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**FINAL**  
**WORKPLAN**  
**INTERIM REMEDIAL MEASURES FOR**  
**SOLID WASTE MANAGEMENT UNITS 254, 258, 293, 299,**  
**314, and 303/318**  
**MCB CAMP LEJEUNE, NORTH CAROLINA**

Prepared for:

**DEPARTMENT OF THE NAVY**  
Naval Facilities Engineering Command



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Task Order 0014  
Shaw Project No. 846069

October 2005

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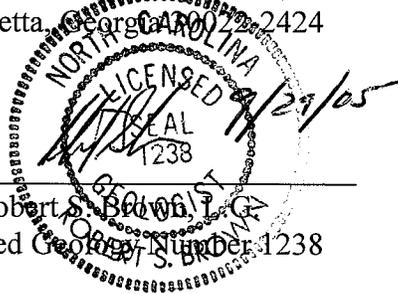
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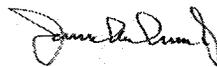
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## **TABLE OF CONTENTS**

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1-1</b>
1.1	SITE DESCRIPTIONS AND BACKGROUND .....	1-2
1.1.1	SWMU 254 .....	1-2
1.1.1.1	Phase I Confirmatory Site Investigation .....	1-2
1.1.1.2	Phase II Confirmatory Site Investigation .....	1-3
1.1.2	SWMU 258 .....	1-4
1.1.2.1	Phase I Confirmatory Site Investigation .....	1-4
1.1.2.2	Phase II Confirmatory Site Investigation .....	1-5
1.1.3	SWMU 293 .....	1-6
1.1.3.1	Phase I Confirmatory Site Investigation .....	1-6
1.1.3.2	Phase II Confirmatory Site Investigation .....	1-7
1.1.4	SWMU 299 .....	1-8
1.1.4.1	Phase I Confirmatory Site Investigation .....	1-8
1.1.4.2	Phase II Confirmatory Site Investigation .....	1-9
1.1.5	SWMU 314.....	1-11
1.1.5.1	Phase I Confirmatory Site Investigation .....	1-11
1.1.5.2	Phase II Confirmatory Site Investigation .....	1-11
1.1.6	SWMU 303/318.....	1-14
1.1.6.1	SWMU 303 - Aboveground Storage Tank .....	1-14
1.1.6.2	SWMU 318 - AS515 Oil/Water Separator .....	1-15
1.2	INTERIM REMEDIAL ACTION OBJECTIVES .....	1-17
<b>2.0</b>	<b>PRE-CONSTRUCTION ACTIVITIES.....</b>	<b>2-1</b>
2.1	PRE-CONSTRUCTION SUBMITTALS .....	2-1
2.2	PERMITS.....	2-1
2.3	PROCUREMENT.....	2-1
2.4	PRE-CONSTRUCTION MEETING .....	2-1
<b>3.0</b>	<b>ENVIRONMENTAL PROTECTION .....</b>	<b>3-1</b>
3.1	TEMPORARY ROAD CONSTRUCTION.....	3-1
3.2	PROTECTION OF TREES, SHRUBS, AND GRASS .....	3-1
3.3	WATER RESOURCES PROTECTION .....	3-1
3.3.1	Surface Water Management.....	3-1
3.3.2	Erosion Control.....	3-2
3.3.3	Spill and Discharge Control.....	3-2
3.4	EMISSIONS CONTROL.....	3-2
3.4.1	Air and Noise Control.....	3-2
3.4.2	Particulate Emissions Control.....	3-3
3.4.2.1	Soil Excavation, Handling, Site Grading and Transport.....	3-3
3.4.2.2	Movement of Equipment .....	3-3

3.5	SITE RESTORATION AND CLEANUP .....	3-3
3.6	SEEDING.....	3-3
<b>4.0</b>	<b>INTERIM MEASURES ACTIVITIES.....</b>	<b>4-1</b>
4.1	MOBILIZATION AND SITE PREPARATION .....	4-1
4.1.1	Utility Clearance .....	4-1
4.1.2	Site Survey .....	4-1
4.1.3	Environmental Protection .....	4-1
4.1.4	Fence Construction .....	4-1
4.1.5	Site Security .....	4-2
4.1.6	Health and Safety Zones .....	4-2
4.1.6.1	Decontamination Areas.....	4-2
4.1.6.2	Personnel Decontamination Facility .....	4-2
4.1.6.3	Equipment Decontamination Area.....	4-2
4.2	SWMU-254 REMEDIAL ACTIVITIES.....	4-2
4.2.1	SWMU-254 Soil Excavation Activities.....	4-2
4.2.2	SWMU-254 Confirmation Soil Sample Collection and Analysis .....	4-3
4.3	SWMU-258 REMEDIAL ACTIVITIES.....	4-3
4.3.1	SWMU-258 Soil Excavation Activities.....	4-3
4.3.2	SWMU-258 Confirmation Soil Sample Collection and Analysis .....	4-4
4.4	SWMU-293 REMEDIAL ACTIVITIES.....	4-5
4.4.1	SWMU-293 Soil Excavation Activities.....	4-5
4.4.2	SWMU-293 Confirmation Soil Sample Collection and Analysis .....	4-5
4.5	SWMU-299 REMEDIAL ACTIVITIES.....	4-6
4.5.1	SWMU 299 AST Removal and Replacement .....	4-6
4.5.2	SWMU-299 Soil Excavation Activities.....	4-7
4.5.3	SWMU-299 Confirmation Soil Sample Collection and Analysis .....	4-8
4.6	SWMU-314 REMEDIAL ACTIVITIES.....	4-8
4.6.1	SWMU-314 Soil Excavation Activities.....	4-8
4.6.2	SWMU-314 Confirmation Soil Sample Collection and Analysis .....	4-9
4.7	SWMU 303/318- ASTS NEAR BUILDING AS-515 AND BUILDING AS-515 OIL/WATER SEPARATOR REMEDIAL ACTIVITIES.....	4-9
4.7.1	SWMU 303/318 ASTs Soil Excavation Activities.....	4-9
4.7.2	SWMU 303/318 Confirmation Soil Sample Collection and Analysis.....	4-10
4.8	BACKFILL/COMPACTING/GRADING .....	4-10
4.9	SOIL STOCKPILE/STAGING AREA .....	4-11
4.10	DISPOSAL OF EXCAVATED MATERIAL.....	4-11
4.11	MANAGEMENT OF CONTAMINATED WATER .....	4-11
4.12	SITE RESTORATION .....	4-11
4.13	DEMOBILIZATION.....	4-11

<b>5.0</b>	<b>TRANSPORTATION AND DISPOSAL .....</b>	<b>5-1</b>
5.1	ON-SITE WASTE MANAGEMENT .....	5-1
5.1.1	Soils .....	5-1
5.1.2	Concrete and Asphalt Debris .....	5-1
5.1.3	Metallic Debris.....	5-1
5.2	TRANSPORTATION.....	5-2
5.3	DISPOSAL.....	5-2
5.4	DISPOSAL OF PPE.....	5-2
5.5	DOCUMENTATION.....	5-2
<b>6.0</b>	<b>REPORTS AND SUBMITTALS.....</b>	<b>6-1</b>
6.1	AS-BUILT RECORDS .....	6-1
6.2	ENVIRONMENTAL CONDITIONS REPORT .....	6-1
6.3	TEST RESULTS SUMMARY REPORT.....	6-1
6.4	DAILY REPORTS.....	6-1
6.5	CONTRACTOR’S CLOSEOUT REPORT.....	6-1

**FIGURES**

- Figure 1.2 SWMU 254 Site Map
- Figure 1.3 SWMU 258 Site Map
- Figure 1.4 SWMU 293 Site Map
- Figure 1.5 SWMU 299 Site Map
- Figure 1.6 SWMU 314 Site Map
- Figure 1.7 SWMU 303/318 Site Map
- Figure 4.1 SWMU 299 New AST Location

**APPENDICES**

- A. Site Specific Health and Safety Plan Addendum
- B. Sampling and Analysis Plan
- C. Construction Quality Control Plan
- D. AST System Manufacturer Equipment Specifications

## ***1.0 INTRODUCTION***

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This document presents Shaw Environmental, Inc. (Shaw) approach to implementing Interim Remedial Measures at five delineated Solid Waste Management Units (SWMUs) located at Marine Corps Base (MCB) Camp Lejeune, North Carolina. Removal activities at SWMU 308/318 are on hold pending additional delineation. The work plan has been prepared by Shaw for the Department of the Navy, Naval Facilities Engineering Command, Atlantic Division (LANTDIV) under Contract Number N62470-02-D-3260, Task Order 014. The Work Plan covers activities at the following SWMUs:

- SWMU 254
- SWMU 258
- SWMU 293
- SWMU 299
- SWMU 303/318
- SWMU 314

Excavation of impacted soils at the SWMUs followed by backfill and grading has been selected as the appropriate interim remedial measure for these sites. At SWMU 299 the removal of an existing AST followed by installation of a new, upgraded AST will be completed.

Accompanying plans have been developed for this task order and are to be considered as complementary components to this work plan. They include:

- Environmental Protection Plan (EPP) (included in Section 3.0 of this document)
- Site Specific Health and Safety Plan (SSHSP) Addendum (Appendix A)
- Sampling and Analysis Plan (SAP) (Appendix B)
- Construction Quality Control Plan (CQCP) (Appendix C)

This Work Plan identifies and describes proposed activities as included in the following sections:

- Section 1.0 presents an Introduction and Background of each site.
- Section 2.0 presents a description of Pre-construction Activities including pre-construction submittals and permits.

- Section 3.0 presents a description of Environmental Protection efforts that include temporary road construction, protection of trees, shrubs and grass, water resources protection, emission control, soil excavation, handling, site grading and transport, movement of equipment, site restoration and cleanup, and seeding.
- Section 4.0 presents a description of the Interim Remedial Measures Activities, which include mobilization and site preparation, contaminated soil excavation, backfilling, site restoration and demobilization.
- Section 5.0 presents the Transportation and Disposal efforts that include soil, decontamination water and PPE waste disposal coordination.
- Section 6.0 presents the Reporting procedures.

## **1.1 SITE DESCRIPTIONS AND BACKGROUND**

### *1.1.1 SWMU 254*

SWMU 254 consists of a dumpster identified in the RFA Report (EnSafe, 1996) as containing unpunched paint cans and approximately one gallon of Citrakleen. The SWMU is located northwest of the intersection of Elm Street and Michael Road in Hadnot Point, west of Building 1408. The dumpster could not be located during the Phase I CSI. The ground surface in the vicinity of the SWMU is covered with grass and did not show evidence of contamination and/or spills during the investigation. A surface water drainage ditch begins in the vicinity of the SWMU and travels northwest and connects to another surface water drainage ditch is located directly southwest of the SWMU. *Figure 1.2* presents a site map of the SWMU 254 area.

#### *1.1.1.1 Phase I Confirmatory Site Investigation*

A Phase I CSI was conducted in September 1997. The purpose of the investigation was to determine if materials placed in the dumpster during past practices had impacted surface and subsurface soils in the vicinity of the SWMU. Surface and subsurface soil samples were collected from one soil boring advanced in the general vicinity of the former dumpster. One additional surface soil sample was collected from the drainage ditch. The samples were submitted to Quanterra Laboratories and analyzed for VOCs, SVOCs, and RCRA metals. The analytical results were compared to background criteria, NC DENR soil to groundwater screening criteria, and USEPA Region IX residential PRGs. Based on evaluation of the results, several SVOCs exceeded the regulatory driven criteria. Therefore, additional investigation at SWMU 254 was recommended in the form of a Phase II CSI.

While writing the Project Plans for the Phase II CSI, it was determined that the SWMU was located in an industrial setting. Therefore, the soil data collected during the Phase II CSI was

compared to the USEPA Region IX industrial PRGs in lieu of the residential PRGs. In addition, it was determined that the COPCs identified in Phase I should be re-evaluated against the industrial PRGs.

#### 1.1.1.2 Phase II Confirmatory Site Investigation

The Phase II CSI was conducted on March 22 and April 4, 2002 in general accordance with the Final Project Plans (Baker, 2002). The purpose of the investigation was to further evaluate potential impacts to soil at the SWMU and determine if groundwater had been impacted as a result of a release(s) from the SWMU. The sample locations were selected based on results from the Phase I CSI.

The field investigation included the following:

- Surface and subsurface soil sampling at three temporary well borings
- Surface soil sampling at one location from the drainage ditch
- Groundwater sampling at three temporary wells

Groundwater was measured in on-site monitoring wells at depths ranging from 9.1 to 9.5 feet below land surface (bls). Groundwater elevations in the wells ranged from 15.3 to 15.4 feet above mean sea level (MSL). The groundwater elevation measurements indicated that groundwater in the vicinity of the SWMU appears to flow southeast.

#### Soil Analytical Results

The analytical results for the COPCs identified in Phase I were combined with the analytical results collected during Phase II. The analytical results from the two phases were compared to the following screening criteria:

- Default and site-specific NC DENR soil to groundwater values
- USEPA Region IX industrial PRGs

Twenty SVOCs (mostly PAHs) were detected in the surface soil sample set. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded NC DENR soil to groundwater screening criteria and/or Region IX industrial PRGs in one or more of the surface soil samples. None of the other detected SVOCs exceeded the established screening criteria.

### Groundwater Analytical Results

No SVOCs were detected above laboratory reporting limits or established screening criteria in the groundwater samples collected from the three temporary wells at SWMU 254.

#### *1.1.2 SWMU 258*

SWMU 258 is located within the central portion of the Hadnot Point Industrial Area adjacent to Michael Road and Building 1711. The SWMU consists of a concrete oil/water separator and grit chamber. The grit chamber receives a mixture of solids and fluids from the adjacent vehicle wash rack. The solid fraction is retained while the fluids which contain water, waste oil, and grease are passed to the oil/water separator. The SWMU currently is in use. It is unknown when the SWMU started operations. The perimeter around the SWMU is secured with a fence and locking gate. The ground surface is covered with asphalt and grass. During the site visit conducted by Baker in 1996, paint and petroleum stains were observed on the concrete walls of the system. *Figure 1.3* presents a site map of the SWMU 258 area.

##### 1.1.2.1 Phase I Confirmatory Site Investigation

A Phase I CSI was conducted in September 1997. The purpose of the investigation was to determine if operation of the oil/water separator and grit chamber has impacted surface and subsurface soils in the vicinity of the SWMU. Surface and subsurface soil samples were collected at six soil borings advanced around the perimeter of the SWMU. The soil samples were analyzed for VOCs, SVOCs, and RCRA metals. The analytical results were compared to background criteria, NCDENR soil to groundwater screening criteria, and USEPA Region IX residential PRGs. Based on evaluation of the results, one VOC (acetone) and two metals (cadmium and mercury) exceeded the regulatory driven criteria and established background/secondary criteria. Therefore, additional investigation at SWMU 258 was recommended in the form of a Phase II CSI.

While writing the Project Plans for the Phase II CSI, it was determined that the SWMU was located in an industrial setting. Therefore, the soil data collected during the Phase II CSI was compared to the USEPA Region IX industrial PRGs in lieu of the residential PRGs. In addition, it was determined that the COPCs identified in Phase I should be re-evaluated against the industrial PRGs.

#### 1.1.2.2 Phase II Confirmatory Site Investigation

The Phase II CSI was conducted on March 22 and April 6, 2002 in general accordance with the Final Project Plans (Baker, 2002). The purpose of the investigation was to further evaluate potential impacts to soil at the SWMU and determine if groundwater had been impacted as a result of a release(s) from the SWMU. The sample locations were selected based on results from the Phase I CSI.

The field investigation included the following:

- Surface and subsurface soil sampling at three temporary well borings
- Re-sampling of surface soil at soil boring SWMU258-IS05-00 (to confirm the presence of acetone)
- Groundwater sampling at three temporary wells

Groundwater was measured in on-site monitoring wells at depths ranging from 3.0 to 3.2 feet bls. Groundwater elevations in the wells ranged from 25.7 to 26.0 feet above MSL. The groundwater elevation measurements indicated that groundwater in the vicinity of the SWMU appears to flow northwest.

#### Soil Analytical Results

For the purpose of this investigation, the analytical results for the COPCs identified in Phase I were combined with the analytical results collected during Phase II. The analytical results from the two phases were compared to the following screening criteria:

- AOC background criteria
- Base background criteria
- Default and site-specific NC DENR soil to groundwater criteria
- USEPA Region IX industrial PRGs

The following six VOCs were detected in the surface soil samples: 2-butanone, acetone, benzene, carbon disulfide, ethylbenzene, and methylene chloride. However, none of the other VOCs detected in the samples exceeded the applicable screening criteria.

The following seven metals were detected in the surface soil samples; arsenic, barium, cadmium, chromium, lead, mercury, and selenium. All of the metals exceeded background screening criteria in one or more of the samples. Arsenic exceeded AOC and Base

background criteria, NC DENR soil to groundwater criteria and the USEPA Region IX industrial PRG. Cadmium, chromium, lead and mercury also exceeded AOC and Base background criteria and the NC DENR soil to groundwater screening criteria.

#### Groundwater Analytical Results

The analytical results and statistical summary for positive detections were compared to the following screening criteria:

- Base background criteria
- North Carolina 2L standards

The following four metals were detected in groundwater samples from one or more of the wells: arsenic, barium, chromium, and lead. Arsenic exceeded the background criteria and 2L standard. Chromium and lead exceeded the Base background criteria; however, the concentrations were below the 2L standards. None of the barium concentrations exceeded the established screening criteria. All of the compounds detected in the groundwater were detected in soils at the SWMU.

#### *1.1.3 SWMU 293*

SWMU 293 is a poured concrete in-ground oil/water separator with baffles that has been in operation since 1980. The outlet for the oil/water separator is connected to the wastewater treatment plant. The oil/water separator contains waste oil, antifreeze, and possibly solvents. During the site visit conducted by Baker in 1996, oil was observed in the grit chambers of the oil/water separator, and the wash pad was stained and cracked. It is suspected that solvents used for degreasing may have been disposed through the oil/water separator. *Figure 1.4* presents a site map of the SWMU 293 area.

##### *1.1.3.1 Phase I Confirmatory Site Investigation*

A Phase I CSI was conducted in September 1997. The purpose of the investigation was to determine if operation of the oil/water separator had impacted surface and subsurface soils in the vicinity of the SWMU. Soil samples were collected from three soil borings that were advanced in the vicinity of the SWMU. The soil samples were submitted to Quanterra Laboratories and analyzed for VOCs, SVOCs, and RCRA metals. The analytical results were compared to background concentrations, NC DENR soil to groundwater screening criteria, and USEPA Region IX residential PRGs. Based on evaluation of the results, lead exceeded

the regulatory driven criteria and established background/secondary criteria. Therefore, additional investigation at SWMU 293 was recommended in the form of a Phase II CSI.

While writing the Project Plans for the Phase II CSI, it was determined that the SWMU was located in an industrial setting. Therefore, the soil data collected during the Phase II CSI would be compared to the USEPA Region IX industrial PRGs in lieu of the residential PRGs. In addition, it was determined that the COPCs identified in Phase I should be re-evaluated against the industrial PRGs.

#### 1.1.3.2 Phase II Confirmatory Site Investigation

The Phase II CSI was conducted on March 22 and April 5, 2002 in general accordance with the Final Project Plans (Baker, 2002). The purpose of the investigation was to further evaluate potential impacts to soil at the SWMU and determine if groundwater had been impacted as a result of a release(s) from the SWMU. The sample locations were selected based on results from the Phase I CSI.

The field investigation included the following:

- Surface and subsurface soil sampling at three temporary well borings
- Groundwater sampling at three temporary wells

Groundwater was measured in on-site monitoring wells at depths ranging from 8.1 to 9.7 feet bls. Groundwater elevations in the wells ranged from 20.0 to 20.1 feet above MSL. The groundwater elevation measurements indicated that groundwater in the vicinity of the SWMU appears to flow northwest.

#### Soil Analytical Results

For the purpose of this investigation, the analytical results for COPCs identified in Phase I were combined with the analytical results collected during Phase II. The analytical results were compared to the following screening criteria:

- AOC background criteria
- Base background criteria
- Default and site-specific NC DENR soil to groundwater criteria
- USEPA Region IX industrial PRGs

The following six metals were detected in the surface soil samples: barium, cadmium, chromium, lead, mercury, and silver. The majority of the metals detected exceeded the established background screening criteria. Mercury exceeded the AOC background screening criteria and/or the NC DENR soil to groundwater screening criteria in three of the surface soil samples. However, concentrations did not exceed the USEPA Region IX industrial PRG or the Base background criteria. Lead exceeded the AOC and Base background screening criteria, and the NC DENR soil to groundwater screening criteria in surface soil sample SWMU293-IS02-00, which was collected during the Phase I CSI conducted in September 1997. None of the other detected metals exceeded the NC DENR soil to groundwater screening criteria or USEPA Region IX industrial PRGs.

#### Groundwater Analytical Results

The analytical results were compared to the following screening criteria:

- Base background criteria
- North Carolina 2L standards

The following four metals were detected in the groundwater samples from one or more of the wells: arsenic, barium, chromium and lead. Arsenic was detected above the background criteria and the 2L Standards in sample SWMU293-GW03. Chromium and lead also were detected above the background criteria in this sample; however, the concentrations were below the 2L standards. All of the metals detected in the groundwater (except arsenic) were detected in soils at the SWMU.

#### *1.1.4 SWMU 299*

SWMU 299 consists of an AST that stores used oil generated from a Hobby Shop located at the MCAS. The SWMU is located west of Bancroft Road adjacent to Buildings AS-114 and AS-116. The steel AST was installed in 1992 and is still used. The ground surface surrounding the SWMU is covered with asphalt except for a small grassy area located to the north. Stormwater travels across the pavement to the narrow grassy area north of the SWMU. *Figure 1.5* presents a site map of the SWMU 299 area.

#### *1.1.4.1 Phase I Confirmatory Site Investigation*

A Phase I CSI was conducted in September 1997. At the time of the investigation, significant staining was noted on the outside of the tank. The purpose of the investigation was to determine if operation of the AST has impacted surface and subsurface soils in the

vicinity of the SWMU. Surface soil samples were collected from four soil borings advanced in the grassy area just north of the SWMU. In addition, a single subsurface soil sample was collected from one of the soil borings at a depth of 2 to 4 feet below the ground surface. Groundwater was encountered at a depth of 2 feet below the ground surface in the remaining three borings, which precluded the collection of subsurface soil samples in these borings. The samples were submitted to Quanterra Laboratories and analyzed for VOCs, SVOCs, and RCRA metals. The analytical results were compared to background criteria, NC DENR soil to groundwater screening criteria and USEPA Region IX residential PRGs. Based on the evaluation of the results, several SVOCs and metals exceeded the regulatory driven criteria and established background/secondary criteria. Therefore, additional investigation at SWMU 299 was recommended in the form of a Phase II CSI.

#### 1.1.4.2 Phase II Confirmatory Site Investigation

The Phase II CSI was conducted on March 19 and April 2, 2002 in general accordance with the Final Project Plans (Baker, 2002). The purpose of the investigation was to further evaluate potential impacts to soil at the SWMU and determine if groundwater had been impacted as a result of a release(s) from the SWMU. The soil and groundwater samples were submitted to CompuChem Laboratories and analyzed for SVOCs and RCRA metals. The sample locations were selected based on results from the Phase I CSI.

The field investigation included the following:

- Surface and subsurface soil sampling at four temporary well borings and four soil borings
- Groundwater sampling at four temporary wells

Depth to groundwater was measured in the wells at depths ranging from approximately 0.9 to 2.2 feet below land surface. Groundwater elevations in the wells ranged from approximately 16.0 to 16.6 feet above Mean Sea Level (MSL). Groundwater in the vicinity of the SWMU appears to flow northeast.

#### Soil Analytical Results

The soil analytical results for the Contaminants of Potential Concern (COPCs) in both Phase I and Phase II assessments were compared to the following screening criteria:

- AOC background criteria
- Base background criteria
- Default and site specific NC DENR soil to groundwater criteria
- USEPA Region IX residential PRGs

Twenty-seven SVOCs (mostly PAHs) were detected in the sample set. In general, the majority of SVOCs were detected in surface and subsurface soil samples from borings advanced in the grassy area adjacent to (north of) the SWMU (e.g., SWMU299-IS01 through SWMU299-IS04, SWMU299-SB01, and SWMU299-TW01). The following SVOCs were detected at concentrations that exceeded the NC DENR soil to groundwater criteria and/or the USEPA Region IX residential PRGs in one or more of the surface soil samples: 2-Methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and isophorone. In addition, benzo(a)pyrene and dibenz(a,h)anthracene exceeded the USEPA Region IX residential PRGs in one or more of the subsurface soil samples. None of the other SVOCs detected in the samples exceeded the applicable screening criteria.

All eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) were detected in the samples. Most of these metals exceeded the background criteria in the surface and/or subsurface soil samples. Arsenic, cadmium, chromium, lead and silver were detected at concentrations exceeding the AOC and Base background criteria, NC DENR soil to groundwater screening criteria, and/or the USEPA Region IX residential PRGs in one or more of the surface soil samples. Mercury was detected at concentrations exceeding NC DENR soil to groundwater screening criteria in surface and subsurface soil.

#### Groundwater Analytical Results

The groundwater analytical results were compared to the following screening criteria:

- Base background criteria
- North Carolina 2L Standards

The following five SVOCs were detected in groundwater samples from one or more of the wells: 2,4-dimethylphenol, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, naphthalene, and phenanthrene. Naphthalene exceeded the North Carolina 2L standard in the sample from well SWMU299-TW03. None of the other SVOCs detected in the samples exceeded the applicable screening criteria.

The following four metals were detected in groundwater samples from one or more of the wells: arsenic, barium, chromium, and lead. None of these metals exceeded the applicable screening criteria.

All of the compounds (with the exception of 2,4-dimethylphenol) detected in groundwater were detected in soils at the SWMU.

### *1.1.5 SWMU 314*

SWMU 314 consists of a concrete oil/water separator and vehicle wash rack located south/southwest of Montford Landing Road and west/southwest (approximately 300 feet) of Northeast Creek at Camp Johnson. Water from the vehicle wash rack is transported to the oil/water separator via underground pipelines. No evidence of stains, spills, or releases was noted during the site visit conducted by Baker in October 1996. *Figure 1.6* presents a site map of the SWMU 314 area.

#### *1.1.5.1 Phase I Confirmatory Site Investigation*

A Phase I CSI was conducted in September 1997. The purpose of the investigation was to determine if operation of the oil/water separator had impacted surface and subsurface soils in the vicinity of the SWMU. Surface and subsurface soil samples were collected from four soil borings advanced around the perimeter of the SWMU. The samples were submitted to Quanterra Laboratories and analyzed for VOCs, SVOCs, and RCRA metals. The analytical results were compared to background criteria, NC DENR soil to groundwater screening criteria, and USEPA Region IX residential PRGs. Based on evaluation of the results, benzo(a)pyrene and arsenic exceeded the regulatory driven criteria and established background/secondary criteria. Therefore, additional investigation at SWMU 314 was recommended in the form of a Phase II CSI.

#### *1.1.5.2 Phase II Confirmatory Site Investigation*

The Phase II CSI was conducted on March 23 and April 9, 2002 in general accordance with the Final Project Plans (Baker, 2002). At the completion of the Phase II CSI, additional samples were collected during a supplemental Phase II investigation conducted in June 2003. The purpose of these investigations were to further evaluate potential impacts to soil at the SWMU and determine if groundwater had been impacted as a result of a release(s) from the SWMU. The sample locations were selected based on results from the Phase I CSI.

The field investigation included the following:

- Surface and subsurface soil sampling at three temporary well borings
- Soil samples from five surface soil sample locations
- Groundwater sampling at three temporary wells
- Installation and sampling of one groundwater monitoring well

Depth to groundwater was measured in the wells at depths ranged from 3.5 to 4.0 feet bls. Groundwater elevations in the wells ranged from 2.4 to 3.2 feet above MSL. Groundwater in the vicinity of the SWMU appears to flow south/southeast.

#### Soil Analytical Results

The analytical results for the COPCs identified in Phase I were combined with the analytical results collected during Phase II and the additional Phase II CSI. The analytical results were compared to the following screening criteria:

- AOC background criteria
- Base background criteria
- Default and site-specific NC DENR soil to groundwater criteria
- USEPA Region IX Residential PRGs

Eighteen SVOCs (mostly PAHs) were detected in the soil samples. Of these 18 SVOCs, bis(2-ethylhexyl)phthalate was the only SVOC detected in the subsurface soil samples. Most of the SVOCs were detected in the surface soil sample SWMU314-TW01-00. All of the constituents that were detected at concentrations that exceeded comparison criteria were detected in the surface soil samples. Benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene exceeded the USEPA Region IX residential PRG in this sample. In addition, benzo(a)pyrene exceeded the USEPA Region IX residential PRG in surface soil sample SWMU314-IS04-00. None of the other SVOCs detected in the samples exceeded the applicable screening criteria.

The following six metals were detected in the soil samples: arsenic, barium, cadmium, chromium, lead, and mercury. All of the detected inorganics exceeded the AOC and/or Base background criteria in one or more of the samples. However, only cadmium and mercury exceeded the NC DENR soil to groundwater screening criteria. Mercury concentrations in soil samples SWMU314-IS01-00 and SWMU314-IS04-00 exceeded the AOC background criteria and/or NC DENR soil to groundwater screening criteria; however, the concentrations were below the Base background and USEPA Region IX residential PRGs. The detections of mercury at concentrations below the Base background concentrations indicate that mercury is within background levels and therefore, its existence within the environment is not considered to be the result of SWMU-related activities. Cadmium was detected in soil sample SWMU314-SS01 at a concentration exceeding the Base background concentration and the NC DENR soil to groundwater screening criteria, but did not exceed the AOC-

specific background concentration. Therefore, it is assumed that although the cadmium concentrations in this sample are elevated enough to cause some concern, the fact that they are below the AOC-specific background concentration indicates that the detection of this constituent is not related to SWMU activities.

Arsenic exceeded the AOC and Base background criteria, and USEPA Region IX residential PRGs in surface soil samples SWMU314-IS03-00, SWMU314-SS02, and SWMU314-SS03. Arsenic exceeded the AOC background and the USEPA Region IX residential PRGs in subsurface soil samples SWMU314-IS03-02 and SWMU314-IS04-02. However, the detected concentrations of arsenic did not exceed the Base background concentrations or the NC DENR soil to groundwater concentrations, and therefore these subsurface soils are not considered to be a threat to the environment.

#### Groundwater Analytical Results

The analytical results and were compared to the following screening criteria:

- Base background criteria
- North Carolina 2L standards
- USEPA Region IX Tap Water PRGs (secondary criteria)

The constituent concentrations detected in the samples were compared to the USEPA Region IX PRGs for tap water only if no comparison concentration existed for the constituent under the NC DENR 2L standards.

One SVOC [bis(2-ethylhexyl)phthalate] was detected in the groundwater sample from well SWMU314-TW02. The concentration was below the NC DENR 2L standard. No SVOCs were detected in samples from the remaining two monitoring wells.

The following four metals were detected in groundwater samples from one or more of the wells: arsenic, barium, chromium, and lead. Barium and chromium exceeded the Base background screening criteria in the sample from well SWMU314-TW03. However, the concentrations were below the 2L standards. Lead was also detected in this sample at a concentration exceeding the background criteria and the NC DENR 2L standard. Arsenic was detected in all four samples collected from the temporary wells, but the detected concentrations did not exceed the NC DENR 2L standard or the Base Background level.

During the supplemental investigation in 2003, a groundwater monitoring well (SWMU314-MW04) was installed next to the location of temporary well SWMU314-TW03. This well was installed and sampled to confirm the high lead results obtained from during the 2002 site investigation. Lead was not detected in the groundwater at SWMU314-MW04. All of the compounds detected in groundwater were detected in soils at SWMU 314.

#### *1.1.6 SWMU 303/318*

SWMUs 303 and 318 were investigated as separate SWMUs during the Phase I and II CSIs. Soil and groundwater contamination was identified at both SWMUs. In a broader context, evidence from the IR Site 86 Amended Remedial Investigation report and demolition of the helicopter wash pad suggested that there was a soil and groundwater contamination plume larger than the individual SWMUs. Completion of additional contamination assessment activities in 2005 identified the limits of soil contamination at the site. *Figure 1.7* presents a site map of the SWMU 303/318 area.

##### *1.1.6.1 SWMU 303 - Aboveground Storage Tank*

SWMU 303 is located in the MCAS area east of Bancroft Street between the helicopter parking apron and Building AS-515. The SWMU consists of two ASTs that are contained within a concrete, bermed structure. The tanks are labeled as "Hydraulic Fluid, Engine and Transmission Oils Only, No Solvents or Other Chemicals." The steel tanks were installed in 1983 and are still in use.

A Phase I CSI was conducted in September 1997. The purpose of the investigation was to determine if operation of the ASTs had impacted surface and subsurface soils in the vicinity of the SWMU. At the time of the investigation, petroleum staining was noted on the outside of the concrete berm. Surface and subsurface soil samples were collected from four borings advanced around the perimeter of the SWMU. The samples were submitted to Quanterra Laboratories and analyzed for VOCs, SVOCs, and RCRA metals. The analytical results were compared to background criteria, NC DENR soil to groundwater screening criteria and USEPA Region IX residential PRGs. Based on the evaluation of the results, acetone, a few SVOCs, and arsenic exceeded the regulatory driven criteria and established background/secondary criteria. Therefore, further investigation at SWMU 303 was recommended in the form of a Phase II CSI.

The Phase II CSI was conducted on March 19, 20, and April 2, 2002. The purpose of the investigation was to further evaluate potential impacts to soil at the SWMU and determine if

groundwater had been impacted as a result of a release(s) from the SWMU. The sample locations were selected based on results from the Phase I CSI. The field investigation included the following:

- Surface and subsurface soil sampling at three temporary well borings and two soil borings
- Groundwater sampling at three temporary wells
- Re-sampling surface soil at location SWMU303-IS04-00

A few SVOCs and metals were detected in soil and groundwater at concentrations exceeding the applicable screening criteria. Compounds that exceeded both the AOC and Base background screening criteria and NC DENR soil to groundwater screening criteria and/or Region IX industrial PRGs in soil included benzo(a)pyrene and arsenic.

4-methylphenol, naphthalene, arsenic, chromium, and lead exceeded the Base background screening criteria and/or the North Carolina 2L standards in groundwater. Conclusions from the Phase II investigation suggested that elevated turbidity in the groundwater samples from the temporary wells may have caused artificially high concentrations of metals in the samples.

Based on the data collected during the two phases of the CSI, it was recommended that a RFI be conducted at the site to further evaluate the SWMU.

#### *1.1.6.2 SWMU 318 - AS515 Oil/Water Separator*

SWMU 318 is a concrete, multi-chambered oil/water separator and grit chamber located adjacent to the helicopter wash pad at the Marine Corps Air Station (MCAS) New River. The primary function of the SWMU is to collect water, soap, oil, grease, and dirt from the helicopter wash pad, separate the solids from the liquids, and then segregate the oil and grease from the remaining liquids. The helicopter wash pad is covered with concrete. The area surrounding the SWMU is covered with grass. A drainage ditch that collects storm water run-off from the surrounding area is located adjacent to the oil/water separator.

A Phase I CSI was performed in September 1997. The purpose of the investigation was to determine if operation of the oil/water separator had impacted surface and subsurface soils in the vicinity of the SWMU. Surface soil samples were collected at three soil borings advanced around the perimeter of the SWMU. Initially, two soil samples were proposed to be collected

from each boring. However, the shallow depth to groundwater precluded collection of additional, deeper samples. In addition, one surface soil sample was collected from the drainage ditch adjacent to the oil/water separator. The samples were submitted to Quanterra Laboratories and analyzed for VOCs, SVOCs and RCRA metals. The analytical results were compared to background criteria, NC DENR soil to groundwater screening criteria and USEPA Region IX residential PRGs. Based on the evaluation of the results, several VOCs, SVOCs, and metals exceeded the regulatory driven criteria and established background/secondary criteria. Therefore, additional investigation at SWMU 318 was recommended in the form of a Phase II CSI.

The Phase II CSI was conducted on March 19 and 20, and April 2, 2002. The purpose of the investigation was to further evaluate potential impacts to soil at the SWMU and determine if groundwater had been impacted as a result of a release(s) from the SWMU. The sample locations were selected based on results from the Phase I CSI.

The field investigation included the following:

- Surface and subsurface soil sampling at three temporary well borings
- Surface soil sampling at two locations in the drainage ditch
- Groundwater sampling at three temporary wells

Several VOCs, SVOCs and metals were detected in soil and/or groundwater at concentrations exceeding the applicable screening criteria. Compounds that exceeded both the AOC and Base background screening criteria and NC DENR soil to groundwater screening criteria and/or USEPA Region III industrial PRGs in soil included: 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,1,2-trichloroethane, bromoform and methylene chloride (VOCs); benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, and naphthalene (SVOCs); and arsenic, cadmium, chromium, mercury, and silver (metals).

Compounds that exceeded both the Base background screening criteria and/or 2L standards in groundwater included benzene, trichloroethene, vinyl chloride, 4-methylphenol, naphthalene, and arsenic. It was noted during the assessment that the elevated turbidity in the groundwater samples from the temporary wells might have caused artificially high arsenic concentrations in the samples.

## **1.2 INTERIM REMEDIAL ACTION OBJECTIVES**

The primary objective of the interim remedial actions for the SWMUs are the removal of the delineated contaminated soil, proper disposal of the soil, and the subsequent backfilling and restoration of each area.

Additionally at SWMU 299 a new waste oil AST and collection system will be installed adjacent to Building AS-113 for use by Base personnel.

## **2.0 PRE-CONSTRUCTION ACTIVITIES**

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### **2.1 PRE-CONSTRUCTION SUBMITTALS**

The following plans have been developed and revised for this task order and are to be considered as complementary components to this work plan:

- EPP (included in Section 4.0 of this document)
- SSHSP Addendum – Appendix A
- SAP – Appendix B
- CQCP – Appendix C

### **2.2 PERMITS**

Shaw will prepare all appropriate permit applications for submission by the base as required for the project, and will coordinate with the state/federal agencies, Camp Lejeune personnel, and LANTDIV as needed. This is expected to consist primarily of utility clearance and Base construction permits.

### **2.3 PROCUREMENT**

Upon approval of this work plan, Shaw will complete procurement of equipment, materials, and subcontractors necessary for the execution of this project. Specialty subcontractors may be procured to execute certain portions of work. The following is a list of anticipated subcontractors that will be procured for the project:

- UL Label Vault AST
- Laboratory analytical services
- Transportation services
- Disposal Facilities

### **2.4 PRE-CONSTRUCTION MEETING**

Shaw will participate in a pre-construction meeting at MCB Camp Lejeune with Base, LANTDIV, and other parties prior to mobilization to the site. Shaw representatives will include at a minimum the Site Supervisor. The purpose of this meeting will be to:

- Confirm roles and responsibilities of key personnel and flow of communications for project execution.
- Review project schedule, work hours, sequence of tasks and key milestones.

- Identify and discuss Base-specific issues relative to the upcoming mobilization and construction activities.
- Obtain any necessary security clearances for operations personnel.

### **3.0 ENVIRONMENTAL PROTECTION**

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The control of environmental pollution will consider air, water and land impacts as well as noise and solid waste management. The land resources within the property of MCB Camp Lejeune, but outside the limits of work, will be preserved in their condition or restored to a condition that does not detract from the appearance of the area after completion of construction. To the extent possible, construction activities will be limited to areas defined by the plans and specifications.

#### **3.1 TEMPORARY ROAD CONSTRUCTION**

In the event that temporary construction roads are required at the project site, road construction will be performed in a manner as to minimize the impact to the natural environment. Water will be used for dust control, as necessary.

#### **3.2 PROTECTION OF TREES, SHRUBS, AND GRASS**

Prudent steps will be taken to protect trees and shrubs outside of the excavation zone as necessary. Trees and shrubs within the excavation zone will be cut down to ground level and removed by Shaw. However, tree stumps or roots within the excavation area will be cut into manageable pieces and moved from the project site so it will not interfere with operations. Precautions will be taken to minimize the construction activities' impact on existing vegetation and will include but not be limited to:

- Utilization of existing or temporary construction roads.
- Closely supervise equipment operators with an emphasis placed on preservation of vegetation in non-work areas.
- Proper guidance of heavy equipment and truck operators by site personnel to minimize damage to adjacent vegetation not directly affected by construction activities.

#### **3.3 WATER RESOURCES PROTECTION**

##### *3.3.1 Surface Water Management*

To protect against damage, surface water run-off caused by storm flow leaving the site will be controlled by temporary erosion/sediment control techniques such as berms, silt fencing and grading. The area of bare soil at any time caused by construction activities will be minimized.

### *3.3.2 Erosion Control*

Prior to disturbance of native vegetation and soils, temporary erosion/sediment control will be established on the down gradient side of each excavation. Control techniques to be utilized may require silt fencing.

If silt fencing is required, the fencing will be installed with the fabric a minimum of 6 inches below grade and extending 36 inches above grade and fastened to posts no more than 6 feet apart. The posts will be installed a minimum of 24 inches below grade and extend a minimum of 36 inches above grade. Fabric will be attached to the upslope side of the posts using 1-inch staples or tie wires. Silt fences will be inspected after every rain and daily during extended rainfall. Accumulated sediment will be removed before the thickness reaches 12 inches.

### *3.3.3 Spill and Discharge Control*

Measures will be taken to prevent chemicals, fuels, oils, greases, bituminous materials and contaminated materials from entering streams, rivers and lakes. Absorbents will be available to solidify any leaks outside containment. Any soil contaminated with fuel spills will be immediately removed and placed into appropriate containers and sampled to determine proper disposition.

## **3.4 EMISSIONS CONTROL**

### *3.4.1 Air and Noise Control*

Personnel and ambient air monitoring will be conducted as necessary to determine airborne dust and contaminant levels at the SWMU's. This ensures that respiratory protection is adequate to protect personnel against the contaminants that are encountered. Shaw will also utilize PID or FID instrumentation to conduct daily monitoring for fugitive emissions of volatile organics from the SWMU excavation areas.

Shaw will only perform operation of heavy equipment during daylight hours to minimize the impact of off-site noise pollution. Noise exposure to off-site residents or personnel is expected to be minimal. Hearing protection for on-site workers will be implemented if necessary as specified in the SSHSP Addendum.

### 3.4.2 *Particulate Emissions Control*

Specific measures to be taken to minimize particle emissions for major activities during site construction include the following:

#### 3.4.2.1 *Soil Excavation, Handling, Site Grading and Transport*

- Apply water to work and traffic areas as necessary to minimize dust emissions
- Cover stockpiles with sheeting to minimize wind and/or storm water erosion
- Move and load soil for transport within the site that limits free fall of material and is least likely to generate dust emissions
- Halt dust-generating work when on-site wind conditions exceed 35 miles per hour

#### 3.4.2.2 *Movement of Equipment*

- Water traffic areas as required to minimize dust emissions
- Designate equipment traffic patterns to minimize travel distance and vehicular dust emissions
- Limit vehicle speed to minimize dust emissions

## 3.5 **SITE RESTORATION AND CLEANUP**

All excavation equipment will be decontaminated prior to demobilizing from the site. Decontamination will consist of scraping and/or pressure washing to remove visible soil and debris from tires and undercarriage of vehicles and heavy equipment. Decontamination liquids will be containerized, sampled/analyzed (if required), and disposed appropriately.

## 3.6 **SEEDING**

Grass seed matching existing grass vegetation will be placed at a rate of 5 pounds per 1,000 square feet over topsoil areas. Fertilizer Type I, Class 2, 10-10-10 analysis will be applied at a rate of 25 pounds for 1,000 square feet. Any asphalt or concrete surfaces that are disturbed during removal activities will be restored to their original condition.

## **4.0 INTERIM MEASURES ACTIVITIES**

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### **4.1 MOBILIZATION AND SITE PREPARATION**

To augment the current workforce at Camp Lejeune, Shaw may mobilize personnel and equipment as necessary from nearby facilities. Prior to beginning work on site, training will be conducted to brief all site personnel on the Site Health and Safety Plan, construction drawings, operation procedures, and other relevant site-specific plans. Site hazards and conditions will be discussed and all personnel will acknowledge their understanding and compliance with the plan by signing an approved acceptance form.

Project site setup and preparation will consist of the following main activities.

#### *4.1.1 Utility Clearance*

Shaw will work with Base personnel to identify and mark all known utilities potentially within the work zones. Shaw will exercise caution while performing ground-intrusive work and will implement its Standard Operating Procedures for excavation near utilities. Techniques for minimizing damage to existing utilities will include the use of location devices and hand digging. A Base issued dig permit or excavation permit will be obtained from the Public Works Officer, Utilities Division prior to beginning work.

#### *4.1.2 Site Survey*

Shaw will mark the location of the utilities and the excavation area as shown in *Figures 1.2, 1.3, 1.4, 1.5 and 1-6*. The locations will be marked using spray paint or wood stakes. The locations will be rechecked just prior to construction or as the need arises.

#### *4.1.3 Environmental Protection*

As previously discussed in Section 3.0, Shaw will implement environmental protection measures at the site to prevent damage to the environment during the execution of this remedial action.

#### *4.1.4 Fence Construction*

Shaw personnel will erect safety fencing around the designated work areas. Fencing will be 3-foot-high, bright orange, polyethylene-mesh to prevent unauthorized personnel from accidentally entering a working area.

#### *4.1.5 Site Security*

All persons entering the site will be required to sign in and out daily. Shaw reserves the right to deny access to any individual not showing proper identification.

#### *4.1.6 Health and Safety Zones*

The site will be segregated into work areas based on degree of hazard and personal protective equipment (PPE) requirements. Personnel working within the Contamination Reduction Zones (CRZ) will be required to wear the appropriate PPE as outlined in the Site Specific Health and Safety Plan. Excavation areas within the exclusion zone will be designated and the exclusion zone will be delineated by orange safety fencing.

Shaw health and safety personnel will monitor air quality during excavation of contaminated soil and will adjust work zone boundaries as appropriate.

##### *4.1.6.1 Decontamination Areas*

In areas of excavation of contaminated soil, personnel and equipment decontamination areas will be provided within the CRZ upon exiting the contaminated working areas. The SSHSP addresses these areas in more detail.

##### *4.1.6.2 Personnel Decontamination Facility*

Shaw will set up a personnel decontamination area at the site. All decontamination and cleaning water generated from decontamination will be collected, tested (if required) and treated at either the on-Base water treatment system, Lot 203 Plant, or the Site 78 North Treatment Plant.

##### *4.1.6.3 Equipment Decontamination Area*

Shaw will establish a temporary equipment decontamination area at the site as needed. Any decontamination and cleaning water generated from decontamination will be collected, tested (if required) and treated at either the on-Base water treatment system, Lot 203 Plant, or the Site 78 North Treatment Plant..

## **4.2 SWMU-254 REMEDIAL ACTIVITIES**

### *4.2.1 SWMU-254 Soil Excavation Activities*

During removal activities, asphalt and concrete will be removed as necessary and staged separately from the contaminated soil. The asphalt will either be disposed at the Base landfill

as construction debris or shipped to a local asphalt recycler. The concrete will be disposed at the Base landfill as construction debris.

The contaminants of concern at the SWMU are SVOCs. Shaw will excavate contaminated surface soils to a depth of 6-feet bls. The dimension of the excavation will be approximately 50 feet long by 25 feet wide. An estimated 300 bank cubic yards (400 tons) of soil will be excavated with an excavator, and ultimately transported to a local solid waste (RCRA Subtitle D) landfill. The four corners of the excavation will have the following coordinates:

- N 338041.97, E 2500409.86
- N 338023.28, E 2500389.10
- N 338002.91, E 2500443.42
- N 337987.74, E 2500422.09

The excavation will be backfilled with clean off-site fill material, followed by re-grading and the placement of grass seed. *Figure 1.2* presents a site map showing the location of the excavation.

#### *4.2.2 SWMU-254 Confirmation Soil Sample Collection and Analysis*

Confirmation sidewall and floor samples will be collected from the excavation for laboratory analyses. Samples will be collected at the midpoint of the excavation sidewall at 50-foot intervals and one floor sample per 500 square feet of surface area (unless the excavation proceeds to groundwater). The excavation will require 4 sidewall and 3 floor samples. The samples will be shipped to a laboratory approved by the State of North Carolina for analysis. The confirmation soil samples will be analyzed for SVOCs using EPA Method 8270C.

The excavation will remain open until the laboratory analytical results are received. Following receipt of analytical results a determination of whether to continue soil removal activities or backfill the excavation will be made.

### **4.3 SWMU-258 REMEDIAL ACTIVITIES**

#### *4.3.1 SWMU-258 Soil Excavation Activities*

During removal activities, asphalt and concrete will be removed as necessary and staged separately from the contaminated soil. The asphalt will either be disposed at the Base landfill

as construction debris or shipped to a local asphalt recycler. The concrete will be disposed at the Base landfill as construction debris.

The contaminants of concern at the SWMU are RCRA Metals. Shaw will excavate contaminated surface soils to a depth of 3-feet bls (or until groundwater is encountered). The dimension of the excavation will be approximately 60 feet long by 30 feet wide. An estimated 200 bank cubic yards (300 tons) of soil will be excavated with a rubber tired backhoe, and ultimately transported to a local solid waste (RCRA Subtitle D) landfill. The four corners of the excavation will have the following coordinates:

- N 337050.74, E 2499653.25
- N 337029.96, E 2499673.39
- N 336991.65, E 2499628.76
- N 337013.29, E 2499610.35

The excavation will be backfilled with clean off-site fill material, followed by re-grading and the placement of grass seed. *Figure 1.3* presents a site map showing the location of the excavation.

#### *4.3.2 SWMU-258 Confirmation Soil Sample Collection and Analysis*

Confirmation sidewall and floor samples will be collected from the excavation for laboratory analyses. Samples will be collected at the midpoint of the excavation sidewall at 50-foot intervals and one floor sample per 500 square feet of surface area (unless the excavation proceeds to groundwater). The excavation will require 4 sidewall and 4 floor samples. The samples will be shipped to a laboratory approved by the State of North Carolina for analysis. The confirmation soil samples will be analyzed for the eight RCRA Metals using EPA Method 6010B and 7000 Series.

The excavation will remain open until the laboratory analytical results are received. Following receipt of analytical results a determination of whether to continue soil removal activities or backfill the excavation will be made.

## 4.4 SWMU-293 REMEDIAL ACTIVITIES

### 4.4.1 SWMU-293 Soil Excavation Activities

During removal activities, asphalt and concrete will be removed as necessary and staged separately from the contaminated soil. The asphalt will either be disposed at the Base landfill as construction debris or shipped to a local asphalt recycler. The concrete will be disposed at the Base landfill as construction debris.

The contaminants of concern at the SWMU are RCRA Metals (lead). Shaw will excavate contaminated surface soils to a depth of 6-feet bls (or until groundwater is encountered). The dimension of the excavation will be approximately 13 feet long by 10 feet wide. An estimated 30 bank cubic yards (40 tons) of soil will be excavated with a rubber tired backhoe, and ultimately transported to a local solid waste (RCRA Subtitle D) landfill. The four corners of the excavation will have the following coordinates:

- N 338947.52, E 2501706.60
- N 338941.20, E 2501700.73
- N 338937.78, E 2501716.82
- N 338931.57, E 2501710.83

The excavation will be backfilled with clean off-site fill material, followed by re-grading and the placement of grass seed. *Figure 1.4* presents a site map showing the location of the excavation.

### 4.4.2 SWMU-293 Confirmation Soil Sample Collection and Analysis

Confirmation sidewall and floor samples will be collected from the excavation for laboratory analyses. Samples will be collected at the midpoint of the excavation sidewall at 50-foot intervals and one floor sample per 500 square feet of surface area (unless the excavation proceeds to groundwater). The excavation will require 4 sidewall and 1 floor samples. The samples will be shipped to a laboratory approved by the State of North Carolina for analysis. The confirmation soil samples will be analyzed for the eight RCRA Metals using EPA Method 6010B and 7000 Series.

The excavation will remain open until the laboratory analytical results are received. Following receipt of analytical results a determination of whether to continue soil removal activities or backfill the excavation will be made.

## 4.5 SWMU-299 REMEDIAL ACTIVITIES

### 4.5.1 SWMU 299 AST Removal and Replacement

In addition to soil excavation activities, Shaw will replace the existing used oil AST with a new upgraded AST system. The existing AST will be replaced with a 1,000 gallon Hoover Vaulted Tank and a Pneumecator Alarm System. The oil collection system will be composed of a used oil wheeled dolly equipped with a diaphragm pump designed to eliminate oil spills when transferring used oil to the AST. Removal of the existing AST and demolition of the concrete pad must first occur before soil excavation can begin. Manufacturer equipment specifications are provided in *Appendix D*.

Following site preparation and ensuring the contents of the existing tank have been removed, the atmosphere inside the tank will be monitored with an O<sub>2</sub>/LEL meter for flammable vapors and oxygen in the AST. If the atmosphere is determined to be in excess of 8% oxygen and/or 10% LEL the tank will need to be inerted prior to removal and destruction activities. If the tank must be inerted, the following calculations should be used as a guide:

- 11.5 pounds of dry ice per 100 cubic feet (15 pounds per 1,000 gallons)
- If using a gas such as nitrogen or argon, use the following as a guide:
  - 1) Determine the tank volume by dividing the number of gallons by 7.5 (which is the number of gallons contained in one cubic foot).
  - 2) Next divide the cubic feet of tank volume by the size of the tank the inerting material (nitrogen or argon) is supplied in. Commonly these tanks contain 288 or 330 cubic feet of gas.
  - 3) The resulting number will indicate the minimum number of cylinders to displace one tank volume. Because of imperfect mixing and discharge it is recommended at least 1.5 times the calculated required number of tanks be used. For an empty 1,000 gallon AST, 1- 288 cubic foot cylinder of nitrogen will be sufficient to inert the tank.

Once the tank is inerted the tank exterior will be cut into manageable pieces. The cutting method will be determined by the presence of residual used oil remaining in the tank. Torching is the preferred cutting method but cold saw cutting will be used if warranted by free product concerns. Once the tank has been cut, the pieces will be pressure washed to a visually clean standard. Vent and fill pipes associated with the tank will be drained and/or inerted as above, removed, decontaminated and placed with the tank carcass.

The existing AST/concrete pad will be demolished using a hydraulic Ram. Concrete debris will be sized to manageable pieces and staged separate from soils for proper disposal

Following completion of soil excavation activities, a reinforced concrete pad (10 ft by 8 ft by 1.0 ft thick), the replacement AST, protective bollards, piping and all associated accessories will be installed. The new AST will be located outside the southwest corner of Building 113. *Figures 1.5* and *4.1* present site maps illustrating the location of the excavations and the location of the new AST and associated piping, respectively. The system will be connected to the electric control panel in Building 113. The existing compressor in the building will be used to operate the pneumatic oil transfer pump. Installation of the system will be completed in accordance with manufacturer specifications. Manufacturer equipment specifications are provided in *Appendix D*.

#### *4.5.2 SWMU-299 Soil Excavation Activities*

During removal activities, asphalt and concrete will be removed as necessary and staged separately from the contaminated soil. The asphalt will either be disposed at the Base landfill as construction debris or shipped to a local asphalt recycler. The concrete will be disposed at the Base landfill as construction debris.

Shaw will excavate contaminated surface soils to depths ranging from 3-feet to 5-feet below land surface (or until groundwater is encountered) at three locations at SWMU-299. An estimated 700 bank cubic yards (1,000 tons) of soil will be excavated with a rubber tired back-hoe, and ultimately transported to a local solid waste (RCRA Subtitle D) landfill. Each of the three excavations will be backfilled with clean off-site fill material, followed by re-grading and the placement of grass seed.

Excavation A (20 x 60 feet x 3 feet deep) encompasses an area around former soil samples SB9 and SB10. Excavation B (35 x 80 feet x 5 feet deep) will be located along the fence line, at the location of soil samples TW01, SB02, TW03, SB04, TW02, IS01, IS02, IS03 and IS04. Excavation C (20 x 20 feet x 3 feet deep) will be located in the area of soil sample SB-03.

#### 4.5.3 *SWMU-299 Confirmation Soil Sample Collection and Analysis*

Confirmation sidewall and floor samples will be collected from each excavation for laboratory analyses. Samples will be collected at the midpoint of the excavation sidewall at 50-foot intervals and one floor sample per 500 square feet of surface area (unless the excavation proceeds to groundwater). The number of confirmation soil samples required for each excavation is as follows: Excavation A, 6 sidewall and 2 floor samples; Excavation B, 6 sidewall and 5 floor samples; and Excavation C, 4 sidewall and 1 floor sample. The samples will be shipped to a laboratory approved by the State of North Carolina for analysis. The confirmation soil samples will be analyzed for SVOCs using EPA Method 8270C and eight RCRA Metals using EPA Method 6010B and 7000 Series.

The excavation will remain open until the laboratory analytical results are received. Following receipt of analytical results a determination of whether to continue soil removal activities or backfill the excavation will be made.

## 4.6 **SWMU-314 REMEDIAL ACTIVITIES**

### 4.6.1 *SWMU-314 Soil Excavation Activities*

During removal activities, asphalt and concrete will be removed as necessary and staged separately from the contaminated soil. The asphalt will either be disposed at the Base landfill as construction debris or shipped to a local asphalt recycler. The concrete will be disposed at the Base landfill as construction debris.

The contaminants of concern at the SWMU are SVOCs and RCRA Metals (arsenic). Shaw will excavate contaminated surface soils to a depth of 3-feet bls (or until groundwater is encountered). The dimension of the excavation will be an irregular shape approximately 30 feet long by 25 feet wide. An estimated 80 bank cubic yards (110 tons) of soil will be excavated with a rubber tired back-hoe, and ultimately transported to a local solid waste (RCRA Subtitle D) landfill. The four corners of the excavation will have the following coordinates:

- N 359370.11, E 2478805.22
- N 359347.73, E 2478821.77
- N 359335.79, E 2478805.30
- N 359329.16, E 2478767.30

The excavation will be backfilled with clean off-site fill material, followed by re-grading and the placement of grass seed. *Figure 1.6* presents a site map showing the location of the excavation.

#### *4.6.2 SWMU-314 Confirmation Soil Sample Collection and Analysis*

Confirmation sidewall and floor samples will be collected from the excavation for laboratory analyses. Samples will be collected at the midpoint of the excavation sidewall at 50-foot intervals and one floor sample per 500 square feet of surface area (unless the excavation proceeds to groundwater). The excavation will require 4 sidewall and 2 floor samples. The samples will be shipped to a laboratory approved by the State of North Carolina for analysis. The confirmation soil samples will be analyzed for SVOCs using EPA Method 8270C and eight RCRA Metals using EPA Method 6010B and 7000 Series.

The excavation will remain open until the laboratory analytical results are received. Following receipt of analytical results a determination of whether to continue soil removal activities or backfill the excavation will be made.

### **4.7 SWMU 303/318- ASTS NEAR BUILDING AS-515 AND BUILDING AS-515 OIL/WATER SEPARATOR REMEDIAL ACTIVITIES**

#### *4.7.1 SWMU 303/318 ASTs Soil Excavation Activities*

During removal activities, asphalt and concrete will be removed as necessary and staged separately from the contaminated soil. The asphalt will either be disposed at the Base landfill as construction debris or shipped to a local asphalt recycler. The concrete will be disposed at the Base landfill as construction debris.

Because soil cannot be staged in an area of active aircraft traffic, the soil will be loaded directly onto trucks for disposal. Therefore, disposal characterization will be completed prior to initiation of excavation work. Two composite soil samples will be collected from a representative area of the site and analyzed for Full RCRA TCLP analysis plus physical properties (one sample per 1,000 cubic yards) and 10 representative samples will be collected for TPH-DRO and TPH-GRO analysis (one per 200 cubic yards).

Shaw will remove the concrete from the helicopter wash pad prior to soil removal. The concrete oil/water separator will also be removed during demolition activities. Shaw will

excavate contaminated surface soils to depths ranging from 1-foot to 2-feet below land surface (or until groundwater is encountered) at five locations at SWMU-303/318. An estimated 1,600 bank cubic yards (2,000 tons) of soil will be excavated with a rubber tired back-hoe, and ultimately transported to a local solid waste (RCRA Subtitle D) landfill. Each of the five excavations will be backfilled with clean off-site fill material, followed by re-grading and the placement of either concrete, asphalt or grass (dependant on original surface cover).

Excavation Area 1 (180 x 100 feet x 1 foot deep and 20 x 120 feet x 1 foot deep) encompasses a majority of the helicopter wash pad area. Excavation Area 2 (40 x 25 feet x 2 feet deep) is located around soil boring SWMU318-SB05. Excavation Area 3 (25 x 35 feet x 2 feet deep) is located around soil boring SWMU318-TW02. Excavation Area 4 (25 x 40 feet x 2 feet deep) is located around soil boring SWMU318-SB03. Excavation Area 5 (15 x 30 feet x 2 feet deep) is located around soil boring SWMU318-IS04. *Figure 1.7* presents a site map showing the location of the excavation areas.

#### *4.7.2 SWMU 303/318 Confirmation Soil Sample Collection and Analysis*

Confirmation sidewall and floor samples will be collected from the excavation for laboratory analyses. Samples will be collected at the midpoint of the excavation sidewall at 50-foot intervals and one floor sample per 500 square feet of surface area (unless the excavation proceeds to groundwater). The excavation will require an estimated 20 sidewall and 35 floor samples. The samples will be shipped to a laboratory approved by the State of North Carolina for analysis. The confirmation soil samples will be analyzed for VOCs using EPA Method 8260B, SVOCs using EPA Method 8270C and eight RCRA Metals using EPA Method 6010B and 7000 Series.

## **4.8 BACKFILL/COMPACTING/GRADING**

Clean soil will be used to backfill the excavations. This will either be imported fill or fill from an on site source. Possible on-site sources include the on-site borrow pit. Any off-site borrow material to be used as backfill will be sampled and analyzed for contaminants of concern prior to transport and use on site.

The fill soil will be placed in successive one-foot lifts and compacted with the site equipment before placing the next lift. After backfilling, the excavation areas will be compacted to pre-

existing conditions using the equipment on site. The backfilled area will be graded to utilize existing drainage structures for surface water run-off, and restored .

#### **4.9 SOIL STOCKPILE/STAGING AREA**

With the exception of SWMU-303/318, a contaminated soil stockpile/staging area will be established adjacent to each removal area for storage of excavated soil prior to transport. The excavated soil will be stockpiled on a 10-mil thick plastic liner, covered and sampled for disposal characterization. The samples will be analyzed for Full RCRA TCLP analysis plus physical parameters (one sample per 1,000 cubic yards) and TPH-GRO/TPH-DRO analysis (one sample every 200 cubic yards).

#### **4.10 DISPOSAL OF EXCAVATED MATERIAL**

It is currently anticipated that soils excavated from each of the SWMUs will pass TCLP and TPH analysis, indicating the soils are non-hazardous and suitable for acceptance at the Base landfill. If not, an appropriate subtitle D or subtitle C facility will be utilized.

#### **4.11 MANAGEMENT OF CONTAMINATED WATER**

Contaminated water may be generated from decontamination activities during implementation of the removal actions. All decontamination and cleaning water generated from decontamination will be collected, tested (if required) and treated at either the on-Base water treatment system, Site 89/Lot 203 Plant, or the Site 78 North Treatment Plant.

#### **4.12 SITE RESTORATION**

After confirmatory sampling results indicate that the contamination has been removed from the site, the excavated areas will be backfilled with clean soil. The backfill will be spread and compacted such that it will provide a surface suitable for paving. The area will then be paved using asphalt. Grass areas destroyed or disturbed during remediation activities will be seeded.

#### **4.13 DEMOBILIZATION**

Upon completion of site restoration, all equipment and personnel associated with this work will be demobilized from the project site. Heavy equipment will be returned to the equipment yard where they originated, and the project personnel will return to their respective home offices.

## **5.0      *TRANSPORTATION AND DISPOSAL***

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This section presents Shaw's approach to managing the offsite transportation and disposal of project generated waste streams. Currently, TPH impacted soils, possibly impacted concrete/asphalt, and decontaminated metallic debris are expected for off-site disposal from the project site. Based on our previous work experience at the site, it is probable the excavated soils will require off site disposal as TPHC contaminated waste.

### **5.1      ON-SITE WASTE MANAGEMENT**

#### *5.1.1    Soils*

As indicated, all excavated soils will be stockpiled and managed on site until they are sampled for disposal characterization analysis and transported to an appropriately permitted facility for final disposal. The current NCDENR soil disposal guidance requires one sample per 200 CY of soil be collected for TPH-GRO/DRO analysis and one sample per 1,000 CY be collected for RCRA TCLP Metals analysis.

Shaw always employs best construction practices when managing excavated soils on site. A non-pervious material such as polyethylene will be placed on the ground surface to place the excavated soils onto. Stockpiles will be covered with a like material and secured against wind at the end of each work day and during all non working hours.

#### *5.1.2    Concrete and Asphalt Debris*

Two sources of concrete or asphalt debris are expected for the project: paving removed from the parking area and the concrete wash pad and AST pad. The concrete and asphalt debris will be staged separately from soils while awaiting disposal. Due to the low potential for contamination or contamination run-off, concrete and debris are not generally covered as with soils. Debris will be sampled for disposal analysis and transported to a proper facility as described above.

#### *5.1.3    Metallic Debris*

Metallic debris generated from the project will consist of the removed AST tank carcass as well as the associated piping. The tank will be cut into proper sizes for loading and transportation and all surfaces will receive pressure wash decontamination. Associated pipe will also be cut into manageable pieces, decontaminated, and stored securely on-site until disposal.

## **5.2 TRANSPORTATION**

Following all necessary testing and obtaining analytical results, soils and/or debris will be loaded into the appropriate transport vehicles. Soil will be loaded onto trucks using a front-end loader or excavator. Concrete or metal debris loading will occur based on the size of the debris, using either a front-end loader or an excavator. Transport vehicles will be guided to the designated loading location by the Shaw crew.

After loading the transport vehicle, Shaw and the driver will complete the necessary shipping papers. Any applicable DOT and/or RCRA placarding of the vehicle will then occur as well as a walk around inspection of the transport vehicle. Shaw reserves the right to reject any transport vehicle without proper permits, licenses, or appears to be unsuitable for transport according to DOT regulations. After loading of waste onto an approved transport vehicle, the truck will be weighed using portable scales

## **5.3 DISPOSAL**

The following possible disposal scenarios are anticipated for the project:

- Soil or debris with less than 1 ppm of TPHC (via GRO/DRO analysis) and non-hazardous by RCRA TCLP and characterization analysis - Disposal at Base landfill
- Soil or debris with more than 1 ppm of TPHC and non-hazardous by RCRA TCLP and characterization analysis – Disposal at State permitted recycling facility
- Soil or debris testing as characteristically hazardous by RCRA – Subtitle C landfill
- Decontaminated metal debris – Disposal at a local metals recycling facility

## **5.4 DISPOSAL OF PPE**

PPE will be stored in plastic trash bags and placed in onsite trash bins as non-hazardous waste.

## **5.5 DOCUMENTATION**

All applicable transport documentation will be completed by Shaw and the transporter before the vehicle departs the site. For non-hazardous wastes this will consist of the Bill-of-Lading document and/or a State non-hazardous manifest. For hazardous wastes, a State or Uniform Hazardous Waste Manifest and Land Disposal Restriction form will be prepared.

## **6.0      *REPORTS AND SUBMITTALS***

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The following paragraphs discuss the reports Shaw plans to prepare during this project.

### **6.1    AS-BUILT RECORDS**

Shaw will maintain two sets of full size drawings marked to show any deviations that have occurred, including buried or concealed construction and utility features revealed during the course of excavation. Shaw will record horizontal and vertical locations of buried utilities that differ from the contract drawings. These drawings will be available for review by the ROICC and NTR at any time. At the completion of the work, Shaw will prepare final as-built drawings for inclusion in the Contractors Closeout Report.

### **6.2    ENVIRONMENTAL CONDITIONS REPORT**

Prior to starting work, Shaw will be available to perform a pre-construction survey with the ROICC and NTR. Shaw will take photographs showing existing environmental conditions on and adjacent to the site.

### **6.3    TEST RESULTS SUMMARY REPORT**

A summary report of field tests and laboratory analytical results will be submitted in the Contractors Closeout Report.

### **6.4    DAILY REPORTS**

A Daily QC Report will be prepared by the QC representative documenting through the three phases of inspection that the work has been completed as required in the work plan. A Daily Production Report will be completed by the Supervisor documenting work activities as well as personnel and equipment on-site. These reports will be prepared daily and submitted in the Contractor's Closeout Report.

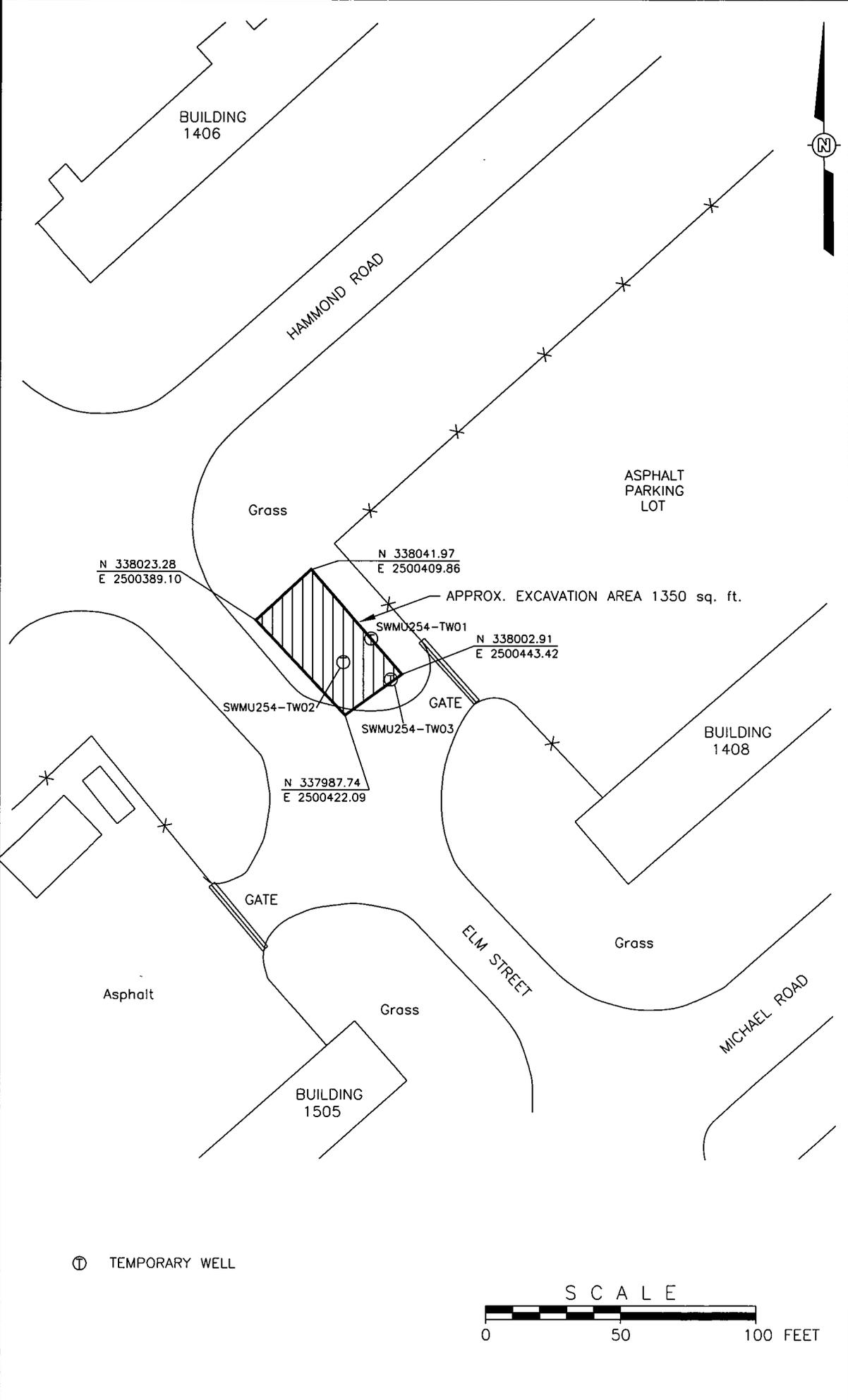
### **6.5    CONTRACTOR'S CLOSEOUT REPORT**

An Interim Measures Implementation Report will be submitted upon completion of the project.

## **FIGURES**

IMAGE X-REF OFFICE  
 --- --- Alpharetta, GA  
 DRAWING NUMBER 846069 - SWMU-254

PLOT DATE: ?/?/99  
 FORMAT REVISION 3/25/99

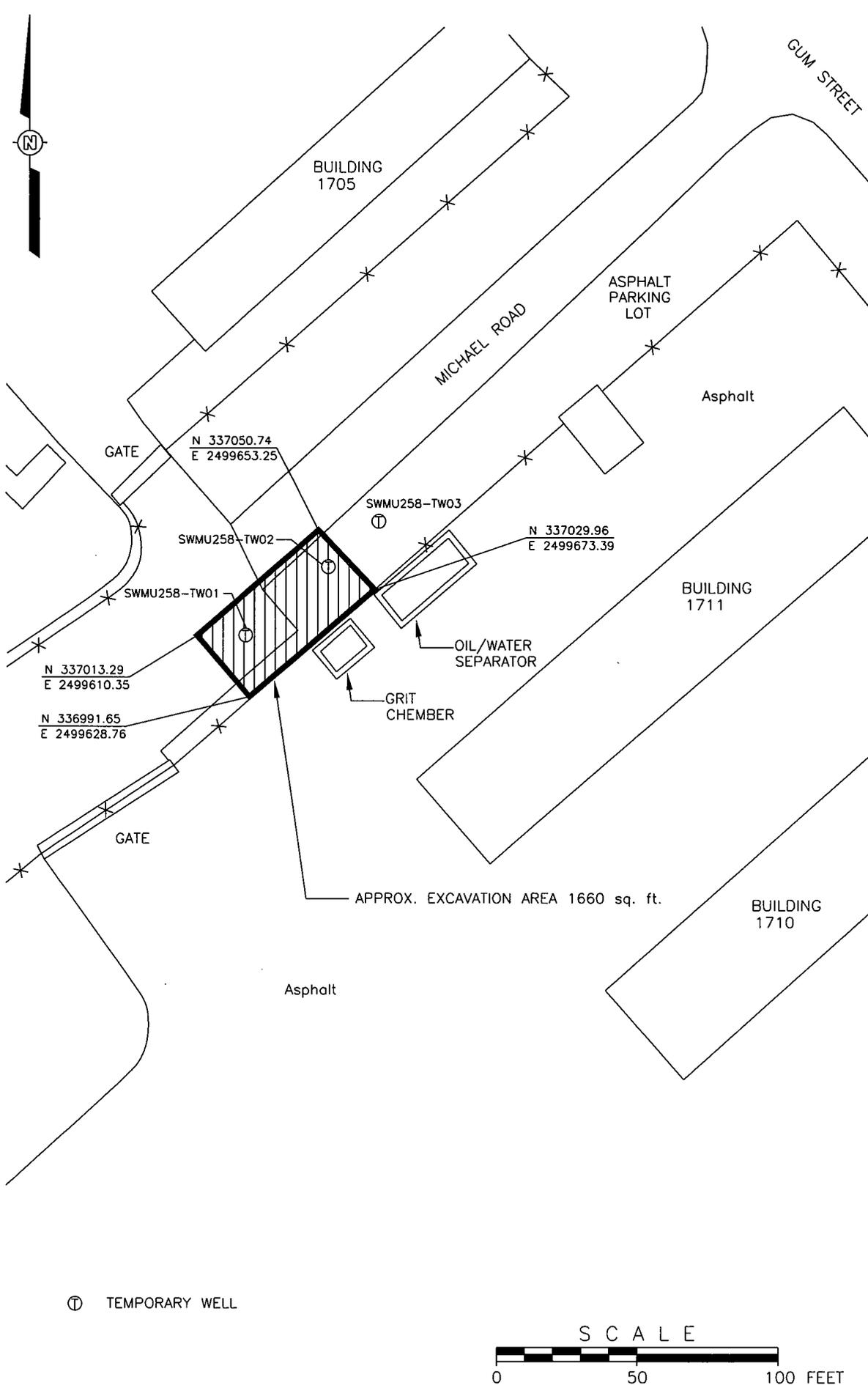


Ⓢ TEMPORARY WELL



DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NORFOLK, VIRGINIA		PROJECT NO. 846069 DESIGNED BY DRAWN BY		CHECKED BY APPROVED BY	
SHAW Environmental, Inc.				REVISIONS	
SWMU 254 EXCAVATION LOCATION SITE PLAN				REV	DATE
				BY	
				CHK'D	APR'VD
DESCRIPTION/ISSUE					
SCALE: AS SHOWN		SIZE: A			
DELIVERY ORDER NO. 0014					
CONSTR. CONTRACT NO. N62470-02-D-3260					
NAVFAC DRAWING NO. ?					
SHEET I.D. 1.2					

IMAGE X-REF OFFICE DRAWING NUMBER  
 --- --- Alpharetta, GA 846069-SWMU-258



PLOT DATE: ?/?/99  
 FORMAT REVISION 3/25/99

Ⓢ TEMPORARY WELL



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DESIGNED BY DRAWN BY	CHECKED BY APPROVED BY	REV DATE BY CHK'D APPROV	DESCRIPTION/ISSUE REVISIONS
DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NORFOLK, VIRGINIA		SWMU 258 EXCAVATION LOCATION SITE PLAN	
SCALE: AS SHOWN	SIZE: A	DELIVERY ORDER NO. 0014	
CONSTR. CONTRACT NO. N62470-Q2-D-3260		NAVFAC DRAWING NO. ?	
SHEET I.D. 1.3			

IMAGE X-REF. OFFICE OFFICE DRAWING NUMBER 846069 - SWMU - 293  
 --- --- Alpharetta, GA



BUILDING S1124

BUILDING 1106

BUILDING S1125

Grass

GRIT CHAMBERS

BUILDING S1128

N 338953.40  
E 2501712.68

BUILDING 1707

N 338941.20  
E 2501700.73

N 338934.25  
E 2501733.08

SWMU293-TW02

SWMU293-TW03

OIL/WATER SEPARATOR

N 338931.57  
E 2501710.83

APPROX. EXCAVATION AREA 121 sq. ft.

Grass

Grass

MICHAEL ROAD

Ⓢ TEMPORARY WELL

S C A L E



REV	DATE	BY	CHK'D	APR'VD	DESCRIPTION/ISSUE

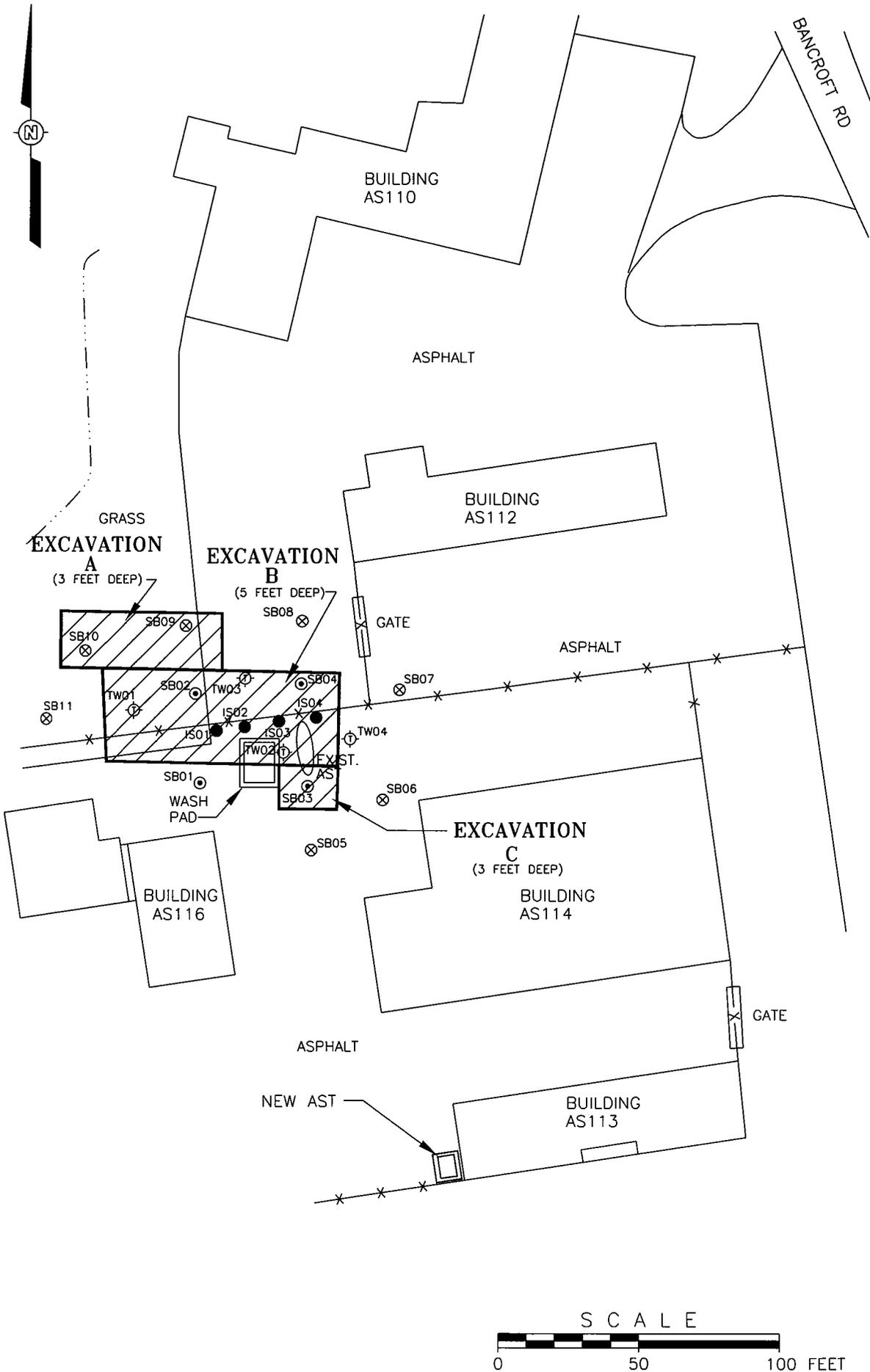

 Shaw Environmental, Inc. PROJECT NO. 846069  
 DESIGNED BY \_\_\_\_\_ CHECKED BY \_\_\_\_\_  
 DRAWN BY \_\_\_\_\_ APPROVED BY \_\_\_\_\_

DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND  
 NAVAL STATION ATLANTIC DIVISION NORFOLK, VIRGINIA  
 SWMU 293 EXCAVATION LOCATION  
 SITE PLAN

SCALE:	AS SHOWN	SIZE:	A
DELIVERY ORDER NO.	0014		
CONSTR. CONTRACT NO.	N62470-02-D-3260		
NAVFAC DRAWING NO.	?		
SHEET I.D.	1.4		

PLOT DATE: ?/?/99  
 FORMAT REVISION 3/25/99

IMAGE X-REF OFFICE DRAWING NUMBER  
 --- --- Alpharetta, GA 846069-FIG3

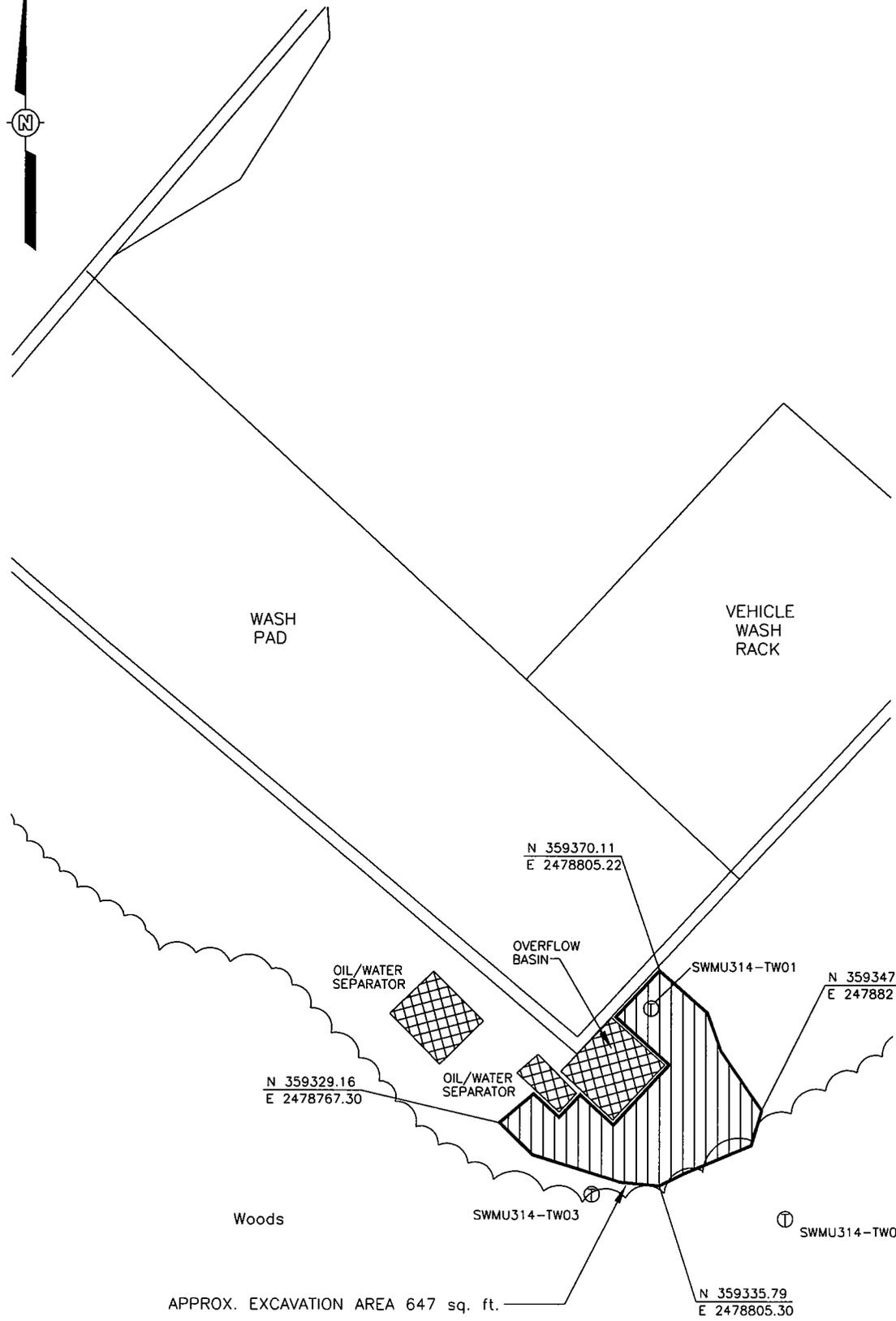


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 FORMAT REVISION 3/25/99



DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA		PROJECT NO. 846069 SHAW Environmental, Inc. DESIGNED BY DRAWN BY		CHECKED BY APPROVED BY	
ATLANTIC DIVISION		SWMU 299 SOIL REMOVAL LOCATION		SITE PLAN	
SCALE: AS SHOWN		SIZE: A		REVISIONS	
DELIVERY ORDER NO. 0014		CONSTR. CONTRACT NO. N62470-02-D-3260		REV DATE BY CHK'D/APP'VD DESCRIPTION/ISSUE	
NAVFAC DRAWING NO. ?		SHEET I.D. 1.5			

IMAGE --- X-REF --- OFFICE Alpharetta, GA DRAWING NUMBER 846069-SWMU-314

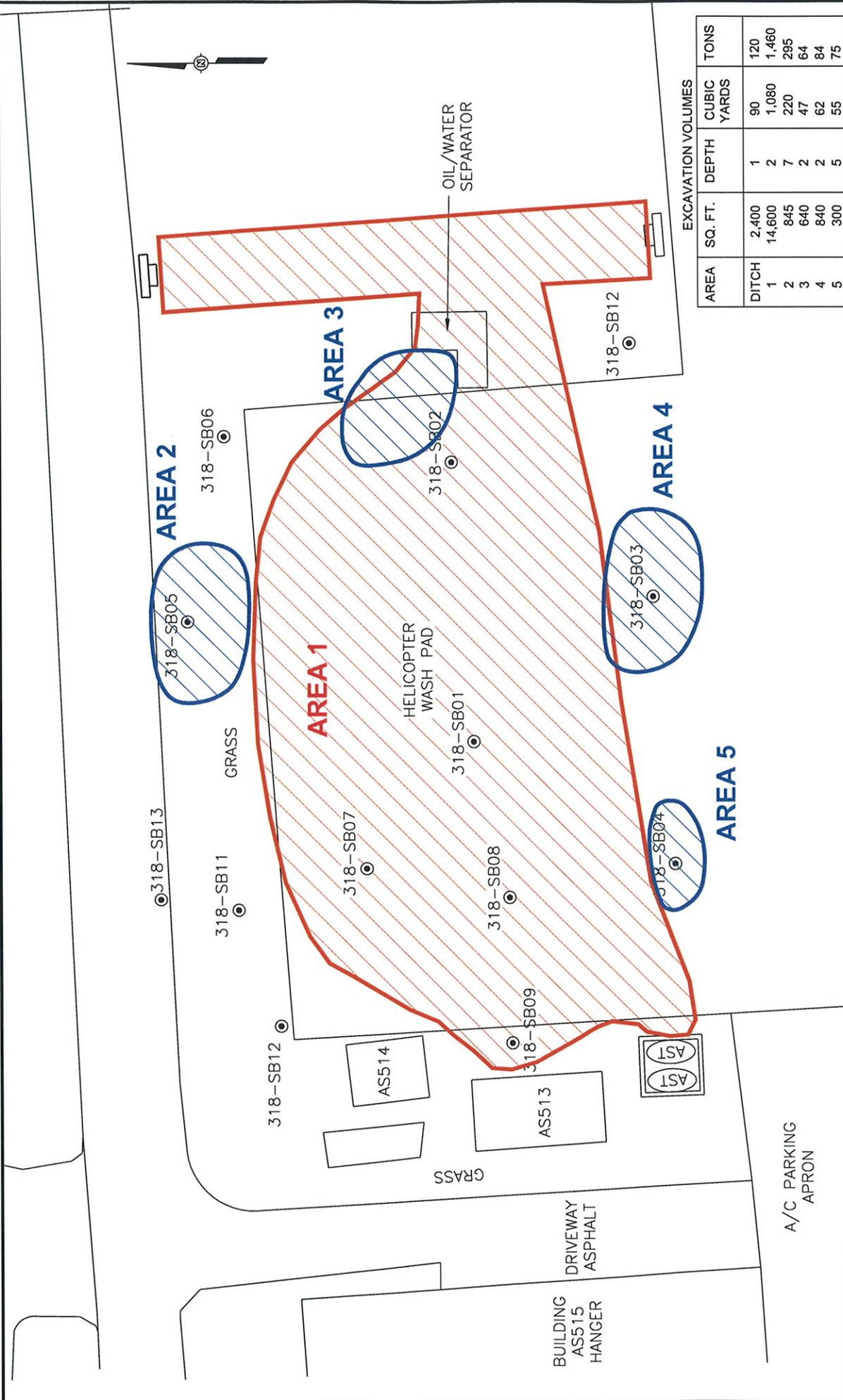


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PLOT DATE: ?/?/99  
FORMAT REVISION 3/25/99

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DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NORFOLK, VIRGINIA		SWMU 314 EXCAVATION LOCATION SITE PLAN	
SCALE:	SIZE:		
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DELIVERY ORDER NO. 0014			
CONSTR. CONTRACT NO. N62470-02-D-3260			
NAVFAC DRAWING NO. ?			
SHEET I.D. 1.6			
REV	DATE	BY	CHK'D/APP'VD
REVISIONS			



REFERENCE: MAP FROM BAKER

SCALE: AS SHOWN SIZE: A

DELIVERY ORDER NO. 0014

CONSTR. CONTRACT NO. N62470-02-D-3260

NAVAFAC DRAWING NO. ?

SHEET I.D. 1.7

DEPARTMENT OF THE NAVY  
 NAVAL STATION  
 ATLANTIC DIVISION  
 NAVAL FACILITIES ENGINEERING COMMAND  
 NORFOLK, VIRGINIA

SWMU 303/318 SITE MAP  
 SITE PLAN

DESIGNED BY  
 DRAWN BY

PROJECT NO. 846069

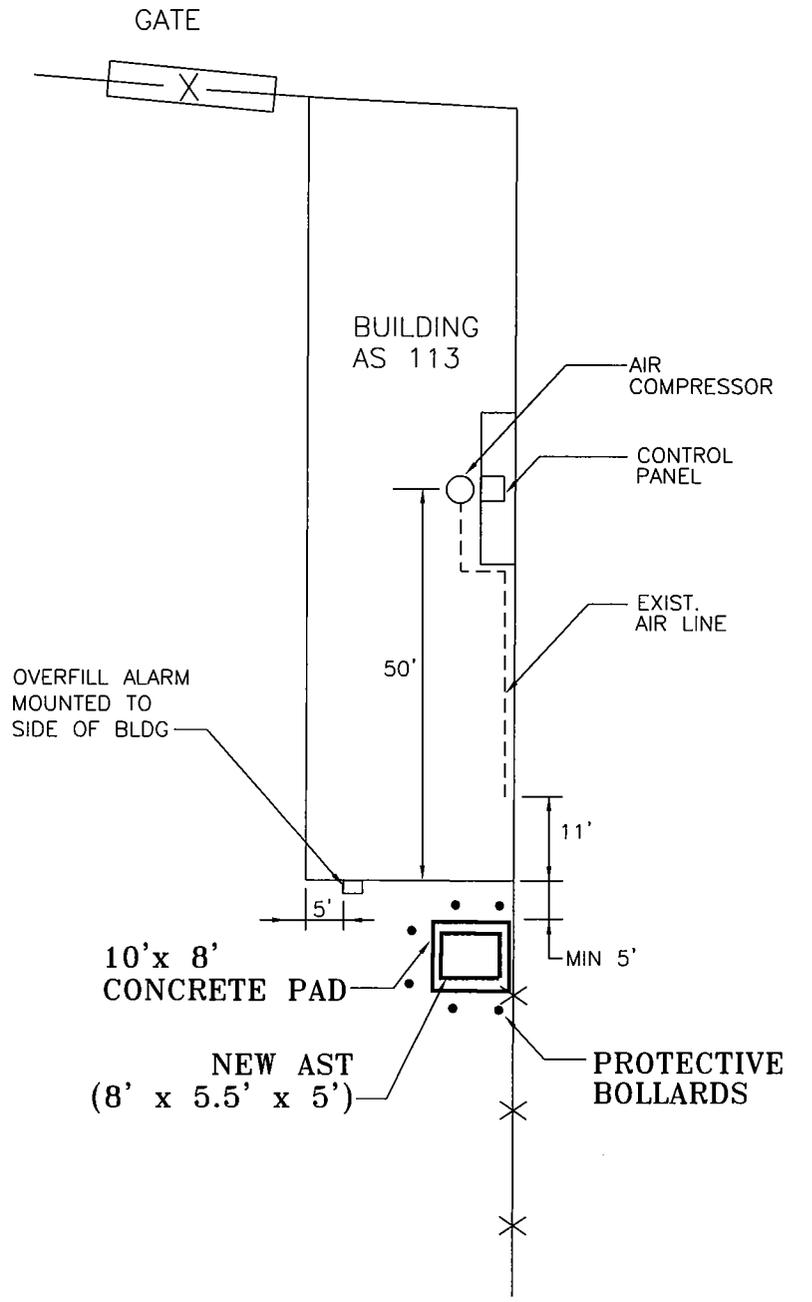
CHECKED BY  
 APPROVED BY

REV. DATE BY CHK'D APR'VD DESCRIPTION/ISSUE

REVISIONS

Shaw Environmental, Inc.

IMAGE X-REF. OFFICE DRAWING NUMBER  
 --- --- Alpharetta, GA 846069-FIG2



PLOT DATE: ?/?/99  
 FORMAT REVISION 3/25/99



DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION NORFOLK, VIRGINIA		PROJECT NO. 846069 Shaw Environmental, Inc. DESIGNED BY DRAWN BY		CHECKED BY APPROVED BY	
SWMU 299 NEW AST LOCATION BUILDING AS 113		REVISIONS			
SCALE: AS SHOWN		SIZE: A			
DELIVERY ORDER NO. 0014					
CONSTR. CONTRACT NO. N62470-Q2-D-3260					
NAVFAC DRAWING NO. ?					
SHEET I.D. 4.1					

## **APPENDIX A**

# **SITE SPECIFIC HEALTH AND SAFETY PLAN**

## **Site Specific Health & Safety Plan Amendment Documentation**

**Project Name:** MCB-Camp Lejeune: **Project No.** 846069  
Solid Waste Management Units 254, 258, 293, 299, 314 and 303/318

**Amendment No.** 21 **Date:** August 2004

### **The Amendment Addresses the Following Sections:**

Section 2.1	Background
Section 2.2	Scope of Work
Section 3.0	Chemical Hazards
Section 4.0	Physical Hazards
Section 5.0	Protective Equipment
Section 6.0	Air Monitoring
Section 7.0	Training

### **Task(s) Amendment Affects:**

Shaw Environmental, Inc. (Shaw) will implement Interim Remedial Measures at six Solid Waste Management Units (SWMUs). The work covers activities at the following SWMUs:

- SWMU 254- 1408 Dumpster
- SWMU 258- S1745 Oil/Water Separator
- SWMU 293- 1106/1107 Oil/Water Separator
- SWMU 299- AS114 AST
- SWMU 314- SM187 Oil/Water Separator
- SWMU 303/318- ASTs near Building AS-515 and Building AS-515 Oil/Water Separator

### **Reason For Amendment:**

The additional work was not addressed in original Site Specific Health and Safety Plan

## **Section 2.1: Site Backgrounds**

### **SWMU 254 - 1408 Dumpster**

SWMU 254 consists of a dumpster identified in the RFA Report (EnSafe, 1996) as containing unpunched paint cans and approximately one gallon of Citrakleen. The SWMU is located northwest of the intersection of Elm Street and Michael Road in Hadnot Point, west of Building 1408. The dumpster could not be located during the Phase I CSI. The ground surface in the vicinity of the SWMU is covered with grass and did not show evidence of contamination and/or spills during the investigation. A surface water drainage ditch begins in the vicinity of the SWMU and travels northwest and connects to another surface water drainage ditch is located directly southwest of the SWMU. The contaminants of concern at the SWMU are SVOCs.

### **SWMU 258 - S1745 Oil/Water Separator**

SWMU 258 is located within the central portion of the Hadnot Point Industrial Area adjacent to Michael Road and Building 1711. The SWMU consists of a concrete oil/water separator and grit chamber. The grit chamber receives a mixture of solids and fluids from the adjacent vehicle wash rack. The solid fraction is retained while the fluids which contain water, waste oil, and grease are passed to the oil/water separator. The SWMU currently is in use. It is unknown when the SWMU started operations. The perimeter around the SWMU is secured with a fence and locking gate. The ground surface is covered with asphalt and grass. The contaminants of concern at the SWMU are heavy metals.

### **SWMU 293- 1106/1107 Oil/Water Separator**

SWMU 293 is a poured concrete in-ground oil/water separator with baffles that has been in operation since 1980. The outlet for the oil/water separator is connected to the wastewater treatment plant. The oil/water separator contains waste oil, antifreeze, and possibly solvents. It is suspected that solvents used for degreasing may have been disposed through the oil/water separator. The contaminants of concern at the SWMU are heavy metals.

### **SWMU 299 - AS114 AST**

SWMU 299 consists of an aboveground storage tank (AST) that stores used oil generated from a Hobby Shop located at the MCAS. Soil and groundwater contaminants consist primarily of semi-volatile organic compounds (SVOCs) and heavy metals.

### **SWMU 303 - Aboveground Storage Tank**

SWMU 303 is located in the MCAS area east of Bancroft Street between the helicopter parking apron and Building AS-515. The SWMU consists of two ASTs that are contained within a concrete, bermed structure. The tanks are labeled as "Hydraulic Fluid, Engine and Transmission Oils Only, No Solvents or Other Chemicals." The steel tanks were installed in 1983 and are still in use. The primary site contaminants include benzo(a)pyrene and arsenic, 4-methylphenol, naphthalene, arsenic, chromium, and lead

### **SWMU 314- SM187 Oil/Water Separator**

SWMU 314 consists of a concrete oil/water separator and vehicle wash rack located south/southwest of Montford Landing Road and west/southwest (approximately 300 feet) of Northeast Creek at Camp Johnson. Water from the vehicle wash rack is transported to the oil/water separator via underground pipelines. The contaminants of concern at the SWMU are SVOCs and heavy metals.

### **SWMU 318 - AS515 Oil/Water Separator**

SWMU 318 is a concrete, multi-chambered oil/water separator and grit chamber located adjacent to the helicopter wash pad at the Marine Corps Air Station (MCAS) New River. The primary function of the SWMU is to collect water, soap, oil, grease, and dirt from the helicopter wash pad, separate the solids from the liquids, and then segregate the oil and grease from the remaining liquids. Several VOCs, SVOCs and metals were detected in soil and/or groundwater at concentrations exceeding the applicable screening criteria.

## **2.2 Scope of Work**

This amendment to the site specific health and safety plan will address the following focused tasks:

- Site Survey
- Road Construction
- Installation of Erosion Controls
- Fence Installation
- Excavation and Backfill
- Tank Removal
- Tank and Equipment Decontamination
- Concrete Demolition
- Concrete Pad Installation

- Tank and Equipment Replacement
- Soil Load out
- Sampling

### Section 3.0 Chemical Hazards

Two sampling events were performed at SWMU 299 and the following chemical contaminants were identified; 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, isophorone, dibenz(a,h)anthracene, 2,4-dimethylphenol, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, naphthalene, phenanthrene arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver

**Table 3.1 SWMU 299**

#### Chemical Hazard Summary

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Arsenic	Inhalation, ingestion, contact with skin/eyes	0.01mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• A human carcinogen; a powerful allergen, inhalation and contact may cause burning, swelling and redness in the eyes, nose, throat and skin; ingestion causes nausea, vomiting, nervous system effects in the extremities (numbness, tingling, weakness); long term exposure can cause liver, kidney, and blood damage.</li> <li>• A fire hazard in the form of dust or contact with oxidizers; thermal decomposition produces toxic gases.</li> </ul>
Barium	Inhalation, ingestion, contact with skin/eyes	0.5 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• Insoluble salts are skin, eye, and respiratory irritants; a nuisance dust; water soluble compounds are highly toxic by ingestion; abdominal pain, vomiting, diarrhea, convulsions, muscular spasms, internal hemorrhage</li> <li>• Insoluble compounds are largely non-reactive; thermal decomposition can release toxic gases</li> </ul>
Benzo(a) pyrene, Benzo(a,h) anthracene, Benzo(b) fluoranthene, Benzo(k) Fluoranthene	Skin, eye, inhalation, ingestion	0.2 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• An Animal Carcinogen, probable human carcinogen; a nasal, respiratory tract, and skin irritant; (all substances have probable, possible carcinogenic potential)</li> <li>• Reacts with acids and oxidizers; produces acrid smoke, toxic gases when involved in fires, thermal decomposition</li> </ul>
Bis (2ethyl-hexyl) phthalate (DEHP)	Skin, eye, inhalation, ingestion	5.0 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• An irritant to eyes, skin, mucous membranes, and respiratory tract; ingestion: nausea, abdominal cramps and diarrhea</li> <li>• Reacts with strong oxidizers; combustible liquid; toxic byproducts of combustion</li> </ul>

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Cadmium	Inhalation, ingestion	0.002 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>A probable carcinogen; skin, eye, respiratory irritation; mild flu and fever symptoms (metal fume fever); and pulmonary edema</li> <li>Reacts violently with ammonium nitrate; finely divided cadmium metal can become pyrophoric; avoid heat, flame, causes cadmium fume formation</li> </ul>
Chromium	Skin, eye, inhalation, ingestion	0.5 mg/m <sup>3</sup> Cr (VI) Soluble 0.05 mg/m <sup>3</sup> Insoluble	<ul style="list-style-type: none"> <li>Some Chromium (VI) compounds are confirmed human carcinogens; corrosive irritant to skin, eyes, respiratory tract; deep skin ulcers; not (always) immediately painful; an allergic sensitizer; 5 grams ingested can be fatal</li> <li>Reacts with strong oxidizers, alkalis, can react with, ignite oils, grease, paper and plastics</li> </ul>
Dibenzo(a,h)anthracene	Skin, eye, inhalation, ingestion	Not Established	<ul style="list-style-type: none"> <li>A possible human carcinogen, a skin irritant.</li> <li>Chemical is generally stable</li> </ul>
2,4 Dimethylphenol	Skin, eye, ingestion	Not Established	<ul style="list-style-type: none"> <li>A poison; an eye irritant; a questionable carcinogen</li> <li>Thermal decomposition releases acrid smoke and irritating fumes</li> </ul>
Di-n- butyl phthalate	Inhalation, ingestion	5.0 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>Causes abdominal pain nausea and diarrhea.</li> <li>The substance decomposes on burning producing toxic and irritating fumes.</li> </ul>
Indeno (1,2,3-c,d) pyrene	Skin, eye, inhalation, ingestion	Not established	<ul style="list-style-type: none"> <li>A possible human carcinogen, a skin irritant.</li> <li>Should protect this chemical from exposure to light..</li> </ul>
Isophorone	Skin, eye, inhalation, ingestion	4 ppm	<ul style="list-style-type: none"> <li>An eye, skin and mucous membrane irritant; dermatitis; headache nausea, dizziness, vomiting, narcosis; possible CNS, liver, kidney damage</li> <li>Reacts with strong oxidizers, strong alkali materials and amines; thermal decomposition releases toxic gases</li> </ul>
Lead	Inhalation, ingestion	0.050 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>Weakness, insomnia; loss of appetite, loss of weight, abdominal pain; anemia; tremors; weakness of wrists/ ankles; kidney damage; low blood pressure</li> <li>Incompatible with strong oxidizers, hydrogen peroxide and acids</li> </ul>
Mercury	Inhalation, skin	0.025 mg/m <sup>3</sup> SKIN alkyl compounds 0.1 mg/m <sup>3</sup> Ceiling	<ul style="list-style-type: none"> <li>Cough, chest pain, shortness of breath; tremor, insomnia, irritability, headache, weakness, stomach pain, loss of appetite; kidney damage</li> <li>Reacts with acetylene, ammonia, chlorine dioxide, copper, and other metals</li> </ul>

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
2-Methyl naphthalene	Skin, eye, inhalation, ingestion	Not Established	<ul style="list-style-type: none"> <li>• A skin and eye irritant</li> <li>• Reacts with acids and oxidizers; emits acrid smoke and irritating fumes</li> </ul>
Naphthalene	Skin eye, ingestion, inhalation	PEL 10 ppm STEL 15 ppm	<ul style="list-style-type: none"> <li>• Over exposure may cause headache, nausea, diaphoresis, fever, anemia, liver damage, vomiting, convulsions, and coma.</li> <li>• Flammable when exposed to heat or flame, reacts with oxidizing materials. Reacts violently with CrO<sub>3</sub>; aluminum chloride + benzoyl chloride.</li> </ul>
Phenanthrene	Skin, eye, inhalation, ingestion	0.2 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• A human skin photosensitizer; a skin and eye irritant; a possible carcinogen</li> <li>• A combustible substance; reacts vigorously with oxidizers; releases acrid smoke, toxic gas during combustion</li> </ul>
Selenium	Skin, eye, inhalation, ingestion	0.2 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• An irritant to skin, eyes, respiratory tract, mucous membranes; visual distortion, chills, fever, bronchitis, metallic taste, garlic breath, abdominal distress, skin, eye burns, dermatitis</li> <li>• Reacts with strong oxidizers, strong acids, chromium trioxide, potassium bromate, cadmium</li> </ul>
Silver	Skin, eye, inhalation, ingestion	0.1 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• A irritant to skin, eyes, respiratory tract; abdominal pain; ulceration of the skin; blue gray eyes, throat, nasal septum, skin</li> <li>• Reacts with acetylene, ammonia, strong peroxides, bromo azide, chlorine trifluoride, ethylene imine, oxalic acid, tartaric acid; can explode as a fine dispersed dust</li> </ul>

Two sampling events were performed at SWMU 303 and the following chemical contaminants were identified; benzo(a)pyrene, arsenic, 4-methylphenol, naphthalene, chromium, and lead

**Table 3.2 SWMU 303  
Chemical Hazard Summary**

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Arsenic	Inhalation, ingestion, contact with skin/eyes	0.01mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• A human carcinogen; a powerful allergen, inhalation and contact may cause burning, swelling and redness in the eyes, nose, throat and skin; ingestion causes nausea, vomiting, nervous system effects in the extremities (numbness, tingling, weakness); long term exposure can cause liver, kidney, and blood damage.</li> <li>• A fire hazard in the form of dust or contact with oxidizers;</li> </ul>

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
			thermal decomposition produces toxic gases.
Benzo(a) pyrene, Benzo(a) anthracene, Benzo(b) fluoranthene, Benzo(k) Fluoranthene	Skin, eye, inhalation, ingestion	0.2 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>An Animal Carcinogen, probable human carcinogen; a nasal, respiratory tract, and skin irritant; (all substances have probable, possible carcinogenic potential)</li> <li>Reacts with acids and oxidizers; produces acrid smoke, toxic gases when involved in fires, thermal decomposition</li> </ul>
Chromium	Skin, eye, inhalation, ingestion	0.5 mg/m <sup>3</sup> Cr (VI) Soluble 0.05 mg/m <sup>3</sup> Insoluble 0.01 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>Some Chromium (VI) compounds are confirmed human carcinogens; corrosive irritant to skin, eyes, respiratory tract; deep skin ulcers; not (always) immediately painful; an allergic sensitizer; 5 grams ingested can be fatal</li> <li>Reacts with strong oxidizers, alkalis, can react with, ignite oils, grease, paper and plastics</li> </ul>
Lead	Inhalation, ingestion	0.050 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>Weakness, insomnia; loss of appetite, loss of weight, abdominal pain; anemia; tremors; weakness of wrists/ankles; kidney damage; low blood pressure</li> <li>Incompatible with strong oxidizers, hydrogen peroxide and acids</li> </ul>
4-Metholphenol (p-creosol)	Skin, eye, inhalation, ingestion	5 ppm	<ul style="list-style-type: none"> <li>The substance is corrosive to the eyes, the skin and respiratory tract. Inhalation of vapors may cause lung edema.</li> <li>Reacts violently with strong oxidizing agents.</li> </ul>
Naphthalene	Skin eye, ingestion, inhalation	PEL 10 ppm STEL 15 ppm	<ul style="list-style-type: none"> <li>Over exposure may cause headache, nausea, diaphoresis, hematuria, fever, anemia, liver damage, vomiting, convulsions, and coma.</li> <li>Flammable when exposed to heat or flame, reacts with oxidizing materials. Reacts violently with CrO<sub>3</sub>; aluminum chloride + benzoyl chloride.</li> </ul>

Two sampling events were performed at SWMU 318 and the following chemical contaminants were identified; 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,1,2-trichloroethane, ethylene chloride, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, naphthalene, arsenic, cadmium, chromium, mercury, silver, benzene, trichloroethene, vinyl chloride and 4-methylphenol.

**Table 3.3 SWMU 318  
Chemical Hazard Summary**

<b>CHEMICAL</b>	<b>EXPOSURE ROUTES</b>	<b>PEL/TLV</b>	<b>HEALTH HAZARDS/ PHYSICAL HAZARDS</b>
Arsenic	Inhalation, ingestion, contact with skin/eyes	0.01mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• A human carcinogen; a powerful allergen, inhalation and contact may cause burning, swelling and redness in the eyes, nose, throat and skin; ingestion causes nausea, vomiting, nervous system effects in the extremities; long term exposure can cause liver, kidney, and blood damage.</li> <li>• A fire hazard in the form of dust or contact with oxidizers; thermal decomposition produces toxic gases.</li> </ul>
Benzene	Skin, eye, inhalation, ingestion	0.5 ppm SKIN STEL 2.5 ppm	<ul style="list-style-type: none"> <li>• Prolonged skin contact with Benzene or excessive inhalation of its vapor may cause headache, weakness, loss of appetite, and lassitude. A human carcinogen.</li> <li>• Extremely flammable, keep sources of ignition away. Incompatible with fluorides, chlorides, oxygen, permanganates, acids, and peroxides</li> </ul>
Benzo(a) pyrene, Benzo(a) anthracene, Benzo(b) fluoranthene, Benzo(k) Fluoranthene	Skin, eye, inhalation, ingestion	0.2 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• An Animal Carcinogen, probable human carcinogen; a nasal, respiratory tract, and skin irritant; (all substances have probable, possible carcinogenic potential)</li> <li>• Reacts with acids and oxidizers; produces acrid smoke, toxic gases when involved in fires, thermal decomposition</li> </ul>
Benzene	Skin, eye, inhalation, ingestion	0.5 ppm SKIN STEL 2.5 ppm	<ul style="list-style-type: none"> <li>• Prolonged skin contact with Benzene or excessive inhalation of its vapor may cause headache, weakness, loss of appetite, and lassitude. A human carcinogen.</li> <li>• Extremely flammable, keep sources of ignition away. Incompatible with fluorides, chlorides, oxygen, permanganates, acids, and peroxides</li> </ul>
Bis (2ethyl-hexyl) phthalate (DEHP)	Skin, eye, inhalation, ingestion	5.0 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• An irritant to eyes, skin, mucous membranes, and respiratory tract; ingestion: nausea, abdominal cramps and diarrhea</li> <li>• Reacts with strong oxidizers; combustible liquid; toxic byproducts of combustion</li> </ul>
Cadmium	Inhalation, ingestion	0.002 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>• A probable carcinogen; skin, eye, respiratory irritation; mild flu and fever symptoms (metal fume fever); pulmonary edema</li> <li>• Reacts violently with ammonium nitrate; finely divided cadmium metal can become pyrophoric; avoid heat, flame, causes cadmium fume formation</li> </ul>

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Chromium	Skin, eye, inhalation, ingestion	0.5 mg/m <sup>3</sup> Cr (VI) Soluble 0.05 mg/m <sup>3</sup> Insoluble 0.01 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>Some Chromium (VI) compounds are confirmed human carcinogens; corrosive irritant to skin, eyes, respiratory tract; deep skin ulcers; not (always) immediately painful; an allergic sensitizer; 5 grams ingested can be fatal</li> <li>Reacts with strong oxidizers, alkalis, can react with, ignites oils, grease, paper and plastics</li> </ul>
Dibenzo(a,h) anthracene	Skin, eye, inhalation, ingestion	Not Established	<ul style="list-style-type: none"> <li>A possible human carcinogen, a skin irritant.</li> <li>Chemical is generally stable</li> </ul>
Dichlorobenzene	Skin, eye, inhalation, ingestion	25ppm, STEL: 50ppm	A corrosive irritant to skin, eyes, respiratory tract, mucus membranes; liver and kidney damage; skin blisters. Reacts with strong oxidizers, aluminum, chlorides, acids, acid fumes; releases toxic gases during combustion.
1,4 - Dichlorobenzene	Skin, eye, inhalation, ingestion	10 ppm	<ul style="list-style-type: none"> <li>An animal carcinogen; irritation, swelling of the eyes, nasal discharge, headache, nausea vomiting, jaundice</li> <li>A strong oxidizers (permanganate and chlorine) emits toxic gases during thermal decomposition</li> </ul>
Di-n- butyl phthalate	Inhalation, ingestion	5.0 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>Causes abdominal pain nausea and diarrhea.</li> <li>The substance decomposes on burning producing toxic and irritating fumes.</li> </ul>
Mercury	Inhalation, skin	0.025 mg/m <sup>3</sup> SKIN alkyl compounds 0.1 mg/m <sup>3</sup> Ceiling	<ul style="list-style-type: none"> <li>Cough, chest pain, shortness of breath; tremor, insomnia, irritability, headache, weakness, stomach pain, loss of appetite; kidney damage</li> <li>Reacts with acetylene, ammonia, chlorine dioxide, copper, and other metals</li> </ul>
4-Metholphenol (p-creosol)	Skin, eye, inhalation, ingestion	5 ppm	<ul style="list-style-type: none"> <li>The substance is corrosive to the eyes, the skin and respiratory tract. Inhalation of vapors may cause lung edema.</li> <li>Reacts violently with strong oxidizing agents.</li> </ul>
Naphthalene	Skin eye, ingestion, inhalation	PEL 10 ppm STEL 15 ppm	<ul style="list-style-type: none"> <li>Over exposure may cause headache, nausea, diaphoresis, hematuria, fever, anemia, liver damage, vomiting, convulsions, and coma.</li> <li>Flammable when exposed to heat or flame, reacts with oxidizing materials. Reacts violently with CrO<sub>3</sub>; aluminum chloride + benzoyl chloride.</li> </ul>
Silver	Skin, eye, inhalation, ingestion	0.1 mg/m <sup>3</sup>	<ul style="list-style-type: none"> <li>A irritant to skin, eyes, respiratory tract; abdominal pain; ulceration of the skin; blue gray eyes, throat, nasal septum, skin</li> <li>Reacts with acetylene, ammonia, strong peroxides, bromo azide, chlorine trifluoride, ethylene imine, oxalic acid, tartaric acid; can explode as a fine dispersed dust</li> </ul>

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
1,1,2 Trichloroethane	Skin, eye, inhalation, ingestion	10 ppm	<ul style="list-style-type: none"> <li>A skin, eye and upper respiratory irritant; a CNS depressant; dermatitis; a carcinogen</li> <li>Reacts with strong oxidizers, caustics and chemically active metals; releases toxic gases during combustion</li> </ul>
Trichloroethylene	Skin, eye, inhalation, ingestion	50 ppm	<ul style="list-style-type: none"> <li>A skin and eye irritant; dermatitis; headache, vertigo, visual distortion, fatigue, nausea, vomiting, irregular heart rhythm</li> <li>A dangerous fire hazard, reacts with strong caustics and chemically reactive metals, will emit toxic phosgene gas when heated</li> </ul>
Vinyl Chloride	Skin, eye, inhalation, ingestion	1 ppm	<ul style="list-style-type: none"> <li>A carcinogen; headache, vertigo, narcosis, collapse; affects CNS; skin and eye irritation</li> <li>A severe fire and explosion hazard; reacts with copper, aluminum, and hydroquinone; forms toxic decomposition products when involved with fires or heat; HCl, carbon monoxide, and phosgene.</li> </ul>

#### Section 4.0: Physical Hazards

Physical hazards on this site include heavy equipment operation, deep excavations, contact with above/underground utilities, and the potential for explosive/combustible atmospheres in and around the tanks.

- Review attached Activity Hazard Analysis for excavation, removal and decontamination of tanks and piping, removal of product, and sampling prior to beginning operations.
- Removal/disconnecting of power sources that may be present will require adherence to HS-315, Control of Hazardous Energy Sources.
- Obtain a hot work permit and conduct all hot work in accordance with HS-314.
- Utilize spark and explosion proof equipment.
- Deep excavations present confined space hazards. In the event entry is necessary, conduct work in accordance with HS-315.
- Isolate equipment swing areas and maintain safe distances to eliminate potential for injury from flying debris during operation of the hoe-ram in the event tanks are filled with concrete.
- All above and underground utilities shall be identified and marked by the appropriate authority, as required by HS-308, prior to the initiation of intrusive activities. Utility mark-out documentation shall be completed prior to beginning all demolition activities.

**Section 5.0: Personal Protective Equipment:**

PPE to be utilized will consist of the following:

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Tank Removal and Soil Excavation	Modified Level 'D'	Not Anticipated	Leather-work gloves, Tyvek coverall, inner sample gloves, outer nitrile gloves, as necessary	None	Hard-hat, steel-toe work boots, hearing protection >85 dBA.
Site Survey, Road Construction, Installation of Erosion Controls, Backfill, Concrete Pad Demolition and Installation, Soil Load out, Tank Replacement	Level D	Not Anticipated	Tyvek® coverall as necessary to protect against biological hazards and concrete dust. Nitrile gloves when working with wet concrete	None	Hard-hat, steel-toe work boots, eye protection and hearing protection >85 dBA.
Sampling	Level D	Not Anticipated	Nitrile sample gloves	None	Hard-hat, steel-toe work boots, and eye protection .
Tank and Equipment Decontamination	Modified Level D	Not Anticipated	PVC rain suit or poly-coated Tyvek® coverall, inner latex sample gloves, outer nitrile gloves, latex boot covers, goggles/ face shield when in contact with liquid contamination.	None	Hard-hat, steel-toe work boots and hearing protection >85 dBA. Metatarsal and shin guards are required when operating a pressure washer.

**Section 6.0 Air Monitoring:**

Air monitoring will be conducted in order to characterize personnel exposures and fugitive emissions from site contaminants. The principle contaminants VOCs, SVOCs and heavy metals, as outlined in Section 3.0. An FID will be utilized to conduct air monitoring in the breathing zone and work area during excavation activities and removal of the tank. Colorimetric tubes will be used to check specifically for benzene when working at SWMU 318. A Data RAM will be

used to monitor for airborne particulate. Monitoring will be conducted to detect oxygen levels and the presence of explosive vapors in the work area with a combustible gas/oxygen meter.

### Direct Reading Air Monitoring Requirements

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	Action
FID	Breathing zone/Equipment Operator (EO) and Recovery Technician (RT) during the excavation and removal of tanks, piping and soils	Continuously during tank removal and excavation activities. Monitoring will be performed during sampling and soil relocation activities at the discretion of the SSO	1.0 ppm*  1.0- 4.0 ppm* No benzene present  >4.0 ppm*	Colorimetric tubes for Benzene when at SWMU 318.  Modified Level D  Stop work and contact Health and Safety Manager
Colorimetric Tubes- Benzene (SWMU 318)	Breathing zone/Equipment Operator (EO) and Recovery Technician (RT) during the excavation and removal of tanks, piping, soils and removal of free product.	Sustained PID readings of 1 ppm or greater	<1.0 ppm*  >1.0 ppm*	Level D  Stop work and contact Health and Safety Manager
Multi-Gas Detector	Work area during tank/piping removal.  Work area in the event entry into excavation is necessary	Duration of operations.  Prior to entry; and continuously during entry	Oxygen $\geq$ 19.5 % and $\leq$ 22.5%; LEL <10%  Oxygen < 19.5% and >22.5%; LEL $\geq$ 10%	Monitor continuously and watch for levels to fluctuate  Stop Work, evacuate area and contact Health and Safety Manager.
Data RAM	Work area/breathing zone of Equipment Operator and Recovery Technician during concrete breaking	Initially and then periodically at the discretion of the SSO	<5.0 mg/m <sup>3</sup>  >5.0 mg/m <sup>3</sup>	Level D  Dust control such as wetting. If dust control is not effective stop work and contact Health and Safety Manager.

\*Sustained readings above background.

## **7.0 Training**

All personnel on this site shall have received training and information on established programs (HAZCOM, emergency procedures, medical surveillance, etc.), as outlined in the Site Specific Health & Safety Plan. A minimum of 2 site personnel certified in CPR/First must be present on-site at all times during site activities. Additionally, all site personnel must be familiar with requirements of this Amendment and sign the Health and Safety Amendment Certification form.

**Completed and Approved by: Alison Harwood, CSP**



***ATTACHMENT 2***  
***Activity Hazard Analysis***

**ACTIVITY HAZARD ANALYSIS FOR SITE SURVEY ACTIVITIES**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Site Survey	Struck By/ Against Motor Vehicles/ Operating Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate potential equipment swing areas</li> <li>• Avoid/isolate survey activities in high traffic areas, warehouse ship/receive areas</li> <li>• Make eye contact with vehicle operators before approaching/crossing high traffic areas</li> <li>• Understand and review hand signals</li> <li>• Emphasize The Buddy System where injury potential exists</li> </ul>	Hard hat, safety glasses and steel toe work boots	
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment and tools</li> <li>• Mark, identify, or barricade other obstructions</li> </ul>		
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> <li>• Warm up muscles before engaging in manual lifting activities</li> <li>• Avoid actions/activities that contribute to over exertion</li> <li>• Review lifting posture/techniques regularly at safety meetings</li> </ul>		
	Sharp Objects	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>• Maintain all hand and power tools in a safe condition</li> <li>• Keep guards in place during use</li> <li>• Close doors, windows on heavy equipment to prevent injuries from tree branches and other vegetation</li> </ul>	Leather gloves	

**ACTIVITY HAZARD ANALYSIS FOR SITE SURVEY ACTIVITIES**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Site Survey (continued)	Insect/ Animal Bites	<ul style="list-style-type: none"> <li>• Review injury potential with workers</li> <li>• Avoid insect nests areas, habitats outside work areas</li> <li>• Emphasize The Buddy System where such injury potential exists</li> <li>• Use insect repellent to protect against sting injuries</li> <li>• Wear PPE and tape joints to keep insects away from the skin</li> <li>• Use protective insect repellents containing DEET to prevent insect bites</li> <li>• Check limbs/body for insects/ insect bites during decontamination and/or shower</li> </ul>	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers, as necessary	
	Contact Dermatitis/ Poison Ivy	<ul style="list-style-type: none"> <li>• Wear long sleeve Shirts / trousers to avoid skin contact with plants or other skin irritants</li> <li>• Identify and review poisonous plants with workers</li> <li>• Avoid unnecessary clearing of plant/vegetation areas</li> <li>• Cover vegetation with plastic(visqueen) where survey position raises exposure potential</li> <li>• Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions</li> <li>• Identify workers who are known to contract poison ivy</li> </ul>	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers, as necessary	
	Horseplay	<ul style="list-style-type: none"> <li>• Prohibit horseplay on all project sites</li> <li>• Review rules about horseplay with subcontractors</li> <li>• Do not respond to horseplay started by others</li> </ul>		
	High/Low Ambient Temperature	<ul style="list-style-type: none"> <li>• Monitor for Heat/Cold stress in accordance with Shaw Health and Safety Procedures # HS400, HS401</li> <li>• Provide fluids to prevent worker dehydration</li> </ul>		Meteorological Equipment

**ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION OF ACCESS ROADS/GRADING**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Construction to Access Roads/Grading	Struck by/ Against Heavy Equipment, Protruding Objects	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Avoid equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Barricade or enclose the work area</li> <li>• Restrict entry to the work area to authorized personnel during paving activities</li> <li>• Understand and review hand signals</li> <li>• All heavy equipment will have operable back-up alarms.</li> <li>• Spotters will be used to back-up equipment and direct traffic in all "blind" areas</li> </ul>	Warning vests, hard hat, safety glasses and steel-toed work boots. Goggles and face shield, as necessary	
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>		
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment, tools, debris, &amp; other materials</li> <li>• Mark, identify, or barricade other obstructions</li> <li>• Use 3 point contact when ascending/descending heavy equipment</li> <li>• Park heavy equipment on level ground to avoid potential sprains/strains when ascending/descending</li> </ul>		

<b>ACTIVITY HAZARD ANALYSIS FOR CONSTRUCTION OF ACCESS ROADS/GRADING</b>				
<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Construction to Access Roads/Grading (continued)	Inhalation and Contact with Dusts and Particulates, Contact Dermatitis	<ul style="list-style-type: none"> <li>• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present</li> <li>• Apply water spray to road surfaces to minimize/eliminate fugitive dust</li> <li>• Wear PPE to avoid skin contact with contaminated soil, or other skin irritants</li> <li>• Monitor breathing zone air to determine levels of contaminants</li> </ul>	Hard hat, steel-toe boots and leather gloves	
	Fire/ Explosion	<ul style="list-style-type: none"> <li>• Eliminate sources of ignition from the work area</li> <li>• Prohibit smoking</li> <li>• Provide ABC (or equivalent) fire extinguishers in all work areas, flammable storage areas, generator and compressor locations</li> <li>• Store flammable liquids in well ventilated areas</li> <li>• Prohibit storage, transfer of flammable liquids in plastic containers</li> <li>• Store combustible materials away from flammables</li> <li>• Separate Flammables and Oxidizers by 20 feet minimum</li> </ul>	Portable fire extinguishers	
	High/Low Ambient Temperature	<ul style="list-style-type: none"> <li>• Monitor for heat/cold stress in accordance with Shaw Health and Safety Procedures HS400 and HS401</li> <li>• Provide fluids to prevent worker dehydration</li> </ul>		
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>	
<ul style="list-style-type: none"> <li>• Dozer</li> <li>• Dump Trucks</li> </ul>		<ul style="list-style-type: none"> <li>• Daily equipment inspections as per manufacturers requirements</li> <li>• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> </ul>	<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review operations/safety manuals for all equipment utilized</li> </ul>	

**ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF EROSION CONTROL**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Installation of Erosion Controls	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment, tools and debris</li> <li>• Mark, identify, or barricade other obstructions</li> </ul>		
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>		
	Insect/ Snake Bites	<ul style="list-style-type: none"> <li>• Review injury potential and types of snakes with workers</li> <li>• Avoid insect nests areas, likely habitats of snakes outside work areas</li> <li>• Emphasize the buddy system where such injury potential exists</li> <li>• Use insect repellent, wear PPE to protect against sting/bite injuries</li> </ul>	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot covers, as necessary	
	Contact with Poison Ivy/ Dermatitis	<ul style="list-style-type: none"> <li>• Wear PPE to avoid skin contact with contaminated soil, waste, plants, or other skin irritants</li> <li>• Identify and review poisonous plants with workers</li> <li>• Identify workers who are known to contract poison ivy.</li> <li>• Use Ivy Block® protective lotion, as necessary</li> <li>• Wear PPE and tape joints to keep poison ivy irritants plant matter away from skin</li> </ul>	Tyvek coveralls, duct tape bottom of coveralls to boots or latex boot cover, as necessary. Leather gloves	
	Struck-by Hand Tools, Flying Debris	<ul style="list-style-type: none"> <li>• Hold stakes in place with tongs, vice-pliers or other remote grasping tools</li> <li>• Wear safety goggles when using sledge hammer, hatchet, maul or axe</li> </ul>	Leather gloves, full-face shield and goggles	

**ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF EROSION CONTROL**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Installation of Erosion Controls (continued)	Sharp Objects	<ul style="list-style-type: none"> <li>Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>Maintain all hand and power tools in a safe condition</li> <li>Keep guards in place during use</li> </ul>	Leather gloves	
	High Noise Levels	<ul style="list-style-type: none"> <li>Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> <li>Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA</li> </ul>	Hearing protection	
	High Ambient Temperature	<ul style="list-style-type: none"> <li>Provide fluids to prevent worker dehydration</li> <li>Monitor for heat stress in accordance with Health and Safety Procedure HS400</li> </ul>		Meteorological Equipment
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>	
<ul style="list-style-type: none"> <li>Silt fence</li> <li>Shovels</li> <li>Hammers</li> </ul>		<ul style="list-style-type: none"> <li>Daily equipment inspections as per manufacturers requirements</li> <li>Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> </ul>	<ul style="list-style-type: none"> <li>Review AHA with all task personnel</li> <li>Review operations/safety manuals for all equipment utilized</li> <li>Review Site Specific Health and Safety Plan</li> </ul>	

**ACTIVITY HAZARD ANALYSIS FOR FENCE INSTALLATION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Fence Installation	Sharp Objects	<ul style="list-style-type: none"> <li>Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>Maintain all hand and power tools in a safe condition</li> <li>Keep guards in place during use</li> </ul>	Leather gloves	
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris</li> <li>Mark, identify, or barricade other obstructions</li> </ul>		
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>Observe proper lifting techniques</li> <li>Obey sensible lifting limits (60 lb. maximum per person manual lifting)</li> <li>Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>		
	Eye Injuries	<ul style="list-style-type: none"> <li>Wear face shield, goggles when operating powered clearing / grubbing equipment</li> </ul>	Goggles and face shield	
	High Noise Levels	<ul style="list-style-type: none"> <li>Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> </ul>	Hearing Protection	
	Overexertion	<ul style="list-style-type: none"> <li>Use the right tool for the task at hand</li> <li>Avoid actions/activities that produce overexertion</li> </ul>		
	Horseplay	<ul style="list-style-type: none"> <li>Prohibit horseplay at all project sites</li> <li>Review rules about horseplay with subcontractor supervisors and workers</li> <li>Remind workers not to respond/participate in horseplay</li> <li>started by others</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR FENCE INSTALLATION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Fence Installation (continued)	Electrical Shock	<ul style="list-style-type: none"> <li>• De-energize or shut off utility lines at their source before work begins</li> <li>• Use double insulated or properly grounded electric power-operated tools</li> <li>• Maintain tools in a safe condition</li> <li>• Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters</li> <li>• Use qualified electricians to hook up electrical circuits</li> <li>• Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation</li> <li>• Cover or elevate electric wire or flexible cord passing through work areas to protect from damage</li> <li>• Keep all plugs and receptacles out of water</li> <li>• Use approved water-proof, weather-proof type if exposure to moisture is likely</li> <li>• Inspect all electrical power circuits prior to commencing work</li> <li>• Follow Shaw procedure HS315, Control of Hazardous Energy and the Site Specific Lockout/Tagout/Try Plan</li> </ul>	Lockout-Tagout Devices	Voltage Meter or "Tic" Tracer
	Allergic Reaction	<ul style="list-style-type: none"> <li>• Review allergy hazards with work crew</li> <li>• Identify workers with allergies</li> <li>• Review work assignments PPE upgrades</li> </ul>	Tyvek coveralls, duct tape bottom of coveralls to boots; latex gloves, if required	
	Insect Stings	<ul style="list-style-type: none"> <li>• Avoid hand mowing/clearing in dense brush areas, suspected Areas of stinging insects</li> </ul>		

<b>ACTIVITY HAZARD ANALYSIS FOR FENCE INSTALLATION</b>				
<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Fence Installation (continued)	Contact with Poison Ivy	<ul style="list-style-type: none"> <li>Identify workers who are known to contract poison ivy</li> <li>Wear PPE and tape joints to keep poison ivy irritants/ plant matter away from skin</li> <li>Use protective creams and wash with poison ivy preventing soaps when working in suspected exposure area</li> </ul>	Long sleeve shirts, Tyvek coveralls,, as necessary Leather gloves	
	High/Low Ambient Temperature	<ul style="list-style-type: none"> <li>Monitor for Heat/Cold stress in accordance with Shaw Health and Safety Procedures # HS400, HS401</li> <li>Provide fluids to prevent worker dehydration</li> </ul>		Meteorological Equipment
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>		<b>TRAINING REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>Augers</li> <li>Hand tools</li> <li>Fence materials</li> </ul>		<ul style="list-style-type: none"> <li>Daily equipment inspections as per manufacturers requirements</li> <li>Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> </ul>		<ul style="list-style-type: none"> <li>Review AHA with all task personnel</li> <li>Review Site-specific Health and Safety Plan and Amendment</li> <li>Review operations/safety manuals for all equipment</li> </ul>

**ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION AND BACKFILLING**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Soil Excavation	Underground/ Overhead Utilities	<ul style="list-style-type: none"> <li>• Identify all utilities around the site before work commences</li> <li>• Be aware that the radial grounding system composed of copper wires maybe buried 6 to 12 inches below ground surface.</li> <li>• Complete the underground utility permit in accordance with Shaw Health and Safety Procedure HS308</li> <li>• Cease work immediately if unknown utility markers are uncovered</li> <li>• Use manual excavation within 3 feet of known utilities</li> <li>• Utility clearance shall conform with 29 CFR 1926.955 (high voltage &gt;700 kv) 15 feet phase to ground clearance; 31 feet phase to phase clearance</li> </ul>		
	Sharp Objects	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>• Maintain all hand and power tools in a safe condition</li> <li>• Keep guards in place during use</li> <li>• Observe work area and location of other personnel before lifting/moving objects with sharp edges</li> </ul>	Leather gloves	
	Struck By/ Against Heavy Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate equipment swing areas</li> <li>• Make eye contact with operators before approaching</li> <li>• Understand and review hand signals</li> <li>• Step away from equipment when bucket adjustments are made.</li> <li>• Park equipment in areas where operator can see clearly to dismount equipment</li> </ul>	Warning vests, hard hat, safety glasses and steel-toed boots	

**ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION AND BACKFILLING**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment	Monitoring Devices
Soil Excavation (continued)	High Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> <li>• Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA</li> </ul>	Hearing protection	
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear, walkways of equipment, vegetation, excavated material, tools and debris</li> <li>• Mark, identify, or barricade other obstructions</li> <li>• Exit equipment slowly and maintain three point contact</li> <li>• Clean boot soles before climbing on equipment</li> </ul>		
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Review proper lifting posture/techniques regularly at safety meetings</li> <li>• Obey sensible lifting limits (60 lb. Max per person)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> <li>• Avoid carrying heavy objects above shoulder level</li> <li>• Warm up muscles before engaging in manual lifting</li> </ul>		
	Excavation Wall Collapse	<ul style="list-style-type: none"> <li>• Trench boxes or sheeting will be used around the perimeter of each excavation to prevent continuous sloughing of sand/soils from the sides of the excavation.</li> <li>• Store excavated material at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face</li> <li>• Assign a competent person to inspect, decide soil classification, proper sloping, the correct shoring, or sheeting</li> <li>• Inspect excavations daily and any time conditions change</li> </ul>	Hard hat, safety glasses, steel toe work boots	

**ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION AND BACKFILLING**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Soil Excavation (continued)	Inhalation and Contact with Site Contaminants (Arsenic, MIBK), Nuisance Dust and Carbon Monoxide (CO)	<ul style="list-style-type: none"> <li>• Provide workers proper skin and eye protection based on the exposure hazards present.</li> <li>• Review hazardous properties of concrete (silica) with workers before operations begin.</li> <li>• Monitor breathing zone air to determine levels of contaminants.</li> <li>• Dampen work area to control dust.</li> <li>• Position workers upwind as much as possible.</li> <li>• Monitor for carbon monoxide when operating heavy equipment (combustion engines) in enclosed areas.</li> </ul>	Modified Level D	Data RAM, FID and Benzene detector tubes when working SWMU 318
Manual Excavation	Struck/Struck By	<ul style="list-style-type: none"> <li>• Use the right tool for the task at hand</li> <li>• Maintain personal balance when performing manual excavation</li> <li>• Concentrate on the work task being performed</li> </ul>		
	Overexertion	<ul style="list-style-type: none"> <li>• Use the right tool for the task at hand</li> <li>• Avoid actions/activities that produce overexertion</li> </ul>		
	Horseplay	<ul style="list-style-type: none"> <li>• Prohibit horseplay on all project sites</li> <li>• Review rules about horseplay with subcontract Superintendents and workers</li> <li>• Remind workers not to respond/participate in horseplay started by others</li> </ul>		
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear, walkways of equipment, vegetation, excavated material, tools and debris</li> <li>• Mark, identify, or barricade other obstructions</li> <li>• Exit equipment slowly and maintain three point contact</li> <li>• Clean boot soles before climbing on equipment</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION AND BACKFILLING**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Backfilling	Struck By/ Against Heavy Equipment	<ul style="list-style-type: none"> <li>Wear reflective warning</li> <li>Isolate equipment swing areas</li> <li>Make eye contact with operators before approaching</li> <li>Understand and review hand signals</li> <li>Park equipment in areas where operator can see clearly to dismount equipment</li> </ul>	Warning vests, hard hat safety glasses and steel toe work boots	
	High Noise Levels	<ul style="list-style-type: none"> <li>Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> </ul>	Hearing protection	
	Sharp Objects	<ul style="list-style-type: none"> <li>Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>Maintain all hand and power tools in a safe condition</li> <li>Observe work area and location of other personnel before lifting/moving objects with sharp edges</li> </ul>	Leather gloves	
	High/Low Ambient Temperature	<ul style="list-style-type: none"> <li>Provide fluids to prevent worker dehydration</li> <li>Monitor for heat stress in accordance with Shaw Health and Safety Procedures HS400 and HS401</li> </ul>		Meteorological Equipment
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>		<b>TRAINING REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>Excavator</li> <li>Roll-offs</li> <li>Air monitoring equipment</li> <li>Dump Trucks or Loaders</li> </ul>		<ul style="list-style-type: none"> <li>Daily equipment inspections as per manufacturers requirements</li> <li>Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> <li>Underground Utility Permit (HS308)</li> <li>Excavation permit (HS307)</li> <li>Inspect all dump trucks in accordance with Section 18 of the USACE EM 385-1-1 Manual</li> </ul>		<ul style="list-style-type: none"> <li>Review AHA with all task personnel</li> <li>Review Site Specific Health and Safety Plan and Amendment</li> <li>Review the hazards associated with site contaminants</li> <li>Review Shaw Procedures: HS308 Utility Contact Prevention; HS315 Control of Energy Sources; HS402 Hearing Conservation</li> </ul>

**ACTIVITY HAZARD ANALYSIS FOR SOIL LOAD-OUT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Soil Load-out	Struck By/ Against Heavy Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Obey posted speed limits</li> <li>• Isolate equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Understand and review hand signals</li> <li>• Exit equipment slowly and maintain three point contact</li> <li>• Report minor incidents to site supervision</li> <li>• Park equipment in areas where operator can see clearly to dismount equipment</li> <li>• Step away from equipment when bucket adjustments are made</li> <li>• Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into loader bucket.</li> </ul>	Warning vests, hard hat, safety glasses and steel toe work boots	
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walk ways, work areas of equipment, tools and debris</li> <li>• Mark, identify, or barricade other obstructions</li> <li>• Clean mud from boots before climbing on equipment</li> </ul>		
	Sharp Objects	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>• Maintain all hand and power tools in a safe condition</li> <li>• Keep guards in place during use</li> </ul>	Leather gloves	
	High Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> </ul>	Hearing protection	

**ACTIVITY HAZARD ANALYSIS FOR SOIL LOAD-OUT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Soil Load-out (continued)	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. Maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> <li>• Avid carrying heavy objects above shoulder level</li> <li>• Avoid actions/activities that contribute to overexertion</li> <li>• Warm up muscles before engaging in manual lifting activities</li> <li>• Review lifting posture/techniques regularly at safety meetings</li> </ul>		
	Defective Vehicles	<ul style="list-style-type: none"> <li>• Inspect all trucks before loading</li> <li>• Do not load soil or equipment into defective equipment</li> </ul>		
	Horseplay	<ul style="list-style-type: none"> <li>• Prohibit horseplay on all project sites</li> <li>• Review rules about horseplay with subcontractor supervisors and workers</li> <li>• Remind workers not to respond/participate in horseplay started by others</li> </ul>		
	High/Low Ambient Temperature	<ul style="list-style-type: none"> <li>• Monitor for heat/cold stress in accordance with Health and Safety Procedure HS400 and HS401</li> <li>• Provide fluids to prevent worker dehydration</li> </ul>		Meteorological Equipment
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>	
<ul style="list-style-type: none"> <li>• Loader</li> <li>• Sheeting</li> <li>• Dump trucks (possible)</li> </ul>		<ul style="list-style-type: none"> <li>• Daily equipment inspections as per manufacturers requirements</li> <li>• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> <li>• Inspect all dump trucks in accordance with Section 18 of the USACE EM 385-1-1 Manual</li> </ul>	<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan and Amendment</li> <li>• Review operations/safety manuals for all equipment utilized</li> </ul>	

**ACTIVITY HAZARD ANALYSIS FOR SAMPLING**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Sampling	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. maximum per person manual lifting)</li> <li>• <input type="checkbox"/> Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>		
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris</li> <li>• <input type="checkbox"/> Mark, identify, or barricade other obstructions</li> </ul>		
	Spills	<ul style="list-style-type: none"> <li>• Wear splash protection as necessary to prevent dermal contact</li> <li>• Ensure spill cleanup equipment/material on hand/ready for use (i.e.: Baking soda to neutralize and sample preservative spills)</li> <li>• Cleanup spills immediately</li> </ul>	Full face shield	
	Inhalation and Contact with Site Contaminants	<ul style="list-style-type: none"> <li>• Provide workers proper skin and eye protection based on the exposure hazards present.</li> <li>• Review hazardous properties of site contaminants with workers before operations begin.</li> <li>• Dampen work area to control dust</li> </ul>	Level D with sample gloves.	
	High/Low Ambient Temperature	<ul style="list-style-type: none"> <li>• Monitor for heat/cold stress in accordance with Health and Safety Procedure HS400 and HS401</li> <li>• Provide fluids to prevent worker dehydration</li> </ul>		Meteorological Equipment
<b>EQUIPMENT TO BE USED</b>		<b>INSPECTION REQUIREMENTS</b>		<b>TRAINING REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>• Sample containers</li> <li>• Coolers</li> <li>• Hand tools</li> </ul>		<ul style="list-style-type: none"> <li>• Excavation inspections/permits</li> <li>• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> </ul>		<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan.</li> <li>• Review site specific chemical hazards</li> </ul>

**ACTIVITY HAZARD ANALYSIS FOR ABOVEGROUND TANK REMOVAL/DEMOLITION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Inerting Tanks	Operation of Boom lift	<ul style="list-style-type: none"> <li>• Review operation manual and safety devices of boom lift with all operators.</li> <li>• Inspect equipment before use</li> <li>• Full body harness and lanyard is required while operating boom lift</li> <li>• Review path of travel for any debris, tools, holes, etc. before moving boom lift</li> <li>• Use spotters when moving boom lift.</li> <li>• Spotters must wear reflective vests</li> <li>• Do not step out of the basket or stand on the railing</li> <li>• Isolate equipment swing areas</li> <li>• Wear leather gloves while attaching members to protect against pinch injuries.</li> <li>• Falling out of the aerial lift may tip the aerial lift. The lanyard must be adjusted to prevent falling out of the lift should there be a sudden movement or failure.</li> <li>• Never tie off to an adjacent structure.</li> <li>• Always maintain a firm footing in the lift.</li> <li>• Do not stand under loads that are being raised or lowered with the lift.</li> <li>• Maintain appropriate distance from overhead utilities. &gt;50 kV, add .04 inches per kV to obtain the safe distance. If voltage is unknown, remain at least 20 feet from the power lines.</li> <li>• Tools should always be hung or put into belt when possible</li> <li>• Plan for an emergency rescue in the event the lift becomes stuck.</li> </ul>	Full body harness, reflective vests, hard hat, safety glasses, steel toed boots	

**ACTIVITY HAZARD ANALYSIS FOR ABOVEGROUND TANK REMOVAL/DEMOLITION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Inerting Tanks (continued)	Dry Ice	<ul style="list-style-type: none"> <li>• Use leather gloves and tongs, or similar items when handling the dry ice.</li> <li>• The atmosphere must be diluted to less than 8 percent oxygen by volume to be completely safe from potential vapor ignition</li> <li>• 15 pounds of dry ice is required per 1,000 gallons tank volume</li> <li>• The tanks are 11' diameter by 30' in height. This means the tanks hold 21,325 gallons and 320 pounds of dry ice will be needed to inert the tanks</li> <li>• Once the tank is cut or opened, the inert gas can be lost</li> <li>• LEL/O2 measurements must be used to verify the O2 concentrations</li> </ul>	Leather gloves or thermal gloves	LEL/O2 meter, FID
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. Maximum per person manual lifting)</li> <li>• Use only approved lifting devices that are designed for the intended application and that are rated at the proper capacity</li> <li>• If more than normal exertion on the body is required when lifting manually or with a mechanical lifting device, stop lifting immediately and notify the supervisor.</li> <li>• Avoid carrying heavy objects above shoulder height</li> <li>• Warm up muscles before engaging in manual lifting</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR ABOVEGROUND TANK REMOVAL/DEMOLITION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Inerting Tanks (continued)	Fire/ Explosion	<ul style="list-style-type: none"> <li>• Eliminate sources of ignition from the work area</li> <li>• Prohibit smoking</li> <li>• Provide ABC (or equivalent) fire extinguishers in all work, flammable storage areas and with fuel powered generators and compressors</li> <li>• Post "NO SMOKING" signs</li> </ul>	Portable fire extinguisher	LEL/O <sub>2</sub>
Cutting Tanks with shears	Premature structural Collapse	<ul style="list-style-type: none"> <li>• Barricade or enclose the demolition area</li> <li>• Restrict entry to the work area to heavy equipment operator(s) and signaler(s) during demolition</li> <li>• Wear hard hats, safety glasses with side shields, and steel-toe safety boots</li> <li>• Understand and review posted hand signals</li> </ul>	Warning vests, hard hat and safety glasses	
	Sharp Objects	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>• Maintain all hand and power tools in a safe condition</li> <li>• Keep guards in place during use</li> </ul>	Leather gloves	
	High Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> <li>• Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA</li> </ul>	Hearing protection	

**ACTIVITY HAZARD ANALYSIS FOR ABOVEGROUND TANK REMOVAL/DEMOLITION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Cutting Tanks with shears (continued)	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> <li>• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present</li> <li>• Review hazardous properties of site contaminants with workers before operations begin</li> <li>• Monitor breathing zone air to determine levels of contaminants</li> </ul>	Modified Level D	LEL/O <sub>2</sub> , FID
	Struck by/ Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Restrict entry to the work area to heavy equipment operator(s) and signaler(s) during demolition</li> <li>• Understand and review hand signals</li> <li>• Stay clear of shears while in operations</li> </ul>	Warning vests, hard hat, safety glasses	
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment, vegetation, excavated material, tools, and debris</li> <li>• Mark, identify, or barricade other obstructions</li> </ul>		
	Walking on Machine Tracks	<ul style="list-style-type: none"> <li>• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surface</li> <li>• Observe track surfaces when walking, move cautiously</li> <li>• Uneven, slippery surfaces</li> <li>• Avoid sudden awkward motions (pulling hoses)</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR ABOVEGROUND TANK REMOVAL/DEMOLITION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Cutting Tanks with shears (continued)	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. Maximum per person manual lifting)</li> <li>• Use only approved lifting devices that are designed for the intended application and that are rated at the proper capacity</li> <li>• If more than normal exertion on the body is required when lifting manually or with a mechanical lifting device, stop lifting immediately and notify the supervisor.</li> <li>• Avoid carrying heavy objects above shoulder height</li> <li>• Warm up muscles before engaging in manual lifting</li> <li>• Regularly review proper lifting posture/techniques</li> </ul>		
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>		<b>TRAINING REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>• Boom lift</li> <li>• Dry Ice</li> <li>• Track hoe</li> <li>• Shears</li> <li>• FID, LEL/O2</li> </ul>		<ul style="list-style-type: none"> <li>• Daily equipment inspections as per manufacturers requirements</li> <li>• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> </ul>		<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan and Amendment</li> <li>• Review operations/safety manuals for all equipment utilized</li> </ul>

**ACTIVITY HAZARD ANALYSIS FOR CONCRETE DEMOLITION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Concrete Demolition	Sharp Objects	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>• Maintain all hand and power tools in a safe condition</li> </ul>	Leather gloves	
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris</li> <li>• Mark, identify, or barricade other obstructions</li> </ul>		
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>		
	Eye Injuries	<ul style="list-style-type: none"> <li>• Wear face shield, goggles when operating powered clearing / grubbing equipment</li> </ul>	Goggles and face shield	
	Inhalation and Contact with Concrete Dust	<ul style="list-style-type: none"> <li>• Provide workers proper skin and eye protection based on the exposure hazards present</li> <li>• Review hazardous properties of site contaminants with workers before operations begin</li> </ul>	Leather gloves	
	High Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> <li>• Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA</li> </ul>	Hearing protection	

**ACTIVITY HAZARD ANALYSIS FOR CONCRETE DEMOLITION**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment	Monitoring Devices
Concrete Demolition (continued)	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. Maximum per person manual lifting)</li> <li>• Use only approved lifting devices that are designed for the intended application and that are rated at the proper capacity</li> <li>• If more than normal exertion on the body is required when lifting manually or with a mechanical lifting device, stop lifting immediately and notify the supervisor.</li> <li>• Avoid carrying heavy objects above shoulder height</li> <li>• Warm up muscles before engaging in manual lifting</li> <li>• Regularly review proper lifting posture/techniques</li> </ul>		Meteorological Equipment
	Struck by/ Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Restrict entry to the work area to heavy equipment operator(s) and signaler(s) during demolition</li> <li>• Understand and review hand signals</li> <li>• Stay clear of shears while in operations</li> </ul>	Warning vests, hard hat, safety glasses and steel-toed boots	

**ACTIVITY HAZARD ANALYSIS FOR CONCRETE DEMOLITION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
<b>EQUIPMENT REQUIREMENTS</b>		<b>INSPECTION REQUIREMENTS</b>		<b>INSPECTION REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>Hoe Ram</li> </ul>		<ul style="list-style-type: none"> <li>Emergency Safety Equipment-Shower, Eyewashes, Fire Extinguishers, First aid supplies</li> <li>Daily Equipment Inspection</li> </ul>	<ul style="list-style-type: none"> <li>Review Site Specific Health and Safety Plan and Amendment.</li> <li>Review site specific AHA with all task personnel</li> </ul>	

**ACTIVITY HAZARD ANALYSIS FOR TANK AND EQUIPMENT DECONTAMINATION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Tank and Equipment Decontamination	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment, vegetation, tools and debris</li> <li>• Mark, identify, or barricade other obstructions</li> <li>• Clean heavy objects of oil/grease or other slippery contamination before attempting to lift/remove</li> <li>• Wear gloves with grip improving surfaces for handling large, slippery objects</li> <li>• Clean up spills or water accumulation in walkways</li> </ul>		
	Struck by/Against Heavy Equipment, Protruding Objects	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Understand and review hand signals</li> <li>• Step away from equipment when bucket adjustments are made</li> <li>• Do not attempt verbal communication in high noise backgrounds</li> </ul>	Warning vests hard hat safety glasses, goggles and face shield, steel toe work boots	
	Inhalation and Contact with Hazardous Substances, & Splashes	<ul style="list-style-type: none"> <li>• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present</li> <li>• Review hazardous properties of site contaminants with workers before operations begin</li> <li>• Wear hard hats, safety glasses with side shields, or goggles with splash shields and steel-toe safety boots</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR TANK AND EQUIPMENT DECONTAMINATION**

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment	Monitoring Devices
Tank and Equipment Decontamination (continued)	Burns	<ul style="list-style-type: none"> <li>• Wear proper gloves, face shield/safety goggles, shin and toe guards, and splash suits to protect workers from skin burns and injury when operating laser (high pressure washers)</li> <li>• Tape gloves to PPE sleeves to lessen the possibility of hot water entering gloves</li> <li>• Use hand tools to loosen connections and position body to avoid pressure discharge</li> <li>• Wear shin and toe guards to protect from burns, lacerations and similar injuries</li> </ul>	Goggles and face shield, shin and toe guards	
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> <li>• Avoid actions/activities that contribute to overexertion</li> <li>• Warm up muscles before engaging in manual lifting activities</li> <li>• Review lifting posture/techniques regularly at safety meetings</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR TANK AND EQUIPMENT DECONTAMINATION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Tank and Equipment Decontamination (continued)	Sharp Objects/ Cuts and Punctures	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges/objects or working with hand tools</li> <li>• Maintain all hand and power tools in a safe condition</li> <li>• Keep guards in place during use</li> <li>• Guard or pad metal edges of objects frequently used (access panels, etc.) or manipulated/bypassed during maintenance</li> <li>• Position heavy objects to avoid manipulation while cleaning</li> <li>• Get assistance and dry glove surfaces to improve grip during object manipulation while cleaning</li> </ul>	Leather gloves	
	High Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> </ul>	Hearing Protection	
	Repetitive Strains	<ul style="list-style-type: none"> <li>• Rotate job tasks on high vibration equipment</li> <li>• Report equipment that produces high vibration for inspection and maintenance</li> <li>• Wear vibration reducing gloves</li> </ul>		
	Strains and Sprains	<ul style="list-style-type: none"> <li>• Maintain a safe stance and body position operating pressurized equipment</li> <li>• Avoid rushing</li> </ul>		

<b>ACTIVITY HAZARD ANALYSIS FOR TANK AND EQUIPMENT DECONTAMINATION</b>				
<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Tank and Equipment Decontamination	High Ambient Temperature	<ul style="list-style-type: none"> <li>• Provide fluids to prevent worker dehydration</li> <li>• Monitor for heat stress in accordance with Health and Safety Procedure HS400.</li> </ul>		Meteorological Equipment
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>	
<ul style="list-style-type: none"> <li>• Pressure washer</li> </ul>		<ul style="list-style-type: none"> <li>• Daily equipment inspections as per manufacturers requirements</li> <li>• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> </ul>	<ul style="list-style-type: none"> <li>• Review AHA with all task personnel</li> <li>• Review Site Specific Health and Safety Plan and Amendment</li> <li>• Review operations/safety manuals for all equipment utilized</li> </ul>	

**ACTIVITY HAZARD ANALYSIS FOR CONCRETE REPLACEMENT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Concrete Replacement	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways work areas of equipment, tools and debris</li> <li>• Exit equipment slowly and maintain three point contact</li> <li>• Mark, identify, or barricade other obstructions</li> </ul>		
	Struck By/ Against Heavy Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Understand and review hand signals</li> <li>• Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into bucket.</li> </ul>	Warning vests, hard hat, safety glasses and steel toe work boots	
	Inhalation and Contact with Concrete Dust	<ul style="list-style-type: none"> <li>• Provide workers proper skin and eye protection based on the exposure hazards present</li> <li>• Review hazardous properties of concrete contaminants with workers before operations begin</li> <li>• If concrete get on skin or clothing, wash area immediately</li> </ul>	Nitrile gloves. Full-face shield as necessary when splash hazards are present	
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. Maximum per person manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> <li>• Avoid carrying heavy objects above shoulder level</li> <li>• Avoid manual lifting/carrying tasks</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR CONCRETE REPLACEMENT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Installation of Concrete Pad (continued)	Sharp Objects (rebar)	<ul style="list-style-type: none"> <li>Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> </ul>	Leather gloves	
	High Noise Levels	<ul style="list-style-type: none"> <li>Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> </ul>	Hearing protection	
	Strains and Sprains	<ul style="list-style-type: none"> <li>Use long-handled tool whenever possible for the form work</li> <li>Use knee pads when necessary</li> </ul>	Knee-pads as necessary	
	High/Low Ambient Temperature	<ul style="list-style-type: none"> <li>Provide fluids to prevent worker dehydration</li> <li>Monitor for heat/cold stress in accordance with Shaw Health and Safety Procedures HS400, HS401</li> </ul>	Insulated Clothing (subject to ambient temperature)	Meteorological Equipment
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>		<b>TRAINING REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>Concrete truck</li> <li>Rebar</li> <li>Hand tools</li> </ul>		<ul style="list-style-type: none"> <li>Daily equipment inspections as per manufacturers requirements</li> <li>Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> </ul>		<ul style="list-style-type: none"> <li>Review AHA with all task personnel</li> <li>Review Site Specific Health and Safety Plan and Amendment</li> <li>Review operations/safety manuals for all equipment utilized</li> </ul>

**ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF TANKS AND EQUIPMENT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Installation of Tanks and Equipment	Underground/ Overhead Utilities	<ul style="list-style-type: none"> <li>• Identify all utilities around the site before work commences</li> <li>• Cease work immediately if unknown utility markers are uncovered</li> <li>• Complete the underground utility permit in accordance with Health and Safety Procedure HS308</li> <li>• Use manual excavation within 3 feet of known utilities</li> <li>• Utility clearance shall conform with 29 CFR 1926.955 (high voltage &gt;700 kv) 15 feet phase to ground clearance; 31 feet phase to phase clearance</li> </ul>		
	Struck By/ Against Heavy Equipment	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Isolate equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Understand and review hand signals</li> <li>• Step away from equipment when bucket adjustments are made</li> <li>• Use “spotter” when backing.</li> <li>• Ensure the excavator and pump truck are equipped with back-up alarms.</li> </ul>	Warning vests, hard hat, safety glasses and steel toe work boots	
	Sharp Objects	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of injury may be caused by sharp edges or objects</li> <li>• Maintain all hand and power tools in a safe condition</li> <li>• Keep guards in place during use</li> </ul>	Leather gloves	

**ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF TANKS AND EQUIPMENT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Installation of Tanks and Equipment (continued)	High Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> <li>• Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA</li> </ul>	Hearing protection	
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment, vegetation, excavated material, tools, and debris</li> <li>• Mark, identify, or barricade other obstructions</li> <li>• Exit equipment slowly and maintain three point contact</li> <li>• Evaluate the site for fall hazards.</li> <li>• Conform with the provisions of HS301-Fall Protection</li> </ul>		
	Rigging Equipment	<ul style="list-style-type: none"> <li>• Identify the proper rigging equipment for the type of lift</li> <li>• Inspect rigging devices to verify slings, chains, straps are free from defects and rated for the lift weight</li> <li>• Prohibit use of equipment with missing documentation tags, or defective equipment</li> <li>• Ensure tag-lines are free of knots and defects</li> <li>• The lift supervisor will review rigging techniques, positioning of load, tag lines with workers involved in rigging activities prior to conducting the lift.</li> <li>• Conform with all requirements of Health and Safety procedure HS823 – Rigging and Lifting</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF TANKS AND EQUIPMENT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Installation of Tanks and Equipment (continued)	Crane Operation (if required)	<ul style="list-style-type: none"> <li>• Verify the crane's annual inspection and maintenance log</li> <li>• Perform required daily crane inspections</li> <li>• Perform daily inspection of mechanical, hydraulic operations of crane</li> <li>• Complete Crane inspection checklist.</li> <li>• Complete the Lift Plan Worksheet</li> <li>• Conform with all requirements of Health and Safety procedure HS822 – Crane Operations</li> </ul>		
	Pre-lift Meetings	<ul style="list-style-type: none"> <li>• Hold a pre-lift meeting for lifting and rigging of major components.</li> <li>• Assign lift supervisor and a signaler for the lift</li> <li>• Review lift hand signals</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF TANKS AND EQUIPMENT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
	Forklift Operations	<ul style="list-style-type: none"> <li>• Conduct pre-operation equipment inspections using checklist</li> <li>• Only trained qualified operators may operate forklifts</li> <li>• Do not exceed rated capacity of forklift</li> <li>• Use spotters when backing or when view is obstructed by objects</li> <li>• Use horn to warn when rounding corners</li> <li>• Use only approved lifting devices that are properly rated and certified for the load being moved</li> <li>• Conform with all requirements of Health and Safety procedure HS820 – Forklifts</li> </ul>		
Installation of Tanks and Equipment (continued)	Tag Lines	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by tag lines</li> <li>• Prohibit looping / winding tag lines around hands or body</li> <li>• Prohibit positioning, moving load using tag lines</li> </ul>	Leather gloves	

**ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF TANKS AND EQUIPMENT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
	Electrical Shock	<ul style="list-style-type: none"> <li>• De-energize or shut off utility lines at their source before work begins</li> <li>• Use double insulated or properly grounded electric power-operated tools</li> <li>• Label equipment that is 480 and above with high voltage signs.</li> <li>• Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters</li> <li>• Use qualified electricians to hook up electrical circuits</li> <li>• Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation</li> <li>• Cover or elevate electric wire or flexible cord passing through work areas to protect from damage</li> <li>• Keep all plugs and receptacles out of water</li> <li>• Use approved water-proof, weather-proof type if exposure to moisture is likely</li> <li>• Inspect all electrical power circuits prior to commencing work</li> <li>• Follow Lockout-Tagout procedures in accordance with Health and Safety Procedures HS315</li> </ul>	Lockout-Tagout Devices	Voltage Meter or "Tic" Tracer

**ACTIVITY HAZARD ANALYSIS FOR INSTALLATION OF TANKS AND EQUIPMENT**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Installation of Tanks and Equipment (continued)	Operation of Hand Tools	<ul style="list-style-type: none"> <li>Review power tool operation before starting work</li> <li>Maintain steady even pressure when drilling into concrete/hard materials</li> <li>Avoid actions that cause over exertion or binding of drills</li> </ul>		
	Horseplay	<ul style="list-style-type: none"> <li>Prohibit horseplay on all project sites</li> <li>Review rules about horseplay with subcontractors</li> <li>Remind workers not to respond/participate in horseplay started by others.</li> </ul>		
	High/Low Ambient Temperature	<ul style="list-style-type: none"> <li>Monitor for Heat/Cold stress in accordance with Health and Safety Procedures HS400 &amp; HS401</li> <li>Provide fluids to prevent worker dehydration</li> </ul>		
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>		<b>TRAINING REQUIREMENTS</b>
<ul style="list-style-type: none"> <li>Forklift</li> <li>Crane (possible)</li> <li>Rigging equipment</li> <li>Piping</li> <li>Glues and primer</li> <li>Hand tools</li> </ul>		<ul style="list-style-type: none"> <li>Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> <li>Crane inspection</li> <li>Forklift inspection</li> <li>Sling/rigging inspection</li> </ul>		<ul style="list-style-type: none"> <li>Review AHA with all task personnel</li> <li>Review Site Specific Health and Safety Plan and Amendment</li> <li>Review operations/safety manuals for all equipment utilized</li> <li>Review MSDS's for primers and glues</li> <li>Review the all applicable Shaw Health and Safety Procedures.</li> </ul>

**ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Site Restoration	Struck by/ Against Heavy Equipment, Protruding Objects	<ul style="list-style-type: none"> <li>• Wear reflective warning vests when exposed to vehicular traffic</li> <li>• Avoid equipment swing areas</li> <li>• Make eye contact with operators before approaching equipment</li> <li>• Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times</li> <li>• Understand and review hand signals</li> </ul>	Warning vests, hard hat, safety glasses, steel toe work boots	
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear, walkways of equipment, tools, debris, other materials</li> <li>• Mark, identify, or barricade other obstructions</li> </ul>		
	High Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> </ul>	Hearing Protection	
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. per person for manual lifting)</li> <li>• Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads</li> </ul>		

**ACTIVITY HAZARD ANALYSIS FOR SITE RESTORATION**

<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
Site restoration (continued)	High Ambient Temperature	<ul style="list-style-type: none"> <li>• Provide fluids to prevent worker dehydration</li> <li>• Monitor for heat stress in accordance with Health and Safety Procedure HS400.</li> </ul>		Meteorological Equipment
<b>EQUIPMENT TO BE USED</b>		<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>	
<ul style="list-style-type: none"> <li>• Bob Cat or Forklift for moving bulky loads</li> </ul>		<ul style="list-style-type: none"> <li>• Equipment inspections</li> <li>• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)</li> </ul>	<ul style="list-style-type: none"> <li>• Review SSHSP</li> <li>• Review Site Specific Health and Safety Plan and Amendment</li> <li>• Review operation manuals for the pumps and related equipment</li> </ul>	

## **APPENDIX B**

### **SAMPLING AND ANALYSIS PLAN**

# **Addendum to the Camp Lejeune Basewide Sampling and Analysis Plan for Solid Waste Management Units 254, 258, 293, 299, 314, and 303/318**

## **1.0 Introduction**

This Addendum to the Basewide SAP for Camp Lejeune Marine Corps Base was developed to provide task-specific requirements for implementing Interim Remedial Measures at specified Solid Waste Management Units (SWMUs). This Addendum is to be used in conjunction with the Basewide SAP. In the case of discrepancies between this Addendum and the Basewide SAP, this document takes precedence.

## **2.0 Scope of Investigation**

The Interim Remedial Measure for SWMUs 254, 258, 293, 299, 314, and 303/318 will include excavation and disposal of impacted soils followed by backfilling and grading. SWMU 254 is a dumpster located west of Building 1408 and containing unpunched paint cans and approximately one gallon of Citrakleen. SWMU 258 is a concrete oil/water separator and grit chamber located within the central portion of the Hadnot Point Industrial Area adjacent to Building 1711. SWMU 293 is a baffled, concrete, in-ground oil/water separator containing waste oil, antifreeze, and possibly solvents. SWMU 299 is an above-ground storage tank (AST) that stores used oil and is located adjacent to Buildings AS-114 and AS-116. SWMU 314 is a concrete oil/water separator and vehicle wash rack located south/southwest of Montford Landing Road. SWMU 303/318 consists of ASTs near building AS-515.

## **3.0 Sampling and Analytical Methodology**

The samples will be collected in accordance with the requirements of the Camp Lejeune Basewide SAP. Also reference Table B-1 of this SAP Addendum for sampling procedures. The samples will be analyzed by the fixed-base laboratory using appropriate SW-846 Update III and other EPA-approved methods.

### *3.1 Confirmation Samples*

All excavations proposed for this scope of work will remain open until analytical results are available. Confirmation samples will be collected in each excavation at the midpoint of the sidewalls at 50-ft. intervals and floor samples every 500 sq.ft. A 3-day laboratory turn-around time will be requested for all confirmation samples.

### *3.1.1 SWMU 254*

In the SWMU 254 excavation, the anticipated dimensions are 6-ft. below land surface (bls) by 50-ft. long by 25-ft. wide. This will yield 4 sidewall samples and 3 floor samples. All of these soil samples will be tested for Semi-volatile Organic Compounds (SVOCs) by SW-846 method 8270C.

### *3.1.2 SWMU 258*

The SWMU 258 excavation will be approximately 3-ft. bls by 60-ft. long by 30-ft. wide. There will be 4 sidewall and 4 floor samples. All of these soil samples will be tested for RCRA Metals by SW-846 methods 6010B/7000 series.

### *3.1.3 SWMU 293*

SWMU 293 will have an excavation 6-ft. bls by 13-ft. long by 10-ft. wide. This will yield 4 sidewall samples and 1 floor sample. All of these soil samples will be tested for RCRA Metals by SW-846 methods 6010B/7000 series.

### *3.1.4 SWMU 299*

There will be three excavations at SWMU 299. Excavation A will require 6 sidewall and 2 floor samples. Excavation B will have 6 sidewall and 5 floor samples. Excavation C will need 4 sidewall and 2 floor samples. All of these soil samples will be tested for SVOCs by SW-846 method 8270C and RCRA Metals by SW-846 methods 6010B/7000 series.

### *3.1.5 SWMU 314*

SWMU 314 will have an excavation approximately 3-ft. bls by 30-ft. long by 25-ft. wide. There will be 4 sidewall and 2 floor samples. All of these soil samples will be tested for SVOCs by SW-846 method 8270C and RCRA Metals by SW-846 methods 6010B/7000 series.

### *3.1.6 SWMU 303/318*

Soil excavation activities at SWMU 303/318 will include five separate areas with an estimated 1,600 cubic yards of soil being removed. Reference the project Work Plan for locations and dimensions of these excavations. Asphalt and concrete will be staged separately from the contaminated soil. Prior to initiation of excavation work, two representative composite soil samples will be collected and analyzed for disposal characterization including full TCLP parameters by SW-846 method 1311 with Reactivity, Corrosivity, and Ignitability. Additionally ten representative samples will be collected for analysis of Diesel Range Organics (DRO) and Gasoline Range Organics (GRO) by SW-846 method 8015B. Approximately 20 sidewall and 35 floor confirmation samples will be collected from the excavations. These will be analyzed for Volatile Organic Compounds (VOCs) by SW-846 method 8260B, SVOCs by SW-846 method 8270C, and RCRA Metals by SW-846 methods 6010B/7000 series.

### *3.2 Backfill Samples*

If backfill material is used from an on-site source, a representative sample will be collected and analyzed for contaminants of concern. The required analytical methods will be Target Compound List VOCs by SW-846 8260B, SVOCs by SW-846 8270C, and Target Analyte List Metals by SW-846 6010B/7000 series.

### *3.3 Disposal Samples*

The excavated material will be stockpiled on a plastic liner to await disposal characterization. One sample per every 1,000 cubic yards will be tested for TCLP Metals by SW-846 method 1311/6010B/7000 series. One sample per every 200 cubic yards will be analyzed for DRO and GRO by SW-846 method 8015B.

### *3.4 Decontamination Water*

Any water generated during the excavation activities will be collected and stored for appropriate disposal. Analysis for SVOCs and RCRA Metals may be required.

## **4.0 Subcontracted Laboratory**

A laboratory previously procured for Navy Atlantic Division work will be assigned this task based on the capacity and capabilities of the pre-approved laboratories at the time of sampling.

## Tables

**TABLE B-1**  
**Sampling and Analysis Summary**

Sample Location	Sample Point	Matrix	Sampling Frequency	Approx Sample No.	Sampling Method	Sampling Equipment	TAT	QC Level	Required Analysis	Analytical Method	Holding Time	Preservatives	Containers
SWMU 254	Sidewall	Soil	50-foot intervals	4 + 1 MS/MSD	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC	8270C	14 / 40 days	Cool to 4°C	1-4 oz. Jar
	Floor	Soil	1 every 500-sq.ft.	3 + 1 DUP	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC	8270C	14 / 40 days	Cool to 4°C	1-4 oz. Jar
SWMU 258	Sidewall	Soil	50-foot intervals	4 + 1 MS/MSD	Grab	SS Spoon SS Bowl	3 days	Project Standard	RCRA Metals	6010B/7000	180 days	Cool to 4°C	1-4 oz. Jar
	Floor	Soil	1 every 500-sq.ft.	4 + 1 DUP	Grab	SS Spoon SS Bowl	3 days	Project Standard	RCRA Metals	6010B/7000	180 days	Cool to 4°C	1-4 oz. Jar
SWMU 293	Sidewall	Soil	50-foot intervals	4 + 1 DUP	Grab	SS Spoon SS Bowl	3 days	Project Standard	RCRA Metals	6010B/7000	180 days	Cool to 4°C	1-4 oz. Jar
	Floor	Soil	1 every 500-sq.ft.	1 + 1 MS/MSD	Grab	SS Spoon SS Bowl	3 days	Project Standard	RCRA Metals	6010B/7000	180 days	Cool to 4°C	1-4 oz. Jar

**TABLE B-1**  
**Sampling and Analysis Summary**

Sample Location	Sample Point	Matrix	Sampling Frequency	Approx Sample No.	Sampling Method	Sampling Equipment	TAT	QC Level	Required Analysis	Analytical Method	Holding Time	Preservatives	Containers
SWMU 299 Excavation A	Sidewall	Soil	50-foot intervals	6 + 1 MS/MSD	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar
	Floor	Soil	1 every 500-sq.ft.	2 + 1 DUP	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar
SWMU 299 Excavation B	Sidewall	Soil	50-foot intervals	6 + 1 DUP	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar
	Floor	Soil	1 every 500-sq.ft.	5	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar
SWMU 299 Excavation C	Sidewall	Soil	50-foot intervals	4	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar
	Floor	Soil	1 every 500-sq.ft.	2	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar
SWMU 314	Sidewall	Soil	50-foot intervals	4 + 1 DUP	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar
	Floor	Soil	1 every 500-sq.ft.	2	Grab	SS Spoon SS Bowl	3 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar

**TABLE B-1**  
**Sampling and Analysis Summary**

Sample Location	Sample Point	Matrix	Sampling Frequency	Approx Sample No.	Sampling Method	Sampling Equipment	TAT	QC Level	Required Analysis	Analytical Method	Holding Time	Preservatives	Containers
SWMU 303/318	Sidewall	Soil	50-foot intervals	20 + 1 DUP + 1 MS/MSD	Grab	SS Spoon SS Bowl	3 days	Project Standard	VOC SVOC RCRA Metals	8260B 8270C 6010B/7000	14 days 14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar 3 EnCore Samplers
	Floor	Soil	1 every 500-sq.ft.	35 + 2 DUP + 1 MS/MSD	Grab	SS Spoon SS Bowl	3 days	Project Standard	VOC SVOC RCRA Metals	8260B 8270C 6010B/7000	14 days 14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar 3 EnCore Samplers
	Disposal Stockpile	Soil	1 every 1000 cubic yards	2	Grab	SS Spoon SS Bowl	14 days	Project Standard	TCLP Volatiles TCLP Semi-volatiles TCLP Pesticides TCLP Herbicides TCLP Metals Reactive Cyanide Reactive Sulfide pH (Corrosivity) Ignitability	1311/8260B 1311/8270C 1311/8081A 1311/8151A 1311/6010B/7000 7.3 7.3 9040B 1010	14 / 14 days 14 / 14 / 40 days 14 / 14 / 40 days 14 / 14 / 40 days 14 / 180 days None None None None	Cool to 4°C	3-16 oz. Jars
		Soil	1 every 200 cubic yards	10	Grab	SS Spoon SS Bowl	14 days	Project Standard	Diesel Range Organics Gasoline Range Organics	8015B 5035/8015B	14 / 40 days 14 / 40 days	Cool to 4°C	1-4 oz. Jar 3 EnCore Samplers
Backfill Material	On-site Source	Soil	Once	1	Grab	SS Spoon SS Bowl	14 days	Project Standard	TCL VOC TCL SVOC TAL Metals	5035/8260B 8270C 6010B/7000	14 days 14 / 40 days 180 days	Cool to 4°C	2-4 oz. Jar 3 EnCore Samplers
Disposal	Stockpile	Soil	1 every 1000 cubic yards	5	Grab	SS Spoon SS Bowl	14 days	Project Standard	TCLP Metals	1311/6010B/7000	14 / 180 days	Cool to 4°C	1-4 oz. Jar
	Stockpile	Soil	1 every 200 cubic yards	25	Grab	SS Spoon SS Bowl	14 days	Project Standard	Diesel Range Organics Gasoline Range Organics	8015B 5035/8015B	14 / 40 days 14 / 40 days	Cool to 4°C	1-4 oz. Jar 3 EnCore Samplers
Decon Water	Waste Drums	Water	Once	1	Grab	Jar	14 days	Project Standard	SVOC RCRA Metals	8270C 6010B/7000	14 / 40 days 180 days	Cool to 4°C HNO <sub>3</sub>	2-1L Ambers 1-250mL HDPE

**TABLE B-2**  
**Project Quality Control Objectives**

Method No	Analyte / Component	Project Action Limits		Minimum PQL		Accuracy Limits MS/MSD Recoveries		Precision Limits MS/MSD Deviation		Accuracy Limits LCS Recoveries		Precision Limits Field Dup Deviation		Completeness Limits	
		Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil
<b>TCL VOLATILES BY GC/MS</b>															
8260B	Acetone	700000	3000	2	10	60-140	20-150	<30	<50	65-135	43-165	<50	<75	95	90
8260B	Benzene	5000	5.6	2	10	60-140	20-150	<30	<50	65-135	51-139	<50	<75	95	90
8260B	Bromodichloromethane	NS	NS	4	20	60-140	20-150	<30	<50	65-135	58-145	<50	<75	95	90
8260B	Bromoform	NS	NS	6	30	60-140	20-150	<30	<50	65-135	67-129	<50	<75	95	90
8260B	Bromomethane	NS	NS	5.5	25	60-140	20-150	<30	<50	62-135	49-117	<50	<75	95	90
8260B	2-Butanone	170000	700	10	10	60-140	20-150	<30	<50	65-135	50-163	<50	<75	95	90
8260B	Carbon Disulfide	700000	4000	10	10	60-140	20-150	<30	<50	65-135	76-119	<50	<75	95	90
8260B	Carbon Tetrachloride	NS	NS	10.5	10	60-140	20-150	<30	<50	52-135	67-125	<50	<75	95	90
8260B	Chlorobenzene	NS	NS	2	10	60-140	20-150	<30	<50	65-135	69-140	<50	<75	95	90
8260B	Chloroethane	NS	NS	5	10	60-140	20-150	<30	<50	55-135	62-116	<50	<75	95	90
8260B	Chloroform	190	1	1.5	2	60-140	20-150	<30	<50	64-135	65-129	<50	<75	95	90
8260B	Chloromethane	2600	20	6.5	10	60-140	20-150	<30	<50	65-135	38-116	<50	<75	95	90
8260B	Dibromochloromethane	410	2	2.5	3	60-140	20-150	<30	<50	63-135	64-120	<50	<75	95	90
8260B	1,1-Dichloroethane	700000	4000	2	10	60-140	20-150	<30	<50	62-135	62-141	<50	<75	95	90
8260B	1,2-Dichloroethane	380	1.8	3	3	60-140	20-150	<30	<50	58-137	68-135	<50	<75	95	90
8260B	1,1-Dichloroethene	7000	45	6	10	60-140	20-150	<30	<50	65-135	54-128	<50	<75	95	90
8260B	Cis-1,2-Dichloroethene	70000	350	6	10	60-140	20-150	<30	<50	65-135	60-141	<50	<75	95	90
8260B	Trans-1,2-Dichloroethene	70000	380	3	10	60-140	20-150	<30	<50	65-135	51-148	<50	<75	95	90
8260B	1,2-Dichloropropane	560	2.9	2	2	60-140	20-150	<30	<50	60-135	76-132	<50	<75	95	90
8260B	Cis-1,3-Dichloropropene	200	0.9	5	5	60-140	20-150	<30	<50	64-135	70-122	<50	<75	95	90
8260B	Trans-1,3-Dichloropropene	200	0.9	5	5	60-140	20-150	<30	<50	56-135	42-154	<50	<75	95	90
8260B	Ethylbenzene	29000	240	3	10	60-140	20-150	<30	<50	65-135	59-140	<50	<75	95	90
8260B	2-Hexanone	280000	1900	10	10	60-140	20-150	<30	<50	65-135	47-165	<50	<75	95	90
8260B	4-Methyl-2-pentanone	NS	NS	10	10	60-140	20-150	<30	<50	65-135	77-119	<50	<75	95	90
8260B	Methylene Chloride	5000	20	1.5	10	60-140	20-150	<30	<50	65-135	55-126	<50	<75	95	90
8260B	Styrene	100000	2240	2	10	60-140	20-150	<30	<50	65-135	71-133	<50	<75	95	90
8260B	1,1,2,2-Tetrachloroethane	170	1	2	2	60-140	20-150	<30	<50	64-135	55-138	<50	<75	95	90
8260B	Tetrachloroethene	700	7.4	7	7	60-140	20-150	<30	<50	61-135	67-131	<50	<75	95	90
8260B	Toluene	257500	7000	5.5	10	60-140	20-150	<30	<50	64-135	31-137	<50	<75	95	90
8260B	1,1,1-Trichloroethane	NS	NS	4	10	60-140	20-150	<30	<50	65-135	68-135	<50	<75	95	90
8260B	1,1,2-Trichloroethane	NS	NS	5	10	60-140	20-150	<30	<50	65-135	70-141	<50	<75	95	90
8260B	Trichloroethene	2800	18.3	5	10	60-140	20-150	<30	<50	61-135	67-137	<50	<75	95	90
8260B	Vinyl Chloride	15	NS	5.5	9	60-140	20-150	<30	<50	36-144	31-121	<50	<75	95	90
8260B	Xylenes, Total	87500	5000	2.5	10	60-140	20-150	<30	<50	65-135	68-133	<50	<75	95	90
8260B	Dibromofluoromethane (surr)					75-125	65-135								
8260B	Toluene-d8 (surr)					75-125	65-135								
8260B	4-Bromofluorobenzene (surr)					75-1225	65-135								
8260B	1,2-Dichloroethane-d4 (surr)					62-139	52-149								

Notes:  
NS = Not Specified  
NA = Not Applicable

**TABLE B-2**  
**Project Quality Control Objectives**

Method No	Analyte / Component	Project Action Limits		Minimum PQL		Accuracy Limits MS/MSD Recoveries		Precision Limits MS/MSD Deviation		Accuracy Limits LCS Recoveries		Precision Limits Field Dup Deviation		Completeness Limits	
		Water ug/L	Soil ug/kg	Water ug/L	Soil ug/kg	Water %	Soil %	Water %	Soil %	Water %	Soil %	Water %	Soil %	Water %	Soil %
8270C	Phenol	NS	NS	10	330	60-140	20-150	<30	<50	25-125	25-135	<50	<75	95	90
8270C	Bis (2-chloroethyl) ether	31	NS	10	330	60-140	20-150	<30	<50	44-125	34-135	<50	<75	95	90
8270C	2-Chlorophenol	NS	NS	10	330	60-140	20-150	<30	<50	41-125	31-135	<50	<75	95	90
8270C	1,3-Dichlorobenzene	61500	24000	10	330	60-140	20-150	<30	<50	36-125	26-135	<50	<75	95	90
8270C	1,4-Dichlorobenzene	39500	1000	10	330	60-140	20-150	<30	<50	30-125	25-135	<50	<75	95	90
8270C	1,2-Dichlorobenzene	72500	7000	10	330	60-140	20-150	<30	<50	42-155	32-135	<50	<75	95	90
8270C	2-Methylphenol	NS	NS	10	330	60-140	20-150	<30	<50	25-125	25-135	<50	<75	95	90
8270C	Bis (2-chloroisopropyl) ether	NS	NS	10	330	60-140	20-150	<30	<50	36-166	26-175	<50	<75	95	90
8270C	4-Methylphenol	NS	NS	10	330	60-140	20-150	<30	<50	33-125	25-135	<50	<75	95	90
8270C	N-Nitrosodi-n-propylamine	NS	NS	10	330	60-140	20-150	<30	<50	37-125	27-135	<50	<75	95	90
8270C	Hexachloroethane	NS	NS	10	330	60-140	20-150	<30	<50	25-153	25-163	<50	<75	95	90
8270C	Nitrobenzene	NS	NS	10	330	60-140	20-150	<30	<50	46-133	36-143	<50	<75	95	90
8270C	Isophorone	NS	NS	10	330	60-140	20-150	<30	<50	26-175	25-175	<50	<75	95	90
8270C	2-Nitrophenol	NS	NS	10	330	60-140	20-150	<30	<50	44-125	34-135	<50	<75	95	90
8270C	2,4-Dimethylphenol	140000	900	10	330	60-140	20-150	<30	<50	45-139	35-149	<50	<75	95	90
8270C	Bis (2-chloroethoxy) methane	NS	NS	10	330	60-140	20-150	<30	<50	49-125	39-135	<50	<75	95	90
8270C	2,4-Dichlorophenol	NS	NS	10	330	60-140	20-150	<30	<50	46-125	36-135	<50	<75	95	90
8270C	1,2,4-Trichlorobenzene	9500	2600	10	330	60-140	20-150	<30	<50	44-142	34-152	<50	<75	95	90
8270C	Naphthalene	15500	580	10	330	60-140	20-150	<30	<50	50-125	40-135	<50	<75	95	90
8270C	4-Chloroaniline	NS	NS	20	330	60-140	20-150	<30	<50	45-136	35-146	<50	<75	95	90
8270C	Hexachlorobutadiene	440	2600	10	330	60-140	20-150	<30	<50	25-125	25-135	<50	<75	95	90
8270C	4-Chloro-3-methyl phenol	NS	NS	20	330	60-140	20-150	<30	<50	44-125	34-135	<50	<75	95	90
8270C	2-Methylnaphthalene	12500	3000	10	330	60-140	20-150	<30	<50	41-125	31-135	<50	<75	95	90
8270C	Hexachlorocyclopentadiene	NS	NS	10	330	60-140	20-150	<30	<50	41-125	31-135	<50	<75	95	90
8270C	2,4,6-Trichlorophenol	NS	NS	10	330	60-140	20-150	<30	<50	39-128	29-138	<50	<75	95	90
8270C	2,4,5-Trichlorophenol	NS	NS	50	800	60-140	20-150	<30	<50	25-175	25-175	<50	<75	95	90
8270C	2-Chloronaphthalene	NS	NS	10	330	60-140	20-150	<30	<50	60-125	50-135	<50	<75	95	90
8270C	2-Nitroaniline	NS	NS	50	800	60-140	20-150	<30	<50	50-125	40-135	<50	<75	95	90
8270C	Dimethyl phthalate	NS	NS	10	330	60-140	20-150	<30	<50	25-175	25-175	<50	<75	95	90
8270C	Acenaphthylene	1965	11000	10	330	60-140	20-150	<30	<50	47-125	37-135	<50	<75	95	90
8270C	2,6-Dinitrotoluene	NS	NS	10	330	60-140	20-150	<30	<50	51-125	41-135	<50	<75	95	90
8270C	3-Nitroaniline	NS	NS	50	800	60-140	20-150	<30	<50	51-125	41-135	<50	<75	95	90
8270C	Acenaphthene	2120	8000	10	330	60-140	20-150	<30	<50	49-124	39-135	<50	<75	95	90
8270C	2,4-Dinitrophenol	NS	NS	50	800	60-140	20-150	<30	<50	30-151	25-161	<50	<75	95	90
8270C	4-Nitrophenol	NS	NS	50	800	60-140	20-150	<30	<50	25-131	25-141	<50	<75	95	90
8270C	Dibenzofuran	28000	4700	10	330	60-140	20-150	<30	<50	52-125	42-135	<50	<75	95	90
8270C	2,4-Dinitrotoluene	NS	NS	10	330	60-140	20-150	<30	<50	39-139	29-149	<50	<75	95	90
8270C	Diethyl phthalate	NS	NS	10	330	60-140	20-150	<30	<50	37-125	27-135	<50	<75	95	90
8270C	4-Chlorophenyl-phenyl ether	NS	NS	10	330	60-140	20-150	<30	<50	51-132	41-142	<50	<75	95	90
8270C	Fluorene	950	44000	10	330	60-140	20-150	<30	<50	48-139	38-149	<50	<75	95	90
8270C	4-Nitroaniline	NS	NS	50	800	60-140	20-150	<30	<50	40-143	30-153	<50	<75	95	90
8270C	4,6-Dinitro-2-methyl phenol	NS	NS	50	800	60-140	20-150	<30	<50	26-134	25-144	<50	<75	95	90
8270C	N-Nitrosodiphenylamine	NS	NS	10	330	60-140	20-150	<30	<50	27-125	25-135	<50	<75	95	90
8270C	4-Bromophenyl-phenyl ether	NS	NS	10	330	60-140	20-150	<30	<50	53-127	43-137	<50	<75	95	90

Notes:  
NS = Not Specified  
NA = Not Applicable

**TABLE B-2**  
**Project Quality Control Objectives**

Method No	Analyte / Component	Project Action Limits		Minimum PQL		Accuracy Limits MS/MSD Recoveries		Precision Limits MS/MSD Deviation		Accuracy Limits LCS Recoveries		Precision Limits Field Dup Deviation		Completeness Limits	
		Water ug/L	Soil ug/kg	Water ug/L	Soil ug/kg	Water %	Soil %	Water %	Soil %	Water %	Soil %	Water %	Soil %	Water %	Soil %
<b>TCL SEMI-VOLATILES BY GC/MS</b>															
8270C	Hexachlorobenzene	NS	NS	10	330	60-140	20-150	<30	<50	46-133	36-143	<50	<75	95	90
8270C	Pentachlorophenol	NS	NS	50	800	60-140	20-150	<30	<50	28-136	38-146	<50	<75	95	90
8270C	Phenanthrene	410	60000	10	330	60-140	20-150	<30	<50	54-125	44-135	<50	<75	95	90
8270C	Anthracene	2100	995000	10	330	60-140	20-150	<30	<50	45-165	35-175	<50	<75	95	90
8270C	Carbazole	NS	NS	10	330	60-140	20-150	<30	<50	34-132	34-132	<50	<75	95	90
8270C	Di-n-butyl phthalate	NS	NS	10	330	60-140	20-150	<30	<50	34-126	25-136	<50	<75	95	90
8270C	Fluoranthene	280	276000	10	330	60-140	20-150	<30	<50	47-125	37-135	<50	<75	95	90
8270C	Pyrene	210	286000	10	330	60-140	20-150	<30	<50	47-136	37-146	<50	<75	95	90
8270C	Butyl benzyl phthalate	NS	NS	10	330	60-140	20-150	<30	<50	26-125	25-135	<50	<75	95	90
8270C	3,3'-Dichlorobenzidine	NS	NS	20	330	60-140	20-150	<30	<50	29-175	25-175	<50	<75	95	90
8270C	Benzo (a) anthracene	22	340	10	330	60-140	20-150	<30	<50	51-133	41-143	<50	<75	95	90
8270C	Chrysene	5	38000	10	330	60-140	20-150	<30	<50	55-133	45-143	<50	<75	95	90
8270C	Bis (2-ethylhexyl) phthalate	3000	6670	10	330	60-140	20-150	<30	<50	33-129	25-139	<50	<75	95	90
8270C	Di-n-octyl phthalate	NS	NS	10	330	60-140	20-150	<30	<50	38-127	28-137	<50	<75	95	90
8270C	Benzo (b) fluoranthene	0.6	1000	10	330	60-140	20-150	<30	<50	37-125	27-135	<50	<75	95	90
8270C	Benzo (k) fluoranthene	0.47	12000	10	330	60-140	20-150	<30	<50	37-123	37-123	<50	<75	95	90
8270C	Benzo (a) pyrene	1.5	91	10	660	60-140	20-150	<30	<50	41-125	31-135	<50	<75	95	90
8270C	Indeno (1,2,3-c,d) pyrene	31	3000	10	660	60-140	20-150	<30	<50	27-160	25-170	<50	<75	95	90
8270C	Dibenzo (a,h) anthracene	0.25	170	10	660	60-140	20-150	<30	<50	50-125	40-135	<50	<75	95	90
8270C	Benzo (g,h,i) perylene	210	6720000	10	660	60-140	20-150	<30	<50	34-149	25-159	<50	<75	95	90
8270C	2,4,6-Tribromophenol					25-134	19-122								
8270C	2-Fluorobiphenyl					43-125	30-115								
8270C	2-Fluorophenol					25-125	25-121								
8270C	Nitrobenzene-d5					32-125	23-120								
8270C	Phenol-d5					25-125	24-113								
8270C	Terphenyl-d14					42-126	18-137								

<b>TOTAL ORGANICS BY GC</b>		ug/L	mg/kg	ug/L	mg/kg	%	%	%	%	%	%	%	%	%	%
8015B	Diesel Range Organics	NS	10	10	10	60-140	30-170	<30	<50	25-125	61-143	<50	<75	95	90
8015B	Gasoline Range Organics	NS	10	10	1	60-140	30-170	<30	<50	44-125	67-136	<50	<75	95	90

<b>TAL METALS BY ICP</b>		mg/L	mg/kg	mg/L	mg/kg	%	%	%	%	%	%	%	%	%	%
6010B	Aluminum	NS	NS	0.2	22.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Antimony	NS	NS	0.06	10.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Arsenic	NS	NS	0.01	40.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Barium	2000000	848000	0.2	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Beryllium	NS	NS	0.005	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Cadmium	NS	NS	0.005	0.50	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Calcium	NS	NS	5	100	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Chromium	50000	27000	0.01	20	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Cobalt	NS	NS	0.05	10.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Copper	NS	NS	0.025	2.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Iron	NS	NS	0.1	3.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Lead	15000	270000	0.003	10.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Magnesium	NS	NS	5	100	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
<b>TAL METALS BY ICP</b>		mg/L	mg/kg	mg/L	mg/kg	%	%	%	%	%	%	%	%	%	%
6010B	Manganese	NS	NS	0.015	2.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Nickel	NS	NS	0.04	2.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Potassium	NS	NS	5	600	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Selenium	NS	NS	0.005	3.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Silver	18000	230	0.01	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Sodium	NS	NS	5	10.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90

Notes:  
NS = Not Specified  
NA = Not Applicable

**TABLE B-2**  
**Project Quality Control Objectives**

Method No	Analyte / Component	Project Action Limits		Minimum PQL		Accuracy Limits MS/MSD Recoveries		Precision Limits MS/MSD Deviation		Accuracy Limits LCS Recoveries		Precision Limits Field Dup Deviation		Completeness Limits	
		Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil	Water	Soil
6010B	Thallium	NS	NS	0.01	6.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Vanadium	NS	NS	0.05	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
6010B	Zinc	NS	NS	0.02	1.0	50-150	30-170	<30	<50	80-120	80-120	<50	<75	95	90
<b>MERCURY BY COLD VAPOR</b>		<b>mg/L</b>	<b>mg/kg</b>	<b>mg/L</b>	<b>mg/kg</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
7470A	Mercury	NS	NA	0.001	NA	50-150	NA	<30	NA	70-130	NA	<50	NA	95	NA
7471A	Mercury	NA	NS	NA	0.001	50-150	NA	<30	NA	70-130	NA	<50	NA	95	NA

Notes:  
NS = Not Specified  
NA = Not Applicable

**TABLE B-2**  
**Project Quality Control Objectives**

Method No	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits	Precision Limits	Accuracy Limits	Precision Limits	Completeness Limits
		TCLP	TCLP	MS/MSD Recoveries	MS/MSD Deviation	LCS Recoveries	Field Dup Deviation	TCLP
<b>TCLP VOLATILES BY GC/MS</b>		mg/L	mg/L	%	%	%	%	%
1311/8260B	Benzene	0.5	0.1	50-150	<50	70-130	<50	90
1311/8260B	Carbon Tetrachloride	0.5	0.1	50-150	<50	70-130	<50	90
1311/8260B	Chlorobenzene	100	20	50-150	<50	70-130	<50	90
1311/8260B	Chloroform	6	1	50-150	<50	70-130	<50	90
1311/8260B	1,1-Dichloroethene	0.7	0.1	50-150	<50	70-130	<50	90
1311/8260B	1,2-Dichloroethane	0.5	0.1	50-150	<50	70-130	<50	90
1311/8260B	Methyl ethyl ketone	200	20	50-150	<50	70-130	<50	90
1311/8260B	Tetrachloroethene	0.7	0.7	50-150	<50	70-130	<50	90
1311/8260B	Trichloroethene	0.5	0.1	50-150	<50	70-130	<50	90
1311/8260B	Vinyl Chloride	0.2	0.05	50-150	<50	70-130	<50	90
<b>TCLP SEMI-VOLATILES BY GC/MS</b>		mg/L	mg/L	%	%	%	%	%
1311/8270C	Cresols	200	40	50-150	<50	70-130	<50	90
1311/8270C	1,4-Dichlorobenzene	7.5	1	50-150	<50	70-130	<50	90
1311/8270C	2,4-Dinitrotoluene	0.13	0.02	50-150	<50	70-130	<50	90
1311/8270C	Hexachlorobenzene	0.13	0.02	50-150	<50	70-130	<50	90
1311/8270C	Hexachlorobutadiene	0.5	0.4	50-150	<50	70-130	<50	90
1311/8270C	Hexachloroethane	3	0.5	50-150	<50	70-130	<50	90
1311/8270C	Nitrobenzene	2	0.4	50-150	<50	70-130	<50	90
1311/8270C	Pentachlorophenol	100	80	50-150	<50	70-130	<50	90
1311/8270C	Pyridine	5	1	50-150	<50	70-130	<50	90
1311/8270C	2,4,5-Trichlorophenol	400	80	50-150	<50	70-130	<50	90
1311/8270C	2,4,6-Trichlorophenol	2	0.4	50-150	<50	70-130	<50	90
<b>TCLP PESTICIDES BY GC</b>		mg/L	mg/L	%	%	%	%	%
1311/8081A	Endrin	0.02	0.004	50-150	<50	70-130	<50	90
1311/8081A	Lindane	0.4	0.08	50-150	<50	70-130	<50	90
1311/8081A	Methoxychlor	10	1	50-150	<50	70-130	<50	90
1311/8081A	Toxaphene	0.5	0.1	50-150	<50	70-130	<50	90
1311/8081A	Chlordane	0.03	0.005	50-150	<50	70-130	<50	90
1311/8081A	Heptachlor	0.008	0.001	50-150	<50	70-130	<50	90
1311/8081A	Heptachlor epoxide	0.008	0.001	50-150	<50	70-130	<50	90
<b>TCLP HERBICIDES BY GC</b>		mg/L	mg/L	%	%	%	%	%
1311/8151A	2,4-D	10	2	50-150	<50	70-130	<50	90
1311/8151A	2,4,5-TP	1	0.2	50-150	<50	70-130	<50	90

Notes:  
NS= not specified  
NA= not applicable

**TABLE B-2**  
**Project Quality Control Objectives**

Method No	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
		TCLP	TCLP	TCLP	TCLP	TCLP	TCLP	TCLP
<b>TCLP METALS BY ICP/CV</b>		mg/L	mg/L	%	%	%	%	%
6010B	Arsenic	5	1	50-150	<50	70-130	<50	90
6010B	Barium	100	20	50-150	<50	70-130	<50	90
6010B	Cadmium	1	0.2	50-150	<50	70-130	<50	90
6010B	Chromium	5	1	50-150	<50	70-130	<50	90
6010B	Lead	5	1	50-150	<50	70-130	<50	90
7470A	Mercury	0.2	0.04	50-150	<50	70-130	<50	90
6010B	Selenium	1	0.2	50-150	<50	70-130	<50	90
6010B	Silver	5	1	50-150	<50	70-130	<50	90
<b>TCLP CHARACTERISTICS</b>		mg/L	mg/L	%	%	%	%	%
7.3	Reactive Sulfide	500	50	N/A	<50	N/A	<50	90
7.3	Reactive Cyanide	250	25	N/A	<50	N/A	<50	90
1010	Ignitability	<60°C or <140°F	40°C or 100°F	N/A	<50	N/A	<50	90
9040B	pH (Corrosivity)	<2; >12.5	N/A	N/A	<50	N/A	<50	90

Notes:  
NS= not specified  
NA= not applicable

## **APPENDIX C**

# **CONSTRUCTION QUALITY CONTROL PLAN**

**PROGRAM QUALITY CONTROL PLAN ADDENDUM  
DRAFT WORKPLAN  
INTERIM REMEDIAL MEASURES  
FOR  
SOLID WASTE MANAGEMENT UNITS 254, 258, 293, 299, 314 and  
303/318  
MCB, CAMP LEJEUNE, NORTH CAROLINA**

**Prepared for:**

**DEPARTMENT OF THE NAVY  
Atlantic Division  
Naval Facilities Engineering Command  
Contract No. N62470-02-D-3260  
Task Order No. 014**

**Prepared by:**

**Shaw Environmental, Inc.  
11560 Great Oaks Way  
Suite 500  
Alpharetta, Georgia 30022-2424**

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**Ron Kenyon  
Project Manager**

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**Ernest P. Duke  
Program QC Manager**

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**Roland Moreau, P.E.  
Program Manager**

**October 2004  
Shaw Project 846069**

## ***TABLE OF CONTENTS***

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<b>STATEMENT OF QC PROGRAM.....</b>	<b>1</b>
<b>I. QUALITY CONTROL ORGANIZATION .....</b>	<b>1</b>
<b>II. IDENTIFICATION OF PERSONNEL ASSIGNED TO THE QC ORGANIZATION .....</b>	<b>2</b>
<b>III. APPOINTMENT LETTERS .....</b>	<b>2</b>
<b>IV. OUTSIDE ORGANIZATIONS .....</b>	<b>2</b>
<b>V. INITIAL SUBMITTAL REGISTER &amp; REVIEWERS .....</b>	<b>2</b>
<b>VI. TESTING LABORATORY ACCREDITATION.....</b>	<b>2</b>
<b>VII. TESTING PLAN AND LOG .....</b>	<b>2</b>
<b>VIII. REWORK ITEMS.....</b>	<b>3</b>
<b>IX DOCUMENTATION PROCEDURES .....</b>	<b>3</b>
<b>X. QUALITY CONTROL INSPECTION PLAN.....</b>	<b>3</b>
<b>XI. PERSONNEL MATRIX .....</b>	<b>3</b>

## ***FIGURES***

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I-1	QC Organizational Relationship with Production Personnel
II-1	Site QC Manager / Representative - Resume
III-1	Site QC Manager / Representative - Letter of Appointment

## ***EXHIBITS***

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IV-1	Approved Consultant and Subcontractor List
V-1	Submittal Register
V-2	List of Personnel Authorized to Review and Certify Submittals
VII-1	Test Plan and Log
VIII-1	Rework Items Log
X-1	Quality Control Inspection Plan
XI-1	Personnel Matrix

## **STATEMENT OF QC PROGRAM**

This Site Specific Addendum to the Program QC Plan is prepared and submitted for Task Order 014, Interim Remedial Measures Solid Waste Management Units 254, 258, 293, 299, 314 and 303/318. This plan incorporated methods and procedures from the Program Quality Control Plan approved by the Atlantic Division, Naval Facilities Engineering Command. The Program Quality Control Plan was developed specifically to be responsive to the Contract Specification, Contract No. N62470-02-D-3260, Atlantic Division, Naval Facilities Engineering. Shaw Environmental, Inc. (Shaw) will perform the inspections and tests required to ensure that materials, workmanship, and construction conform to drawings, specifications, and contract requirements.

### **Note to Employees – Concept of Quality Control**

Quality control should not be considered a person or an organization of personnel, but a concept to perform in such a manner that the end product of our efforts provides a quality product and customer satisfaction. The quality control individual or group cannot inspect quality into the final product, but only inspect and document the results of our efforts. The only people that can build quality into the product are the individuals performing the task of producing the end product.

It should be noted by all employees that the documentation requirements of Shaw procedures, plans, and the Task Order Specifications are considered equally as important as the end product itself. When it is stated that the documentation will be approved prior to the start of work, this is exactly what is intended. To eliminate problems in this area requires careful planning and execution by everyone.

We would do well to remember that our livelihood depends on how well we satisfy our customer. To accomplish this requires teamwork and attention to detail by all employees and contractors.

## **I. QUALITY CONTROL ORGANIZATION**

The QC Manager will have the authority to implement and manage the QC Plan, the three phases of quality control and the authority to stop work, which is not in compliance with the contract.

Mr. Luke Garcia-Somuk will function as the Site QC Manager and also as the Site Foreman for this Task Order. Mr. Garcia-Somuk has more than 5 years construction management and QA/QC experience and maintains current US Army Corps of Engineers (USACE) Construction Quality Management for Contractors, QC certification.

Mr. Randy Smith will function as the Alternate QC Manager when Mr. Garcia-Somuk is not on-site. Mr. Smith has more than 10 years of construction management and QA/QC experience and also maintains current US Army Corps of Engineers (USACE) Construction Quality Management for Contractors, QC certification.

Mr. Ron Kenyon, Shaw Project Manager will be in direct contact with Mr. Randy Smith who is the Site Superintendent, concerning the operational activities at the sites.

Mr. Ernie Duke, Shaw Program QC Manager will serve to resolve any QC related issues, which need his involvement. The Site QC Manager will have a direct line of communication to the Program QC Manager on QC issues.

The relationship between the QC Organization, and Production Personnel of the Task Order, is presented in the Organizational Chart, Figure I-1.

## **II. IDENTIFICATION OF PERSONNEL ASSIGNED TO THE QC ORGANIZATION**

Figure II-1 provides the resume of the Site QC Manager. The resumes of the Alternate QC Manager will be submitted to the CO or designated representative upon request.

## **III. APPOINTMENT LETTERS**

The Site QC Manager appointment letter is provided as Figure III-1. Similar letters will be provided when necessary to describe the duties and authorities of personnel assigned to the position of Alternate QC Manager or Assistant.

## **IV. OUTSIDE ORGANIZATIONS**

A list of outside organizations such as subcontractors employed by Shaw for work under this task order is provided in Exhibit IV-1. This list provides each firm's name and address and a description of the services each firm will provide. This list will be maintained current and will be available for review.

## **V. INITIAL SUBMITTAL REGISTER & REVIEWER**

### **V.1 Submittal Register**

The Initial Submittal Register is provided as Exhibit V-1. The status of each submittal will be recorded as changes occur.

### **V.2 Personnel Authorized to Review and Certify Submittals**

Personnel authorized to review and certify submittals other than the Site QC Manager are identified on Exhibit V-2. Any additional personnel assigned to perform submittal review and certification must be approved by the CO, prior to performance.

## **VI. TESTING LABORATORY ACCREDITATION**

Testing laboratory accreditation requirements are addressed in the Program QC Plan Section 1, part 4.7, Construction Testing.

## **VII. TESTING PLAN & LOG PREPARATION**

A Testing Plan and Log has been prepared for this TO and is provided as Exhibit VII-1.

## **VIII. REWORK ITEMS**

Rework Items will be documented on the Daily QC Report and on the Rework Items Log. This will be used to report and track rework Items.

## **IX. DOCUMENTATION PROCEDURES**

The Daily QC Report form and Daily Production Report form will be used to document daily activities at the site.

## **X. QUALITY CONTROL INSPECTION PLAN**

The Quality Control Inspection Plan, Exhibit X-1, lists each specification section and definable feature of work with provisions for recording the corresponding checklist/report for each phase of the three phase control process. As each control phase is satisfactorily preformed, the Site QC Manager will record the corresponding checklist/report number and date.

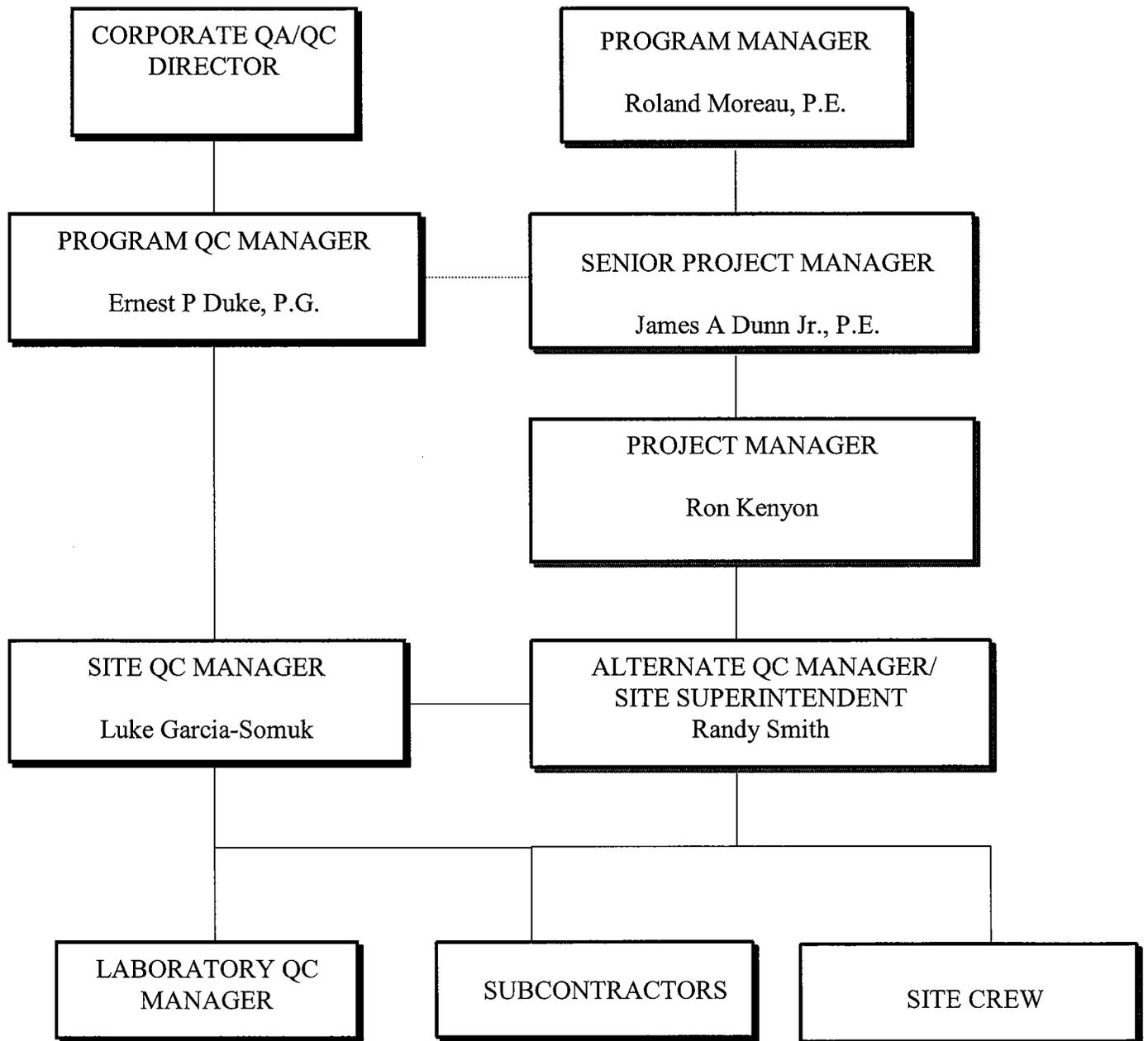
This list has been prepared to correspond to the activities of the project schedule. It will be maintained as provided in Section 1, Part 4.4 of the PQCP. The list will be agreed upon during the Coordination and Mutual Understanding Meeting. The list will be keyed to the construction schedule. Each preparatory, initial and follow-up phase checklist/report will reflect the construction activity number derived from the construction schedule.

## **XI. PERSONNEL MATRIX**

The personnel matrix, Exhibit XI-1, shows each section of the TO specification with identification of who will review and certify submittals, who will perform and document the three phases of control, and who will perform and document testing. This matrix should be completed as much as possible prior to and during site mobilization.

**FIGURE I-1**

**QC ORGANIZATIONAL RELATIONSHIP WITH  
PRODUCTION PERSONNEL  
SHAW ENVIRONMENTAL INC.,  
TASK ORDER NO. 025**



**Figure II-1  
Site QC Manager**

Luke Garcia-Somuk

**Professional Qualifications**

Mr. Garcia-Somuk has eight years experience supervising crews in the construction field for both government and private contractors. His responsibilities have included directing site work to achieve compliance with project specifications and schedules. His experience includes reading specifications and drawings and establishing schedules and quality requirements for each task to assure the work is completed to the quality specified and to the satisfaction of the clients. This requires working closely with the clients, vendors and subcontractors to assure the work is completed as specified. He has supervised projects with multiple work activities and requirements and is successful with the projects completed. His experience includes construction management, quality assurance and quality control, field supervision and mechanical construction.

**Education**

Onslow County High School; Jacksonville, North Carolina; Graduated 1994

**Additional Training**

40 Hour OSHA Hazardous Waste Operations Certification  
USACE Quality Control for Contractors Certification  
Health and Safety Site Safety Officer Training – 29 CFR 1910.120

**Figure III-1**

April 19, 2004

Luke Garcia-Somuk  
Shaw Environmental, Inc.  
Bldg 626, Lot 203  
Piney Green Road  
Camp Lejeune, NC. 28547

RE: Site QC Manager  
Contract N62470-02-D-3260  
Task Order 014

Dear Luke Garcia-Somuk:

This letter will serve as your appointment as the Site Quality Control Manager on the referenced project and will also clarify your duties and authority in this position. In this position, you will be authorized to use available resources to satisfy all applicable requirements of the Program and Task Order Quality Control Plans.

This authorization specifically gives you the authority to direct removal and replacement or correction of nonconforming materials or work and stop work authority when continuation would be unsafe to personnel, harmful to the environment, or result in a significant degradation of quality.

You will be expected to work closely with the Project Manager, Site Supervisor and other project personnel, but you will not be directly responsible to anyone but myself for resolution of quality issues when working in the capacity of Quality Control Manager.

If you have any question in this matter, please contact me.

Respectfully,

Ernest P. Duke  
Program QC Manager  
LANTDIV RAC Program

## EXHIBIT IV-1

**SUBCONTRACTOR LIST**  
**Shaw Environmental, Inc.**  
**Solid Waste Management Units 254, 258, 293, 299, 314 and 303/318**  
**Task Order No. 014**

COMPANY NAME AND ADDRESS	DESCRIPTION OF SERVICES PROVIDED
Les Craft Locating Contractor	Utility Locations
Accutest Laboratories	Chemical Analytical Testing
TBD	Transportation and Disposal Services

EXHIBIT V-1

SUBMITTAL REGISTER

Task Order No. 014 Contract No. N62470-02-D-3260						Project No. 846069 Project Title: Solid Waste Management Units 254, 258, 293, 299, 314 and 303/318					Revision No. 01 Shaw Environmental, Inc.				
Spec. Sect.	SD Number and Submittal Description	Spec Paragraph Number	Approving Authority	Other Reviewers	Transmittal Control No.	Planned Submittal Date	Contractor Action			Approving Authority			Date Rcvd from Appr Auth	Remarks	
							Action Code	Date of Action	Date Forwarded to Appr Auth/ from Contr	Date Forward to Other Reviewer	Date Rcvd from Other Reviewer	Action Code			Date of Action
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	<b>SD-01 Preconstruction</b>														
	Work Plan		G												
	Health and Safety Plan Addendum		G												
	Quality Control Plan Addendum		G												
	Sampling and Analysis Plan Addendum		G												
	Base Construction/Dig Permit		G												
	<b>SD-11 Closeout Submittals</b>														
	Contractor's Closeout Report					Closeout Report									
	As-Built Records					Closeout Report									
	Status Reports					Closeout Report									
	Environmental Conditions Report					Closeout Report									
	Test Results Summary Report					Closeout Report									
	Daily Contractor Production Reports					Closeout Report									
	Daily QC Reports					Closeout Report									
	Rework Items List					Closeout Report									
	<b>SD-13 Certifications</b>														
	Testing Laboratory Accreditation					Closeout Report									
	<b>SD-10 Test Reports</b>														
	Lab Test Results of Confirmation Samples					Closeout Report									
	Lab Test Results of Backfill Soils					Closeout Report									
	Lab Test Results of Waste Soils					Closeout Report									

**EXHIBIT V-1**  
**SUBMITTAL REGISTER**

	<b>SD-08 Statements</b>														
	Disposal Facility Permits					Closeout Report									
	<b>SD-18 Records</b>														
	Shipment Manifests					Closeout Report									

Notes:  
 Approved By:  
 G: Government  
 Blank: QC Manager  
 Reference; QMP-16.2 Submittal Management Process

**ACTION CODES**  
 A: Approved  
 AN: Approved as Noted  
 NR: Not Reviewed  
 RR: Disapproved; Revise and Resubmit

**EXHIBIT V-2**

<b>LIST OF PERSONNEL AUTHORIZED TO REVIEW AND CERTIFY SUBMITTALS</b> <b>Shaw Environmental, Inc.</b> <b>Solid Waste Management Units 254, 258, 293, 299, 314 and 303/318</b> <b>Task Order 014</b>		
	<b>SUBMITTAL TYPE:</b>	<b>AUTHORIZED PERSONNEL:</b>
Work Plan Submittals	Preconstruction	Project Manager
All Work Plan/ Addendum Sections	All Types	QC Manager, Program QC Manager Project Manager and Site Engineer

**EXHIBIT VII-1**

<p align="center"><b>TESTING PLAN AND LOG</b>  <b>Shaw Environmental, Inc.</b>  <b>Solid Waste Management Units 254, 258, 293, 299, 314 and 303/318</b>  <b>Task Order No. 014</b></p>											
<p><b>CONTRACT NUMBER</b> N62470-02-D-3260</p>			<p><b>PROJECT TITLE:</b> Solid Waste Management Unit 254, 258, 293, 299, 314 and 303/318</p>								
			<p><b>LOCATION:</b> Camp Lejeune, NC</p>								
<p><b>WORK PLAN SECTION AND PARAGRAPH NUMBER</b></p>	<p><b>ITEM OF WORK</b></p>	<p><b>TEST REQUIRED</b></p>	<p><b>ACCREDITED/ APPROVED LAB</b></p>		<p><b>SAMPLED BY</b></p>	<p><b>TESTED BY</b></p>	<p><b>LOCATION OF TEST</b></p>		<p><b>DATE COMPLETED</b></p>	<p><b>DATE FORWARDED TO CONTR. OFF.</b></p>	<p><b>REMARKS</b></p>
			<p><b>YES</b></p>	<p><b>NO</b></p>			<p><b>ON SITE</b></p>	<p><b>OFF SITE</b></p>			
WP 4.2.3	Sidewall Confirmation Testing SWMU 254	SVOCs Method 8270C									Sidewalls at 50-ft intervals, Min 4 samples per excavation (See Table B-1 - SAP)
WP 4.2.3	Floor Confirmation Testing SWMU 254	SVOCs Method 8270C									One floor sample per 500 sq ft of excavation floor, unless groundwater is encountered, (See Table B-1 - SAP)
WP 4.3.3	Sidewall Confirmation Testing SWMU 258	RCRA Metals Method 6010B and 7000 Series									Sidewalls at 50-ft intervals, Min 4 samples per excavation (See Table B-1 - SAP)
WP 4.3.3	Floor Confirmation Testing SWMU 258	RCRA Metals Method 6010B and 7000 Series									One floor sample per 500 sq ft of excavation floor, unless groundwater is encountered, (See Table B-1 - SAP)
WP 4.4.3	Sidewall Confirmation Testing SWMU 293	RCRA Metals (Lead) Method 6010B and 7000 Series									Sidewalls at 50-ft intervals, Min 4 samples per excavation (See Table B-1 - SAP)
WP 4.4.3	Floor Confirmation Testing SWMU 293	RCRA Metals (Lead) Method 6010B and 7000 Series									One floor sample per 500 sq ft of excavation floor, unless groundwater is encountered, (See Table B-1 - SAP)
WP 4.5.1	AST Removal	O2/LEL									If in excess of 8% oxygen and/or 10% LEL the tank will be inerted
WP 4.5.3	Sidewall Confirmation Testing SWMU 299	SVOCs Method 8270C RCRA Metals Method 6010B and 7000 Series									Sidewalls at 50-ft intervals, Min 4 samples per excavation (See Table B-1 - SAP)
WP 4.5.3	Floor Confirmation Testing SWMU 299	SVOCs Method 8270C RCRA Metals Method 6010B and 7000 Series									One floor sample per 500 sq ft of excavation floor, unless groundwater is encountered, (See Table B-1 - SAP)
WP 4.6.3	Sidewall Confirmation Testing SWMU 314	SVOCs Method 8270C RCRA Metals Method 6010B and 7000 Series									Sidewalls at 50-ft intervals, Min 4 samples per excavation (See Table B-1 - SAP)
WP 4.6.3	Floor Confirmation Testing SWMU 314	SVOCs Method 8270C RCRA Metals Method 6010B and 7000 Series									One floor sample per 500 sq ft of excavation floor, unless groundwater is encountered, (See Table B-1 - SAP)
WP 4.7.1	Confirmation Samples of SWMU 303/318	TBD									TBD
WP 4.8	Backfill	TCL VOCs, TCL SVOCs and TAL Metals									One per source
WP 4.9	Soil Disposal	DRO, GRO, & TCLP/Metals									Soil Stockpile - Composite sample analyzed for RCRA TCLP Metals (1/1000cy) AND TPH-DRO/GRO (1/200CY)
WP 4.11	Contaminated Water	TCL SVOCs and TAL Metals									One sample, if required



**EXHIBIT X-1**

<p align="center"><b>QUALITY CONTROL INSPECTION PLAN</b>                      Shaw Environmental, Inc.                      Solid Waste Management Units 254, 258, 293, 299, 314 and 303/318                      Task Order No. 014</p>								
Specification Section	Definable Feature of Work	Activity Number	Control Check Verification					
			Date	Preparatory Phase Checklist/Report No.	Date	Initial Phase Checklist/Report No.	Follow-up Phase Checklist/Report No.	
WP 4.1	Mobilization and Site Setup							
WP 4.2.1	SWMU 254 Soil Excavation							
WP 4.2.2	SWMU 254 Confirmation Samples							
WP 4.3.1	SWMU 258 Soil Excavation							
WP 4.3.2	SWMU 258 Confirmation Samples							
WP 4.4.1	SWMU 293 Soil Excavation							
WP 4.4.2	SWMU 293 Confirmation Samples							
WP 4.5.1	SWMU 299 AST Removal and Replacement							
WP 4.5.2	SWMU 299 Soil Excavation							
WP 4.5.3	SWMU 299 Confirmation Samples							
WP 4.6.1	SWMU 314 Soil Excavation							
WP 4.6.2	SWMU 314 Confirmation Samples							
WP 4.7.1	SWMU 303/318 ASTs Soil Excavation							
WP 4.7.2	SWMU 303/318 Confirmation Soil Samples							
WP 4.8	Backfill							
WP 4.9, 4.10 & 4.11	Waste Management and Disposal							
WP 4.12	Site Restoration							

**EXHIBIT XI-1**

<b>PERSONNEL MATRIX</b> <b>Shaw Environmental, Inc.</b> <b>Solid Waste Management Units 254, 258, 293, 299, 314 and 303/318</b> <b>Task Order No. 014</b>			
<b>SPECIFICATION SECTION</b>	<b>SUBMITTALS TO BE REVIEWED BY:</b>	<b>THREE PHASE TO BE PERFORMED BY:</b>	<b>TESTING TO BE PERFORMED BY:</b>
All Sectons	Site QC Manager, Program QC Manager, Project Manager or Project Engineer	Site QC Manager	Chemical Analysis - Accutest Laboratories

## **APPENDIX D**

# **AST SYSTEM MANUFACTURER EQUIPMENT SPECIFICATIONS**

SWMU  
Camp Lejeune Marine Corps Base, NC  
Auto Hobby Shop

MATERIALS	ORDER QUANTITY	VENDOR
<b>1) 1,000 Gallon Aboveground Storage Tank</b> Model No. = VT1000 Dimensions: 7'9" x 5'7" x 4'9" Doubled Walled Hoover Tank Morrison Clock Gauge 3 Steps	1	Containment Solutions
<b>2) 25 Gallon Used Oil Receiver</b> Model No. = 238866, Series C	1	Graco
<b>3) Husky 1040 Air-Operated Diaphragm Pump</b> Part No. = 236625 120 psi Maximum Fluid Working Pressure 120 psi Maximum Air Input Pressure	1	Graco
<b>4) Level Switches</b> Model No. = LS600 One Liquid Level Float for high overflow alarm	1	Pneumercator
<b>5) Leak Monitor Switches and Control System</b> Model No. = LS 600LD Leak Detector	1	Pneumercator
<b>6) Audible Alarm Controls</b> Model No. = LC 1002 Alarm Console	1	Pneumercator
<b>7) Concrete Pad with Ballards</b> Dimensions: 10' x 8' x 1' 4" diameter <del>Alarm Console</del> ballards	1	Pneumercator

Note: Additional items may include

- 1) Air Compressor
- 2) Galvanized Steel Pipe for Air Line
- 3) Trench for Air Line

**1,000-Gallon AST**  
(<http://www.containmentsolutions.com/>)

Model: VT1000

Dimensions = 7'9" x 5'7" x 4'9"

**1.0 GENERAL TANK DESCRIPTION:**

- 1.1 Hoover Vault Tanks are constructed and listed in accordance with Underwriters Laboratories Inc. Standard 2085 for Insulated Secondary Containment Aboveground Tanks for Flammable and Combustible Liquids, Protected Type. This 2 Hour fire rating shall exceed all requirements of The National Fire Protection Association Sections 30 and 30A for "fire resistant" tanks and meet the requirements of The Uniform Fire Code Articles 52 and 79, Appendix II-F and Appendix Standard A-II-F-1 for "protected" aboveground tanks.
- 1.2 The standard model Hoover Vault Tank is constructed as a UL listed secondary containment tank, utilizing steel inner and outer tanks.
- 1.3 All Vault Tank designs are resistant to bullet penetration according to Appendix II-F of the Uniform Fire Code.
- 1.4 Lightweight concrete surrounds the primary storage tank and shall be listed to allow the detection of leaks from the primary tank.
- 1.5 The tanks shall have Certification from CARB for Phase I and II Vapor Recovery.
- 1.6 The anchoring tie downs shall be welded to the bottom of the secondary tank and meet Zone 4 Seismic requirements.
- 1.7 The tanks must be off-loaded on site with a crane.
- 1.8 All openings shall be from the top, with threaded NPT risers.
- 1.9 The Vault Manufacturer shall provide certificate of insurance that provides a minimum of eleven million dollars (\$11,000,000) of Product Liability Coverage per occurrence.
- 1.10 The Vault Tank to include a Warranty for 30 years.
- 1.11 The tank manufacturer shall provide proof of a minimum 5 years of manufacturing vault tanks.

## 2.0 PRIMARY STORAGE TANKS:

- 2.1 The standard primary storage tank shall be rectangular in design. It shall be constructed of UL specified steel thickness, with continuous welds.
- 2.2 The primary storage tank shall be constructed of ASTM A-569 or A-36 carbon steel, or ASTM A-240 type 304 or 316 stainless steel, as required for compatibility of product being stored.
- 2.3 The primary storage tank shall be constructed and listed in accordance with UL 142 Standards.
- 2.4 The primary tank shall be fitted with: a 4" or 6" Fill Port, a 2" Normal Vent Port, either a 4", 6", 8", or 10" Emergency Vent Port, a 2" Liquid Gauging Port, a 2" Port for Dispensing Pump, a 4" Phase I Vapor Recovery Port, and a minimum 18" manway (for tanks with capacities 5,000 gallons and greater). An optional 15 gallon Spill Containment with Lockable Lid and Drain Port to the primary tank is available.
- 2.5 The primary tank shall be pressure tested to UL 142 Standard (minimum 3 to maximum 5 psi) at the factory, and shall be field tested by the contractor to a maximum 3 psi.
- 2.6 The primary steel tank shall be designed to store M85 (methanol), alcohol and petroleum blends.

## 3.0 FIRE PROTECTION:

- 3.1 The standard fire protection material shall be lightweight concrete and surround the primary tank. The tank design shall provide a minimum two (2) hour fire rating per UFC Appendix Standard A-II-F (formerly UFC 79 7), and UL 2085 Protected Secondary Containment Tanks.
- 3.2 The fire protective material shall allow liquid leaking from the primary tank to penetrate the material and communicate with the leak detection tube according to UL 2085 Protected Secondary Containment Tanks.
- 3.3 The fire protective material shall be of a monolithic pour, poured at the factory.
- 3.4 The fire protective material shall provide a minimum of a R-10 insulating factor.

#### 4.0 BULLET RESISTANCE:

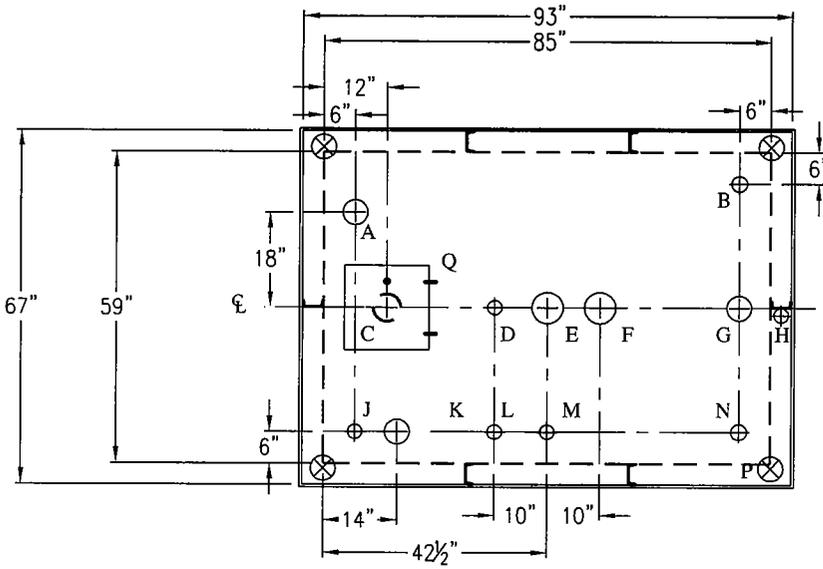
- 4.1 The fire protected primary tank shall be tested by a qualified engineering firm to be resistant to penetration of the primary tank by a 150 grain, M 2 Bullet, traveling at a velocity of at least 2700 feet per second, when fired from a .30 caliber rifle, located a maximum of 100 feet from the target.
- 4.2 The fire protected tank must be able to be repaired in the field by a factory representative, when impacted by a bullet.
- 4.3 The factory representative must be able to certify that the primary and secondary containment do not leak, and that the fire protective material regains its minimum two (2) hour protection.

#### 5.0 SECONDARY LEAK CONTAINMENT TANK:

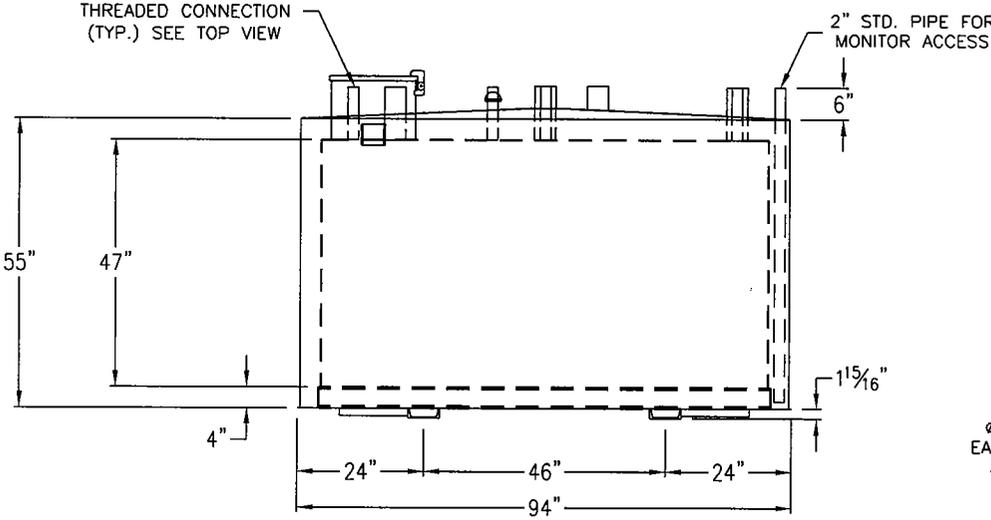
- 5.1 The secondary leak containment tank shall be rectangular in design and listed according to UL 2085 insulated secondary aboveground tanks for flammable and combustible liquids, protected type.
- 5.2 The secondary tank shall be tested liquid tight at the factory (minimum 3 to maximum 5 psi), and shall also be field tested by the contractor to a maximum 3 psi.
- 5.3 The secondary tank shall provide reinforcement for the lightweight concrete.
- 5.4 The secondary tank shall provide true 360° Radius "pressure testable" containment for the primary tank.
- 5.5 The secondary tank shall be fitted with : a 2" Annular Space Monitoring Tube, a 2" Normal Vent Port and either a 4", 6", 8" or 10" Emergency Vent Port, in addition to openings for all ports in the primary tank.
- 5.6 The port openings in the top of the secondary tank shall be constructed with full welds to prevent moisture from seeping between the fire proofing material and secondary and primary tanks.
- 5.7 The top of the secondary tank shall be sloped so that water will not accumulate on top of the tank.
- 5.8 The secondary tank shall have a two (2) inch monitoring port including a tube which provides a means to detect product leakage from the primary tank into fire protection material that directly surrounds the primary tank. This design shall be listed under UL 2085.

6.0 COATINGS:

- 6.1 The exterior surface of the secondary tank shall be cleansed of foreign material and coated with a corrosion resistant industrial paint (3 to 5 mils dry film thickness).
- 6.2 The standard color shall be desert sand.
- 6.3 An optional fiberglass impregnated coating (FIBERVAULT) can be applied to the exterior surface of the secondary tank to provide resistance to corrosive environments such as salt water spray.
  - 6.3.1 The total dry thickness shall be a minimum of 1/8 inch.
  - 6.3.2 All threaded openings and flanges shall be protected during the coating process.
  - 6.3.3 The coating shall be applied only when the work area and the secondary steel tank are between the temperatures of 32 and 103 degrees F.
  - 6.3.4 The standard color shall be desert sand.



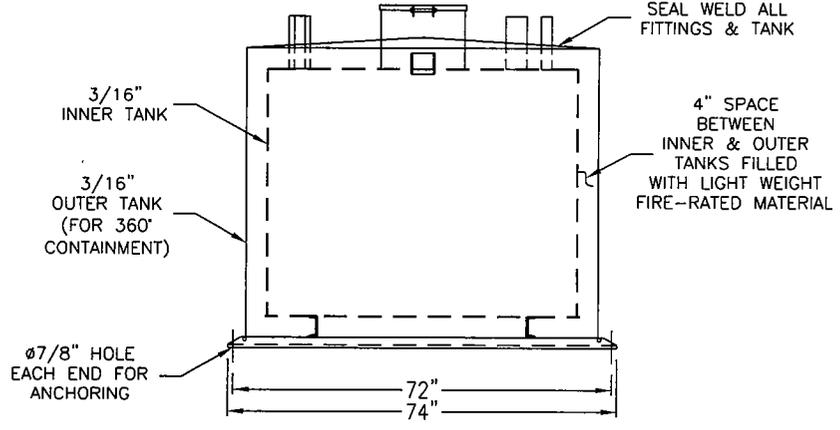
TOP VIEW



ELEVATION

ITEM	SIZE	FUNCTION
A	4"	PHASE I VAPOR RECOVERY/SPARE
B	2"	SPARE
C	4"	FILL
D	2"	SECONDARY WORKING VENT
E	6"	PRIMARY TANK EMERGENCY VENT
F	6"	SECONDARY CONTAINMENT EMERGENCY VENT
G	4"	SUBMERSIBLE PUMP/SPARE
H	2"	MONITORING PIPE
J	2"	MECHANICAL GAUGE/SPARE
K	4"	ELECTRONIC LEVEL GAUGE/SPARE
L	2"	VENT/SPARE
M	2"	SPARE
N	2"	SUCTION PUMP/SPARE
P	4"	FIRE-RATED MATERIAL FILL
Q	15 GAL.	SPILLBOX W/CAP, ADAPTER, & 1/2" NPT DRAIN

OPENINGS LABELED "SPARE" MAY BE CHANGED TO ACCOMMODATE CUSTOMER'S NEEDS



PRODUCT CODE	GALLONS	DESCRIPTION	OVERALL SIZE	SHIP WT.
V4AA101MVS001	1,000	UL-2085 VAULT TANK W/SPILLBOX	7'9"L X 5'7"W X 4'9"H	7,500 LBS

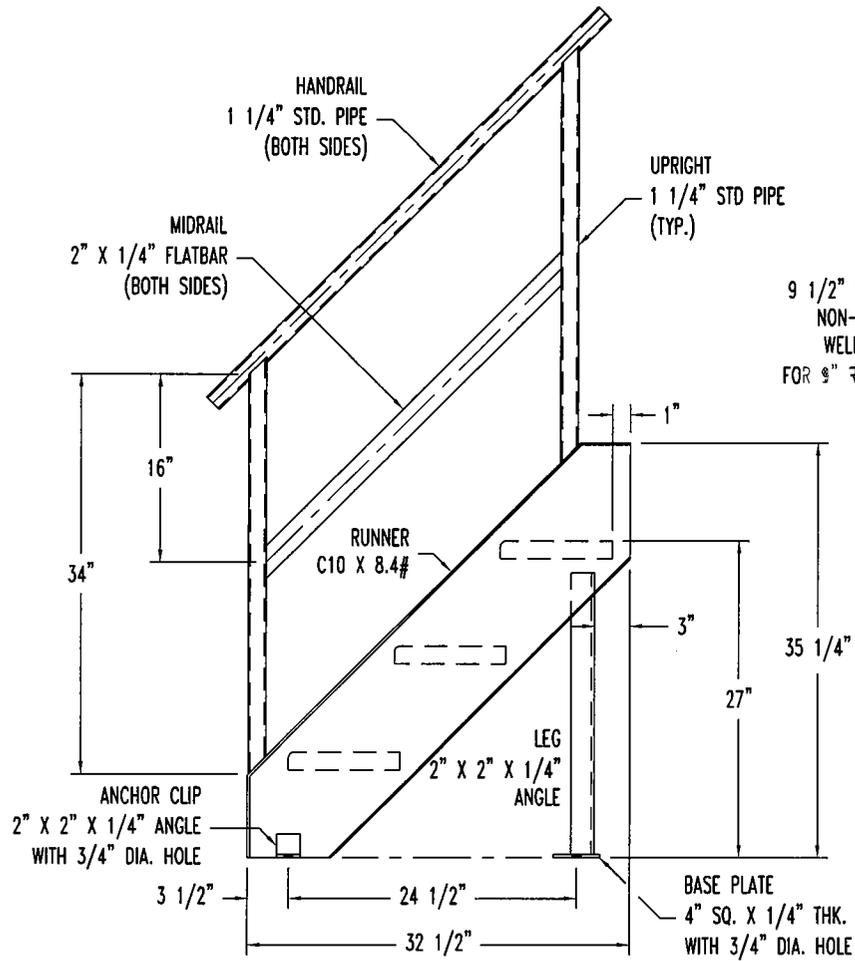


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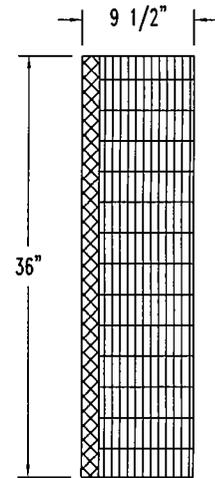
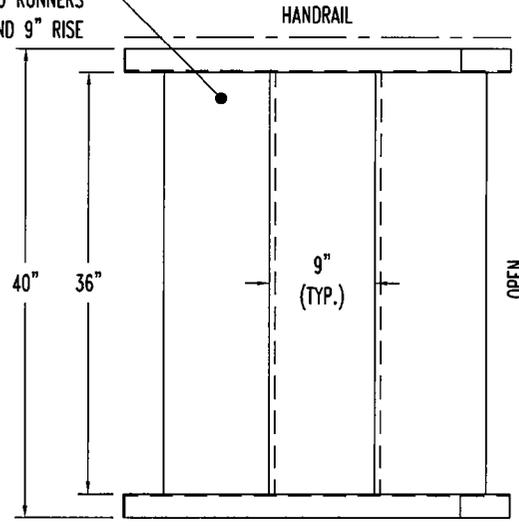
CUSTOMER NAME: \_\_\_\_\_ APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

DRAWN BY: R.P.H.	DATE DRAWN: 5/1/02
DWG NUMBER: 100002	DWG. TYP: SALES
REV: _____	REV BY: _____ DATE: _____ SHEET: 1 OF 1

THREE STEP STAIR WITH HANDRAIL



9 1/2" X 36" X 1 1/2"  
NON-SERRATED STEPS  
WELDED TO RUNNERS  
FOR 9" RUN AND 9" RISE



ELEVATION

TOP VIEW

TYPICAL STAIR TREAD

NOTES:

1. STEP GRATING SHALL BE NON-SERRATED
2. STAIR SHALL BE MOUNTED BETWEEN 1/2" AND 3/4" FROM TANK EXTERIOR.
3. OPTIONAL GALVANIZED FINISH AVAILABLE.

PRODUCT CODE	GALLONS	DESCRIPTION	OVERALL SIZE	SHIP WT.
STB002		3 STEP STAIRS W/ HANDRAIL		225 LBS



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CUSTOMER NAME: \_\_\_\_\_ APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

DRAWN BY: R.P.H.	DATE DRAWN: 5/1/02
DWG NUMBER: STB002	DWG. TYP: SALES
REV: _____	REV BY: _____ DATE: _____ SHEET: 1 OF 1

2

—

# Instructions – Parts List



## 25-GALLON (95-LITER) Oil King™ and Coolant King™

308667J

**Used-Oil Receiver**  
Model 238866, Series C

**Used-Anti-Freeze Receiver**  
Model 248632, Series C

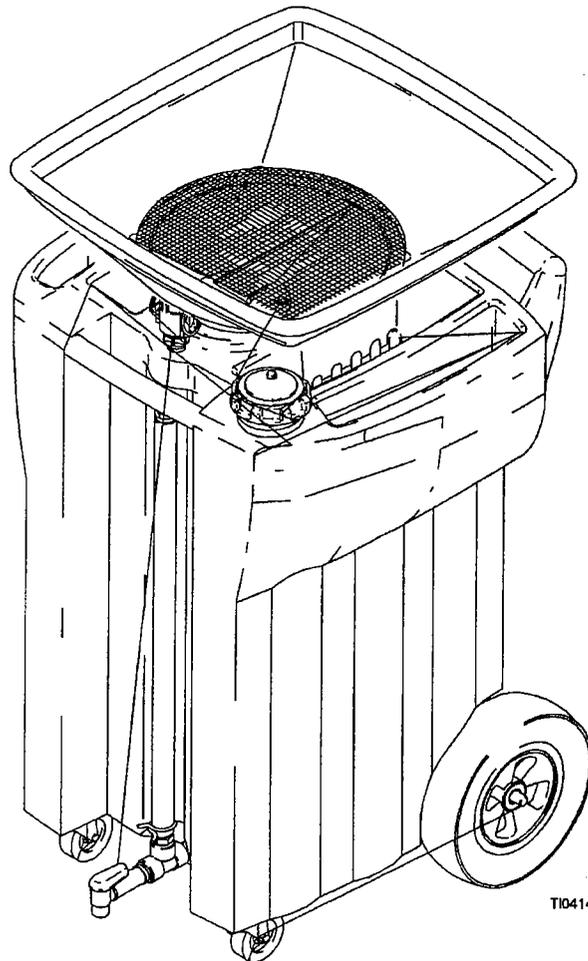
**Funnel Kit**  
Model 243650, Series A

U.S. Patent No. Des. 395,439

**NOTE:** These used-fluid receivers can be used with the Graco used-oil receiver evacuation system and accessories documented in instruction manuals 308719 and 307870.



Read warnings and instructions.



T10414

## Table of Contents

Warnings .....	2
Operation .....	3
Parts Drawing .....	4
Parts List .....	5
Technical Data .....	5
Graco Standard Warranty .....	6
Graco Information .....	6

PROVEN QUALITY. LEADING TECHNOLOGY.

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441  
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# Symbols

## Warning Symbol



This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

## Caution Symbol



This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

 <b>WARNING</b>	
 <small>INSTRUCTIONS</small>	<p><b>EQUIPMENT MISUSE HAZARD</b></p> <p>Equipment misuse can cause the equipment to malfunction and result in serious injury.</p> <ul style="list-style-type: none"> <li>• This equipment is for professional use only.</li> <li>• Read all instruction manuals before you operate this equipment.</li> <li>• Use the equipment only for its intended purpose. If you are not sure, contact your Graco distributor.</li> <li>• Do not alter or modify this equipment.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately.</li> <li>• This equipment is intended for collection of petroleum lubricants or antifreeze only. Any other use or collection of any other fluids could result in damage to the equipment or serious bodily injury.</li> <li>• Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturer.</li> <li>• Comply with all applicable local, state, and national fire, electrical, and safety regulations.</li> <li>• Dispose of waste fluids according to all local, state, and national guidelines.</li> </ul>
	<p><b>FIRE AND EXPLOSION HAZARD</b></p> <p>Poor ventilation, open flames, or sparks can cause a hazardous condition and result in a fire or explosion and serious injury.</p> <ul style="list-style-type: none"> <li>• If you are using this unit with an evacuation system, make sure the pumping system is installed and grounded according to the manufacturer's recommendation.</li> <li>• Provide fresh air ventilation to avoid the buildup of flammable fumes.</li> <li>• Extinguish all open flames in the work area.</li> <li>• Do not smoke in the work area.</li> </ul>

United States Government safety standards have been adopted under the Occupational Safety and Health Act. You should consult these standards—particularly the General Standards, Part 1910.

# Operation

Refer to parts drawing. Squeeze the handles together on the torsion spring (8), and slide the funnel up or down to achieve the proper height.

## WARNING

To lower the center of gravity and reduce the possibility of tipping, make sure you lower the funnel before you roll the unit anywhere.

To ensure that the funnel does not plug and fill up, keep the strainer (24) clean.

- To drain the unit, use the lower drain, or use an evacuation system as described in instruction manual 308719.

## WARNING

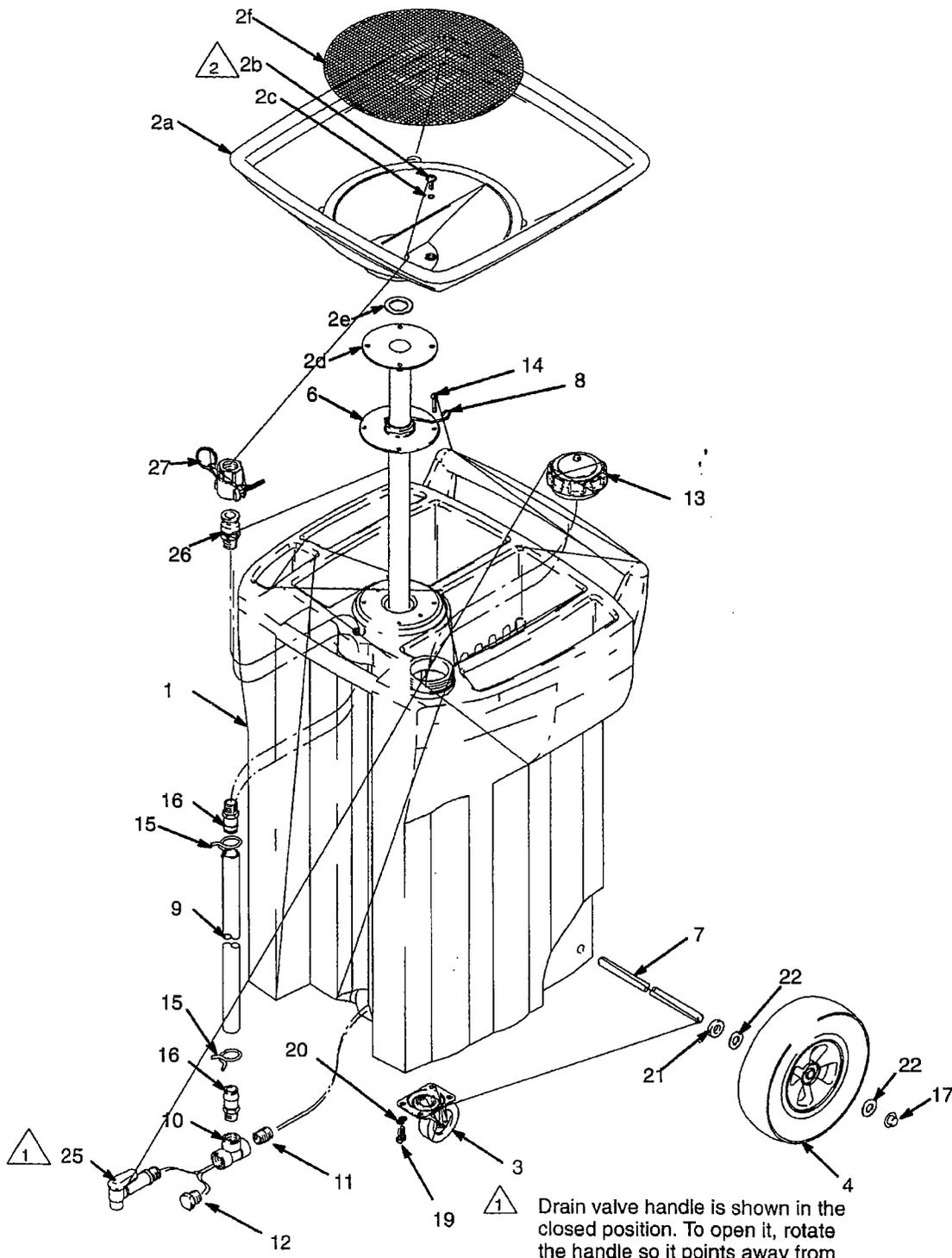
To prevent spill, do not fill unit above the 25 gallon indication on the sight tube.

## CAUTION

**NOTE:** If you will use the lower drain, remove the pipe plug (12) from the tee (10), and replace it with the drain valve (25) **before you put any fluid into the unit.**

- For ease in positioning the unit during use, it is best to guide the unit by the front handle, because the pivoting casters are on the front.

# Parts Drawing



① Drain valve handle is shown in the closed position. To open it, rotate the handle so it points away from the unit.

② Torque to 30 – 35 in.lbs.

T10415

# Parts List

Used-Oil Receiver (black tank), Model 238866, Series C

Used-Anti-Freeze Receiver (green tank), Model 248632, Series C

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1		TANK; 25 gallon (95 liter)	1	10	113655	TEE, pipe;	
2	243650	FUNNEL ASSEMBLY	1			3/4 in. x 3/4 in. x 3/4 in.	1
2a		FUNNEL	1	11	113656	NIPPLE, pipe; 3/4 in. x 3/4 in.	1
2b		SCREW, machine, pan head,		12	113657	PLUG, pipe; 3/4 in.	1
		5/16-18 UNC	4	13	113648	FILL CAP, vented	1
2c	111959	O-RING	4	14	113783	SCREW, machine, panhead;	
2d		TUBE, drain	1			1/4-20 UNC-2A	4
2e	116092	GASKET	1	15	113908	CLAMP, hose; 1.25 in. (32 mm)	2
2f	196562	STRAINER	1	16	113649	ADAPTER, hose	2
3	113645	CASTER, polyurethane;		17	113658	CREST NUT, hat	2
		3 in. (76 mm)	2	19		BOLT, hex hd; 5/16-18 x 3/4 in.	8
4	113647	WHEEL, semi-pneumatic, syn-		20	100214	WASHER, lock; 5/16 in.	8
		thetic rubber; 10.5 in. (267 mm)	2	21	191824	WASHER, spacer;	
6	191748	COLLAR, funnel	1			0.66 in. I.D. x 0.25 in. thick	2
7	191752	AXLE	1	22	111841	WASHER, plain; 5/8 in.	4
8	104820	SPRING, torsion	1	25	113895	VALVE, drain; 3/4 in.	1
9	192871	TUBE, sight;		26	113902	COUPLING, cam, male; 3/4 in.	1
		1.29 in. O.D x 1 in. I.D. x 29 in.	1	27	113907	COUPLING, cam, female; 3/4 in.	1

## Technical Data

Length .....	24 in. (610 mm)
Width .....	24 in. (610 mm)
Height	
with bowl at lowest adjustment .....	45 in. (1143 mm)
with bowl at highest adjustment .....	69 in. (1573 mm)
Dry Weight .....	54 lb (24.5 kg)
Fluid inlet/inspection port size .....	3 in. (76 mm) buttress
Fluid outlet fitting size .....	3/4 in. npt
Wetted parts .....	linear low-density polyethylene (LLDPE), zinc-plated steel, brass, nylon, polypropylene, PVC, Buna-N, polyurethane
Recommended operating temperature .....	30° to 105° F (-1° to 41° C)

# Graco Standard Warranty

Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

**THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

Graco makes no warranty, and disclaims all implied warranties of merchantability and fitness for a particular purpose in connection with accessories, equipment, materials or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

## **FOR GRACO CANADA CUSTOMERS**

The parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés à la suite de ou en rapport, directement ou indirectement, avec les procédures concernées.

# Graco Information

**TO PLACE AN ORDER**, contact your Graco distributor, or call this number to identify the distributor closest to you:

**1-800-533-9655 Toll Free**  
**612-623-6928**  
**612-378-3590 Fax**

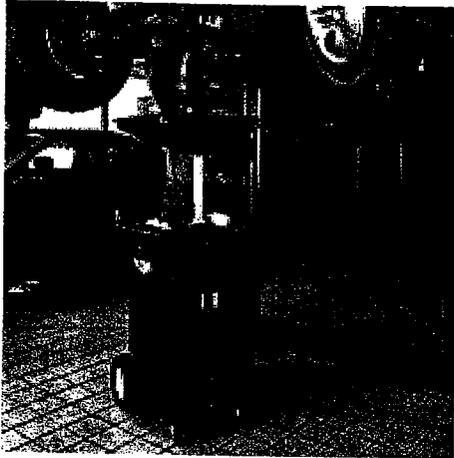
*All written and visual data contained in this document reflects the latest product information available at the time of publication. Graco reserves the right to make changes at any time without notice.*

**Sales Offices:** Minneapolis  
**International Offices:** Belgium, Korea, Hong Kong, Japan  
**GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441**  
**www.graco.com**

PRINTED IN USA 308667 10/1996, Revised 03/2004

Oil King

## 25 Gal (95 l) Used-Oil Receiver



### Key Applications

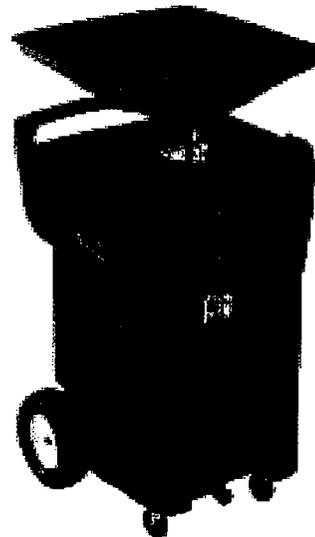
- Evacuation of used oil

**Perfect for evacuation of fluids in high volume areas**

Oversized wheels move smoothly across uneven surfaces while funnel collects fluids from both a drain plug and a filter port. The removable filter screen prevents debris from entering the tank.

### Features and Benefits

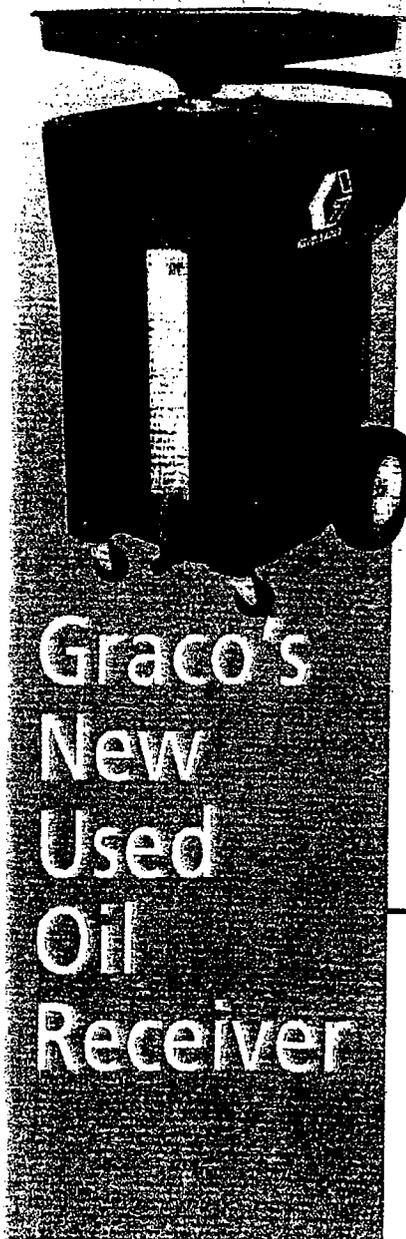
- 25 gal (95 l) tank for high volume use
- Oversized wheels move smoothly across uneven surfaces
- Funnel collects fluids from both drain plug and filter port
- Removable filter screen prevents debris from entering the tank
- Polyethylene tank with used-filter tray, tool holders and sight gauge



Part No. 238-866

## Features

## Benefits



**Graco's  
New  
Used  
Oil  
Receiver**

### *More Portable*

- |  |   |
|--|---|
| • Most portable drain oil cart available | Easy to maneuver on uneven surfaces when full or empty  |
| • Low center of gravity                  | Provides stability when moving<br>Less chance of tipping or spillage                                    |
| • Large pneumatic tires                  | Easily rolls over air hoses and floor bumps   |
| • Hard rubber tires and casters          | Will not mar your clean finished floors<br>Maintains traction on wet or oily floors                     |
| • Made of lightweight polyethylene       | Just 54 lbs. (24.5 kg) (dry weight)<br>Easily cleaned<br>Rust and corrosion resistant<br>Dent resistant |

### *More Practical*

- |  |  |
|--|--|
| • Large oil receiving bowl (22 in. x 24 in.) | Large enough to catch both drain plug and filter drain<br>No need for separate transmission adapter bowl<br>Fully adjustable bowl height |
| • Handles common fluids                      | Motor oil, automatic transmission fluid, gear oil, hydraulic oil, power steering fluids and engine coolants                              |
| • Full view sight gauge.                     | Provides immediate, constant oil level indication, reduces chance of overfilling   |

### *More Efficient*

- |  |   |
|--|---|
| • Unit comes standard with gravity valve and top side evacuation fitting | Quicker and easier to drain, with less spilling (order used oil evacuation separately)<br>Adapts to your existing used oil system |
| • Spacious tool storage area   | The required tools at your fingertips   |
| • High fluid capacity  | Holds up to 25 gallons (94.6 liters)  |
| • Includes filter storage  | Carries new filters and drains old filters  |

To put order in your oil changes, call **800-367-4023** for the Graco distributor near you.

• HOSE REELS • AIR-OPERATED PUMPS • DISPENSING METERS • HYDRAULIC PUMPS

Graco Inc.  
P.O. Box 1441 Minneapolis, MN 55440-1441

The Lubrication Professionals™



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All written and visual data contained in this document are based on the latest product information available at the time of publication. Graco reserves the right to make changes at any time without notice.

—



# Liquid Level Gauge

## The Morrison Clock Gauge

2" Fig. 818

For 6,000 GALLON ABOVEGROUND TANKS

### Description:

The Morrison Clock Gauge is a unique liquid level indicator which can be used in a variety of applications. The standard model will measure up to a 12 ft dimension. Originally intended for small aboveground petroleum storage tanks to eliminate the need to manually "stick" the tank. Operation is simple: the float moves up and down with the level of the product and is cabled to a wheel which drives the hands on the clock. The small hand reads feet and the large hand reads inches up to 1/8 inch increments.

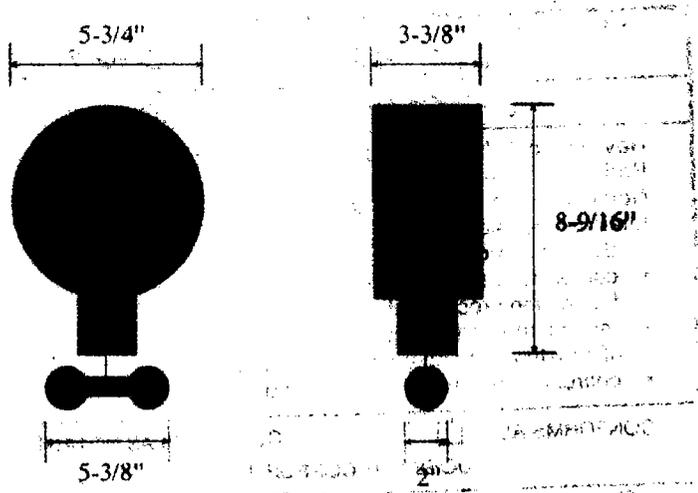
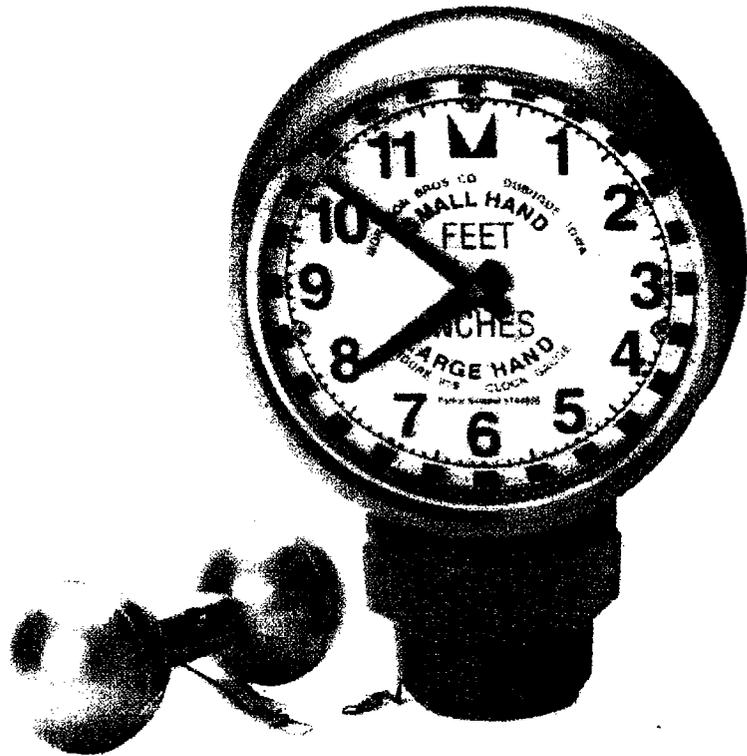
### Features:

- 2" Male NPT
- Vapor Tight
- Clock Face Swivels 360°
- Readable From 20-30 Ft Away
- 10 Minute Installation
- Anodized Aluminum Housing
- Stainless Steel Ball (Float) Swivel
- Standard Float Fits Through 2" Tank Bung
- Optional Float Fits Through 2" Risor Pipe
- Metric Conversion Chart Available
- Comes with Decals for Indicating Overfill and/or Re-order Levels

### Construction:

- Body - Cast Aluminum
- Float - Stainless Steel
- Cable - Braided Stainless Steel (Nylon Coated)
- Swivel - Stainless Steel

WT: 4.5 lb.



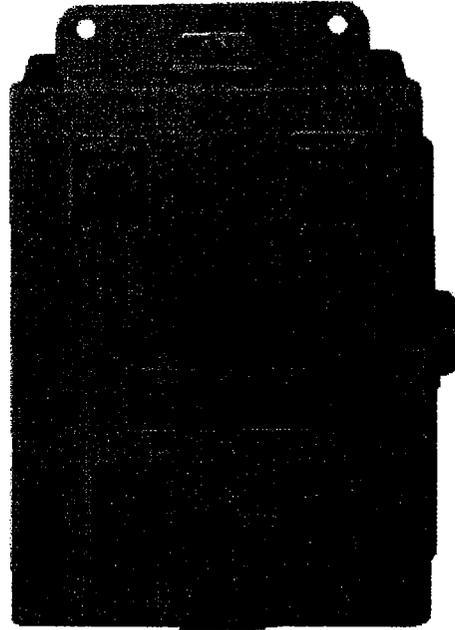
# Audible Alarm Controls LC 1002

**PNEUMERCATOR**  
Liquid Level Control Systems

120 Finn Court, Farmingdale, NY, 11735  
(631)293-8450 Fax (631)293-8533 www.pneumercator.com

The LC 1002 alarm console is designed for use with any tank mounted sensing device that transmits an alarm condition by opening or closing switch contacts. While the controls are usable with a variety of field sensors, the LC's are optimized for level control. They assure complete safety and minimum installation cost by requiring only low current, intrinsically safe wiring between console and tank switch.

Housed in a water tight Nema 4 enclosure, the solid state circuitry provides two (2) alarm channel for monitoring one independent sensing point. A bright incandescent alarm light and a loud sounding horn warn of alarm conditions. A dry contact is provided for controlling your external devices such as pumps, valves, or remote alarm stations.



## Features

- > Two warning lights with name plates
- > Two switches
- > Two relays
- > Nema 4 enclosure with hinged lockable door
- > Audible alarm
- > Reset and Test buttons
- > Intrinsically safe operation of tank mounted sensors
- > Industrial coating (inside and out)

## Operation

Each alarm channel transmits a low voltage 12 VDC signal to a tank mounted level switch. When the switch senses a level alarm condition, the switch transfers and the LC 1002 circuit energizes the audible horn and indicator light. The light will remain on after silencing the horn by pressing the *Reset* button. At any time, an operator may test the alarm circuit by pressing the *Test* button.

## Specifications

### Power Input

120 VAC  $\pm$  10%, 60 Hz  
Fuse .10 AMP, AG-SLO BLO

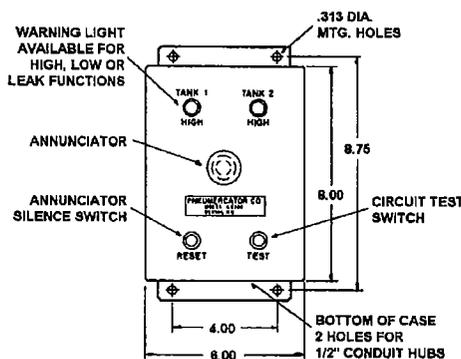
### Power to Field Sensor

Low electrical energy; 12 VDC at 15mA provided by control unit to each sensor switch. Safe for Class I, Division I, Groups A, B, C, D; Class II Division I, Groups E, G.

### Control Relay Output

Dry switch contact-SPDT per point, rated 3 AMPS at 120 VAC; selectable either normally open or normally closed.

## INDICATOR DETAIL



## Response Time

Typically 1/2 second. Automatic horn silence (ASC) option, adjustable 30 seconds to 3 minutes.

## Indicators/Controls

Red light indicates alarm condition  
Horn signals audible alarm -85dB min. Reset button silences alarm  
Test button tests alarm circuits

## Sensor Cable

Standard 2 conductor #18 AWG  
Up to 5000 feet (by customer)



## Level Switches

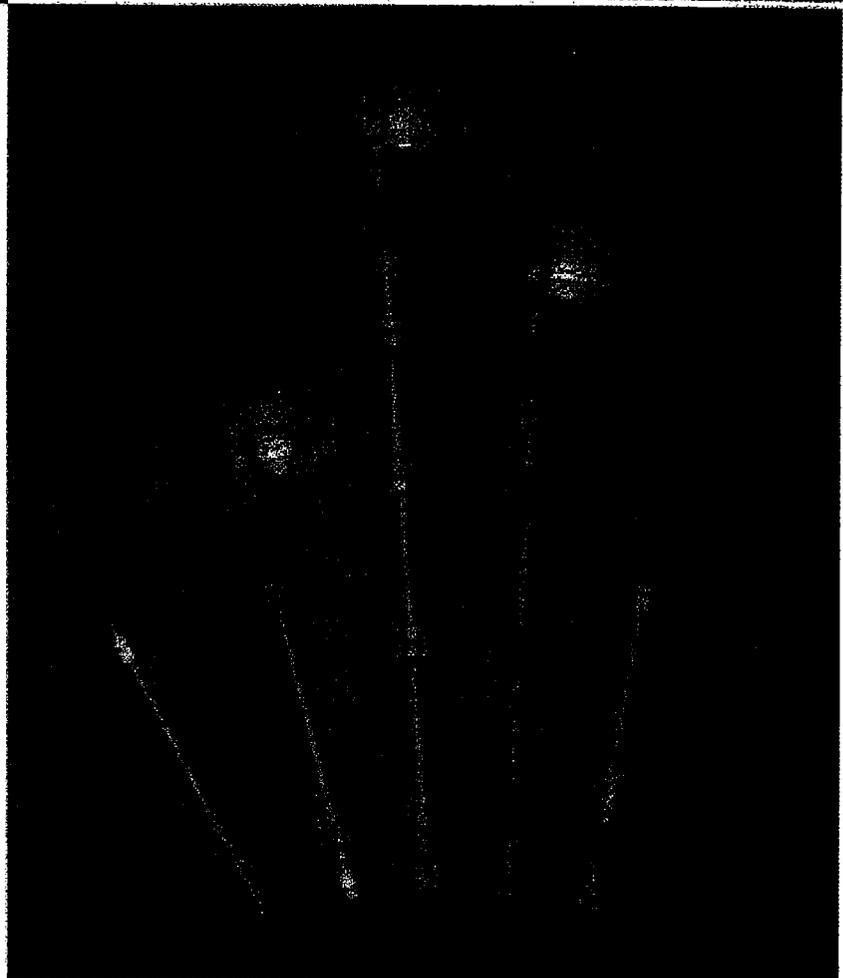
# LS 600

The LS 600 series liquid level float switches provide the highest degree of dependable accuracy for sensing and controlling liquid levels. They may be used with audible alarm consoles such as the Pneumercator LC 1000 or customers' own to actuate high and/or low level warning devices. The LS 600 is available with intermediate switches for control of pumps to maintain liquid levels within a predetermined range.

The LS 600 series is simple in design and operation. A magnet within each float actuates a hermetically sealed dry-reed switch. The encapsulated switches are sealed inside the sensing probe and completely protected from exposure to liquid or vapor. Float travel is restricted via the use of stops placed immediately above and below the customer specified switch operating points.

### FEATURES

- One to four magnetic switch floats.
- Available in brass or stainless steel configuration.
- Each switch may be operated in either normally open (NO) or normally closed (NC) contact states.
- Factory Mutual (FM) approved intrinsically safe system.
- Easy installation.
- Virtually maintenance free.
- Repeatability of  $\frac{1}{8}$ -inch.

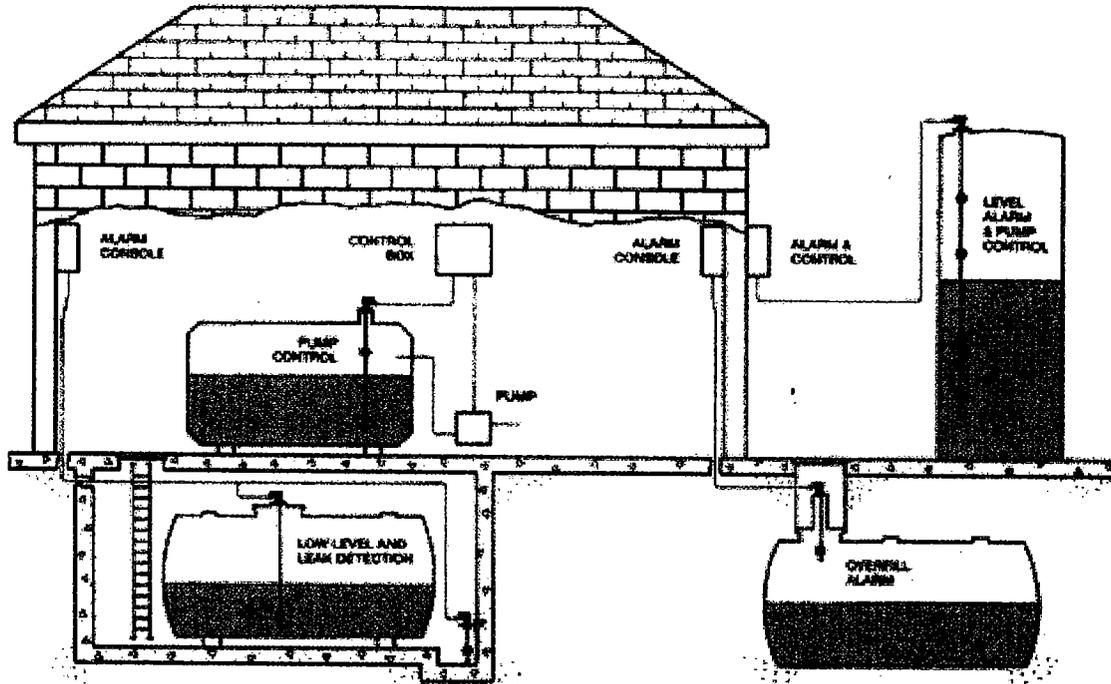


NYC-BSA  
APPROVED

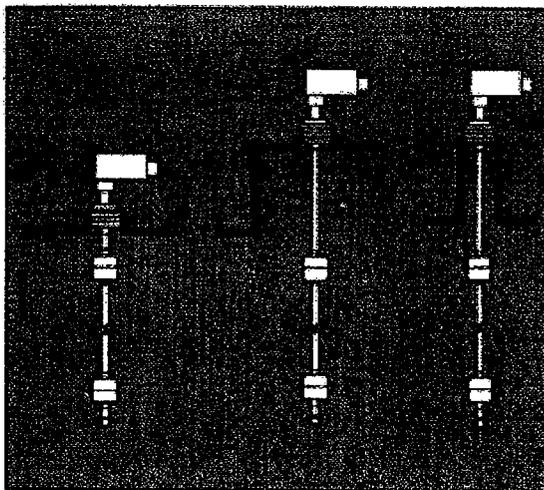
**PNEUMERCATOR**  
Liquid Level Control Systems

# Applications

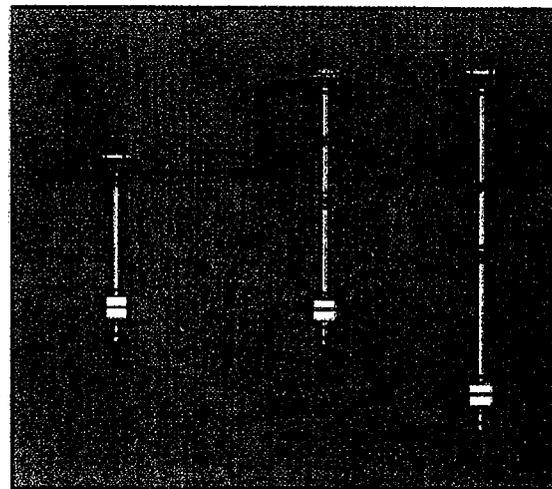
- Level Alarms • Overfill Alarms • Pump Control • Leak Detection



...Above or below ground...Indoor or outdoor...



LS 600 Series:  
Up to four actuation points.



LS 600A Series:  
Single switch with fixed 8" actuation point

...Tank, manway or riser pipe mount.

# Ordering Specifications

LS 600 series float switches are available in three different configurations: LS 600A, LS 600 and custom. When ordering, please fill in the information below and at right for the desired configuration.

1. For percent capacity settings, please state:

Tank capacity ▼

Tank manufacturer ▼

Type of ends ▼

Type of mounting ▼

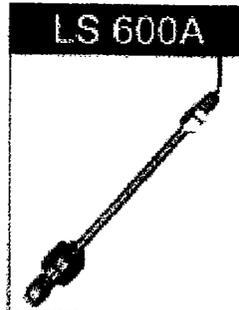
TANK  RISER  MANWAY

2. A minimum distance of 3" between switches is required.

3. Before ordering, ascertain the compatibility of the material selected with the tank contents.

4. Unless specified:

- Overfill and high levels are set normally open to close on the rise of liquid level.
- Low levels are set normally closed to open on the rise of liquid level.
- Pump controls are set normally closed to open on the rise of liquid level.



Check One:

- brass stem, 1.5" s/s float  
 s/s stem, 1.5" s/s float  
 brass stem, 1.4" buna-n float

3" Actuation Point

Percent volume settings may be used at the time of installation.



Check One:

- brass stem, 1.5" s/s float  
 s/s stem, 1.5" s/s float  
 brass stem, 1.4" buna-n float

Check Actuation Point:

- 6"  8"  12"  
 Custom (see below)

## LS 600 CUSTOM CONFIGURATION

Enter mounting height in inches

Enter stem and float type

Enter switch setting in inches from top (T) or bottom (B) of tank or at a % of capacity

Enter wall thickness in inches

Enter tank I.D. or height

Enter required switch numbers S1-S4, (S1 being closest to the bottom)

Enter level condition. (high, pump-on etc.)

Enter dry tank switch condition: NO= normally open NC= normally closed

From

From

From

From

# LS 600 Level Switches

## SPECIFICATIONS

### Probe Materials

Brass or stainless steel .50" dia.  
(max. length 20 feet.)

### Float

1.62" dia. stainless steel or 1.4" dia. Buna-N

### Retainer Clips

Stainless steel.

### Bushing

2" or 1 1/2" NPT Cast iron standard

### Wiring

2 conductor—18 AWG each switch,  
10 feet long for models LS 600A.

### Float Switch

Dry reed type hermetically sealed within probe.  
SPST rated 100W resistive load, 400V max. at  
3 amp.

### Temperature

20° to 180°F (-29° to 82°C).

### Pressure

Full vacuum to 150 PSIG.

### Repeatability

1/8" inch typical per point.

### Housing

(Model LS 600) Explosion proof die cast alum.,  
1/2" NPT conduit fitting. UL approved for  
Class 1 and 2 Group C,D,E,F & G; NEMA 4.

### System Approvals:

#### FM

Approved intrinsically safe with entity for  
Class I, II and III, Division 1, Groups A, B, C,  
D, E, F & G under File No. 1Q3A4. AX \*

#### NYC-BSA

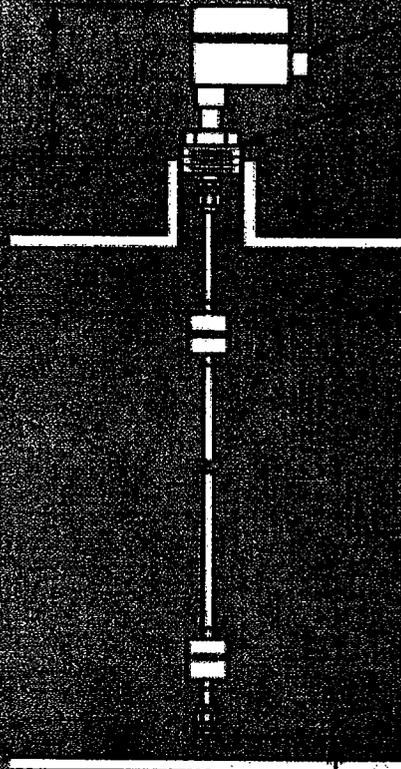
Approved under calendar number  
630-71-SM.\*

\*When used in combination with a  
Pneumercator LC 1000 alarm console.

specifications subject to change without notice.

**PNEUMERCATOR**  
Liquid Level Control Systems

PNEUMERCATOR COMPANY  
120 Finn Court, Farmingdale, NY 11735  
(631) 293-8450  
Fax (631) 293-8533



# Leak Monitor Switches and Control System

## LS 600LD

The LS 600LD float-actuated Leak Sensor and the Pneumercator LC 1000 series Alarm Console are combined to provide time-proven accurate and reliable leak monitoring in above-ground and underground storage tank applications. The sensor assembly may be suspended at the desired point of actuation via the sensor cable and compression fitting, or allowed to rest at the bottom of the containment area being monitored. The compact size and favorable displacement properties of the LS 600LD make it ideal for monitoring shallow liquid levels.

The LC 1000 Alarm Console provides multiple-point monitoring with an audible alarm and easy-to-view dedicated alarm indicator lamps. Internal relays provide per-sensor output contacts for controlling pumps, valves and other external devices. A weatherproof and approved intrinsically safe design assures complete safety and reliability.

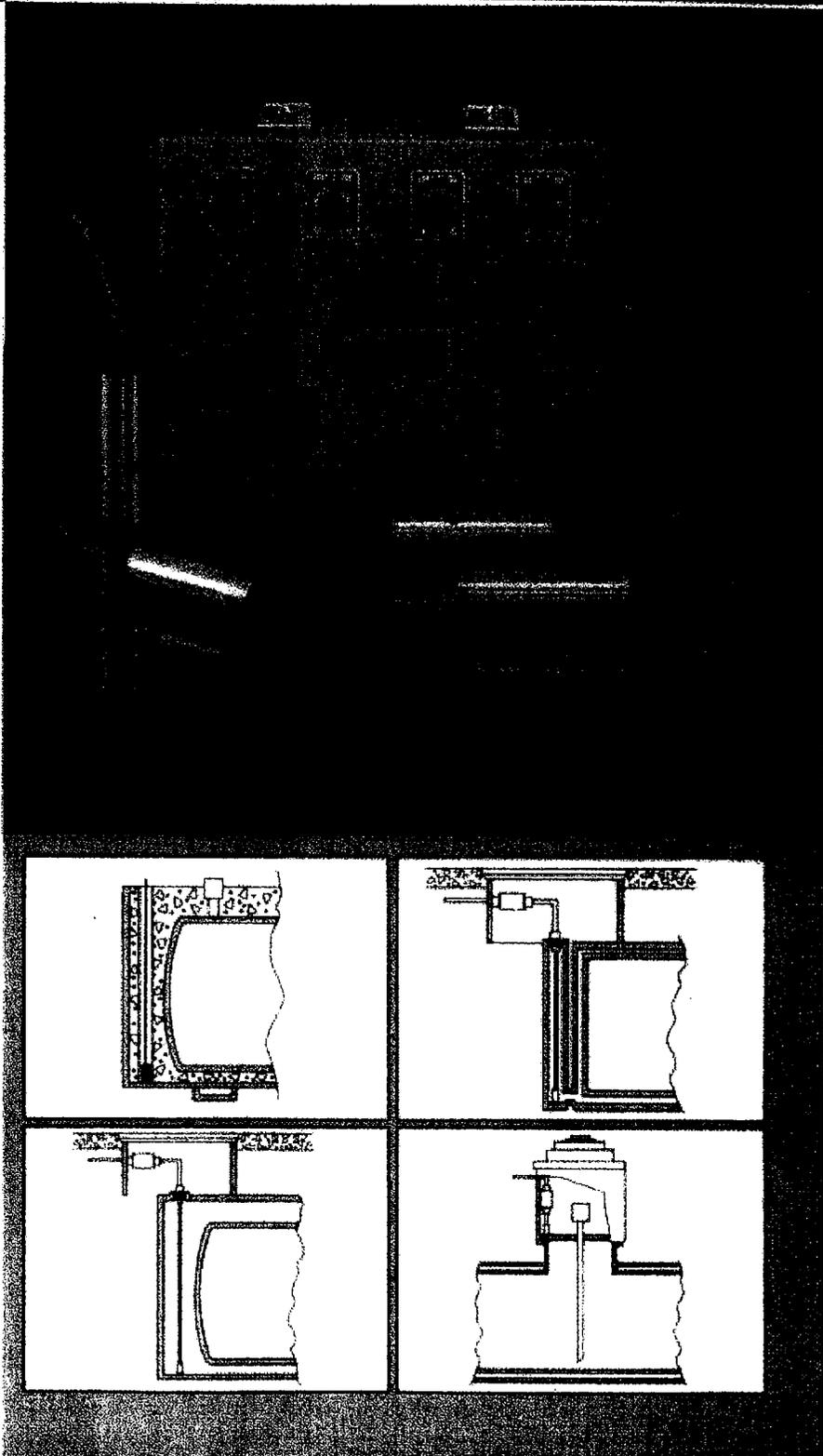
The LS 600LD Leak Switch is available with Buna-N, stainless steel or Teflon floats. This variety of float materials permits the LS 600LD to effectively monitor nearly any type of chemical or petrochemical storage tank, man-way or piping sump.

### FEATURES

- Float types for nearly all chemical and petrochemical applications
- Approved intrinsically safe console
- Compact and efficient design is ideal for monitoring shallow liquid levels
- Reliable, accurate and virtually maintenance free
- Audible and visual alarms with test and reset functions
- Weatherproof NEMA 4 enclosure

PEI

**PNEUMERCATOR**  
Liquid Level Control Systems



# Leak Monitor Switches and Control System

## SPECIFICATIONS:

### Float and Stem

Buna-Nitrile float and brass stem

### Shield

Stainless steel

### Sensor Cable

10 foot/2 conductor 18 AWG.

May be extended up to 5000 feet.

### Temperature

-40° F to 160° F (-40° C to 71° C)

### Pressure

Full vacuum to 100 PSI

### Console Enclosure

NEMA 4 weatherproof standard

### Console Power Input

120 VAC ± 10% 60Hz

240 VAC ± 10% 50Hz (optional)

### Control Relay Output

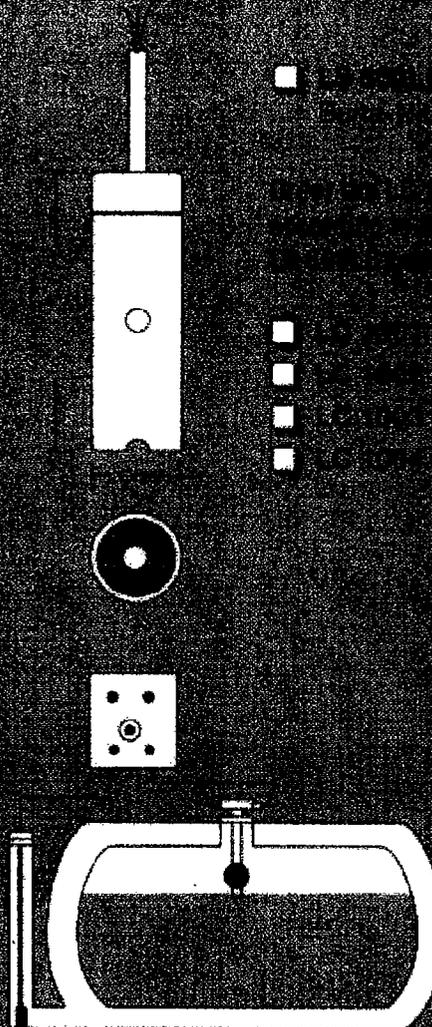
Dry switch contact—SPDT per-point rated  
3 AMPS at 120 VAC. Selectable either  
normally open or normally closed.

### Console Approvals

FM Approved intrinsically safe with entity  
for Class I, II and III, Division 1, Groups A, B,  
C, D, E, F & G.

Specifications subject to change without notice

## LEAK MONITOR SWITCHES AND CONTROL SYSTEM



**PNEUMERCATOR**  
Liquid Level Control Systems

**PNEUMERCATOR COMPANY, INC.**

120 Finn Court, Farmingdale, NY 11735

(631)293-8450 FAX (631)293-8533

<http://www.pneumercator.com>

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Husky 1040

## Air-Operated Double Diaphragm Pump



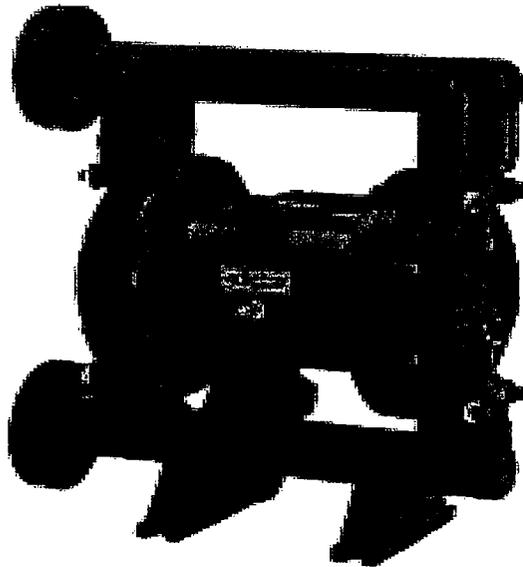
Click here for more info!

**Ideal for applications requiring high flow rates and a compact, portable design**

This 1-inch diaphragm pump is equipped with an effective and reliable air valve system. Available in aluminum, stainless steel, acetal, polypropylene and kynar.

### Features and Benefits

- 1 in. (25.4 mm) ANSI end-porting
- High flow - 40 gpm (151 lpm) in a compact, portable size
- Fluid pressure to 120 psi (8.4 bar, 0.84 MPa)
- External controller for remote control access



# Instructions – Parts List



## Husky™ 1040 Air-Operated Diaphragm Pumps

308326T

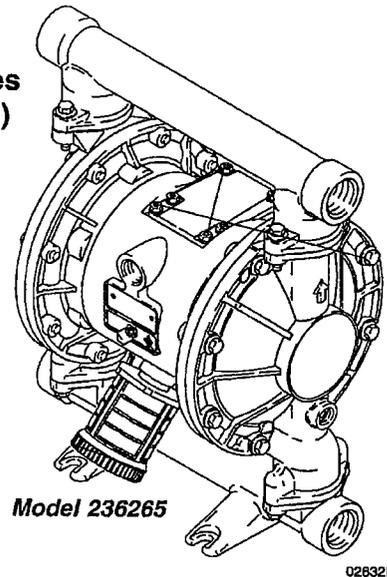
Intended for use in accordance with the United States Flammable and Combustible Liquids Code (NFPA 30) and the Automotive and Marine Service Station Code (NFPA 30A).

### Evacuation and Transfer Pumps

120 psi (0.84 MPa, 8.4 bar) Maximum Fluid Working Pressure  
120 psi (0.84 MPa, 8.4 bar) Maximum Air Input Pressure

#### Part No. 236265

with Hytrel® diaphragms and seats, acetal balls



Model 236265

02832B

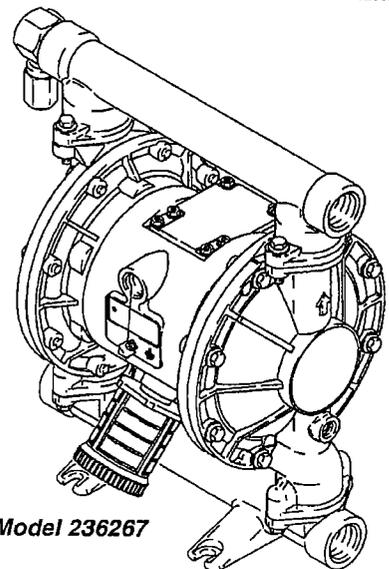
### Fuel Dispense Pumps

For use in petroleum product dispense systems  
50 psi (350 kPa, 3.5 bar) Maximum Fluid Working Pressure  
50 psi (350 kPa, 3.5 bar) Maximum Air Input Pressure

#### Part No. 236267

with Hytrel® diaphragms and seats, acetal balls

Patent No.  
CN ZL94102643.4  
EU 0942171  
US 5,860,794  
AR AR006617B1



Model 236267

03538B



This symbol on the nameplate means the product is listed by Underwriters Laboratories Inc. (UL Standard No. 79, Standard for Power-Operated Pumps for Petroleum Product Dispensing Systems).



Read warnings and instructions.  
See page 2 for table of contents

PROVEN QUALITY. LEADING TECHNOLOGY.

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440-1441  
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# Table of Contents

Warnings .....	3	Maintenance	
Typical Installation Drawings		Lubrication .....	14
Waste Oil Receiver Evacuation System, or		Flushing and Storage .....	14
General Fluid Transfer Application .....	7	Tightening Threaded Connections .....	14
Gear Oil Evacuation System .....	7	Preventive Maintenance Schedule .....	14
Fuel Dispense System .....	8	Troubleshooting .....	15
Installation		Service	
General Information .....	5	Repairing the Air Valve .....	16
Grounding .....	5	Ball Check Valve Repair .....	18
Mountings .....	6	Diaphragm Repair .....	19
Air Line .....	6	Bearing and Air Gasket Removal .....	22
Pressure Relief Valve (Fuel Dispense Systems) .	8	Parts Drawings & Lists	
Changing the Orientation of the Fluid Inlet		Evacuation and Transfer Pumps .....	24
and Outlet Ports .....	8	Fuel Dispense Pumps .....	26
Fluid Suction Line .....	9	Repair Kits .....	28
Fluid Outlet Line .....	9	Dimensions .....	29
Air Exhaust Ventilation .....	10	Technical Data and Performance Charts	
Fluid Pressure Relief Kit .....	11	Evacuation and Transfer Pumps .....	30
Operation		Fuel Dispense Pumps .....	31
Flush the Pump Before First Use .....	13	Graco Standard Warranty .....	32
Starting and Adjusting the Pump .....	13	Graco Information .....	32
Pump Shutdown .....	14		

# Symbols

## Warning Symbol



This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

## Caution Symbol



This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

## **WARNING**



### **EQUIPMENT MISUSE HAZARD**

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call your Graco distributor.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated component in your system. Refer to the Technical Data on pages 30 and 31 for the maximum working pressure of your equipment.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below -40°C (-40°F).
- Wear hearing protection when operating this equipment.
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.
- Never use 1.1.1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in pressurized aluminum equipment. Such use could result in a chemical reaction, with the possibility of explosion.

## WARNING



### TOXIC FLUID HAZARD

Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed.

- Know the specific hazards of the fluid you are using.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.
- Pipe and dispose of the exhaust air safely, away from people, animals, and food handling areas. If the diaphragm fails, the fluid is exhausted along with the air. See **Air Exhaust Ventilation** on page 10.
- **Never** use an acetal pump to pump acids. Take precautions to avoid acid or acid fumes from contacting the pump housing exterior. Stainless steel parts will be damaged by exposure to acid spills and fumes.



### FIRE AND EXPLOSION HAZARD

Improper grounding, poor ventilation, open flames or sparks can cause a hazardous condition and result in a fire or explosion and serious injury.

- Ground the equipment. Refer to **Grounding** on page 5.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop pumping immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being pumped.
- Pipe and dispose of the exhaust air safely, away from all sources of ignition. If the diaphragm fails, the fluid is exhausted along with the air. See **Air Exhaust Ventilation** on page 10.
- Keep the work area free of debris, including solvent, rags, and gasoline.
- Electrically disconnect all equipment in the work area.
- Extinguish all open flames or pilot lights in the work area.
- Do not smoke in the work area.
- Do not turn on or off any light switch in the work area while operating or if fumes are present.
- Do not operate a gasoline engine in the work area.

# Installation

## General Information

- The Typical Installations shown in Figs. 2 to 4 are only guides for selecting and installing system components. Contact your Graco distributor or Graco Technical Assistance (see back page) for assistance in planning a system to suit your needs.
- Reference numbers and letters in parentheses refer to the callouts in the figures and the parts lists on pages 24 to 27.
- Installation and use must be in accordance with the Flammable and Combustible Liquids Code (NFPA 30) and Automotive and Marine Service Station Code (NFPA 30A) and must comply with all local, state and federal codes.
- All pipe joints are to be made tight with UL listed gasoline-resistant pipe compound.
- All solvent pails used when flushing, according to local code. Use only metal pails, which are conductive. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts the grounding continuity.
- Fluid supply container: according to local code.
- Suction device nozzle: must be bonded to metal container from which it is suctioning by firm metal-to-metal contact to a properly grounded suction hose and pump.
- Piping, valves, and fittings: use only electrically conductive materials. Bond and ground per code.

Check your system electrical continuity after the initial installation, and then set up a regular schedule for checking continuity to be sure proper grounding is maintained.

## Tightening Screws Before First Use

After unpacking the pump and before using it for the first time, check and retorque the external fasteners. To prevent the manifolds from interfering with the fluid covers, retorque the fluid cover screws first, then the manifold screws. See the **Service** section for torque specifications.

After the first day of operation, check and retorque the fasteners again. The recommended frequency for retorquing fasteners varies with pump usage; a general guideline is to retorque fasteners every two months.

## Grounding

**⚠ WARNING**

**FIRE AND EXPLOSION HAZARD**  
Before operating the pump, ground the system as explained below. Also read the section **FIRE AND EXPLOSION HAZARD** on page 4.

- **Pump:** loosen the grounding screw (W). Insert one end of a 12 ga (1.5 mm<sup>2</sup>) minimum ground wire (Y) behind the grounding screw and tighten the screw securely. See Fig. 1. Connect the clamp end of the ground wire to a true earth ground. Order Part No. 222011 Ground Wire and Clamp.
- Air and fluid hoses: use only grounded hoses with a maximum of 500 ft (150 m) combined hose length to ensure grounding continuity.
- Air compressor: follow manufacturer's recommendations.

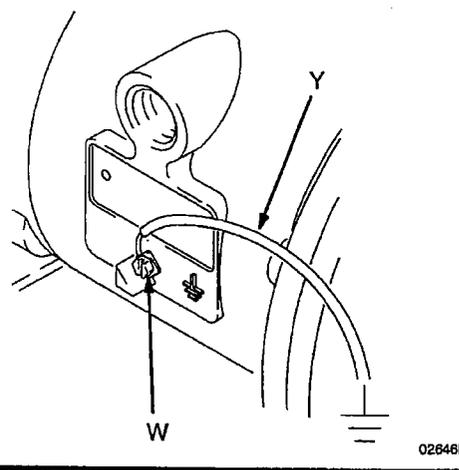


Fig. 1

# Installation

## Mountings

### CAUTION

The pump exhaust air may contain contaminants. Ventilate to a remote area if the contaminants could affect your fluid supply. See **Air Exhaust Ventilation** on page 10.

- Be sure the mounting surface can support the weight of the pump, hoses, and accessories, as well as the stress caused during operation.
- For all mountings, be sure the pump is bolted directly to the mounting surface.
- For ease of operation and service, mount the pump so the air valve cover (7), air inlet, and fluid inlet and outlet ports are easily accessible.
- Rubber Foot Mounting Kit 236452 is available to reduce noise and vibration during operation. Contact your Graco distributor.

### WARNING

To reduce the risk of serious injury, splashing in the eyes or on the skin, and toxic fluid spills, never move or lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the **Pressure Relief Procedure Warning** on page 12 before moving or lifting the pump.

## Air Line

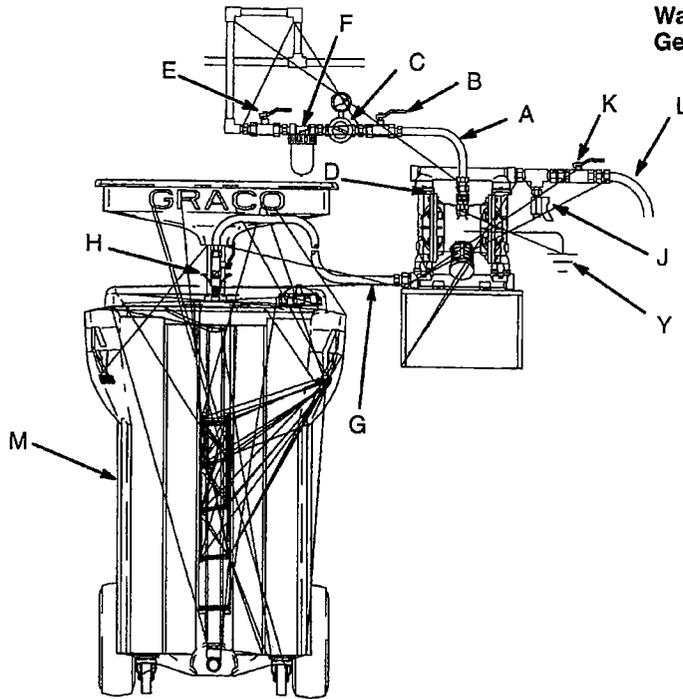
### WARNING

A bleed-type master air valve (B) is required in your system to relieve air trapped between this valve and the pump. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin, injury from moving parts, or contamination from hazardous fluids.

1. Install the air line accessories as shown in Figs. 2 to 4 on pages 7 and 8. Mount these accessories on the wall or on a bracket. Be sure the air line supplying the accessories is grounded.
  - a. Install an air regulator (C) and gauge to control the fluid pressure. The fluid outlet pressure at stall will be the same as the setting of the air regulator.
  - b. Locate one bleed-type master air valve (B) close to the pump and use it to relieve trapped air. See the **WARNING** above. Locate the other master air valve (E) upstream from all air line accessories and use it to isolate them during cleaning and repair.
  - c. The air line filter (F) removes harmful dirt and moisture from the compressed air supply.
2. Install a grounded, flexible air hose (A) between the accessories and the 1/2 npt(f) pump air inlet (N). See Fig. 5. Use a minimum 1/2" (13 mm) ID air hose. Screw an air line quick disconnect coupler (D) onto the end of the air hose (A), and screw the mating fitting into the pump air inlet snugly. Do not connect the coupler (D) to the fitting until you are ready to operate the pump.

# Installation

## Waste Oil Receiver Evacuation System, or General Fluid Transfer Application



### KEY FOR FIG. 2

- A Air supply line
- B Bleed-type master air valve (required for pump)
- C Air regulator
- D Air line quick disconnect
- E Master air valve (for accessories)
- F Air line filter
- G Fluid suction line
- H Fluid line quick disconnect
- J Fluid drain valve (required)
- K Fluid shutoff valve
- L Fluid line
- M Waste oil receiver
- Y Ground wire (required; see page 5 for installation instructions)

Fig. 2

03541B

## Gear Oil Evacuation System

### KEY FOR FIG. 3

- A Air supply line
- B Bleed-type master air valve (required for pump)
- C Air regulator
- D Air line quick disconnect
- E Master air valve (for accessories)
- F Air line filter
- G Fluid suction line
- H Fluid Line quick disconnect
- J Fluid drain valve (required)
- K Fluid shutoff valve
- L Waste oil line (to storage tank)
- P Suction hose
- R Control valve
- S Suction wand
- Y Ground wire (required; see page 5 for installation instructions)

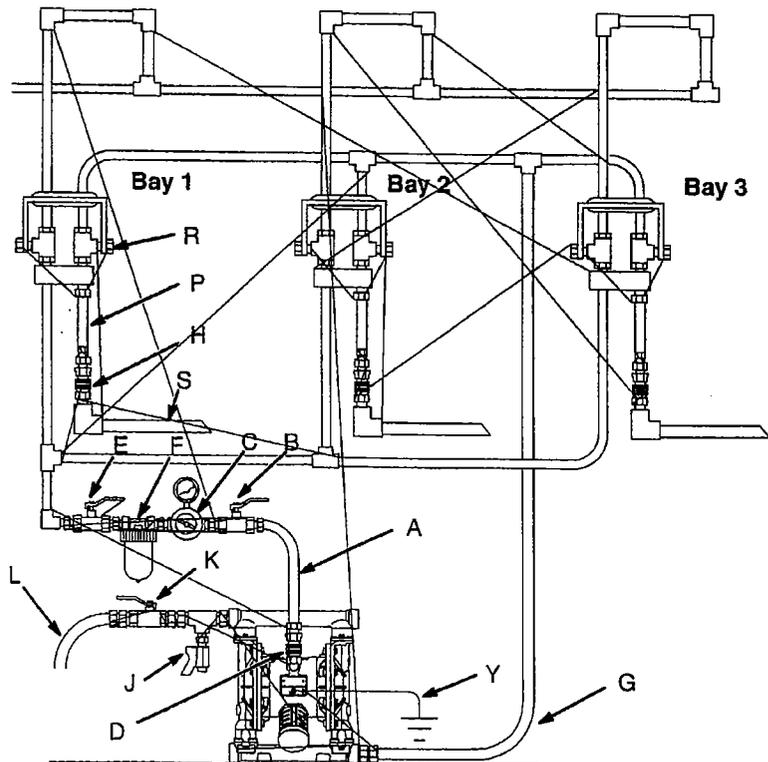


Fig. 3

03542B

# Installation

## Fuel Dispense System

### KEY FOR FIG. 4

- A Air supply line
- B Bleed-type master air valve (required for pump)
- C Air regulator
- D Air line quick disconnect
- E Master air valve (for accessories)
- F Air line filter
- G Fluid suction line
- J Fluid drain valve (required)
- K Fluid shutoff valve
- L Fluid line
- M Wall mounting bracket
- T Hose reel
- V Fuel dispense valve
- Y Ground wire (required; see page 5 for installation instructions)
- 46 Pressure relief valve (required to limit fluid outlet pressure to 50 psi [350 kPa, 3.5 bar])

 Fluid from the relief valve (46) must be vented to a safe area.

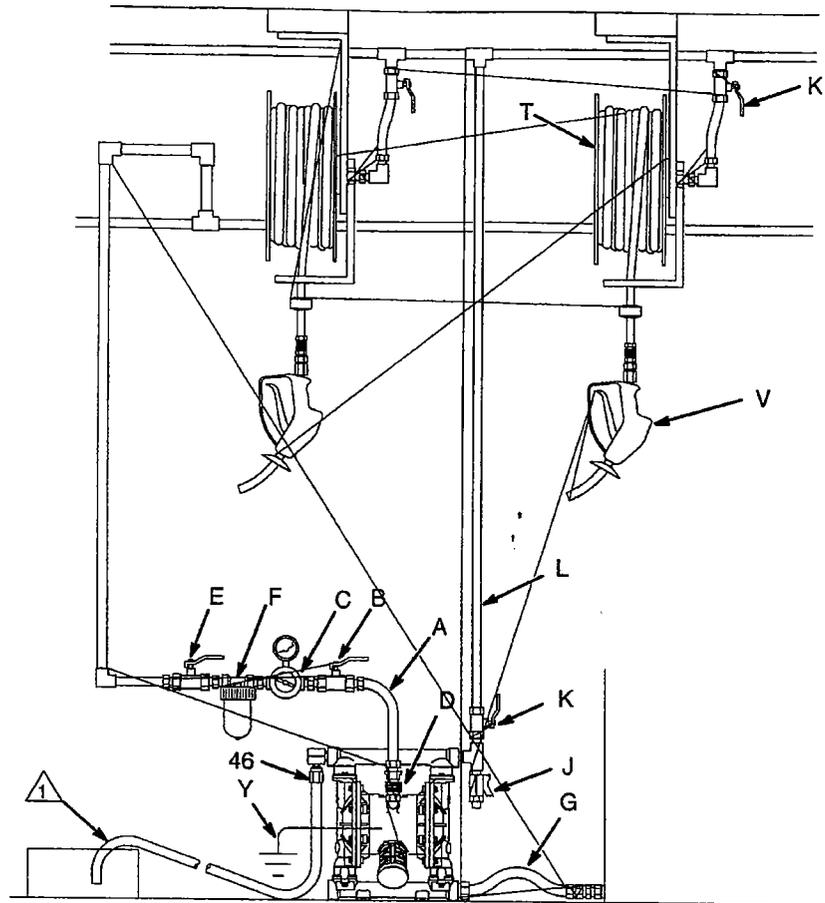


Fig. 4

03543E

## Pressure Relief Valve (Fuel Dispense Systems)

### WARNING

Fuel Dispense Model 236267 requires a pressure relief valve 112353 (46), which is supplied with the pump, to prevent fluid pressure from exceeding 50 psi (350 kPa, 3.5 bar). Do not exceed the maximum air inlet pressure of 50 psi (350 kPa, 3.5 bar). Recommended air operating pressure is 40 psi (280 kPa, 2.8 bar) or less. As the air inlet pressure approaches 50 psi (350 kPa, 3.5 bar), the relief valve will open and vent fluid. Vented fluid must be routed to a container in a safe place.

## Changing the Orientation of the Fluid Inlet and Outlet Ports

If desired, you can easily change the orientation of the fluid inlet and outlet ports. See Fig. 5.

1. Remove the screws (6) holding the inlet and/or outlet manifold (1, 3) to the covers (2).
2. Reverse the manifold and reattach. Install the screws and torque to 120 to 130 in-lb (14 to 15 N.m).

# Installation

## Fluid Suction Line

1. **Use only electrically conductive fluid hoses.**  
The pump fluid inlet (3) is 1" npt(f). See Fig. 5.  
Screw the fluid fitting into the pump inlet securely.
2. If the fluid inlet pressure to the pump is more than 25% of the outlet working pressure, the ball check valves will not close fast enough, resulting in inefficient pump operation.
3. At inlet fluid pressures greater than 15 psi (1.05 bar), diaphragm life will be shortened.
4. See the **Technical Data** on pages 30 and 31 for maximum suction lift (wet and dry).
5. For the Waste Oil Receiver Evacuation System, connect an appropriate suction hose (G) and fluid quick coupler (H) between the pump fluid inlet and the waste oil receiver (M). See Fig. 2.
6. For the Gear Oil Evacuation System, install a control valve (R) and an appropriate wand (S). See Fig. 3.

## Fluid Outlet Line

### **⚠ WARNING**

A fluid drain valve (J) is required to relieve pressure in the hose if it is plugged. The drain valve reduces the risk of serious injury, including splashing in the eyes or on the skin, or contamination from hazardous fluids when relieving pressure. Install the valve close to the pump fluid outlet.

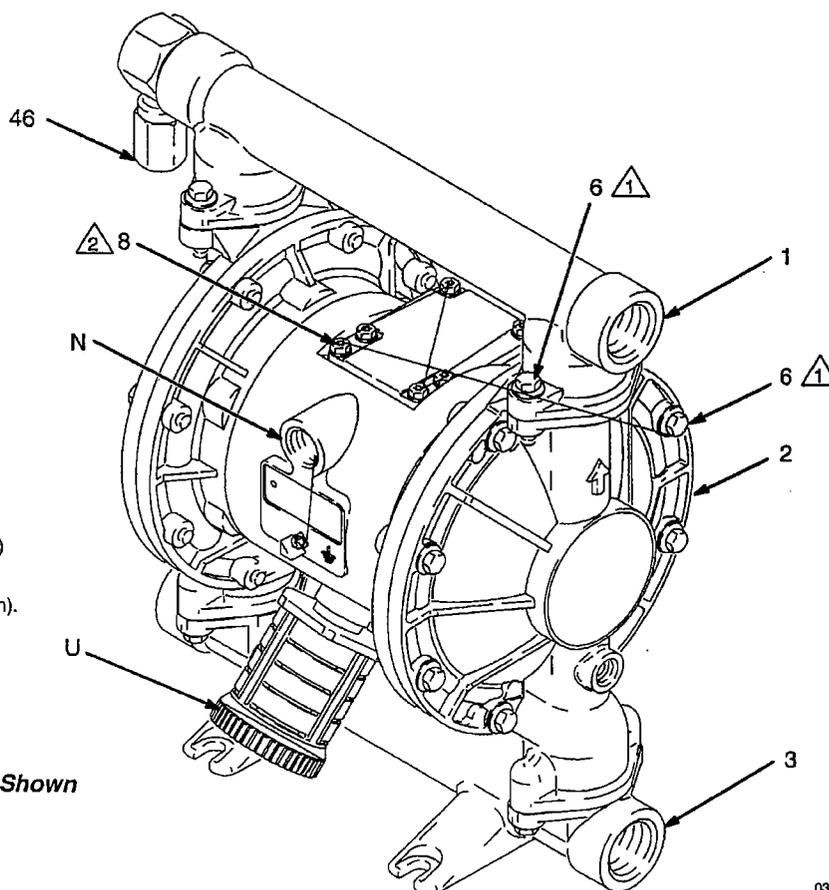
1. **Use only electrically conductive fluid hoses (L).** The pump fluid outlet (1) is 1" npt(f). See Fig. 5. Screw the fluid fitting into the pump outlet securely.
2. Install a fluid drain valve (J) near the fluid outlet. See the **WARNING** above, and Figs. 2 to 4 on pages 7 and 8.
3. Install a shutoff valve (K) in the fluid outlet line.

### KEY

- N 1/2 npt(f) air inlet port
- U Muffler; air exhaust port is 3/4 npt(f)
- 1 1" npt(f) fluid outlet port
- 2 Fluid covers
- 3 1" npt(f) fluid inlet port
- 6 Manifold and cover screws
- 8 Air valve screws
- 46 3/8 npt(f) pressure relief valve (Models 236267 only)

**1** Torque to 120 to 130 in-lb (14 to 15 N.m). Apply medium-strength (blue) Loctite or equivalent to threads.

**2** Torque to 50–60 in-lb (5.6–6.87 N•m).



Model 236267 Shown

Fig. 5

03538B

# Installation

## Air Exhaust Ventilation

### **⚠ WARNING**

Be sure to read and follow the **TOXIC FLUID HAZARD** and **FIRE AND EXPLOSION HAZARD** warnings on page 4 before operating this pump.

Be sure the system is properly ventilated for your type of installation. You must vent the exhaust to a safe place, away from people, animals, food handling area, and all sources of ignition when pumping flammable or hazardous fluids.

Diaphragm failure will cause the fluid being pumped to exhaust with the air. Place an appropriate container at the end of the air exhaust line to catch the fluid. See Fig. 6.

The air exhaust port is 3/4 npt(f). Do not restrict the air exhaust port. Excessive exhaust restriction can cause erratic pump operation.

To provide a remote exhaust:

1. Remove the muffler (U) from the pump air exhaust port.
2. Install a grounded air exhaust hose (W) and connect the muffler (U) to the other end of the hose. The minimum size for the air exhaust hose is 3/4 in. (19 mm) ID. If a hose longer than 15 ft (4.57 m) is required, use a larger diameter hose. Avoid sharp bends or kinks in the hose.
3. Place a container (X) at the end of the air exhaust line to catch fluid in case a diaphragm ruptures. See Fig. 6. Locate the container away from all sources of ignition, including pilot lights and waste materials. If the diaphragm ruptures, the fluid being pumped will exhaust with the air.

### VENTING EXHAUST AIR

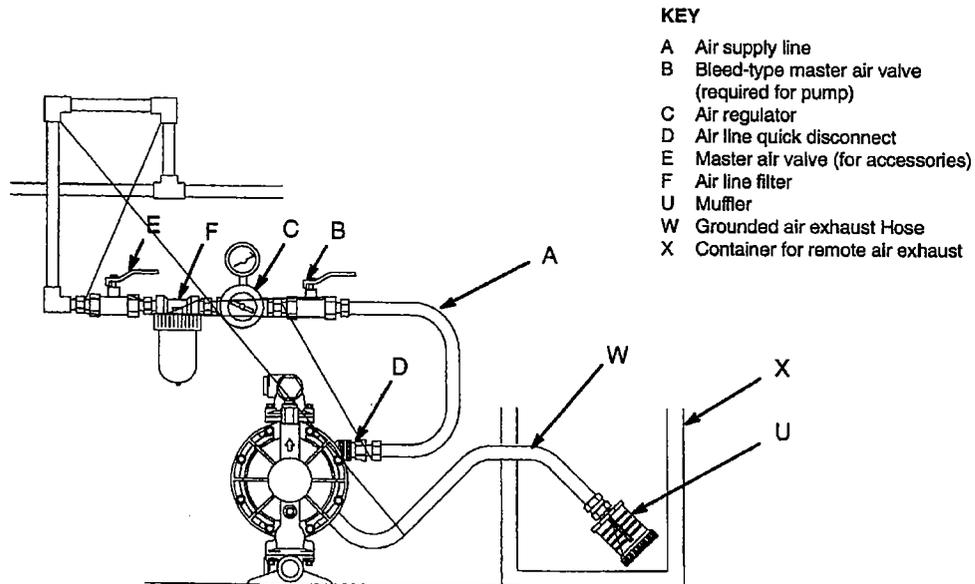


Fig. 6

03539

# Installation

## Fluid Pressure Relief Kit (for Pump Model 236265 only)

### ⚠ CAUTION

Pressure Relief Kit 238428 (Z) is available, to prevent overpressurization and rupture of the pump or hose. See Fig. 7. The kit includes instructions.

**This kit is not for use in fuel dispense applications.** Order a fuel dispense pump, Model 236267, which is equipped with a pressure relief valve 112353. See page 8.

Thermal expansion of fluid in the outlet line can cause overpressurization. This can occur when using long fluid lines exposed to sunlight or ambient heat, or when pumping from a cool to a warm area (for example, from an underground tank).

Overpressurization can also occur if the Husky pump is being used to feed fluid to a piston pump, and the intake valve of the piston pump does not close, causing fluid to back up in the outlet line.

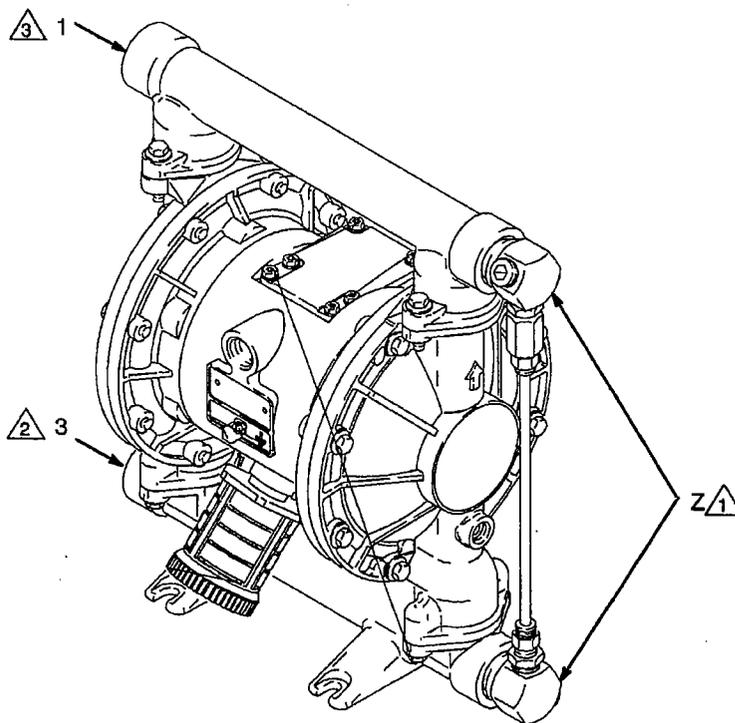
#### KEY

- 1 1" npt(f) Optional fluid outlet port
- 3 1" npt(f) Optional fluid inlet port
- Z Pressure relief kit

1 Apply medium-strength (blue) Loctite or equivalent to the threads, and install kit between fluid inlet and outlet manifolds.

2 Connect fluid inlet line here.

3 Connect fluid outlet line here.



*For Model 236265*

Fig. 7

02853B

# Operation

## Pressure Relief Procedure

### **WARNING**

#### **PRESSURIZED EQUIPMENT HAZARD**

The equipment stays pressurized until pressure is manually relieved. To reduce the risk of serious injury from pressurized fluid, accidental spray from the gun or splashing fluid, follow this procedure whenever you

- Are instructed to relieve pressure
- Stop pumping
- Check, clean or service any system equipment
- Install or clean fluid nozzles

1. Shut off the air to the pump.
2. Open the dispensing valve, if used.
3. Open the fluid drain valve to relieve all fluid pressure, having a container ready to catch the drainage.

# Operation

## Flush the Pump Before First Use

The pump was tested in water. If the water could contaminate the fluid you are pumping, flush the pump thoroughly with a compatible solvent. Follow the steps under **Starting and Adjusting the Pump**.

## Starting and Adjusting the Pump

### All Systems

#### **WARNING**

To reduce the risk of serious injury, splashing in the eyes or on the skin, and toxic fluid spills, never move or lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the **Pressure Relief Procedure Warning** on page 12 before moving or lifting the pump.

1. Be sure the pump is properly grounded. Read and follow **FIRE AND EXPLOSION HAZARD**, on page 4.
2. Check all fittings to be sure they are tight. Be sure to use a compatible liquid thread sealant on all male threads. Tighten the fluid inlet and outlet fittings securely.

**NOTE:** If the fluid inlet pressure to the pump is more than 25 percent of the outlet working pressure, the ball check valves will not close fast enough, resulting in inefficient pump operation.

**NOTE:** If you are flushing, run the pump long enough to thoroughly clean the pump and hoses. Close the air regulator. Remove the suction tube from the solvent and place it in the fluid to be pumped.

### **Waste Oil Receiver Evacuation Systems, or General Fluid Transfer Applications (see Fig. 2)**

1. Close the pump air regulator (C) and all bleed-type master air valves (B, E).
2. Connect the pump suction hose (G) to the pump fluid inlet. Attach a fluid quick coupler (H) to the other end of the hose, then connect the coupler to the outlet fitting of the waste oil receiver (M).
3. Place the end of the fluid hose (L) into an appropriate container.
4. Close the fluid drain valve (J). Open the fluid shutoff valve (K).

5. Connect the air side quick coupler (D) to the pump air inlet fitting.
6. Open all bleed-type master air valves (B, E).
7. Slowly increase air with the air regulator (C) until the pump starts to cycle. Allow the pump to cycle slowly until all air is pushed out of the lines and the pump is primed.
8. Adjust the air regulator. Do not use higher air pressure than necessary for the pump to provide good suction. Increasing the pump cycle rate does not necessarily improve suction.

### **Gear Oil Evacuation Systems (see Fig. 3)**

1. Close the pump air regulator (C) and all bleed-type master air valves (B, E).
2. Attach an appropriate wand (S) to the suction hose (P). Place the wand in the differential or fluid to be pumped.
3. Place the end of the fluid hose (L) into an appropriate container.
4. Close the fluid drain valve (J). Open the fluid shutoff valve (K).
5. Connect the air side quick coupler (D) to the pump air inlet fitting.
6. Open all bleed-type master air valves (B, E).
7. Set the air regulator (C) to about 50 psi (3.5 bar).
8. Pull the control valve handle (R) down to start the pump.
9. Adjust the air regulator. Allow the pump to cycle slowly until all air is pushed out of the lines and the pump is primed. Do not use higher air pressure than necessary for the pump to provide good suction. Increasing the pump cycle rate does not necessarily improve suction.

**NOTE:** To provide better control of the cycle rate, order Air Supply Kit 221147.

10. Push the control valve handle (R) up when finished. Place the wand (S) in the holder on the control valve.

**NOTE:** Be sure the control valve handle is closed when evacuation is completed. Failure to close it may prevent other service bays from developing full suction.

# Operation

*Fuel Dispense Systems (see Fig. 4)*

## WARNING

Fuel Dispense Model 236267 requires a pressure relief valve (46), which is supplied with the pump, to prevent fluid pressure from exceeding 50 psi (350 kPa, 3.5 bar). Do not exceed the maximum air inlet pressure of 50 psi (350 kPa, 3.5 bar). Recommended air operating pressure is 40 psi (280 kPa, 2.8 bar) or less. As the air inlet pressure approaches 50 psi (350 kPa, 3.5 bar), the relief valve will open and vent fluid. Vented fluid must be routed to a container in a safe place.

1. Close the pump air regulator (C) and all bleed-type master air valves (B, E).
2. Close the fluid drain valve (J). Open the fluid shutoff valve (K).
3. Hold the dispense valve (V) firmly to a grounded metal container, and open the valve.
4. Connect the air side quick coupler (D) to the pump air inlet fitting.

5. Open all bleed-type master air valves (B, E).
6. Slowly open the air regulator (C) until the pump starts to cycle. Allow the pump to cycle slowly until all air is pushed out of the lines and the pump is primed.
7. Adjust the air regulator. Do not use higher air pressure than necessary for the pump to provide good suction. Increasing the pump cycle rate does not necessarily improve suction.

## Pump Shutdown (All Systems)

### WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

At the end of the work shift and before checking, adjusting, cleaning or repairing the system, **relieve the pressure.**

# Maintenance

## Lubrication

The air valve is designed to operate unlubricated, however if lubrication is desired, every 500 hours of operation (or monthly) remove the hose from the pump air inlet and add two drops of machine oil to the air inlet.

### CAUTION

Do not over-lubricate the pump. Oil is exhausted through the muffler, which could contaminate your fluid supply or other equipment. Excessive lubrication can also cause the pump to malfunction.

An air line lubricator is available, contact your Graco distributor for more information.

## Flushing and Storage

### WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

Flush the pump often enough to prevent the fluid you are pumping from drying or freezing in the pump and damaging it. Always flush the pump and **relieve the pressure** before storing it for any length of time. Use a compatible solvent.

## Tightening Threaded Connections

Before each use, check all hoses for wear or damage, and replace as necessary. Check to be sure all threaded connections are tight and leak free. Check and retorque all threaded connections at least every two months. Retorque the fluid cover screws first, followed by the manifold screws.

The recommended frequency for retorquing fasteners varies with pump usage; a general guideline is to retorque fasteners every two months.

## Preventive Maintenance Schedule

Establish a preventive maintenance schedule, based on the pump's service history. This is especially important for prevention of spills or leakage due to diaphragm failure.

# Troubleshooting

## **⚠ WARNING**

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

Relieve the pressure before you check or service any system equipment.

Check all possible problems and solutions before disassembling the motor.

PROBLEM	CAUSE	SOLUTION
Pump cycles at stall or fails to hold pressure at stall.	Worn check valve balls (16) or seats (17).	Replace. See page 18.
Pump will not cycle, or cycles once and stops.	Air valve is stuck or dirty.	Disassemble and clean air valve. See pages 16 and 17. Use filtered air.
	Check valve ball (16) severely worn and wedged in seat (17) or manifold (1 or 3).	Replace ball and seat. See page 18.
	Check valve ball (16) is wedged into seat (17), due to overpressurization.	Install Pressure Relief Kit (see page 11).
	Dispensing valve clogged.	Relieve pressure and clear valve.
Pump operates erratically.	Clogged suction line.	Inspect; clear.
	Sticky or leaking check valve balls (16).	Clean or replace. See page 18.
	Diaphragm (29) ruptured.	Replace. See pages 19 to 21.
	Restricted exhaust.	Remove restriction.
Pump will not operate.	Foreign material in ball checks.	Clean ball check area.
Air bubbles in fluid.	Suction line is loose.	Tighten.
	Diaphragm (29) ruptured.	Replace. See pages 19 to 21.
	Loose manifolds (1, 3), or damaged seal between manifold and seat (17).	Tighten manifold bolts (6) or replace seats (17). See page 18.
	Loose diaphragm shaft bolt (21).	Tighten. See pages 19 to 21.
	Damaged o-ring (25).	Replace. See pages 19 to 21.
Fluid in exhaust air.	Diaphragm (29) ruptured.	Replace. See pages 19 to 21.
	Loose diaphragm shaft bolt (21).	Tighten. See pages 19 to 21.
	Damaged o-ring (25).	Replace. See pages 19 to 21.
Pump exhausts excessive air at stall.	Worn air valve block (13), o-ring (12), plate (14), pilot block (9), or o-ring (27).	Repair or replace. See pages 16 and 17.
	Worn shaft seals (22).	Replace. See pages 19 to 21.
Pump leaks air externally.	Air valve cover (7) or air valve cover screws (8) are loose.	Tighten screws. See page 17.
	Air valve gasket (10) or air cover gasket (32) is damaged.	Inspect; replace. See pages 16 and 17, 22 and 23.
	Air cover screws (6) are loose.	Tighten screws. See pages 22 and 23.
Pump leaks fluid externally from ball check valves.	Loose manifolds (1, 3), or damaged seal between manifold and seat (17).	Tighten manifold bolts (6) or replace seats (17). See page 18.
Relief valve relieving (Fuel Dispense Model 236267).	Air inlet pressure is too high.	Reduce inlet air pressure to below 50 psi (3.5 bar).
In evacuation application, pump is not drawing suction.	Pump should run at uniform speed.	Reduce inlet air pressure or use Air Supply Kit 221147.

# Service

## Repairing the Air Valve

### Tools Required

- Torque wrench
- Torx (T20) screwdriver or 7 mm (9/32") socket wrench
- Needle-nose pliers
- O-ring pick
- Lithium base grease

**NOTE:** Air Valve Repair Kit 236273 is available. Refer to page 28. Parts included in the kit are marked with a symbol, for example (10†). Use all the parts in the kit for the best results.

### Disassembly

#### **⚠ WARNING**

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

1. Relieve the pressure.
2. With a Torx (T20) screwdriver or 7 mm (9/32") socket wrench, remove the six screws (8), air valve cover (7), and gasket (10). See Fig. 8.
3. Move the valve carriage (11) to the center position and pull it out of the cavity. Remove the valve block (13) and o-ring (12) from the carriage. Using a needle-nose pliers, pull the pilot block (9) straight up and out of the cavity. See Fig. 9.
4. Pull the two actuator pistons (30) out of the bearings (31). Remove the u-cup packings (22) from the pistons. Pull the push pins (26) out of the bearings (28). Remove the o-rings (27) from the push pins. See Fig. 10.
5. Inspect the valve plate (14) in place. If damaged, use a Torx (T20) screwdriver or 7 mm (9/32") socket wrench to remove the three screws (8). Remove the valve plate (14) and seal (15). See Fig. 11.
6. Inspect the bearings (28, 31) in place. See Fig. 10. The bearings are tapered and, if damaged, must be removed from the outside. This requires disassembly of the fluid section. See page 22.
7. Clean all parts and inspect for wear or damage. Replace as needed. Reassemble as explained on page 17.

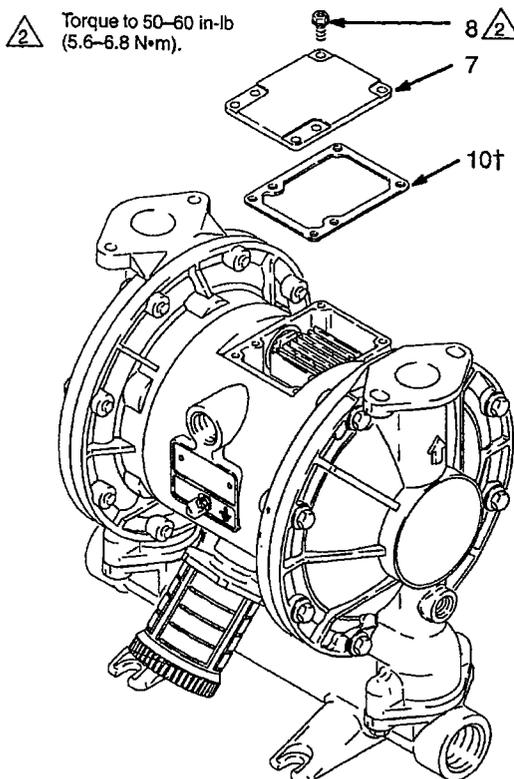


Fig. 8

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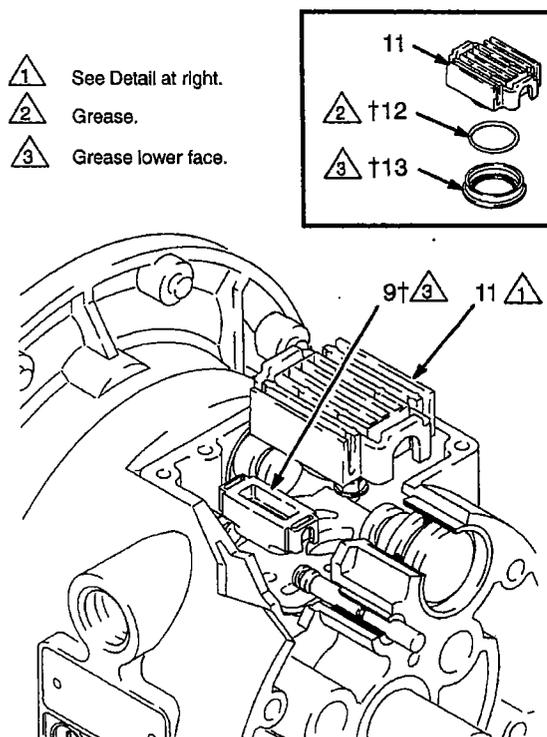


Fig. 9

02842

# Service

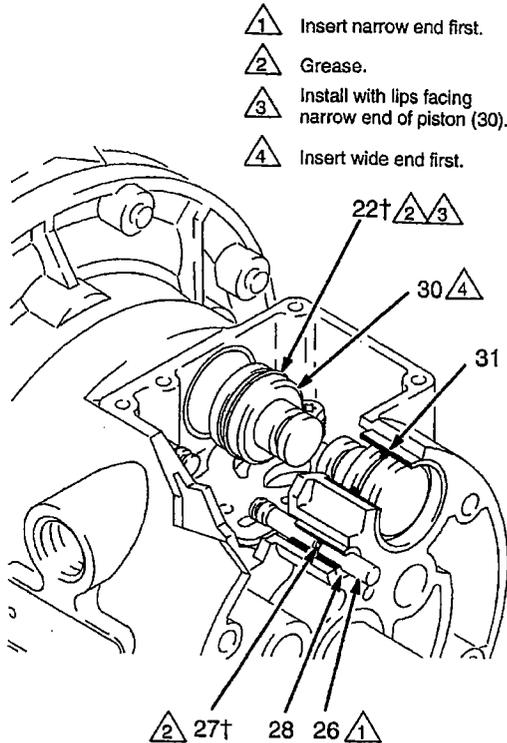


Fig. 10

02643

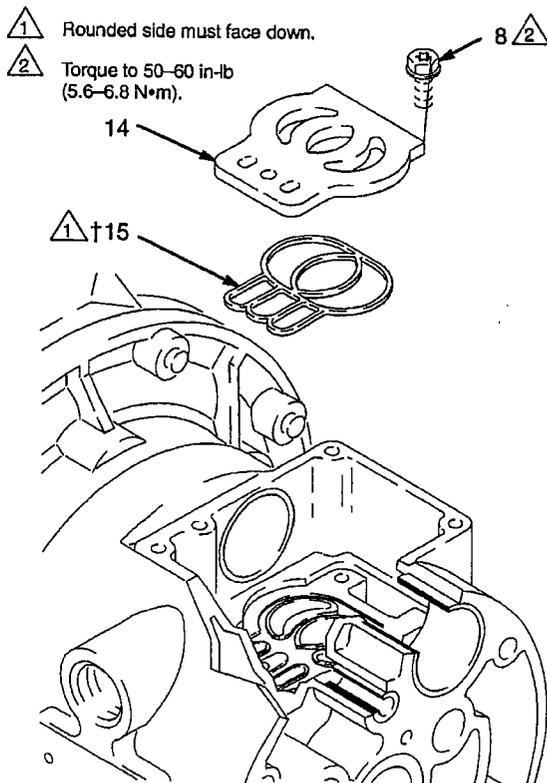


Fig. 11

02645

## Reassembly

1. If you replaced the bearings (28, 31), reinstall as explained on page 22. Reassemble the fluid section.
2. Install the valve plate seal (15†) into the groove at the bottom of the valve cavity. The rounded side of the seal **must face down** into the groove. See Fig. 11.
3. Install the valve plate (14) in the cavity. The plate is reversible, so either side can face up. Install the three screws (8), using a Torx (T20) screwdriver or 7 mm (9/32") socket wrench. Torque to 50–60 in-lb (5.6–6.8 N·m). See Fig. 11.
4. Install an o-ring (27†) on each push pin (26). Grease the pins and o-rings. Insert the pins into the bearings (28), **narrow** end first. See Fig. 10.
5. Install a u-cup packing (22†) on each actuator piston (30), so the lips of the packings face the **narrow** end of the pistons. See Fig. 10.
6. Lubricate the u-cup packings (22†) and actuator pistons (30). Insert the actuator pistons in the bearings (31), **wide** end first. Leave the narrow end of the pistons exposed. See Fig. 10.
7. Install the pilot block (9†) so its tabs snap into the grooves on the ends of the push pins (26). See Fig. 9.
8. Grease the o-ring (12†) and install it in the valve block (13). Push the block onto the valve carriage (11). Grease the lower face of the valve block. See Fig. 9.
9. Align the valve carriage (11) with the actuator pistons (30) and install so its tabs slip into the grooves on the narrow end of the pistons. See Fig. 9.
10. Align the valve gasket (10†) and cover (7) with the six holes in the center housing (5). Secure with six screws (8), using a Torx (T20) screwdriver or 7 mm (9/32") socket wrench. Torque to 50–60 in-lb (5.6–6.8 N·m). See Fig. 8.

# Service

## Ball Check Valve Repair

### Tools Required

- Torque wrench
- 10 mm socket wrench
- O-ring pick

### Disassembly

#### **⚠ WARNING**

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

**NOTE:** A Fluid Section Repair Kit is available. Refer to page 28 to order the correct kit for your pump. Parts included in the kit are marked with an asterisk, for example (16\*). Use all the parts in the kit for the best results.

**NOTE:** To ensure proper seating of the balls (16), always replace the seats (17) when replacing the balls.

1. **Relieve the pressure.** Disconnect all hoses.
  - Remove the pump from its mounting.
3. Using a 10 mm socket wrench, remove the four bolts (6) holding the outlet manifold (1) to the fluid covers (2). See Fig. 12.
4. Remove the seats (17) and balls (16) from the manifold.
5. Turn the pump over and remove the inlet manifold (3). Remove the seats (17) and balls (16) from the fluid covers (2).

### Reassembly

1. Clean all parts and inspect for wear or damage. Replace parts as needed.
2. Reassemble in the reverse order, following all notes in Fig. 12. Be sure the ball checks are assembled **exactly** as shown. The arrows (A) on the fluid covers (2) **must** point toward the outlet manifold (1).

1. Apply medium-strength (blue) Loctite or equivalent to the threads, and torque to 120 to 130 in-lb (14 to 15 N.m).
2. Arrow (A) must point toward outlet manifold (1).

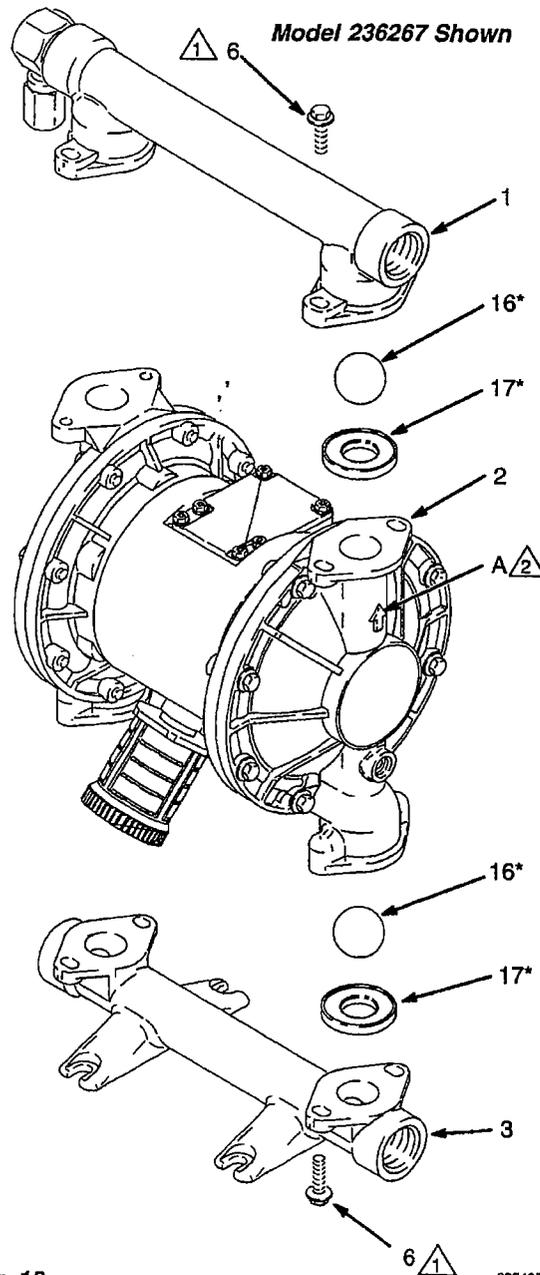


Fig. 12

03540E

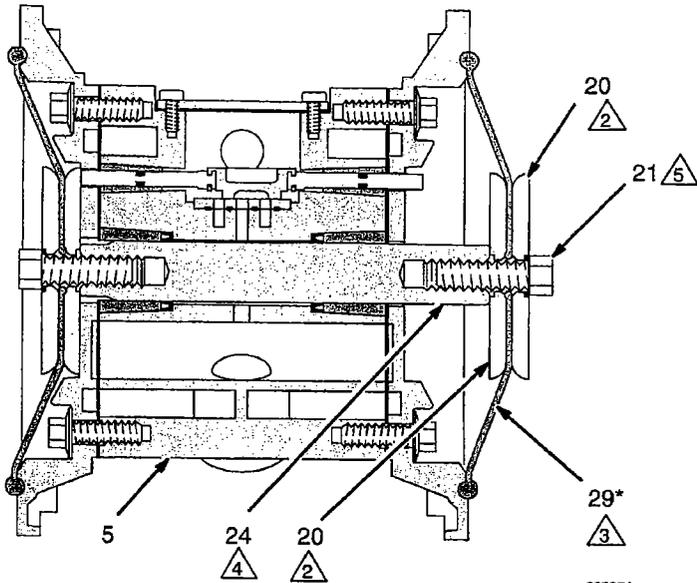
# Service

4. Loosen but do not remove the diaphragm shaft bolts (21), using a 15 mm socket wrench on both bolts.
  5. Unscrew one bolt from the diaphragm shaft (24) and remove the o-ring (25), fluid side diaphragm plate (20), diaphragm (29), and air side diaphragm plate (20). See Fig. 14.
  6. Pull the other diaphragm assembly and the diaphragm shaft (24) out of the center housing (5). Remove the bolt (21) from the shaft and disassemble the remaining diaphragm assembly.
  7. Inspect the diaphragm shaft (24) for wear or scratches. If it is damaged, inspect the bearings (23) in place. If the bearings are damaged, refer to page 22.
  8. Reach into the center housing (5) with an o-ring pick and hook the u-cup packings (22), then pull them out of the housing. This can be done with the bearings (23) in place.
  9. Clean all parts and inspect for wear or damage. Replace parts as needed.
- c. Install the diaphragm (29\*) on the bolt. Make certain the side marked AIR SIDE faces the center housing (5).
  - d. Install the air side diaphragm plate (20) so the rounded side faces the diaphragm (29).
  - e. Apply medium-strength (blue) Loctite or equivalent to the bolt (21) threads. Screw the bolt (21) into the shaft (24) hand tight.
3. Grease the length and ends of the diaphragm shaft (24), and slide it through the housing (5).
  4. Assemble the other diaphragm assembly to the shaft as explained in step 2.
  5. Hold one shaft bolt (21) with a wrench and torque the other bolt to 20 to 25 ft-lb (27 to 34 N.m) at 100 rpm maximum.
  6. Align the fluid covers (2) and the center housing (5) so the arrows (A) on the covers face the same direction as the air valve (B). Apply medium-strength (blue) Loctite or equivalent to the threads of the screws (6), and secure the covers with the screws (6) hand tight. See Fig. 13. Using a 10 mm socket wrench, torque the screws oppositely and evenly to 120 to 130 in-lb (14 to 15 N.m).
  7. Reassemble the ball check valves and manifolds as explained on page 18.

## Reassembly

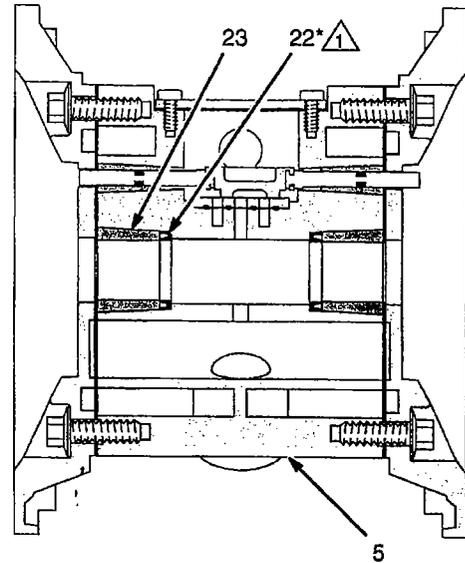
1. Install the shaft u-cup packings (22\*) so the lips face **out** of the housing (5). Lubricate the packings. See Fig. 14.
2. Install the diaphragm assembly on one end of the shaft (24) as follows:
  - a. Install the o-ring (25\*) on the shaft bolt (21).
  - b. Install the fluid side diaphragm plate (20) on the bolt so the rounded side faces the diaphragm (29).

# Service



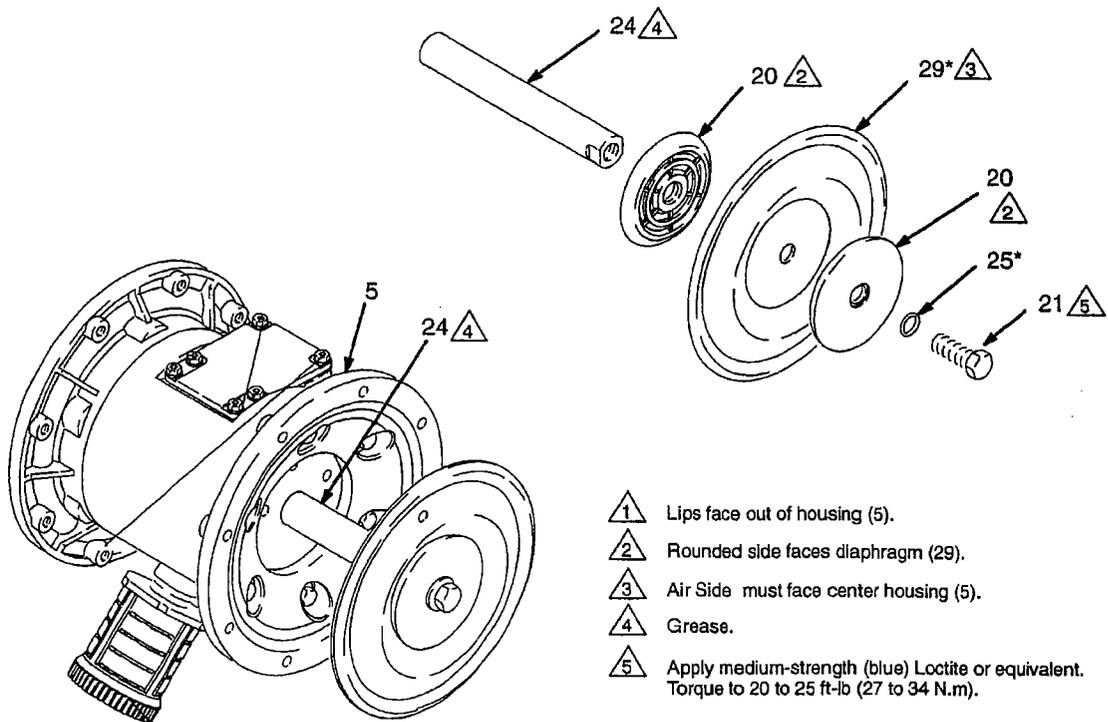
**Cutaway View, with Diaphragms In Place**

03535A



**Cutaway View, with Diaphragms Removed**

02837A



- 1 Lips face out of housing (5).
- 2 Rounded side faces diaphragm (29).
- 3 Air Side must face center housing (5).
- 4 Grease.
- 5 Apply medium-strength (blue) Loctite or equivalent. Torque to 20 to 25 ft-lb (27 to 34 N.m).

# Service

## Bearing and Air Gasket Removal

### Tools Required

- Torque wrench
- 10 mm socket wrench
- Bearing puller
- O-ring pick
- Press, or block and mallet

### Disassembly

#### **WARNING**

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 12.

**NOTE:** Do not remove undamaged bearings.

1. **Relieve the pressure.**
2. Remove the manifolds and disassemble the ball check valves as explained on page 18.
3. Remove the fluid covers and diaphragm assemblies as explained on page 19.

**NOTE:** If you are removing only the diaphragm shaft bearing (23), skip step 4.

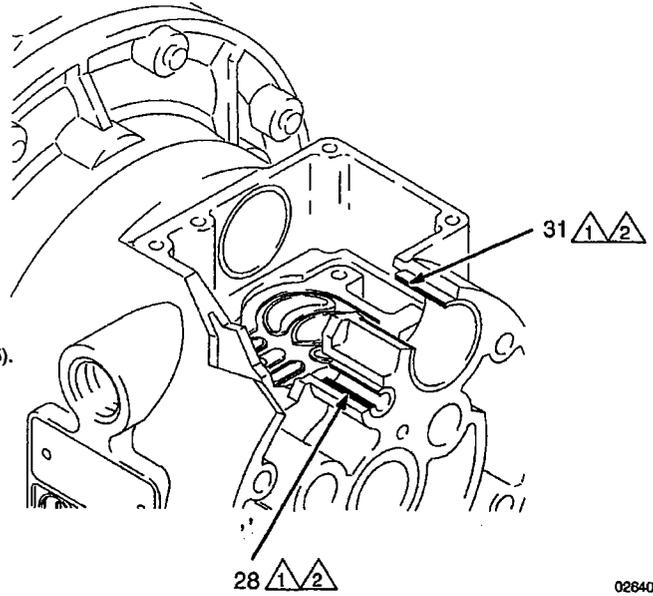
4. Disassemble the air valve as explained on page 16.
5. Using a 10 mm socket wrench, remove the screws (6) holding the air covers (4) to the center housing (5). See Fig. 15.
6. Remove the air cover gaskets (32). Always replace the gaskets with new ones.
7. Use a bearing puller to remove the diaphragm shaft bearings (23), air valve bearings (31) or pilot pin bearings (28). Do not remove undamaged bearings.
8. If you removed the diaphragm shaft bearings (23), reach into the center housing (5) with an o-ring pick and hook the u-cup packings (22), then pull them out of the housing. Inspect the packings. See Fig. 14.

### Reassembly

1. If removed, install the shaft u-cup packings (22\*) so the lips face **out** of the housing (5).
2. The bearings (23, 28, and 31) are tapered and can only be installed one way. Insert the bearings into the center housing (5), **tapered end first**. Using a press or a block and rubber mallet, press-fit the bearing so it is flush with the surface of the center housing.
3. Reassemble the air valve as explained on page 17.
4. Align the new air cover gasket (32) so the pilot pin (26) protruding from the center housing (5) fits through the proper hole (H) in the gasket.
5. Align the air cover (4) so the pilot pin (26) fits in the middle hole (M) of the three small holes near the center of the cover. Apply medium-strength (blue) Loctite or equivalent to the threads of the screws, and install the screws (6), hand tight. See Fig. 15. Using a 10 mm socket wrench, torque the screws oppositely and evenly to 120 to 130 in-lb (14 to 15 N.m).
6. Install the diaphragm assemblies and fluid covers as explained on page 19.
7. Reassemble the ball check valves and manifolds as explained on page 18.

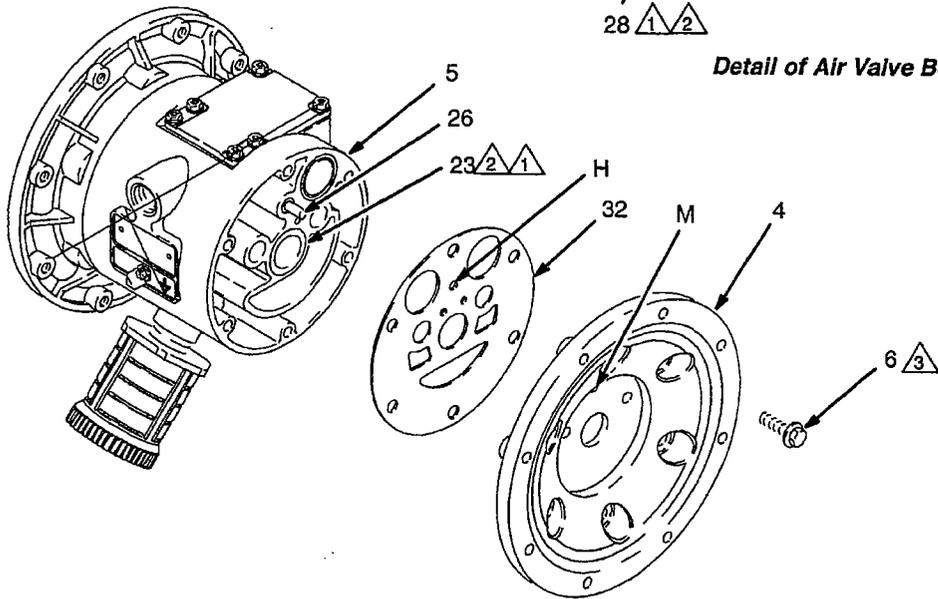
# Service

- 1 Insert bearings tapered end first.
- 2 Press-fit bearings flush with surface of center housing (5).
- 3 Apply medium-strength (blue) Loctite or equivalent. Torque to 120 to 130 in-lb (14 to 15 N.m).



02640

**Detail of Air Valve Bearings**



**Fig. 15**

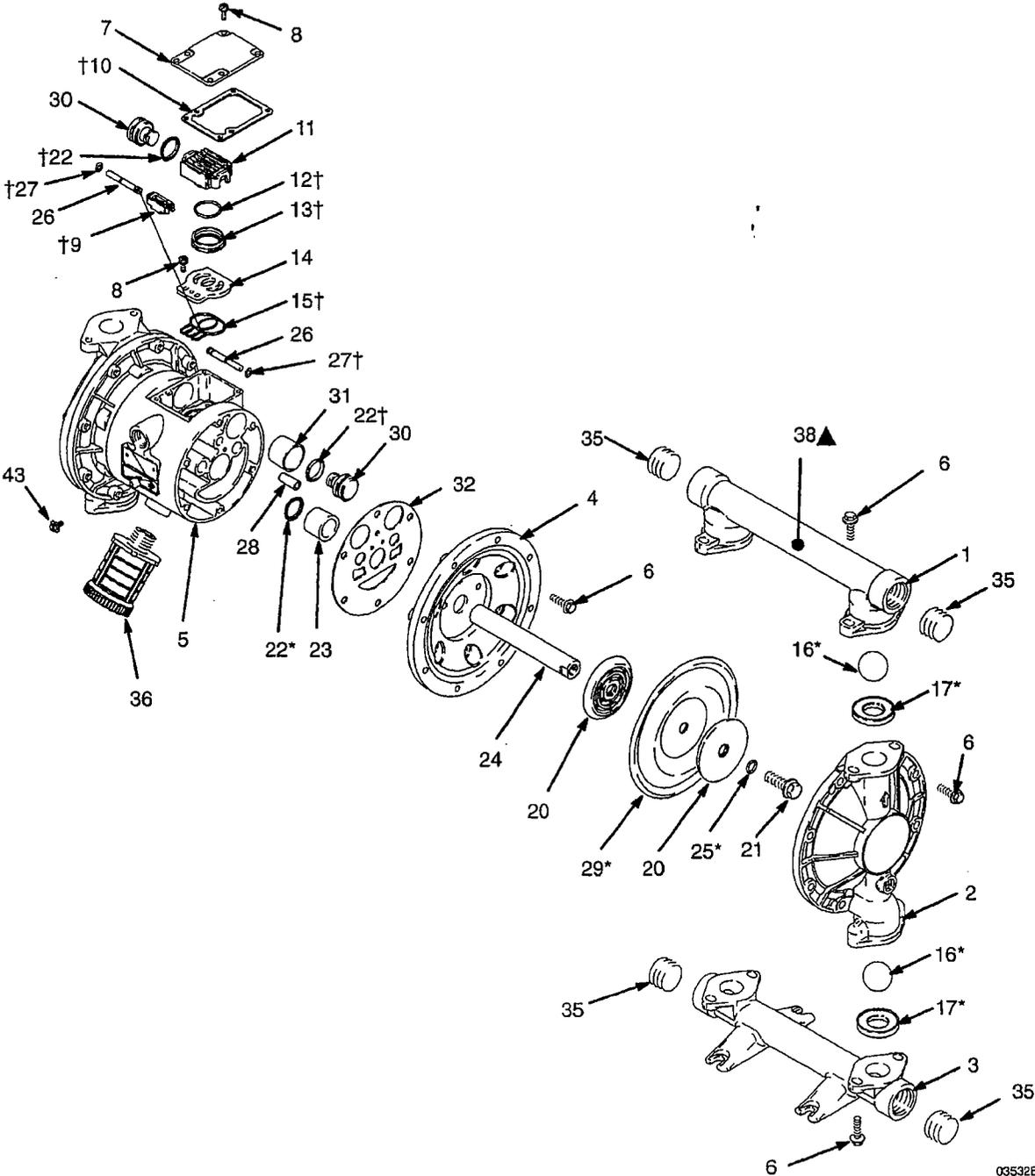
02639B

# Parts Drawing

## EVACUATION AND TRANSFER PUMPS

art No. 236265

with Hytrel® Diaphragms and Seats, Acetal Balls



03532B

# Parts List

## EVACUATION AND TRANSFER PUMPS

Part No. 236265

with Hytrel® Diaphragms and Seats, Acetal Balls

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
1	188842	MANIFOLD, outlet; aluminum	1	22†	112181	PACKING, u-cup; nitrile	4
2	188840	COVER, fluid; aluminum	2	23	188609	BEARING, shaft; acetal	2
3	188841	MANIFOLD, inlet; aluminum	1	24	188608	SHAFT, diaphragm; stainless steel	1
4	188839	COVER, air; aluminum	2	25*	104319	O-RING; Teflon	2
5	188838	HOUSING, center; aluminum	1	26	188610	PIN, push; stainless steel	2
6	115643	SCREW, machine, hex washer hd; M8 x 1.25; 25 mm (1 in.) long	36	27†	157628	O-RING; buna-N	2
7	188854	COVER, air valve; aluminum	1	28	188611	BEARING, pin; acetal	2
8	116344	SCREW, machine, hex flange hd; M5 x 0.8 thread forming; 12 mm (0.47 in.) long	9	29*	188606	DIAPHRAGM, Hytrel	2
9†	188614	BLOCK, pilot; acetal	1	30	188612	PISTON, actuator; acetal	2
10†	188618	GASKET, cover; molded Santoprene	1	31	188613	BEARING, piston; acetal	2
11	188855	CARRIAGE, air valve; aluminum	1	32	188603	GASKET, air cover; HDPE foam	2
12†	108730	O-RING; nitrile	1	35	112183	PLUG, pipe; 1" npt; carbon steel	4
13†	188616	BLOCK, air valve; acetal	1	36	112182	MUFFLER	1
14	188615	PLATE, air valve; stainless steel	1	38▲	188970	LABEL, warning	2
15†	188617	SEAL, valve plate; buna-N	1	43	116343	SCREW, grounding	1
16*	112254	BALL, Acetal	4				
17*	188711	SEAT, ball, Hytrel	4				
20	188607	PLATE, diaphragm; aluminum	4				
21	189044	BOLT, hex hd; M12 x 1.75; 35 mm (1.38 in.) long	2				

\* These parts are included in the Fluid Section Repair Kits. Refer to page 28 for the correct kit for your pump.

† These parts are included in Air Valve Repair Kit 236273.

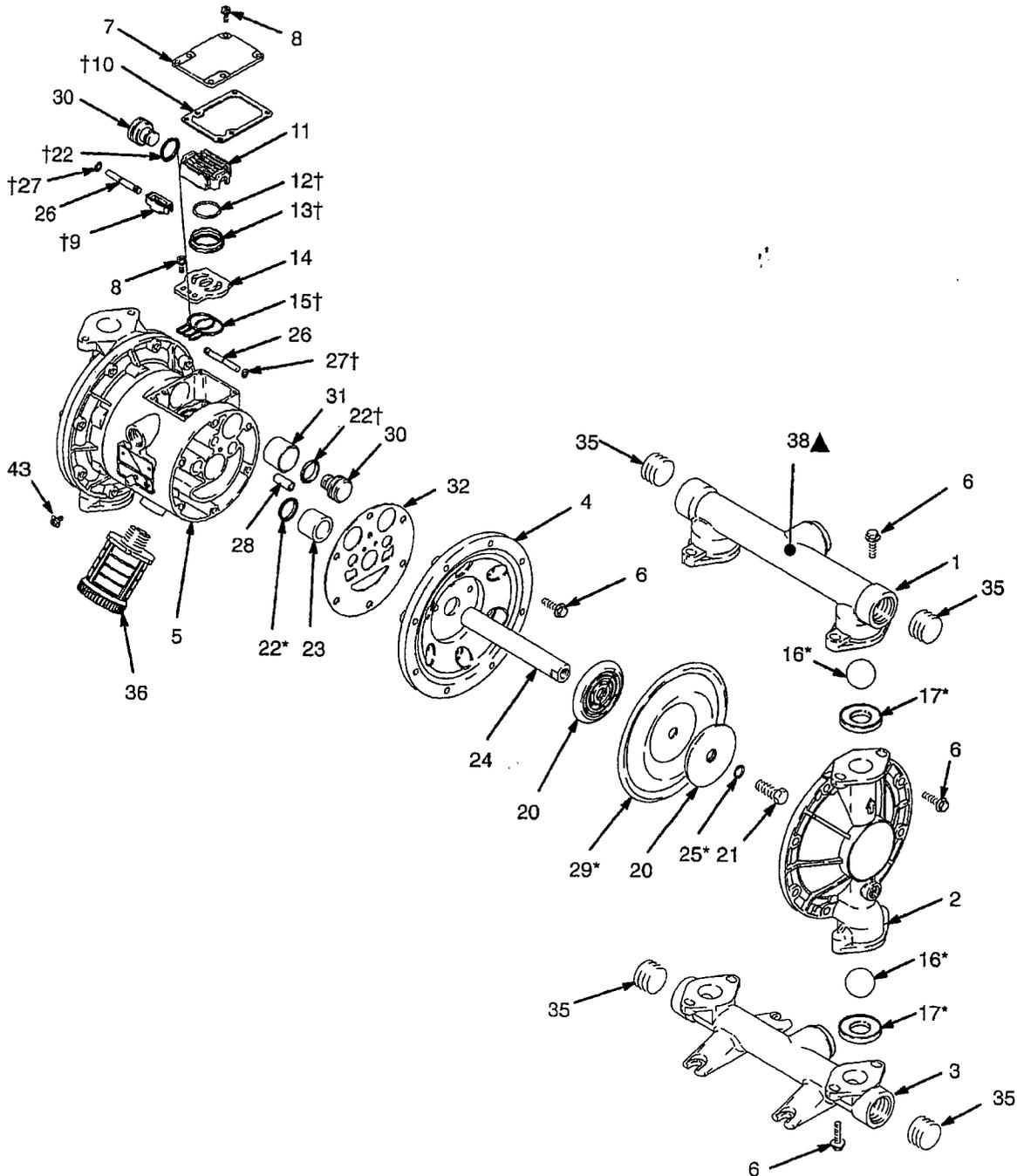
▲ Replacement Danger and Warning labels, tags and cards are available at no cost.

# Parts Drawing

## FUEL DISPENSE PUMPS

Part No. 236267

with Hytrel® Diaphragms and Seats, Acetal Balls



# Technical Data

## Fuel Dispense Pumps (Model 236267)

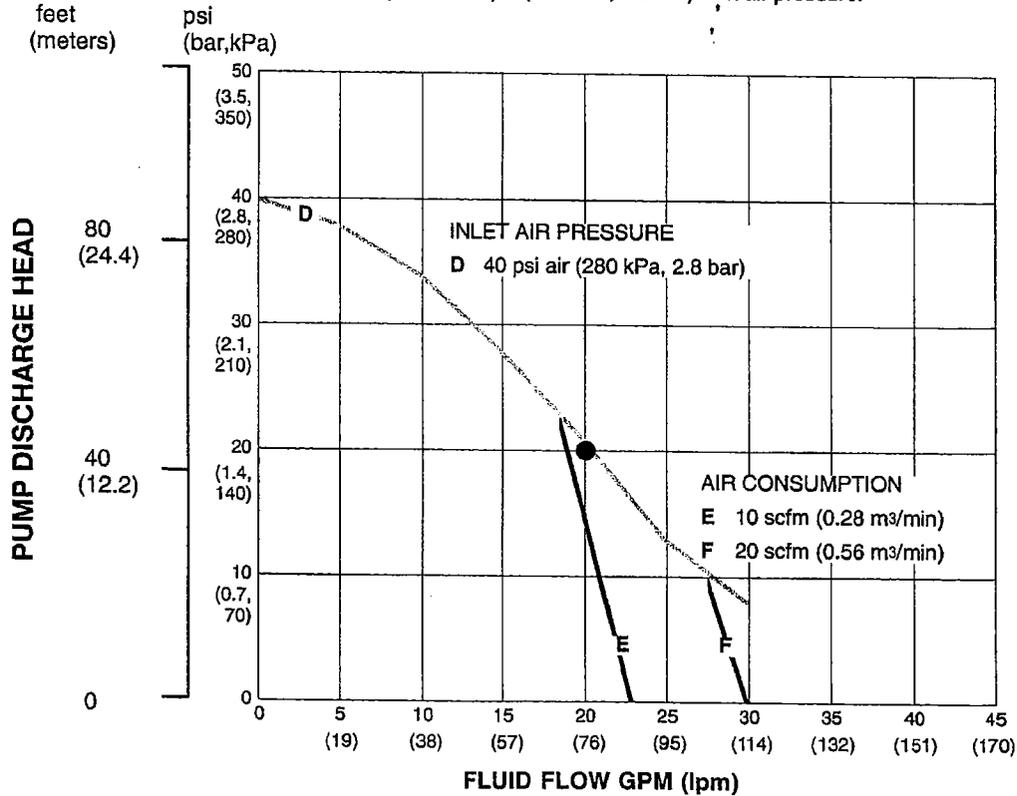
Maximum fluid working pressure . . . 50 psi (350 kPa, 3.5 bar)  
 Air pressure operating range . . . 20 to 50 psi (140 to 350 kPa, 1.4 to 3.5 bar)  
 Maximum air consumption . . . . . 60 scfm  
 Air consumption at 70 psi/20 gpm . . . . . 20 scfm (see chart)  
 Maximum free flow delivery . . . . . 42 gpm (159 l/min)  
 Maximum pump speed . . . . . 276 cpm  
 Gallons (Liters) per cycle . . . . . 0.15 (0.57)  
 Maximum suction lift . . . . . 18 ft (5.48 m) wet or dry  
 Maximum size pumpable solids . . . . . 1/8 in. (3.2 mm)  
 Maximum operating temperature . . . . . 150°F (65.5°C)  
 \* Noise level at 50 psi, 50 cycles/min: . . . . . 78 dBa

Air inlet size . . . . . 1/2 npt(f)  
 Fluid inlet size. . . . . 1" npt(f)  
 Fluid outlet size. . . . . 1" npt(f)  
 Wetted parts . . . . . Model 236267: aluminum, Hytrel®, acetal, Teflon®  
 Non-wetted external parts . . . . . aluminum, 302 stainless steel, polyester (labels)  
 Weight . . . . . 18 lb (8.2 kg)

Teflon®, Viton®, and Hytrel® are registered trademarks of the DuPont Co.  
 Loctite® is a registered trademark of the Loctite Corporation.

\* Noise levels measured with the pump mounted on the floor, using Rubber Foot Kit 236452. Sound power measured per ISO Standard 9216.

**Example of Finding Pump Air Consumption and Air Pressure at a Specific Fluid Delivery and Discharge Head:**  
 To supply 20 gpm (76 liters) fluid flow (horizontal scale) at 20 psi (140 kPa, 1.4 bar) discharge head pressure (vertical scale) requires approximately 11 scfm (0.31 m<sup>3</sup>/min) air consumption at 40 psi (280 kPa, 2.8 bar) inlet air pressure.



**TEST CONDITIONS**  
 Pump tested in water with Teflon diaphragm and inlet submerged.

**KEY**  
 - - - - - FLUID PRESSURE AND FLOW  
 ——— SCFM AIR CONSUMPTION

# Graco Warranties

## Graco Standard Husky Pump Warranty

Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of five years from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

**THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within six years of the date of sale.

Graco makes no warranty, and disclaims all implied warranties of merchantability and fitness for a particular purpose in connection with accessories, equipment, materials or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

### **FOR GRACO CANADA CUSTOMERS**

The parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés à la suite de ou en rapport, directement ou indirectement, avec les procédures concernées.

## Extended Product Warranty

Graco warrants all Husky 205, 307, 515, 716, 1040, 1590, 2150, and 3275 air valve center sections to be free from defects in material and workmanship for a period of fifteen years from date installed in service by the original purchaser. Normal wear of items such as packings or seals are not considered to be defects in material and workmanship.

Five years	Graco will provide parts and labor.
Six to Fifteen years	Graco will replace defective parts only.

# Graco Information

**TO PLACE AN ORDER**, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you:

1-800-533-9655 Toll Free

612-623-6928

612-378-3590 Fax

*All written and visual data contained in this document reflects the latest product information available at the time of publication. Graco reserves the right to make changes at any time without notice.*

**Sales Offices:** Minneapolis, Detroit  
**International Offices:** Belgium, Korea, Hong Kong, Japan

[www.graco.com](http://www.graco.com)

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