisted.
 NIOSH = National Institute of Occupational Safety and Health.

Material Safety Data Sheets (MSDS) for these materials are located in the NSA Memphis Field Trailer.

5.0 OPERATIONS AND PHYSICAL HAZARDS

Physical hazards typically encountered during environmental investigations will be present at this site. These hazards include heat-related illnesses, cold-related illnesses, uneven terrain, slippery surfaces, waterborne operations, lifting, and use of heavy equipment. The Site Supervisor and Site Health and Safety Officer shall be aware of the potential for heat stress and other weather-related illnesses, and as necessary, implement appropriate work regimens to minimize the likelihood of field personnel becoming ill.

Heavy equipment operations will be conducted in accordance with the procedures outlined in the CHASP, Attachment B. When conducting operations or survey work on foot, personnel will walk at all times. Running greatly increases the probability of slipping, tripping, and falling.

Biological Hazards

If working in areas supporting habitat for poisonous snakes, personnel should wear protective chaps made of a heavy material designed to prevent snake bites to the legs. As previously stated, the site is heavily vegetated, with some poison ivy observed. Personnel should take the necessary precautions and avoid these areas if possible. Also during previous site visits, bees were observed in and around the empty drums. Personnel should also take the necessary precautions and avoid disturbing these areas. Any personnel that is acutely allergic to bee stings shall bring this information to the attention of the Site Health and Safety Officer and the Site Manager.

6.0 EMPLOYEE PROTECTION

Employee protection for this project includes standard safe work practices, NSA Memphis rules of conduct, personal protective equipment (PPE), personal decontamination procedures, and equipment for extreme weather conditions, work limitations, and exposure evaluation.

6.1 Standard Safe Work Practices

See Section 7.5.1 of the CHASP for Standard Safe Work Practices.

6.2 NSA Memphis General Rules of Conduct

See Section 7.5.2 of the CHASP for NSA Memphis General Rules of Conduct.

6.3 Selection of Personal Protective Equipment

It is important that PPE be appropriate to protect against the potential or known hazards at each cleanup or investigation site. Protective equipment will be selected based on the types, concentrations, and routes of personal exposure that may be encountered. In situations where the types of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the PPE required, based on past experiences and sound safety practices.

The Project Health and Safety Officer will determine the appropriate level of PPE prior to the initial site entry based on the best available information. PPE requirements are subject to change as site information is updated or changes. **The decision to upgrade or downgrade levels of PPE shall be made by the Project Health and Safety Officer.**

Field activities which disturb soils will be initiated in modified Level D protection except when stated otherwise in the SSHSP or when site conditions (e.g., sampling results from previous studies) indicate that modified Level D is inappropriate. Modified Level D protection consists of a hard hat, appropriate chemical-resistant gloves (vinyl or nitrile), eye protection, and chemical-resistant, steel-toed and shank boots. Work coveralls (full length sleeves and pants) will be worn if free product or contaminants identified as skin irritants are encountered. This level of protection was selected because the concentrations of contaminants detected in previous the studies were low and free product was not detected.

PPE upgrades to Level C will be initiated if airborne concentrations exceed 2 ppm above the background concentration in the breathing zone or if the concentration of any contaminant exceeds 50 percent of the OSHA Permissible Exposure Limit (PEL). See Table 7-1 in the Comprehensive Health and Safety Plan for the specific criteria for use and equipment for each level of protection.

6.4 Air Monitoring

Investigations at similar sites indicate that workers may potentially be exposed to low concentrations of chemicals including VOCs, halogenated compounds, and combustible gases/vapors. Air monitoring using a photoionization detector (PID) and/or other appropriate sampling equipment will be conducted prior to beginning field activities at a new EZ and during ground-disturbing activities. The PID will be field calibrated to measure VOCs relative to a 100 ppm isobutylene standard.

A combustible gas indicator (CGI) will be used during all excavation activities. The CGI will be field calibrated to measure flammable gases relative to a 23 percent lower explosive limit (LEL) methane standard. Downhole CGI readings will be collected continuously during all soil disturbing operations. Field activities will immediately cease if downhole readings exceed 10 percent LEL. If CGI readings do not subside, a careful investigation and mapping of the area will be made. Operations may not proceed until readings are below 10 percent LEL. The area will be immediately evacuated and the situation re-evaluated to determine how to proceed.

If breathing zone levels exceed 2 ppm above background or site conditions indicate that additional health and safety precautions are needed, field activities in the area shall stop. Field staff shall notify the Site Supervisor of the situation and he/she shall contact both the Project Manager and the Project Health and Safety Officer. The Project Health and Safety Officer will be responsible for reassessing the hazards and prescribing revised health and safety requirements as necessary, including upgraded PPE requirements, revised work schedules, and revised decontamination procedures. (Typically, PPE will be upgraded to Level C assuming that cartridge respirators are appropriate, otherwise Level B.) See Table 6-1 for specific criteria for each protection level. Work shall not proceed until breathing zone levels return to background levels and it is reasonably anticipated that breathing zone samples will stay approximately at background levels, or the chemical constituent(s) are identified and appropriate PPE is donned.

On a daily basis, PIDs, CGIs, and other monitoring equipment shall be calibrated or their proper function verified before being used. Throughout the day this equipment shall be periodically checked to ensure that it is working properly. A final calibration shall be conducted at the end of the work day, at which time each instrument will be checked to ensure that it is free from surface contamination. Field staff shall note in their field notebooks that they conducted these calibrations and checks and note whether the equipment was or was not functioning properly. When equipment is not functioning properly it should be brought to the attention of the Site Supervisor or Site Health and Safety Officer who will arrange for repairs and/or replacement of that equipment as needed.

6.5 Procedures and Equipment for Extreme Hot or Cold Weather Conditions

See CHASP Section 7.5.5.

Severe Weather Conditions

All field work shall immediately cease at the first sign of thunder or lightning. Field personnel shall perform emergency personal and equipment decontamination (see Section 6.6) and seek immediate shelter.

6.6 Personal Decontamination

See Section 7.5.6 of the CHASP for information on Personal Decontamination.

6.6.1 Personal Decontamination Procedures

See Section 7.5.6.1 of the CHASP for information on Personal Decontamination Procedures. All wastes (soil and water) generated during personal decontamination will be collected in 55-gallon drums. The drums will be labeled by E/A&H personnel for later disposal.

6.6.2 Closure of the Personal Decontamination Station

All disposable clothing and plastic sheeting used during site activities will be double-bagged and disposed of in a labeled refuse container. Decontamination and rinse solutions will be placed in a labeled 55-gallon drum for later analysis and disposal. All washtubs, pails, buckets, etc. will be washed, rinsed, and dried at the end of each workday.

6.7 Work Limitations

All site activities will be conducted during daylight hours only. All personnel scheduled for these activities will have completed initial health and safety training and actual field training as specified in 29 CFR 1910.120(e). All supervisors must complete an additional 8 hours of training in site management. All personnel must complete an 8-hour refresher training course on an annual basis in order to continue working at the site.

6.8 Exposure Evaluation

See Section 7.5.8 of the CHASP for information on Exposure Evaluation.

7.0 MEDICAL MONITORING PROGRAM

See CHASP Section 7.6.

8.0 AUTHORIZED PERSONNEL

Personnel anticipated to be onsite at various times during site activities include:

- Principal-In-Charge — Dr. James Speakman (E/A&H)
- Task Order Manager/Project Manager — Mr. Lawson Anderson (E/A&H)
- Project Health & Safety Officer — Mr. Doug Petty (E/A&H)
- Field Environmental Scientist — Mr. Robert Smith (E/A&H)
- Engineer-in-Charge — Mr. Mark Taylor (SOUTHDIV)
- Naval Support Activity Memphis, Tennessee Site Contact — Ms. Tonya Barker

8.1 Responsibilities of Site Supervisor

See Section 7.7.1 of the CHASP for Responsibilities of the Site Supervisor.

8.2 Responsibilities of Site Health and Safety Officer

See Section 7.7.2 of the CHASP for Responsibilities of Site Health and Safety Officer.

8.3 Responsibilities of Onsite Field Staff

See Section 7.7.3 of the CHASP for Responsibilities of Onsite Field Staff.

9.0 EMERGENCY INFORMATION

All hazardous waste site activities present a potential risk to onsite personnel. During routine operations risk is minimized by establishing good work practices, staying alert, and using proper PPE. Unpredictable events such as physical injury, chemical exposure, or fire may occur and must be anticipated.

If any situation or unplanned occurrence requires outside or support service, Tonya Barker, NSA Memphis Site Contact, will be informed and the appropriate contact from the following list will be made:

Contact	Agency or Organization	Telephone
Tonya Barker	NSA Memphis	(901) 873-5461/5462
Mark Taylor	SOUTHDIV EIC	(803) 743-0573
Law Enforcement	NSA Memphis Base Security	9-911
Fire Department	NSA Memphis	9-911

Ambulance Service	Naval Hospital, Millington Navy Road	(901) 873-5801/5802 or 9-911
Hospital	Methodist North Hospital 3960 Covington Pike	(901) 372-5211 or 9-911
Southern Poison Control Center	—	(901) 528-6048
Lawson Anderson	EnSafe/Allen & Hoshall	(901) 372-7962
Doug Petty	EnSafe/Allen & Hoshall	(901) 372-7962

Mark Taylor, SOUTHDIV Engineer-in-Charge (EIC) will be contacted after appropriate emergency measures have been initiated onsite.

9.1 Site Resources

Cellular telephones may be used for emergency use and communication/coordination with NSA Memphis. First aid and eye wash equipment will be available at the work area.

9.2 Emergency Procedures

Conditions which may constitute an emergency include any member of the field crew being involved in an accident or experiencing any adverse effects or symptoms of exposure while onsite or if a condition is discovered that suggests the existence of a situation more hazardous than anticipated.

The following emergency procedures should be followed:

- Site work area entrance and exit routes will be planned and emergency escape routes delineated by the Site Health and Safety Officer. Copies of the emergency contacts and routes will be posted onsite.

- If any member of the field team experiences any effects or symptoms of exposure while on the scene, the entire field crew will immediately stop work and act according to the instructions provided by the Site Health and Safety Officer.

- For applicable site activities, wind indicators visible to all onsite personnel will be provided by the Site Health and Safety Officer to indicate possible routes for upwind escape.

- The discovery of any conditions that would suggest the existence of a situation more hazardous than anticipated will result in the suspension of work until the Site Health and Safety Officer has evaluated the situation and provided the appropriate instructions to the field team.

- If an accident occurs, the Field Project Manager is to complete an Accident Report Form (See Attachment C of CHASP) for submittal to the managing principal-in-charge of the project.

- If a member of the field crew suffers a personal injury, the Site Health and Safety Officer will call (901) 372-5211 or 9-911 (serious injury) to alert appropriate emergency response agencies or administer onsite first aid (minor injury) as the situation dictates. An Accident Report Form will be completed for any such incident.

- If a member of the field crew suffers chemical exposure, the affected areas should be flushed immediately with copious amounts of clean water, and if the situation dictates, the Site Health and Safety Officer should alert appropriate emergency response agencies, or personally ensure that the exposed individual is transported to the nearest medical treatment facility for prompt treatment. (See Attachment A for map to the emergency medical facility.) An Accident Report Form will be completed for any such incident.

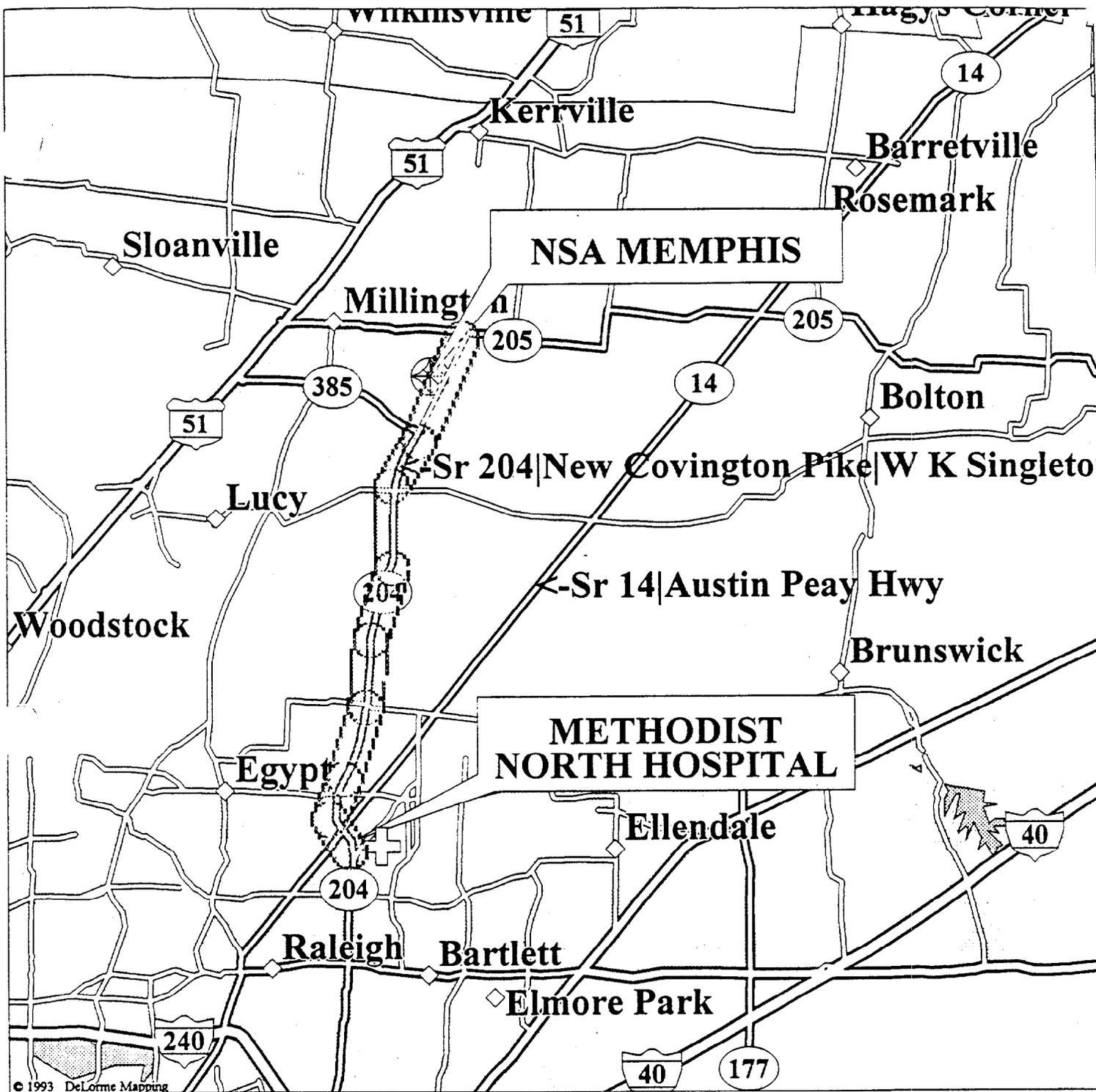
Additional information on appropriate chemical exposure treatment methods will be provided through MSDS, which are in the NSA Memphis Field Trailer.

Additional information on appropriate chemical exposure treatment methods will be provided through Material Safety Data Sheets (MSDS), which are located in the NSA Memphis Field Trailer.

10.0 FORMS

See Attachment C of the CHASP for Health and Safety Forms

Attachment A
Map to Hospital



© 1993 DeLorme Mapping

LEGEND

- Population Center
- State Route
- ◇ Town, Small City
- ⬮ Interstate, Turnpike
- ⌚ US Highway
- - - County Boundary
- Major Street/Road
- State Route
- Interstate Highway
- US Highway
- ▨ Open Water

Scale 1:125,000 (at center)

2 Miles

2 KM

ROUTE TO METHODIST NORTH HOSPITAL

Mag 11.00

Tue Feb 27 12:34:43 1996