

CLOSURE REPORT EMO UST SITES FORT DEVENS, MASSACHUSETTS

Prepared for:

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Prepared by:

OHM Remediation Services Corp. Hopkinton, Massachusetts

ack Kevin I Mack

Project Manager

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LIST OF ACRONYMS AND ABBREVIATIONS

AENI	American Environmental Network, Inc.
BLDGS	Buildings
BNAs	Base/Neutral/Acid Extractables
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
BWP	MADEP Bureau of Waste Prevention
COC	Chain of Custody
CQAR	Chemical Quality Assurance Report
су	Cubic Yards
DEHP	Bis(2-ethylhexyl)phthalate
DPW	Department of Public Works
ECS	Equipment Construction Site
EMO	Environmental Management Office
IR	Infrared Spectrometer
IRAs	Immediate Response Actions
JES	Jet Line Environmental Services, Inc.
LRA	Limited Removal Action
MAAF	Moore Army Airfield
MADEP	Massachusetts Department of Environmental Protection
МСР	Massachusetts Contingency Plan
mg/kg	milligram/kilogram
MTBE	Methyl-tert-butyl-ether
NED	US Army Corps of Engineers New England Division
NFPA	National Fire Prevention Act
ng/g	nanogram/gram
OHM	OHM Remediation Services Corporation
PAH	Polycyclic Aromatic Hydrocarbon

LIST OF ACRONYMS

- PCB Polychlorinated Biphenyl
- QA/QC Quality Assurance/Quality Control
- RAMs Release Abatement Measures
- RCRA Resource Conservation and Recovery Act
- TCLP Toxicity Characteristic Leaching Procedure
- TPH Total Petroleum Hydrocarbons
- ug/kg microgram/kilogram
- USAEC United States Army Environmental Center
- USACE United States Army Corps of Engineers
- UST Underground Storage Tank
- VOC Volatile Organic Compound

EXECUTIVE SUMMARY

The Fort Devens Environmental Management Office (EMO) requested that the New England Division (NED) of the United States Army Corps of Engineers (USACE) remove 13 underground storage tanks (USTs) and replace the USTs at Buildings (Bldgs.) 3411and 3820 with vaulted tanks. The NED contracted OHM Remediation Services Corporation (OHM) to conduct the removals in accordance with the Final Underground Storage Tank Removal Protocol, Fort Devens, Massachusetts (USAEC, 1993). If contamination was encountered, the removals were conducted as Limited Removal Actions (LRAs) under the Massachusetts Contingency Plan (MCP). LRAs are limited to 100 cubic yards (cy) of petroleum-contaminated soil.

UST removals at Bldgs. 3411, 3628, and 3770 were conducted as Immediate Response Actions (IRAs) triggered by field observations and analytical screening results. In addition, the removals of Tanks 3825, 3826, and 3827 located at Moore Army Airfield (MAAF) were conducted as a Release Abatement Measures (RAMs) after significant concentrations of polynuclear aromatic hydrocarbons (PAHs) were discovered in the soil surrounding the USTs. However, the work conducted at these IRA and RAM sites is not included in this closure report. This work was documented in separate stand-alone reports submitted to the Massachusetts Department of Environmental Protection (MADEP) along with the required regulatory submittal forms. As a result, this closure report only contains summaries of the closure activities associated with UST removals at Bldgs. 13, 683, 688, 1423, 3759, and 3820.

OHM removed one UST each at Bldgs. 13, 683, 688, 1423, and 3820, and two USTs at Bldg. 3759. Soil was excavated, as necessary, to remove any residual contamination. Confirmation soil samples were collected and analyzed for targeted parameters to determine whether applicable MCP S-1, GW-1 cleanup standards had been attained. Contaminated soil was characterized for disposal where identified and placed into a temporary storage facility located adjacent to Bldg. 202 in the northeast portion of the Main Post. Excavated soil that was analytically verified to be suitable for backfill was reused as backfill material. Groundwater was not encountered during any of the removals described in this report. Based on the results of the confirmation samples and the activities described herein, no further action is recommended at these sites.

SECTION 1.0 INTRODUCTION

The EMO requested that the NED of the USACE remove 13 USTs, and replace the USTs at Bldgs. 3411and 3820 with vaulted tanks. The NED contracted OHM to conduct the removals in accordance with the Final Underground Storage Tank Removal Protocol, Fort Devens, Massachusetts (USAEC, 1993). If contamination was encountered, the removals were conducted as LRAs under the MCP. LRAs are limited to 100 cy of petroleum-contaminated soil.

UST removals at Bldgs. 3411, 3628 and 3770 were conducted as IRAs triggered by field observations and analytical screening results. In addition, UST removals at MAAF (Tanks-3825, -3826, and -3827) were conducted as a RAMs after significant concentrations of PAHs were discovered in the soil surrounding the USTs. The work conducted at the IRA and RAM sites is not described in this closure report. This work was documented in separate stand-alone reports submitted to MADEP along with the appropriate regulatory submittal forms. As a result, this closure report only contains summaries of the closure activities associated with UST removals at Bldgs. 13, 683, 688, 1423, 3759, and 3820.

Bldgs. 13, 683, 688, 1423, and 3759 are located on the Main Post at Fort Devens. Bldg. 3820 is located at MAAF on the North Post. Refer to Figure 1-1 for the locations of the buildings associated with the USTs addressed in this closure report. Site maps are presented as Figures 1-2 through 1-7. Site descriptions and closure activities for each site are described in Section 2. A brief discussion of project quality assurance/quality control (QA/QC) is provided in Section 3, and conclusions are summarized in Section 4.













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SECTION 2.0 EMO UST REMOVALS

NED contracted OHM to remove 7 USTs at Bldgs. 13, 683, 688, 1423, 3759 (two USTs), and 3820. The scope of work also included the removal of any contaminated soil, characterization of contaminated soil for disposal, replacement of the UST removed at Building 3820, and site restoration through backfilling. The removals were conducted in accordance with the Final Underground Storage Tank Removal Protocol, Fort Devens, Massachusetts (USAEC, 1993) which was the primary guidance document used to establish procedures and protocols to be followed during the removal activities.

The following subsections briefly summarize background sampling, site security measures employed during UST removals, post-removal excavation screening protocols, confirmation sampling to ensure that open excavations were ready for backfilling, and analytical methods. Detailed descriptions are contained in the Final Underground Storage Tank Removal Protocol, Fort Devens, Massachusetts (USAEC, 1993). An analytical matrix for the UST sites is presented as Table 2-1.

<u>Background Samples</u> - In conformance with UST removal protocols for Fort Devens, two background soil samples were collected around each site for on-site analysis of total petroleum hydrocarbons (TPH)by infrared spectrophotometry (IR).

<u>Site Security</u> - Exclusion zones were established around each removal site using orange fencing and/or caution tape in order to ensure that potential contaminants would be confined to the site, and to prevent anyone from inadvertently coming into contact with contaminants exposed during removal activities. When necessary, bermed staging cells double-lined with polyethylene sheeting were constructed for temporary storage of excavated soils.

Excavation Screening - Two screening samples were collected from each excavation wall and the excavation bottom following UST removal. The analytical results were used to identify TPH-impacted soil and to guide the removal of soil above the site action level of 500 milligrams per kilogram (mg/kg). This protocol was not followed when the UST was installed in a vault.

<u>Confirmation Sampling</u> - Confirmation sampling was conducted in accordance with the Fort Devens UST removal protocols to verify attainment of cleanup standards for TPH and other targeted analyses. This protocol requires collecting a grab sample from the excavation wall exhibiting the highest TPH concentration during the screening sampling and from the excavation bottom. Confirmation samples were analyzed off-site by the American Environmental Network, Inc. laboratory in Columbia, Maryland (AENI). The specific analytical parameters requested for each site were based on past site history, the type of petroleum product stored in the tank, and the excavation screening results. Specific analytical parameters requested for each in the Confirmation Sampling Results section for each individual site.

In general, samples were analyzed for TPH, volatile organic compounds (VOCs), and base/neutral/acid extractable compounds (BNAs). Some samples were also analyzed for lead, methyl-tert-butyl-ether (MTBE), and benzene, toluene, ethylbenzene, and xylenes (BTEX). Grab samples for on-site analysis of TPH/IR were collected at the confirmation sampling locations prior to confirmation sampling to minimize unnecessary off-site analyses.



<u>Waste Characterization</u> - Excavated soil was sampled and analyzed to assess the presence and concentration of hazardous constituents for disposal and also to evaluate its suitability as backfill material or as cover material in a lined landfill. Both total and Toxicity Characteristic Leaching Procedure (TCLP) analyses were performed. The specific analytical parameters requested for each site were based on past site history, the type of petroleum product stored in the tank, and the excavation screening and confirmation results. Specific analytical parameters requested for waste characterization purposes are discussed in the Waste Characterization and Disposal sections for each individual site.

Site descriptions, brief site histories, and summaries of the tank removal, sampling, waste characterization, and site restoration activities conducted at each UST removal site are contained in Sections 2.1 through 2.6.

Table 2-1 Analytical Matrix for UST Sites								
Analytical Parameters	Bldg. 13	Bldg. 683	Bldg. 688	Bldg. 1423	Bldg. 3759	Bldg. 3820		
	Background Sampling							
TPH/IR	x	x	x	X	x	x		
	Excavat	tion Screenin	ng Sampling					
TPH/IR	x	x		x	X			
BTEX					x			
	Cor	nfirmation S	ampling					
TPH/IR	x	x		X	X	x		
VOCs, total	x	x		x	x			
BNAs, total	x	x		x	x			
MTBE, total					x	x		
PAHs, total	x							
BTEX						x		
Lead, total						x		
Waste Characterization Sampling								
TPH/IR	x	x		X	X			
VOCs, total x								



Table 2-1 Analytical Matrix for UST Sites						
Analytical ParametersBldg.Bldg.Bldg.Bldg.Bldg.Bldg.13683688142337593820						Bldg. 3820
BNAs, total	x					
RCRA metals, total	X					-
PCBs, total x						
TCLP RCRA	x					

2.1 BUILDING 13 UST REMOVAL

Bldg. 13 is located on the north side of Rogers Field and Buena Vista Street in the northern end of the Main Post at Fort Devens (Figure 1-1). The UST was located on the north side of the building adjacent to the generator building and a concrete pad with cooling equipment (Figure 1-2). NED contracted OHM to remove the tank and all associated piping in accordance with the MCP and Fort Devens UST removal protocol. No previous investigatory work had been conducted in the area of the UST.

2.1.1 Excavation and Soil Screening Activities

JetLine Environmental Services, Inc. (JES) removed 500 gallons of No. 2 fuel oil from the Bldg. 13 UST on June 12, 1996. The UST at Building 13 was removed on June 14, 1995. The UST was noted to be in good condition upon removal and there were no obvious signs of a release. Initial screening samples, collected immediately after the tank was removed, indicated that soil surrounding the UST had not been impacted by petroleum. A summary of the screening sample results is presented in Table 2-2a, and the on-site analytical documentation is contained in Appendix A.





Table 2-2a Soil Sample Screening Results Building 13 UST							
Sample IDSample LocationSample DateSample Depth (ft)TPH Rest (mg/kg)							
SBE13BG1	Background in area of UST	05-Jun-95	1.5 - 2.0	10 J			
SBE13BG2	Background in area of UST	05-Jun-95	1.5 -2.0	ND (42)			
SB13W1	South sidewall	14-Jun-95	2.2	13 J			
SB13W2	South sidewall	14-Jun-95	2.7	10 J			
SB13W3	West sidewall	14-Jun-95	3.2	ND (42)			
SB13W4	West sidewall	14-Jun-95	2.8	19 J			
SB13W5	North sidewall	14-Jun-95	3.5	12 J			
SB13W6	North sidewall	14-Jun-95	3.5	ND (42)			
SB13W7	East sidewall	14-Jun-95	3.6	ND (42)			
SB13W8	East sidewall	14-Jun-95	3.0	13 J			
SB13B1	Excavation bottom	14-Jun-95	5.3	9 J			
SB13B2	Excavation bottom	14-Jun-95	5.3	32 J			
SBE13W4A	Confirmation - west sidewall	15-Jun-95	2.8	ND (42)			
SBE13B2A	Confirmation - bottom	15-Jun-95	5.3	63			
EXE13A	Stockpile sample	15-Jun-95	2.0	ND (42)			

NOTES: ND () = indicates TPH was not detected at specified detection limit J = Qualifier indicating estimated concentration below practical quantitation limit mg/kg = milligrams per kilogram

2.1.2 Confirmation Sample Results

Two confirmation samples, one from the excavation bottom and one from the west sidewall, were collected from the Bldg. 13 excavation on June 15, 1995. They were submitted to AENI for analysis of total TPH, VOCs, and BNAs in order to confirm that cleanup goals had been attained. Refer to Figure 2-1 for confirmation sample locations. Both confirmation sampling locations were sampled for on-site TPH/IR screening prior to confirmation sampling to minimize any unnecessary off-site analyses.





Confirmation sampling results indicated non-detectable levels of TPH and VOCs with the exception of methylene chloride ($MeCl_2$), a common laboratory artifact. Several PAH compounds were detected in the west sidewall sample at concentrations slightly exceeding their respective MCP S1/GW1 standards. Additional soil was removed from the west wall until action levels for these PAH compounds were attained. In addition, a composite sample was collected from the north, east, and south sidewalls to verify that the PAHs were confined to the west sidewall. PAH confirmation sampling results are summarized in Table 2-2b, and the AENI analytical report is contained in Appendix B.

Table 2-2b PAH Confirmation Soil Sample Results (ug/kg) Building 13 UST						
Sample ID	SBE13W4 A	SBE13B2A	SB13W4B	SB13W9	SB13W10	SB13W9A
Date	15-Jun-95	15-June-95	12-July-95	31-July-95	31-July-95	18-Aug-95
Туре	grab	grab	grab	composite	grab	grab
Location	W sidewall	bottom	W sidewall	3 sidewalls	W sidewall	W sidewall
Acenaphthalene	78 J	ND	51	ND	ND	ND
Phenanthrene	860	130 J	131	260 J	39 J	ND
Anthracene	240 J	ND	54	100 J	ND	ND
Fluoranthene	1900	140 J	978	1100	110 J	ND
Pyrene	1500	86 J	800	770	81 J	ND
Benzo(a)anth.	1100	ND	723	720	69 J	ND
Chrysene	1100	70 J	716	730	74 J	ND
Benzo(b)fluoranth.	1200	ND	NA	580	66 J	ND
Benzo(k)fluoranth.	630	ND	NA	650	64 J	ND
Benzo(a)pyrene	940	ND	953	660	62 J	ND
Ind.(1,2,3-cd)pyr.	610	ND	197	440	48 J	ND
Dibenz(a,h)anth.	360	ND	307	300	ND	ND
Benzo(g,h,i)per.	570	ND	189	430	48 J	ND

NOTES: ug/kg = micrograms per kilogram

ND = indicates that the PAH was not detected in sample

J = indicates estimated concentration below the practical quantitation limit



2.1.3 Waste Characterization and Disposal

A composite sample and a grab sample were collected from the excavated soil stockpile in order to characterize it for disposal or reuse. The grab sample was analyzed for total VOCs while the composite sample was analyzed for total TPH, BNAs, polychlorinated biphenyls (PCBs), and the eight RCRA metals to determine if the material could be reused on-site. The composite sample was also analyzed to determine if the stockpiled soil was a Resource Conservation and Recovery Act (RCRA) waste based on ignitability, corrosivity, reactivity, and to determine if it was toxic per TCLP. The test results indicated that the stockpiled soil was not hazardous and that it met the reuse criteria set forth in MADEP's Bureau of Waste Prevention (BWP) Interim Policy #BWP-94-037. The AENI analytical report is contained in Appendix C.

Approximately 40 tons of excavated soil from Bldg. 13 is stockpiled at a temporary soil storage facility located adjacent to Bldg. 202 in the northeast portion of the Main Post. Refer to Appendix D for the Material Shipping Record used to document transportation of the soil to the storage facility. Also included is disposal documentation for the UST that was taken to Tombarello & Sons certified tank yard.

2.1.4 Backfilling and Site Restoration

The excavation at Bldg. 13 was backfilled with clean fill obtained from the North Post of Fort Devens. The excavation area was then loamed and seeded per specifications.

2.2 BUILDING 683 UST REMOVAL

Bldg. 683 is a chapel located off Pine Street near the center of the Main Post (Figure 1-1). A 1,500 gallon No. 2 fuel oil UST was located approximately 6 feet off the west corner of the building (Figure 1-3). No previous investigatory work had been conducted in the area of the UST.

2.2.1 Excavation and Soil Screening Activities

The UST at Bldg. 683 was removed on June 2, 1995. It was noted to be in good condition upon removal and there were no obvious signs of a release. The excavation inspection and TPH screening samples, collected immediately after tank removal, indicated that the soil surrounding the UST had not been impacted by petroleum. A summary of the soil sample screening results is presented Table 2-2a. The on-site analytical documentation is contained in Appendix A.



Table 2-3a Soil Sample Screening Results Building 683 UST							
Sample IDSample LocationSample DateSample Depth (ft)TPH Resu (mg/kg)							
SBE683BG1	Background in area of UST	02-Jun-95	1.5 - 2.0	32 J			
SBE683BG2	Background in area of UST	02-Jun-95	1.5 -2.0	327			
SBE683W1	Northeast sidewall	02-Jun-95	7.0	ND (42)			
SBE683W2	Northeast sidewall	02-Jun-95	6.2	23 J			
SBE683W3	Southeast sidewall	02-Jun-95	7.3	ND (42)			
SBE683W4	Southeast sidewall	02-Jun-95	6.7	ND (42)			
SBE683W5	Southwest sidewall	02-Jun-95	7.1	14 J			
SBE683W6	Southwest sidewall	02-Jun-95	7.2	10 J			
SBE683W7	Northwest sidewall	02-Jun-95	6.9	9 J			
SBE683W8	Northwest sidewall	02-Jun-95	7.0	13 J			
SBE683B1	Excavation bottom	02-Jun-95	8.4	ND (42)			
SBE683B2	Excavation bottom	02-Jun-95	8.5	13 J			

NOTES: ND () = indicates TPH was not detected at specified detection limit

J = Qualifier indicating estimated concentration below the practical quantitation limit mg/kg = milligrams per kilogram

2.2.2 Confirmation Sample Results

Confirmation samples were collected from the bottom and from the northeast sidewall of the excavation on June 5, 1995 in accordance with the Fort Devens UST removal protocol. They were submitted to AENI for total TPH, VOC, and BNA analyses to confirm that cleanup goals had been met. Refer to Figure 2-2 for confirmation sampling locations. No detectable levels of TPH were found in either sample. The VOC and BNA results indicated that cleanup goals had been met for all contaminants of concern, however, several organic constituents were detected at concentrations below their respective MCP S1/GW1 standards. These results are summarized in Table 2-3b. The AENI analytical report is contained in Appendix B.







Table 2-3b PAH Confirmation Soil Sample Results (mg/kg) Building 683 UST							
MCP S-1 GW-1SampleSampleContaminantStandardSBE683W2ASBE683B2A							
Trichloroethylene	0.4	ND (0.0056)	0.002 J				
Methylene chloride	0.1	0.004 J	ND (0.0053)				
Phenanthrene	700	0.076 J	0.270				
Anthracene	1,000	ND (0.360)	0.096				
Carbazole	None	ND (0.360)	0.053				
Fluoranthene	600	0.210 J	0.680				
Ругепе	500	0.120 J	0.360				
Benzo(a)anthracene	0.7	0.079 J	0.220 J				
Chrysene	0.7	0.100 J	0.240 J				
Bis(2-ethylhexyl)phthalate	100	1.60	0.470				
Benzo(b)fluoranthene	0.7	0.099 J	0.110 J				
Benzo(k)fluoranthene	0.7	0.072 J	0.110 J				
Benzo(a)pyrene	0.7	0.098 J	0.110 J				
Indeno(1,2,3-cd)pyrene	0.7	0.068 J	0.059 J				
Dibenz(a,h)anthracene	0.7	ND (0.360)	0.041 J				
Benzo(g,h,i)perylene	100	0.072 J	0.069 J				

Notes: 1) "B" qualifier indicates that constituent was also detected in the laboratory method blank.

2) "J" qualifier indicates that concentration is below laboratory practical quantitation limit

3) All concentrations are in milligrams per kilogram (mg/kg)

2.2.3 Waste Characterization and Disposal

One composite sample was collected from the excavated soil stockpile for on-site laboratory analysis of TPH/IR. The TPH result of 57 mg/kg indicated that the soil could be used to backfill the excavation. As a result, no soil disposal was required at this site. The UST was taken to Tombarello and Sons tank yard. UST disposal documentation is contained in Appendix D.



2.2.4 Backfilling and Site Restoration

The excavation at Bldg. 683 was backfilled with the soil removed during the UST excavation. Additional clean fill material required to restore the site to grade was obtained from the North Post of Fort Devens. The excavation area was then loamed and seeded per the specifications, and limited repaying was done to fully restore the site.

2.3 BUILDING 688 UST REMOVAL

Bldg. 688 is located on MacArthur Avenue approximately 900 feet southwest of the intersection of MacArthur Avenue and Pine Street near the center of the Main Post (Figure 1-1). The tank was located on the south side of the building adjacent to a paved parking area (Figure 1-4). It was used to store diesel fuel for an emergency generator and was installed within a below-grade concrete vault. OHM was contracted to remove the emergency generator, demolish the top part of the vault, remove the UST, and abandon the vault by perforating the bottom and backfilling.

2.3.1 Excavation and Soil Screening Activities

OHM disconnected the generator and transported it to Bldg. 247 as directed by the Fort Devens Department of Public Works (DPW). When the vault top was removed OHM discovered a 1,000 gallon fiberglass UST, not a 500 gallon steel UST as indicated in the work specifications. After approximately 1,000 gallons of fuel oil was removed by JES on June 12, 1996, OHM removed the UST. No signs of a release were noted. Subsequent to UST removal OHM demolished the sides of the vault and perforated the bottom per the specification. Screening samples were not collected at this site because the UST was installed in a concrete vault and showed no signs of a previous release.

2.3.2 Confirmation Sample Results

No confirmation sampling was required at this site because the UST was installed in a concrete vault and showed no signs of a previous release.

2.3.3 Waste Characterization and Disposal

No waste characterization samples were collected because soil removal was not required at this site. The fiberglass UST was left at the site for reuse by the EMO.

2.3.4 Backfilling and Site Restoration

The vault was backfilled with clean fill obtained from the North Post of Fort Devens and the removal area was covered with topsoil, seeded, and mulched.

2.4 BUILDING 1423 UST REMOVAL

Bldg. 1423 was demolished in 1994. It was located in the southwest corner of the DPW yard on the eastern side of the Main Post (Figure 1-1). Access to the yard is through a gate at the south end of Chattanooga Street. The UST was located approximately 6 feet north of an 18-foot by 45-foot covered drum storage pad (Figure 1-5). The 1,000 gallon UST was used to store No. 2 fuel oil for heating Bldg. 1423.





2.4.1 Excavation and Soil Screening Activities

The UST at Bldg. 1423 was removed on June 6, 1995. The UST was noted to be in good condition upon removal and there were no obvious signs of a release. Initial screening samples, collected immediately after the tank removal, indicated that the soil surrounding the UST had not been impacted by petroleum. A summary of the soil sample screening TPH/IR results is presented in Table 2-4, and the on-site analytical documentation is contained in Appendix A.

Table 2-4 Soil Screening Results Building 1423 UST						
Sample ID	Sample Location	Sample Date	Sample Depth (ft)	TPH Result (mg/kg)		
SBE1423BG1	Background in area of UST	06-Jun-95	1.5 - 2.0	21 J		
SBE1423BG2	Background in area of UST	06-Jun-95	1.5 -2.0	51		
SBE1423W1	North sidewall	06-Jun-95	3.6	8 J		
SBE1423W2	North sidewall	06-Jun-95	3.8	ND (42)		
SBE1423W3	East sidewall	06-Jun-95	3.9	22 J		
SBE1423W4	East sidewall	06-Jun-95	4.1	16 J		
SBE1423W5	South sidewall	06-Jun-95	3.9	9 J		
SBE1423W6	South sidewall	06-Jun-95	4.2	243		
SBE1423W7	West sidewall	06-Jun-95	4.5	70		
SBE1423W8	West sidewall	06-Jun-95	4.7	43		
SBE1423B1	Excavation bottom	06-Jun-95	7.3	12 J		
SBE1423B2	Excavation bottom	06-Jun-95	7.3	17 J		

NOTES: ND () = indicates TPH was not detected at specified detection limit I = O unalifier indicating estimated concentration below the practical gas

J = Qualifier indicating estimated concentration below the practical quantitation limit mg/kg = milligrams per kilogram

2.4.2 Confirmation Sample Results

Two confirmation samples were collected from the excavation on June 12, 1995. One sample was collected from the excavation bottom and one from the south sidewall. The soil samples were submitted to AENI for TPH, VOC, and BNA analyses to confirm that cleanup goals had been met. Refer to Figure 2-3 for confirmation sample locations.





The analytical results indicated that there were no exceedances of applicable MCP S1/GWI standards. TPH was detected at 130 mg/kg in sidewall sample SBE1423W6A but was not detected in bottom sample SBE1423B2A. The PAHs 2-methlynaphthalene (47 micrograms per kilogram (ug/kg)), indeno(1,2,3-cd)pyrene (350 ug/kg), and benzo(g,h,i)perylene (350 ug/kg) were detected in sidewall sample SBE1423W6A. Bis(2-ethylhexyl)phthalate (DEHP), a common laboratory contaminant, was detected in the sidewall sample at a concentration of 1200 ug/kg and in the bottom sample at a concentration of 550 ug/kg. No other BNAs were detected. MeCl₂, a common laboratory contaminant, was detected in sidewall sample SBE1423W6A at a concentration of 7.1 ug/kg. No other VOCs were detected in either sample. The AENI analytical report is provided as Appendix B.

2.4.3 Waste Characterization and Disposal

A composite sample was collected from the stockpiled soil for on-site analysis for TPH/IR. The TPH result of 42 mg/kg indicated that the material could be used to backfill the excavation. As a result, no soil disposal was required at this site. The UST was taken to Tombarello and Sons tank yard. Disposal documentation is contained in Appendix D.

2.4.4 Backfilling and Site Restoration

The excavation at Bldg. 1423 was backfilled soil excavated during the UST removal. Additional clean fill required to restore the site to grade was obtained from the North Post of Fort Devens. No further restoration was required at this site

2.5 BUILDING 3759 REMOVALS

Bldg. 3759 is located within Equipment Concentration Site (ECS) 65 on the east side of Barnum Road (Figure 1-1), approximately 2,800 feet south of the Barnum Road gate on the Main Post (Figure 1-6). One 3,000-gallon gasoline UST and one 5,000-gallon diesel UST were installed under concrete pads. OHM was tasked with demolishing the pads and removing of the tanks.

2.5.1 Excavation and Soil Screening Activities

On June 9, 1995, JES transferred 2,400 gallons of gasoline from the 3,000-gallon gasoline UST at Bldg. 3759 to Bldg. 1404. JES later removed 3,000 gallons of diesel fuel from the 5,000-gallon UST on June 12th. A ho-ram was then used on June 14 and 15 to demolish the concrete pads over the tanks. Both USTs at Bldg. 3759 were removed on June 20th. The USTs was noted to be in excellent condition upon removal and there were no obvious signs of a release. The USTs were close enough together so that only one excavation was created. Initial screen samples, collected immediately after the tank removals, indicated that the soil surrounding the USTs had not been impacted by gasoline or diesel fuel. Samples were screened on-site for TPH/IR and BTEX compounds. BTEX compounds were not detected in any of the screening samples. A summary of the TPH/IR screening results is presented in Table 2-5 and the on-site analytical documentation is contained in Appendix A.



Table 2-5 Soil Sample Screening Results Building 3759 UST						
Sample ID	Sample Location	Sample Date	Sample Depth (ft)	TPH Result (mg/kg)		
SB3759BG1	Background in area of UST	26-Jun-95	1.5 - 2.0	17 J		
SB3759BG2	Background in area of UST	26-Jun-95	1.5 -2.0	10 J		
SB3759W1	Excavation sidewall	21-Jun-95	5.3	ND (42)		
SB3759W2	Excavation sidewall	21-Jun-95	4.5	ND (42)		
SB3759W3	Excavation sidewall	21-Jun-95	5.5	ND (42)		
SB3759W4	Excavation sidewall	21-Jun-95	4.1	ND (42)		
SB3759W5	Excavation sidewall	21-Jun-95	5.7	17 J		
SB3759W6	Excavation sidewall	21-Jun-95	6.0	ND (42)		
SB3759W7	Excavation sidewall	21-Jun-95	4.4	115		
SB3759W8	Excavation sidewall	21-Jun-95	6.0	ND (42)		
SB3759W9	Excavation sidewall	21-Jun-95	5.9	ND (42)		
SB3759W10	Excavation sidewall	21-Jun-95	5.8	ND (42)		
SB3759W11	Excavation sidewall	21-Jun-95	6.0	ND (42)		
SB3759W12	Excavation sidewall	21-Jun-95	6.3	ND (42)		
SB3759B1	Excavation bottom	21-Jun-95	9.2	ND (42)		
SB3759B2	Excavation bottom	21-Jun-95	9.3	ND (42)		
SB3759B3	Excavation bottom	21-Jun-95	9.5	ND (42)		
SB3759B4	Excavation bottom	21-Jun-95	9.7	19 J		

NOTES: ND () = indicates TPH was not detected at specified detection limit J = Qualifier indicating estimated concentration below practical quantitation limit mg/kg = milligrams per kilogram

2.5.2 Confirmation Sample Results

Four confirmation samples were collected from the excavation on June 22, 1995. Two samples were collected from the bottom and two from the sidewalls of the excavation (Figure 2-4). The samples were submitted to AENI for TPH, VOCs plus MTBE, BNAs, and lead analyses to confirm that cleanup goals had been met.





The results showed a TPH concentration of 870 mg/kg in the duplicate (SB3759DUPB) of sidewall sample SB3759W7A (480 mg/kg). After reviewing the field notes it was discovered that small pieces of asphalt had been noted in this pair of samples. Confirmation resampling was conducted on July 6th, and the sample was sieved to remove the asphalt material. No detectable levels of TPH were found in the second sample. TPH was also detected in bottom sample SB3759B4A at a concentration of 37 mg/kg. The following PAHs were also detected in duplicate sample SB3759DUPB at residual concentrations well below their respective MCP S1/GW1 standards: fluoranthene (71ug/kg J), pyrene (50ug/kg J), benzo(a)anthracene (43 ug/kg J), chrysene (64 ug/kg J), benzo(b)fluoranthene (65g/kg J), benzo(k)fluoranthene (77 ug/kg J), benzo(a)pyrene (51 ug/kg J), indeno(1,2,3-cd)pyrene (39 ug/kg J), and benzo(g,h,i)perylene (45 ug/kg J).

Laboratory results for all other analytes were below their respective MCP S1/GW1 standards. $MeCl_2$ and DEHP, which are common laboratory contaminants, were detected in several of the samples at concentrations ranging from 9.9 to 31 ug/kg and from 130 to 600 ug/kg, respectively. No other VOCs or BNAs were detected. Lead concentrations ranged from 2.8 to 3.2 mg/kg. The AENI analytical report is contained in Appendix B.

2.5.3 Waste Characterization and Disposal

Twelve grab samples were collected from the excavated soil stockpile for on-site analysis for TPH/IR. The TPH results, ranging from 8 to 27 mg/kg, indicated that the material could be used to backfill the excavation. As a result, no soil disposal was required at this site. The UST was taken to Tombarello and Sons tank yard.

2.5.4 Backfilling and Site Restoration

The excavation at Bldg. 3759 was backfilled with the excavated soil. Additional clean fill material required to restore the site to grade was obtained from the North Post of Fort Devens. No additional restoration was required at this site.

2.6 BUILDING 3820 REMOVAL AND REPLACEMENT

Bldg. 3820 is located north of the air traffic control tower and the airfield hangars at MAAF on the North Post of Fort Devens (Figure 1-1). The building contains four vertical turbine fire pumps that provide fire protection water for deluge systems installed in the airfield hangars. Each pump is driven by a Chrysler 354 cubic inch, V-8 engine. Fuel for the engines was provided by separate fuel lines connected to a single 400-gallon gasoline UST located approximately 7 feet from the south side of the building (Figure 1-7). OHM was contracted to remove this UST and replace it with a vaulted tank in accordance with the scope of work.

2.6.1 UST Removal and Replacement

A new 275-gallon UST was installed during the months of November and December, 1995 in accordance with contract specifications for aboveground storage tanks (see Section 15487). The precast concrete vault, tank, piping, and ancillary equipment were installed in accordance National Fire Protection Act (NFPA) 30 and 527 CMR 9.00 and 9.04(E). Refer to Figure 2-6 for the approximate location of the new tank. Once installation of the new UST was complete, approximately 200 gallons of gasoline were transferred from the old UST to the newly installed UST. On December 12, 1996, OHM removed the old UST. It was noted to be in good condition upon removal and there were no obvious signs of a release. Excavation screening samples were not collected because the on-site laboratory trailer had been demobed.



2.6.2 Confirmation Sample Results

Since no screening samples had been collected from the excavation, confirmation samples were collected from each sidewall of the excavation on December 19. The base of the excavation was a concrete pad, therefore no bottom sample was collected. Each sample was submitted to AENI for TPH, BTEX, MTBE and lead analyses. The confirmation sample locations are shown in Figure 2-6 and the AENI analytical report is included in Appendix C.

No organic analytes were detected in any of the confirmation samples. Lead was detected at concentrations ranging from 5.8 to 6.6 mg/kg.

2.6.3 Waste Characterization and Disposal

No soil disposal was required at this site. The UST was taken to Tombarello and Sons tank yard. Disposal documentation is contained in Appendix D.

2.6.4 Backfilling and Site Restoration

The excavation at Bldg. 3820 was backfilled with the excavated soil. Additional clean fill required to restore the site to grade was obtained from the North Post of Fort Devens. No additional restoration was required at this site.



SECTION 3.0 QUALITY ASSURANCE/QUALITY CONTROL

Appropriate QA/QC measures were taken at each of the EMO UST sites to ensure the collection of representative soil samples and the generation of accurate and reproducible analytical data.

3.1 SAMPLE COLLECTION QUALITY CONTROL

Soil samples were collected using either a stainless steel trowel or disposable polyethylene scoops. Composite samples were thoroughly homogenized in stainless steel sampling buckets. The sampling equipment was decontaminated using the following procedure:

- 1) Non-phosphate soap and water rinse;
- 2) tap water rinse;
- 3) distilled water rinse;
- 4) 10% nitric acid rinse;
- 5) distilled water rinse;
- 6) methanol rinse; and,
- 7) distilled water rinse.

Sample integrity was also maintained by changing gloves between each sample location. All samples collected on site were entered on a chain-of-custody (COC) and documented on a sample collection log and a permanent logbook. Samples sent off-site were properly preserved, packaged and overnight shipped to the proper laboratory.

3.2 LABORATORY QUALITY CONTROL

QC measures were taken in the on-site laboratory to ensure the accuracy and precision of the analytical data. TPH concentrations were determined using an IR while BTEX concentrations were determined by gas chromatography. A calibration curve was developed for both instruments prior to the start up of sampling activities to establish detection limits and document the instrument response linearity. A single calibration point was run in triplicate to demonstrate measurement precision. Continuing calibrations were also performed on a daily basis thereafter to provide a check on instrument response.

The off-site laboratory took the proper QC measures specified for the methods used. Samples were properly preserved upon receipt by the laboratory and sample extraction and analysis were performed within the holding times specified in the methods. Blank and spike samples associated with the EMO UST excavation samples were within acceptable QC limits. Refer to the analytical reports for more specific QC information.

Three confirmation and two waste characterization composite samples were collected in triplicate for QA/QC purposes. Two of the three split samples for each triplicate were analyzed by AENI (the contract laboratory), and the third split was shipped to the USACE Environmental Laboratory for analyses.

The USACE Laboratory prepared a Chemical Quality Assurance Report (CQAR) to compare their data with the results generated by AENI. The report indicates that AENI laboratory results for the primary (contractor lab) and QA samples agreed overall in 292 of the 293 comparisons (99%) with one minor discrepancy. The minor discrepancy involved the contractor laboratory's detection of toluene at 7.7 nanograms per gram (ng/g) versus the QA laboratory's non-detect at 1.6 ng/g. The discrepancy has not impacted decisions regarding site closure or waste characterization. The CQAR is contained in Appendix F.

SECTION 4.0 CONCLUSIONS

The EMO requested that the NED remove 13 USTs and replace the USTs at Buildings 3411 and 3820 (two USTs) with vaulted tanks. NED contracted OHM to conduct the removals in accordance with the Final Underground Storage Tank Removal Protocol, Fort Devens, Massachusetts. If contamination was encountered, the removals were conducted as LRAs under the MCP. LRAs are limited to 100 cy of petroleum-contaminated soil. In addition to the IRAs, UST removals at MAAF were conducted as RAMs after significant concentrations of PAHs were detected in the soil surrounding the USTs. As a result, only seven of the thirteen USTs are addressed in this report because the other six removals required MADEP notification, were carried out as either IRAs or RAMs, and the work was documented in separate stand-alone reports submitted to MADEP along with the required regulatory submittal forms. This closure report summarizes closure activities associated with UST removals at Bldgs. 13, 683, 688, 1423, 3759, and 3820.

Bldgs. 13, 683, 688, 1423, and 3759 are located on the Main Post at Fort Devens (Figure 1-1). Bldg. 3820 is located at MAAF on the North Post. Screening samples were collected from each excavation following UST removal for on-site TPH/IR analysis. The analytical results were used to identify TPH-impacted soil and to guide the removal of soil above the site action level of 500 mg/kg. This screening sampling protocol was not followed when the UST was installed in a vault. Confirmation sampling was used to verify attainment of cleanup standards for TPH, VOCs, BNAs, and other targeted analytes prior to backfilling.

Site restoration included backfilling at each site. Restoration at some sites also required seeding, mulching, and limited repaying. Groundwater was not encountered during any of the UST removals. Based on the results of the confirmation samples, no further action is recommended for the UST sites.

Proper QA/QC measures were observed to ensure the collection of accurate and reproducible data. The results of split samples submitted to the USACE Environmental Laboratory indicated an overall agreement of 99% with the results of the contractors laboratory. Soil excavated from Bldg. 13 was characterized and transported to the temporary soil storage facility adjacent to Bldg. 202 in the northeast portion of the Main Post. The soil transfer was documented using a Material Shipping Record and Log. Soil excavated during UST removals at the other sites was analytically verified as suitable for reuse as backfill.