N00639.AR.001825
NSA MID SOUTH
5090.3a

ADDENDUM 2 TO WORK PLAN FOR UNDERGROUND STORAGE TANK REMOVAL
MILLINGTON SUPPACT TN
12/1/1997
MORRISON KNUDESEN CORPORATION

ADDENDUM #2
To
Work Plan
For
Underground Storage Tank Removal

NAVAL SUPPORT ACTIVITY, MEMPHIS
MILLINGTON, TENNESSEE

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Contract #N62467-93-D-1106
Delivery Order #0030
Statement of Work #039

December, 1997

Revision #0

ADDENDUM #2
To
Work Plan
For
Underground Storage Tank Removal

NAVAL SUPPORT ACTIVITY, MEMPHIS
MILLINGTON, TENNESSEE

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Contract #N62467-93-D-1106
Delivery Order #0030
Statement of Work #039

December, 1997

Revision #0

ADDENDUM #2
TO
WORK PLAN

UNDERGROUND STORAGE TANK REMOVAL

NAVAL SUPPORT ACTIVITY, MEMPHIS
MILLINGTON, TENNESSEE

Revision #0

December 4, 1997

CONTRACT N62467-93-D-1106
DELIVERY ORDER #0030
STATEMENT OF WORK #039

Prepared for

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Prepared by:

MORRISON KNUDSEN CORPORATION
2420 Mall Drive
Corporate Square 1 - Suite 211
North Charleston, South Carolina 29406

PREPARED/APPROVED BY:

Jeffrey D. Kyser
MK Project Engineer — Date: 12/4/97

APPROVALS:

Robert E. Hlavacek
MK Program Manager — Date: 12-5-97

CLIENT ACCEPTANCE:

U. S. Navy Responsible Authority — Date: 12-15-97

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

ACRONYMS

AHA	Activity Hazard Analysis
CAA	Clean Air Act
CGI	combustible gas indicator
CLEAN	Comprehensive Long-Term Environmental Action Navy
DSCFM	Dry Standard Cubic Feet Per Minute
DFOW	definable feature of work
E/A & H	EnSafe/Allen & Hoshall
°F	degrees Fahrenheit
ft/s	feet per second
FID	flame ionization detector
HAZWOPER	hazardous waste operations and emergency response
in/Hg	inches of mercury
lbs	pounds
LEL	lower explosive limit
MEME	Mobile Enhanced Multi-phase Extraction
MK	Morrison Knudsen Corporation
NSA	Naval Support Activity
OSHA	Occupational Safety and Health Administration
POD	Plan of the Day
PPE	personal protective equipment
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
SSHP	Site Safety and Health Plan
TDEC	Tennessee Department of Environment and Conservation
TGD	Tennessee Guidance Document
TPH/DRO	Total Petroleum Hydrocarbons for Diesel Range Organics
UST	underground storage tank

1.0
INTRODUCTION

1.1 BACKGROUND

This Work Plan Addendum has been prepared by Morrison Knudsen Corporation (MK) for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) under contract number N62467-93-D-1106, Delivery Order 0030, Statement of Work 039 for work at Naval Support Activity Memphis, in Millington, Tennessee. This Addendum is a supplement to the *Work Plan,* Naval Support Activity (NSA) Memphis, Millington, Tennessee [MK, 1997] to address the additional work under this delivery order, the performance of two Mobile Enhanced Multi-phase Extraction (MEME) events. A MEME event can be defined as applying high pressure suction to a ground water monitoring or recovery well to reduce the levels of dissolved petroleum constituents in the ground water and soil. Any statements made in this addendum will complement the requirements specified in the *Work Plan.*

1.2 OBJECTIVES

MK completed all of the objectives associated with the removal of Underground Storage Tanks (USTs) 304 and 1239 on August 1, 1997. Details of the UST removal are included in the *Completion Report*, NSA Memphis, Millington, Tennessee [MK, 1997]. Approximately one month after completion of the work, EnSafe, Allen and Hoshall (E/A & H), the Comprehensive Long-Term Environmental Action Navy (CLEAN) contractor, performed ground water sampling utilizing the monitoring wells surrounding the UST removal area and in the new recovery well (RW-1) installed by MK after the UST removal. Analytical results of the samples showed that RW-1 ground water contained 1.5 parts per million (ppm) Total Petroleum Hydrocarbons for Diesel Range Organics (TPH/DRO) and Monitoring Well #5 (N-MW-5) contained 19.7 ppm TPH/DRO. Both of these values exceed the Tennessee Department of Environment and Conservation (TDEC) Division of UST's cleanup levels of 1.0 ppm TPH/DRO for ground water specified in the *Corrective Action Plan Addendum,* NSA Memphis, Millington, Tennessee [E/A &H, 1996].

Following the discovery of ground water above TPH/DRO cleanup levels in the two wells, SOUTHNAVFACENGCOM has tasked MK with performing two MEME events. The objective of each MEME event will be to reduce the levels of dissolved petroleum constituents specifically in the ground water, but in the soil as well.

The scope of work includes the following work elements:

- Provide notification of each MEME event to the TDEC Division of USTs
- Perform the MEME events in accordance with applicable TDEC standards
- Dispose of removed ground water via the sanitary sewer
- Complete and submit MEME report requirements to TDEC Division of USTs within 20 days of each event

1.3 SITE DESCRIPTION

The site was identified in the Work Plan and is shown on Figure 1-1 on the next page. Figure 1-1 shows the existing conditions after UST removal was performed and site restoration completed. The recovery and monitoring well that will be utilized for each MEME are shown in bold.

2.0
REGULATORY COMPLIANCE

2.1 ENVIRONMENTAL COMPLIANCE

Regulatory standards used as guidance in the development of the Work Plan have also been used for the development of this Addendum with particular attention to Tennessee Guidance Document (TGD) -016 of the TDEC Division of USTs *Underground Storage Tank Reference Handbook* [TDEC, 1996]. TGD-016 cites the specific requirements for the performance of a MEME event.

2.2 PERMITS, APPLICATIONS AND NOTIFICATIONS

All MK correspondence to regulatory agencies will be submitted to NSA Memphis Public Works Department, Environmental Division for review. NSA Memphis will then forward the material to the appropriate regulatory body as required per regulatory criteria. Regulatory aspects new to this Addendum are discussed below.

2.2.1 Certifications and Permits

2.2.1.1 Ground water Discharge

A formal discharge permit application for authorization to discharge generated ground water is not required by the City of Millington Sewer Department. Instead, discharge requests are typically handled on a case by case basis. In this situation however, MK will request to discharge generated ground water without a case by case request to the Sewer Department based on the analytical data obtained during the CLEAN contractor's sampling event discussed in Section 1.2. MK will develop this request and submit it to NSA Memphis to forward to the Sewer Department. No discharge will be made without the approval of the Millington Sewer Department.

2.2.1.2 Clean Air Act

No portions of the Clean Air Act (CAA) are applicable in this type of operation.

2.2.2 Notifications

2.2.2.1 Application and Cost Proposal to Perform MEME

Per TGD-016, MK will prepare an application and cost proposal to perform a MEME and submit to NSA Memphis two weeks prior to the MEME event. NSA Memphis is to forward the material to the Division of USTs office no later than 24 hours prior to the MEME event. Both submittals will follow the format provided in TGD-016. The second MEME event will require an additional application and cost proposal to be prepared and submitted which may be submitted with the first MEME event's information if time permits.

2.3 REPORTING

During each MEME event, a Field Monitoring Log will be completed in a manner consistent with TGD-016. The format of the Field Monitoring Log will follow the example given in TGD-016. A sample of the Field Monitoring Log is included as Attachment A to this Addendum. Upon completion of each MEME, MK will prepare a cover sheet summarizing the event and submit to NSA Memphis along with the completed MEME Field Monitoring Log. The summary will include an explanation of the disposition of extracted ground water. The cover sheet and Field Monitoring Log will be submitted to NSA Memphis within 15 days of the completed event, so that NSA Memphis can forward the material to the Division of USTs within 20 days of the completed event.

3.0
PROJECT EXECUTION

This section describes the work approach that will be employed during the performance of each MEME and ground water disposal.

3.1 DEFINABLE FEATURES OF WORK

Definable features of work (DFOWs) and the Three Phases of Control will be used to maintain quality control over the work described in this addendum. The DFOWs shown below and described in the following sections are the basic elements associated with the work:

- Perform MEME
- Dispose of Generated Ground water
- Reporting

3.1.1 Perform MEME

MK will mobilize to the site and measure and record the ground water levels in the surrounding monitoring wells, N-MW-1, N-MW-2, N-MW-3, N-MW-4, N-MW-5, N-MW-6 and RW-1, prior to beginning the MEME (See Figure 1-1). The first MEME will then be performed on wells N-MW-5 and RW-1 simultaneously. The MEME will be performed using a KING-VAC type truck (vacuum pressure up to 28 inches of mercury and flow rates up to 3,000 cubic feet per minute) or equivalent. Each MEME event will last approximately eight hours. Immediately after each MEME event is completed, the ground water levels in the surrounding monitoring wells will be re-measured and recorded.

During the event, N-MW-5 and RW-1 will be monitored for parameters included in Table 3-1 at fifteen minute intervals for the first two hours of the event and thirty minute intervals thereafter. Additionally, the emission readings from the outlet (stack) of the truck will be monitored using a flame ionization detector (FID) or equivalent instrument. These items will be recorded on the Field Monitoring Log shown in Attachment A. The Field Monitoring Log includes the instrumentation and method requirements to obtain values of the necessary monitoring parameters.

TABLE 3-1
REQUIRED MONITORING PARAMETERS

Parameter	Units
Vacuum Pressure	Inches of Mercury (in/Hg)
Air Flow Velocity	Feet Per Second (ft/sec)
Total Flow	Dry Standard Cubic Feet Per Minute (DSCFM)
Temperature of Stack Gas at System Outlet	Degrees Fahrenheit (°F)
Stack Emission Readings	Parts Per Million (PPM)
Carbon Removed	Pounds (lbs)

3.1.2 Disposal of Generated Ground Water

Once the vacuum truck becomes full of ground water, the MEME process will temporarily stop to off-load the truck. The truck will be moved to the oil/water separator, approximately 300 feet away, and the ground water will be discharged to the sanitary sewer via the oil/water separator. The oil/water separator will be used to process the water before it is released to the sanitary sewer. Ground water will not be discharged until approval is received from the Millington Sewer Department.

3.1.3 Reporting

Once the MEME event is completed, a report will be developed that will follow the guidelines discussed in Section 2.3.

3.2 QUALITY CONTROL

The Site QC Supervisor will monitor the work through the performance of the Three Phases of Control process. Preparatory, Initial, and Follow-up inspections will be performed on each Definable Feature of Work using the criteria stated in this Addendum. The results of these inspections will be documented on the combined Contractor Daily Production/Quality Control Report. Field Inspection Checklist ME-01 has been included as Attachment B to this Addendum to address quality issues involved with the MEME events.

4.0
HEALTH AND SAFETY

Where applicable, the requirements of the Site Safety and Health Plan (SSHP) included in Appendix A of the Work Plan will be followed during work execution. Additional Activity Hazard Analysis (AHA) worksheets for activities associated with the work described in this addendum have been generated and are attached.

The use of a truck equipped with high vacuum, high flow pump and self contained storage tank to conduct vacuum-enhanced extraction on monitoring and extraction wells presents minimal health and safety risks however precautions are necessary. Personnel are required to be hazardous waste operations and emergency response (HAZWOPER) trained. Level D personal protective equipment (PPE) is anticipated for the majority of the work tasks with the addition of chemical resistant gloves (e.g. nitrile) when direct contact with product or product contaminated ground water is possible (e.g. manual hose connecting).

Total organic monitoring using a portable FID instrument will be conducted. Levels will be measured in the exhaust stack and general work area for characterization purposes. In addition, a Combustible Gas Indicator (CGI) will be used to measure percent Lower Explosive Limit (LEL) in the general work area as a safeguard for warning of potential explosive atmospheres. Action levels will follow the guidance presented in Table 6-2 of the original SSHP document.

Prior to operation, the vacuum truck tank will be checked to insure it is clean and contains no residues which could be potentially reactive with fuel oils. Where appropriate, all temporary equipment connections (vacuum suction and discharge hoses) from the vacuum truck will be electrically bonded and grounded. Where necessary, roadways and walkways will be barricaded or posted to control pedestrian and vehicle traffic near the work zones. No ignition sources will be permitted in the immediate work area. A 10-lb multi-purpose ABC dry chemical fire extinguisher will be maintained in the work area.

During operation, precautions include placement of the vacuum truck so that flammable vapors will not reach the internal-combustion engine. The vacuum truck exhaust vapors will be discharged through a hose of adequate size and length downwind of the truck and away from any well connection, building ventilation intake or other sources of ignition.

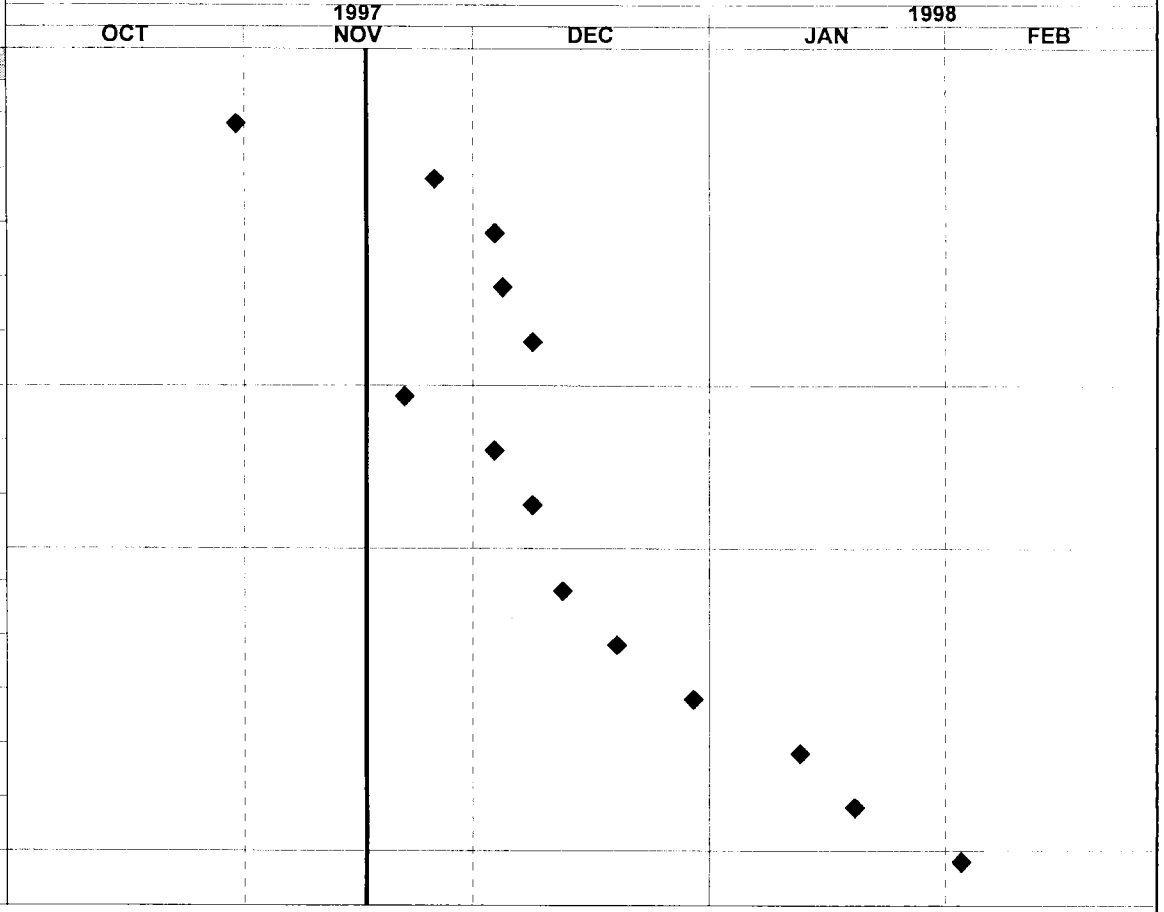
ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Mobilization and Hookups		Analyzed By/Date: Frank J. Petrik 10/24/97	Reviewed By/Date: 11/18/97
1.0 Principal Steps	**Potential Hazards**	**Recommended Controls**	
1.1 Walk area down, establish work zones, connect vacuum truck to monitoring and extraction wells.	Struck-by and struck against physical objects.	Preplan work layout, establish emergency plan and post emergency phone numbers. Use correct hand tools and good housekeeping practices.	
	Explosion/fire caused by static sparks or ignition source.	Verify if potential reactive vacuum tank residues are present. Ground and bond all connections. Provide air monitoring around the work area. Insure safe vapor discharge path.	
	Chemical exposure by direct contact with fuel residues.	Level D PPE expected, add chemical resistant where direct contact with residual product is possible. Monitor work areas with FID and if necessary CGI.	
1.2 Equipment to be Used	**Inspection Requirements**	**Training Requirements**	
1.3 Hand tools and vacuum truck.	Daily, prior to use per manufacturers recommendation.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory, 8 hour refresher, Safety and Health Project Kickoff, POD, OSHA Hazard Communication and Vacuum Truck operator's training.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Vacuuming and Waste Management		Analyzed By/Date: Frank J. Petrik 10/24/97	Reviewed By/Date: William Pierson 11/18/97
2.0 Principal Steps	**Potential Hazards**	**Recommended Controls**	
2.1 Vacuum wells, discharge liquids to onsite oil/water separator.	Struck-by and struck against physical objects.	Master brake set on truck and wheel chocked. Work zone barricaded or posted as determined to be appropriate.	
	Explosion/fire caused by static sparks or ignition source.	Ground and bond all connections. Provide air monitoring around the work area. Insure safe vapor discharge path. Ignition sources in workplace eliminated.	
	Chemical exposure by direct contact with fuel residues.	Level D PPE expected, add chemical resistant where direct contact with residual product is possible. Monitor work areas with FID and if necessary CGI.	
2.2 Equipment to be Used	**Inspection Requirements**	**Training Requirements**	
2.3 Vacuum truck and hand tools.	Daily, prior to use per manufacturers recommendation.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour refresher, Safety and Health Project Kickoff, POD, OSHA Hazard Communication and Vacuum Truck operator's training.	

5.0
SCHEDULE

The first MEME event is expected to be performed in December 1997. After the first MEME event is completed, a period of two weeks will be allowed to pass for the wells to recharge. Then, the second MEME event will be performed.

Activity ID	Activity Description	Orig Dur	%	Early Start	Early Finish
DO#0030 NSA MEMPHIS, TENNESSEE					
SOW#039, Phase 20					
CN2210	MEME - Receive Technical Directive	0	100		30OCT97A
CN2215	MEME - Issue Work Plan Addendum for Navy Review	0	0		25NOV97
CN2220	MEME - Receive Navy Comments on WP Addendum	0	0		03DEC97
CN2225	MEME - Incorp. Comments & Issue WP Add.for Appr.	0	0		04DEC97
CN2230	MEME - Receive Navy Approval of WP Addendum	0	0		08DEC97
CN2250	MEME - Issue RFP	0	0		21NOV97
CN2255	MEME - Receive Bids	0	0		03DEC97
CN2260	MEME - Award Subcontract for Added Scope	0	0		08DEC97
SOW#039, Phase 30					
CN4010	MEME - Prepare Notifications & Submit to NSA	0	0		12DEC97
CN4015	MEME - NSA Submits Notifications to State	0	0		19DEC97
CN4020	MEME - Perform MEME	0	0		29DEC97
CN4022	MEME - Perform 2nd MEME	0	0		12JAN98
CN4025	MEME - Submit MEME Report to State	0	0		19JAN98
CN4027	MEME - Submit 2nd MEME Report to State	0	0		02FEB98



Project Start 01MAR94
Project Finish 02FEB98
Data Date 17NOV97
Plot Date 14NOV97

Early Bar
Progress Bar
Critical Activity

MEM3

SOUTHDIV ERAC PROGRAM - WO# 4324
NSA MEMPHIS, TENNESSEE
MEME MILESTONES

Sheet 1 of 1

MORRISON KNUDSEN CORPORATION

Date	Revision	Checked	Approved

6.0
REFERENCES

MK, 1997. *Work Plan, Underground Storage Tank Removal,* Naval Support Activity Memphis, Millington, Tennessee. Prepared by Morrison Knudsen Corporation, Rev. 0, March 17, 1997.

MK, 1997. *Completion Report, Underground Storage Tank Removal,* Naval Support Activity Memphis, Millington, Tennessee. Prepared by Morrison Knudsen Corporation, Final Draft, October 21, 1997.

TDEC, 1996. *Underground Storage Tank Reference Handbook*, Prepared by Tennessee Department of Environment and Conservation Division of Underground Storage Tanks, July, 1996.

E/A &H, 1996. *Corrective Action Plan Addendum, Registered Tanks 7, 303, 1241 (Facility ID 0-791709) and Nonregistered Tanks 304 and 1239,* Naval Support Activity Memphis, Millington, TN. Prepared by EnSafe/Allen & Hoshall, October, 1996.

ATTACHMENT A
FIELD MONITORING LOG

Attachment A

Measurements recorded on the attached MEME Field Monitoring Log shall be taken every fifteen (15) minutes for the first two (2) hours, and every thirty (30) minutes thereafter. Field monitoring associated with TGD-016 shall include the following parameters:

1. Event date
2. Event number
3. Facility Name
4. Facility address
5. UST Facility ID number
6. Consultant name
7. Monitoring interval time
8. Extraction well number(s)
9. Vacuum measurements in inches of mercury for each extraction well per time interval
10. Air flow velocity in feet per second at system outlet (stack) per time interval
11. Total flow reported as Dry Standand Cubic Feet per Minute. **(See EQUATIONS)**
12. Temperature of stack gas at system outlet (stack) per time interval
13. Stack emission readings in parts per million (PPMv) per time interval
14. Pounds of carbon, removed per time interval **(See EQUATIONS)**
15. Monitoring well number
16. Depth to water (DTW) before the event
17. Depth to product (DTP) before the event
18. Product thickness, in feet, before the event
19. Depth to water (DTW) after the event
20. Depth to product (DTP) after the event
21. Product thickness, in feet, after the event
22. Comments
23. Personnel onsite during the MEME event
24. Stack Diameter (Inside Diameter)
25 Type of calibration gas used
26. Total gallons of water removed during the event
27. Cumulative gallons of water removed to date
28. Total pounds of carbon removed during this event
29. Cumlative pounds of carbon removed to date
30. Total time of event

Periodic adjustments shall be made to insure maximum recovery of hydrocarbons. Any changes or adjustments performed in the field during the MEME event shall be documented in the comments section on the MEME Field Monitoring Log.

MEME FIELD MONITORING LOG

1. Date:	3. Facility Name:	5. Facility ID #:
2. Event #:	4. Facility Address:	6. Consultant:

7. Time	8. Extraction Wells	11. Vacuum (in/ Hg) At Extraction Well Head				10. Velocity in Feet per Second	11. Total Flow as DSCFM	12. Temp. of stack gas	13. Conc. in PPMv	14. Pounds of Carbon Removed
		Well #	Well #	Well #	Well #					
								Total lbs. Removed	

	Before Event			After Event		
15. Well #	16. DTW	17. DTP	18. Prod. (ft)	19. DTW	20. DTP	21. Prod (ft)

22. Comments:	23. Personnel:
	24. Stack Diameter I.D.:
	25. Calibration Gas:
	26. Total Gal. of Water:
	27. Cum. Gal. H_20 :
	28. Total lbs. of Carbon this event. :
	29. Cum. lbs of Carbon removed:
	30. Total hours of event:

ATTACHMENT B
FIELD INSPECTION CHECKLIST

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
MEME Event	ME-01	Rev. 0	Page 1 of 1

References: Work Plan Addendum #2

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Verify that MEME application and cost proposal have been properly completed per TGD-016.			
2	Verify that completed MEME application and cost proposal have been submitted to the TDEC Division of USTs at least 24 hours prior to MEME event.			
3	Verify that City of Millington Sewer Dept. has issued written permission to NSA to discharge produced ground water to the sanitary sewer.			
4	Verify that preliminary ground water levels in MWs 1-6 and RW-1 have been measured and recorded.			
5	Verify that monitoring equipment is available to perform required intermittent monitoring.			
6	Verify that vacuum truck is capable of achieving a minimum vacuum pressure of 26 in/Hg and a flow rate of up 3000 cfm.			
7	Confirm tha t oil/water separator is in proper working condition.			
	Initial and Follow-Up Inspections			
1	Confirm that the parameters in Table 3-1 are monitored for and recorded every 15 minutes for the first two hours and every thirty minutes thereafter.			
2	Verify that all water is processed through the oil/water separator prior to discharge to the sanitary sewer.			
3	Verify that theField Inspection Checklist is properly completed as the MEME progresses.			
4	Verify that groundwater levels are measured and recorded immediately following the MEME.			

Specific Item Identification or Location, as applicable:

ADDENDUM
TO
WORK PLAN

UNDERGROUND STORAGE TANK REMOVAL

NAVAL SUPPORT ACTIVITY, MEMPHIS
MILLINGTON, TENNESSEE

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Contract #N62467-93-D-1106
Delivery Order #0030
Statement of Work #039

MAY 1997

ADDENDUM
TO
WORK PLAN

UNDERGROUND STORAGE TANK REMOVAL

NAVAL SUPPORT ACTIVITY, MEMPHIS
MILLINGTON, TENNESSEE

Revision # 0

May 2, 1997

CONTRACT N62467-93-D-1106
DELIVERY ORDER #0030
STATEMENT OF WORK #039

Prepared for

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Prepared by:

MORRISON KNUDSEN CORPORATION
2420 Mall Drive
Corporate Square 1 - Suite 211
North Charleston, South Carolina 29406

PREPARED/APPROVED BY:

Jeffrey D. Kyser
MK Project Engineer

Date: 5/9/97

APPROVALS:

Robert E. Hlavacek
MK Program Manager

Date: 5/15/97

CLIENT ACCEPTANCE:

U. S. Navy Responsible Authority

Date

1.0
INTRODUCTION

1.1 BACKGROUND

This Work Plan Addendum has been prepared by Morrison Knudsen Corporation (MK) for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) under contract number N62467-93-D-1106, Delivery Order 0030, Statement of Work 039 for work at Naval Support Activity Memphis, in Millington, Tennessee. This Addendum is a supplement to the *Work Plan,* Naval Support Activity Memphis, Millington, Tennessee [MK, 1997] to address the new contaminants, lead and asbestos, along with additional work involved with a steam line and associated manholes located on site. Any statements made in this addendum will complement the requirements specified in the *Work Plan.*

1.2 OBJECTIVES

During the bid walk for the civil work, it was discovered that the paint on the process piping involved with Tanks 304 and 1239 may contain lead. Two manholes labeled "STEAM" were also discovered that contained a non-active steam line running between them. Shortly after, the presence of lead paint on the process piping was confirmed through laboratory analysis and it was determined that there is a high confidence level that the steam lines are insulated with potential asbestos containing material (PACM). The objective of work described in this addendum is to properly address the removal of these potential hazards so that remedial activities involved with the tank removal can proceed with minimal impact to the work schedule.

The scope of work includes the following work elements:

- Remove any necessary lead paint from the process piping so that it may be temporarily stored on-site and ultimately disposed of
- Removal of water and sludge (if any) from the two manholes related to the steam line
- Removal of the steam line obstructing the tank removal activities and removal of potential asbestos from the water/sludge in the manholes so that the water/sludge may be handled as stated in the Work Plan
- Cleaning of the manholes to the necessary cleanup criteria for asbestos contamination
- Removal and/or plugging of remaining steam lines within the manholes

As these objectives are achieved, tank removal activities will continue in accordance with the Work Plan.

1.3 SITE DESCRIPTION

The process piping has been previously identified in the Work Plan and is shown again on Figure 1-1. The manholes and steam line are located beneath the concrete road, approximately 10 feet to the north of the fill coupling pits. The steam line runs east-west between the manholes and is approximately 100 feet long (Figure 1-1).

2.0
REGULATORY COMPLIANCE

2.1 ENVIRONMENTAL COMPLIANCE

The following regulatory standards have been used as guidance in the development of this Work Plan Addendum:

- Title 29, CFR Section 1926.1101 - Asbestos;
- Title 29, CFR Section 1910.134 - General Industry Standard for Respiratory Protection;
- Title 29, CFR Section 1926 - Construction Industry;
- Title 29, CFR Section 1910.2 - Access to Employee Exposure and Medical Records;
- Title 29, CFR Section 1910.1200 - Hazard Communication;
- Title 40, CFR Part 61, Subparts A and M (Revised Subpart B) - National Emission Standard for Asbestos;
- Title 40, CFR Part 745, Subpart L - Lead Based Paint Activities;
- Title 29, CFR Section 1926.62 - Lead
- T.C.A. 1200 - 1 - 7 - .01. Which defines asbestos as a special waste.

2.2 PERMITS, APPLICATIONS AND NOTIFICATIONS

All MK correspondence with regulatory agencies will be handled as stated in Section 2.2 of the Work Plan.

2.2.1 Certifications and Permits

2.2.1.1 Asbestos Abatement

All workers and supervisors involved in any asbestos abatement work will be properly certified by the State of Tennessee to perform asbestos abatement.

Due to the small amount of asbestos that is anticipated (< 100 feet) no permit is required to perform abatement, however, the Memphis-Shelby Health Department will be notified as a courtesy prior to any abatement activities. Once the steam line has been uncovered, the actual quantity of asbestos containing material (ACM) to be removed/contained will be identified. If that quantity exceeds the minimum amount requiring a permit by the Health Department, a permit will be obtained to remove/contain the ACM.

2.2.1.2 Lead Abatement

Although no permit is required to perform lead abatement on the process piping, all workers and supervisors involved in any lead abatement work will be properly certified in the State of Tennessee to perform lead abatement.

2.2.1.3 Confined Space Permit

Confined space permits for possible manhole entry will be issued at the discretion of the MK SSHO. The base fire department will be notified prior to any confined space entries.

2.3 COMPLETION/CLOSURE REPORT

Upon completion of all work described in both the Work Plan and this Addendum, both a Permanent Closure Report and a Completion Report will be completed per the manner described in Section 2.2.3.2 of the Work Plan. Work completed for the additional items detailed in this Addendum will also be included the reports.

3.0
PROJECT EXECUTION

This section describes the work approach that will be employed during the removal of the steam lines, piping and other associated work.

3.1 DEFINABLE FEATURES OF WORK

Definable features of work (DFOWs) and the Three Phases of Control will be used to maintain quality control over the work described in this addendum. The DFOWs shown below and described in the following sections are the basic elements associated with the tank removal actions:

- Lead Based Paint Removal/ Process Piping Disposal
- Water/ Sludge Removal from Manholes
- Asbestos/ Steam Line Removal
- Manhole/ Steam Line Cleaning
- Sampling and Analysis
- Waste Management

The extent of work to be performed will go as far as deemed necessary by MK to allow tank removal activities described in the Work Plan to proceed.

3.1.1 Lead Based Paint Removal/ Process Piping Disposal

All lead based paint removal will be performed in accordance with all applicable federal, state and local regulations. Removed paint residue will be properly containerized and turned over to NSA for disposal.

Currently, all process piping will be dismantled at the flanges or manually (no use of saw or torch) cut and placed on 6 mil polyethylene sheeting until a final disposition strategy for the piping is developed. In the event that the flanges contain lead based paint, engineering controls will be implemented to avoid exposure to the paint.

As the pipe is temporarily stored, MK will conduct a search for a recycler in the area that can receive the piping and properly dispose of the lead waste by-product from the recycling process. If such a recycling facility is located, the pipe will be cut into pieces that the facility can handle and shipped to the facility.

If a recycling facility with the previously mentioned capabilities cannot be located, pending a cost analysis, the piping will either be turned over to NSA to dispose of, or all paint will be removed from the piping. Piping that the paint has been removed from will be cut into pieces acceptable to a local scrap or recycling facility and shipped to that facility.

3.1.2 Water/ Sludge Removal from Manholes

Prior to any work activities involved with the steam line, any material in the manhole(s) will require removal. The manhole(s) will be pumped free of water and sludge. Water and sludge removed from the manholes will be stored separately. Any sludge removed from the manhole(s) will be properly contained and turned over to NSA. Water removed from the manholes will be sampled and analyzed for asbestos. Water that is found to contain asbestos will be processed through a filter with a maximum 5 micron opening size. After processing, the water will be handled in accordance with Section 3.2.3 of the Work Plan.

3.1.3 Asbestos/ Steam Line Removal

At a minimum, the section of the steam line that obstructs tank removal activities will be removed and disposed as construction debris. Once unearthed, it will be determined if the steam line possesses PACM. PACM will be sampled to determine if it contains asbestos. In the event that the steam line contains asbestos material, that material will be encapsulated on the pipe in accordance with all federal, state and local regulations. The asbestos and pipe will then be disposed of as stated in Section 3.1.6 of this Addendum.

3.1.4 Manhole/ Steam Line Cleaning

Pending the extent of the steam line that obstructs tank removal activities, the steam line will either be removed to the east manhole, or only as far as it is in the way, and the remaining portion will be cleaned back to the east manhole. Additionally, the two manholes will be cleaned. All cleaning will be performed using a high-pressure wash. Visual staining in the manholes will be removed to the extent possible. After the cleaning water has been removed, the manhole will be visually inspected for asbestos material. The manhole will be cleaned until all visual asbestos has been removed. Water from the cleaning procedure will be collected and handled in the same manner as water pumped from the manholes prior to cleaning.

If portions of the steam line are left in place, the line will be plugged at both ends with a non shrink grout or equivalent material. A plug will be installed at the east manhole and west extent of the remaining line.

3.1.5 Sampling and Analysis

All lead and asbestos sampling will be performed in accordance with federal, state and local regulations. Analyses for asbestos constituents will be performed by a Navy approved lab. Any other required sampling will be consistent with the procedures described in Section 3.2.6 of the Work Plan.

3.1.6 Waste Management

Generated wastes will be handled, stored, and disposed of in accordance with Appendix D of the *Work Plan*. Asbestos will be handled as a special waste as per Tennessee regulations and will be disposed at a landfill designated to accept asbestos, using TN waste manifests declaring asbestos. Lead based paint will be handled as a hazardous waste, covered in appendix D of the *Work Plan*.

3.2 QUALITY CONTROL

The Site QC Supervisor will monitor the work through the performance of the Three Phases of Control process. Preparatory, Initial, and Follow-up inspections will be performed on each Definable Feature of Work using the criteria stated in this Addendum. The results of these inspections will be documented on the combined Contractor Daily Production/Quality Control Report.

4.0
HEALTH AND SAFETY

Work will be completed in accordance with the Appendix A, Site Safety and Health Plan (SSHP) of the Work Plan. Additional requirements for lead and asbestos work are described in the following paragraphs.

The MK SSHO will include identification of lead and asbestos hazards in the site specific training. MK's Subcontractor will provide a designated competent person in lead and competent person in asbestos per OSHA 1926.62 and 1926.1101 respectively to oversee all work tasks involving lead containing paint coatings and presumed ACMs.

4.1 ACTIVITIES HAZARD ANALYSES (AHAs)

4.1.1 Lead Based Paint

If the process piping can be disconnected and removed without disturbing the paint coating, the tasks will be completed in Level D Personal Protective Equipment (PPE) requiring no interim protection as defined in OSHA 1926.62 (d)(2)(v). If paint coatings surround flanges where the pipe connections are located, the MK Subcontractor will implement engineering controls to avoid exposure to the paint prior to unbolting and disconnecting flanges. The same will also apply to any lengths of pipe that will be manually (without using a saw or torch) cut into manageable pieces. Once the disposal method of the process piping has been determined, stripping of the paint from the pipe may be necessary. Prior to using any paint stripper, the material safety data sheets will be reviewed by the MK SSHO and any special controls including PPE will be established. Waste material will be stored in a designated container and labeled per hazard communication requirements. A revised AHA worksheet is attached to this section.

4.1.2 Manhole Cleaning and Presumed Asbestos Containing Material Removal

Manholes will be tested for flammable atmospheric conditions prior to initiating any tasks and vented if required. Personnel entry into the manhole will be treated as permit required confined space unless downgraded to alternate entry by the MK SSHO. Open manholes will be properly guarded per OSHA 29 CFR 1926 Subpart M. Waste waters and sludge removed from the manhole will be labeled per hazard communication requirements and temporarily stored for final disposition by the Navy. Water and sludge removal will be completed in modified Level D PPE. If PACM is identified on the steam pipes and removal is required, the removal will be completed in accordance with 29 CFR 1926.1101. The removal work will be classified by the Competent Person in Asbestos with concurrence by the MK SSHO. ACM removals will be completed in appropriate respiratory protection as defined in 29 CFR 1926.1101. The Subcontractor shall provide his own exposure assessments and a copy of the monitoring results will be provided to the MK SSHO. High pressure washing of the manholes will be completed in Level C PPE. A new AHA worksheet has been prepared and is attached to this section.

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: General Line Breaking/Disconnecting and Draining		Analyzed By/Date: Frank J. Petrik 10/8/96, revised 5/2/97	Reviewed By/Date:
4.0 Principal Steps	**Potential Hazards**	**Recommended Controls**	
4.1 Break line or disconnect at designated locations and drain line back to tank, into a lined sump or into portable containers.	Leaks or spills of product	Use non sparking equipment for making cuts or disconnecting pipe flanges. Preplan all onsite disposition and transport of residual product whether drained back into tank, into temporary sumps or containers.	
	Explosion/fire caused by static sparks or ignition source.	Ground and bond equipment where applicable for drainage collection. Provide air monitoring around the work area. Provide energy control (lockout/tagout) where necessary on process systems. Modified Level D PPE initially, upgrade per MK SSHO direction. Stage spill cleanup supplies and equipment.	
	Chemical exposure by inhalation or direct contact including inorganic lead containing paint on process piping.	If necessary, strip paint coatings with paint stripper near areas where piping will be disconnected or saw cut. Modify PPE level based on requirements for use of stripper. Lead Competent Person will assess all tasks and require upgrades to controls or procedures where applicable.	
4.2 Equipment to be Used	**Inspection Requirements**	**Training Requirements**	
4.3 Non sparking cutting equipment, heavy equipment, temporary sump collection equipment.	Daily, prior to use per manufacturers recommendation.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, and OSHA Hazard Communication. Lead training and Lead Competent Person.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Manhole sludge and water removal, steam line removal, and cleaning tasks.		Analyzed By/Date: Frank J. Petrik 5/2/97	Reviewed By/Date: _____
10.0 Principal Steps	Potential Hazards	Recommended Controls	
10.1 Remove water and sludge. Remove steam line. Clean manhole.	Fall Hazards. Contaminated atmosphere. Asbestos containing material. Spills of waste water or sludge.	Guard unprotected openings per OSHA 1926 Subpart M. Sample internal manhole atmosphere using gas meter. Ventilate space if necessary. Use Modified Level D PPE, modify where necessary. Assess space for confined space entry procedure needs. Complete energy control (lockout/tagout) on steam lines if necessary. Complete ACM removals in appropriate PPE as assessed by the Competent Person in Asbestos and the SSHO. Use mechanical lifting equipment for pipe removals, inspect hoisting and rigging equipment prior to use. Stage spill clean up equipment in work zone. Mark all containers for hazard communication.	
10.2 Equipment to be Used	Inspection Requirements	Training Requirements	
10.3 Pump, containers, hand tools, and pressure cleaning equipment.	Daily, prior to use per manufacturers recommendation.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, and OSHA Hazard Communication. Asbestos Training and Asbestos Competent Person.	

5.0
SCHEDULE

The work items covered in this Addendum will be scheduled in with activities in the current Work Plan schedule. It is not anticipated that the extra items will affect the end date of the project.

6.0
REFERENCES

MK, 1997. *Work Plan, Underground Storage Tank Removal,* Naval Support Activity Memphis - Millington, Tennessee. Prepared by Morrison Knudsen Corporation, Rev. 0, March 17, 1997.

WORK PLAN
UNDERGROUND STORAGE TANK REMOVAL

NAVAL SUPPORT ACTIVITY, MEMPHIS
MILLINGTON, TENNESSEE

March 17, 1997

Revision 0

CONTRACT N62467-93-D-1106
DELIVERY ORDER #0030
STATEMENT OF WORK #039

Prepared for

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Prepared by:

MORRISON KNUDSEN CORPORATION
2420 Mall Drive
Corporate Square 1 - Suite 211
North Charleston, South Carolina 29406

PREPARED/APPROVED BY:

Jeff Kyser
MK Project Engineer — Date 3/17/97

APPROVALS:

MK Program Manager — Date 20 March 97

CLIENT ACCEPTANCE

U. S. Navy Responsible Authority — Date 26 MAR 97

TABLE OF CONTENTS

SECTION **PAGE**

LIST OF TABLES

LIST OF FIGURES

APPENDICES

ACRONYMS

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
CGI	combustible gas indicator
CWA	Clean Water Act
DFOW	definable feature of work
E/A & H	EnSafe/Allen & Hoshall
EPA	Environmental Protection Agency
FID	flame ionization detector
GHSP	General Health and Safety Plan
HDPE	high density polyethylene
LEL	lower explosive limit
MK	Morrison Knudsen Corporation
NSA	Naval Support Activity
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PID	photoionization detector
POTW	Publicly-Owned Treatment Works
PPE	personal protective equipment
QA/QC	Quality Control / Quality Assurance
RCRA	Resource Conservation and Recovery Act
ROICC	Resident Officer in Charge of Construction
SAP	Sampling and Analysis Plan
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
SQCS	Site Quality Control Supervisor
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
T.C.A.	Tennessee Code of Administration
TDEC	Tennessee Department of Environment and Conservation
TPH/DRO	Total Petroleum Hydrocarbons for Diesel Range Organics
TPH/GRO	Total Petroleum Hydrocarbons for Gasoline Range Organics
UST	underground storage tank

1.0
INTRODUCTION

1.1 OBJECTIVES

This Work Plan describes the remedial action activities to be undertaken by Morrison Knudsen Corporation (MK) at the Naval Support Activity (NSA) Memphis in Millington, Tennessee. The remedial action activities include the removal of two, 100,000 gallon, concrete underground storage tanks (USTs) and site restoration.

This Work Plan was prepared for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) and is contract number N62467-93-D-1106 Delivery Order 0030, Statement of Work 039. Procedures and practices contained herein were derived using guidance from the Tennessee Department of Environment and Conservation (TDEC), Division of Underground Storage Tanks - *Reference Handbook*.

Since there may be previous releases associated with the tanks, the objective of the work described in this Work Plan is as follows:

- remove the tanks, ancillary equipment and connected piping;
- remove all excavation zone soil that exceeds the identified cleanup objectives;
- remove influent groundwater that exceeds identified cleanup objectives and
- site restoration, including clean backfill placement and landscape work.

Cleanup levels established for this site were established based on the TDEC- approved Corrective Action Plan (CAP) developed by EnSafe, Allen and Hoshall (E/A & H) [E/A & H, October, 1995]. The cleanup goals are less than 1000 ppm for soil for the compounds of concern: Total Petroleum Hydrocarbons for Diesel Range Organics (TPH/DRO) and Gasoline Range Organics (GRO) identified in the CAP. Completion will be achieved once all conditions described herein are met.

NSA Memphis' North Fuel Farm, as shown in Figure 1-1, contained five tanks: 7, 303, 304, 1239 and 1241. Table 1-1 summarizes the current status of these tanks.

Table 1-1 Tanks in the North Fuel Farm		
Tank Number	**Contents**	**Status**
7	Aviation Gasoline	Regulated - Removed April 1992
303	Aviation Gasoline	Regulated - Removed April 1992
1241	Aviation Gasoline	Regulated - Removed April 1992
304	Heating Oil (#2 Fuel Oil)	Non-regulated - Out of service November 1993, scheduled for removal
1239	Heating Oil (#2 Fuel Oil)	Non-regulated - Out of service November 1993, scheduled for removal

Tanks 7, 303 and 1241 contained aviation gasoline and were removed in April of 1992. There is a possibility that some impacted soil was left in place when the tanks were removed [E/A & H, October 1995]. Tanks 304 and 1239 are concrete, cast-in-place, 100,000 gallon tanks that contained heating oil and still remain in the ground. The two remaining tanks are not regulated under Tennessee Code of Administration (T.C.A.) 68-215-201 and they reportedly have been pumped dry of any remaining heating oil when removed from service in November 1993. The service piping and mechanical appurtenances remain connected to the tanks. These two tanks along with their service piping and ancillary equipment are to be excavated, demolished and disposed of. Impacted soil with levels of TPH/DRO and GRO above the cleanup goals are to be removed and properly disposed of.

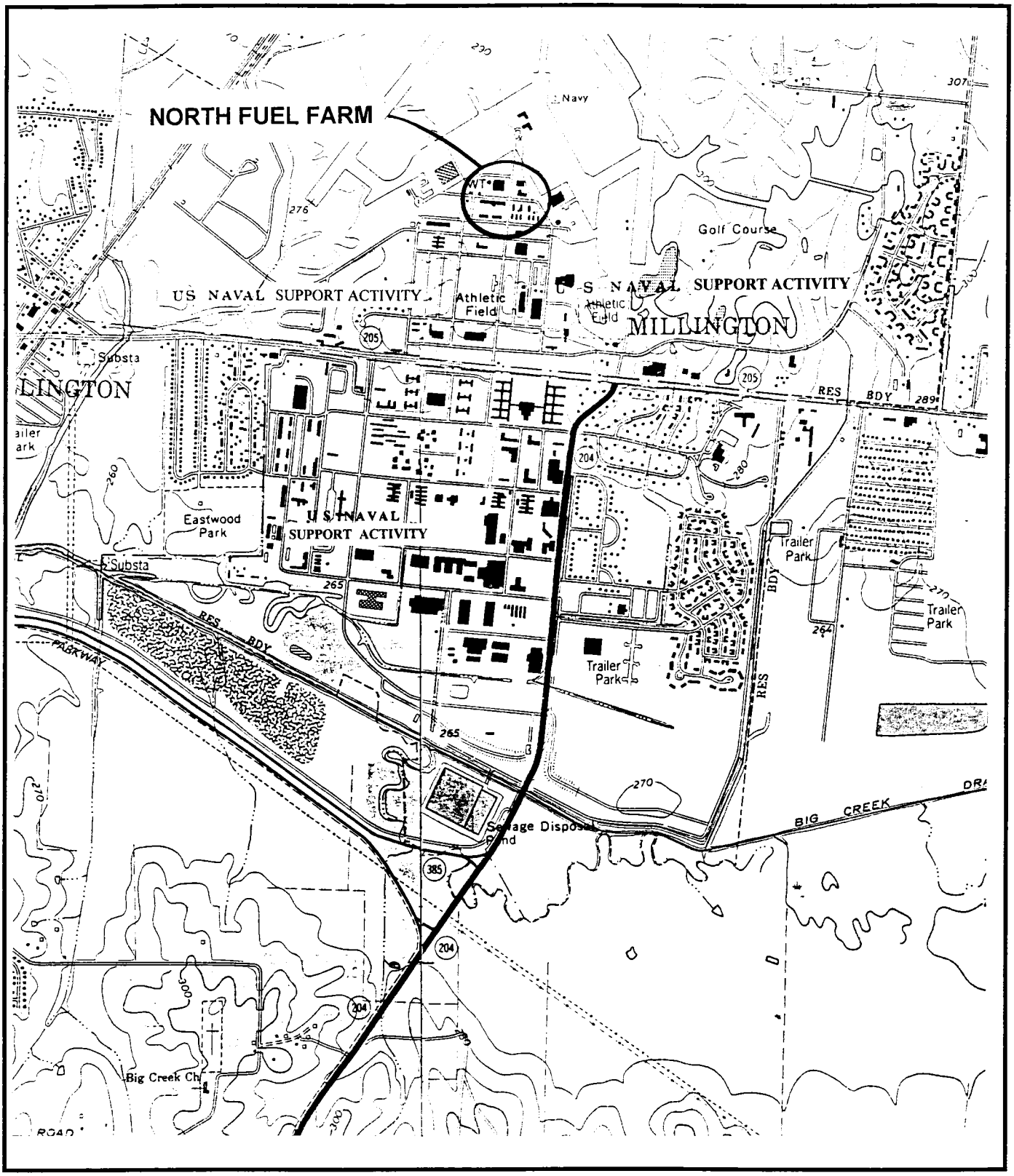


Figure 1-1
NSA Memphis Vicinity Map

1.2 SITE GEOLOGY AND HYDROGEOLOGY

NSA Memphis is underlain by Pleistocene age loess deposits which are in turn underlain (in descending order) by the Terrace Deposits (Pleistocene and Pliocene age) and the Claiborne and Wilcox formations (Tertiary age). The surficial loess deposits are unconsolidated windblown sediments consisting of silt, silty clay, clay and minor amounts of sand. These deposits typically range from 0 to 65 feet in thickness in the Memphis/Millington area. The underlying Terrace Deposits are unconsolidated alluvial sediments consisting of sand, gravel and some clay with thin layers of ferrugineous sands and conglomerates at the base. This unit ranges from 0 to 100 feet in thickness in the Memphis/Millington area [E/A & H, October 1994].

Shallow groundwater occurs at the site as a perched zone within the surficial loess deposits. These deposits are primarily made up of silt, silty clay, and clay, and exhibit low water yields and poor water quality. Beneath this surficial water-bearing zone, lie two major aquifers known as the Memphis Sand (lower Claiborne Group) and the Fort Pillow Formation (Wilcox Group) which provide 95 percent of the municipal and industrial water supply for the Memphis and Shelby County areas. Their surficial aquifer is separated from these aquifers by the Jackson- Upper Claiborne confining unit which consists of the Cockfield and Cook Mountain Formations. These confining units act as an aquitard impending the downward migration of shallow groundwater to the Memphis Sand and Fort Pillow aquifers below [E/A & H, October 1994].

1.3 WORK PLAN ORGANIZATION

1.3.1 Site Safety and Health Plan

The Site Safety and Health Plan (SSHP), Appendix A, is consistent with requirements of the Occupational Safety and Health Administration's (OSHA) Hazardous Waste Site Regulations, 29 CFR 1910.120 and 29 CFR 1926.65, and the U.S. Army Corps of Engineers' *Safety and Health Requirements Manual* EM 385-1-1, dated October 1992. The SSHP is applicable to all personnel who enter the work areas described in this Work Plan and covers all aspects of this work. Activity Hazards Analysis (AHA) sheets have been developed for each particular activity. For additional tasks identified during the work, additional AHAs will be performed prior to the new work. The SSHP is supported by the General Health and Safety Plan (GHSP), which is a document that provides general health and safety procedures for all SOUTHDIVNAVENGCOM projects in accordance with 29 CFR 1910.120, 29 CFR 1926.65 and EM 385-1-1 as well.

1.3.2 Sampling and Analysis Plan

The Sampling and Analysis Plan (SAP), Appendix C, presents the organization, project objectives, planned activities and specific procedures required to complete proper sampling at NSA Memphis. The SAP includes sampling locations, analytical methods, sampling techniques, sampling frequencies, etc. All QA/QC procedures will be structured in accordance with applicable technical standards and TDEC guidance.

1.3.3 Environmental Protection Plan

The Environmental Protection Plan, Appendix D, describes the methods that will be used to protect human health and the environment during work execution.

1.3.4 Waste Management Plan

The Waste Management Plan, Appendix E, is a detailed discussion on waste management for the project explaining collection and storage of waste generated on-site.

Local disposal approvals are required for disposal of nonhazardous solid wastes in a municipal landfill. Approvals will also be required by a special waste disposal facility for any petroleum-impacted waste that may be transported to the facility for processing. All required approvals will be obtained prior to disposal. Manifests will be prepared for signature by the authorized Navy representative.

2.0
ENVIRONMENTAL COMPLIANCE

2.1 REGULATORY COMPLIANCE

Because the tanks at NSA Memphis were field constructed, they are deferred from the Tennessee Petroleum Underground Storage Tank Act and its implementing regulations. All removal activities, however, will be performed as though the tanks were regulated. Thus, the following regulatory standards have been used as guidance in the development of this Work Plan:

- ***Resource Conservation and Recovery Act*** (RCRA) and its implementing regulations for USTs in 40 CFR 280 Subpart F.
- ***40 CFR 261*** which defines hazardous waste and what is exempt from hazardous waste.
- ***Tennessee Petroleum Underground Storage Tank Act***, in ***T.C.A. 68-215-201*** *et seq.* and its implementing regulations as Rules of the Department of Environment and Conservation, Division of Underground Storage Tanks, Chapter 1200-1-15.
- **Public Chapter No. 864 Senate Bill No. 2720**, specifies that the cleanup requirements for all petroleum USTs will be consistent with TDEC UST guidelines.
- ***Occupational Safety and Health Act*** and its implementing regulations in 29 CFR regarding excavations.
- The ***Shelby County Health Department Monitoring Well Regulations*** specify procedures when abandoning and installing monitoring wells.

2.2 PERMITS, APPROVALS, AND NOTIFICATIONS

All MK correspondence to regulatory agencies will be submitted to NSA Memphis Public Works Department, Environmental Division for review. NSA Memphis will then forward the material to the appropriate regulatory body at their discretion.

2.2.1 Certifications and Permits

2.2.1.1 UST Removal

The tank removal activities shall be performed by a Tennessee certified and registered UST contractor.

2.2.1.2 Closure Application

An Application for Permanent Closure of Underground Storage Tanks System will be prepared and submitted to NSA Memphis. The application will follow the format of the one shown in the TDEC Division of USTs Reference Handbook.

2.2.1.3 Water Discharge

If the excavated area approaches five acres in size, relevant portions of the Clean Water Act (CWA) will be implemented. Current projections are for a remediated area of less than five acres, therefore, no CWA permitting activities are planned.

A formal discharge permit application, for authorization to discharge excavation water into the sewer system, is not required by the City of Millington Sewer Department. Instead, discharge requests will be made to the Sewer Department on a case by case basis. When a stored quantity of water is ready to be disposed of, it will be sampled and analyzed for analytical parameters. A request will be made to the Sewer Department that will provide the quantity of water to be

disposed of and reports of the analytical results the sampled water. No water will be discharged to the Public Owned Treatment Works (POTW) until the Sewer Department approves it.

2.2.1.4 Well Abandonment/Removal

Prior to decommissioning any monitoring wells, a monitoring well abandonment permit will be obtained from the Shelby County Health Department. The permit application will contain a letter which specifies each well obstructing the excavation and whether it will be abandoned, in accordance with Health Department regulations, or removed by means of overexcavation.

2.2.1.5 Well Installation

In addition to the abandonment request on the well permit application, a request to install a recovery well will be included. The recovery well will be installed in accordance with Shelby County Well Regulations.

2.2.1.6 Soil Disposal

Tennessee regulations define special waste as "waste which poses a special hazard". Based on existing data, the contaminated soil associated with the tanks is not hazardous, but does pose a special hazard. Therefore all impacted soil at the site will be handled as special waste unless analytical results show otherwise. A permit for the disposal of special waste will be obtained from the TDEC Division of Solid Waste. Once the soil above cleanup goals has been excavated, stockpiled, sampled and analyzed, a permit application will be submitted to the TDEC including the results of the sampled soil..

2.2.1.7 Utilities

One week prior to any remedial activities, the Millington Telephone Company will be contacted so that any public utilities within the area can be located. NSA Memphis' Public Works Department will also be contacted to obtain a map of the existing base utilities which will be located by MK.

2.2.1.8 Excavation and Trenching

Permits for excavation and trenching will be prepared and submitted for review by the Resident Officer in Charge of Construction (ROICC).

2.2.2 Notifications

2.2.2.1 State Fire Marshal

Prior to work, notification of closure will be made to the Office of the State Fire Marshal. The local fire department will be notified as well.

2.2.2.2 Health Department

At least ten days prior to the actual work, the Shelby County Health Department will be notified so that they can observe well abandonment/removal activity and installation of the new well.

2.2.3 Reporting

A copy of all reports will be submitted to NSA Memphis Public Works Department, Environmental Division for review.

2.2.3.1 Free Product Removal Report

A Free Product Removal Report per Tennessee UST guidance will be prepared and submitted to NSA Memphis if free product is discovered in the tank excavation. Additionally verbal notification

will be made to the Base Environmental Coordinator at that time so that proper notice can be given to NSA Memphis.

2.2.3.2 Permanent Closure and Completion Reports

MK will prepare a Permanent Closure Report that follows the format of the one shown in the TDEC Division of USTs Reference Handbook and submit it to NSA Memphis within 30 days of completion of all soil disposal. MK will also prepare a Completion Report and submit it to SOUTHNAVFACENGCOM within 90 days of completion of all work. The outline of the Completion Report is presented in Section 3.2.10. The Permanent Closure Report will be submitted as part of the Completion Report.

3.0
PROJECT EXECUTION

3.1 WORK APPROACH

This section describes the approach for the demolition of the two USTs, removal of impacted soil and collection of influent groundwater. The work approach addresses the control of work process, work elements, and regulatory and reporting requirements. Site actions will generally be consistent with the requirements specified in the TDEC UST Reference Manual [TDEC, Division of Underground Storage Tanks, July 1996].

3.2 DEFINABLE FEATURES OF WORK

The general sequence of the work can be broken down into definable features of work (DFOWs). DFOWs and the three phases of control, preparatory, initial and follow-up phases, which will be used to maintain quality control of work activities. The DFOWs, identified below and described in the following sections, are the basic elements associated with the removal of the tanks:

- Site Preparatory Work
- Soil Excavation, Storage and Disposal
- Excavation Dewatering and Disposal of Groundwater
- Tank and Ancillary Equipment Demolition and Disposal
- Decontamination Actions
- Sampling and Analysis
- Backfill
- Site Restoration
- Waste Management
- Reports
- Regulatory Compliance

3.2.1 Site Preparatory Work

Site preparatory work is the first physical activity at the site and involves the staging of material and equipment, demarcation of work zones and scanning the site for underground utilities. Since follow-on excavation involves intrusion into the subsurface, an excavation permit will be developed during the site preparatory stage.

3.2.1.1 Subsurface Utility Survey

NSA Memphis Public Works Department will be contacted and a map of the existing utilities in the area will be obtained. A complete subsurface utility search will be made in the proposed work area. Any utilities in the area will be located and marked prior to the start of work.In addition, the Millington Telephone Company will be contacted at (901) 872-7771, one week in advance, to assure that no buried phone lines are in the area.

3.2.1.2 Runon/Runoff Control

Once the excavation is opened, stormwater movement into and out of the open excavation will be minimized. To ensure this, a soil berm, ditch or straw bales with silt fencing will be placed continuously around the site to prevent stormwater entry. The runon/runoff control will be inspected and maintained daily to ensure there are no off-site impacts. All stockpiles will have runon and runoff control as well. Stockpile run on/runoff control is discussed in Section 3.2.2.4. Handling of all runon/runoff will be performed as outlined in Appendix C, the Sampling and

Analysis Plan, Appendix D, the Environmental Protection Plan and Appendix E, the Waste Management Plan.

3.2.2 Soil Excavation, Storage and Disposal

3.2.2.1 Above Tank Excavation

Concrete slabs and soil, within the excavation zone and above the tank, will be excavated and stockpiled in accordance with Section 3.2.2.4. Since the soil removed from above the tanks should have contaminant levels that are below backfill requirements (< 100 ppm TPH), it shall be stockpiled separately. This will allow reuse of the shallow soil as backfill, should analytical results verify that the soil is acceptable for on-site backfill.

Miscellaneous excavated concrete shall be stockpiled separately from the UST concrete. In order to determine the method of disposal, non-UST concrete will be laboratory tested for TPH. If the concrete meets backfill criteria of < 100 ppm TPH/DRO and GRO combined, it shall be disposed of as construction debris. If the concrete does not meet backfill criteria, it will be disposed of as special waste.

3.2.2.2 Lateral and Below Tank Soil Removal

All soil within the excavation limits (≥ 1000 ppm TPH/DRO and GRO combined) and/or adjacent to or below the tanks as shown in Figures 3-1, 3-2 and 3-3 will be removed and stockpiled for sampling to assure that it is acceptable for disposal as special waste by the TDEC Division of Solid Waste. The soil will then manifested and disposed of at a permitted special waste facility, pending review of analytical results.

Soil beyond the currently designated excavation limits that may be above the cleanup goals will be field screened for combined TPH/DRO and GRO using field test kits. If a test yields results above cleanup goals, an additional foot of material will be excavated in the test area followed by additional field screening. If the test kits indicate that cleanup goals have been met, confirmatory samples will be taken. Care will be taken to avoid removing soil below cleanup goals due to the fact that a lower cleanup level is required to reuse the excavated soil as backfill.

3.2.2.3 Safe Excavation Plan

Based on the contaminant plumes shown in Figures 3-2 and 3-3, it appears likely that the depth of excavation activities will exceed twenty feet. For this reason, a Safe Excavation Plan will be developed that is consistent with EM 385-1-1.

3.2.2.4 Stockpiling of Soil

Soil removed from the excavation area will be stockpiled and managed as a special waste unless analytical results show otherwise. Stockpile management will follow these guidelines:

- soil and concrete shall be placed on a minimum 6-mil polyethylene liner and the stockpile shall be covered at the end of each day and during precipitation;
- stockpiles containing clean material as determined by laboratory analysis, need not be covered;
- the stockpile shall be continually bermed around the stockpile perimeter with straw bales;
- soil shall be placed at no greater than 1.5 horizontal to 1 vertical (1.5H:1V) slope;
- sand bags or other methods shall be used to secure the liner and cover;
- soil from overburden excavation shall be stockpiled separately to ensure

contaminated/noncontaminated soils are not mixed;

- if acceptable, visibly impacted soil may be loaded directly onto lined rolloffs or trucks, or stockpiled separately from other excavated soil; and
- each stockpile shall be limited to 200 cubic yards of excavated material.

Potential stockpile areas are shown on Figure 3-1.

3.2.2.5 Monitoring Well Removal

During the course of excavation several monitoring wells, shown within the excavation limits on Figure 3-1, will be encountered that will obstruct remedial activities. These wells will be abandoned in accordance with the Shelby County Well Abandonment Regulations or completely removed by means of over excavation. It is anticipated that seven wells will be removed and one will be abandoned.

3.2.2.6 Disposition of Soil

Excavated soil will be sampled per Section 3.2.6 to determine its disposition as either backfill, or special waste requiring off-site disposal. The haul route to be used is shown on Figure 3-4.

3.2.2.7 Quantity and Location Surveys

Quantity of soil removed from the excavation and quantity of backfill returned to the excavation will be determined using field measurements. Quantity of soil disposed will be determined by weight measured at the disposal facility. The extent of the excavation will be recorded based on field measurements and documented in the Completion Report.

3.2.3 Excavation Dewatering and Disposal of Groundwater

Dewatering of the excavation will be ongoing throughout the course of remedial activities. Prior to any deepening of the excavation, a sump will be established so that water can generally be directed away from excavation activities. The sump will remain pumped down to the extent possible when work activities are ongoing.

3.2.3.1 Dewatering During Excavation

All water generated during excavation activities will be transferred to holding tanks where it will be sampled and analyzed. Upon receipt of acceptable results, water in the tanks will be pumped to the existing oil/water separator where it will be processed and discharged to the Publicly Owned Treatment Works (POTW) in accordance with City of Millington Sewer Department's requirements. This process may be changed if the local POTW does not require treatment of the excavation water. The oil/water separator is approximately 300 feet west of the site.

3.2.3.2 Post Excavation Dewatering

Upon removal of the required soil, excavation activities will cease and a sump will be installed at the low point of the excavation. The floor of the excavation will be graded to drain to the sump so that the potential for ponding is minimized. Groundwater will be pumped down to the extent possible and field screening of the excavation will follow. Groundwater samples for laboratory analysis will be taken directly from the storage tanks.

In the event that collected groundwater does not meet City of Millington Sewer Department requirements for discharge to the POTW, the collected water will be transported off-site to an appropriate treatment facility.

3.2.4 Tank and Ancillary Equipment Demolition and Removal

All fill lines and other product lines associated with the system, once uncovered, will be cut and drained as necessary. Following removal of residuals (if any), piping and ancillary equipment (fill stands, pumps, etc.) will be transported to the decontamination area and cleaned. All decontaminated piping and ancillary equipment will be disposed of off-site as recyclable scrap.

Pending field conditions, the tanks will either be demolished and disposed of as special waste, or cleaned prior to demolition, and then disposed of as construction debris. If the tanks are just demolished, demolished materials will be of acceptable size for the disposal facility.

If the tanks are cleaned prior to demolition, tank cleaning will be performed in accordance with API 2015 - *Safe Entry and Cleaning of Petroleum Storage Tanks*. Tanks will be steam cleaned with detergent solution or using a high pressure/low volume water stream. Steps will be taken to ensure that the tank is adequately ventilated. If vapor concentration rises to 10% or greater of the LEL, washing will be stopped until safe working conditions have been re-established. Following cleaning, tank interiors will be screened with a FID/PID, a CGI, and an oxygen meter. The interior tank atmosphere will be checked at three levels: top, middle, and bottom. The tank will be considered sufficiently cleaned when the atmosphere inside the tank equals or falls below 10% of the LEL at all three locations in the tank, and the tank passes a visual inspection showing it to be free of residual sludge.

If personnel are required to physically enter the tank, loose sludge will be removed and waste materials will be removed. The interior of the tank may be scraped, along with support members. Ventilation shall be continuous throughout the cleaning process. To assist in fluid and sludge removal, a vacuum truck may be used. Monitoring of the interior of the tank will be continuous. Prior to tank demolition, the atmosphere in the tank and surrounding area will be continuously tested with a combustible gas indicator (CGI) and oxygen meter. If explosive or oxygen-deficient/rich readings are found to exist in the tank, vapors will be displaced by the means of mechanical ventilation, steam ventilation, natural ventilation, or inert-gas purging. This process will continue until the tank is considered vapor free.

3.2.5 Decontamination Actions

A decontamination area will be established and delineated with fencing or warning tape within the contamination reduction zone. The decontamination area will include a continuous, 60-mil high density polyethylene (HDPE) liner, draped over a wood frame, secured with sandbags and sloped to a container.

The decon area will be inspected daily to verify its integrity. If any damage is discovered, it will be repaired or replaced before further use. Daily records will be maintained that document inspections and repairs made.

After the decontamination area has been dismantled, the underlying soil will be visually inspected for potential leaks. In areas where leakage is known or suspected, the soil will be screened using field test kits. Impacted soil will be removed and managed as described in the Waste Management Plan. If tests indicate that no contamination has occurred, the material will be left in place.

3.2.5.1 Construction, Field and Ancillary Equipment

Upon its arrival on site, each piece of construction equipment will be thoroughly inspected to assure that it is visibly clean. Construction and field equipment that have come into contact with any potentially contaminated material will be decontaminated. At the decontamination area,

exposed surfaces of construction and field equipment will be decontaminated using a solution of high-pressure/low-volume water or steam with detergent. Ancillary equipment will be triple rinsed in the same fashion. The equipment will be visually inspected for signs of contamination. If the equipment does not appear to have been adequately cleaned, the cleaning procedure will be repeated until the inspection criteria for cleanliness have been met. Pumping equipment and associated hoses (including vacuum truck hoses) will be flushed with water and detergent and followed by a water rinse.

3.2.5.2 Personnel Decontamination

Articles of clothing which have come into contact with potentially contaminated soil will be discarded or decontaminated prior to site egress. Plastic lined drums or waste barrels will be used for disposable PPE such as Tyvek®, gloves, etc. These containers will be disposed of with the contaminated soil as special waste. A boot wash/rinse area will be used to decontaminate reusable articles. The decontamination area will also contain a sign-in sheet, fire extinguisher, first aid kit, and an eyewash station and benches.

3.2.5.3 Decontamination Fluids

All decontamination fluids will be collected and transferred to the storage tanks containing collected groundwater. The two liquids will be handled together.

3.2.6 Sampling and Analysis

3.2.6.1 Excavation Sampling

Upon reaching the excavation limits, soil at the excavation limits will be field screened using TPH field test kits. If the tests yield results below cleanup goals, confirmation samples will be taken for cleanup verification. Samples of these types will also be taken beneath piping runs.

3.2.6.2 Stockpile Sampling

Material that is stockpiled for either disposal or backfill will be sampled and analyzed (both field screening and off-site analytical) at the frequencies specified in the SAP and Tennessee Technical Guidance Document Number 5.

Stockpiled UST concrete will be sampled for disposal purposes at the same frequency as stockpiled soil to be disposed of. UST concrete will be sampled for laboratory analysis only.

3.2.6.3 Water Sampling

Groundwater and decontamination water will be sampled and analyzed prior to disposal to the local POTW. Samples will be taken from the storage tanks provided and will be analyzed in accordance with the City of Millington Sewer Department requirements. Analytical results will be provided to the Sewer Department before disposal occurs.

Additional samples may be taken at the direction of the TDEC regulatory oversight personnel. Field and laboratory QC will be performed as specified in the SAP. All samples will be collected and analyzed per the methods and procedures in the SAP. Laboratory analytical for TPH DRO and GRO will be performed using Tennessee DRO and GRO UST analytical methods. The analyses will be performed at a State of Tennessee approved laboratory.

3.2.7 Backfill Placement

Backfill material from an off-site borrow source will be analyzed for parameters specified in the SAP at the frequency of 1 per 500 cubic yards.

Prior to backfill, a recovery well will be installed. The well will be placed in the low point (sump area) of the excavation. It will be made of six inch diameter PVC pipe and its construction will conform with the installation permit requirements from the Shelby County Health Department. The recovery well will be slotted from the bottom up to 2 feet below final grade. Once installed, the excavation will be backfilled with two inch minus stone up to two feet below final grade. Remaining backfill will consist of off-site borrow source material or clean soil obtained from the excavation area, if it meets the backfill criteria of < 100 ppm combined TPH/DRO and TPH/GRO. This fill will be placed up to six inches below final grade. Topsoil will be placed for the final six inches up to finished grade. Details of the backfill are provided on Figure 3-5.

Backfill material will be placed in the tank excavation in maximum 12-inch lifts and compacted to a density of 85 percent in non-structural bearing areas and 95 percent where roads were removed per ASTM D698. Field density tests (ASTM D1556, ASTM D2167, or ASTM D2922 and D3017) will be performed on each lift to confirm adequate compaction. Final grade of the backfill will be six inches below final surface grade.

3.2.8 Site Restoration

All tank sites will be restored at completion of work and six inches of topsoil will be placed followed by seeding and mulching at the completion of excavation activities. Concrete sidewalks and structures will not be replaced. Areas where roads were removed will be resurfaced with six inches of crushed stone. A post-remedial inspection will be held to assure the site has been properly restored.

3.2.9 Waste Management

All waste generated will be collected and stored on-site in appropriate containers or piles, analyzed for characterization purposes, and dispositioned (i.e., reused or disposed of) in accordance with federal, state and local regulations and the Waste Management Plan located in Appendix E.

Any material which is found to be a hazardous waste, or cannot be sent to a special waste landfill or POTW will be turned over to the NSA Memphis for disposal. MK will be responsible for packaging, labelling, analytical data and delivery to building 1694 located in the vicinity of the site. Bulk items such as water will be stored by MK for up to 30 days, until NSA Memphis can pick the water up.

3.2.10 Reports

A Permanent Closure Report will be prepared and submitted to NSA Memphis within 30 days of the final sampling event. The report will follow the format shown in the TDEC Division of USTs Reference Handbook. Additionally, a Completion Report will be prepared after completion of site work to satisfy SOUTHNAVFACENGCOM requirements not covered in the Closure Report. MK will complete and submit the Completion Report to SOUTHNAVFACENGCOM within 90 days of completion of remedial activities. The report will include the a copy of the Closure Report as well as the following information:

- a description of the project location, tank service and description;
- a discussion of project remedial activities;

- a discussion of the management of wastes, including ultimate disposal of generated materials;
- volume or mass of residue and waste removed, including wastes resulting from decontamination activities;
- pertinent waste disposal documentation (manifests, bills of lading, or other type of shipping records);
- a description of the sampling and analytical methods used, including sample preservation methods and chain-of-custody information;
- analytical laboratory data that include:
  -boring number or location of sampling points
  -sample collection date
  -sample analysis date
  -sample depth
  -parameter analyzed
  -units of measurement on a mass/mass or mass/volume basis
  -statement of conformance to Tennessee analytical standards, and
  -signature of laboratory director or designee;
- photographic documentation of closure indicating conditions before, during, and after closure;
- field and laboratory geotechnical tests performed, methods and results;
- changes to the Work Plan procedures, if any; and,
- recommendations and conclusions.

A proposed outline for this report is provided below:

EXECUTIVE SUMMARY

1.0 PROBLEM STATEMENT
2.0 SCOPE OF WORK
  2.1 MOBILIZATION
  2.2 WASTES GENERATED AND DISPOSED
  2.3 SITE RESTORATION AND DEMOBILIZATION
3.0 SAMPLING AND ANALYSIS SUMMARY
4.0 LESSONS LEARNED
5.0 CONCLUSIONS
6.0 REFERENCES

TABLES

FIGURES

APPENDICES

APPENDIX A AS-BUILT DRAWINGS
APPENDIX B REGULATORY FORMS/CORRESPONDENCE (Closure Report)
APPENDIX C ANALYTICAL RESULTS
APPENDIX D PHOTOGRAPHS
APPENDIX E SUMMARY OF MANIFESTS

3.2.11 Regulatory Compliance

To assure compliance with federal, state and local regulations, a quality control checklist has been developed to verify that the applicable regulations have been addressed and are being implemented. The Regulatory Compliance checklist (RG-01) requires the QA/QC representative

to review other specific checklists and verify that regulatory requirements have been put into place prior to proceeding with a definable feature of work. These requirements may include permits, verbal or written notification to local, state or federal authorities, etc. The checklist RG-01 can be found in Appendix B, Quality Control Documentation.

4.0
QUALITY CONTROL

4.1 QUALITY CONTROL REQUIREMENTS

The Quality Control Requirements specified in this section supplement and are to be used in conjunction with the requirements contained in the Delivery Order Execution Quality Control Plan previously approved by SOUTHNAVFACENGCOM.

Analytical and Data Quality requirements are specified in the SAP Appendix C of this Work Plan.

4.2 INSPECTION SYSTEM

MK will use DFOWs and the three phases of control to ensure that remedial activities at NSA Memphis achieve and maintain a consistently high level of quality. The DFOWs for NSA Memphis are described in Section 3 of this work plan. Table 4-1 cross references each DFOW, as it relates to the project specifications, activity hazard analysis, quality control checklists, and applicable regulations.

At each phase of control - Preparatory, Initial, and Follow-up - Quality Control verification activities may be supplemented by the performance of detailed inspections of a particular activity. In these cases, Field Inspection Checklists have been generated to assure a thorough verification of the work process. When utilized, the completed Field Inspection Checklist will be attached to the combined *Contractor Production Report/Contractor Quality Control Report (Form 01400-1)* completed on a daily basis.

4.3 TESTING PLAN AND LOG

A Testing Plan and Log, provided in Table 4-2, has been prepared and included in this section of the Work Plan. The Testing Plan and Log delineates the required tests and inspections applicable to a definable feature, as well as the inspection checklist or governing standard to be used in the performance of the inspection. The Testing Plan and Log will be utilized in the field to record the status of inspections performed. The Site Quality Control Supervisor (SQCS) will attach a copy of the updated Testing Plan and Log to the last daily Contractor Quality Control Report of each week.

Table 4-1
DFOW Cross Reference

DFOW (Work Plan)	Specification Sections	Activity Hazard Analysis (Site Safety and Health Plan)	Field Inspection Checklist (Quality Control Documentation)
Site Preparatory Work	01020 01500 01510 01550 01570 02100	1.0	SP-01 MD-01
Soil Excavation, Storage and Disposal	01500 01550 02210 02255	2.0 3.0	EX-01
Excavation Dewatering and Disposal	01570	3.0	SP-01
Tank and Ancillary Demolition and Disposal	02255	4.0 5.0 6.0	TR-01
Decontamination Action	01500 01510 01800	8.0	DE-01
Sampling and Analysis	01500 02262	7.0	SA-01
Backfill Placement	01550 01570 02220	9.0	BF-01
Site Restoration	01550 02100 02960	9.0	SR-01
Waste Management	01510 01800	3.0	WD-01
Reports	NONE	NONE	NONE
Regulatory Compliance	NONE	NONE	RG-01

TABLE 4-2
TESTING PLAN AND LOG

Definable Feature of Work	Inspection Checklist	Three Phases of Control (Enter Dates that Inspections are Performed)			Test or Inspection Results	Comments
		Preparatory	Initial	Follow-up		
Mobilization and Demobilization	MD-01					
Site Preparatory Work	SP-01					
Excavation	EX-02					
Tank and Ancillary Equipment Removal	TR-01					
Decontamination	DE-01					
Sampling and Analysis	SA-01					
Backfill Placement	BF-01					
Site Restoration	SR-01					
Regulatory Compliance	RG-01					

4.4 REQUIRED QC DOCUMENTATION

Required Quality Control documentation to be completed to support the NSA Memphis tank removal is provided in Table 4-3. This table identifies required checklists to be completed when performing inspections, and specific forms to be used for activities such as sample chain of custody. A copy of these forms are included in Attachment B of this Work Plan.

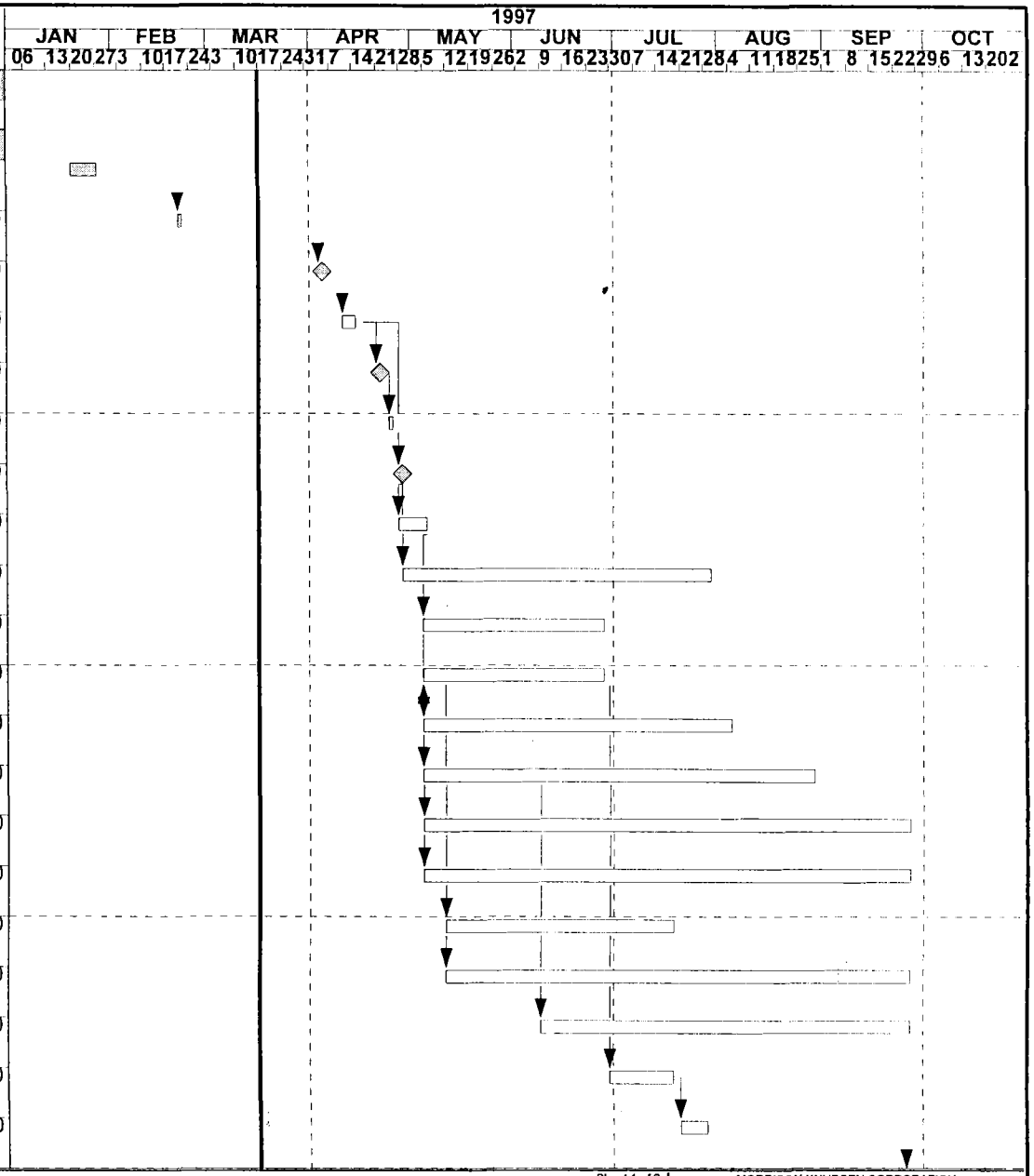
TABLE 4-3
REQUIRED DOCUMENTATION

Document Name	Document Number	Completed By
Contractor Production Report	Form 01400-1	MK Production Supervision
Contractor Quality Control Report	Form 01400-1	MK Quality Control
Chain of Custody Form	Form 1799a/88	MK Sampling Technician/Project Engineer
Field Inspection Checklist: Mobilization and Demobilization	MD-01	MK Quality Control
Field Inspection Checklist: Site Preparation	SP-01	MK Quality Control
Field Inspection Checklist: Excavation	EX-02	MK Quality Control
Field Inspection Checklist: Tank and Ancillary Equipment Removal	TR-01	MK Quality Control
Field Inspection Checklist: Decontamination	DE-01	MK Quality Control
Field Inspection Checklist: Backfill Procedures	BF-01	MK Quality Control
Field Inspection Checklist: Site Restoration	SR-01	MK Quality Control
Field Inspection Checklist: Regulatory Compliance	RG-01	MK Quality Control
Subcontractor Submittal Register	N/A	MK Quality Control
Rework Items List	N/A	MK Quality Control

5.0
SCHEDULE

Field work is scheduled to begin April 1997. Following is a simple schedule that contains some milestone dates:

Activity ID	Activity description	Early start	Early finish	Rem Dur	%
DO#0030 NSA MEMPHIS, TENNESSEE					
SOW#039, Phase 30					
Phase 3 Activities					
CN3012	Negotiate Phase 3 Estimate	20JAN97A	27JAN97A	0	100
CN3013	Phase 3 Award	21FEB97A	21FEB97A	0	100
CN3028	Subcontract Award		04APR97*	0	0
CN3015	MK Field Personnel Orientation	11APR97	14APR97*	2	0
CN3016	MK Mobilization		21APR97	0	0
CN3029	Precon. Meeting	25APR97	25APR97	1	0
CN3030	Subcontractor Mobilization		28APR97	0	0
CN3110	Site Preparation	28APR97	05MAY97	6	0
CN3031	Complete Site Work	29APR97	29JUL97	64	0
CN3210	Soil Excavation	05MAY97	27JUN97	39	0
CN3320	Tank & Ancillary Equipment Demolition	05MAY97	27JUN97	39	0
CN3310	Dewatering & Disposal of Groundwater	05MAY97	04AUG97	64	0
CN3220	Soil Storage	05MAY97	29AUG97	83	0
CN3410	Decontamination Activities	05MAY97	26SEP97	102	0
CN3610	Waste Management	05MAY97	26SEP97	102	0
CN3330	Tank & Ancillary Equipment Disposal	12MAY97	18JUL97	48	0
CN3420	Sampling & Analysis	12MAY97	26SEP97	97	0
CN3230	Soil Disposal	09JUN97	26SEP97	78	0
CN3510	Backfill Placement	30JUN97	18JUL97	14	0
CN3520	Site Restoration	21JUL97	28JUL97	6	0



Project Start 01MAR94
Project Finish 17OCT97
Data Date 17MAR97
Plot Date 19MAR97

Early Bar
Progress Bar
Critical Activity

4324:MEM2

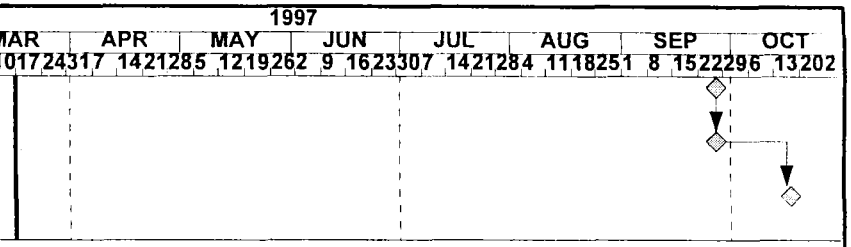
SOUTHDIV ERAC PROGRAM - WO #4324
NSA MEMPHIS, MILLINGTON, TENNESSEE
DO#0030, SOW#039

Sheet 1 of 2

MORRISON KNUDSEN CORPORATION

Date	Revision	Checked	Approved

Activity ID	Activity description	Early start	Early finish	Rem Dur	%
CN3032	Complete Waste Disposal		26SEP97*	0	0
CN3033	Demobilization		26SEP97	0	0
CN3034	Closure Reports		17OCT97	0	0



Project Start 01MAR94
Project Finish 17OCT97
Data Date 17MAR97
Plot Date 19MAR97

Early Bar
Progress Bar
Critical Activity

4324.MEM2

SOUTHDIV ERAC PROGRAM - WO #4324
NSA MEMPHIS, MILLINGTON, TENNESSEE
DO#0030, SOW#039

MORRISON KNUDSEN CORPORATION

Date	Revision	Checked	Approved

6.0
REFERENCES

1. *Final Environmental Assessment Report Building N-146* by EnSafe/Allen & Hoshall, November, 1994 [E/A & H, November, 1994]

2. *Final Environmental Assessment Report USTs 304 and 1239*, by EnSafe/Allen & Hoshall, October, 1994 [E/A & H, October, 1994].

3. *Final Corrective Action Plan (CAP) for Registered Tanks 7, 303, 1241 and Non-registered Tanks 304 and 1239*, by EnSafe/Allen & Hoshall, October 1995 [E/A & H, October, 1995].

4. API Recommended Practice 1604, second edition, *Removal and Disposal of Underground Petroleum Storage Tanks*, American Petroleum Institute, December, 1989 [API, December 1989].

5. *Underground Storage Tank Reference Manual*, Tennessee Department of Environment and Conservation Division of Underground Storage Tanks, July, 1996 [TDEC Division of USTs, July 1996].

6. T.C.A. 68-215-201, *Tennessee Petroleum Underground Storage Tank Act,* September, 1994 [TDEC Division of USTs, September, 1994]..

7. Code of Federal Regulations, Title 40, Part 264, *Standards for Owners and Operators of Hazardous Waste, Treatment, Storage, and Disposal Facilities*, July, 1992.

8. Code of Federal Regulations, Title 29, Part 1910, Subpart 120, *Hazardous Waste Operations and Emergency Response*, July, 1993.

9. Code of Federal Regulations, Title 40, Parts 110-140, *National Pollution Discharge Elimination Systems* (NPDES) permits.

10. Code of Federal Regulations, Title 40, Parts 400-470, *Effluent Guidelines for Wastewater Treatment by Industry and Publicly Owned Treatment Works* (POTWs).

11. Code of Federal Regulations, Title 29, Part 1926, Subpart 65, Safety and Health Regulations for Construction, July 1994

12. *Safety and Health Requirements Manual,* US Army Corps of Engineers, EM 385-1-1, October 1992 [US Army COE, October, 1992].

APPENDIX A
SITE SAFETY AND HEALTH PLAN (SSHP)

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0
SITE DESCRIPTION, CONTAMINANT CHARACTERIZATION AND REFERENCES

1.1 INTRODUCTION

This Site Safety and Health Plan (SSHP) describes safety and health requirements for the removal of two underground storage tanks at the Naval Support Activity (NSA Memphis), in Millington, Tennessee. This SSHP, together with the **MK General Safety and Health Plan (GSHP)** is consistent with requirements of the Occupational Safety and Health Administration's (OSHA) Hazardous Waste Site Regulations, 29 CFR 1910.120 and 29 CFR 1926.65 along with the U.S. Army Corps of Engineers' (ACOE) *Safety and Health Requirements Manual* EM 385-1-1 dated October 1996. This SSHP has been created as Appendix A to the Work Plan which describes construction means and methods, and is applicable to all personnel who enter into work areas described in this SSHP and who are under Morrison Knudsen Corporation (MK) or MK's Subcontractors' control.

1.2 SITE AND WORK TASK DESCRIPTION

Site - North Fuel Farm, Tanks 304 and 1239. Tanks are concrete, cast-in-place, 100,000 gallon capacity that last contained heating oil. The tanks were pumped dry of any remaining oil when they were removed from service. The service piping and appurtenances remain connected to the tanks.

The definable features of work are as follows: (1) Site Preparatory Work; (2) Soil Excavation, Storage and Disposal; (3) Excavation Dewatering and Disposal of Groundwater; (4) Tank and Ancillary Equipment Demolition and Disposal; (5) Decontamination Actions; (6) Sampling and Analysis; (7) Backfill Placement; (8) Site Restoration; (9) Waste Management; and (10) Reports. Section 3 of the Work Plan provides details on each DFOW.

1.3 CONTAMINANT CHARACTERISTICS

Tanks may contain sludge from the heating oil mixed with water. Free product and sludge may be encountered in the ancillary piping. The tanks previously contained Fuel Oil Number 2. Fuel Oil Number 2 (diesel fuel) is a straight-run or cracked petroleum distillate. Fuel Oil Number 2 is a moderately combustible substance. Table 1-1 summarizes hazard communication information on fuel oil.

TABLE 1-1
POTENTIAL CONTAMINANTS

Potential Contaminants	Description	LEL (%)	Ionization Potential (eV)	Exposure Limits	Signs and Symptoms	First Aid
Fuel oil, fuel oil sludges	Straw yellow to dark colored liquid. Fuel oil Number 2 is a brown, slightly viscous liquid.	N/A	N/A	None listed.	Vapors may be poisonous if inhaled or absorbed through skin. Vapors may cause dizziness or suffocation. Contact may irritate or burn skin and eyes.	Irrigate eyes immediately with water. Soap wash skin promptly. Provide respiratory support. Seek medical attention immediately.

2.0
SAFETY AND HEALTH HAZARDS

2.1 OVERVIEW

Chemical exposure by any route is considered negligible. Internal tank atmospheres could present flammability/explosion potential and therefore will be monitored prior to demolition. Construction physical hazards arising from heavy equipment operation, excavations and general demolition practices present the most risk for this project.

2.2 ACTIVITY HAZARD ANALYSES (AHA)

AHA have been prepared for each anticipated task in accordance with EM 385-1-1, October 1992 (ACOE, 1992). These hazard analyses are in the form of worksheets contained in Attachment A of this SSHP. Each site activity shall be reviewed by field supervision, namely the MK SSHO, MK Site Project Manager and Subcontractor Job Supervisors(s) and affected personnel prior to starting work, to determine if the prepared AHA adequately addresses the planned activity. If the prepared AHA requires revision or a new task is identified, additional hazard analysis will be prepared as needed. The AHA worksheet shall be redlined or a new AHA worksheet shall be field prepared by the Subcontractor Job Supervisor and the MK SSHO before the activity takes place. The Pre-Entry Briefing meeting is utilized to review the AHA and is conducted with all affected workers by the Subcontractor Job Supervisor.

2.2.1 Noise

Excessive noise levels may be encountered during tank demolition operations. Hearing protection devices providing a minimal of 29 dB(A) sound reduction shall be made available by the Subcontractor. The MK SSHO will assess Hearing Protection Device (HPD) needs on all cutting and cleaning operations in accordance with GSHP Section 2.5.2.

2.2.2 Excavation Safety

Open excavations are a hazard from falling into the excavation and/or side wall collapse while personnel are near or inside the excavation. To minimize these hazards the excavation will be barricaded and safeguarded in accordance with the requirements of MK Program Procedure PHSP 05.1 including the preparation of a Safe Excavation Plan by the Subcontractor. Excavations exceeding five feet in depth will be properly sloped or shored according to OSHA and Corps of Engineers requirements (EM 385-1-1, Section 25) prior to any personnel entering the excavation. For excavations less than 20 feet in depth, the maximum slope shall be 34° measured from the horizontal (1-1/2 horizontal to 1 vertical) unless the sloping or benching system is certified by a registered professional engineer. Excavations greater than 20 feet in depth must be certified by a registered professional engineer. Support systems may be used, but they must be in accordance with manufacturer's specifications, limitations, and recommendations or they must be selected from tabulated data certified by a Tennessee registered professional engineer. Personnel not directly involved in excavation activities will remain at least ten feet away from the edge of the excavation.

Positive identification of underground utilities and services is required at least 24 hours prior to any excavation or trenching. An MK Excavation and Trenching Permit system shall be used whenever excavation, trenching or penetrations are planned. MK and the Navy ROICC will coordinate underground utility locator service. Individuals shall be properly trained prior to initiating work activities. A competent person shall inspect all excavations on a daily basis regardless of whether personnel enter or not.

2.2.3 Utilities and Process Piping, Energy Control

All tanks and ancillary subsystems will be energy controlled prior to initiating decontamination activities. Initial locks and tags will be applied by the Public Works Department (PWD). A second set will be applied by the Subcontractor. An energy control program for this project will be established and managed by the MK SSHO using MK Program Procedure PHSP 01.2.

2.2.4 Fire and Explosion

Internal tank atmospheres shall be monitored for combustibility prior to demolition. Tank atmospheres exhibiting explosive levels will be purged and/or inserted prior to demolition. No hot work or open flames will be allowed in the work area without a "Hot Work Permit". At least two 20 lb or equivalent "ABC" multipurpose fire extinguisher shall be maintained for fire response at the entrance to the Contamination Reduction Zone (CRZ). All mobile heavy equipment must be fitted with a minimum 10 lb "ABC" fire extinguisher. All temporary trailers or structures must have fire extinguishers installed in accordance with NFPA 10. Depending on the fire loading, in most cases, a 5 lb "ABC" is sufficient in each office trailer. This extinguisher must be mounted at least four feet from the floor next to an egress door.

2.2.5 General Motor Vehicle, Hand and Power Equipment Safety

Requirements in GSHP Section 2.5.8 apply.

2.2.6 Traffic and Work Site Control Safety

Potential hazards from heavy equipment and vehicular traffic around the work areas will be controlled by placing approved barricades and signs around the work area. Workers required to work in active traffic areas or roadways will be required to wear high visibility reflective vests.

2.2.7 Overhead Power Lines

Overhead power lines represent an electrocution hazard. Work conducted in proximity of overhead power lines shall be performed in accordance with the requirements contained in the EM 385-1-1, Section 11.E. Overhead lines will be de-energized prior to excavation. One power pole may be removed and relocated or it may be braced in position during excavation.

3.0
RESPONSIBILITIES AND AUTHORITIES

This section describes the roles and responsibilities of project personnel with regard to safety and health. Ultimately, responsibility for the safety and health lies with the individual. All personnel must be cognizant of the hazards and the methods of reducing the risk of injury and illness. All personnel will comply with the rules and procedures set forth in this plan and will make project management aware of any conditions which may jeopardize the welfare of project workers and/or the general public.

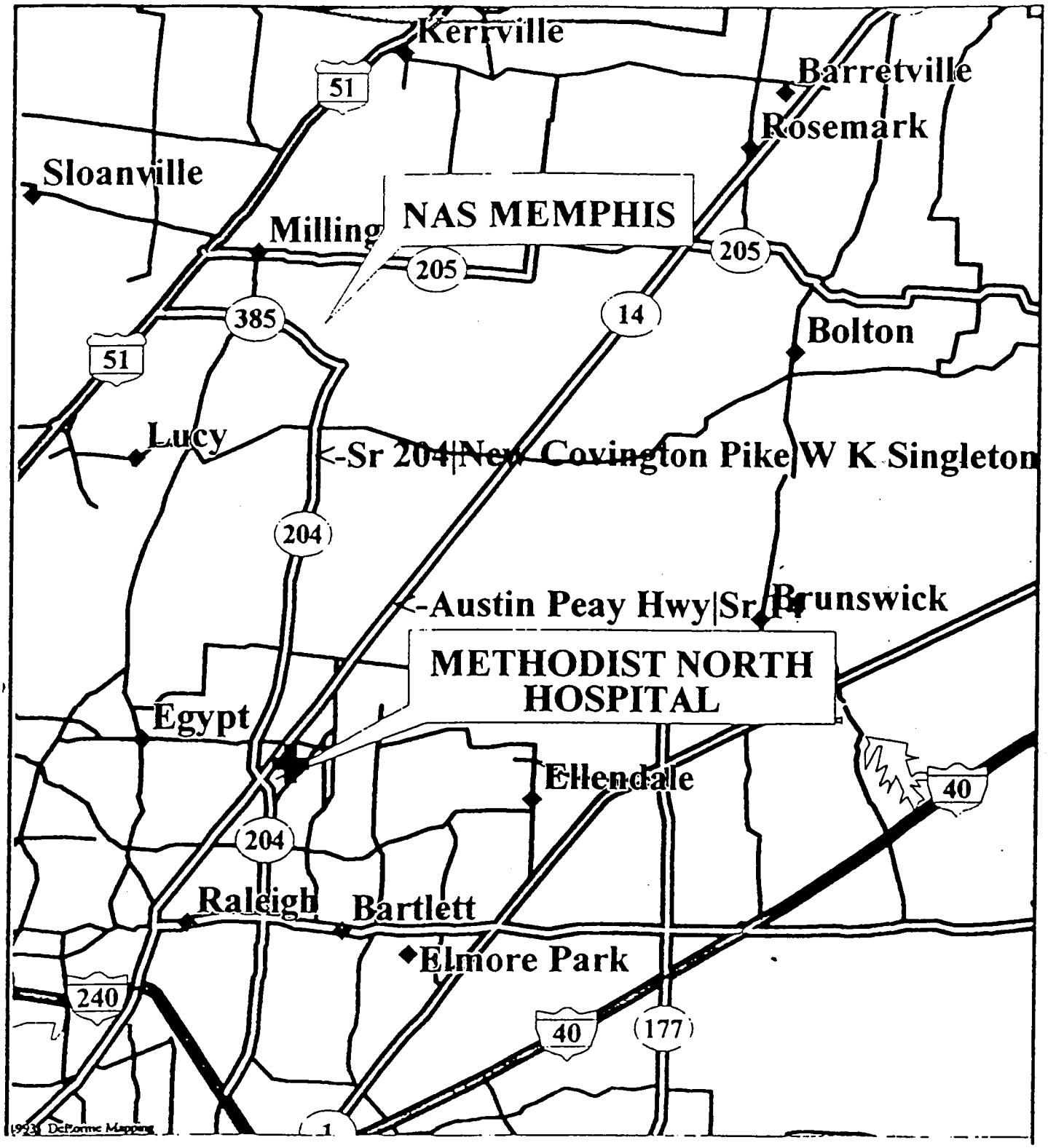
The specific personnel names and telephone numbers of responsible persons are presented in Table 3-1. The map to the nearest medical facility is provided in Figure 3-1. MK intends to provide a project staff consisting of one Project Manager (PM) and one Site Safety and Health Officer (SSHO). The GSHP provides specifics on personnel responsibilities and authorities.

Table 3-1 Personnel Names and Telephone Numbers

Contact	Person or Agency	Telephone
Fire Department	**Base Fire Department**	**Ext. 9-911**
Law Enforcement	**Base Security**	**Ext. 9-911**
Ambulance Service	**Base Ambulance**	**Ext. 9-911**
Robert Hlavacek	MK Program Manager	(803) 554-9367
Scott Newman	MK Senior Project Manager	(803) 554-9369
Marty Wilson	MK Field Operations Manager	(803) 554-6003
tbd	MK Project Manager (Site)	Office: tbd
tbd	MK Site Safety and Health Officer	Office: tbd
Jeff Kyser	MK Project Engineer	Office:(216) 523-5010
tbd	MK Quality Control onsite	
William Piispanen	MK SouthDiv Health and Safety Program Manager	(208) 386-5930
John Karlyk	SOUTHNAVFACENGCOM Remedial Project Manager	(803) 820-5624
Linda Boyd	ROICC	(901) 874-5486
Mike Jones	Asst. ROICC	(901) 874-5612
Randy Wilson	Env. Protection Specialist/UST Manager	(901) 874-5461
Jim Heide	Environmental Engineer	(901) 874-5461
Poison Control Center	National Poison Control Center	800 492-2414
CHEMTRAC	Chemical spill or leak emergencies	800 424-9300
National Response Center	National Response Center	800 424-8802
USEPA RCRA/CERCLA Hotline	USEPA	1-800-424-9346
Hospital	Methodist North	(901) 873-5801/5802

Directions to Methodist North Hospital, 3960 Covington Pike, Memphis, Tennessee:
From NSA Memphis Main Gate: (1) Exit Base through South Gate (Singleton Parkway); (2) Continue on Singleton Parkway through the stop signs; (3) 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.

Figure 3-1 Hospital Route Map



4.0
TRAINING AND SAFETY MEETING REQUIREMENTS

This Section lists all regulatory driven and project specific training and meetings required for this project.

4.1 HAZARDOUS WASTE OPERATIONS TRAINING

Refer to GSHP Section 4.1.

4.2 ADDITIONAL TRAINING AND MEETINGS

Additional training and meetings required for this job are summarized in the following table that follows. The reader is referred to the GSHP for details on the training and meeting requirements.

TABLE 4-1
TRAINING AND MEETINGS

	Type of Training or Meeting	GSHP Reference
1.	Site Specific Training	GSHP Section 4.2
2.	Confined Space (See Note 1)	GSHP Section 4.3
3.	Respiratory Protection	GHSP Section 4.4
4.	Hazard Communication	GSHP Section 4.5
5.	CPR/First Aid & Bloodborne Pathogens	GSHP Section 4.6
6.	DOT Haz Mat	GSHP Section 4.7
7.	Safety Meeting	GSHP Section 4.8, complete safety meeting form found in the GSHP
8.	Plan-of-the-Day Meeting	GSHP Section 4.9, document meeting attendance.
9.	Pre-and Post-Entry Briefings (Meeting)	GSHP Section 4.10, document pre-entry meeting attendance.
10.	Quality Control Preparatory Phase Inspection Meeting	GSHP Section 4.11

Note 1: permit required confined space entry is not anticipated on this project, however, entry into open excavation shall be treated initially as confined spaces until engineering controls are determined to be adequate and atmospheric monitoring shows no hazardous conditions.

4.3 RECORD KEEPING

Per GSHP Section 4.12.

5.0
MEDICAL SURVEILLANCE PROGRAM REQUIREMENTS

All project personnel who work within the exclusion zone for more than three days per month, or are required to use respiratory protection regardless of the time within the exclusion zone, will participate in a medical surveillance program in accordance with OSHA 1910.120 and 1926.65.

Requirements for this job include certification of current medical exam and respirator clearance. Copies of these form(s) shall be maintained onsite by the MK SSHO.

6.0
PERSONAL PROTECTIVE EQUIPMENT (PPE)

6.1 GENERAL REQUIREMENTS

Refer to Table 4 in the GSHP document for the definition of the basic levels (Level B, C, Modified D, and D) of PPE.

6.2 SPECIFIC REQUIREMENTS

Table 6-1 lists the minimum PPE level required for each task or operation. If air sampling/monitoring indicates that modification to the levels of protection are warranted, the MK SSHO is empowered with the authority to authorize the modification based on the guidance provided in **Table 6-2**, Airborne Contaminant Response Criteria or professional judgement.

Table 6-1 Minimum Personal Protective Equipment Requirements by Task

Site	Activity	PPE
Tanks 304 and 1239	1. Site Preparatory Work. 2. Soil Excavation, Storage and Disposal. 3. Excavation Dewatering and Disposal of Groundwater. 4. Tank and Ancillary Equipment Demolition and Disposal. 5. Decontamination Activities. 6. Sampling and Analysis. 7. Backfill Placement. 8. Site Restoration. 9. Waste Management.	1. Level D. 2. Level D, modify where necessary. 3. Level D, modified Level D where contact with visibly contaminated groundwater is possible. 4. Modified Level D. Level D where no contact is anticipated. 5. Modified Level D. Level C for high pressure washing. 6. Modified Level D. 7. Level D 8. Level D 9. Level D, modify where necessary.
Reserved	Reserved	Reserved

Notes:

1. Level D = standard work attire. Include hardhat, safety glasses with side shields, and steel- toed boots.

2. Modified Level D = Level D plus the following modifications: (1) chemical resistant gloves made of nitrile rubber or equivalent material; (2) chemical resistant boot covers or boots made of nitrile, neoprene, or PVC; (3) poly-coated tyvek or equivalent body suit where minor splash protection is necessary.

   Field Sampling Activities - disposable nitrile gloves, booties if necessary.
   Dewatering of Groundwater and Disposal - chemical resistant gloves.

3. Level C = same as Modified Level D. Use full face APR with HEPA cartridges for high pressure washing activities or half-mask, HEPA cartridges with face-shield.

Table 6-2 Airborne Contaminant Response Criteria

Contaminant or Chemical	Level	PPE	Monitoring Frequency	Actions Taken
Volatile organic compounds	No more than 5 ppm above background, no benzene detected above 0.5 ppm (Action Level).	Level D or Modified Level D. See Table 5 for PPE requirements by task.	Prior to each shift and reentry following 30 minute vacancy or as described in Section 7 of this plan.	Continue periodic monitoring or maintain continuous monitoring dependent on task.
	Greater than 5 ppm above background but less than 10 ppm above background. No benzene detected above 0.5 ppm (Action Level).	Level D or Modified Level D. See Table 5 for PPE requirements by task.	At least once every hour, when change in operation occurs or as described in Section 7 of this plan.	Monitor for benzene, continue periodic monitoring or maintain continuous monitoring dependent on task.
	Greater than 10 ppm above background or benzene detected greater than 0.5 ppm or action level exceeded for any organic (BTEX and petroleum hydrocarbons).	Level C or B PPE as specified by CBBY SSHO. See Table 5 for PPE requirements by task.	Continuous.	Stop work, evacuate exclusion zone and notify MK SSHO. Size up situation and re-evaluate re-entry requirements.
Oxygen	Less than 19.5% or greater than 22%	Level B per concurrence by MK SSHO.	Prior to each shift and reentry following 30 minute vacancy or as described in Section 7 of this plan.	Stop work, evacuate exclusion zone and notify MK SSHO. Size up situation and re-evaluate re-entry requirements.
% LEL	Equal to or greater than 10%.	Level B PPE per concurrence by MK SSHO.	Prior to each shift and reentry following 30 minute vacancy or as described in Section 7 of this plan.	Stop work, evacuate exclusion zone and notify MK SSHO. Size up situation and re-evaluate re-entry requirements.

7.0
MONITORING AND SAMPLING

Air monitoring refers to direct real time reading of airborne concentrations and air sampling refers to time integrated air sampling, either personal or area samples. The Subcontractor is responsible for supplying one flame ionization detector (FID), a supply of colorimetric indicator tubes and handpump, and one combustible gas indicator (CGI)/ oxygen (O_2) meter as described in subsections 7.1.1 and 7.1.2. The MK SSHO will maintain an additional CGI/O_2 meter and a sound level meter. Execution of real time air monitoring will be coordinated by the MK SSHO in accordance with the requirements for air monitoring depicted in Table 7-1. Time integrated air sampling is not anticipated for this project.

7.1 AIR MONITORING

7.1.1 Volatile Organic Compounds

A direct-reading, real-time flame ionization detector (FID) instrument capable of detecting volatile organic compounds (VOCs) will be used for checking tank interiors, ancillary components, and general area scans.

Colorimetric indicator tubes (e.g., Dräeger tubes) shall be used at the MK SSHO's discretion for general area checks on Benzene, Toluene, Ethyl benzene, Xylene (BTEX) and petroleum hydrocarbons.

7.1.2 Combustible Gas and Oxygen Monitoring

A direct reading real time combination instrument capable of measuring % Lower Explosive Level (LEL) and percent of oxygen (O_2) will be used for checking tank interiors and ancillary system components prior to demolition. Also, this instrument will be used to check atmospheric conditions prior to any personnel entry into open, safeguarded excavations.

7.2 NOISE MONITORING

Noise monitoring will be performed by the MK SSHO at the initiation of demolition tasks or operations posing an occupational risk. Sound levels will be determined at locations that best approximate the sound levels at the ear of potentially affected personnel.

Table 7-1 Air Monitoring and Sampling Requirements

Site	Activity	Monitor				
		VOC	Oxygen and, % LEL	Perimeter (VOCs)	Noise	Heat Stress
Tanks 304 and 1239	Soil Excavation and Tank and Ancillary Equipment Demolition and Disposal.	1.Y	1. Y	1. N	1.Y	1. O

Y = Yes, O = Optional at discretion of MK SSHO, N = Not required

8.0
GENERAL SAFETY RULES AND PROCEDURES

8.1 GENERAL

Operations will be conducted in a safe manner consistent with the policies and procedures outlined in this SSHP. The number of personnel will be restricted to the minimum necessary to complete the required work as an administrative control to limit personnel exposures to potential site chemical, physical and biological agents. All project and subcontractor personnel assigned to this project are responsible for following this SSHP and its approved modifications, for using safe practices, and for wearing the PPE specified by the MK SSHO. Project personnel will report hazards and unsafe conditions and practices to the MK SSHO. All federal, state and local occupational health and safety regulations must be complied with by project personnel. Violations of project procedures may include disciplinary measures up to and including termination.

8.2 RULES AND PROCEDURES

Refer to GSHP Section 8.2.

9.0
SITE CONTROL MEASURES

9.1 WORK ZONE MAPS

Prior to the commencement of field activities, Work Zones will be established by the Subcontractor with the approval of the MK SSHO as necessary to meet operational and safety objectives. These work zones will be depicted on Work Zone Maps that are field prepared by the Subcontractor to be posted by the Subcontractor Job Supervisor near the entrance to the work area. In addition to the zones, these maps should show assembly points; evacuation routes; location of first aid equipment, fire extinguisher(s), eye wash/drench and spill containment equipment; and emergency communications equipment. One copy of the work zone maps and all revisions will be delivered to the MK SSHO by the Subcontractor Job Supervisor to be retained by the MK SSHO in Attachment A of the field master copy SSHP. Posted with the Work Zone Map will be the list of emergency phone numbers and route map to hospital.

9.2 WORK ZONE CONTROLS

Before site operations begin, the Support Zone MK site office and Subcontractor offices will be identified with signs identifying as such. The Subcontractor will post signs at entrances to the CRZ and/or EZ stating the following or equivalent:

HAZARDOUS AREA KEEP OUT
DANGER
AUTHORIZED PERSONNEL ONLY
PERSONAL PROTECTIVE EQUIPMENT IS REQUIRED IN THIS AREA

Included with the above sign, the Subcontractor will post signs at the entrance to the CRZ before operations begin, stating:

NO SMOKING, DRINKING OR EATING BEYOND THIS POINT

The Subcontractor will control pedestrian traffic in interior work areas using traffic type barricades such as cones and also caution tape where necessary.

10.0
PERSONNEL AND EQUIPMENT DECONTAMINATION AND HYGIENE PROCEDURES

10.1 GENERAL

All personnel, clothing and equipment leaving an exclusion zone (contaminated or potentially contaminated area) shall be inspected and, if necessary, decontaminated to remove any potentially harmful substances that may have adhered to them. Some equipment/clothing may be disposed of rather than decontaminated. In this case, the used PPE and/or equipment (e.g. disposable sampling equipment) will be stored in properly marked, plastic lined 55-gallon drums in the CRZ.

10.2 PERSONNEL DECONTAMINATION

Personnel decontamination (decon) stations will be established in the contamination reduction zone, or they may be integrated into the decontamination facility, discussed in Section 3.2.5 of the Work Plan. The decon stations will consist of the following, as appropriate:

- Equipment drop to include used respirator receptacle.
- Boot wash station with boot pick for cleaning initial mud cakes from boots (a tub of water and detergent (Alconox® or equivalent) with brushes for cleaning and another tub of water for rinsing.
- Outer glove wash station when reusable (similar to boot wash station).
- Sampling equipment wash station (similar to boot wash station).
- Disposable clothing drop. All contaminated or potentially contaminated disposable clothing shall be placed into labeled 6-mil plastic bags within a 55-gallon drum for disposal. Ergonomic attributes will be built into the individual decontamination station(s) consisting of handrails for leaning against and portable chairs for sitting when removing PPE.

10.3 EMERGENCY PERSONNEL DECONTAMINATION

Based on the type of emergency that is postulated, the following types of response actions are anticipated for personnel emergencies within the exclusion zone.

10.3.1 Critical Triage Condition (life threatening)

Emergency evacuation or extrication from the exclusion zone to contamination reduction zone will occur, where emergency medical treatment and stabilization will be attempted until arrival of first responding medical unit. Or, emergency medical treatment and stabilization will be completed in the exclusion zone until arrival of first responding medical unit. In either case, gross decontamination will be completed to the extent possible by removal of PPE, wiping patient down to remove contamination and/or wrapping patient to prevent spread of contamination.

10.3.2 Marginal Triage Condition (non life threatening)

The patient will be evacuated from exclusion zone and treated in the contamination reduction zone followed by decontamination and patient preparation for transport to emergency medical facility. Decontamination could occur first followed by medical treatment in selected scenarios.

10.4 EQUIPMENT DECONTAMINATION

All equipment/tools used in the EZ will be inspected for contamination prior to removal from the site. Any equipment/tools with visible contamination will be cleaned prior to removal from the site at the personnel decontamination stations or equivalent facility. A high pressure low volume water and detergent solution may be used for contaminated equipment, followed by a high-pressure

water rinse if necessary. Steam cleaning is an acceptable alternative and will be used at the PM's discretion. All water used during decontamination will be contained and collected for disposal.

10.5 DECONTAMINATION WASH WATER

Equipment and personnel decontamination areas will be designed to allow for collection of all wash/rinse waters into 55-gallon drums or a larger temporary storage container. Regardless of the container used, it shall be labeled for hazard communication purposes.

10.6 PERSONAL HYGIENE AND SANITATION

Personnel exiting the CRZ are required to thoroughly wash their hands and face prior to eating, drinking, smoking, or using toilet facilities. A hand and face washing facility shall be made available in or near the CRZ consisting of water, towels and soap for personnel. Washing facilities shall be conveniently located to the portable toilet facilities. Lunchroom facilities free of contaminants shall be made available in accordance with EM 385-1-1 Section 2.

11.0
ON-SITE FIRST AID AND EQUIPMENT

11.1 FIRST AID AND MEDICAL FACILITY REQUIREMENTS

At a minimum, 16-unit first aid kits will be maintained by MK in their office trailer. Each Subcontractors will maintain a first aid kit at their office trailer and have sufficient supply of kits for each work site. The location of the first aid equipment will be communicated to project personnel as part of the site-specific and pre-entry brief training. Included with the first aid kit will be a CPR Pocket Mask and a biohazards control kit (used to clean up incidents involving body fluids). The MK SSHO can require upgrades to the first aid equipment requirements as deemed necessary for this job.

An emergency eyewash/drench kit, fire extinguisher(s) and spill control kit will be available at each controlled work area. The emergency phone number list and route map to medical facilities will be posted at each office trailer and at each controlled work zone as part of the Subcontractor prepared Work Zone Map.

11.2 REPORT OF FIRST AID CASES

All first aid cases, accidents and incidents including equipment damage incidents will be promptly reported to the MK SSHO. Refer to GSHP Section 11.2 for additional guidance on reporting requirements. Revise incident reporting such that a Navy CSIR Form, available from Health and Safety Manager, will be used to document all OSHA recordables and equipment damage greater than $1,000.00.

12.0
EMERGENCY RESPONSE PLAN AND CONTINGENCY PROCEDURES

12.1 GENERAL

This section describes a contingency plan to be implemented in the event of injuries, illnesses, accidents, and fires. The contingency plan provides guidelines for the proper response to emergency situations, however the actual response will depend on the situation. In the event of an emergency, the MK SSHO, MK Site Project Manager and/or Subcontractor Job Supervisors will direct all personnel to take appropriate action which could include any or all of the following:

- Evacuate all personnel involved to a safe place of refuge.
- Notify emergency services: **BASE EMERGENCY RESPONSE AT 9-911**
- Initiate emergency response action.

12.2 PRE-EMERGENCY PLANNING

During mobilization activities for this project, the MK Project Manager, MK Quality Control Supervisor, and the MK SSHO will review the MK Program Procedure PHSP 02.1 and execute the steps necessary to assure effective emergency response requirements and resources are established for this project.

12.3 INITIAL REPORTING AND MANAGEMENT OF INCIDENTS

All emergencies will be promptly reported to the Base Emergency Response Number **9-911** and to the MK SSHO. The MK SSHO will assure that the Navy designated authority is notified promptly and will direct initial emergency response actions until the arrival of the emergency response unit. The following contains the initial response actions to be taken by MK personnel and subcontractors at the work site for the type of incident incurred.

12.3.1 Incident Type: Accident involving vehicles and mobile equipment, process equipment, and structures.

Response Actions:

1. Notify the **BASE EMERGENCY RESPONSE AT 9-911** include the following information:
   A. Name and phone number of person calling;
   B. Location of incident;
   C. Type of incident;
   D. Is anyone injured or trapped and potential material release or spill conditions.
2. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) designates one person to meet the emergency response units at the nearest road where the units will be approaching.
3. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) assumes initial command of the situation and directs personnel to do one of the following either separately or concurrently:
   A. Emergency shutdown of process equipment or mobile equipment, evacuate the work zone or immediate area to a safe place of refuge and meet the incoming response units and provide all available information.
   B. If fire is present, initiate initial fire attack and knockdown using available fire extinguishing equipment followed by evacuating the work zone or immediate area.

12.3.2. Incident Type: Preparation for adverse weather condition including high winds, tornado, heavy rains, severe lightning.

Response Actions:

1. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) will direct personnel to shutdown operations, secure loose materials, park and secure mobile equipment. Personnel will remain in vehicles on site, meet in designated Assembly Point, or be released from the site.
2. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) will complete accountability and obtain information from local weather service in support of the decision to resume operations or take other action.
4. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) will inspect all offices, trailers, mobile equipment, work sites for damage or downed power lines.

12.3.3. Incident Type: Medical and Rescue Emergencies.

Response Actions:

1. Notify the **BASE EMERGENCY RESPONSE AT 9-911,** include the following information:
   A. Name and phone number of person calling;
   B. Location of incident;
   C. Type of incident;
   D. Person(s) injured or trapped and exposed to hazardous material.
2. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) designates one person to meet the emergency response units at the nearest road where the units will be approaching.
3. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) assumes initial command of the situation and completes or directs personnel to do one or both of the following:
   A. Emergency shutdown of process equipment or mobile equipment and any other necessary action to mitigate or control the incident.
   B. Initiate emergency first aid actions until arrival of emergency units.
4. For Confined Space Rescue, only emergency rescue units trained in confined space rescue will enter the confined space. The Designated Attendant for that work space must never enter the space as a rescue attempt unless relieved of attendant duties and assigned as a member of the trained rescue team by either the MK SSHO or the responsible supervisor for the confined space entry. The appropriate Fire Department will be notified at least two hours in advance by the MK SSHO or MK Site Project Manager of any permit required confined space entry on site.

13.0
LOGS, REPORTS, AND RECORD KEEPING

13.1 SAFETY AND HEALTH LOGBOOK

MK SSHO will maintain safety and health logbook in accordance with GSHP Section 13.1 including use of GSHP Figure 3 for daily recording.

13.2 REPORTS

A weekly site safety and health inspection report will be prepared by the MK SSHO in accordance with GSHP Section 13.2 and using Figure 4 from the GSHP for weekly reports.

13.3 FIELD MASTER COPY OF SSHP

The MK SSHO will maintain a field master copy of the SSHP in accordance with the GSHP Section 13.3.

13.4 RECORD KEEPING

Refer to GSHP Section 13.4. The MK SSHO will receive copies of all records for injuries and illnesses of Subcontractors incidental to the work, including copies of the Worker's Compensation First Report of Injury. These records will be maintained on the Subcontractors OSHA 200 Log. Per the contract subcontract General Conditions (GC) 13(c), the Subcontractor will provide a monthly project safety review form and attach with it a copy of its OSHA 200 Log specific to this project. The MK SSHO will insure that information on Subcontractor exposure hours is provided to the MK SouthDiv Health and Safety Manager on a monthly basis. A record of all first aid treatments not otherwise recordable will be maintained and furnished to MK or the Navy's designated authority upon request.

13.5 SAFETY AND HEALTH PROJECT COMPLETION REPORT

The MK SSHO will complete a safety and health project completion report at the conclusion of the field work in accordance with the GSHP Section 13.5.

14.0
ON-SITE WORK PLANS

This SSHP is to be used in conjunction with the site specific Work Plan documents. This SSHP is designated as Appendix A to the Work Plan which defines the work objectives and the means and methods for obtaining these objectives.

15.0
COMMUNICATION PROCEDURES

15.1 RADIO COMMUNICATION, TELEPHONE, ALARMS AND DRILLS/EXERCISES

Telephones will be selected as the primary choice of emergency communication and are installed onsite. An emergency alarm, such as an air horn, will be available if necessary at each major work site to warn personnel of an emergency. Personnel will be trained on what actions they are to take if the alarm is sounded to include evacuation routes and assembly points. Drills and exercises will be conducted to ensure that communication methods are adequate. The MK SSHO will test all communication systems prior to commencing work, and on a monthly basis thereafter, for confirmation of emergency communication capability.

16.0
SPILL CONTAINMENT PLAN

16.1 GENERAL

Spill and release accident scenarios during remediation could occur and involve residue process material and rinsates from decontamination activities, or a spill of containerized material that required relocating during the cleaning tasks. The following information will be used by project personnel to respond to and mitigate any releases on the project site. In the event of a spill or release, the MK SSHO, MK Site Project Manager and/or Subcontractor Job Supervisors will direct all personnel to take appropriate action which could include any one or all of the following:

- Initiate spill response action.
- Notify the **BASE EMERGENCY RESPONSE AT 9-911.**
- Evacuate the work zone to a safe place of refuge.

16.2 PREPLANNING FOR SPILL CONTROL

Remedial construction or removal activities will be reviewed for release potential during Plan of the Day and Pre-Entry Briefs. Base personnel will be contacted to determine their capability to respond to various releases.

During mobilization activities for this project, the MK Project Manager, MK SSHO, and the MK Site Project Manager will review the MK Program Procedure PHSP 03.1 and execute the steps necessary to assure effective spill response planning requirements and resources are established for this project. **The Base Fire Department will be notified of any spills classified above incidental and will assist in spill containment. The Fire Department will provide overall command and control of the clean-up activity for spills classified above operational until relieved by a higher authority.**

16.3 SPILL AND FIRE CONTROL MATERIALS AND EQUIPMENT

When planning to move or handle drums (or other containers) containing hazardous or special waste materials, the following will be kept available in areas where spills, leaks or ruptures may occur: 1) salvage drums and container overpacks; 2) suitable quantities of proper absorbent materials; 3) portable containing material; 4) neutralizing agents, both acid and caustic, if necessary, based on the type of material being handled; 5) fire extinguisher(s); 6) emergency eyewash/drench station; and 7) spill pallets or platforms for secondary containment.

Drums and containers used during a clean-up will be appropriate for the hazardous substances they are meant to contain, and will meet the regulations promulgated by DOT, 49 CFR Parts 171-179, OSHA 29 CFR 1910.120, and EPA 40 CFR 262. Drums and containers will be inspected for defects and their integrity assured prior to being filled with any hazardous or special waste substance.

A spill of material can be contained with porous or absorbent barriers. Absorbent materials can take several configurations (pillows, sheets, booms, loose chips, particle beads, and fibers) that may be set in place, or scattered by hand. Preferred sorbents are inert nonreactive clay minerals (neutralizing agents may be added), or specific formulations which provide automatic neutralization or vapor control.

16.4 SPILL CONTROL MEASURES

Stopping the leak or spill at its source may involve turning off pumps or closing valves. Returning a container to an upright position, transferring wastes to other containers, or moving containers to less dangerous locations may, in some circumstances, be possible, but should not be attempted if

the identification of the substance is not known unless Level B Protection is worn and decontamination stations have been established. Similarly, the patching of an active leak is not advised until an initial "Size-Up" of the situation is made by the MK SSHO and guidance established in Section 16.6 has been followed.

16.5 DRUM, CONTAINER, AND TANK HANDLING AND MOVING PROCEDURES

Drums, containers, and/or tanks of hazardous or special waste substances will not be moved until the requirements for preparation have been completed (i.e., all required equipment and materials are at the work site ready for use, and the employees have been familiarized with their responsibilities, the emergency response procedures, and the potential hazards associated with the contents of the drums and containers).

Work site operations will be organized to minimize the amount of drum or container movement. Each drum or container will be inspected before it is moved to ensure that it can be handled without suffering a rupture or puncture, and relocated without having the contents spill or leak.

Unlabeled or unmarked drums and containers will be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled. Drums and containers under pressure, as evidenced by bulging or swelling, will not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosion.

Equipment used to handle the drums and containers will be selected, positioned, operated, and maintained to minimize any contact that could rupture, puncture, dent, or drop drums and containers holding hazardous or special waste substances, and the potential for equipment ignition sources to ignite vapors released from ruptured drums or containers will be controlled. Drums and containers that cannot be moved without rupture, leakage or spillage will be transferred to a sound container using a device specified for the material being transferred. During liquid transfer of flammable or combustible liquids, bonding and grounding equipment will be utilized.

16.6 INITIAL REPORTING AND MANAGEMENT OF INCIDENTS

All spill emergencies initially classified above an Incidental Release as defined below will be promptly reported to the **BASE EMERGENCY RESPONSE AT 9-911.**

Incidental Release (defined) - a release of hazardous material where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel. In addition, the quantity of released material does not exceed EPA Reportable Quantities.

The MK SSHO, the MK Site Project Manager and the Subcontractor Job Supervisor(s) are responsible for directing initial emergency response actions until the arrival of the FIRE DEPT. The following contains the initial response actions to be taken by MK personnel and subcontractors at the work site for spill and release emergencies.

16.6.1. Spill Response Actions:

1. Classify spill as Incidental or an Emergency.
2. If Incidental (as defined above): 1) notify immediate supervisor; 2) assess hazard potential, establish precautions and PPE requirements; 3) begin clean-up of spill.
3. If Emergency, initiate response action in accordance with the following steps:

    A. Quickly assess probability of safely stopping spill. If physical, chemical, or biological health hazards exist, immediate evacuate the area to a safe distance upwind and upgrade from the spill.

B. Notify the **BASE FIRE DEPT** and provide the following information:
   1. Name and phone number of person calling;
   2. Location of incident;
   3. Type of incident;
   4. Is anyone injured or trapped and estimated volume of material released.

C. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) designates one person to meet the emergency response units at the nearest road where the units will be approaching.

D. MK SSHO, MK Site Project Manager or Subcontractor Job Supervisor(s) assumes initial command of the situation and directs personnel to do one of the following:

   1. Emergency shutdown of process equipment or mobile equipment, evacuate the work zone or immediate area to a safe place of refuge and meet the incoming response units and provide all available information.

   2. Initiate initial spill response using available spill response equipment only for small emergency spill events where personnel are trained to mitigate. Evacuate the work zone or immediate area if there are any health threats or risks to personnel.

   3. MK's PM will immediately notify the Navy's Designated Authority and the MK PMO. The Navy's Designated Authority is the ROICC assigned to this project.

17.0
CONFINED SPACES

Permit required confined space entry "may" be encountered on this project with entry into the open excavations. Entry will be treated initially as a permit required confined space until (1) atmospheric monitoring is completed and an (2) assessment of physical and (3) stored energy hazards (utility and process lines) has been documented by a competent person. Air monitoring will be continuous unless specified otherwise by the MK SSHO. Any confined space entry must follow the MK IH Procedure 9.0 under the direction of the MK SSHO. This procedure is found in the MK Industrial Hygiene Procedures Manual and is based on regulation 29 CFR 1910.146.

Adequate provisions for rescue and emergency medical care must be made prior to entry. Initial emergency rescue response will be provided by the **Base Fire Department.** This Fire Department will be notified at least two hours in advance by the MK SSHO or MK Site Project Manager of permit required confined space entry and the duration of the entry. The designated first arrival engine or rescue company for the Base will be invited to tour the site during work activities as part of a pre-planning activity. This will be coordinated by the MK SSHO.

ATTACHMENT A

ACTIVITY HAZARD ANALYSIS (AHA)

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Site Preparation Work.		Analyzed By/Date: Frank J. Petrik 10/8/96	Reviewed By/Date:
1.0 Principal Steps	**Potential Hazards**	**Recommended Controls**	
1.1 Walk area down, establish work zone and lay down areas.	1.1a. Struck by and struck against physical objects during loading and unloading operations and setup. 1.1b. Biological; weeds, snakes, spider's; other plant life. 1.1c. Contact by inhalation, direct contact or ingestion of chemical contaminants.	1.1a. Preplan work layout (Work Zone Map completed and posted by Subcontractor, also emergency numbers and hospital map). Backup alarms on all motorized heavy equipment. Use correct hand and power tools for job and good housekeeping practices. Insure adequate number of personnel assigned on manual lifting and moving operations. 1.1b. MK SSHO to assess Work Zone for any specific biological hazards and communicate findings at POD and/or Pre Entry Briefs. 1.1c. Level D PPE expected. MK SSHO to visually inspect area for evidence of chemical contaminants and if necessary, conduct general area scans for VOCs using FID.	
1.2 Equipment to be Used	**Inspection Requirements**	**Training Requirements**	
1.3 Heavy equipment for loading and hauling. Hand and power tools.	Daily inspection by Sub, prior to use per manufacturer's recommendation. Initial safety inspection of all Subcontractor equipment to be completed by MK SSHO.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour Refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs and OSHA Hazard Communication.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Hand and mechanical excavating.		Analyzed By/Date: Frank J. Petrik 10/8/96	Reviewed By/Date:
2.0 Principal Steps	**Potential Hazards**	**Recommended Controls**	
2.1 Initial excavations completed by hand (potholing) where necessary to locate utilities or UST system connections. 2.2 Mechanical excavation.	Contact with underground utilities including process connections, and other objects not expected in the UST area. Inhalation, direct contact or ingestion of chemical agents. Struck by and struck against physical objects during excavations.	MK Excavation and Trenching permit required. Confirm utilities in area and two shutdown locations (for natural gas) if necessary. Establish Energy Control locations and requirements. Discuss at POD what the expected size and configuration are expected to be for each UST system. Safe Excavation Plan shall be in place. Perimeter guarding shall be implemented for each excavation. Level D PPE during excavating, upgrade or downgrade per MK SSHO direction. MK SSHO to conduct periodic air monitoring for VOCs, LEL, and O_2. Maintain clear area around heavy equipment. High visibility vests for personnel working around heavy equipment. Competent person shall inspect excavation and energy control lock/tags on a daily basis. Record inspection in log book.	
2.3 Equipment to be Used	**Inspection Requirements**	**Training Requirements**	
2.4 Heavy equipment and hand tools.	Daily, prior to use per manufacturer's recommendation.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour Refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, OSHA Hazard Communication, Respirator and Operator Training.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Temporary storage and management of contaminated soils and excavation dewatering and disposal.		Analyzed By/Date: Frank J. Petrik 10/8/96	Reviewed By/Date:
3.0 Principal Steps	Potential Hazards	Recommended Controls	
3.1 Assess for contamination, store in designated location.	Contact with contaminated material during removal, loss of containment of contaminated material.	Level D PPE during initial removal of soil, upgrade per MK SSHO direction. Stockpile soil on polyethylene sheeting, surround with hay bales and cover. Secure area as Exclusion Zone. If roll-off containers used, inspect container for integrity and containment, secure area and cover.	
3.2 Shipment of contaminated soils offsite for disposal.	Contact with contaminated material during loading if not already in container, loss of containment of contaminated material, unsecured loads.	Modified Level D during material handling, upgrade per MK SSHO direction. Inspect shipping containers for integrity and containment, comply with all DOT shipping requirements. Insure provisions for decontamination of any loading equipment.	
3.3 Dewater and dispose of groundwater from excavations.	Slip, trips and falls. Excavation collapse during or after dewatering. Personal direct contact with visibly contaminated groundwater. Contaminated groundwater causes explosion in dewatering pump. Receipt container loss of containment.	Use caution when working near edge of excavation. Competent person on site at all times during dewatering of excavation. Level D PPE expected, upgrade with chemical resistant gloves if direct contact with contaminated groundwater possible. Use explosion proof pumping system, ground and bond where necessary. Inspect receipt containers daily and label nonpotable water.	
Equipment to be Used	Inspection Requirements	Training Requirements	
3.4. Polyethylene sheeting, hay bales, material handling equipment, roll-off containers, portable pumps and Frac Tanks.	Follow general safety rules and procedures in SSHP; review manufacturers recommendation and guidance on inspection of equipment and complete on daily basis prior to use.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour Refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, and OSHA Hazard Communication. Add DOT 181 certification for person supervising the preparation of contaminated materials for offsite shipment.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: General Line Breaking/Disconnecting and Draining		Analyzed By/Date: Frank J. Petrik 10/8/96	Reviewed By/Date:
4.0 Principal Steps	Potential Hazards	Recommended Controls	
4.1 Break line or disconnect at designated locations and drain line back to tank or into a lined sump or int portable containers.	Leaks or spills of product Explosion/fire caused by static sparks or ignition source. Chemical exposure by inhalation or direct contact.	Use non sparking equipment for making cuts or disconnecting pipe flanges. Preplan all onsite disposition and transport of residual product whether drained back into tank or into temporary sumps or containers. Ground and bond equipment where applicable for drainage collection. Provide air monitoring around the work area. Provide energy control (lockout/tagout) where necessary on process systems. Modified Level D PPE initially, upgrade per MK SSHO direction. Stage spill cleanup supplies and equipment.	
4.3 Equipment to be Used	Inspection Requirements	Training Requirements	
4.4 Non sparking cutting equipment, heavy equipment, temporary sump collection equipment.	Daily, prior to use per manufacturers recommendation.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, and OSHA Hazard Communication.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: General Tank Emptying Activity (if necessary)		Analyzed By/Date: Frank J. Petrik 10/8/96)	Reviewed By/Date:
5.0 Principal Steps	**Potential Hazards**	**Recommended Controls**	
5.1 Emptying tank using existing lines or temporary field pump	a. Leaks or spills of product b. Explosion/fire caused by static sparks or ignition source. c. Chemical exposure by inhalation or direct contact	a1. Survey and check integrity of system, valves, pump, piping, hoses, etc. Preplan all onsite disposition and transport of residual product. b1. All electrical connections must meet electrical classification as explosion proof. b2. All temporary equipment must be electrically bounded and grounded. b3. Locate vacuum truck upwind of tank b4. Provide LEL monitoring around the work area. c1. Provide PPE, Level D initially, upgrade per MK SSHO direction. c2. Verify tank contents and/or previous contents to determine cleaning compatibilities and potential exposures.	
5.2 Equipment to be Used	**Inspection Requirements**	**Training Requirements**	
5.3 Temporary pumps, vacuum trucks.	Daily, prior to use per manufactures recommendation.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour refresher, Site Safety and Health Plan (Project Kickoff), Pre and Post Entry Briefs, and OSHA Hazard Communication.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Tank Demolition		Analyzed By/Date: Frank J. Petrik 10/8/96	Reviewed By/Date:
6.0. Principal Steps	Potential Hazards	Recommended Controls	
6.1. Break tank into manageable pieces. Cut hole in tank using shears, or cutting of complete tank into manageable pieces using shears. 6.2. Remove tank pieces using excavator, store for characterization.	a. Flying metal and concrete debris b. Noise c. Fall potential into excavation a. same as above	a. Maintain clear area around demolition area at least 25 feet, hardhats, safety shoes and safety glasses required. b. MK SSHO to conduct general noise surveys, hearing protection with sufficient noise reduction rating to be used where necessary. c. Work zones to be barricaded and signs posted, maintain two feet clear area around excavation and control fall hazard into excavation. d. Maintain IH monitoring, use PPE in accordance with MK SSHO direction. e. Preplan all lifts, Competent Person shall verify safe loading factors for equipment and all hoisting and rigging if used.	
Equipment to be Used	Inspection Requirements	Training Requirements	
6.3. Excavator with shears, lifting and rigging equipment.	Use general safety rules and procedures listed SSHP, review manufacturers recommendation and guidance on inspection equipment. Complete on daily basis prior to use.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour Refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, and OSHA Hazard Communication. Competent Person, Hoisting and Rigging.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Sampling Activities at UST sites		Analyzed By/Date: Frank J. Petrik 10/8/96	Reviewed By/Date:
7.0 Principal Steps	Potential Hazards	Recommended Controls	
7.1 Hand auguring (in excavations)	a. Collapse of excavation; entrance and egress slip, trips and falls; contaminated soil contact: contact with underground utility or piping/ mechanical system.	a. Sampler requires approval from competent person to enter excavation. Atmospheric conditions in excavation checked prior to and during sampling. Modified Level D PPE expected, upgrade per MK SSHO direction. Analyze for potential contact with any underground utility or mechanical service. Note: MK Excavation Permit must be valid. Review manufacturer's field sampling kit manual where applicable.	
7.2 Hand auguring (non excavated areas)	a. Contaminated soil contact, contact with utility or piping/ mechanical system.	a. Excavation/Trenching Permit required. Analyze for potential contact with any underground utility or mechanical service. Modified Level D PPE initially, upgrade per MK SSHO direction. Review manufacturer's field sampling kit manual where applicable.	
7.3 Containerized Liquids Sampling	a. Contaminated liquid contact.	a. Modified Level D PPE.	
7.4 Sampling Equipment Decontamination	a. Contact with contaminated material, also direct contact with decontamination solutions (weak nitric acid and acetone) if used.	a. Modified Level D PPE with splash goggles and chemical gloves.	
7.5 Product Sampling	a. Chemical vapors, pinch points, slips and falls around manholes.	a. Modified Level D, modify where necessary, check organic vapor, LEL/O_2 in and around breathing zone and near manhole prior to and during opening, guard fall hazards. Review MSDS's for known chemicals.	
Equipment to be Used	Inspection Requirements	Training Requirements	
7.5 Core drilling and sampling equipment. Soil auger, stainless steel spoons, buckets, decontamination solutions.	Core drilling equipment must be inspected daily. Use general safety rules and procedures listed in SSHP, review manufacturers recommendation and guidance on inspection equipment. Complete on daily basis prior to use.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour Refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, OSHA Hazard Communication and Respirator. Add DOT 181 certification for person supervising the preparation of contaminated materials for offsite shipment.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Decontamination Facility Operations		Analyzed By/Date: Frank J. Petrik 10/8/96	Reviewed By/Date:
8.0 Principal Steps	Potential Hazards	Recommended Controls	
8.1 Receive and place material at facility.	a. Material handling concerns.	a. Site Decontamination Facility to provide isolation and controlled access. MK SSHO and Project Supervisor to review material handling procedures to insure good practices and approved equipment is used which conforms to OSHA and EM-381 Section 28.I requirements.	
8.2 Decontaminate Equipment using high pressure wash or hand scrubbing.	a. Contact with contaminated material, inhalation of airborne aerosols, contact with high pressure wash stream, unexpected movement of material to be decontaminated.	a. Level C PPE with face shield, modify per MK SSHO direction. Secure items to be decontaminated. Visual inspect integrity of Facility's containment liners and containers used for wastewater. CRZ provided for worker decontamination. MSDS's obtained and reviewed for all cleaning solutions and chemicals if used.	
Equipment to be Used	Inspection Requirements	Training Requirements	
8.3. High pressure wash with soap solution, other decontamination solutions, scrub brushes, material handling equipment if necessary, securing equipment.	Use general safety rules and procedures listed in SSHP, review manufacturers recommendation and guidance on inspection equipment. Complete on daily basis prior to use.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour Refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, OSHA Hazard Communication and Respirator.	

ACTIVITY HAZARD ANALYSIS (AHA)			
Activity: Backfilling and Site Restoration.		Analyzed By/Date: Frank J. Petrik 10/8/96	Reviewed By/Date:
9.0 Principal Steps	Potential Hazards	Recommended Controls	
9.1 Offload, spread, compact and reseed area.	a. Contact with airborne treated material, may present a biological hazard.	a. Dust Controls required to include wetting fill material. Level D PPE expected, upgrade if necessary per MK SSHO direction. Dust controls and respirator (dust mask) may be necessary during spreading and covering with cover material (spray on straw)	
	b. Struck by and struck against physical objects during off loading and spreading material.	b. Preplan work layout. Backup alarms on all motorized equipment. Keep clear area around heavy equipment.	
	c. Vibration from compactor, electric or air source.	c. Equipment operated per manufacturers recommendation. May require heavy work glove for vibration dampening and hearing protection for noise mitigation. Full metatarsal foot protection when using hand held controlled compaction devices.	
9.2 Equipment to be Used	Inspection Requirements	Training Requirements	
9.3 Heavy equipment, hand tools, sodding equipment, straw spreader, Compactor.	Daily, prior to use per manufacturer's recommendation.	OSHA 1910.120 40-Hour Training, 3 day OJT, 8 hours Supervisory. 8 hour Refresher, Site Safety and Health Plan (Project Kickoff), POD, Pre and Post Entry Briefs, and OSHA Hazard Communication.	

ATTACHMENT B

WORK ZONE MAPS

Note: Work Zone Maps are field prepared by the Subcontractor and approved by the MK SSHO. The Subcontractor will deliver one set of the Work Zone Maps to the MK SSHO who will insert copies of the map(s) into the field master copy of this SSHP.

APPENDIX B
QUALITY CONTROL DOCUMENTATION

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Backfill Placement	BF-01	Rev. 1	Page 1 of 2

References: Specifications 01550 -Dust Control, 01570 Dewatering, Drainage and Erosion Control, 02220 - Backfill

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Perform a preparatory phase meeting prior to initiating backfill operations to ensure that backfill placement requirements are understood by all parties.			
2	Ensure that the services of a material testing laboratory are available and the laboratory has been approved.			
3	Verify that compaction densities are identified and understood.			
4	Verify that backfill equipment is present and suitable for the effort, i.e. vibratory compaction equipment, smooth drum rollers, etc.			
5	Verify that proposed fill material complies with the technical specifications, including approved test results.			
6	Verify that shoring has been approved, as required, and that provisions have been made for safety barricades.			
7	Verify that required samples from excavation have been analyzed and the results are acceptable prior to backfill.			
8	Review Work Plan for recovery well installation procedures.			
	Initial Inspections			
1	Verify that excavation is performed in accordance with the Work Plan and within established bounds.			
2	Verify that sub-standard materials (tree roots, etc.) are removed.			
3	Verify that subsoil irregularities such as soft spots are removed.			
4	Confirm that drainage, de-watering, etc., conform to Technical Specifications.			
5	Ensure that materials, compaction, and work are performed, inspected, and tested in accordance with the Work Plan and specifications.			
6	Verify the performance of ASTM D698 Proctor Tests for each soil type. Ensure receipt of test report by MK.			
7	Verify recovery well has been installed in accordance with the Work Plan.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Backfill Placement	BF-01	Rev. 1	Page 2 of 2

References: Specifications 01550 -Dust Control, 01570 Dewatering, Drainage and Erosion Control, 02220 - Backfill

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Follow-Up Inspections			
1	Verify that backfill materials comply with specifications (moisture, density, gradation).			
2	Verify that backfill materials are compacted in lift thicknesses that do not exceed 12 inches. Compaction testing of lifts shall also be confirmed.			
3	Verify performance of Field Density Tests and documentation of results.			
4	Ensure that final grade of the backfill is to previous subgrade material.			
5	See that corrective action measures have been performed where required, verified, and documented. Ensure clearance of items identified on the Rework Items List.			
6	Ensure that the required density testing is performed and test results are provided.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Decontamination	DE-01	Rev. 2	Page 1 of 2

References: Specification 01500 - Decontamination

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Verify Subcontractor Decontamination Plan is submitted and it conforms with the Technical Specification.			
2	Review the specification requirements regarding establishment of the Decontamination Facility.			
3	Review the requirement for daily visual inspection of the decontamination facility and documentation requirements.			
4	Review decontamination procedures for the external surfaces of construction and field equipment as contained in the Work Plan/Technical Specifications			
5	Verify that container for storage of decontamination water is established and of adequate size.			
6	Verify Subcontractor has required supplies for decontamination activities.			
7	Review Site Safety & Health Plan requirements for the Personnel Decontamination Facility. (Briefing by the Site Safety & Health Officer).			
	Initial Inspections			
1	Verify that the decontamination facility is constructed in an area approved by the Project Manager.			
2	Verify that decontamination facilities are delineated with orange fencing and appropriate signs as part of the contamination reduction zone.			
3	Perform an initial inspection of the decontamination facility liner for the following attributes: evidence of tears and holes; evidence of seepage; that the sheeting is adequately fastened to the side walls; that the liner adequately covers the end sections and is secured by sandbags or other appropriate means; that expected quantities of generated liquids can be contained until collected for disposal			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP	FIELD INSPECTION CHECKLIST		
Checklist Title Decontamination	Checklist No. DE-01	Revision Rev. 2	Checklist Page 2 of 2

References: Specification 01500 - Decontamination

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Initial Inspections			
4	Verify that records are established that specify decontamination facility construction materials and methods, disposition of liquids, and any repairs and/or breaches of liner integrity.			
5	Verify decontamination activities are performed in accordance with the Work Plan and Technical Specifications.			
	Follow-Up Inspections			
1	Monitor on-going decontamination operations to verify compliance with the Work Plan/Technical Specifications.			
2	Verify that daily inspections of the decontamination facility are performed and documented.			
3	Verify that records of any breaches and/or repairs to the liner are documented.			
4	Verify decontamination wastes are characterized and disposed of properly.			
5	Verify upon dismantlement of the decontamination facility, that underlying material is not contaminated and no indications of contamination are present (i.e. saturated ground, discolored ground). Potentially contaminated soil shall be sampled and analyzed prior to removal and managed per the Sampling and Analysis Plan.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

acklist Title	Checklist No.	Revision	Checklist
Excavation (UST Removal)	EX-02	Rev. 2	Page 1 of 3

References: 01500 - Decontamination, 01570 - Dewatering, Drainage, and Erosion Control, 02210 - Excavation

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Verify that a well abandonment permit has been obtained from the Shelby County Health Department.			
2	Review specification and drawings to understand scope of excavation.			
3	Verify that excavation permits have been obtained.			
4	Verify that disposal permits have been obtained from both the disposal facility and the TDEC Division of Solid Waste.			
5	Verify that underground utilities have been identified and marked.			
6	Verify that the Work Zone has been clearly delineated in the field.			
7	Verify that a Stockpiling Plan has been developed by Subcontractor and conforms to the Technical Specifications.			
8	Ensure that a Safe Excavation Plan has been developed by Subcontractor and conforms to the Technical Specifications.			
9	Verify that procedures and equipment for line breaks under pressure are in place and understood.			
10	Verify that Safe Excavation requirements are understood and reviewed.			
11	Identify existing improvements and items that are to remain and verify arrangements to protect these items from damage.			
12	Verify that a review of safety requirements is performed as a part of the preparatory phase inspection (Briefing by the Site Safety & Health Officer)			
13	Verify that notification has been given to the Shelby County Health Dept. ten days prior to well abandonment/removal.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP	FIELD INSPECTION CHECKLIST		
Checklist Title Excavation (UST Removal)	Checklist No. EX-02	Revision Rev. 2	Checklist Page 2 of 3

References: 01500 - Decontamination, 01570 - Dewatering, Drainage, and Erosion Control, 02210 - Excavation

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
14	Review the requirements for Lockout/Tagout at the Preparatory phase inspection. (Briefing by the Site Safety & Health Officer.			
15	Ensure that locations of underground utilities have been marked.			
	Initial Inspections			
1	Ensure that work is proceeding according to the plans discussed in the preparatory phase.			
2	Verify that screening and classification of excavated soils is performed according to the Technical Specification.			
3	Verify protection of items that are to remain.			
4	Verify that a dewatering sump is in place prior to further excavation beneath groundwater table.			
5	Verify sump is pumped down to extent possible prior to excavation.			
	Follow-up Inspections			
1	Ensure that excavated soil is stockpiled, shaped, and managed according to the Stockpiling Plan.			
2	Verify that excavation progresses to top of tanks as described in the Technical Specification.			
3	Monitor excavation work to ensure compliance to the Technical Specification.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP	FIELD INSPECTION CHECKLIST		
ecklist Title Excavation (UST Removal)	Checklist No. EX-02	Revision Rev. 2	Checklist Page 3 of 3

References: 01500 - Decontamination, 01570 - Dewatering, Drainage, and Erosion Control, 02210 - Excavation

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Follow-up Inspections			
4	Verify that excavation stops for required sampling.			
5	Verify that any over-excavation has MK approval.			
6	Verify that shoring (if any) is in accordance with approved plans and drawings.			
7	Verify dust control measures are being performed per SSHP.			
8	Verify that erosion control measures are maintained daily.			
9	Verify that monitoring wells have been properly abandoned per the Shelby County Monitoring Well Regulations or completely removed by means of over-excavation.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Mobilization and Demobilization	MD-01	Rev. 2	Page 1 of 2

References: Specification 01020 - Mobilization and Cleanup

Item No.	Item Checked	Accept/Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Schedule a pre-construction meeting prior to construction activities.			
2	Verify that a visual site inspection and evaluation of environmental conditions have been performed.			
3	Verify Subcontractor Work Plan is submitted and in accordance with the Technical Specification.			
4	Verify that site security measures have been established.			
	Initial Inspections			
1	Verify that all equipment mobilized to the site is visually clean and documentation of its cleanliness is provided by Subcontractor..			
2	Verify that all equipment has been inspected upon arrival at site for general conditions to assure that all safety systems and alarms are functional and tested.			
3	Verify that equipment has been set up at designated area.			
4	Verify that work zones and access routes have been established and signs, barricades and tapes have been placed to limit access.			
	Follow-Up Inspections			
1	Verify that all equipment mobilized to the site has been steam cleaned and inspected prior to leaving site.			
2	Verify daily that all equipment has been inspected for general conditions to assure that all safety systems and alarms are functional and tested.			

Specific Item Identification or Location, as applicable:

Checklist Title	Checklist No.	Revision	Checklist
Mobilization and Demobilization	MD-01	Rev. 2	Page 2 of 2

References: Specification 01020 - Mobilization and Cleanup

Item No.	Item Checked	Accept/Reject	Remarks	Verified By /Date
	Follow-Up Inspections			
3	Verify that equipment has been set up at designated area.			
4	Verify that work zones and access routes have been established and signs, barricades and tapes have been maintained to limit access.			
5	Verify that the site has been cleaned upon completion of work. All equipment, unused materials, temporary facilities, and miscellaneous materials have been removed from the site.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Regulatory Compliance	RG-01	Rev. 1	Page 1 of 1

References: SP-01, EX-01, BF-01

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Verify that required disposal permits have been obtained from the disposal facility and the TDEC Division of Solid Waste.			
2	Verify that Shelby County Health Dept. has been notified ten days in advance of well abandonment/removal.			
3	Verify that City of Millington Sewer Dept. discharge permit is in place.			
4	Verify that Safe Excavation Plan has been developed per EM 385-1-1..			
	Initial Inspections			
1	Verify that analytical water data conforms with City of Millington Sewer Dept. requirements prior to discharge.			
2	Verify that analytical soil data conforms with disposal facility requirements.			
3	Verify that analytical soil data conforms with backfill requirements.			
4	Verify that waste is properly manifested and that the Navy or authorized representative has signed off on it.			
5	Verify that waste hauling vehicles do not leak.			
6	Verify that waste hauling vehicles are properly placcarded.			
	Follow-Up Inspections			
1	Verify that monitoring wells have been abandoned in accordance with Shelby County Well Regulations of completely removed by means of overexcavation.			
2	Verify proper implementing of Safe Excavation Plan.			
3	Verify quantities of discharged water stay within permit allowances.			
4	Verify completion of proper shipping manifests for waste disposal.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

cklist Title	Checklist No.	Revision	Checklist
Sampling and Analysis	SA-01	Rev. 1	Page 1 of 2

References: SAP and Specification 02262-Sampling

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Schedule Preparatory Phase Meeting prior to initiating field analytical sampling activities.			
2	Verify that analytical laboratory services have been procured.			
3	Verify that sample containers, coolers, chain-of-custody records (COCs), labels, seals and all necessary sampling equipment is present.			
4	Verify that field sampling personnel have completed training as required by the Sampling and Analysis Plan (SAP), including training in completing COCs.			
5	Ensure that the requirements of the SAP have been reviewed with the Project Team.			
	Initial and Follow-up Inspections			
1	Ensure the sampling locations are properly selected per the SAP and verified by the Project Manager, or designee.			
2	Ensure that sampling locations are adequately documented in a field log book.			
3	Verify that any field instruments utilized are properly calibrated, and that calibrations are recorded in a field log book.			
4	Verify that sampling equipment is properly protected from possible contamination prior to sample collection.			
5	Verify that the sampling technician wears clean, disposable latex or vinyl gloves during sample collection.			
6	Verify that the sampling technician changes gloves for each sampling location.			
7	Verify that proper field sampling equipment cleaning procedures are used per the SAP.			
8	Verify the collection of equipment rinsate blanks after field cleaning per the SAP.			
9	Verify that the correct sample containers are used for sample collection.			
10	Ensure that the correct frequency of duplicate samples are corrected per the SAP.			
11	Ensure that samples are properly field-preserved per the SAP.			

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

acklist Title	Checklist No.	Revision	Checklist
Sampling and Analysis	SA-01	Rev. 1	Page 2 of 2

References: SAP and Specification 02262-Sampling

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
12	Ensure that field and/or trip blanks are utilized per the SAP.			
13	Ensure that sample containers are properly identified with labels.			
14	Ensure that sample coolers are sealed with custody seals after samples are packed.			
15	Verify that the proper security measures are taken to ensure custody of the samples after collection, per the sample custody procedures in the QAPP.			
16	Ensure that COCs and receipt for sample forms are properly completed. **REVIEW ALL COCs PRIOR TO SAMPLE SHIPMENT**.			
17	Verify correct frequency of collection and preparation of matrix spike/matrix spike duplications (MS/MSD) at the frequency specified in the SAP (including trip blanks, field blanks and duplicates).			
18	Verify that three times the necessary sample volume for the field duplicate sample identified for QC sampling is collected for MS/MSD sample aliquot.			

ıitional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Site Preparatory Work	SP-01	Rev. 2	Page 1 of 2

References: Specification 01020 - Mobilization; 02100 -Dust Control; 01570 - Dewatering, Drainage and Erosion Control; 02211 - Excavation; 02960 - Site Restoration

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Perform preparatory phase meeting prior to initiating work items for site clearing.			
2	Verify Work Zone is clearly delineated.			
3	Verify excavation permits have been obtained.			
4	Ensure that a Stockpiling Plan has been developed and it complies with the Technical Specification.			
5	Ensure that a Decontamination Plan has been developed and it complies with the Technical Specification.			
6	Ensure that a Storm Water Run-on and Run-off Control Plan has been developed and it complies with the Technical Specification..			
7	Ensure that a Spill Control Plan has been developed and it complies with the Technical Specification.			
8	Verify completion of any initial surveys.			
9	Verify that a review of safety requirements is performed as part of the preparatory inspection. (Briefing by Site Safety & Health Officer).			
10	Ensure that a housekeeping and maintenance requirements are understood.			
	Initial Inspections			
1	Confirm work areas have been located within the limits of established stakes, lines or monuments.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Site Preparatory Work	SP-01	Rev. 2	Page 2 of 2

References: Specification 01020 - Mobilization; 02100 -Dust Control; 01570 - Dewatering, Drainage and Erosion Control; 02211 - Excavation; 02960 - Site Restoration

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Initial Inspections			
2	Verify that protection of items not to be removed or disturbed has been provided, as necessary.			
3	Ensure compliance with the plans identified in the Preparatory Phase.			
4	Verify that dust control measures are available and effective.			
5	Verify that storm water and erosion control measures have been implemented to control run-on, run-off.			
6	Verify that filter fence for surface water and erosion is in place.			
	Follow-Up Inspections			
1	Ensure removal of ground surface vegetation from the construction areas.			
2	Verify removal from the construction area of stumps, roots, debris and other deleterious materials not suitable for subsequent grading or reuse and compaction.			
3	Verify continuing compliance with the approved plans identified during the Preparatory Phase Inspection.			
4	Verify that storm water and erosion control measures have been implemented to control run-on, run-off.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Site Restoration	SR-01	Rev. 1	Page 1 of 1

References: Specification 02960 - Site Restoration

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Verify that the subcontractor provides a Site Restoration Plan (SRP) in accordance with the specifications. Ensure that the SRP is reviewed and approved by the PM.			
	Initial Inspections			
1	Verify inventory of existing conditions and surface features that will affect site restoration.			
	Follow-Up Inspections			
1	Verify that the site is restored in accordance to the specification and the Site Restoration Plan.			
2	Verify continued maintenance of grass and plant life. Replaced or replenish, if required.			
3	Verify implementation of erosion control where necessary.			
4	Perform final walk-through with the Navy Resident Officer in Charge of Construction to confirm final site restoration.			
5	Compile a punchlist of any items identified as deficient or incomplete, and submit to the subcontractor for resolution.			
6	Obtain final written acceptance from Navy ROICC on site.			

Additional Notes or comments: Use Additional Sheets as necessary

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Tank and Ancillary Equipment Removal	TR-01	Rev. 1	Page 1 of 2

References: Specification 02255 - Underground Tank Removal

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Preparatory Inspection			
1	Perform preparatory phase meeting prior to initiating work on tank and ancillary equipment removal.			
3	Verify that all monitoring equipment (i.e. Combustible Gas Indicator, Oxygen Analyzer, etc.) is maintained and calibrated according to manufacturers instructions.			
4	Verify completion of excavation of soil to the top of the tank.			
5	Review safety requirements for tank removal and cleaning. **(Briefing by the Site Safety & Health Officer)**			
6	Review procedure for residual product removal in the event of it remaining in the lines.			
7	Verify that the decontamination facility is acceptable and has adequate capacity.			
8	Ensure that all potential sources of ignition in the area have been removed; ensure that the area is posted with "No Smoking" signs and PPE requirements for entry.			
10	Verify all equipment is properly grounded and GFIs are used.			
	Initial Inspections			
1	Verify that no product is in the lines so that cleaning operations can proceed.			

Specific Item Identification or Location, as applicable:

MORRISON KNUDSEN CORPORATION
ENGINEERING, CONSTRUCTION, ENVIRONMENTAL GROUP

FIELD INSPECTION CHECKLIST

Checklist Title	Checklist No.	Revision	Checklist
Tank and Ancillary Equipment Removal	TR-01	Rev. 1	Page 2 of 2

References: Specification 02255 - Underground Tank Removal

Item No.	Item Checked	Accept/ Reject	Remarks	Verified By /Date
	Initial Inspections			
2	Ensure that the Site Safety & Health Officer regularly monitors the tank atmosphere and the excavation area with a Combustible Gas Indicator for flammable or combustible vapor concentrations until the tank is demolished. Monitoring the UST shall be done at three levels in the tank-bottom, middle, and top.			
3	Verify purging/vapor freeing of the tank. When purging the tank with compressed air or using inert gasses, all devices must be bonded to the tank and the tank must be grounded to a separate ground.			
4	Ensure that the Site Safety & Health Officer monitors the tank to ensure explosive conditions do not exist.			
	Follow-up Inspections			
1	Verify size of demolished materials is of acceptable size to the disposal facility.			
2	Verify removal of demolished tank from excavation			
3	Verify that ancillary equipment has been cleaned according to the Technical Specification.			
3	Ensure characterization of excavated soils and proper stockpiling.			
4	Verify that tank and ancillary equipment are disposed of in accordance with the Waste Management Plan.			

Specific Item Identification or Location, as applicable:

APPENDIX C
SAMPLING AND ANALYSIS PLAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0
PROJECT DESCRIPTION

1.1 INTRODUCTION AND SCOPE

Tanks 304 and 1239 are located on the north side of the facility in the North Fuel Farm at the Naval Support Activity site (NSA Memphis), Millington, Tennessee. Both tanks are composed of cast-in-place concrete with a capacity of 100,000 gallons each. Both contained heating oil and are reportedly empty at the present time. Service piping and mechanical appurtenances remain connected to the tanks. Further details on the tank construction, utilities and layout are provided in the Work Plan.

The Scope of Work includes the removal of these tanks and confirmation sampling following tank removal. Remediation activities will be performed as specified by Delivery Order #0030, Statement Of Work #039, under the Environmental Remedial Action Contract (ERAC) No. N62467-93-D-1106.

This Sampling and Analysis Plan (SAP) presents the organization, objectives, and planned activities associated with the remedial activities for this facility. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses will be described. All Quality Assurance (QA) procedures will be structured in accordance with applicable technical standards and Tennessee Department of Environment and Conservation (TDEC) regulations and guidance.

1.2 PROJECT OBJECTIVES

The objective of the work described in this document and the Work Plan is to close the tank sites by removing and disposing of the tanks, ancillary equipment, connected piping and soil within the excavation zone. Removal and disposal of ground water and decontamination water will also be accomplished. Continuous monitoring of the tank sites will be performed during remedial activities. Excavation completion will be achieved once all conditions specified in the Work Plan are met. Soil sampling will also be performed at the tank site for confirmation.

Specific objectives for sampling include:

- Determine the extent of excavation by collecting and analyzing samples in the field for total petroleum hydrocarbons (TPH) using immunoassay test kits.
- Verify by laboratory analysis whether the limits of soil excavation meet cleanup objectives for Underground Storage Tank (UST) removal.
- Characterize liquid and soils for disposal.
- Confirm that backfill material meets chemical and geotechnical criteria stated in the Work Plan.
- Support health and safety requirements.

A structured approach will be utilized during implementation of the Corrective Action Plan developed by EnSafe. During the course of the work, data collection will be conducted as each tank is removed, with the results of the sampling being a determining factor in decisions regarding the necessity for Corrective Action following tank removal.

Samples will be collected as described in Section 2 and analyzed for constituents listed in Table 1-1. Excavated soil will be sampled, analyzed and transported for off-site disposal, if it fails to meet the criteria for use as backfill (see Section 1.4 and Waste Management Plan, Appendix E).

1.3 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of the data required to support decisions made during UST removal actions and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality. This project will primarily utilize EPA Level 3, and it will be necessary to gather sufficient information to evaluate the nature and extent of contaminants remaining in the soils after tank removals are completed.

The analytical level used for data collection at NSA MEMPHIS are as follows:

- **Field Level -** Field Level involves the use of field analysis (immunoassay test kits) to obtain preliminary quantitative results. TPH field test kits will be used to determine the extent of excavation at each tank location, followed by confirmation sampling and analysis.

- **EPA Level 3 -** EPA Level 3 involves the use of an off-site analytical laboratory to analyze the samples. Level 3 allows the use of non-Contract Laboratory Program (non-CLP) methods, but do require that the methods be EPA-approved or equivalent.

Level 3 laboratory analyses, using EPA methods from the most recent edition of SW-846 (USEPA, 1990) or from "Methods for Chemical Analysis of Water and Wastes" (USEPA, 1983), will be performed on confirmation, soil stockpile, ground water and decontamination water samples collected at the tank sites. QC documentation, similar to CLP requirements, will be generated to enable data verification and data validation. The data set deliverable requirements are identified in Table 3-1.

1.4 CLEANUP GOALS

Following tank removal, soil samples from the sidewalls and base of the excavation will be collected and field screened for TPH. Once field screening measurements show that soil in the excavation are below 1000 ppm TPH, confirmation samples will be collected and submitted for laboratory analysis for TPH-Diesel Range Organics and Gasoline Range Organics (TPH-DRO, TPH-GRO). Once confirmation samples show soil levels are below 1000 ppm combined TPH-DRO and TPH-GRO, excavation will cease.

Excavated soil which exhibits levels greater than or equal to 100 ppm combined TPH-DRO and TPH-GRO will be transported off-site for disposal. Excavated soil which is less than 100 ppm combined TPH-GRO and TPH-DRO may be used as backfill. These primary cleanup goals for the project are summarized in Table 1-2.

The Millington City Sewer Department, the local Publicly Owned Treatment Works (POTW), will provide the acceptance criteria for discharge of ground water pumped from the excavation and decontamination water generated during field activities. Upon approval, these waters may be discharged to the on-site sewer system via the existing oil/water separator. Specific permit requirements are described in Section 2.2.1 of the Work Plan.

Table 1-1
Analytical Methods Summary

Sample Matrix	Constituent(s)	Analytical Method
Excavation Soils - field screening	VOCs	PID/FID
Excavation Soils - field immunoassay analysis	Total Petroleum Hydrocarbons (TPH)	EnSys™, D-Tech™, Ohmicron™ or equivalent
Excavation Soils - confirmation (sidewalls, base, piping runs)	TPH-GRO, TPH-DRO	8015 Modified (California Method)
Excavated Soils - confirmation for use as backfill (soil above tank only)	TPH-GRO, TPH-DRO	8015 Modified (California Method)
Excavated Soils/ Demolished UST Concrete - for disposal (1)	TCLP Lead	1311/6010/7470
	TCLP Benzene	1311/8240
	Paint Filter Test	9095
Decontamination/ Pumped Ground Water (2)	BTEX	8240
	Oil & Grease	5520f
	TPH-GRO, TPH-DRO	8015 Modified (California Method)

Notes:

1. Actual disposal parameters for soil will be determined by the chosen disposal facility prior to being transported off-site. The disposal facility may require sampling for additional constituents as well.
2. Water disposal parameters will be finalized with the POTW.
3. Less than 1000 ppm combined TPH-GRO and TPH-DRO shall be used as a target level for confirmation soil sampling.
4. Backfill obtained from off-site source must be less than 100 ppm TPH-GRO + TPH-DRO. TAL and TCL detections will be evaluated by the Project Chemist or designee.

VOC = volatile organic compounds
PID/FID = photoionization detector, flame ionization detector
BTEX = benzene, toluene, ethyl benzene, xylene
TCLP = Toxicity Characteristic Leachate Procedure

Table 1-2
Cleanup Levels

Sample Matrix	Parameter	Cleanup Level (ppm)	Data Use
Excavation Soils - field screening	VOCs	(will be relative to background levels)	to assist in delineating limits of excavation
Excavation Soils - field immunoassay analysis	TPH	1000	to determine if confirmation samples may be collected
Excavation Soils - confirmation samples collected from base, sidewalls and piping runs	TPH-GRO; TPH-DRO	1000	to determine if excavation may cease, and the hole may be backfilled
Excavated Soils - soil above tank which passes field screening	TPH-GRO; TPH-DRO	100	to determine if soil removed from above tanks may be used as backfill (<100 ppm) or must be shipped offsite (>=100 ppm)
Decontamination/ Pumped Ground Water	BTEX TPH-GRO TPH-DRO	TBP	to determine if decon water and pumped ground water may be discharged to sanitary sewer

Notes:
1. Disposal parameters for excavated soil which cannot be used as backfill will be finalized with the disposal facility.
2. Water disposal parameters will be finalized with the POTW.

VOC = volatile organic compounds
TBP = to be provided
BTEX = benzene, toluene, ethyl benzene, xylene
TPH = total petroleum hydrocarbons
GRO = gasoline range organics
DRO = diesel range organics

2.0
SAMPLING PROCEDURES AND ANALYTICAL REQUIREMENTS

This Section contains sampling procedures for confirmation, disposal, backfill, and waste water samples for constituents of concern. The overall objective of this sampling event is to collect samples from which data can be used to make management decisions regarding contaminant extent, extent of excavation, and disposal options.

The following procedures will apply:

- On-site analysis of soil samples using TPH immunoassay kits -(following manufacturer's instructions), and field screening for VOCs;
- Excavation Soil Sampling, (Table 2-1);
- Stockpile Sampling, (Table 2-2);
- Waste Water Sampling - Decon Water/Ground Water, (Table 2-3);
- Backfill Soil Sampling, (Table 2-4);
- QC sample procedures;
- Sampling equipment decontamination; and
- Sample Packaging and Shipping (Table 2-5).

2.1 PREPARATION FOR SAMPLING

Prior to sample collection, the following tasks will be completed:

1. Review tank information, including previous closure data from three tanks (USTs 7, 303, 1241) formerly located 50 feet west of the tanks to be removed.

2. Ensure that appropriate staging areas, decontamination pads and holding areas have been properly constructed. Access to support vehicles, office trailers, etc. should not be affected by excavation activities. Verify that excavation permits have been obtained or approved.

3. Review the SSHP. All field personnel will attend a Health and Safety training meeting at the beginning of each task. Field personnel will be asked to document that training was completed and that they will abide by the provisions stated in the SSHP.

4. Establish an equipment locker or staging area. Inventory all supplies and maintain careful records of initial and continuing calibration for all monitoring equipment. Check supply lists daily to determine if additional items will be needed. A general list of sampling and other field equipment is provided in Table 2-6.

5. Obtain all necessary documentation materials, including field data logging forms, field logbooks, sample labels and chain-of-custody forms, etc. Become familiar with calibration procedures for the field instruments.

6. Collect the applicable health and safety equipment for tank sampling as defined in the SSHP. Consult the SSHP for specific details including calibration procedures, action levels, lockout/tagout and confined space entry procedures.

7. Ensure all utilities have been cleared prior to all excavation work. Obtain approval from the Project Manager and the Navy for clearance of utilities.

8. Obtain sample bottles from the laboratory. Sample bottles will be provided by the analytical laboratory. These bottles will arrive at the site in sealed boxes or coolers. Certification of cleanliness will accompany each box of bottles. The exception to this would be if any bottles were pre-preserved by the lab.

2.2 TRAINING REQUIREMENTS

All field sampling personnel will be trained as described in the SSHP (Appendix A of the Work Plan). Personnel responsible for collecting field samples will be required to read this SAP and will be familiar with all required methods and procedures. The MK field sampling crew and the Quality Control personnel performing inspections will be trained prior to commencing field activities, and training will be provided by MK and verified as part of the MK review process. Personnel in charge of reducing, evaluating, and reviewing the laboratory and field data must have a working knowledge of the analytical methods employed.

2.3 SITE SAMPLING PROCEDURES

Two tanks (Tanks 304 and 1239) will be removed as described in the Work Plan. Documentation for each tank will be thoroughly reviewed prior to work. Confirmation sampling will be conducted to satisfy soil cleanup objectives.

2.3.1 General Approach

The following approach will be used at each tank location.

1. Soil will be removed to expose the tank. Based on review of site documents, the tanks were pumped dry of product. As a result, sampling of tank or piping contents is not addressed in this document.

2. Soil around the tank which is stained, displays high PID/FID readings, or has greater than or equal to 1000 ppm TPH as determined using field test kits will be excavated and the tanks will be demolished in place. Once the tanks are removed, samples will be collected from the walls and base of the excavations and field analyzed using immunoassay test kits to determine if additional excavation is required.

3. If field analysis reveals TPH levels less than 1000 ppm, excavation will cease, and confirmation soil samples will be collected from the walls and base of the excavation and submitted for laboratory analysis. Each sample will be analyzed for TPH-GRO and TPH-DRO, and the two results will be added together. If the total TPH value (TPH-GRO + TPH-DRO) is greater than or equal to 1000 ppm, excavation will continue.

4. If confirmation soil sample TPH levels are less than 1000 ppm, excavation will cease and remaining ground water will be pumped from the excavation. The ground water will be sampled and laboratory tested for TPH-GRO and TPH-DRO. The TPH results will be combined to give a total TPH for ground water.

5. Soil removed from above the elevation of the tanks and exhibiting field readings of less than 100 ppm TPH will be stockpiled and analyzed for use as backfill. Sampling of stockpiled soil will be performed in accordance with Tennessee Division of Underground Storage Tanks Technical Guidance Document - 005 (TDEC, 1996).

6. Soil removed from around the perimeter and base of the tanks will be stockpiled separately from above tank soils. All excavated soil which is greater than 100 ppm total TPH will be disposed of off-site.

Pumped ground water and decontamination water generated during site activities will be sampled as detailed in Table 2-3 for discharge to the local POTW.

2.3.2 Sampling Locations

Soil sampling locations will be field located and will be based on 20-foot spacing around the perimeter of the tanks and a maximum 20-foot grid pattern beneath the tanks. It is possible, however, that depending on the nature of encountered field conditions, some of these locations will be changed. Sampling locations are shown on Figure 1. Field sampling locations will be finalized by the Project Manager in consultation with the Navy Resident Officer in Charge of Construction (ROICC).

2.3.3 Summary of Procedures

Samples will be collected at each UST location and beneath piping runs during removal actions. Types of sampling covered by this SAP include:

- Field-screening of soils for the presence of VOCs and TPH;
- Sampling stockpiled (excavated) soil for reuse as backfill or disposal characterization. Overburden as well as soil excavated from around the tank will be sampled;
- Decontamination water and ground water sampling for characterization and/or disposal;
- Confirmation sampling to verify that removal of contaminated soils has been completed in accordance with cleanup objectives; and
- Sampling backfill material including topsoil for chemical and geotechnical characterization.

Procedures for sampling activities are summarized in Tables 2-1 through 2-4. Objectives, equipment, methods and documentation are covered in each table. Information on number of samples to be collected is provided in Table 2-7. Analytical method requirements are provided in Table 2-8. The data collection procedures are included at the end of this section:

- Table 2-1: Excavation Soil Sampling
- Table 2-2: Stockpile Sampling
- Table 2-3: Waste Water Sampling
- Table 2-4: Backfill Sampling

Soil sampling field data will be recorded on the Field Data Sheet 1 found in Attachment A, for excavation, stockpile and backfill samples.

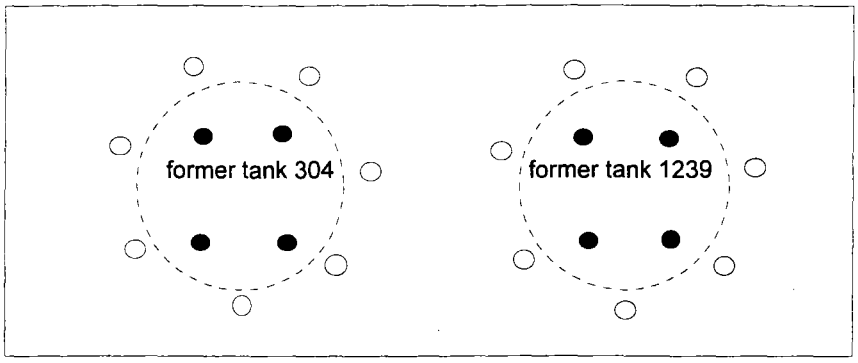
The following assumptions have been made in developing these procedures:

- Based on site records, no radioactive materials were introduced to the site.
- No unexploded ordnance are present, and an ordnance survey will not be required.

2.4 ADDITIONAL SAMPLING PROCEDURES

2.4.1 Field Quality Control Samples

QC samples will be collected to ensure that representative and reproducible data are obtained in accordance with TN guidance. The types of QC samples that will be used are discussed below. QC samples apply only to samples submitted for off-site analysis by a laboratory, with the exception of field duplicates for field screening samples. Field duplicates will be collected at a frequency of 1 per 10 field screening samples collected and 1 per 10 samples for off-site analysis.

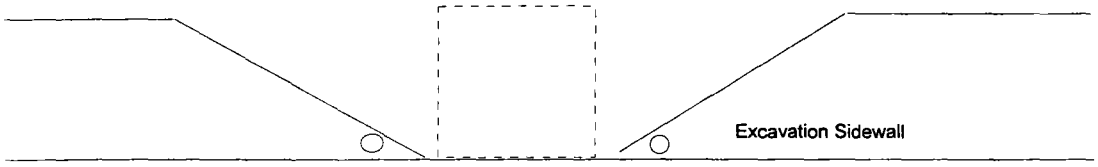


SAMPLING LOCATION PLAN - TOP VIEW

Note: Not to scale

● BOTTOM SAMPLING LOCATIONS

○ SIDEWALL SAMPLING LOCATIONS



Typical UST

SAMPLING LOCATION PLAN - SIDE VIEW

Note: Not to scale

FIGURE 1
SAMPLING LOCATIONS

2.4.1.1 Trip Blanks

A trip blank is a QC sample that consists of two vials filled with organic-free water and is prepared in the laboratory, shipped to the sampling site with the sample containers, and returned to the laboratory with the samples to be analyzed for VOCs. One trip blank will accompany each cooler containing VOC samples and will be stored at the laboratory with the samples and analyzed by the laboratory. Trip blanks will be analyzed for VOCs only.

2.4.1.2 Rinsate Blanks

Sampling equipment rinsate blanks are collected to ensure that sampling equipment is clean and that the potential for cross-contamination has been minimized. Rinsate blanks are collected from the final reagent grade water rinse used in sample equipment decontamination. Rinsate blanks will be collected on a daily basis and analyzed at a frequency of one per 20 (or less) regular samples or as determined by the Project Chemist or designee. A reduction in the frequency of rinsate blanks may be deemed justifiable by the Project Chemist based on review of analytical results which would need to show no discernable evidence of introduction of cross-contamination due to inadequate equipment cleansing.

The rinsate blank is obtained by first decontaminating the sampling device and then pouring reagent grade, deionized water over the device. This water will be provided by the analytical laboratory. The rinsate water is collected either in a decontaminated stainless steel bowl and then transferred to the sample bottles or by direct collection into the sample bottles. Rinsate blanks are analyzed for the same constituents as the related samples. The results will be used to flag or assess the levels of analytes in the samples and evaluate the effectiveness of sampling equipment decontamination. Wherever possible, disposable equipment will be used during sampling to reduce the number of rinsate blanks required.

2.4.1.3 Field Blanks

Two types of field blanks will be collected during the project. The first type of field blank (A) consists of the potable source water used in decontamination (NEESA, 1988). At a minimum, one field blank from each potable source of water must be collected and analyzed for the same constituents as the related sample. The second type of field blank (B) is prepared by pouring distilled/deionized water into sampling containers at the tank area. One to two type B samples will be collected to determine if background contamination at the site has an effect on sample integrity. A reduction in the frequency of field blanks may be deemed justifiable by the Project Chemist based on review of analytical results which would need to show no discernable evidence of introduction of cross-contamination due to inadequate equipment cleansing.

2.4.1.4 Field Duplicate Samples

Field duplicate samples will be collected to allow determination of analytical and sampling precision. One duplicate sample per twenty samples (field screening and off-site analytical) will be collected and submitted for the same analysis as the regular (or true) samples. This will be the case for all samples except confirmatory samples that verify soil at the excavation limits has met cleanup goals. These samples will have one duplicate per ten samples.

The duplicate sample will be collected simultaneously with the true sample. The duplicate will be collected using the same sampling equipment, at the same location, and labeled with the next consecutive number. The location of the regular sample and its duplicate will be documented in the field logbook or on Field Data Sheet 1.

2.4.1.5 Matrix Spike Samples

Matrix spike/matrix spike duplicates (MS/MSD) samples will be used as further QC checks. These samples will be spiked at the laboratory. The samples will be collected and prepared at the frequency of one MS and MSD for every 20 field samples (including trip blanks, field blanks, and duplicates). The samples will allow accuracy to be determined by the recovery rates of compounds (the matrix spike and/or surrogate spike compounds defined in the analytical methods). Precision will also be assessed by comparison of matrix spike duplicate recoveries. The purpose of these laboratory spikes is to monitor any possible matrix effects specific to samples collected from the site. The addition of known concentrations of compounds/ constituents to the sample also monitors extraction/digestion efficiency.

MS/MSD samples will be collected by providing sufficient volume per QC and Lab requirements. The laboratory will select aliquots that are as homogeneous with respect to one another as possible to avoid precision problems related to sample homogeneity.

2.5 SAMPLE IDENTIFICATION NUMBERS

Samples will be labeled, preserved, and properly packaged for shipment to the analytical laboratory. Information on the sample label will include:

- Sample identification number
- Site name
- Analytical method
- Date and time of sampling

Sample identification numbers will be used to provide a tracking procedure allowing information on a particular sample location to be easily and accurately retrieved. This system also ensures that each sample is unique and not confused with any other sample. The Project Manager will maintain a complete list of sample numbers.

The sample identification number will consist of six (or more) characters that represent the following information:

- Project Name (to be included on the sample bottle label)
- Site Name
- Sampling Event
- Sample Matrix
- Sample Number
- QC sample type (when applicable)

Site Name

At tank removal sites, the first four digits indicate the tank excavation site number:

- 0304 will represent Tank 304
- 1239 will represent Tank 1239

Sample Matrix

Confirmation soil samples will be collected from the floor and sidewalls. This sample matrix will be represented by the following sample identifier:

- SB = Field Screening (S) Sample collected from Excavation Base (B)
- SS = Field Screening (S) Sample collected from Excavation Sidewall (S)
- CB = Confirmation © Soil Sample from Excavation Base (B)
- CS = Confirmation © Soil Sample from Excavation Sidewall (S)

Excavation soils stockpiled will be represented by the following identifier:

- ES = excavated soil (soil present alongside the tanks in the excavation and overburden soil stored in stockpiles)

Wastewater and backfill will be represented by the following identifiers:

- WD = Waste Water from Decontamination Practices
- WG = Waste Water from the Excavation (pumped ground water)
- BF = Backfill

Each of the above pairs of letters will be placed after the tank site identifier in the sample identification number. For example:

- 0304CBXXX
- 1239CSXXX

Sample Number

The last three digits in the sample identification number (XXX) will be a sample number. These numbers will be ordered consecutively for each excavation area. For example:

- 0304ES100: This is the 100th field screening sample collected from excavated soil from above the tank. (For excavated soil, sample numbers 001-300 will be reserved for field screening. Sample numbers 301 and higher will be for disposal or confirmation sampling.)

- 0304SB001: (This was the first sample of soil collected for field screening from the Tank 304 excavation base.)

Duplicate Sample Notation

Each duplicate sample will be labeled as the regular sample. The sample number portion of the sample identification number, however, will be the next consecutive number. For example:

- 0304CB001 represents a confirmation soil sample collected from Tank 0304's excavation base. If the field duplicate was collected from the same location as this sample, the field duplicate would be labeled 0304CB002.

The field sampling team will note in the field notebook the location of all field duplicates, including identification numbers for the regular sample and the duplicate sample.

QA/QC Sample Notation

The following QC identification will be used for sampling:

- TB - Trip Blank
- ER - Equipment Rinsate Blank
- FB - Field Blank

- MS - Matrix Spike/Matrix Spike Duplicate

When a QC sample is collected, the appropriate two letter code will replace the sample matrix identifier. For example:

- 0304ER001 (represents the first rinsate blank collected at Tank 0304)
- 0304TB005 (represents a trip blank submitted with the fifth cooler of VOC samples collected during sampling at Tank 0304)

2.6 FIELD DOCUMENTATION

Field logbooks will provide the means of recording data collecting activities. Entries will be described in as much detail as possible so sampling events may be reconstructed without reliance on memory.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by a project-specific document number.

The title page of each logbook will contain the following:

- Person or persons to whom the logbook is assigned,
- Logbook number,
- Project name,
- Subject (Sampling, Waste Management, etc.)
- Tank Site,
- Project start date, and
- End date.

At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Field notebooks will be used to document all field activities. Sampling information to be entered in the field notebook includes at a minimum:

- Project name and location,
- Individuals on site,
- Sample locations (include sketch of excavation base and sidewalls),
- Date and time of each activity,
- Results of air monitoring and personal protective equipment levels,
- Sample identification,
- Date and time of sample collection,
- Requested analyses, type and number of sample containers, preservative,
- Results of field screening measurements, and
- Type of sample collected.

Notes will be written on sequentially numbered pages with indelible ink. Each page will be initialed and dated when full. Corrections to logbook entries will be made by lining through incorrect entries with a single line and initialing and dating the strike out. At the end of the day, any unused space at the bottom of the last page will be crossed out, initialed and dated.

Whenever a sample is collected, or a measurement is made, a detailed description of the location shall be recorded. The number of the photographs taken of the tank site, if any, will also be noted. All equipment used to make measurements will be identified, along with the date and results of calibration. If possible, a sample logbook will be kept, containing a detailed listing of samples collected and updated on a daily basis.

2.7 SAMPLE CUSTODY

Custody is one of several factors which is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity.

A sample is under a person's custody if:

- The item is in actual possession of a person; or
- The item is in the view of the person after being in actual possession of the person; or
- The item was in actual physical possession but is locked up to prevent tampering; or
- The item is in a designated and identified secure area.

To maintain and document sample possession, chain-of-custody (COC) procedures must be implemented. A COC form will be used to record pertinent information for each sample and the individuals responsible for the sample collection, shipment and receipt.

The subcontracted laboratories will not accept samples collected by MK for analysis without a completed COC form. The COC form shall be initiated in the field by the person collecting the sample, for each sample. Each COC form will be assigned a unique number. Each sample will be assigned a unique identification number, as described in Section 2.5, and that number will be entered on the COC form. In order to be complete, project identification, date and time of sample collection, sample location, requested analyses, turnaround time, and any special instructions must be included on the COC form, along with each sample identification number.

Custody will be relinquished by using the signature blocks at the bottom of the custody form. The original COC form will accompany the shipment, and a copy will be retained by the PM or designee. A signed COC form will be obtained from the laboratory custodian after the samples have been received and their condition checked. For samples shipped by commercial carrier, the air bill or bill of lading will serve as an extension of the COC form. A summary of COC form protocols is provided in Table 2-5.

Upon receipt in the laboratory, all samples will proceed through an orderly processing sequence (as defined in the laboratory QA/QC Plan) specifically designed to ensure continuous integrity of both the sample and other information pertinent to the analysis. All samples will be carefully checked and verified for proper COC records, preservation, presence of broken or leaking sample containers, proper label identification, and any associated discrepancies. If any samples arrive leaking or broken, or the custody seal on the shipment coolers is not intact, the Project Manager and Project Chemist will be notified of the problem(s) immediately. If no discrepancies are identified, the sample COC record will be signed, and the samples will subsequently be assigned a unique laboratory identification number by the laboratory for tracking and filing. The laboratory QA system and the use of an internal COC procedure will ensure that the samples are appropriately tracked from receipt through completion of the analytical process.

2.8 EQUIPMENT CALIBRATION AND MAINTENANCE

Measurements that affect the quality of an activity or operation will be taken only with instruments, tools, gauges, or other measuring devices that are controlled, calibrated, adjusted and maintained

at predetermined intervals to a specified accuracy. The calibration and maintenance of field equipment and instrumentation will be in accordance with manufacturer's specifications or applicable test specifications, and shall be documented in the Field or Site Safety and Health Logbooks, as applicable. Air monitoring equipment used for personnel exposure monitoring will be calibrated daily, or after long periods of non-use during the day.

Preventive maintenance programs will, as a minimum, be established for equipment that would otherwise be subject to breakdown, when the breakdown could lead to safety hazards, environmental contamination, or loss of completeness and accuracy in data. The program will include a schedule of the important preventative maintenance tasks that will be carried out to minimize downtime of measurement systems, and a list of any critical spare parts that need to be on hand to minimize downtime.

2.9 SAMPLE EQUIPMENT DECONTAMINATION

Decontamination of construction and field equipment will take place in a designated area using procedures described in the Work Plan. All non-disposable sampling equipment, including stainless steel trowels and spoons, will be decontaminated according to the following procedure and sequence:

1) Manual scrub with Alconox and tap water wash.
2) Rinse with potable water.
3) Rinse with reagent grade water.
4) Pesticide-grade hexane or isopropanol rinse (for organics only).
5) Rinse with reagent grade water.
6) Air dry.

Once dry, sampling equipment will be stored to prevent contamination.

Decontamination water from equipment and vehicle decontamination activities will be stored in a dedicated container. Decontamination water will be transported off-site for disposal or discharged to a sanitary sewer following approval by the Millington City Sewer Department.

2.10 SAMPLE PACKAGING AND SHIPPING

Immediately after collection, samples will be properly labeled and include all necessary preservatives. Table 2-8 lists the proper container material, volume requirements, and preservation needed for the sampling effort. Samples will be immediately placed in coolers

packed with ice or ice packs. Proper chain-of-custody documentation will be maintained as discussed in Section 2.7.

Packaging and shipping procedures will vary depending upon sample media, potential contaminant concentration, preservation technique, and sample container. A waterproof metal or equivalent strength ice chest or cooler (provided by the Laboratory) is suitable for packaging and shipping those samples not considered "Dangerous Goods" by the U.S. Department of Transportation (USDOT). The person packaging the samples is responsible for ensuring that the cooler is in suitable condition for shipping. In the event a concern arises regarding whether a sample shipment is a USDOT "Dangerous Good" or is potentially in violation of international transportation regulations, the Project Manager will be consulted.

Sample packaging should ensure that the chance of breakage is minimized and that, in the event a sample container breaks or leaks, it will not impact the integrity of other samples in the shipment. Also, samples should be protected from ice melt. Each sample container should be

placed in a Ziploc™-type bag, and wrapped in packing material such as bubble wrap or comparable shock-absorbing materials to avoid breakage. Adequate ice, contained in double Ziploc-type bags, or frozen blue ice must be included with each cooler shipment so that the contents are maintained at 4 (± 2) degrees Celsius until receipt at the laboratory. A chain-of-custody record, protected from moisture by enclosure in a Ziploc™-type bag, must accompany each cooler shipped. The cooler lid should be secured using packing tape around the outside of the cooler. Custody seals will be signed, dated and affixed to the front, side and back of the cooler. The seals should be placed in such a way that tampering with the cooler lid will result in a ripped seal.

Table 2-1
Excavation Soil Sampling

Objective:
-Verify that contaminated soil has been removed
-Document tank removal

Sampling Equipment:
-stainless steel trowel, spoons, putty knife, hand shovel and bowls
-barrel-type sampler (drive sampler) or hand auger with attachments (AMS hammer)
-stainless steel or brass sleeves and endcaps (6-inch x 2-inch dia.)
-folding tables and plastic sheeting
-teflon film
-PID/FID
-TPH field test kits

Method:
This procedure will be used for field screening and confirmation sampling within tank excavations.

Analysis:
Soil samples shall initially be analyzed for total petroleum hydrocarbons (TPH) using field test kits. Conformation soil samples will be collected and analyzed for diesel range organics and gasoline range organics (TPH-DRO and TPH-GRO) to confirm cleanup goals have been met.

Frequency:
Tank Pit Floors
Samples will be collected from each tank floor, approximately one (1) foot beneath the soil surface, on a 20' grid. No composites shall be collected. It is anticipated that a minimum of 11 samples will be collected from beneath and around each tank. Seven of these will come from the tank pit walls, and the remaining four from within the tank area. Exact locations will be determined in the field.

Tank Pit Walls
Samples will be collected along the excavation walls, approximately one (1) foot beneath the soil surface, at 20' intervals. No composites shall be collected.

Piping Runs
Samples will be collected from beneath piping, approximately one foot (1) beneath the soil surface, at 20' intervals. No composites shall be collected.

Field Screening:

Samples will be collected and initially screened for TPH using a field test (immunoassay) kit. A grid will be laid out along the base and walls of the excavation(s)

1. Use a decontaminated or disposable stainless steel spoon or trowel to collect a soil sample from approximately one foot below ground surface. Remove gravel or other large particulate matter.

Table 2-1
Excavation Soil Sampling

Method (continued):

Record screening measurements in the field logbook. Once field screening samples show levels of TPH below 1000 ppm, collect confirmation soil samples from locations next to the field screening sample "borings."

In-Place Confirmation Soil and Initial Screening Samples:

The following sampling procedures will be followed when acquiring soil sample grabs:

1. Remove the upper foot of surficial soil on the bottom or one foot on the sidewall with a small, decontaminated hand shovel, to expose undisturbed soil.
2. Collect an undisturbed soil sample using a barrel-type (or drive) sampler. Place a 6-inch by 2-inch diameter brass or stainless steel sleeve into the sampler.
3. Drive the sampler to one foot below the undisturbed soil surface to ensure that the sample tube is completely full. If the soil is too rocky, change sample locations. If soil is too clayey (dense) to penetrate, use a small pick and hand shovel to remove a sample. Consult the Project Manager if soil cannot be sampled with a drive sampler.
4. Remove the drive sampler from the hole, taking care that sample material is retained within the sleeve. If the sleeve is not full, obtain a new sample from an adjacent area following the above procedure. If, upon withdrawal, the sample exceeds the length of the sleeve, trim excess soil with a decontaminated stainless steel putty knife.
5. Seal the ends of the sampling sleeves with aluminum foil or Teflon film. Attach fitted endcaps, and secure with tape, if necessary.
6. Each sample will be collected in this manner, one sleeve per sample. Place the sample label directly on the sleeve.
7. Place samples into a cooler with double-bagged ice. Review packaging and shipment procedures (Section 2.10).
8. Decontaminate sampling equipment, after each sample is collected, using procedures described in Section 2.8.

Excavator-Acquired Confirmation Soil or Screening Samples

Confirmation soil samples and field screening samples will be collected with the assistance of an excavator when entry into an excavation by field personnel is restricted due to health and safety considerations. The following sampling procedures will be followed:

1. Instruct the excavator where to collect the desired soil for sampling. The excavator bucket will be brought to the surface of the excavation and swung to a safe area.

2. Use a decontaminated hand shovel to remove the top six inches to one foot of material in the bucket to assure a relatively undisturbed sampling area.

Table 2-1
Excavation Soil Sampling

Excavator-Acquired Confirmation Soil Samples (continued)

3. Collect the sample from the excavator bucket using a barrel-type sampler, following the procedures defined above for in-place confirmation samples.

4. If the soil within the bucket exhibits fracturing or is of insufficient quantity, the contents will be discarded. A second bucket of soil will be obtained immediately adjacent to the initial location for sampling. If the second bucket is non-cohesive or otherwise non-amenable to sampling with a barrel-type sampler, collect grab samples using a stainless steel spoon and place sample material directly into containers provided by the laboratory. Take care to ensure that all samples are tightly packed.

5. If possible, use a drive sampler fitted with a brass or stainless steel sleeve to collect samples. Remove the sampler from the hole, taking care that sample material is retained within the sleeve. If the sleeve is not full, obtain a new sample from an adjacent area in the bucket, following the above procedure. If, upon withdrawal, the sample exceeds the length of the sleeve, trim excess soil with a decontaminated stainless steel putty knife.

6. Seal the ends of the sampling sleeves with Teflon film. Attach fitted endcaps, and secure with tape, if necessary. Place a completed sample label directly on the sleeve.

7. Place samples into a cooler with bagged ice. Review packaging and shipment procedures (Section 2.10).

8. Decontaminate sampling equipment, after each sample is collected, using procedures described in Section 2.8.

See Table 2-8 for bottle requirements.

Field Duplicates

Field duplicates will be collected and submitted at a frequency of one per 10 confirmation samples collected. As a check on field screening, one duplicate sample per 10 samples screened will be collected.

Documentation: Soil field data will be recorded on Field Data Sheet 1; all other data will be recorded in the field logbook (See Section 2.6) or the Health and Safety logbook.

Table 2-2
Stockpile Sampling

Objective:
-confirm presence/nonpresence of contaminants associated with the contents of the UST
-determine if soil is suitable for use as backfill
-determine if disposal facility acceptance criteria are met

Equipment:
-drive (barrel) sampler
-brass or stainless steel sleeves with endcaps
-stainless steel spoons and bowls
-small hand shovel
-FID/PID

Methods:
Samples for waste characterization of soil stockpiles will be collected after completion of the stockpile. Stockpiled material will be field-screened with a PID/FID and visually inspected for potential areas of contamination.

Stockpile Management

Pending TDEC Solid Waste Division approval, soil excavated from beside or beneath the tank will be directly loaded into rolloffs or trucks and hauled to the disposal facility. If this is not possible, soil removed from an excavation area will be temporarily stored in one of two stockpile types, as applicable. These include overburden soil (above tank) and special waste soil above cleanup goals. Any soil below the top of the tanks removed for safe excavation purposes will be stored with the known contaminated soil. Potential special waste soil to be disposed of offsite will be sampled for parameters listed in Table 1-1.

Table 2-2
Stockpile Sampling

Each stockpile will be tank specific and will be placed in 200 cubic yard maximum batches. Overburden soil and general excavation soil will not be mixed without approval from Southern Division and the Project Manager.

Action Levels

The only stockpiles which will be field screened will be those composed of soil removed from above the tanks. The results of screening will determine if the stockpiled materials may be placed back into the excavation or require offsite disposal. If sample results are ≤ 100 ppm TPH, a confirmation sample will be collected. If confirmation sample results are > 100 ppm TPH, the soil will be sampled for off-site disposal.

Sampling Procedures

Field Screening:

The total volume of stockpiled soil will be determined and divided by ten (10). This number represents the total number of discrete samples to be collected for field screening. If the resulting number is not a whole number, round up top the next whole number. The grab samples collected for field screening must be evenly distributed throughout the entire volume of soil.

Collect samples for field screening as follows:

1. Use a decontaminated or disposable stainless steel spoon or trowel to collect a soil sample from approximately one foot below ground surface. Remove gravel or other large particles.
2. Fill one 8-ounce glass jar and seal tightly. Label the jar using the protocol described in Section 2.5.
3. Record screening results in the field logbook.

Table 2-2
Stockpile Sampling

Confirmation Samples:

Confirmation samples will be collected from the stockpiled soil volumes which show field screening results below 100 ppm TPH. Sample locations will be placed where high levels of TPH were recorded during screening. A sample will be collected for the first sixty (60) cubic yards of material followed by additional samples as dictated in the chart below. Samples will be collected according to the procedures below and analyzed for TPH-DRO and TPH-GRO using TDEC analytical methods.

1. Using a drive sampler, fitted with a stainless steel or brass sleeve, insert the sampling device below the undisturbed soil surface adjacent to the previous "grab" sample location.
2. Remove the sampler from the hole, taking care that sample material is retained within the sleeve. If the sleeve is not full, obtain a new sample from another adjacent area. If, upon withdrawal, the sample exceeds the length of the sleeve, trim excess soil with a decontaminated stainless steel putty knife.
3. Seal the ends of the sampling sleeves with teflon tape. Attach the fitted endcaps, and secure with tape.
4. Affix labels and place samples into a cooler with double-bagged ice or frozen blue ice packs. Review packaging and shipment procedures (Section 2.10).
5. Decontaminate sampling equipment, after each sample is collected, using procedures described in Section 2.8.

Volume of Material (cubic yards)	Number of Samples
0-60	1
60-240	2
240-480	3
480-720	4

NOTE:
Each additional 240 cubic yards of material will require one additional sample for lab analysis (TPH-GRO, TPH-DRO)

Disposal Samples:

Soil removed from around the tank(s) or soil from above the tank which did not pass field screening (i.e. >100 ppm) will be sampled for disposal. Samples will be collected at a frequency of 1 per 1000 cubic yards using the procedures above (steps 1-5). Analytical parameters are included in Table 1-1, and will be finalized with the disposal facility.

Documentation: Soil field data will be recorded on Field Data Sheet 1; all other data will be recorded in the field logbook (See Section 2.7) or the Health and Safety logbook.

Table 2-3
Waste Water Sampling

Objective:
To collect representative samples and obtain data necessary to properly dispose of decontamination/ground water generated during site activities.

Equipment:

-stainless steel bucket or ladle
-disposable Teflon or stainless steel bailer or dipper and bottom-emptying devices (for VOC sample collection)
-submersible pump and disposable tubing (may be used for tank sampling if tank is too large to access with a bailer)
-fishing line, cord and reel

Method:
During remedial activities, surface or ground water or incidental water may infiltrate the excavation. This water will be pumped from the excavation into holding tanks. In addition, fluids generated during decontamination activities will be stored in similar tanks. Following solids settling, a minimum of one water sample will be collected from each tank. Samples will be collected from each type of fluid.

1. If the tank is not fitted with a valve, a submersible pump will be lowered midway between the water surface and tank bottom. Care will be taken not to disturb the settled solids at the tank bottom.

2. Collect the BTEX sample first, followed by the TPH-GRO and TPH-DRO volumes. Lower the pump slowly into the water to avoid degassing. Pump the water from the tank at a low rate (200 mL/min or less).
   a. Slowly fill the volatile organic analysis (VOA) vials, taking care not to force out the preservative.
   b. Slightly overfill vial to form a meniscus.
   c. Tightly cap the vial and invert the bottle.
   d. Tap the sides of the vial to see if air bubbles are trapped in the sample.
   e. If air bubbles are present, place the vial in an upright position and open the cap. Repeat steps "a" through "d". If air bubbles are still present, discard sample and redo all steps.

   A disposable Teflon or decontaminated stainless steel bailer may be used in place of a centrifugal pump and tubing. Slowly lower the bailer beneath the water surface and fill. Attach a VOA vial "bottom-emptier" device to the bottom of the bailer. NOTE; the bailer will begin to drain immediately. Be sure that the bottom fill device tube has been placed in the vial prior to attachment to the bailer. Fill the vial until full. Follow steps a through e to properly seal the vials.

3. Remaining sample containers, if any, may be filled using pump and tubing or directly from a bailer. Using a fresh bailer volume, fill the remaining containers to nearly full (usually to the lip of the container).

4. A sample can be obtained through a bottom valve if no other access point is available. The sample may be rather turbid due to high solids content at the bottom of the tank. Consult the Project Manager to determine if the samples will be filtered in this case. Also determine if the sludge/solids at the base of the holding tank will be sampled as well.

Documentation: field logbook (sample information); chain-of-custody forms and sample labels

Table 2-4
Backfill Sampling

Objective:
-Ensure that backfill soil is "clean" and test for standard moisture-density relationship

Equipment:
-drive (barrel) sampler
-stainless steel spoon, trowel and bowls
-stainless steel or brass sleeve and endcaps
-sample containers (including special geotechnical sample quart size, wide-mouth jars)

Methods:
Off-site and/or on-site material will be used to backfill tank and product line excavations. Soil backfill will be used to backfill at least the last 2 feet of the excavation.

Samples will be collected and analyzed to ensure that the backfill material meets soil cleanup objectives. For soil excavated from the tank pit, the initial cleanup goal is less than 1000 ppm TPH-DRO and TPH-GRO combined).

Additionally, samples will also be tested for the following geotechnical parameters:

- ASTM D698 moisture-density relationship.
- ASTM D2487 soil classification.
- ASTM D4318 Atterberg limits.

Geotechnical Sample:
One geotechnical sample will be collected per source for each type of backfill material intended for use at a frequency of one per every 500 cubic yards or less of soil brought onto the site.

1. Dig approximately 12 inches below the source pile surface using a hand shovel or trowel.

2. Using the drive sampler or stainless steel spoon/trowel, collect one grab sample from each of five locations in the source pile. Note approximate location (distances) in the field logbook and on the field data sheet (1). The five locations should be representative of the source pile materials.

3. Composite the grab samples in a stainless steel bowl and place the composite in the geotechnical sample container. Pack the jar tightly and seal the edges of the container with clear tape to prevent moisture loss in transit. Store in a cooler with bagged ice prior to shipment.

4. This sample will be analyzed using the three ASTM methods listed above.

Table 2-4
Backfill Sampling

Method (continued):

Chemical Analysis Sample:

1. Collect samples at a frequency of one per 500 cubic yards or less.

2. Dig approximately 12 inches below the source pile surface using a hand shovel or trowel.

3. Using the drive sampler (with sleeve inserted), collect a sample for volatile organics analysis. If recovery is poor, collect a grab sample using a decontaminated stainless steel trowel and spoon. Tightly pack the sample material into the glass jar (4 ounces), and seal the container. Fill additional sample containers from the source pile for additional analyses listed in Table 1-1.

Backfilling of on-site material will take place after confirmation samples are collected and analytical results indicate no target analytes above clean-up levels. Backfilling using off-site borrow material will take place after results are reviewed and approved by the Project Chemist. MK will also notify the Navy Resident Officer In Charge of Construction (ROICC) that the excavation meets the cleanup objectives. The ROICC will issue permission to MK to instruct the Subcontractor to backfill the excavation.

Documentation: Soil field data will be recorded on Field Data Sheet 1; other field data will be included in the field logbook (see Section 2.6).

Table 2-5
Procedure for Sample Documentation, Packaging and Shipping

Objective:
To ensure that samples are properly packaged to prevent or minimize breakage and maintain sample integrity between the field and laboratory, and to maintain proper chain-of-custody protocols.

General:

For waste characterization samples, the Subcontractor shall be responsible for shipping samples to a Subcontractor-procured laboratory. All decontamination and rinse samples will be submitted by the Subcontractor to the Contractor-procured laboratory. The name and address of the Contractor-procured laboratory will be provided to the site prior to work.

One trip blank (consisting of two 40-mL vials) will be submitted with each cooler of volatile organics samples shipped. All trip blanks for the rinse water samples will be prepared and shipped to the site by the Contractor-procured laboratory.

For each sample shipment, complete sample documentation, including labels, chain-of-custody (COC) forms, etc. and properly package sample containers for shipment to the laboratory in accordance with the following procedures:

Sample Labels and Tags.

After a sample is collected, it shall be temporarily stored in the field in a cooler with 2-3 bags of ice. When sampling is completed, the cooler(s) shall be brought to the support zone. Any empty containers found in the cooler shall be discarded.

All sample containers sent to the laboratory shall be labeled. Labels shall be completed in ink. If an error is made on a label, strike out the erroneous item with a single line and initial the strike out.

At a minimum, the following information shall be included on each sample label and tag:

- Sample identification number;
- Analytical method; and
- Date and time of collection.

If enough room is available on the sample label, the following information shall also be included:

- Site name,
- Location of Sample,
- Initials of sample collector, and
- Preservative, if applicable.

Table 2-5
Procedure for Sample Documentation, Packaging and Shipping

Chain-of-Custody Form (COC).

Once the samples have been recorded in the field logbook, complete the COC form. Prior to filling out the COC form, verify that all samples are accounted for and all volume requirements are met. At least one COC form shall be completed for each cooler of samples to be shipped. COC forms will vary slightly depending on the laboratory providing the forms. The Contractor will specify which COC format is to be used for decon and rinse water samples. The following general instructions shall be followed when completing the COC form:

a. If the COC form does not have a unique document number, assign a sequential reference number to the COC form and record this number in the top right corner of the document (i.e. COC #001). Each COC form shall have a unique reference number. Reference numbers, whether already included on the document, or assigned, shall be recorded in the field logbook.

b. Include one line on the COC form for each sample. Fill in the appropriate information in the columns on the form for each sample. Ensure the following information is included for each sample:
   -sample identification number;
   -sample location;
   -date sample was collected;
   -time sample was collected;
   -sample matrix (i.e. water, sludge);
   -size and quantity of containers included; and
   -required analyses.

c. Specify QC samples (i.e. field blank, rinsate blank and trip blank), when collected. DO NOT specify duplicate samples. Trip blank "sample time" must be entered on the COC form. Use the time the cooler was sealed.

d. Ensure the sample time and sample I.D. on the COC form are exactly the same as on the sample container label.

e. When specifying an analysis, write both the analysis and the method number. If a specific parameter list is required, note on the COC form (i.e. "TCL volatiles") or list out the parameters requested, if the list is short. If the parameter list is lengthy, attach it to the COC form.

f. Enter the turnaround time for the samples in the "Remarks" section of the COC form.

g. Complete the "Relinquished By" information (person, date and time) at the bottom of the COC form. The "Relinquished Time" should be roughly the time the cooler is sealed and given to overnight shipper.

h. Include the overnight shipment airbill number somewhere on the COC form. Record this number in the field logbook, and reserve a copy of the airbill for the project files.

I. Keep one copy of the COC form for site records and submit the remaining copies to the Laboratory. Seal the Laboratory copies in a gallon size Ziploc™, or equivalent, bag and affix to the underside of the cooler lid using strapping tape.

Table 2-5
Procedure for Sample Documentation, Packaging and Shipping

Sample Preparation.

The following tasks will be completed, prior to sample packaging:

a. Remove visible dirt, residue and excess moisture from the sample jars;

b. Check container lids to ensure they are on tight;

c. Place sample jars (glass) in protective bubble wrap and seal using adhesive strip on bubble wrap package or tape.

Sample Packaging.

Package samples carefully to prevent breakage or movement of containers during shipment. The following guidelines shall be used for packaging:

a. Line the base and sides of the cooler with bubble wrap. Coolers designated for decon and rinse water samples will be provided by the Contractor-procured laboratory.

b. Pack the larger containers into the cooler first. Place double-bagged cubed ice or small containers between larger containers then pack the remaining smaller containers. Add additional double-bagged ice to the cooler, distributing as evenly as possible to chill all samples. This is **most important** with samples requiring VOC analysis.

c. Place a trip blank in each cooler containing samples to be analyzed for volatile organic compounds. The trip blank is a regular sample and must be labeled and recorded as such. It shall be analyzed for volatile organics only. When possible, keep all volatile organic analyses samples together in the same cooler to minimize the number of trip blanks required.

d. Don't overload the cooler with samples. Allow enough room for a layer of ice at the top, as well as a final layer of bubble wrap. At least one COC form shall be filled out for each cooler of samples. The samples and ice should be packed tight enough to prevent movement of containers during shipment.

e. Close the cooler and seal closed with custody seals. Use 2-3 custody seals (signed and dated) per cooler (small or large). Place seals on the front, side and back of each cooler where they shall be visible and easily ripped if the cooler is tampered with. Use a thin cover of strapping tape to protect the edges of the seal during shipment.

f. Seal the cooler with strapping tape.

Table 2-5
Procedure for Sample Documentation, Packaging and Shipping

Sample Shipping.

Ship all samples to the laboratory for next-day delivery. Ensure the air bills have been completely filled out and copied. Place one airbill into each envelope. Affix the envelope to the top of the cooler, if the lid is flat. If the lid is sliding, as with a "playmate" cooler, affix the envelope to the side of the cooler. Do not obstruct address labels provided by the laboratory (if present).

Fax the COC form to the Contractor Project Chemist or designee [(216) 523-5201] the same day samples are shipped. If short turn-around time is needed, such as 24 or 48-hours, notify the Project Chemist **IMMEDIATELY** by phone. It is preferable to notify the Project Chemist of short turn-around times as soon as it is known that samples will require this.

QA/QC and Documentation: Maintain all generated sample documentation (copies of COCs, field logbooks, etc) in the field during the course of the site work. This documentation may be managed by the Contractor, or if managed by the Subcontractor will be available for review. At the conclusion of site work, provide a copy of all documentation to the Contractor.

Table 2-6
Field Equipment List

Soil Sampling	**Water Sampling**
Stainless steel trowel Stainless steel spoons Stainless steel knife Stainless steel hand shovel Stainless steel bowls/pans Stainless steel or brass sampling sleeves Sample containers (from lab) Barrel-type drive sampler Immunoassay test kits (TPH) PID/FID Measuring tape Teflon film Other:	Stainless steel bucket or dipper Teflon or stainless steel bailer Submersible pump Disposable tubing Fishing line or disposable rope Cord reel VOA bottom-emptying devices Sample containers (from lab) Other:
Miscellaneous	**Decontamination**
Camera and film Assorted hand tools Coolers (from lab) Cubed Ice Labels/ tags Packaging tape Custody seals Chain of Custody forms (from lab) Bubble wrap/ packing material Federal Express airbills Ziploc™ bags Other:	Reagent grade water for blanks and decontamination (from lab) Nitrile or surgical gloves Deionized water Isopropanol solution (from lab) Alconox Buckets Cleaning brushes Paper towels or clean rags Garbage bags Spray bottles Chemical rinse tubs Other:

Table 2-7
Data Collection Locations

Media	Constituents	Number of Samples[1]	QA/QC			
			Trip Blanks	Rinse Blanks	Field Blanks	Field Dup.
Excavation Soil - Screening	Field TPH	22+	0	0	0	2+
Excavation Soil-Confirmation (sidewalls, base, piping runs)	TPH - DRO TPH - GRO	27+	0	2	2	3+
Stockpiled Soil -field screening	Field TPH	200	0	0	0	20
Stockpile Soil-confirmation for use as backfill	TPH - DRO TPH - GRO (more tests may be required- consult Project Manager)	3	0	1	1	0
Stockpiled Soil-disposal[2]	TCLP lead, TCLP benzene, paint filter	4	3 BTEX	2	2	1
Decon/Ground water	BTEX, TPH-GRO, TPH-DRO, Oil & Grease	3+	3+	0	0	1+

Notes:

TBD = to be determined
[1]Total number of samples provided for estimate only. Actual totals may vary (±) greatly.
[2]Disposal constituents will be finalized with the disposal facility.

Table 2-8 Analytical Method Requirements				
Parameter	**Method Number**	**Sample Size/ Container[1]**	**Preservative**	**Holding Time**
Confirmation (sidewalls, base, piping runs) and Excavated Soils for Backfill				
TPH - GRO	8015 Modified (California Method)	1 8-ounce glass jar	Ice to 4°C	14 days
TPH - DRO	8015 Modified (California Method)	1 8-ounce glass jar	Ice to 4°C	14 days
Excavated Soils for Offsite Disposal (will be confirmed with disposal facility)				
TCLP Volatiles	1311/ 8240	1 4-ounce glass jar	Ice to 4°C	14 days for extract analysis
TCLP Semivolatiles	1311/ 8270	1 8-ounce glass jar	Ice to 4°C	7/40 days after extraction
TCLP Lead	1311/6010/7470			180 days; 28 days for mercury
Paint Filter Test	9095			None
Backfill				
TPH-DRO	8015 Modified (California Method)	1 8-ounce glass jar	Ice to 4°C	14 days
TPH-GRO	8015 Modified (California Method)	1 8-ounce glass jar	Ice to 4°C	14 days
Decontamination/Ground water for Disposal (proposed)				
BTEX	8240	3 40-mL glass vials	HCL to pH < 2; Ice to 4°C	14 days
TPH-GRO	8015 Modified (California Method)	3 40-mL glass vials	HCL to pH < 2; Ice to 4°C	14 days
TPH-DRO	8015 Modified (California Method)	2 1-liter amber glass jars	Ice to 4°C	14 days
Water Blanks for Offsite Disposal and Backfill				
Volatile Organics	8240 or CLP SOW	3 40-mL glass vials	HCL to pH < 2; Ice to 4°C	14 days

Table 2-8
Analytical Method Requirements

Parameter	Method Number	Sample Size/ Container[1]	Preservative	Holding Time
Semivolatiles	8270 or CLP SOW	2 1-L amber glass jars	Ice to 4°C	7 days until extraction
RCRA metals or TAL Metals	6010/7470	1 1-L plastic	HNO3 to pH < 2; Ice to 4°C	28 days (mercury); 180 days (other metals)
TPH-GRO	8015 Modified (California Method)	3 40-mL glass vials	HCL to pH < 2; Ice to 4°C	14 days
TPH-DRO	8015 Modified (California Method)	2 1-liter amber glass jars	Ice to 4°C	14 days

Notes:
DRO = diesel range organics, GRO = gasoline range organics
TAL = target analyte list, TCL = target compound list
1. Sample volume requirements will be finalized with the lab.
2.Confirmation soil and excavated soil samples will initially be analyzed for TPH-DRO and TPH-GRO. If either exceeds 1000 ppm, the samples will be analyzed for disposal parameters.

3.0
DATA MANAGEMENT

3.1 SAMPLE HANDLING IN THE LABORATORY

Upon receipt, all samples will proceed through an orderly processing sequence (as defined in the laboratory QA/QC Plan) specifically designed to ensure continuous integrity of both the sample and other pertinent information to the analysis.

All samples will be carefully checked and verified for proper chain of custody (COC) records, preservation, broken or leaking sample containers, proper label identification, and any associated discrepancies. These items will be documented by use of a laboratory receipt form. If any samples arrive leaking or broken, or the custody seal on the shipment coolers is not intact, the Project Chemist will be notified of the problem(s) immediately.

If no discrepancies are identified, the sample COC record will be signed, and the samples will subsequently be assigned a unique laboratory identification number by the laboratory for tracking and filing. The laboratory QA system and the use of an internal COC procedure will ensure that the samples are appropriately tracked from storage through the laboratory until the analytical process is complete.

Analytical and procedural information and activities will be documented with the use of Standard Operating Procedures (SOPs), a laboratory data management system, laboratory benchsheets, laboratory notebooks, and orderly project files containing any information pertinent to the analysis or integrity of the results.

The contracted laboratory will provide a written QA/QC program to the Project Chemist which discusses rules and guidelines to ensure the reliability and validity of all analytical work conducted in their laboratory. Compliance with the QA/QC program is coordinated and monitored by designated laboratory quality assurance personnel.

The laboratory will document, in each data package provided, that both initial and ongoing instrument and analytical QC functions have been met. Corrective action will be initiated on any samples analyzed in non-conformance with the QC criteria.

3.2 LABORATORY QUALITY CONTROL CHECKS

The laboratory QC program shall ensure the reliability and validity of the analysis performed at the laboratory. All analytical procedures are documented in writing as SOPs, and each SOP includes a QC section which addresses the minimum QC requirements for the procedure. The internal quality control checks might differ slightly for each individual procedure but in general the QC requirements include the following:

- Field/Trip blanks;
- Method blanks;
- Reagent/preparation blanks (applicable to inorganic analysis);
- Instrument blanks;
- Matrix spikes/matrix spike duplicates;
- Surrogate spikes;
- Analytical spikes (Graphite furnace);
- Field duplicates;
- Laboratory duplicates;

- Laboratory control standards;
- Internal standard areas for GC/MS analysis;
- Quality Control limits;
- Mass tuning for GC/MS analysis; and
- Second, dissimilar column confirmation for GC/EC analysis.

A description of the specific QC requirements for this facility investigation and the frequency of audit is described in laboratory SOPs. These documents are considered proprietary by the laboratory, and may be obtained through specific request. The QC criteria are also included in the SOPs.

All data obtained will be properly recorded. The data package will include a full deliverable package capable of allowing the recipient to reconstruct QC information and compare it to QC criteria. A list of deliverables is proved in Table 3-1. Any samples analyzed in nonconformance with the QC criteria will be reanalyzed by the laboratory, if sufficient volume is available and holding times have not been exceeded. It is expected that sufficient volumes/weights of samples will be collected to allow for reanalysis when necessary.

3.3 LABORATORY DATA REPORT

The task of reporting laboratory data begins after the laboratory validation activity has been concluded. The Laboratory QA Manager must perform a final review of the report summaries and case narratives to determine whether the report meets project requirements. In addition to the record of chain-of-custody, the report format shall consist of the following:

1. Case Narrative:
   - I. Date of issuance
   - ii. Laboratory analysis performed
   - iii. Any deviations from intended analytical strategy
   - iv. Laboratory batch number
   - v. Numbers of samples and respective matrices
   - vi. Quality control procedures utilized and also references to the acceptance criteria
   - vii. Laboratory report contents
   - viii. Project name and number
   - ix. Condition of samples 'as-received' including cooler temperature
   - x. Discussion of whether or not sample holding times were met
   - xi. Discussion of technical problems or other observations which may have created analytical difficulties
   - xii. Discussion of any laboratory quality control checks which failed to meet project criteria
   - xiii. Signature of the Laboratory QA Manager

2. Chemistry Data Package
   - I. Case narrative for each analyzed batch of samples
   - ii. Summary page indicating dates of analyses for samples and laboratory quality control checks
   - iii. Cross referencing of laboratory sample number to project sample identification numbers
   - iv. Data qualifiers to be used should be adequately described
   - v. Sample preparation and analyses for samples
   - vi. Sample results
   - vii. Raw data for sample results and laboratory quality control samples

viii. Results of (dated) initial and continuing calibration checks, and GC/MS tuning results

ix. Matrix spike and matrix spike duplicate recoveries, laboratory control samples, method blank results, calibration check compounds, and system performance check compound results

x. Labeled (and dated) chromatograms/spectra of sample results and laboratory quality control checks

The data package submitted will be a "CLP-like" data package consisting of all the forms presented in a CLP data package. A list of deliverables is provided in Table 3-1.

3.4 ANALYTICAL DATA QUALITY OBJECTIVES

DQOs for analytical data will be defined and reviewed through assessment of the precision, accuracy, representativeness, completeness, and comparability .

3.4.1 Precision

Precision is the degree to which the measurement is reproducible. This will be determined by comparison of sample duplicates or designated laboratory matrix spike/ matrix spike duplicates. Precision will be calculated as the relative percent difference (RPD) between these duplicates according to the procedures. RPD is calculated using the following equation:

$$RPD = \frac{|V_1 - V_2|}{(V_1 + V_2)/2} \times 100$$

Where: RPD = Relative Percent Difference
V_1 = Value of the first duplicate
V_2 = Value of the second duplicate

RPD values will be finalized prior to the start of the project by the Project Manager and/or the Project Chemist.

3.4.2 Accuracy

Accuracy will be expressed as the percent recovery of a compound from a sample spiked with known concentrations of target compounds for each analytical method. The determination of the accuracy of a measurement requires a knowledge of the true or accepted value for the parameter being measured and the value of the parameter for the unspiked sample. Accuracy will be monitored for each matrix type and analytical method and is calculated as follows:

$$Percent\ Recovery = \frac{C_{SMS} - C_S}{TC} \times 100$$

Where: C_{SMS} = Concentration of sample matrix spike
C_S = Concentration found in non-spiked sample
TC = Target concentration spiked into sample

Accuracy determination will be based on the contract laboratory quality control/assurance spikes for a given method. These accuracy determinations are lab, method and analyte specific and will be evaluated through the use of control charts, method accuracy determinations and/or other reasonable standards. Therefore, no specific acceptance criteria will be established in this document and analytical data will be evaluated as it is received and documented in the data verification package.

3.4.3 Representativeness

The representativeness of the data is the degree to which data represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Data are considered representative if the sampling is in accordance with the sampling procedures defined in Section 2.0, and sample analysis methods are standard and complied with. Field duplicate samples and rinse blanks will be collected and analyzed as a means to assess field representativeness. Trip blanks will also be included with each sample shipment containing VOC samples to evaluate potential cross-contamination during transport and storage which may impact data representativeness.

Rinse blanks, field blanks, and trip blanks should be free of target compound contamination, however, in some instances this criteria may not be possible and/or relevant. No specific criteria is required for this parameter, however, qualitative statements regarding this parameter should be made at project closure by the Project Chemist or designee.

3.4.4 Completeness

Completeness is a measure of the amount of valid data obtained from an analytical data set compared with the amount that would be expected to be obtained under normal sampling and analytical conditions. Completeness is based on only those samples collected and submitted for laboratory analysis and has been established at 90 percent for this project. Percent completeness will be calculated as follows:

$$Completeness = \frac{Amount\ of\ Valid\ Data}{Total\ Samples\ Analyzed} \times 100$$

3.4.5 Comparability

Comparability expresses the confidence with which one data set can be compared to another. Samples from the same media (*i.e.*, soil) will be considered comparable if the procedures for collecting and analyzing the samples are complied with and consistent.

Comparability is assured through the use of established and approved analytical methods and protocols. The laboratory's quality control program is designed to establish consistency in the performance of the analytical process. The program includes traceability of measurements to standardized reference materials to establish comparability with other laboratory results, and internal controls to verify consistency of the contract laboratory's performance. Standard reporting units (*e.g.*, mg/kg, ug/L) will be used for reporting the various parameter results.

Precision and accuracy criteria may be used for indicating comparability to previous sampling events. If other criteria will be used for comparability determination, they must be approved by the Project Chemist.

3.5 DATA REDUCTION AND VALIDATION

All data generated during field activities or by the laboratory shall be reduced and validated prior to inclusion in the completion report.

3.5.1 Data Reduction

3.5.1.1 Field Data Reduction Procedures

Field data reduction procedures will be minimal in scope compared to those implemented in the laboratory setting. Only direct reading instrumentation will be employed in the field. The use of field test kits will generate measurements directly read from meters following calibration according to the manufacturer's recommendations. Such data will be written into field logbooks immediately after measurements are taken. If errors are made, results will be legibly crossed out, initialed and dated by the field sampler, and corrected in a space adjacent to the original (erroneous) entry. Later, when the results forms required for this study are being filled out, the MK Project Manager or designee will review the forms to determine whether any transcription errors have been made by the field crew.

Because the use of field instrumentation such as a mobile gas chromatograph will not be used, there will be no further need for assuring that field data has been reduced properly through the use of formulas or interpretation of raw data printouts.

3.5.1.2 Laboratory Data Reduction Procedures

Laboratory data reduction procedures will be followed according to the following protocol. All raw analytical data will be recorded in numerically identified laboratory notebooks or equivalent forms. These notebooks will be issued only by the Laboratory QA Manager. Data are recorded in this notebook along with other pertinent information, such as the sample identification number and the sample tag number. Other details will also be recorded in the lab notebook, such as the analytical method used, name of analyst, the date of analysis, matrix sampled, reagent concentrations, instrument settings, and the raw data. Each page of the notebook shall be signed and dated by the analyst. Copies of any strip chart printouts (such as gas chromatograms) will be maintained on file. Periodic review of these notebooks by the Lab QA Manager will be completed prior to final data reporting. (Records of notebook entry inspections are maintained by the Lab QA Manager.)

For this project, the equations that will be employed in reducing data are those associated with the CLP-SOW (Multi-Media, Multi-Concentration Contractual Requirements and Equations For Volatile Data Review OLM03.1, August 1994 or latest revision) or equivalent procedures. Two of these equations, expressing analytical accuracy and precision, are provided in Section 3.4. Such formulae make pertinent allowances for matrix type. All calculations will be checked by the Organic Section supervisor at the conclusion of each operating day. Errors will be noted, corrections made, with the original notations crossed out legibly. Analytical results for soil samples shall be calculated and reported on a dry weight basis.

Quality control data (e.g. laboratory duplicates, surrogates, matrix spikes, and matrix spike duplicates) will be compared to the method acceptance criteria. Data considered to be acceptable will be entered into the laboratory computer system. Data summaries will be sent to the Laboratory QA Manager for review. If approved, data are logged into the project database format. Unacceptable data shall be appropriately qualified in the project report. Case narratives will be prepared which will include information concerning data that fell outside acceptance limits, and any other anomalous conditions encountered during sample analysis. After the Lab QA Manager approves these data, they are considered ready for third party data validation.

3.5.2 Data Validation

Data validation procedures shall be performed for both field and laboratory operations as described below:

3.5.2.1 Procedures Used to Evaluate Field Data

Procedures to evaluate field data for this project primarily include checking for transcription errors and review of field log books, on the part of field crew members. This task will be the responsibility of the SQCS, who will otherwise not participate in making any of the field measurements, or in adding notes, data or other information to the logbook.

3.5.2.2 Procedures to Validate Laboratory Data

First, all Level C data will be verified by reviewing Chain-of-Custody records, sample preservation records, analytical holding times, requested turnaround time, sample data as compared to QC sample data, and reporting requirements. Following verification, ten percent of the data for samples collected for final confirmatory results will be validated to substantiate and document that these data are of known quality. Data validation of laboratory data will follow accepted criteria defined by Section 7.3.2 of NEESA 20.2-097B. Problems or discrepancies will be discussed with the laboratory by the data validator for resolution and/or documentation. Qualifiers will be applied to the data based on results of the validation effort.

3.6 COMPLETION REPORT

A Completion Report will be prepared after completion of site work and will include the information the following information:

- a description of the project location, tank service and description;
- a discussion of tank removal activities;
- a discussion of the management of wastes, including ultimate disposal of generated materials;
- volume or mass of residue and waste removed, including wastes resulting from decontamination activities;
- pertinent waste disposal documentation (manifests, bills of lading, or other type of shipping records);
- a description of the sampling and analytical methods used, including sample preservation methods and chain-of-custody information;
- analytical laboratory data that include:
  -location of sampling points
  -sample collection date
  -sample analysis date
  -sample depth
  -parameter analyzed
  -units of measurement on a mass/mass or mass/volume basis
  -statement of conformance to Tennessee analytical standards, and
  -signature of laboratory director or designee;
- photographic documentation of removal indicating conditions before, during, and after removal;
- field and laboratory geotechnical tests performed, methods and results;
- changes to the Work Plan procedures, if any; and,
- recommendations and conclusions.

A proposed outline for this report is provided below:

EXECUTIVE SUMMARY

1.0 PROBLEM STATEMENT
2.0 SCOPE OF WORK
    2.1 MOBILIZATION
    2.2 WASTES GENERATED AND DISPOSED
    2.3 SITE RESTORATION AND DEMOBILIZATION
3.0 SAMPLING AND ANALYSIS SUMMARY
4.0 LESSONS LEARNED
5.0 CONCLUSIONS
6.0 REFERENCES

TABLES

FIGURES

APPENDICES

APPENDIX A AS-BUILT DRAWINGS
APPENDIX B REGULATORY FORMS/CORRESPONDENCE
APPENDIX C ANALYTICAL RESULTS
APPENDIX D PHOTOGRAPHS
APPENDIX E SUMMARY OF MANIFESTS

Table 3-1
Data Set Deliverables
(use CLP-forms as listed below)

Contaminants	Method Requirements	Deliverables
Organics	Method blank spikes with results and control charts. Run with each batch of samples processed.	Control chart
	Results to be reported on Form 1. Sample results using standard data flags. Raw data must be submitted with data deliverable package.	Form 1, Sample chromatograms and mass spectra
	Surrogate recovery from samples reported on Form 2. Surrogates to be used in volatiles, semivolatiles, pesticides/PCBs analysis. For volatiles by GC, the names of surrogates should be changed to reflect the surrogate used.	Form 2
	Matrix spike/spike duplicate data; one spike and spike duplicate per QC lot of samples of similar matrix reported on Form 3.	Form 3, sample chromatograms and mass spectra
	Method blank data reported on Form 4.	Form 4, sample chromatograms and mass spectra
	GC/MS tuning results for volatiles/semi-volatiles.	Form 5
	Initial calibration data. Initial calibration data with response factors for GC/HPLC methods. No chromatograms or mass spectra are presented for GC/MS calibration. These data should be filed in the laboratory and made available if problems arise in reviewing/validating the data. The calibration information should be available for checking during on-site audits. For GC analyses, calibration data will be submitted.	Form 6, sample chromatograms and mass spectra No form Form 9, sample chromatograms and mass spectra
	Continuing calibration GC/MS data For GC and HPLC methods, the response factors and their percent differences from the initial calibration must be reported. Internal Standard Area for volatiles and semivolatiles.	Form 7 SLF Form 8

Table 3-1
Data Set Deliverables
(use CLP-forms as listed below)

Contaminants	Method Requirements	Deliverables
Organics	Pesticide/PCB data will be presented using Form 9. Second column confirmation shall be done for all GC and HPLC work when compounds are detected above reporting limits.	Form 9 Chromatograms
	Internal standard area for GC/MS analyses shall be supplied.	Form 8
	Instrument Logs	SLF (std. lab form)
	Standard Preparation Logs	SLF
	Sample Preparation Logs	SLF
	Internal COC form	SLF
Metals	Method blank spikes with results and control charts. Run with each batch of samples processed.	Control chart
	Sample results with standard CLP flagging system. Raw data must be submitted with the data deliverable package.	Form 1/Raw Data
	Initial and continuing calibration.	Form 2, Part 1 only, Raw Data
	Blanks 10% frequency	Form 3
	Method blank taken through digestion (1 per 20 samples of same matrix).	Form 3
	ICP interference check sample.	Form 4
	Matrix spike recovery (1 per 20 samples of similar matrix).	Form 5, Part 1
	Postdigestion spike sample recovery for ICP metals. Only done if predigest spike recovery exceed laboratory standards.	Form 5, Part 2 (never used for GFAA work)
	Postdigest spike for GFAA. Duplicates (1 per 20 samples will be split and digested as separate).	Recovery noted on raw data Form 6 samples

Table 3-1
Data Set Deliverables
(use CLP-forms as listed below)

Contaminants	Method Requirements	Deliverables
Metals	Method blank spike information will be plotted on control chart, one per batch of samples processed.	Control chart
	Standard addition, as required.	Form 8
	Holding times	Form 10
	Instrument Logs	Standard Lab Form (SLF)
	Standard Preparation Logs	SLF
	Sample Preparation Logs	SLF
	Internal COC form	SLF
Wet Chemistry	Method blank spikes with results and control charts. Run with each batch of samples processed.	Report result, control chart
	Method blank 1 per batch	Report result, no format
	Sample results (raw and final data)	Report result, no format
	Matrix spike/spike duplicate or calibration information (Raw data)	Report result if applicable
	Instrument Logs	Standard Lab Form (SLF)
	Standard Preparation Logs	SLF
	Sample Preparation Logs	SLF
	Internal COC form	SLF
	Calibration check report percent RSD or percent difference from initial calibration	Report percent or percent difference, no format
General Requirements	Method blank spikes with results and control charts. Run with each batch of samples processed.	Report result, control chart
	Internal Chain-of-Custody forms	SLF
	Instrument logs (what samples have been run and under what conditions)	SLF
	Summaries of Extraction Logs	SLF
	Standards Logs	SLF

Table 3-1 Data Set Deliverables (use CLP-forms as listed below)		
Contaminants	**Method Requirements**	**Deliverables**
General Requirements	Spiking Logs	SLF
	Quantification Reports	SLF
	Percent Moisture Logs	SLF
	Standard Chromatograms	SLF
	Standard Spectra	SLF
	QC Comments (unless already included in the case narrative)	SLF

4.0
REFERENCES

Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program, NEESA 20.2-047B, Department of the Navy Facilities Engineering Command, June 1988.

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846, United States Environmental Protection Agency, Third Edition, November 1990.

Methods for the Chemical Analysis of Water and Waste, United States Environmental Protection Agency, March 1983.

Code of Federal Regulations, Title 49, Parts 171-173, *Hazardous Materials Regulation - Transportation.*

Tennessee Department of Environment and Conservation, Division of Underground Storage Tanks, Reference Handbook, Third Edition, July 1996.

FIELD DATA SHEET 1 - SOIL SAMPLING FIELD DATA
NSA MEMPHIS, MILLINGTON, TENNESSEE

SITE DESCRIPTION	WEATHER	SAMPLER INITIALS	DATE

SAMPLE NUMBER:_____

TIME COLLECTED: _____

SAMPLE TYPE (Confirmation, Disposal etc.)_____

ANALYSIS TYPE (Laboratory or Field Test) _____

PID (PPM): _____

SAMPLE DESCRIPTION (moisture, odors, colors,etc.): _____

_____

SAMPLE LOCATION: _____

ANALYTICAL METHODS: _____

_____

SHIP DATE: _____

CHAIN OF CUSTODY FORM NO. (If lab analysis)_____

(SKETCH OF SAMPLE LOCATION)

COMMENTS:

SAMPLE NUMBER:_____

TIME COLLECTED: _____

SAMPLE TYPE (Confirmation, Disposal etc.)_____

ANALYSIS TYPE (Laboratory or Field Test) _____

PID (PPM): _____

SAMPLE DESCRIPTION (moisture, odors, colors,etc.): _____

_____

SAMPLE LOCATION: _____

ANALYTICAL METHODS: _____

_____

SHIP DATE: _____

CHAIN OF CUSTODY FORM NO. (If lab analysis)_____

(SKETCH OF SAMPLE LOCATION)

COMMENTS:

APPENDIX D
ENVIRONMENTAL PROTECTION PLAN

TABLE OF CONTENTS

1.0
INTRODUCTION

This Plan describes the measures that will be implemented at NSA Memphis, Millington, Tennessee to protect human health and the environment. The project involves removal of two USTs and will require excavation of soil, removal of groundwater from open excavation, and pumping of storm water which may enter the tank excavation.

MK will ensure all work is performed in such a manner to minimize air, water and soil pollution. Inadvertent spills or releases caused by site operations will be immediately mitigated and controlled to protect human health and the environment. Spill prevention and control measures are discussed in the Waste Management Plan and the Site Safety and Health Plan. Upon completion of site activities, all disturbed areas will be returned to acceptable condition.

2.0
PROTECTION OF NATURAL RESOURCES

2.1 PROTECTION OF LAND AND STRUCTURES

Except for any work or storage areas and access routes specifically assigned for use under this Contract, the land areas including buildings, roadways, utility poles and lines, fences, and other structures will be preserved in their present condition.

Trees and shrubs will not be removed, cut, defaced, injured or destroyed unless specifically authorized by the Navy. All trees which are to remain at the site that could be injured during operations will be protected by placing boards, planks or protective posts around them. No ropes, cables or guides will be attached or fastened to nearby trees for anchorage.

2.2 PROTECTION OF WATER RESOURCES

There are no stream crossings that must be traversed to reach the work sites. Ground- water from open excavations and surface water entering the excavations will be pumped into temporary storage containers. All collected water will be stored, characterized, disposed of into the sanitary sewer as specified in the Waste Management Plan.

2.3 PROTECTION OF FISH AND WILDLIFE RESOURCES

This work will not disturb fish or wildlife, alter surface water flows or otherwise significantly disturb the native habitat on or adjacent to the project sites.

2.4 HISTORICAL AND ARCHEOLOGICAL RESOURCES

Although no historical and archeological items or human skeletal remains are expected to be found, the ROICC will be notified immediately in the event any archeological items are encountered. Any items discovered will be carefully preserved and work stopped in the area until direction is received from the ROICC to resume work.

3.0
DUST CONTROL

All excavations, stockpiles, access roads and other work areas will be maintained free from excess dust to avoid causing a hazard. Dust control at the site will be accomplished by wetting the soil or structure with water or approved wetting agents. Nuisance or fugitive dust concentrations will be maintained at or below 1 mg/m^3 total dust. Dry power brooming will not be used. Instead, vacuuming, wet mopping, wet sweeping, or wet power brooming will be used. Only wet cutting will be used for cutting concrete blocks, concrete, and bituminous concrete.

4.0
EROSION CONTROL

Temporary erosion control measures will be provided in excavation areas and protected drainage courses to minimize off-site impacts. Soil berm or straw bales with silt fence will be placed across drainage courses and continuously around the perimeter of the open excavation to retard and divert storm water. Ditches and berms or dikes, if required, will be constructed to control surface water runon and runoff. The erosion control measures will be inspected daily to ensure that the devices are maintained properly. The amount of bare soil exposed will be minimized at all times.

5.0
SITE MANAGEMENT AND RESTORATION

All equipment, tools, and materials will be cleaned prior to mobilization and demobilization. No burning of wood and construction debris will be allowed at the site. All generated wastes will be properly handled, stored, protected from the elements, characterized, and disposed of in accordance with the Waste Management Plan.

Upon completion of site activities, all backfilled areas will be covered with topsoil, seeded and fertilized. Temporary construction facilities such as haul roads, work areas, and equipment and material staging areas will be removed from the site. All disturbed areas will be graded to conform with surrounding contours and returned to acceptable condition.

APPENDIX E
WASTE MANAGEMENT PLAN

TABLE OF CONTENTS

1.0
INTRODUCTION

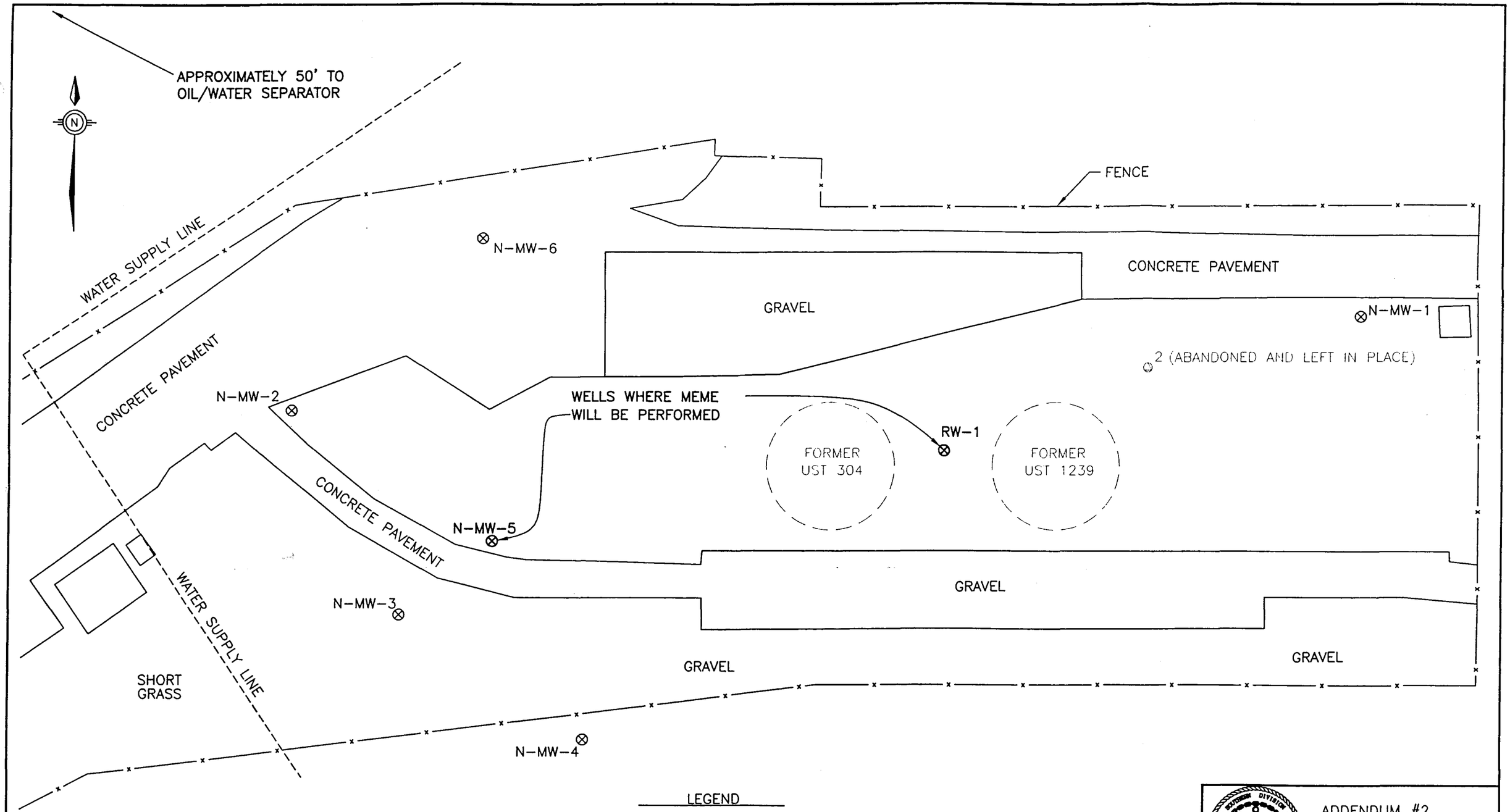
This section describes methods to manage and dispose the various waste streams generated during the remedial action activities at NSA Memphis, Millington, Tennessee. All contaminated wastes will be identified, collected and stored on-site in appropriate containers or piles, analyzed for characterization purposes, and disposed of in accordance with applicable local, state and federal rules and regulations including, but not limited to, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, and 40 CFR 279. Solid waste will be managed and disposed of off-site in accordance with applicable local, state and federal rules and regulations including, but not limited to, 40 CFR 241, 40 CFR 243, and 40 CFR 258.

MK will be responsible for:

- classifying all waste streams
- ensuring that all waste streams are managed in accordance with the guidelines presented in this plan;
- submitting proper information on the proposed disposal facility
- providing field oversight and ensuring subcontractor compliance with the procedures in this plan;
- ensuring that appropriate waste containers and secondary containment are provided,
- preparing all required paperwork and documentation for all wastes generated during the removal activities, for Navy-authorized generator signature; and
- maintaining waste records for the field effort.

3.0
SPILL PREVENTION AND CONTROL

Precautions will be taken to prevent spills or releases of oil and hazardous substances. If a spill or release of hazardous materials occurs in the work area, MK will call 9-911 and report the spill. The Navy Resident Officer In-Charge of Construction (ROICC) will be notified immediately. In addition, the Public Works Department, Environmental Division will be notified at 874-5461. The spill or release will be contained and mitigated in accordance with the guidelines presented in Section 16.0 of the Site Safety and Health Plan (Appendix A of the Work Plan).

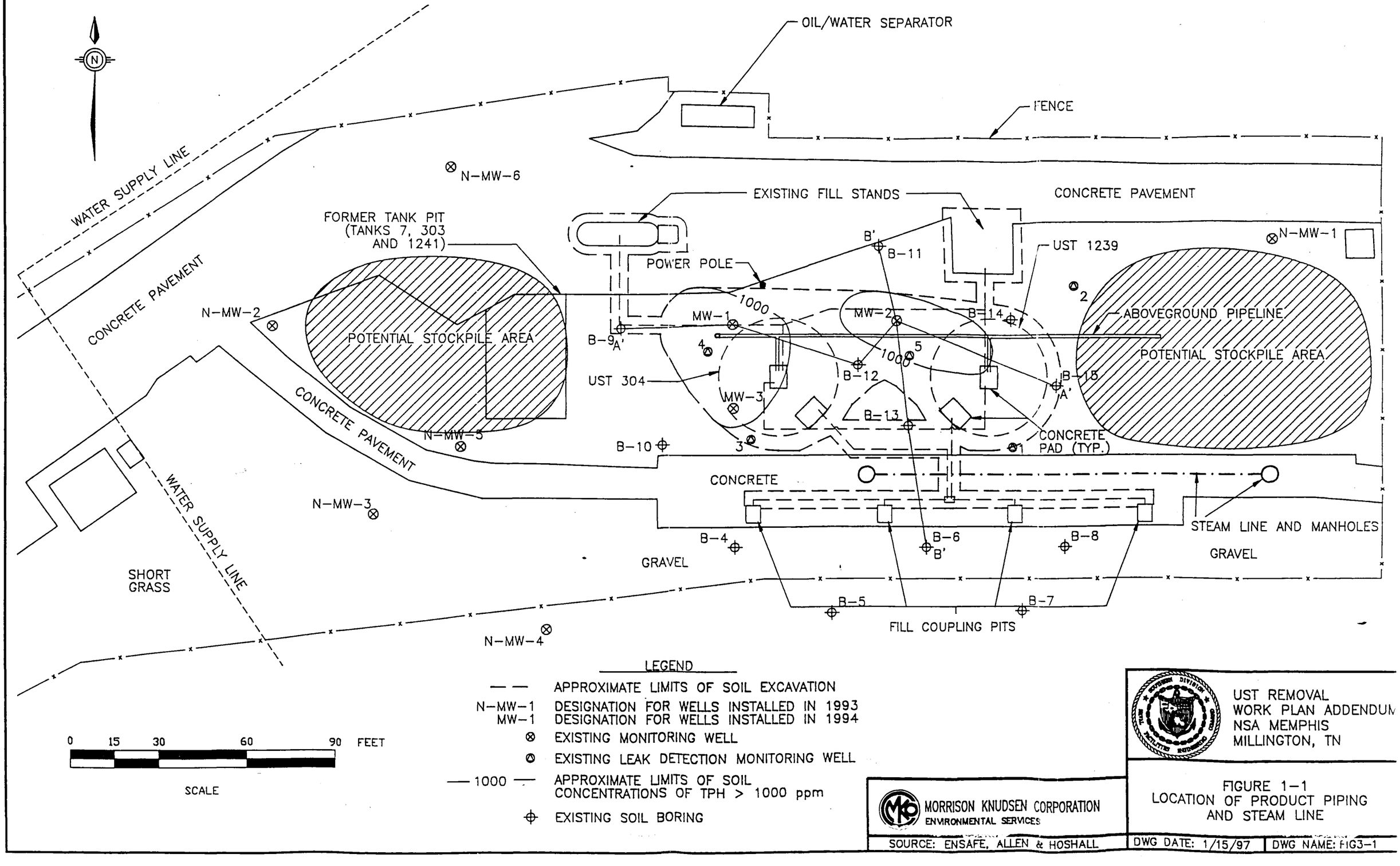


ADDENDUM #2
WORK PLAN
NSA MEMPHIS
MILLINGTON, TN

FIGURE 1-1
EXISTING CONDITIONS
PLAN VIEW

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

SOURCE: ENSAFE, ALLEN & HOSHALL | DWG DATE: 10/24/97 | DWG NAME: MEME



LEGEND

— —	APPROXIMATE LIMITS OF SOIL EXCAVATION
N-MW-1	DESIGNATION FOR WELLS INSTALLED IN 1993
MW-1	DESIGNATION FOR WELLS INSTALLED IN 1994
⊗	EXISTING MONITORING WELL
⊘	EXISTING LEAK DETECTION MONITORING WELL
— 1000 —	APPROXIMATE LIMITS OF SOIL CONCENTRATIONS OF TPH > 1000 ppm
⊕	EXISTING SOIL BORING

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

SOURCE: ENSAFE, ALLEN & HOSHALL

UST REMOVAL
WORK PLAN ADDENDUM
NSA MEMPHIS
MILLINGTON, TN

FIGURE 1-1
LOCATION OF PRODUCT PIPING AND STEAM LINE

DWG DATE: 1/15/97 | DWG NAME: FIG3-1

OIL/WATER SEPARATOR

FENCE

WATER SUPPLY LINE

N-MW-6

EXISTING FILL STANDS

CONCRETE PAVEMENT

FORMER TANK PIT (TANKS 7, 303 AND 1241)

POWER POLE

B'

B-11

UST 1239

N-MW-1

CONCRETE PAVEMENT

N-MW-2

POTENTIAL STOCKPILE AREA

1000

MW-1

MW-2

B-14

2

ABOVEGROUND PIPELINE

B-9

A'

4

5

1000

POTENTIAL STOCKPILE AREA

UST 304

B-12

B-15

A'

MW-3

B-13

CONCRETE PAVEMENT

N-MW-5

B-10

3

CONCRETE PAD (TYP.)

CONCRETE

WATER SUPPLY LINE

N-MW-3

B-4

B-6

B'

B-8

GRAVEL

GRAVEL

SHORT GRASS

B-5

B-7

FILL COUPLING PITS

N-MW-4

LEGEND

- APPROXIMATE LIMITS OF SOIL EXCAVATION
- N-MW-1 DESIGNATION FOR WELLS INSTALLED IN 1993
- MW-1 DESIGNATION FOR WELLS INSTALLED IN 1994
- EXISTING MONITORING WELL
- EXISTING LEAK DETECTION MONITORING WELL
- 1000 APPROXIMATE LIMITS OF SOIL CONCENTRATIONS OF TPH > 1000 ppm
- EXISTING SOIL BORING

0 15 30 60 90 FEET

SCALE

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

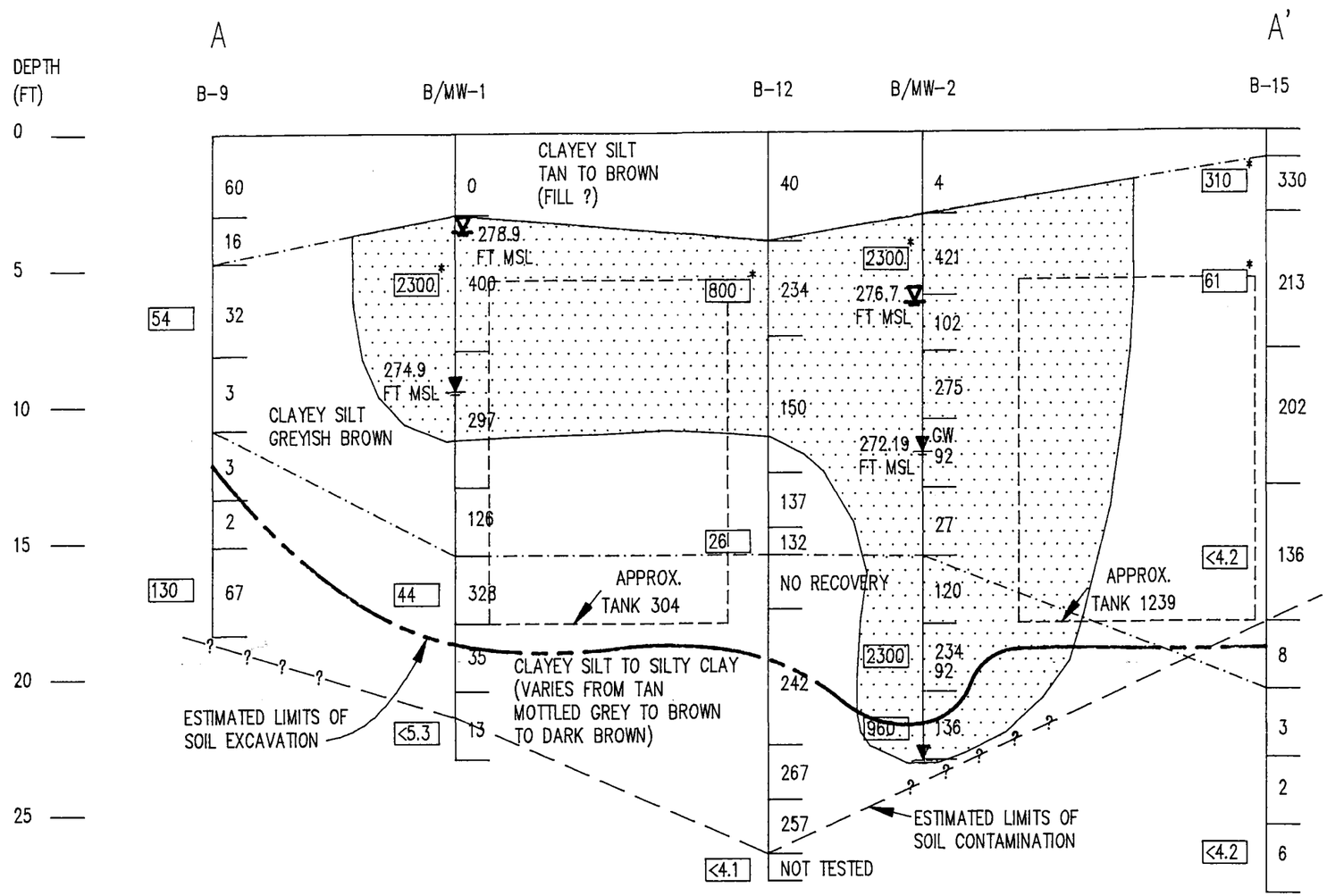
SOURCE: ENSAFE, ALLEN & HOSHALL

UST REMOVAL
WORK PLAN
NAS MEMPHIS
MILLINGTON, TN

FIGURE 3-1
APPROXIMATE LIMITS OF
SOIL EXCAVATION

DWG DATE: 1/15/97

DWG NAME: FIG3-1



LEGEND

SOIL SAMPLE LOCATION

TPH-DRO (ppm) 310 — 330 – OVM READING (ppm)

800* – INDICATES PRESENCE OF TPH-GRO CONSTITUENT (IN ADDITION TO TPH-DRO)

– FIRST ENCOUNTER

– POTENTIOMETRIC SURFACE IN COMPLETED WELL (MEASURED JULY 19,1994)

– SOIL LITHOLOGY CONTACT

– ESTIMATED LIMITS OF SOIL CONTAMINATION

– ESTIMATED LIMITS OF SOIL EXCAVATION

– SOIL CONTAMINATION WITH ≥ 600 MG/KG DRO

UST REMOVAL
WORK PLAN
NSA MEMPHIS
MILLINGTON, TN

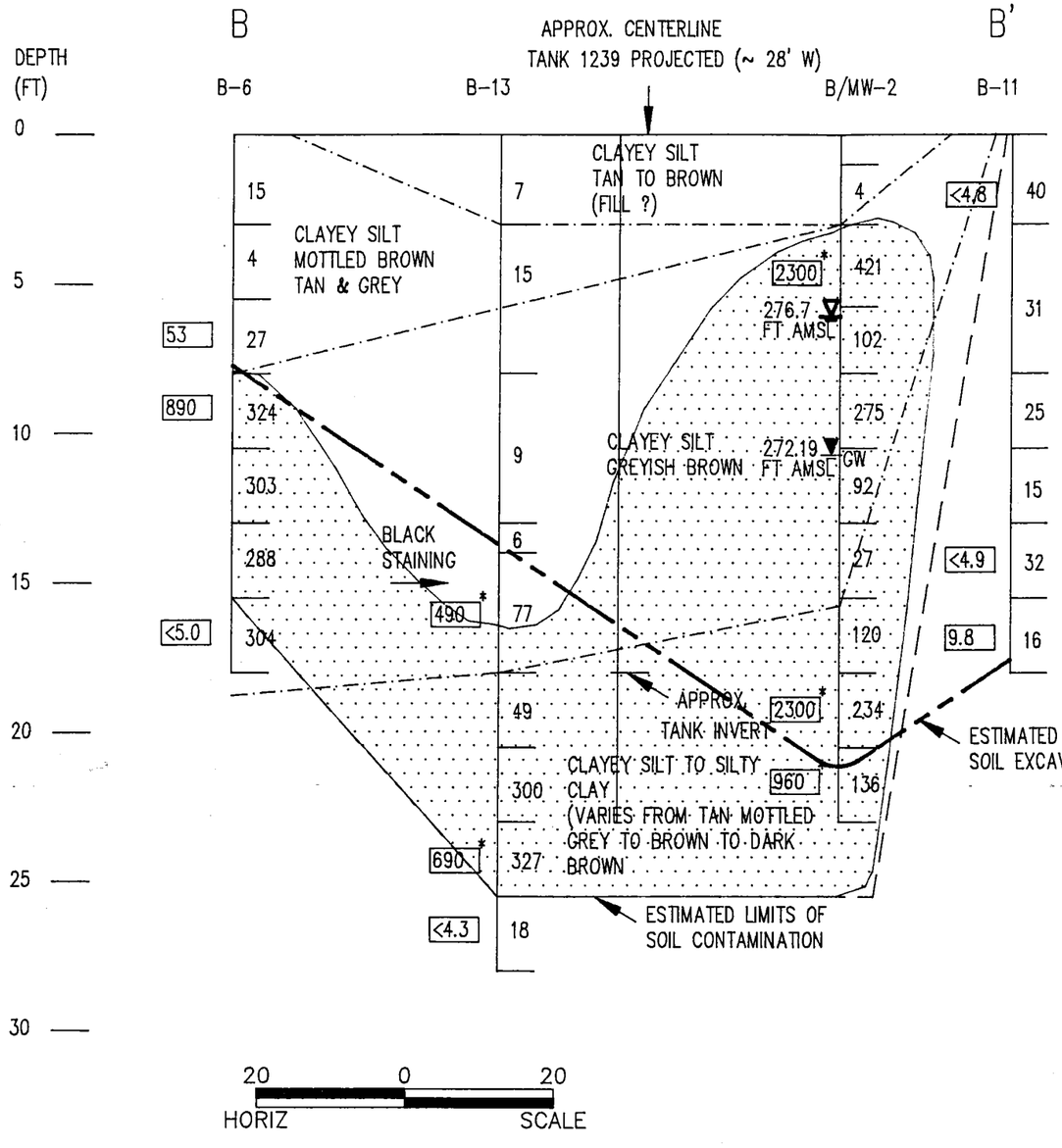
FIGURE 3-2
TPH CONTAMINANT PLUME MAP
SECTION A-A'
NORTH FUEL FARM

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

SOURCE: ENSAFE, ALLEN & HOSHALL

DWG DATE:11/12/96

DWG NAME:FIG3-2



LEGEND

SOIL SAMPLE LOCATION

TPH-DRO (ppm) 310 / 330 – OVM READING (ppm)

800* – INDICATES PRESENCE OF TPH-GRO CONSTITUENT (IN addition TO TPH-DRO)

– FIRST ENCOUNTER

– POTENTIOMETRIC SURFACE IN COMPLETED WELL (MEASURED JULY 19,1994)

– SOIL LITHOLOGY CONTACT

– ESTIMATED LIMITS OF SOIL CONTAMINATION

– ESTIMATED LIMITS OF SOIL EXCAVATION

– SOIL CONTAMINATION WITH ≥ 600 MG/KG DRO

UST REMOVAL
WORK PLAN
NSA MEMPHIS
MILLINGTON, TN

FIGURE 3-3
TPH CONTAMINANT PLUME MAP
SECTION B-B'
NORTH FUEL FARM

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

SOURCE: ENSAFE, ALLEN & HOSHALL

DWG DATE:11/12/96

DWG NAME:FIG3-3

UST REMOVAL
WORK PLAN
NAS MEMPHIS
MILLINGTON, TN

FIGURE 3-4
PROPOSED WASTE
HAULING ROUTE

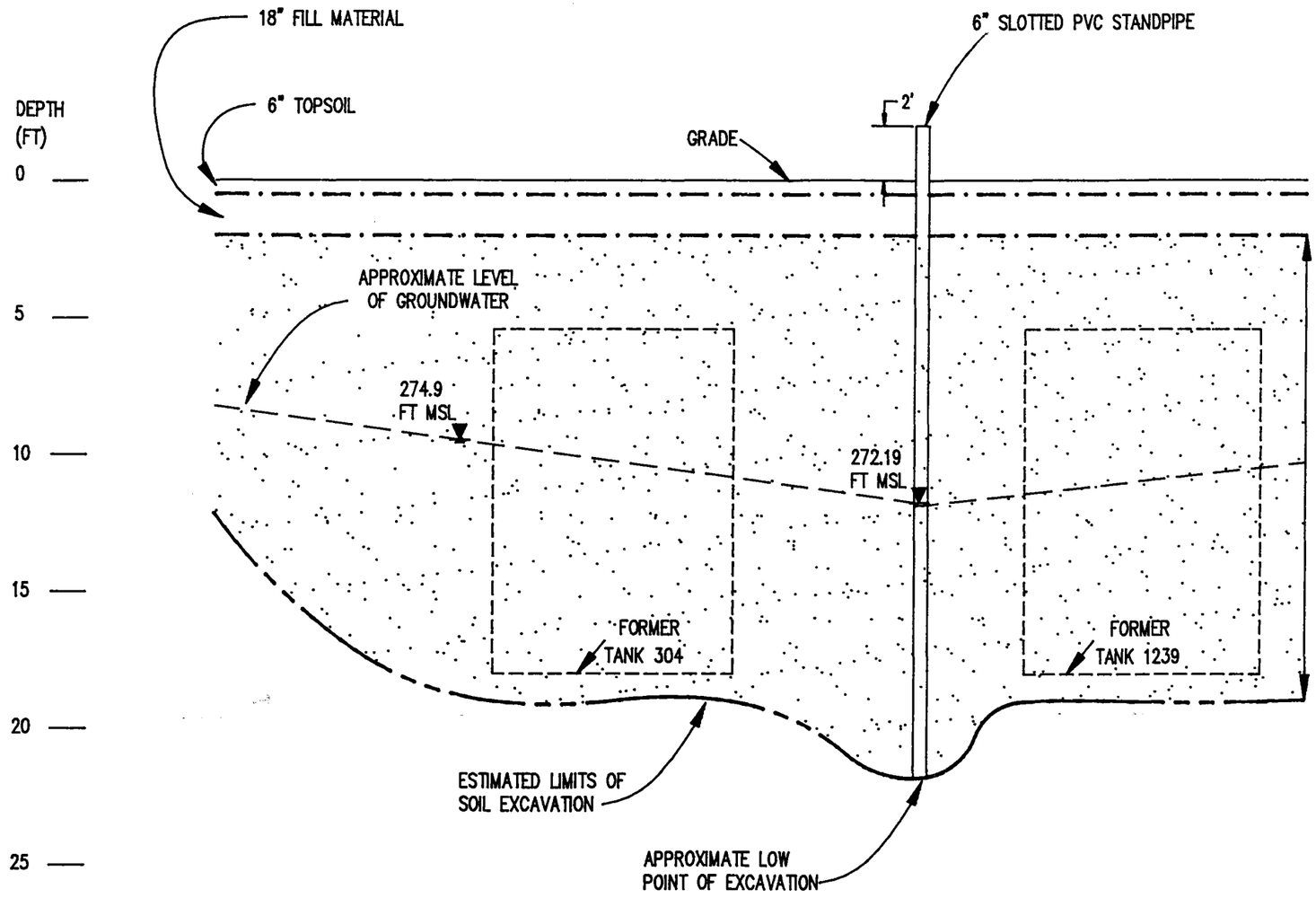
DWG DATE: 11/13/96 | DWG NAME: FIG3-4

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

SOURCE: NSA MEMPHIS

N-126
774
1637
1651
1652
1591
1592
1587
1600
1590
1656
1589
N-88
1620
1621
AIMD VANS
N-48
1603
N-7
1577
304
1268
1558
FUNAFUTI ST
N-11
1265
1596
1658
1239
N-12
301
369
370
296
1266
1217
N-13
N-14
ENIWETOK ST
243
N-16
345
359
763
DAKAR ST
1694
CASABLANCA ST
348
N-1
930
343
FIRST
SECOND
THIRD
FOURTH
FIFTH
1387
1399
1388
BOUGAINVILLE ST
764
397
N-114
349
ARMORY NG-1
1655
778
767
ATTU ST
1549
1453
KINSER GATE
NAVY ROAD
NAVY ROAD
1578
HARRISON GATE
1452
1650

0 100 200 400 600 FEET
SCALE



LEGEND

- ▼ – POTENTIOMETRIC SURFACE IN COMPLETED WELL (MEASURED JULY 19,1994)
- – – – – – ESTIMATED LIMITS OF SOIL EXCAVATION
- 2 INCH MINUS ROUNDED GRAVEL

UST REMOVAL
WORK PLAN
NSA MEMPHIS
MILLINGTON, TN

FIGURE 3–5
EXCAVATION BACKFILL DETAIL
CROSS SECTION
NORTH FUEL FARM

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

SOURCE: ENSAFE, ALLEN & HOSHALL | DWG DATE:11/14/96 | DWG NAME:FIG3–5