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WORK PLAN RAC ACTION FOR STATEMENT OF WORK DESIGN SUBSURFACE  
PETROLEUM REMEDIATION BUILDINGS 130 AND 3996 MCAS CHERRY POINT NC  
4/7/2000  
J. A. JONES ENVIRONMENTAL SERVICES COMPANY



**WORK PLAN**  
**Task Order No. 045**  
**RAC Action for Statement of Work Design**  
**Subsurface Petroleum Remediation**  
**Buildings 130 and 3996**  
**Marine Corps Air Station**  
**Cherry Point, North Carolina**

Prepared for

Prepared for

The Atlantic Division, Naval Facilities Engineering Command

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## ACRONYM LIST

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ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APR	air purifying respirator
ASTM	American Society of Testing and Materials
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CLP	Contract Laboratory Program
CMS	Contract Management System
ConRep	Construction Representative
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
DOL	Department of Labor
EAD	Environmental Affairs Division
EZ	exclusion zone
FID	flame ionization detector
FOPS	falling object protective structures
ft bls	feet below land surface
HDPE	high density polyethylene
J.A. Jones	J.A. Jones Environmental Services Company
Law	Law Engineering and Environmental Services, Inc
LEL	lower explosive limit
LEPC	Local Emergency Planning Committee
LNAPL	light non-aqueous phase liquid
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
MSDS	material safety data sheet
MSHA	Mine Safety Health Administration
NAVFACENCOM	Navy Atlantic Division, Naval Facilities Engineering Command
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NCDOT	North Carolina Department of Transportation
NIOSH	National Institute of Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NTR	Navy Technical Representative
NOSC	Navy On-Scene Coordinator
OSHA	Occupational Safety and Health Administration

# TABLE OF CONTENTS

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<b>ACRONYM LIST</b>	<b>i</b>
<b>TABLE OF CONTENTS</b>	<b>iii</b>
<b>LIST OF TABLES</b>	<b>viii</b>
<b>LIST OF FIGURES</b>	<b>ix</b>
<b>LIST OF APPENDICES</b>	<b>xi</b>
<b>SECTION 1.0 INTRODUCTION</b>	<b>1-1</b>
1.1 SITE HISTORY AND PROJECT OBJECTIVES	1-2
1.2 SCOPE OF WORK	1-5
1.2.1 Setup/Construction of Temporary Facilities And Site Controls	1-5
1.2.2 Air Sparge Well Installation	1-6
1.2.3 Soil Vapor Extraction Well Installation	1-7
1.2.4 Product Recovery	1-8
1.2.4.1 Building 130	1-8
1.2.4.2 Building 3996	1-10
1.2.5 Trenching and Piping System Installation	1-10
1.2.6 Subsurface Petroleum Remediation System Installation	1-12
1.2.7 System Testing	1-14
1.2.8 Site Restoration	1-14
1.2.9 Demobilization	1-15
1.2.10 Operation And Maintenance	1-15
1.3 PROJECT SCHEDULE	1-15
1.4 REPORTING	1-16
1.5 GOVERNMENT FURNISHED PROPERTY	1-18
<b>SECTION 2.0 SAMPLING AND ANALYSIS PLAN</b>	<b>2-1</b>
2.1 PURPOSE AND SCOPE	2-1
2.2 CHEMICAL SAMPLING METHODOLOGIES AND ANALYTICAL REQUIREMENTS	2-1
2.2.1 Waste Characterization and Incidental Waste Samples	2-1
2.2.1.1 Soil	2-1
2.2.1.2 Water	2-3
2.2.1.3 Product	2-5
2.2.2 Operation and Maintenance Sampling	2-5
2.2.3 Soil Vapor Water and Air Compressor Condensate	2-7

## TABLE OF CONTENTS (continued)

---

2.2.5	Sample Equipment Decontamination	2-8
2.2.6	Air Monitoring Measurement Procedures	2-9
2.2.7	Sample Handling	2-10
2.2.8	Field Sampling Quality Control	2-10
2.2.9	Sample Identification	2-11
2.2.10	Sample Custody and Handling	2-13
2.2.11	Field Documentation	2-13
2.2.12	Laboratory Requirements	2-14
	2.2.12.1 Sample and Shipping Containers	2-14
	2.2.12.2 Laboratory QA/QC	2-14
	2.2.12.3 Laboratory Management of Samples	2-15
	2.2.12.4 Sample Disposal	2-15
	2.2.12.5 Laboratory Equipment Decontamination	2-16
2.2.13	References and Miscellaneous Procedures	2-16
2.3	CONSTRUCTION MATERIALS SAMPLING METHODOLOGIES AND FIELD TESTING	2-16
	2.3.1 Concrete	2-16
	2.3.2 Backfill and Fill Material Testing	2-17
<b>SECTION 3.0 WASTE STREAM MANAGEMENT PLAN</b>		<b>3-1</b>
3.1	WASTE STREAMS	3-1
3.2	WASTE CHARACTERIZATION	3-2
3.3	TREATMENT AND/OR DISPOSAL OF WASTE STREAMS	3-2
3.4	HANDLING AND TRANSPORTATION OF WASTE STREAMS	3-4
	3.4.1 Temporary Storage	3-4
	3.4.2 Transportation of Waste Streams	3-5
3.5	DOCUMENTATION OF WASTE STREAMS	3-6
<b>SECTION 4.0 ENVIRONMENTAL PROTECTION PLAN</b>		<b>4-1</b>
4.1	INTRODUCTION	4-1
4.2	EROSION AND SEDIMENT CONTROL	4-1
4.3	EXCESS SOIL TREATMENT AND DISPOSAL	4-1
4.4	CONSTRUCTION DEBRIS	4-2
4.5	AIR POLLUTION CONTROL	4-2
4.6	WATER POLLUTION CONTROL	4-2
4.7	DUST CONTROL	4-2
4.8	SPILL CONTAINMENT	4-3

## TABLE OF CONTENTS (continued)

---

4.9	ENVIRONMENTAL CONDITIONS REPORT	4-3
4.10	HAZARDOUS MATERIALS	4-3
<b>SECTION 5.0</b>	<b>SITE HEALTH AND SAFETY PLAN</b>	<b>5-1</b>
5.1	INTRODUCTION	5-1
5.1.1	Health and Safety Program Maintenance	5-2
5.1.2	Plan Acceptance	5-2
5.1.3	References	5-2
5.1.4	Description of Environmental Services	5-2
5.1.5	Site History and Description	5-3
5.2	SITE HEALTH AND SAFETY PERSONNEL	5-3
5.2.1	Certified Industrial Hygienist	5-3
5.2.2	Site Health and Safety Officer	5-3
5.2.3	Site Labor Forces	5-4
5.3	TRAINING REQUIREMENTS	5-4
5.3.1	OSHA 1910.120 Training	5-4
5.3.2	Site-Specific Training	5-5
5.3.3	Daily Safety Meeting	5-5
5.3.4	Emergency First Aid Training	5-5
5.3.5	Spill Response Training	5-6
5.4	MEDICAL SURVEILLANCE PROGRAM	5-7
5.4.1	Personnel Screening	5-7
5.4.2	Site Medical Surveillance	5-7
5.5	WORK ACTIVITIES	5-8
5.6	POTENTIAL HEALTH HAZARDS	5-8
5.6.1	Mobilization/Construct Temporary Facilities	5-9
5.6.2	Surface Water Control	5-9
5.6.3	Vertical Well Installation and Horizontal Drilling Activities	5-9
5.6.4	Hand Excavation Near Utilities	5-9
5.6.5	Machine Excavation and Backfilling	5-10
5.6.6	Treatment Building and System Installation	5-10
5.6.7	Recovery Pump Installation	5-10
5.6.8	Pipe Trenching	5-10
5.6.9	Treatment System Connections	5-11
5.6.10	Soil/Water/Air Sampling	5-11
5.6.11	Site Restoration	5-11
5.6.12	Operation and Maintenance	5-11
5.6.13	Demobilization	5-12

## TABLE OF CONTENTS (continued)

---

5.7	POTENTIAL SAFETY HAZARDS	5-12
5.7.1	Mobilization/Construct Temporary Facilities	5-14
5.7.2	Surface Water Control	5-14
5.7.3	Vertical Well Installation and Horizontal Drilling Activities	5-14
5.7.4	Hand Excavation Near Utilities	5-14
5.7.5	Machine Excavation and Backfilling	5-15
5.7.6	Treatment System Installation	5-15
5.7.7	Pipe Trenching	5-15
5.7.8	Treatment System Connections	5-16
5.7.9	Soil/Water/Air Sampling	5-16
5.7.10	Operation and Maintenance	5-16
5.7.11	Site Restoration and Demobilization	5-16
5.8	PERSONNEL PROTECTION	5-17
5.8.1	Health Hazard Protection	5-17
5.8.1.1	Personal Protection Equipment	5-18
5.8.1.2	Frequency and Types of Air Monitoring	5-19
5.8.2	Potential Safety Hazard Protection	5-20
5.8.3	Hazard Communication Program	5-21
5.8.4	Hearing Conservation Plan	5-21
5.9	WORK ZONE AND SITE CONTROL	5-21
5.10	DECONTAMINATION	5-23
5.10.1	Personnel Decontamination	5-23
5.10.2	Equipment Decontamination	5-25
5.10.3	Wastewater Disposal	5-25
5.11	CONTINGENCY PLAN	5-25
5.11.1	General Response Conditions	5-26
5.11.1.1	First Aid	5-26
5.11.1.2	Accident Report and Response Procedure	5-26
5.11.1.3	Response Requirements	5-26
5.11.2	Responsibilities	5-26
5.11.3	Public Response Agencies	5-27
5.11.4	Emergency Response Equipment	5-27
5.11.5	Accidents and Non-Routine Events	5-27
5.11.5.1	Workers Injury	5-28
5.11.5.2	Heat/Cold Stress	5-28
5.11.5.3	Fires	5-31
5.11.5.4	Inclement Weather Conditions	5-32
5.11.5.5	Refuges for an Emergency Situation	5-34

## TABLE OF CONTENTS (continued)

---

<b>SECTION 6.0</b>	<b>QUALITY CONTROL PLAN</b>	<b>6-1</b>
6.1	SUBMITTAL REGISTER	6-1
6.2	SITE QUALITY ADMINISTRATOR	6-1
6.3	INVOICE QUALITY ADMINISTRATOR	6-2
6.4	SUBMITTAL QUALITY ADMINISTRATOR	6-2
6.5	PROJECT ORGANIZATION	6-2
6.6	DEFINABLE FEATURES OF WORK	6-2
6.7	QUALITY CONTROL INSPECTIONS	6-2
6.7.1	Concrete Foundation Placement	6-3
6.7.2	Building Construction	6-4
6.7.3	Subsurface Petroleum Remediation System Installation And Utility Connection	6-5
6.7.4	Pipe Trench Excavation	6-5
6.7.5	Horizontal Drilling Activities	6-6
6.7.6	Well Installation Activities	6-7
6.7.7	Waste Characterization and Incidental Waste Stream Sampling	6-7
6.7.8	Transportation and Treatment of Petroleum-Impacted Soil And Groundwater	6-8
6.7.9	System Start-up and Operation and Maintenance	6-9
6.7.10	Soil Excavation and Backfilling Activities	6-9
6.8	LABORATORY ANALYSIS	6-11
6.9	CLOSEOUT REPORT	6-11
<b>SECTION 7.0</b>	<b>TECHNICAL SPECIFICATIONS</b>	<b>7-1</b>
7.1	TECHNICAL SPECIFICATION MODIFICATIONS	7-2
7.1.1	Air Sparge/SVE Well Pairs	7-2
7.1.2	Product Recovery Wells	7-2
7.1.3	Treatment System Building	7-3
7.1.4	System "B"	7-3
7.1.5	Submittal Register	7-3
<b>SECTION 8.0</b>	<b>CONTRACTOR GENERATED CONSTRUCTION DRAWINGS</b>	<b>8-1</b>

## LIST OF TABLES

---

<b><u>Table No.</u></b>	<b><u>Description</u></b>
2-1	Summary of Field Sampling Analysis
2-2	QC Sample Frequency
3-1	Summary of Waste Streams
3-2	Summary of Waste Stream Documentation
6-1	Submittal Register
6-2	Testing and Analysis Quality Control Log

## LIST OF FIGURES

---

<u>Figure No.</u>	<u>Description</u>
C-1	Title Sheet with Site Location Map
C-2	General Notes and Legends
C-3	Plan Index and Legend
C-4	Site Plan-Areas 1 and 1A
C-5	Site Plan Area 2
C-6	Treatment System and Utility Plan-Areas 1 and 1A
C-7	Treatment System and Utility Plan-Area 2
C-8	Soil Vapor Extraction System Piping and Instrumentation Diagrams
C-9	Air Sparge Piping and Instrumentation Diagram
C-10	Product Recovery System Piping and Instrumentation Diagrams
C-11	Treatment System Piping and Electrical Plan
C-12	Horizontal Boring and Pipe Trench Details
C-13	Soil Vapor Extraction Well and Product Recovery Well Details
C-14	Air Sparge and Soil Vapor Extraction Well Pair Details
C-15	Miscellaneous Details
E-1	Power Supply Connection and Control Panel Details
E-2	Electrical Line Diagram and Control Logic
E-3	Electrical Line Diagram and Control Logic
E-4	Electrical Line Diagram and Control Logic
2-1	Equipment Decontamination Procedure
2-2	Daily Report
3-1	Transportation and Disposal Log
5-1	Health and Safety Plan Acceptance Form
5-2	Sign-In-Log
5-3	Safety Pre-Planning Checklist
5-4	Medical Authorization/Data Sheet
5-5	Lost Time Injury Report
5-6	Accident Investigation Written Statement
5-7	Contractor Significant Incident Report
5-8	Accident Investigation Photo Log

## LIST OF FIGURES (continued)

---

<u>Figure No.</u>	<u>Description</u>
5-9	Levels of Protection Required for Various Activities
5-10	Air Monitoring Log
5-11	Permissible Noise Exposures
5-12	Emergency Telephone Numbers
5-13	Hospital Location Map
5-14	MCAS EAD Spill Report
6-1	Contractor Production Report
6-2	Contractor Quality Control Report
6-3	Contractor Deficiency Report
6-4	Rework Items List
6-5	Project Organizational Chart

## LIST OF APPENDICES

---

<b>APPENDIX A</b>	<b>CONSTRUCTION SCHEDULE</b>
<b>APPENDIX B</b>	<b>EROSION AND SEDIMENT CONTROL PLAN</b>
<b>APPENDIX C</b>	<b>TRANSPORTATION AND DISPOSAL PLAN</b>
<b>APPENDIX D</b>	<b>TASK-SPECIFIC HAZARD ANALYSIS</b>
<b>APPENDIX E</b>	<b>CHEMICAL AND PHYSICAL PROPERTIES OF KNOWN SITE CONTAMINANTS</b>
<b>APPENDIX F</b>	<b>MACHINERY AND MECHANIZED EQUIPMENT</b>

## SECTION 1.0

### INTRODUCTION

---

The purpose of this Work Plan is to describe the effort necessary to construct and implement the subsurface petroleum remediation systems at Buildings 130 and 3996 located on the Marine Corps Air Station (MCAS), Cherry Point, North Carolina. J.A. Jones Environmental Services Company (J.A. Jones) has been retained by the Department of the Navy Atlantic Division, Naval Facilities Engineering Command (NAVFACENGCOM), to prepare this Work Plan as part of the installation and operation and maintenance of the subsurface petroleum remediation systems outlined in Section 01115 General Paragraphs of this Task Order's Technical Specifications prepared by Law Engineering and Environmental Services, Inc. (Law).

The work scope includes the construction of the subsurface petroleum remediation systems consisting of six product recovery wells at the Building 130 site and 21 air sparge/SVE well pairs and product recovery in an existing on site groundwater monitoring well at the Building 3996 site. In addition, the work scope includes system start-up and operation and maintenance activities.

This Work Plan is organized into eight sections of text and six appendices. The Work Plan addresses each of the tasks contained in Paragraph 1.2.1, Section 01115 General Paragraphs of the Technical Specifications. A brief description of each section is presented as follows.

**Section 1.0 Introduction** of this Work Plan contains a brief description of the site history, project objectives, and construction schedule, as well as a summary of well installation, trench construction, treatment system construction, and site restoration activities.

**Section 2.0 Sampling and Analysis Plan** contains all sampling and analysis requirements to characterize petroleum-impacted soil and groundwater and evaluate treatment system performance.

**Section 3.0 Waste Stream Management Plan** discusses the characterization, disposal, handling, and transportation of wastes encountered or accumulated during construction or operation and maintenance activities.

**Section 4.0 Environmental Protection Plan** addresses the Environmental Protection Plan in accordance with the requirements of Section 4.0, Part 4 of the Basic Contract.

**Section 5.0 Site Health and Safety Plan (SHSP)** addresses site-specific health and safety issues associated with project construction activities.

**Section 6.0 Quality Control Plan** details the site-specific Quality Control (QC) procedures and contains a completed Submittal Register to document quality control for materials, inspections, and testing in accordance with Section C, Part 7.3 of the Basic Contract.

**Section 7.0 Technical Specifications** contains amended technical specifications, which apply to the Work Plan and satisfy the requirements of the Task Order.

**Section 8.0 Contractor Generated Construction Drawings** contains design drawings that detail project features including the subsurface petroleum remediation system layouts; associated details; and piping and instrumentation diagrams.

The following support documents are presented as Appendices to the Work Plan.

- **Appendix A Construction Schedule**
- **Appendix B Erosion and Sediment Control Plan**
- **Appendix C Transportation and Disposal Plan**
- **Appendix D Task-Specific Hazard Analysis**
- **Appendix E Chemical and Physical Properties of Known Site Contaminants**
- **Appendix F Machinery and Mechanized Equipment**

The following documents prepared by Law were utilized by J.A. Jones in its preparation of this Work Plan and the contractor construction drawings.

- Leaking Underground Pipeline Site Assessment Report; Building 130; Volumes I and II, dated June 1995.
- Addendum Comprehensive Site Assessment Report; Building 130; Volumes I, II, and III; dated March 1996.
- Basis of Design for Subsurface Petroleum Remediation; Building 130, Building 3996, and Pit 4 Area; dated December 18, 1996.
- Corrective Action Plan for the Recovery of Free Product and the Restoration of Petroleum Contaminated Soil and Groundwater; Building 130, Building 3996, and Pit 4 Area; Volumes I and II; dated January 1997.

## **1.1 SITE HISTORY AND PROJECT OBJECTIVES**

Building 130, located on Sixth Avenue on MCAS Cherry Point, is currently being utilized as an aircraft hanger. Light non-aqueous phase liquid (LNAPL) and petroleum-impacted soil and groundwater present at the site are suspected to be caused by an underground aviation fuel pipeline system installed during the 1940's. The pipeline

system was taken out of service in 1983. Additionally, two lubrication oil/waste oil underground storage tanks (USTs) may have contributed to the release at the Building 130 site. Building 3996 is also located on Sixth Avenue. LNAPL and petroleum-impacted soil and groundwater present at the site were suspected to be caused by the above referenced abandoned underground aviation fuel pipeline system; a former fueling station located adjacent to Building 131; three USTs, identified as 3996-1, 3996-2, and 3996-3, located on the north side of Building 3996; and two hydraulic lift pits located inside Building 3996.

The three project objectives are to recover the LNAPL, to prevent further migration of dissolved contaminant groundwater plume, and to reduce contaminant levels in the soil and groundwater to rehabilitation levels using air sparge, SVE, and product recovery methods.

Product recovery will be accomplished at the Building 130 site by using six (6) vertical product recovery wells and at the Building 3996 site by installing a canister containing an oil absorbent pad in monitoring well 74GW-10.

Soil and groundwater treatment will be accomplished by injecting compressed air into the groundwater through 21 air sparge wells installed to a depth of approximately 38 ft below land surface (bls) at the Building 3996 site. In addition, 21 SVE wells at the Building 3996 site will be installed approximately 6 ft bls in the vadose zone between the seasonally high groundwater table and ground surface. The air sparge system is designed to increase the vaporization of the volatile petroleum contaminants, as well as to enhance the biodegradation of the semi-volatile contaminants, by introducing oxygen into the groundwater. The SVE system will recover the volatilized petroleum vapors produced by the air sparge system, as well as remove the petroleum hydrocarbon soil gas.

The subsurface petroleum remediation systems are designed to reduce the elevated groundwater constituents detected in samples collected from the Buildings 130 and 3996 site to rehabilitation levels regulated by the North Carolina Department of Environment and Natural Resources (NCDENR). These rehabilitation goals are provided in the North Carolina Administrative Code (NCAC) Title 15A Subchapter 2L *Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina*. However, a more favorable alternative method of identifying groundwater rehabilitation levels is by evaluating the requirements for the No Further Action Status presented in *Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater, Volume II, dated January 2, 1998* (NCDENR Groundwater Section Guidelines). A petroleum-impacted site caused by a release from a UST system may be considered for No Further Action Status by demonstrating the site as a low risk through a risk classification evaluation in accordance with the NCDENR requirements outlined in the NCDENR Groundwater Section Guidelines. As part of the low risk classification the maximum concentration of the contaminants identified at the site are required to be below the "gross contamination levels" as identified in Table 7 of the NCDENR Groundwater Section Guidelines.

According to the Corrective Action Plan (CAP), dated January 1997, prepared by Law, the primary groundwater contaminants identified at the Building 130 site are benzene, ethylbenzene, xylenes, acenaphthene, acenaphthylene, benzo(k)fluoranthene, chrysene, fluorene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene; and at the Building 3996 site are benzene, ethylbenzene, toluene, xylenes, and naphthalene. The maximum detected groundwater concentrations in micrograms per liter ( $\mu\text{g/l}$ ) of these constituents, as presented in the CAP, with their corresponding site rehabilitation levels, as established in NCAC Title 15A Subchapter 2L and Table 7 of the NCDENR Groundwater Section Guidelines, are provided as follows.

Building 130

<u>Groundwater Constituent</u>	<u>Maximum Detected Concentration</u>	<u>Site Rehabilitation Concentrations Subchapter 2L</u>	<u>"Gross Contamination Level"</u>
Benzene	383 $\mu\text{g/l}$	1 $\mu\text{g/l}$	5,000 $\mu\text{g/l}$
Ethylbenzene	921 $\mu\text{g/l}$	29 $\mu\text{g/l}$	29,000 $\mu\text{g/l}$
Total Xylenes	2,900 $\mu\text{g/l}$	530 $\mu\text{g/l}$	87,500 $\mu\text{g/l}$
Acenaphthene	5,060 $\mu\text{g/l}$	80 $\mu\text{g/l}$	2,120 $\mu\text{g/l}$
Acenaphthylene	2,890 $\mu\text{g/l}$	210 $\mu\text{g/l}^*$	1,965 $\mu\text{g/l}$
Benzo(k)fluoranthene	65.1 $\mu\text{g/l}$	**	0.47 $\mu\text{g/l}$
Chrysene	6.18 $\mu\text{g/l}$	5 $\mu\text{g/l}$	5 $\mu\text{g/l}$
Fluorene	1,180 $\mu\text{g/l}$	210 $\mu\text{g/l}$	950 $\mu\text{g/l}$
Indeno(1,2,3-cd)pyrene	405 $\mu\text{g/l}$	**	31 $\mu\text{g/l}$
1-Methylnaphthalene	2,010 $\mu\text{g/l}$	**	10,000 $\mu\text{g/l}^{***}$
2-Methylnaphthalene	1,510 $\mu\text{g/l}$	28 $\mu\text{g/l}$	12,500 $\mu\text{g/l}$
Naphthalene	5,430 $\mu\text{g/l}$	21 $\mu\text{g/l}$	15,500 $\mu\text{g/l}$

Building 3996

<u>Groundwater Constituent</u>	<u>Maximum Detected Concentration</u>	<u>Site Rehabilitation Concentrations Subchapter 2L</u>	<u>"Gross Contamination Level"</u>
Benzene	383 $\mu\text{g/l}$	1 $\mu\text{g/l}$	5,000 $\mu\text{g/l}$
Ethylbenzene	1,910 $\mu\text{g/l}$	29 $\mu\text{g/l}$	29,000 $\mu\text{g/l}$
Toluene	41,500 $\mu\text{g/l}$	1,000 $\mu\text{g/l}$	257,500 $\mu\text{g/l}$
Total Xylenes	16,530 $\mu\text{g/l}$	530 $\mu\text{g/l}$	87,500 $\mu\text{g/l}$
Naphthalene	1,190 $\mu\text{g/l}$	21 $\mu\text{g/l}$	15,500 $\mu\text{g/l}$

\* Interim Groundwater Quality Standard

\*\* The NCDENR Groundwater Quality Standard for these compounds is the laboratory quantitation limit.

\*\*\*1-Methylnaphthalene is not listed in Table 7 of the NCDENR Groundwater Section Guidelines. As a result, for 1-Methylnaphthalene a value of 1,000 times the laboratory quantitation limit of 10 µg/l was used.

The objectives for petroleum-impacted soil include eliminating the adsorbed hydrocarbons as an ongoing source of groundwater contamination through leaching and desorption and complying with NCDENR guidelines which require remediation of all soil containing petroleum hydrocarbons in excess of target rehabilitation concentrations. The rehabilitation concentration for vadose zone petroleum-impacted soil is established for total petroleum hydrocarbons (TPH) at 10 milligrams per kilogram (mg/kg) using United States Environmental Protection Agency (USEPA) Method 5030/Modified 8015 and 10 mg/kg using USEPA Method 3550/Modified 8015.

## 1.2 SCOPE OF WORK

### 1.2.1 Setup/Construction of Temporary Facilities and Site Controls

This task will consist of the mobilization of personnel and equipment to the work site and the establishment of the temporary facilities. Temporary facilities will include portable sanitary facilities, an equipment laydown area, a stockpile area, a decontamination area, and a site refuge area. J.A. Jones will utilize its Cherry Point office trailer located on Roosevelt Boulevard during completion of the on site project activities. Project management and scheduling activities, including contractor coordination, will be conducted at this office trailer which is equipped with telephone and facsimile capabilities. Office supplies, field equipment, and personal protective clothing and equipment (PPE) will be stored in the office and/or portable equipment trailer that will be located at the Buildings 130 and 3996 site. Site controls such as construction barricades, security fencing, and sediment control features will be installed during this phase. J.A. Jones will conduct a utility clearance survey and prepare the soil staging and stockpile areas as shown on **Figures C-7 and C-15**.

Prior to the commencement of construction, the air sparge, SVE, and product recovery well trench locations at the work site will be well marked with paint and stakes, as appropriate; and an underground utility survey will be conducted by contacting the Resident Officer in Charge of Construction (ROICC), Ms. Karen Boyd. Ms. Boyd will issue a work request to Facility Maintenance for assignment of personnel to perform the survey. Additionally, J.A. Jones will coordinate with the local public utilities to verify the existing underground utilities at the construction site. Utilities, which intersect an excavation/trenching area, will be physically verified by a locating service using vacuum excavation or comparable non-destructive test methods. All marked utility lines in the excavation area will be uncovered with hand tools during construction activities. In addition, the progress of excavations conducted with machinery will be continuously monitored for signs of buried obstructions. Uncovered utilities will be supported to prevent damage and will remain uncovered until permission to backfill is received from

the contracting officer. Any resulting damage to underground utilities or subsurface structures will be immediately reported to the ROICC and subsequently repaired by J.A. Jones via methods approved by the ROICC.

Erosion control will consist of silt fences, which will be installed as outlined in **Section 4.0 Environmental Protection Plan** of this Work Plan. In addition, plastic sheeting, silt fences, and hay bales will be available on site for covering and berming staged material to control runoff or dust, or if it becomes necessary to contain soil in the staging area overnight. Detail F, **Figure C-15** provides a detail of the staked silt fence to be installed along the ends of the pipe trench excavations. Temporary containment of potentially contaminated excavated soil is depicted in Detail J, **Figure C-15**. The figure depicts the use of straw bales around the perimeter and plastic sheeting over the stockpiled soil. In addition, any excavation left open overnight will require temporary fencing around its perimeter. Detail G, **Figure C-15** shows a detail of the temporary barricade fencing. An Erosion and Sediment Control Plan, provided in **Appendix B**, outlines the procedures to be implemented at the site to prevent sediment migration and erosion.

Trenching activities will generate debris including asphalt, concrete, and packaging materials. Asphalt and concrete material will be collected daily and stored of in an on site waste collection container. When the container reaches its capacity, it will be transported to an MCAS disposal facility or an off site disposal facility licensed to accept construction and demolition debris.

### **1.2.2 Horizontal Boring**

In order to minimize disturbance of paved areas, trenchless directional guided horizontal boring methods will be used to install collection network piping. Drawings C-6 and C-7 show the proposed horizontal boring runs. This portion of the project will be subcontracted due to the specialized equipment and training necessary to complete horizontal boring.

The boring procedure consists of excavating an entry and exit trench to access drilling areas. These trenches will generally be at the location of well vaults. Initially, a small diameter pilot hole will be advanced using directionally guided methods to the exit trench. Once the pilot hole is completed, the boring will be reamed to its required diameter from the exit to the entry trench. Simultaneously, SDR 11 HDPE pipe casing will be pulled behind the boring from the exit pit. As a precaution, the casing pipe is also pushed from the rear using a small diameter steel pipe inside the casing pipe. Once in place, the HDPE casing pipe will be the secondary containment pipe for the product recovery system's product conveyance and air supply piping. The HDPE piping will be the primary carrier for the Air Sparge and SVE conveyance systems. The HDPE pipe will be positioned approximately 36 inches below the bottom of the paved areas and at least 18 inches below the ground surface in other areas.

Small entry and exit trenches (approximately four feet by four feet by four feet) will be excavated for the pilot hole boring equipment and casing pipe installation equipment. Multiple piping segments on the same alignment will be bored in a single run without setting up in each well head location to minimize the number of boring access trenches required. Entry and exit trenches may be backfilled with petroleum-contaminated soil if they are located within the SVE system "area of influence". Soils found to be contaminated outside the SVE "area of influence" may not be utilized as backfill. The petroleum-contaminated cuttings will be containerized and sampled in accordance with the requirements outlined in **Section 2.0 Sampling and Analysis Plan** of this Work Plan.

### **1.2.2 Air Sparge Well Installation**

Twenty-one (21) 2-inch diameter vertical air sparge wells at the Building 3996 site will be constructed to the top of the Yorktown formation. Along Sixth Avenue, the Yorktown formation is located at a depth of approximately 38 ft bls. The air sparge wells will be installed by drilling a 7.88-inch diameter borehole with a 4.25-inch inside diameter hollow-stem auger. Each air sparge well casing/screen assembly will be inserted into the borehole through the hollow-stem auger. These wells will be constructed with a 5-foot section of 2-inch diameter, 0.02-inch slot width Circumslot™ polyvinyl chloride (PVC) well screen set to the top of the Yorktown formation. The well screen will be flush threaded to 2-inch diameter Schedule 80 PVC well casing. No glues or adhesives will be used to connect the casing sections or screens.

The sand pack in each well will consist of washed, grade 6/20 silica sand that is appropriate for the formation and slot size of the screen. The sand pack will be placed in the annulus between the casing and borehole and will extend one-foot above the top of the screen. A bentonite pellet seal one-foot thick will be placed immediately above the sand pack. Type I Portland cement grout will be placed in the remaining annular space to the bottom of the three by three by two-foot manway. The well locations are shown in **Figures C-6 and C-7**. A detail of the air sparge well is shown in Detail D, **Figure C-14**.

The 21 vertical air sparge wells will be installed and developed in accordance with EPA Manual of Water Well Construction Practices and North Carolina Title 15A, Subchapter 2C Regulations. The groundwater removed during development activities will be collected in storage tanks and sampled in accordance with the requirements outlined in **Section 2.0 Sampling and Analysis Plan** of this Work Plan.

The well cuttings generated during air sparge well installation activities will be containerized and sampled in accordance with the requirements outlined in **Section 2.0 Sampling and Analysis Plan** of this Work Plan.

### **1.2.3 Soil Vapor Extraction Well Installation**

Twenty-one (21) 2-inch diameter SVE wells at the Building 3996 site will be installed to a depth of approximately 6 ft bls with the well screen interval from approximately 3.5 to

6 ft bls. The SVE wells will be installed by drilling a 7.88-inch diameter borehole with a 4.25-inch inside diameter hollow-stem auger. Each SVE well casing/screen assembly will be inserted into the borehole through the hollow-stem auger. These well screens will be constructed with a 2.5-foot section of 2-inch diameter, 0.02 inch slot width Circumslot™ PVC well screen flush threaded to a 2-foot section of 2-inch diameter Schedule 40 PVC well casing. No glues or adhesives will be used to connect the casing sections or screens.

The sand pack in each well will consist of washed, grade 6/20 silica sand that is appropriate for the formation and slot size of the screen. The sand pack will be placed in the annulus between the casing and borehole and will extend to the bottom of the three-by-three- by two-foot or two- by two- by two-foot manway. The well locations are shown in **Figures C-6 and C-7**. The construction detail for the SVE wells is shown in Detail D, **Figure C-14**.

The well cuttings generated during SVE well installation activities will be containerized and sampled in accordance with the requirements outlined in **Section 2.0 Sampling and Analysis Plan** of this Work Plan.

#### **1.2.4 Product Recovery**

##### **1.2.4.1 Building 130**

Six product recovery wells will be installed in the immediate vicinity surrounding the west corner of Building 130. The six product recovery wells will be located in the interpreted areal extent of product based on the CAP prepared by Law. The six product recovery wells and groundwater monitoring wells 72GW-01, 72GW-03, 72GS-15, and 72GW-17 will identify the areal magnitude of product occurrence in the area of Building 130.

##### Product Recovery Well Installation

Six 4-inch diameter product recovery wells will be constructed to a depth of approximately 23.5 ft bls with the screen interval from 8 to 23 ft bls. These wells will be installed by drilling a 10.5-inch diameter borehole with a 6.5-inch inside diameter hollow-stem auger. Each product recovery well casing/screen assembly will be inserted into the borehole through the hollow-stem auger. The product recovery wells will be constructed with a 15-foot section of 4-inch diameter, 0.02-inch slot width, Schedule 40 PVC well screen flush threaded to 6.5 feet of 4-inch diameter, Schedule 40 PVC well casing. No glues or adhesives will be used to connect the casing sections or screens

A sand pack in each well will consist of washed, grade 6/20 silica sand that is appropriate for the formation and slot size of the screen. The sand pack will be placed in the annulus between the casing and borehole and will extend two feet above the top of the screen. A bentonite pellet seal one-foot thick will be placed immediately above the sand pack.

Type I Portland cement grout will be placed in the remaining annular space to the bottom of the two- by two- by two-foot manway. The locations for the proposed product recovery wells are shown in **Figure C-6**. The construction detail for the proposed product recovery wells is shown as Detail C, **Figure C-13**.

The 6 product recovery wells will be installed and developed in accordance with EPA Manual of Water Well Construction Practices and North Carolina Title 15A, Subchapter 2C Regulations. The groundwater removed during development activities will be collected in storage tanks and sampled in accordance with the requirements outlined in **Section 2.0 Sampling and Analysis Plan** of this Work Plan.

Pneumatic controllerless product pumps will be installed in the recovery wells following installation and development of the wells, installation of the conveyance system, and installation of the Subsurface Petroleum Remediation Building. A pressure regulator with gauge, moisture filter, and ball valve will be installed at each well head. In addition, a check valve, flow control valve, and sampling port will be included in the pump package for each well head. Each pneumatic pump will act as an in-well separator and deliver recovered product to the 500-gallon product storage tank located adjacent to the treatment system building. The product storage tank will be constructed with an integral means for secondary containment. A detail of the product storage tank is shown in **Figure C-10**.

The well cuttings accumulated during product recovery well installation activities will be containerized and sampled in accordance with the requirements outlined in **Section 2.0 Sampling and Analysis Plan** of this Work Plan.

#### **1.2.4.2 Building 3996**

Product removal will be accomplished at the Building 3996 location by installing a canister containing an oil absorbent pad in monitoring well 74GW-10. The recovered product will be collected in a 55-gallon drum temporarily stored at the site. Management of the recovered product including analytical requirements, transportation, and recycling or treatment will be completed in accordance with the requirements outlined in **Section 2.0 Sampling and Analysis Plan** and **Section 3.0 Waste Stream Management Plan**.

#### **1.2.5 Conveyance and Collection System Installation**

The horizontal boring exit and entry trenches for the air sparge, SVE, and product recovery containment piping installation will be excavated to a depth of approximately four ft bls. An appropriate means of egress from trench excavations is required for trench depths of four feet or more according to the Occupational Safety and Health Regulations (OSHA) [29 Code of Federal Regulations (CFR) part 1926.651(c)(2)], and protective systems, such as shoring or sheeting, are required for depths of five feet or more according to the OSHA regulation [29 CFR part 1926.652(a)(1)(ii)]. The protective system regulation requires that the ground be examined by a competent person and that

there is no indication of a potential cave-in. The United States Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1, September 1996) also requires a protective system in trench excavations of five feet or more. Since project personnel will not enter any pit over four ft bls, shoring and/or sheeting will not be necessary.

Entry and exit trenches may be backfilled with petroleum-contaminated soil if they are located within the SVE system "area of influence". Soils found to be contaminated outside the SVE "area of influence" may not be utilized as backfill. The petroleum-contaminated cuttings will be containerized and sampled in accordance with **Section 2.0 Sampling and Analysis Plan** of this Work Plan. If the excavated trench material is determined to be contaminated the trenches will be backfilled with another source of fill in accordance with the Technical Specifications. Backfill material will be compacted underneath areas that are designated for vegetation and that are also outside the 5-foot line of the structure to 85% of American Society of Testing and Materials (ASTM) D 698. The top 12 inches of paved area subgrades and fill within the 5-foot line of the structure will be compacted to 95% of ASTM D 698.

Excavation activities will be continuously supervised by J.A. Jones personnel who will monitor the site for evidence of undetected utilities and petroleum-impacted soil. J.A. Jones personnel will perform soil sampling during excavation activities in accordance with **Section 2.0 Sampling and Analysis Plan**. Petroleum-impacted soil will be stockpiled as discussed in **Section 3.0 Waste Stream Management Plan** or used as fill.

In the event rainfall occurs during excavation activities, standing water will be removed by pumping prior to placing materials or backfilling. Standing water from excavations within areas previously determined to contain chlorinated solvents will be containerized and transported to the Air Station Industrial Waste Water Treatment Plant (IWTP) to be disposed in the OUI Hotspot treatment system with prior approval from the Environmental Affairs Division (EAD) and the (FMD). Standing water from excavations outside the areas previously determined to contain chlorinated solvents will be containerized and transported to an oil/water separator on the Air Station for treatment and discharge as designated by the EAD. Sediment and free phase product will be removed from the water before disposal at the IWTP. Sediment will be containerized, properly labeled, sampled, and analyzed as outlined in **Section 2.0 Sampling and Analysis Plan**. Product will be deposited in the "slop fuel tanks" at Tank Farm "A" with prior approval from the Air Station Fuels Division. All waste materials will be managed in accordance with the requirements provided in **Section 3.0 Waste Stream Management Plan**. It is anticipated that dewatering activities will not be required at the site since the maximum trench excavation will be approximately five feet above the highest observed seasonal groundwater elevation and the majority of the piping installation will be completed using horizontal boring techniques. However, if groundwater is encountered during trenching activities, a dewatering plan will be prepared and submitted to the ROICC/EAD for approval.

Compressed air will be supplied to the air sparge wells through two main headers. The first header supplies compressed air to 10 air sparge wells at the Building 3996 site and will be constructed of approximately 760 linear feet of 2-inch diameter, Air Pro™ high density polyethylene (HDPE) compressed air pipe. The header supplying compressed air to the remaining 11 air sparge wells at the Building 3996 site will be constructed of approximately 910 linear feet of 2-inch diameter, Air Pro™ HDPE compressed air pipe. The Air Pro™ HDPE compressed air pipe will be assembled and tested in accordance with the manufacturer's recommendations using socket fusion equipment designed for joining thermoplastic pipe. The locations of the air sparge headers are shown in **Figures C-6 and C-7**.

The soil vapor recovery system will consist of two SVE headers. The first header conveying recovered soil vapor from 10 SVE wells at the Building 3996 site will be constructed of approximately 530 linear feet of 6-inch diameter, SDR11 HDPE pipe. The second header will convey recovered soil vapor from the remaining 11 SVE wells at the Building 3996 site and will be constructed of approximately 910 linear feet of 6-inch diameter, SDR11 HDPE pipe. In addition to the two 6-inch headers, 811 feet of 2-inch diameter SDR11 HDPE pipe will be installed as laterals from the header piping to the well heads. The locations of the SVE piping and headers is depicted on **Figures C-6 and C-7**.

Product will be conveyed from the recovery wells to the subsurface petroleum remediation system building through product resistant hose. Product hose will be Buna-N core with a PVC nitrile cover and brass sleeves and connections. Compressed air supply to the product recovery pumps will be conveyed through a 1-inch diameter, Air Pro™ HDPE pipe. Both product and compressed air supply hose will be contained within SDR11 HDPE pipe. The secondary containment pipe will be configured such that in the unlikely event of a primary pipe failure the contaminant will flow from the interstitial space back into the recovery well from which it came. The HDPE pipe will be assembled and tested in accordance with the manufacturer's recommendations using socket fusion equipment designed for joining thermoplastic pipe. Since the recovery pumps are pneumatically powered and internally regulated, buried electric conduit will not be required. The locations of the product recovery piping are shown on **Figure C-6**.

The product recovery secondary containment, SVE, and air sparge piping will be installed using horizontal boring techniques as detailed in **Section 1.2.2**.

### **1.2.6 Subsurface Petroleum Remediation System Installation**

The installation of the systems will occur following placement of the concrete foundations and the building structures. Concrete will be placed and formed in accordance with Detail E in **Figure C-15** and Section 03300 Cast-In-Place Concrete. The subsurface petroleum remediation building will be a pre-fabricated metal building with removable, insulated panels. Installation will include the placement and anchoring of the equipment skid. The air sparge system will consist of a rotary vane air compressor, 200-

gallon compressed air receiver, coalescing filter, regulator, and flow meter. Each SVE system will be configured to allow vapors to pass through a moisture separator and a particulate filter prior to entering the positive displacement vapor extraction vacuum blower. Recovered vapor will be discharged directly to the atmosphere. A 500-gallon vertical polyethylene storage tank will be used to store condensate from the air compressor. In addition, fluid from the moisture separators will be pumped to the storage tank.

The skid-mounted building will also contain the product recovery system for the Building 130 site, which will consist of an air compressor, compressed air receiver, in-line filter, regulator, and solenoid valve. Condensate from the air compressor will also be stored in the 500-gallon vertical polyethylene storage tank. The air compressor is required for the operation of the pneumatic pumps located in each of the product recovery wells.

Following placement and installation of the subsurface petroleum remediation system components, the equipment will be tied into the header piping and primary electrical system and tested for proper operation. The air sparge and each SVE system will be electrically operated with the following control logic.

1. A high level condition in the SVE moisture separator will start the centrifugal pumps, which will transfer the collected groundwater to the 500-gallon vertical polyethylene storage tank.
2. A low level condition in the SVE moisture separator will shut-down the centrifugal pumps.
3. A high-high level alarm condition in the SVE moisture separator will shut down the SVE vacuum blower. The system will require a manual restart.
4. A high-high level alarm condition in the 500-gallon vertical polyethylene storage tank will shut down the SVE vacuum blowers and air sparge air compressor.

The product recovery system will be operated using the following control logic.

1. The high-high level alarm condition in the 500-gallon vertical polyethylene storage tank will shut down the product recovery system air compressor and bleed the product recovery solenoid valve. The system will require a manual restart.
2. A 50 percent (%) indicator switch on the 500-gallon product storage tank will activate a light on the control panel indicating the tank is 50 % full.
3. A 75 % indicator switch on the 500-gallon product storage tank will activate a light on the control panel indicating the tank is 75 % full.
4. A 95 % indicator switch on the 500-gallon product storage tank will activate a light on the control panel indicating the tank is 95 % full.
5. A high-high level alarm condition in the 500-gallon product storage tank will shut down the product recovery air compressor and bleed the product recovery solenoid valve. The system will require a manual restart.

The subsurface petroleum remediation systems will be equipped with an auto-dialer located in the control panel to alert J.A. Jones in the event of an emergency or the system shuts down unexpectedly.

Subsurface petroleum remediation system start-up will be performed upon completion of all system testing. System start-up will be followed by 60 days of operation and maintenance.

### **1.2.7 System Testing**

The air sparge, SVE, and product recovery piping will be tested in accordance with the manufacturer's recommendations and the information provided in the Task Order Technical Specifications. All system components will be tested and installed in accordance with the Technical Specifications.

### **1.2.8 Site Restoration**

Each trench excavation will be backfilled to original grade. Top soil will be placed in areas to be seeded with grass and vegetation as depicted in the treatment system layouts shown on **Figures C-6** and **C-7**. The seed will match existing vegetation and will be placed at 5 pounds per 1,000 square feet. CID A-A-1909, Type I, Class 2, 10-10-10 analysis fertilizer will be provided at 25 pounds per 1,000 square feet.

Asphalt will be replaced in accordance with the treatment system layouts shown on **Figures C-6** and **C-7**, Detail K on **Figure C-15**, and Section 02971 Pavement Removal and Replacement of the Technical Specifications. A minimum of eight inches of stone base course aggregate, standard Size No. 21A, meeting the gradation requirements of the North Carolina Department of Transportation (NCDOT), will be placed on the compacted fill material. A minimum of 2 1/2-inches of prime coat and bituminous pavement will be placed to match the existing type and thickness.

Fill material placement and the placement of the treatment building concrete pads and manways will be completed in accordance with the requirements provided in **Section 2.3.1 Concrete** and **Section 2.3.2 Backfill and Fill Material Testing** of this Plan and Sections 02315 Excavation and Fill and 03300 Cast-in-Place Concrete of the Technical Specifications. These required tests include concrete mix design tests and density tests for material placed under slabs or areas to be repaved.

Concrete will be replaced to match existing in accordance with the subsurface petroleum remediation system layouts shown on **Figures C-6** and **C-7**, Detail E on **Figure C-15**, and Sections 02752 Reinforced Cement Concrete Pavement for Roads and Site Facilities and 03300 Cast-in-Place Concrete of the Technical Specifications.

### **1.2.9 Demobilization**

During demobilization, temporary facilities, utilities, and equipment will be removed from the site. In addition, any debris or litter remaining from construction activities will be removed.

### 1.2.10 Operation and Maintenance

J.A. Jones will start, operate, and maintain the subsurface petroleum remediation systems for a period of 60 days. Collection of groundwater samples from existing on site monitoring wells will be conducted as specified in **Section 2.0 Sampling and Analysis Plan**. An operation and maintenance manual for each subsurface petroleum remediation system will be prepared that document sampling activities, normal operating conditions, and troubleshooting guides. These manuals will be submitted to the Navy for review and approval at the end of system installation. Navy comments will be incorporated into the final manuals before system turnover.

Technical personnel performing scheduled operation and maintenance inspections will provide oversight of each subsurface petroleum remediation system operation. System deficiencies will be documented in a bound notebook and maintained within the building. Technical personnel are responsible for providing a report to the project superintendent for review each time a system is inspected. They will also be responsible for collecting required groundwater monitoring well and vapor effluent samples in accordance with **Section 2.0 Sampling and Analysis Plan**.

At the completion of operation and maintenance activities, the treatment systems will be turned over to the Navy for operation. The operation and maintenance manuals will be provided and training of Navy/Contractor personnel will be conducted prior to system turnover. The Site Quality Administrator (SQA) and technical personnel will verify the system is operating in accordance with the technical specifications.

## 1.3 PROJECT SCHEDULE

The project construction activities and estimated completion periods are outlined below. Several of the construction activities will occur concurrently; and the expected duration from the pre-construction conference through demobilization will be approximately twenty weeks. Preconstruction preparatory activities are not included in the twenty weeks and are expected to have a duration of approximately ten weeks. **Appendix A** provides a construction schedule for the work to be performed under this Task Order.

Preconstruction Submittal Preparation and Reviews	10	weeks
Mobilization/Construction of Temporary Facilities	1	week
Survey and Locate Utilities	1	week
Geotechnical Testing	1	week
Horizontal Drilling and Piping Placement	6	weeks
Vertical Well Installation	4	weeks
Manway Placement	5	weeks

Sampling, Transportation and Disposal of Petroleum-Impacted Material	1 week
Electrical Panel and System Structure Wiring	2 weeks
Treatment Building Foundation Construction	1 week
Equipment Placement	1 week
System Start-ups	1 week
Site Restoration and Demobilization	2 weeks

On site activities will be coordinated with facility personnel to minimize operational conflicts. In accordance with Paragraph 1.9.1 of Section 01115 General Paragraphs of the Task Order Specifications, work hours will be limited to an eight and one half hour period established by the ROICC Monday through Friday. Work will not be scheduled for Saturday or Sunday. Exceptions will be made for emergencies only. Additionally, no open trenches will be left unsecured overnight; and if possible, trenches will not be left open during the weekend.

#### 1.4 REPORTING

A list of deliverables and their anticipated submittal dates is provided in this Work Plan. These anticipated submittal dates match those deliverables listed in the Specification Section 01115 General Paragraphs.

<u>Deliverables</u>	<u>Submittal Date(s)</u>
Design Drawings	Submitted with Work Plan. Marked sets of as-built construction drawings will be delivered to the Navy Technical Representative (NTR) at project completion
Environmental Conditions Report	Two weeks prior to construction
Network Analysis Diagram	Within 30 days of Work Plan approval
Status Reports	Every 30 days from Work Plan approval
QC Meeting Minutes	Four calendar days after each QC meeting
Contractor Production Report	Daily
Contractor Quality Control Report	Daily
Rework Items List	Monthly during field operations
Permits	Digging and/or recovery well permits will be obtained by J.A. Jones
Contractor's Closeout Report	Project completion

Once approved, one set of full size contract design drawings will be at the site and available to the NTR for review during the project. At the completion of the project, the marked sets of drawings indicating changes to the design will be delivered to the NTR. Field Survey Notes will be submitted with the final as-built drawings. An electronic file of the as-built drawings will also be submitted to the NTR at this time.

J.A. Jones will prepare an Environmental Conditions Report prior to the commencement of construction. Photographs of the pre-construction condition of the work sites will be

incorporated into the report. Roads, sidewalks, and storage and staging areas subject to heavy and repeated loading will also be photographed and incorporated into the report. Copies of the Environmental Condition Report will be submitted to the NTR within two weeks prior to the start of construction.

As part of the Contract Management System (CMS), the Network Analysis Diagram and the Monthly Status Report provide an ongoing tracking system designed to limit project pitfalls and monitor project activities and upcoming events. The information required in the Monthly Status Report will be submitted in accordance with Paragraph 5.5.1, Section C of the Base Contract.

Copies of the minutes from QC meetings will be delivered to the NTR within four calendar days after each meeting. Contractor Production Reports are required to be completed by the Site Superintendent for each day work is performed. These daily reports will document the work performed and project events. A copy of the Contractor Production Report is provided in Section C, Part 6.0, of the Basic Contract and **Figure 6-1** of this Plan.

Contractor Quality Control Reports are required to be completed by the QC Manager for each day that work is performed. These daily reports identify the control phase, the definable feature of work, meetings held, approved submittals, compliance with material usage and storage, field testing completed, and work methods and schedule. A copy of the Contractor Quality Control Report is provided as **Figure 6-2**. **Section 6.0 Quality Control Plan** identifies the QC requirements for this project.

A Rework Items List will document the work that does not comply with the contract. The list includes the items that need to be reworked, the discovery date of the reworked items, and the date that they were corrected. The Rework Items List will be maintained by the SQA and will be submitted with the last daily Contractor Quality Control Report of each month. A copy of the Rework Items List is provided as **Figure 6-4**.

The digging and recovery well permits necessary to complete the project will be obtained by J.A. Jones. Registration of the SVE system will also be completed by J.A. Jones. Both the permits and the registration forms will be submitted through MCAS EAD. J.A. Jones will also submit copies of all well construction records to MCAS EAD.

At the completion of the project, J.A. Jones will submit a Contractor's Closeout Report. This report will include an introduction, summary of action, final health and safety report, summary of record documents, field changes and contract modifications, final documents, complete set of data validation results, off site transportation and treatment of materials, and a QC summary report.

## **1.5 GOVERNMENT FURNISHED PROPERTY**

J.A. Jones anticipates that government-furnished property will not be required during the project. However, any equipment, materials, or other items purchased by the Navy for this project will remain the property of the Navy following completion of the project. The items will either be turned over to the ROICC or will remain with J.A. Jones to be used on other Task Orders issued under this contract. An inventory for these items will be maintained by J.A. Jones to track the disposition of each item.

## SECTION 2.0

### SAMPLING AND ANALYSIS PLAN

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#### 2.1 PURPOSE AND SCOPE

The Sampling and Analysis Plan outlines the required testing of environmental media including construction materials during the construction and two-month operation and maintenance project phases at the Buildings 130 and 3996 site. Specifically, the Sampling and Analysis Plan outlines the required sample locations, frequency, and analyses for treatment system and groundwater monitoring well samples collected during operation and maintenance activities and the collection of any required waste characterization and incidental waste samples.

The various types of environmental samples collected during the construction and operation and maintenance phases of the project include waste characterization samples, treatment system samples, groundwater monitoring well samples, and incidental waste stream samples. Waste characterization samples are collected and analyzed to evaluate the required management, transportation, and treatment or disposal requirements for any waste stream generated during the project. Treatment system samples are collected and analyzed to evaluate the effectiveness or efficiency of the treatment system. Groundwater monitoring well samples, collected and analyzed during the operation of the subsurface petroleum remediation system, are used to evaluate system performance and to characterize the magnitude of the groundwater contaminant plume. Incidental waste stream samples are collected and analyzed to properly characterize management, transportation, and treatment or disposal requirements for any incidental waste stream, such as decontamination water, generated during project construction or operation and maintenance activities. **Table 2-1** presents a summary of the construction and operation and maintenance sampling and analyses requirements.

#### 2.2 CHEMICAL SAMPLING METHODOLOGIES AND ANALYTICAL REQUIREMENTS

##### 2.2.1 Waste Characterization and Incidental Waste Samples

###### 2.2.1.1 Soil

Waste characterization samples will be collected to evaluate handling, transportation, and treatment or disposal requirements in the event that petroleum-impacted soil is encountered during trench excavation; horizontal drilling; and air sparge, SVE, and product recovery well installation activities. Soil excavated during installation of the pipe trenches will be screened in the field with a flame ionization detector (FID) to segregate soil which is potentially impacted. Screened soil that exhibits a FID reading of 10 parts

per million (ppm) above ambient air levels will be segregated and stockpiled. For every 200 cubic yards of soil, three soil samples from each of two locations (total of six soil samples), will be collected and delivered to an approved NC Department of Water Quality laboratory. The samples will be commingled and analyzed by laboratory for the parameters presented in Table 2.1. **Section 2.2.6 Air Monitoring Measurement Procedures** outlines the procedures for direct air monitoring using a FID.

Screened soil that exhibits a FID reading of less than 10 ppm above ambient air levels can be used as trench fill material. In addition, soils which exhibit an FID reading greater than 10 ppm, which are excavated within the SVE "area of influence", may be utilized as backfill within the immediate area it was removed. To reduce the volume of soil requiring off site treatment or disposal, soil exhibiting FID readings above 500 ppm will be further segregated, stockpiled, and sampled as discussed above. A soil stockpile will require off site transportation to a facility permitted to accept petroleum-impacted soil if the soil samples collected from the stockpile detect TPH at a concentration greater than 10 mg/kg, using USEPA Methods 3550/Modified 8015 and 5030/Modified 8015.

Samples from the stockpiled soil accumulated during horizontal drilling and from the installation of the air sparge, SVE, and product recovery wells will be collected at a frequency required by the NCDENR guidance document *Guidelines for the Investigation and Remediation of Soils and Groundwater*. This guidance document requires the collection of three (3) separate soil samples from each of two borings for each 200 cubic yards of excavated, stockpiled soil (total of 6 separate samples). The six (6) separate samples will be shipped to a NC Department of Water Quality approved laboratory, commingled under controlled conditions, and analyzed for the parameters listed in Table 2.1. Soil will either be identified as RCRA or petroleum contaminated waste and disposed of accordingly, or due to the CERCLA Off-site rule, transported to a Subtitle D landfill for disposal.

The samples will be collected from the stockpile approximately 12 inches below the surface of the sampling location using a clean, plastic or stainless steel sampling utensil and mixing bowl. Equal amounts of soil, typically 16 to 32 ounces, will be collected from six locations within the soil pile and mixed in a stainless steel bowl. The sample will be adequately mixed by stirring the material in a circular fashion and occasionally turning the material over.

The following protocol outlines sample procedures for soil stockpiles, soil contained in drums, and in-situ soil from an excavation wall or floor.

- Soil Stockpiles: for every 200 cubic yards of material, grab samples will be collected at two locations. Three primary samples will be collected from each of the two locations (6 total samples) and submitted to an approved NC Division of Water Quality Laboratory for commingling and analysis.

- Drums or Other Containers: for six or less 55-gallon drums one grab sample will be collected from each drum and properly shipped to an approved NC Division of Water Quality laboratory. The laboratory shall composite the samples for analysis. Closed-top drums will be accessed using non-sparking techniques and tools.

If a sample is collected for purgeable organic compound analysis [i.e., volatile organic compounds (VOCs) and/or benzene, toluene, ethylbenzene, and xylenes (BTEX)], a portion of the sample will be directly placed into the sample container without mixing and compacted so that no head space remains in the sample container. The container rim will be cleaned of soil and material so the lid can be tightly sealed.

### **2.2.1.2 Water**

Water accumulated from development of the air sparge and product recovery wells, purging, and any decontamination water accumulated during construction activities will be disposed of according to the following. If the accumulated water is from areas where groundwater has been shown to contain chlorinated solvents, it will be containerized and transported to the IWTP to be disposed in the OU1 Hotspot treatment system, with prior approval from EAD and FMD. Sediment and free phase product must be removed from rain, purge, and development water before disposal at the IWTP. Sediment will be stockpiled in the contaminated soil pile onsite for later sampling and disposal. Product will be deposited in the “slop fuel tanks” at Tank Farm “A” with prior approval from the Fuels Division. If the accumulated water is collected outside the area shown to contain chlorinated solvents it will be collected and transported to an oil/water separator on the Air Station for treatment and discharge as designated by the EAD.

If petroleum-impacted groundwater is intended to be hauled to a recycling or treatment facility permitted to accept the material, J.A. Jones will coordinate with the treatment facility concerning any additional required number of samples and analyses to be completed.

The following sample collection protocol will be observed when collecting water samples from groundwater monitoring wells and approved temporary containers used to store groundwater for volatile organic analyses and, if required by a treatment facility, nonvolatile organic or inorganic analyses. The water sample obtained from an approved container, such as 55-gallon drums, or groundwater monitoring well will be collected using a decontaminated Teflon or stainless steel bailer.

- Volatile Organic Analyses: It is assumed the 40 ml vials, supplied by the Navy approved laboratory, contain the required preservative. The following steps must be followed when collecting water samples for volatile organic analyses:

1. Slowly pour from the top of the decontaminated Teflon or stainless steel bailer and completely fill the 40 ml vials. Cap each 40 ml vial. Dislodge all air bubbles from the cap before sealing the vial.
  2. Turn the capped vial upside-down and check for air bubbles. Tap the bottom of the vials to dislodge any bubbles that may have formed around the cap or sides. Discard and re-sample if bubbles are present.
  3. Wipe the outside of sample vials with a Kimwipe or clean paper towel.
  4. Place sample vial(s) in a zip-top plastic bag and seal the bag.
  5. Immediately pack all samples into a chilled cooler.
- Nonvolatile Organic or Inorganic Analyses: It is assumed the sample containers, supplied by the Navy approved laboratory, contain the required preservative. The following steps must be followed when collecting water samples for nonvolatile organic or inorganic analysis:
    1. Slowly pour from the top of the decontaminated Teflon or stainless steel bailer and fill the sample containers to approximately 90 percent capacity.
    2. Cap the sample containers and wipe the outer surfaces of the sample containers clean with a Kimwipe or clean paper towel.
    3. Place sample container(s) in individual zip-top plastic bags, if possible, and seal the bags.
    4. Water level/sample level may be marked on container to determine whether or not liquid is lost during storage and shipping.  
**Note:** Marking of 40 ml vials is not necessary.
    5. Immediately pack all samples into a chilled cooler.

At a minimum, three water column well volumes will be purged prior to sample collection from a monitoring well. Measurements of pH, temperature, conductivity, and appearance (turbidity) will be collected and recorded in a field notebook for each well volume removed. The representative sample will be collected once three well volumes have been removed and the pH and conductivity measurements have stabilized. If the pH and conductivity measurements have not stabilized after five water well volumes have been purged, the required sample will be collected for analyses.

### 2.2.1.3 Product

J.A. Jones will coordinate with EAD personnel concerning transportation and acceptance of any petroleum-hydrocarbon product recovered during monitoring well purge activities or during the operation of the proposed product recovery system. Product recovered during monitoring well purge activities will be containerized in a 55-gallon drum and temporarily stored at the Buildings 130 and 3996 site. If the proposed product recovery system at the Building 130 location is operational, the product accumulated during purge activities will be delivered to the 500-gallon product storage tank. It is intended to utilize the recovered product at the MCAS Cherry Point as an alternate fuel source.

## 2.2.2 Operation and Maintenance Sampling

To evaluate the horizontal migration of the dissolved groundwater contaminant plume since the last sampling event conducted in August 1995, a baseline groundwater sample collection event will be completed prior to start-up of the subsurface petroleum remediation system. At the Building 130 location a groundwater sample will be collected from monitoring wells 72GW-01, 72GW-02, 72GW-04 through 72GW-06, 72GW-09 through 72GW-11, 72GW-13, 72GW-14, 72GW-23, 72GW-28, 72GW-31, 72GW-34, and 13GW-23. At the Building 3996 location a groundwater sample will be collected from monitoring wells 74GW-01, 74GW-12, 74GW-14, 74GW-17, 74GW-21, and 74GW-23. The groundwater samples will be delivered to a Navy approved laboratory and analyzed for volatile halogenated compounds using USEPA Method 601, volatile aromatic compounds using USEPA Method 602, and semi-volatile organic compounds using USEPA Method 625.

Following system start-up, groundwater samples will be collected semi-annually in February and August of each calendar year. Based on the proposed "base-wide" long-term monitoring program developed by Richard Catlin & Associates (RC&A) the following monitoring wells were identified as sample collection locations to evaluate system performance. At the Building 130 location groundwater samples will be collected semi-annually from monitoring wells 72GW-02, 72GW-07, 72GW-14, 72GW-23, and 13GW-23. In addition, at the Building 3996 location groundwater samples will be collected semi-annually from monitoring wells 74GW-01, 74GW-05, 74GW-06, 74GW-07, 74GW-15, 74GW-17, and 74GW-23. Figures depicting the interpreted areal extent of the dissolved groundwater hydrocarbon plume are provided in the CAP prepared by Law. Samples collected during the semi-annual sampling events will be analyzed for volatile aromatic hydrocarbons using USEPA Methods 602 and the USEPA Method 610 list of polynuclear aromatic hydrocarbons using USEPA Method 625.

Air quality samples collected from the soil vapor recovery system effluent will be collected concurrently during the proposed semi-annual groundwater monitoring well sampling events scheduled for February and August of each calendar year. The effluent sample will be analyzed for volatile aromatics using USEPA Method 18.

Following system start-up, water level measurements will be obtained semi-annually during the sample collection events from eight on site monitoring wells in the area of Building 130 and from eleven on site monitoring wells in the area of Building 3996. Groundwater elevation measurements will be collected from monitoring wells 72GW-01, 72GW-02, 72GW-04, 72GW-07, 72GW-14, 72GW-15, 72GW-23, and 13GW23 in the area of Building 130 and from monitoring wells 74GW-01, 74GW-05, 74GW-06 through 74GW-08, 74GW-10, 72GW-11, 74GW-15 through 74GW-17, and 74GW-23 in the area of Building 3996. All measurements will include product thickness, if present. The information will be used to calculate groundwater elevations and to generate groundwater contour maps that are used in evaluating the groundwater flow patterns during air sparge

system operation. In addition, the depth to water measurements are used to evaluate the rate of groundwater and contaminant migration.

Post-operational monitoring will be conducted at the site quarterly for one year once groundwater treatment standards established in **Section 1.1 Site History and Project Objectives** have been met for two consecutive semi-annual sampling events. If, during the year of post-operational monitoring, the groundwater treatment standards are exceeded, the operation of the soil and groundwater treatment system may be resumed. Post-operational monitoring will include collection of groundwater samples from the same monitoring wells sampled during the semi-annual sample collection events completed during the operational monitoring period. These samples will also be analyzed for the identical parameters specified during the semi-annual collection events completed during the operational monitoring period.

Diesel-range and/or gasoline range TPH was detected above 10 mg/kg in four soil samples collected for laboratory analyses during the site assessment activities. During post-operational monitoring, four additional soil samples will be collected in the four areas that detected TPH above 10 mg/kg in soil samples collected during the site assessment activities. The soil samples collected from the vadose zone will be analyzed for TPH using USEPA Methods 3550/Modified 8015 and 5030/Modified 8015. If required, an additional soil sample will be collected from the area(s) which detected TPH at a concentration above 10 mg/kg using USEPA Methods 3550/Modified 8015 or 5030/Modified 8015 and analyzed for following USEPA Methods:

- Chlorinated and Aromatic Constituents using USEPA Method 8021
- Base Neutral/Acid Extractables using USEPA Method 8270
- Lead using USEPA Method 239.1
- Chromium using USEPA Method 218.1
- Extractable and Volatile Petroleum Hydrocarbons using the Massachusetts Method

The analytical results will be compared to the maximum soil contaminant concentrations for industrial/commercial settings established in Table 4 of the NCDENR Groundwater Section Guidelines. The maximum soil contaminant concentrations are utilized to evaluate if additional remedial action for petroleum-impacted vadose zone soil is required.

Each laboratory will be certified in accordance with the NCDENR regulations 143-215.3 (a)(1), 143-215.3 (a)(10) and NCAC 2H .0800.

A summary report of all field tests and laboratory analytical results will be submitted to the NTR within 30 days after laboratory receipt of the samples.

### **2.2.3 Soil Vapor Water and Air Compressor Condensate**

Condensate collected from the air compressor and the vadose zone interstitial soil particle water recovered from the SVE systems will be collected in a 500-gallon vertical polyethylene storage tank. The water level present in the tank will be verified during scheduled operation and maintenance inspections. Once the level in the tank is near its capacity, the condensate and soil particle water will be containerized and hauled to the Air Station IWTP to be disposed with prior EAD and FMD approval. Should it become necessary to dispose of condensate water off-site, analytical results from the baseline sampling event activities will be reviewed by the designated treatment facility prior to acceptance of the groundwater.

#### **2.2.4 Sample Equipment Decontamination**

Decontamination of field equipment is necessary to support the quality of samples by preventing cross contamination. Further, decontamination reduces health hazards and prevents the spread of contaminants off site. All reusable equipment (non-dedicated) used to collect, handle, or measure samples will be decontaminated before coming into contact with any sample. Decontamination of equipment will occur at the sampling location(s). The sample location will include a bucket in which sampling equipment can be cleaned. Decontamination water will be transferred into 55-gallon drums or a temporary Frac tank for storage. Decontamination water must be containerized and transported to the IWTP to be disposed in the OU1 Hotspot treatment system, with prior approval from EAD and FMD. Sediment and free phase product must be removed from the purge water before disposal at the IWTP. Sediment can be stockpiled in the contaminated soil pile onsite for later disposal at the "slop fuel tanks" at Tank Farm "A" with prior approval from the Fuels Division. However, if small quantities of decontamination water are collected during the project, the water may be allowed to evaporate to dryness.

All items that will come into contact with potentially contaminated media will be decontaminated before use and between sample locations. If decontaminated items are not immediately used, they will be covered either with plastic or aluminum foil depending on the size of the item. All decontamination procedures for the equipment being used are as follows:

##### General Guidelines

- Potable water will be of a known quality. Water from untested sources that may contain contaminants will not be used.
- Soap used in the soap and water rinse step will be a low phosphate detergent.
- Sampling equipment that has come into contact with oil and grease will be cleaned with methanol or other approved alternative to remove the oily material. This may be followed by a hexane rinse and then another methanol rinse.
- Decontaminated equipment will be allowed to air dry before being used.

- Documentation for all cleaning will be documented.
- Gloves, boots, safety glasses, and any other PPE will be used as specified in the site-specific health and safety plan.

Decontamination procedures for sampling equipment including split spoons, spatulas, and bowls used for sample homogenization that directly contacts sample media are identified in **Figure 2-1**.

## **2.2.5 Air Monitoring Measurement Procedures**

As outlined in **Section 2.2.1.1 Soil**, the direct measurement of organic vapors using the FID is a required step during pipe trench excavation, air sparging well installation, or recovery well installation activities. The following outlines the procedures for direct measurement of organic vapors using the FID:

- Connect measurement probe to instrument and make necessary operational checks (e.g., battery check, etc.) as outlined in the manufacturer's manual.
- Calibrate the instrument according to the manufacturer's manual.
- Verify that the instrument is reading zero and that all function and range switches are set appropriately.
- Insert the end of the probe directly into the atmosphere to be measured (e.g., breathing zone, monitoring well casing, split spoon, mason jar, etc.), and read the organic vapor concentration in ppm from the instrument display. Record the highest instrument response.
- Immediately document the reading in the field logbook, or on the appropriate field form.

## **2.2.6 Sample Handling**

Handling of sample containers upon completion of sample collection activities will be minimized. Sample containers will be placed in plastic bags prior to their placement in the shipping containers. Packing will be provided between containers to avoid breakage. A chain-of-custody, documenting the sample identifications, the number of samples, and the required analyses, will accompany the shipping containers. If shipped by common carrier, the chain of custody will be placed in a sealed plastic bag taped to the inside of the shipping containers. Shipping containers will be sealed with strapping tape to avoid tampering during transport to the laboratory.

Special handling procedures must be used for samples requiring an environment maintained at 4 degrees Celsius (i.e., samples to be analyzed for VOCs, semi-volatiles, BTEX, and/or TPH). Shipping containers will be insulated coolers and packed with wet ice. Wet ice substitutes such as dry ice, blue ice, or chemical cooling packs will not be used. Environmental samples collected from a petroleum, oil, or lubricant source will be

considered non-hazardous substances and will be delivered to an approved laboratory, within 24 hours of packaging, by a commercial carrier such as Federal Express.

Samples will typically be considered non-hazardous substances and will be transported to the laboratory by commercial shippers (i.e., Federal Express, U.S. Mail, etc.) or directly delivered if the laboratory is within a one hour drive of the site. Shipping labels for non-hazardous substances will identify the samples as "soil/water/air samples."

### 2.2.7 Field Sampling Quality Control

Field quality control will include collection of QC samples. QC samples will be collected and analyzed for the identical parameters, using the same method, as the samples collected during the same sampling event. All QC samples will be collected, handled, and documented in the same manner as samples collected during the same sampling event. QC samples will be collected for each sampling event including water sampling, solid sampling, and combined water/solid sampling events. QC samples will include the following:

- Trip Blanks: Trip blanks will be implemented only for VOC samples. The trip blanks will be prepared by the laboratory. Each trip blank will include one set of VOC vials filled with analyte-free water. The trip blanks will be placed in the same transport container as empty VOC vials and be returned to the laboratory in the same shipping container as VOC samples. A trip blank will be submitted for each cooler that transports ten or more empty or full VOC vials. The trip blanks remain unopened for the entire sampling episode.
- Pre-Cleaned Equipment Blanks: Blanks will be collected on equipment that is brought to the site precleaned and ready for use. Precleaned equipment will include disposable sampling equipment (i.e., disposable Teflon bailers, etc.). These blanks will be collected from the sampling equipment immediately prior to sampling by rinsing the sampling equipment with analyte-free water and collecting rinsate in the appropriate sample containers.
- Field-Cleaned Equipment Blanks: In the event that field decontamination of sampling equipment is necessary, blanks will be collected on equipment that has been decontaminated in the field. These blanks will be collected after the equipment is decontaminated by rinsing the sampling equipment with analyte-free water and collecting rinsate in the appropriate sample containers.
- Field Duplicates: Duplicate samples will be collected and analyzed for the identical parameters, using the same method as the samples collected during the same sampling event when five or more samples are taken in accordance with established USEPA methods in their *Standard Operating Procedures and Quality Assurance Manual* (USEPA, Environmental Compliance Branch, Athens, Georgia, February 1, 1991). The duplicates will be collected using the same sample acquisition technique used to collect samples of the same

environmental media (i.e., soil, water) for the same laboratory analysis (i.e., USEPA Method 602 and USEPA Method 5030/Modified 8015, etc.).

QC samples will be completed at the frequency identified in **Table 2-2**. QC samples for the site-specific projects at Cherry Point will be provided in a tabular format in the work plan.

Quality control of field measurements will include calibration of all field sampling equipment at the start of each sampling day in accordance with equipment manufacturers' recommendations.

### **2.2.8 Sample Identification**

All sample containers will be labeled in advance of sampling activities. The sample label will include a specific sample identification. The sample label will also include the date and time the sample was collected, the name or initials of the sampler, and the sample location. The label will also identify the container preservative, if any, as prepared by the laboratory.

The sample identification procedure will be implemented for following types of environmental samples collected during project activities.

#### Waste Characterization Samples and Incidental Waste Stream Samples

Site Type and Site Name - Location Type and Depth (optional) - Sample Collection Event Number

Site Type: UST (underground storage tank site)

Site Name: 130 (Building 130), 3996 (Building 3996), or 130/3996 (Buildings 130 and 3996)

Location Type:

DW: Development water

SS: Soil stockpiled during trenching activities

SW: Surface water

SVEW: Groundwater accumulated during the operation of the SVE system

Sample Collection Event Number:

Last two digits of calendar year and quarter (identified as a capital letter A through D) and location type number of samples collected during the quarter.

*Example:* The third soil sample collected during the fourth quarter of 1999 from the Building 130 site to evaluate the stockpiled soil during trenching activities would have the following sample identification: UST130-SS-99D3

#### Monitoring Well and Soil Vapor Extraction Effluent Samples

Site Type and Site Name - Location Type - Sample Collection Event Number

Site Name:

Monitoring wells with the prefix 13, 66, and 72 are associated with Building 130 and monitoring wells with the prefix 74 are associated with Building 3996.

Location Type:

MW: Groundwater samples collected from monitoring wells.

SVE-E: Air quality sample collected from the SVE effluent.

Sample Collection Event Number:

Last two digits of calendar year and quarter (identified as a capital letter A through D) and month in the quarter (if required).

*Example:* The subsurface petroleum remediation system at Buildings 130 and 3996 was started in January 2000. A groundwater sample was collected from monitoring well 72GW-02 in February 2000 as part of the monitoring activities. The sample would have the following sample identification: UST130-72GW03-00A

## 2.2.9 Sample Custody and Handling

A chain-of-custody record will be completed for each sampling event and will accompany the samples during shipment. The chain-of-custody record, typically completed on a carbon copy form provided by the laboratory, documents the site-specific sample information required by the laboratory. The record will, at a minimum, contain the following:

- Site name and address;
- Full name of sampler;
- Sample identification number or label for each sample;
- Collection date and time for each sample;
- Sample matrix (liquid, solid, gas);
- Number of containers for each sample;
- Sample location description for each sample;
- Required analyses for each sample;
- Preservation for each sample;
- Confirmation indicating samples were shipped on ice;
- Documentation if sample(s) is expected to be highly contaminated;
- Signature of person(s) involved in chain of possession; and,
- Transfer date(s) and time(s) in chain of possession.

Personnel preparing the chain-of-custody form (i.e., sampler) will retain a copy of the form and attach it to the project's daily field logs.

If the samples are shipped by common carrier, the chain-of-custody form will be placed in a sealed plastic bag inside the shipping container. Prior to shipment, the shipping container will be secured with strapping tape and a custody seal. Thus, in the case of using a common carrier for shipment, two signatures will be required on the final chain-of-custody: one signature by the sample technician who prepared the form and one signature of the sample custodian assigned by the laboratory. The sample custodian assigned by the laboratory will open the shipping container and will document on the chain-of-custody form any shipping container custody seal breaks and/or shipping container or sample container(s) damage.

### **2.2.10 Field Documentation**

A Field Activity Daily Log form will be completed for each day of sampling. A copy of the form is provided in **Figure 2-2**. This daily log form will be completed using waterproof ink and will be placed in a dedicated on site binder at the completion of each sampling day. Individual sheets in the dedicated binder will be signed/initialed, dated, and sequentially numbered. The dedicated binder of daily logs will be placed in the project file at the completion of each sampling event. The daily log will index and will have attached all other paperwork generated during the sampling event including well purge logs, equipment calibration sheets, sampling analysis request forms, chain-of-custody forms, and shipping receipts.

A single responsible party will be designated for field documentation whenever feasible. For multi-person sampling teams, the party responsible for documentation will be focused on the field documentation effort such as the daily log and other related forms and will not be directly involved in the sample collection activities. The field documentation will include sufficient detailed information so that the history of each sample can be retained when necessary without the assistance of the sample collection personnel. Data will typically include a detailed description of equipment decontamination procedures, equipment calibration procedures, preparatory purging at each sample location, inventory of all generated wastes, and disposition of all generated wastes.

A copy of the daily log, including all attachments, will be attached to the Daily Production Report.

### **2.2.11 Laboratory Requirements**

#### **2.2.11.1 Sample and Shipping Containers**

Sample containers required to complete the analyses will be provided by the approved laboratory. The laboratory will be responsible for evaluating and supplying the appropriate sample preservatives. The laboratory will also provide shipping containers and custody seals for each shipping container. By evaluating the size of the sample volume, the laboratory will supply the required shipping container(s).

### **2.2.11.2 Laboratory QA/QC**

The laboratory will be certified with the Navy in accordance with NEESA 20.2-047B. An acceptable substitute for Navy approval according to NEESA 20.2-047B will be current certification and participation in the USEPA Contract Laboratory Program (CLP) or certification by the U.S. Army Corps of Engineers for environmental work. Evidence of the appropriate certification(s) will be provided by the laboratory prior to completion of any analytical work.

A list of approved analytical laboratories is included in **Section 6.8 Laboratory Analysis**. The selected laboratory's data validation and quality analysis procedures will conform to USEPA and NCDENR laboratory certification Quality Assurance (QA)/QC requirements. These stringent requirements provide written procedures for laboratory methodologies, equipment, and quality analyses. Each certified North Carolina laboratory is inspected on an annual basis to verify laboratory operations are being conducted in conformance with certification requirements.

QC tests such as method blanks and matrix spikes will be completed at frequencies established by the test method or the laboratory QA/QC program, whichever is more stringent. The results of the QC tests, completed by the laboratory concurrent with the required sample analysis, will be reported with the sample results.

### **2.2.11.3 Laboratory Management of Samples**

The laboratory will assign a sample custodian to receive samples. The sample custodian will open the shipping container(s) and denote any damage to shipping container or sample containers on the chain-of-custody form for the samples. Upon receipt of a sample, the custodian will inspect the condition of each sample and document any discrepancies between information presented on the sample label and the chain-of-custody record. The custodian will assign a laboratory number to each sample, record the sample in the laboratory logbook, and store the sample in a secured storage room or cabinet until assigned to an analyst for analysis. Each sample will be stored in the appropriate conditions, such as four degrees Celsius, if required, and for maximum holding times identified by 40 CFR 136, USEPA "Guidelines Establishing Test Procedures For The Analysis Of Pollutants."

The custodian will immediately contact the person who completed the chain-of-custody in the event any shipping container seal is broken, any discrepancies between the chain-of-custody and sample labels are noted, or any sample container is damaged. Any problem(s) documented by the sample custodian will be resolved with the sample collection personnel before the sample is assigned for analysis.

### **2.2.11.4 Sample Disposal**

The laboratory will dispose of all samples in accordance with all applicable federal, state, and local environmental regulations. Prior to off site transportation of samples, the laboratory will be responsible for evaluating the classification of each sample in accordance with the environmental regulations established in 40 CFR 260 and 261. If a sample is deemed a hazardous waste by the laboratory, the sample and sample container will be disposed of or treated at a facility permitted in accordance with the requirements outlined 40 CFR 264. If a sample is deemed a non-hazardous waste by the laboratory, the sample and sample container will be disposed of or treated at a facility permitted in accordance with 40 CFR 257.

Non-hazardous soil waste samples and sample containers disposed of or treated at a facility located in North Carolina will be classified as special waste and designated as "Soil Contaminated with Petroleum Products" in accordance with NCDENR regulations.

#### **2.2.11.5 Laboratory Equipment Decontamination**

The selected laboratory will decontaminate equipment in accordance with the approved procedures established in their QA/QC program which served as the basis of their certification.

#### **2.2.12 References and Miscellaneous Procedures**

Procedures for chemical sampling and analyses have been developed to comply with standard industry practices. For issues or circumstances not covered in **Section 2.0 Sampling and Analysis Plan**, standard practices will be implemented based upon guidance provided in the following referenced documents used to develop the methodologies provided in the preceding sections.

- Guidance of USEPA as established in their *Standard Operating Procedures and Quality Assurance Manual* (USEPA, Environmental Compliance Branch, Athens, Georgia, February 1, 1991)
- Guidance of the NCDENR as established in NCAC, Title 15A, Subchapter 2L *Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina* (November 8, 1993).

### **2.3 CONSTRUCTION MATERIALS SAMPLING METHODOLOGIES AND FIELD TESTING**

#### **2.3.1 Concrete**

Sampling and testing of concrete will be in accordance with required procedures outlined in the project's technical specifications. The technical specifications will typically cross-reference procedures to specific ASTM standards. Testing will be completed by a testing laboratory certified by the NCDOT for concrete testing. Laboratory certification will be

required prior to concrete placement. Field sampling and testing will be performed by technicians trained in concrete sampling and testing procedures.

If the placement of concrete is required the following guidelines for sampling and testing will be maintained:

- Concrete will have a 28-day compressive strength of 3000 pounds per square inch (psi) and will be sampled during placement. Slump will be between 2 and 4 inches in accordance with ASTM C 143. Air content will be tested using ASTM C 33 aggregate Size No. 57 to verify 4 to 6 percent air entrainment for concrete exposed to freeze-thaw conditions. Cylinders will be taken for compressive strength testing. They will be broken on day 7 and 28 to verify the concrete is 3000 psi. A copy of test results for the mix design will be attached to the Daily Production Report for the initial day of use of each concrete supply.
- The time of arrival on site for each load of concrete will be documented. Loads will be placed within 2 hours of arrival on site. Any load, or portion of a load, on site in excess of this allowed holding time will be rejected and not used on site.
- Field tests for temperature, slump by cone method, using ASTM C 143, and entrained air by pressure method, using ASTM Method C231, will be completed for each load of concrete delivered to the site prior to placement of the load. Any load of concrete not meeting specified criteria will be rejected for use at the site. Material may be reworked on site (e.g., additional water, mixing, etc.) to meet specified criteria subject to the limits of the previously identified holding time.
- Three concrete cylinders will be collected in accordance with ASTM C 172 for every 40 cubic yards of concrete placed with a minimum of one set of cylinders collected for each day of concrete placement. One cylinder will be tested for 7-day compressive strength and one cylinder will be tested for 28-day compressive strength. The third cylinder will be tested for 28-day compressive strength if the initial 28-day test indicated deficient strength.

### **2.3.2 Backfill and Fill Material Testing**

All in-place density tests will be conducted in accordance with ASTM 1556, or ASTM D 2922 and ASTM D 3017. When ASTM D 2922 and ASTM D 3017 density tests are used, the results will be verified by performing an ASTM D 1556 density test at a location where ASTM D 2922 and ASTM D 3017 tests were completed. Under slabs or areas to be repaved, backfill will be compacted to 95% of ASTM D 698. All other areas will be compacted to 85% percent of ASTM D 698 but will not require a compaction test. Granular backfill materials including gravel and sand will be compacted to non-movement.

An independent subcontractor will perform the field density tests. Field tests will be performed by a qualified technician. Data collected by the technician will be reviewed by the Site Superintendent and ROICC. If necessary any adjustments in placement and

compaction of the fill will be made. Data will be recorded by the technician on a field log which will be presented as part of the field density test submittal.

**Table 2-1**  
**Summary of Field Sampling and Analysis**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Sample Description	Sample Location(s)	No. of Events	Number of Samples	Analytical Method	Required Turnaround Time	Comments
Treatment System Sampling	Soil Vapor Extraction System Effluents	Semi-Annual (February and August of each Calendar Year)	1 from each system effluent	USEPA Method 602 list of volatile aromatic constituents using USEPA Method 18	Normal	Collected During Soil Vapor Extraction System Operation
Initial Baseline Sampling	<b>Bldg 130</b> 72GW-01, 72GW-02, 72GW-04 through 72GW-06, 72GW-09 through 72GW-11, 72GW-13, 72GW-14, 72GW-23, 72GW-28, 72GW-31, 72GW-34, and 13GW-23. <b>Bldg 3996</b> 74GW-01, 74GW-12, 74GW-14, 74GW-17, 74GW-21, and 74GW-23.	Prior to or During Initial Construction Activities	1	USEPA Methods 601, 602 and 625	Normal	
Groundwater Monitoring Well Sampling	<b>Bldg 130</b> 72GW-02, 72GW-07, 72GW-14, 72GW-23, and 13GW-23 <b>Bldg 3996</b> 74GW-01, 74GW-05, 74GW-06, 74GW-07, 74GW-15, 74GW-17, and 74GW-23	Semi-Annual (February and August of each Calendar Year)	1	USEPA Method 602 and USEPA Method 610 list of PAHs using USEPA Method 625	Normal	Collected During System Operation

**Table 2-1**  
**Summary of Field Sampling and Analysis**  
**RAC Action for UST Remedial Action**  
**Buildings 130 and 3996**  
**Marine Corps Air Station**  
**Cherry Point, North Carolina**

Sample Description	Sample Location(s)	No. of Events	Number of Samples	Analytical Method	Required Turnaround Time	Comments
Groundwater Level Measurements	<b>Bldg 130</b> 72GW-01, 72GW-02, 72GW-04, 72GW-07, 72GW-14, 72GW-15, 72GW-23, and 13GW-23 <b>Bldg 3996</b> 74GW-01, 74GW-05, 74GW-06, 74GW-07, 74GW-08, 74GW-10, 74GW-11, 74GW-15, 74GW-16, 74GW-17, and 74GW-23	Semi-Annual (February and August of each Calendar Year)	1	None	Normal	Collected During System Operation
Waste Characterization, Incidental Waste Stream, AFVR Groundwater/ Product, Development and Purge Water, and Condensate and Soil Particle Water Sampling	Groundwater	As Required	1	USEPA Methods 601, 602 and 625	As Needed	Analyses will be based on Treatment Facility's Requirements
	Soil	As Required	1	USEPA Methods 3550/Modified 8015, 5030/Modified 8015, 9071, 8260, 8270, 8081, and RCRA metals (totals)	As Needed	Analyses will be based on Treatment/Disposal Facility's Requirements
Quality Control Sampling	Equipment Blanks	(1)	-	(1)	As Needed	
	Trip Blanks	(1)	-	(1)	As Needed	
	Duplicates	(1)	-	(1)	As Needed	

(1) Frequency of quality control sample collection is provided in Table 2-2 QC Sample Frequency of this Work Plan.  
 Required analytical methods are provided in Section 2.0 Sampling and Analysis Plan of this Work Plan.

**Table 2-2**  
**QC Sample Frequency**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Sample Description	Total Number of Samples in Event		
	<5	5-9	10+
Trip Blanks (Only Shipping Containers with VOC vials)	NR	NR	One per Shipping Container
Pre-Cleaned Equipment Blanks	One*	One*	5%, Minimum of One
Field-Cleaned Equipment Blanks	One*	One*	5%, Minimum of One
Duplicates	NR	One	10%, Minimum of One

Notes:

1. NR - Not Required
2. One\* - Either a Pre-Cleaned Equipment Blank or Field-Cleaned Equipment Blank

**Figure 2-1**  
**Equipment Decontamination Procedure**  
RAC Action for UST Remedial Action  
Buildings 130 and 3996  
Marine Corps Air Station  
Cherry Point, North Carolina

**Definitions**

**Acid** - 10% (minimum) nitric or hydrochloric acid solution. Solution to be made from reagent grade acid and deionized water. Typically, to be provided by laboratory supplying sample container.

**Tap Water** - Tap water from any municipal water treatment system. Bottled distilled water is an acceptable alternate. Water from an untreated potable water supply is not an acceptable alternate.

**Deionized Water** - Water containing no heavy metals or other inorganic compounds at or above analytical detection limits as determined by an inductively coupled Argon Plasma Spectrophotometer (ICP) Scan. Typically, to be tap water treated by a standard deionizing resin column and provided by the laboratory supplying sample containers.

**Detergent** - Alquinox or Liquinox. Alternate brands of phosphate-free laboratory detergents are acceptable.

**Organic-Free Water** - Deionized water containing no extractable organic compounds (or pesticides or herbicides) and less than 5 µg/l of purgeable organic compounds as measured by a low level GC/MS scan. Typically, to be water treated by activated carbon (and deionizing unit) and provided by the laboratory supplying sample containers.

**Solvent** - Pesticide-grade isopropanol. Alternately, pesticide-grade acetone (alternate since potential analyte in many situations) or methanol (alternate since more hazardous than isopropanol or acetone).

**Decontamination Procedure**

**Step #1--Detergent Wash**

- Wash thoroughly using brush and detergent solution (preferably made with hot tap water) to remove particulate matter.
- Equipment contaminated with oil, grease, or other hard to remove materials to be rinsed several times with solvent and/or steam cleaned if necessary.

**Step #2--Tap Water Rinse**

**Step #3--Acid Rinse (Optional)**

- Skip this step if using stainless steel or metal sampling equipment and for field instruments.
- Skip this step for field decontamination (i.e. only complete during off-site decontamination).
- Small and/or awkward equipment to be soaked if necessary to ensure thorough rinse.

**Step #4--Tap Water Rinse (Optional)**

- Skip if skipped Step #3.

**Step #5--Deionized Water Rinse**

**Step #6--Solvent Rinse**

- Rinse twice for field decontamination operations.

**Figure 2-1 (Continued)**  
**Equipment Decontamination Procedure**  
RAC Action for UST Remedial Action  
Buildings 130 and 3996  
Marine Corps Air Station  
Cherry Point, North Carolina

**Step #7--Air Dry For 24-Hours & Aluminum Foil Wrap**

- If 24-air dry not practical, rinse thoroughly with organic-free water and allow to air dry as long as possible. If organic-free water is not available, do not rinse with deionized or distilled water.

**Step #8--Tap Water Rinse**

- Rinse thoroughly in field as soon as possible after use.

**Figure 2-2  
DAILY REPORT**



**J.A. JONES**  
ENVIRONMENTAL  
SERVICES

SITE NAME: Delivery Order 045, RAC Action for UST Remedial Action, Buildings 130 and 3996, MCAS, Cherry Point, NC							
CONTRACT: N62470-93-D-3033		DAY:		DATE:		WEATHER:	
<b>PERSONNEL</b>							
NAME		POSITION		NUMBER	HOURS	S. T.	O. T.
<b>EQUIPMENT</b>	<b>SIZE/SPEC</b>	<b>NUMBER</b>	<b>SAMPLING EQUIPMENT</b>	<b>NUMBER</b>	<b>VEHICLE</b>	<b>NUMBER</b>	<b>MILES</b>
Air Compressor			Hand Augers				
Backhoe			S.S. Scoops		Car		
Loader			Sample Jars (16 oz.)		Pick-Up Truck		
Excavator			Sample Jars (32 oz.)		Van		
Plate Compactor			40 Mil Vials		2-Ton Flatbed		
Jumping Jack			Disposable Bailers		2-Ton Dumptruck		
Cutoff Saw			D.I. Water		2-Ton Boxtruck		
Jackhammer			Silastic Tubing		10 Ton Trailer		
Air Nibbler			Tedlar Bags		14' Utility Trailer		
Air Sawzall			Teflon Bags		17' Cargo Trailer		
2" Centrifugal Pump			Teflon Tubing		21' Cargo Trailer		
2" Diaphragm Pump			Vac Jar Sampling Kit				
1" Diaphragm Pump			Cooler				
Peristaltic Pump			Ice				
Purge Pump			Shipping		MISC.SUPPLIES	SIZE/SPEC	NUMBER
Pressure Washer							
L.E.L. / Oxygen Meter			<b>EXPENDABLES</b>				
OVA / FID			Absorbent Pads				
Photovac / PID			Visqueen				
Gas Chromatograph			Tyvek Suits				
Field Meter Kit			Saran Suits				
Data Logger			Sample Gloves				
Draeger Tubes			Nitrile Gloves				
Survey Set			Cloth Gloves				
Barricades			PVC Gloves				
			Rain Suits				
Street Saw			PVC Booties				
Generator			Rubber Boots				
Cellular Telephone			Face Shields				
			55 Gal. Drums				
			Non-Haz Labels				
			Haz- Labels				
			Caution Tape				
			Ear Plugs				
			Cutoffsaw Blades				
			Geotextile Cloth				

Figure 2-2 (Continued)  
DAILY REPORT

PROGRESS

SUB-CONTRACTORS AND / OR  
MATERIAL DELIVERED

SITE VISITORS AND ITEMS  
DISCUSSED

SAFETY MEETING  
SUBJECTS

JAJESC REPRESENTATIVE  
SIGNATURE: \_\_\_\_\_

## SECTION 3.0

### WASTE STREAM MANAGEMENT PLAN

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All construction materials brought on site will be handled and stored according to the manufacturer's recommendations to prevent damage from weather and moisture.

Excavated soil from the pipe trench excavations will be placed on plastic sheeting near the trench excavation areas as depicted in **Figures C-7 and C-15**, in accordance with approval from the ROICC. To evaluate the proper disposal requirements, three primary samples will be collected from each of two locations (6 total samples) for every 200 cubic yards of soil to be sampled. The samples will be properly shipped to a NC Division of Water Quality (DWQ) Laboratory for commingling and analysis in accordance with Table 2-1.

Excavated soil will be field screened and analyzed in accordance with requirements provided in **Section 2.2.1 Waste Characterization and Incidental Waste Samples**.

Development water from wells within areas previously determined to contain chlorinated solvents will be containerized and transported to the IWTP to be disposed in the OU1 Hotspot treatment system, with prior approval from EAD and FMD. Sediment and free phase product will be removed from purge water before disposal at the IWTP. Sediment will be stockpiled in the contaminated soil pile onsite and handled in accordance with **Section 2.0 Sampling and Analysis Plan**. Product will be deposited in the "slop fuel tanks" at Tank Farm "A" with prior approval from the Fuels Division. Development water from wells outside the areas previously determined to contain chlorinated solvents will be containerized and transported to an oil/water separator on the Air Station for treatment and discharge as designated by the EAD. Should it become necessary to dispose of development water off-site a sample will be collected, delivered to a Navy approved laboratory, and analyzed for the parameters provided in **Section 2.2.1 Waste Characterization and Incidental Waste Samples**.

All required transportation manifests will be prepared by J.A. Jones and signed by a MCAS EAD representative. The EAD is responsible for all wastes generated at Cherry Point. J.A. Jones will coordinate with the ROICC, Ms. Karen Boyd, to obtain the necessary signatures.

#### 3.1 WASTE STREAMS

Wastes will be handled and disposed of in accordance with regulations established by the NCDENR. The regulations for the management of petroleum-impacted soils are

summarized in the publication *Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater*.

Wastes will be segregated into the approximate waste streams as identified in **Table 3-1**. Based on an evaluation of analytical data from samples collected during assessment and corrective action activities, petroleum-impacted material and media impacted by low levels of chlorinated constituents are expected to be encountered during construction and operation and maintenance activities. Due to the magnitude of chlorinated constituents detected in the groundwater samples collected during assessment activities, hazardous waste generation from air sparge well installation and development activities is unlikely and as a result not considered for evaluation. Petroleum-impacted wastes under NCDENR guidelines are designated non-hazardous wastes and will be managed accordingly.

### **3.2 WASTE CHARACTERIZATION**

Waste characterization will be completed for specific waste streams as identified in **Table 3-1**. Some waste streams (i.e., general construction refuse, general demolition debris, and metallic debris) will be common solid waste streams and as such will not require waste characterization.

Waste characterization will involve completion of written documentation describing the wastes. At a minimum, written documentation for waste characterization will include the following:

- Generator information (include name, address, contact, and phone number);
- Site name (include street/ mailing address);
- Activity generating waste (i.e., excavation, treatment system operation, etc.);
- Source of contamination (i.e., storage tanks, pipeline, etc.);
- Historical chemical use for area (i.e., aviation fuel, diesel, etc.);
- Physical state of waste (i.e. solid, liquid, solid with free liquids, etc.); and,
- Copies of all analytical data for waste.

Waste characterization data will typically be completed on a form provided by the disposal facility. At a minimum, supporting analytical data will be from sampling completed in accordance with NCDENR requirements for non-hazardous wastes. In some cases, specific disposal facilities may require additional sampling and analysis. Generator certification and signature, if required, will be by EAD personnel only. If required, an approved copy of the waste characterization form, signed by a representative of the facility approved to accept the waste material, will be received prior to transportation of the material and will accompany the waste shipment.

### **3.3 TREATMENT AND/OR DISPOSAL OF WASTE STREAMS**

Waste streams will be disposed of as identified in **Table 3-1**. The preferred disposal method, whenever feasible, will be by a material recovery or treatment facility (i.e., recycling, bioremediation, treatment, etc.) in lieu of landfilling.

Onsite disposal of liquids and solids may be completed for some wastes under some circumstances as identified in **Table 3-1**. All development, purge, and rainwater will be containerized and disposed of according to the following. Liquids collected from areas previously determined to contain chlorinated solvents will be containerized and transported to the IWTP for disposal in the OU1 Hotspot treatment train, with prior approval from EAD and FMD. Sediment and free phase product will be removed prior to disposal at the IWTP. Sediment will be stockpiled in the contaminated/excess soil pile on-site for later sampling and disposal. Product will be deposited in the "slop fuel tanks" at Tank Farm "A" with prior approval from the Air Stations Fuels Division. Liquids from areas outside the areas previously determined to contain chlorinated solvents will be containerized and transported to an oil/water separator on the Air Station for treatment and discharge as designated by the EAD.

Purge water and incidental groundwater recovered as a result of the operation of the SVE system that contains no product or visible sheen may be deposited on the ground surface in the immediate vicinity of the impacted groundwater area if the water readily infiltrates the local ground surface (i.e. infiltrates with no ponding, no run-off to surface water courses, and no run-off to storm drains or sanitary sewers). However, the MCAS EAD preferred management method is collection and treatment of the groundwater at the Industrial Waste Water Plant with prior approval/permission of Facilities Maintenance. For the groundwater to be accepted at the Industrial Waste Water Plant, a profile of the waste stream is required.

The appropriate documentation will be obtained prior to transportation of the material to the approved designated facility. This includes documentation from the following facilities:

- For off site disposal facilities accepting non-hazardous solids, a copy of documentation indicating the facility as a NCDENR-permitted facility for the disposal/recovery of petroleum-impacted waste;
- For off site disposal facilities accepting petroleum-impacted soil, compliance with the quarantine regulations associated with the imported fire ant as it applies to Craven County, NC, as set forth in United States Department of Agriculture Quarantine No. 81 dated 9 October 1970, and USDA Publication No. 301.81-2A dated 23 July 1976, is required; and,
- For off site water treatment facilities accepting non-hazardous waste, a copy of documentation indicating the facility as a NCDENR-permitted facility for the

treatment/recovery of petroleum-impacted water and, if applicable, a copy of the facility's National Pollutant Discharge Elimination System (NPDES) permit.

The treatment, recycling, or disposal facility will be responsible for providing a copy of the final waste manifest and for providing a certificate of disposal for each load of waste received.

### **3.4 HANDLING AND TRANSPORTATION OF WASTE STREAMS**

#### **3.4.1 Temporary Storage**

Wastes will be securely stored on site prior to transportation and treatment or disposal. Storage containers and stockpiles will be clearly labeled prior to placement of any waste. Labels will indicate the material to be a "Non-Hazardous Waste" and will include the date the waste was initially placed and a description of the waste material. Non-hazardous waste material will typically be stored in the following manner:

- Roll-offs for solids and debris will be provided with covers and disposable liners. Roll-offs will be inspected upon arrival on site and any roll-off arriving on site with contents will be rejected. Roll-offs will be maintained with covers in-place as much as possible with all covers securely fastened at the end of each work day. Liners will be disposed of as non-hazardous debris. Roll-offs will be inspected by the transporter after removal of the liner. In the event of liner failure, the roll-offs will be decontaminated by the transporter either at the treatment or disposal facility or by returning the roll-off to the site for decontamination.
- Stockpiles for solids and debris will be provided with liner, cover, and perimeter berm. Liner and cover will be a minimum of one 10-mil polyethylene sheet each. Covers and perimeter berms will be secured when not in use and in-place at the end of each work day. Stockpiled construction materials which contact petroleum-impacted waste material will be disposed as non-hazardous debris. Vehicles transporting stockpiled material will be decontaminated following each vehicle's final load at end of each work day. Decontamination procedures will be completed by the transporter at the treatment or disposal facility or by returning the roll-off to the site for decontamination.
- Drums containing solids and liquids will be neatly arranged and stored in a single on site location. Drums containing contaminated liquids or product will be stored inside a secondary containment structure and each drum will be provided with its own label. Drums will remain covered until material is placed inside the container. Drums will be disposed with the contents, unless the contents are removed from the drums for bulk off site transportation and treatment or disposal. In the event of bulk shipment of petroleum-impacted waste material, the empty drums will be decontaminated prior to re-use or before leaving the site.

- Storage tanks for bulk liquid containment will be provided with securable covers. Tanks will be inspected upon arrival on site and any tank arriving on site with contents will be rejected. Tanks will be decontaminated prior to leaving the site. Typically, decontamination will occur immediately following removal of the tank contents. Accumulated decontamination fluids will be transported with the waste. Vehicles transporting bulk waste liquids will be decontaminated following each vehicle's final load at end of each work day. Decontamination procedures will be completed by the transporter at the treatment or disposal facility or by returning the tanks to the site for decontamination.

Containers will be inventoried the day of arrival on site using the Transportation & Disposal Log provided on **Figure 3-1**. Containers and stockpiles will be visually inspected on a daily basis with prompt response taken in the event of any evidence of failure to contain the wastes. Decontamination of containers and/or vehicles will be completed according to the procedures established in **Section 5.10 Decontamination**. Decontamination of containers and/or vehicles will be completed at the treatment or disposal facility or at the Buildings 130 and 3996 site. The decontaminating procedures will be documented by the transporter on the waste manifest and documented by J.A. Jones on the Daily Production Report. Containers and stockpiles will be temporarily located at the Buildings 130 and 3996 site for less than 45 days in accordance with NCDENR requirements.

### **3.4.2 Transportation of Waste Streams**

Each load of petroleum-impacted waste material will be accompanied by a non-hazardous waste manifest signed by Navy personnel prior to leaving the Buildings 130 and 3996 site. The manifest form, with multiple carbon copies, will typically be provided by the transporter or selected treatment or disposal facility. The manifest will accompany the waste material to its final destination and will identify the petroleum-impacted waste as non-hazardous. All non-hazardous waste manifests will be signed by MCAS EAD personnel only. At a minimum, the non-hazardous waste manifest form will include the following information:

- Transporter information including name, address, contact and phone number;
- Generator information including name, address, contact, and phone number;
- Site name including street/ mailing address;
- Description of waste including reference to characterization form if available;
- Type of container; and,
- Quantity of waste (volumetric estimate).

Transportation of non-hazardous wastes will be performed by a transporter licensed with the NCDOT for commercial transportation. A copy of documentation indicating that the transporter has appropriate licenses will be received from the transporter prior to transport of any waste by the transporter. The transporter will be responsible for weighing loads by

a scale certified by the North Carolina Department of Commerce, Bureau of Weights and Measures. For each load of material, weight measurements will be obtained for each full container, dump truck, or tanker truck. The treatment or disposal quantity for each load will be based on the difference of weight measurements between the full and empty container, dump truck, or tanker truck. Weights will be denoted on the non-hazardous waste manifest. Copies of weight tickets will be provided by the transporter with the final non-hazardous waste manifest.

Transportation of wastes will be inventoried the day of transportation from the site using the Transportation & Disposal Log provided as **Figure 3-1**. A carbon copy of the initial non-hazardous waste manifest form for each load will be retained on site and attached to the Daily Production Report.

### **3.5 DOCUMENTATION OF WASTE STREAMS**

Documentation of waste streams will be completed as discussed in the preceding sections and summarized in **Table 3-2**.

**Table 3-1**  
**Summary of Waste Streams**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

<u>Waste Stream ID</u>	<u>Description</u>	<u>Disposition</u>	<u>Char. Form Required</u>
A General Construction Refuse	General debris and solid waste material including field office generated refuse, material shipping containers and packing, discarded temporary facilities, and waste construction materials.	Municipal Solid Waste Landfill	No
B General Construction Debris	Non-metallic debris generated by demolition of existing facilities including pavement, masonry, wood, insulation, and other materials of construction.	Municipal Solid Waste Landfill or Construction and Demolition Debris Landfill	No
D Non-Hazardous Petroleum-Impacted Soil	Soil removed from during pipe trench excavation activities, product recovery, air sparge and soil vapor extraction well installation activities, and horizontal drilling activities.	Materials Recovery, Treatment, or Disposal Facility, or Local Backfill	Yes
E Non-Hazardous Petroleum-Impacted Water	Groundwater accumulated during well development and purging, AFVR events, decontamination operations, excavation dewatering, and operation of the soil vapor extraction systems.	Materials Recovery Facility, Treatment Facility, or existing MCAS Cherry Point groundwater and recovery system designed to treat petroleum-impacted water. <sup>1</sup>	Yes
F Non-Hazardous Petroleum-Impacted Debris	General construction refuse and demolition debris which has contacted petroleum-impacted soil, water, or product. To include personal protective equipment and disposable sampling equipment.	Municipal Solid Waste Landfill	Yes
G Recovered Product	Product recovered from the subsurface as a result of groundwater collection events or operation of a product recovery system.	J.A. Jones will coordinate with EAD personnel	Yes
H Recovered Vessel Sediments	Solids removed from tanks and containers. To include material recovered during air sparge well development and horizontal drilling.	Municipal Solid Waste Landfill or Treatment Facility	Yes
I Treatment Sediments	Miscellaneous solids associated with maintenance of the subsurface remediation systems. To include sediment from the soil vapor extraction system's vertical storage tanks.	Municipal Solid Waste Landfill or Treatment Facility	Yes

**Notes:**

Local Backfill-Excavated Soil utilized as on site fill will be below 10 mg/kg for gasoline-range and diesel-range TPH using USEPA Method Modified 5030/8015 and 3550/8015.

<sup>1</sup> All development, purge, and rain water from areas previously determined to contain chlorinated solvents will be containerized and transported to the Air Station IWTP for disposal in the OU1 Hotspot treatment train, with prior approval from EAD and FMD. Sediment and free phase product will be removed before disposal at the IWTP. Sediment will be stockpiled in the contaminated/excess soil pile on the site for later sampling and disposal. Product will be deposited in the "slop fuel tanks" at Tank Farm "A" with prior approval from the Air Station Fuels Division. Liquid from areas outside the areas previously determined to contain chlorinated solvents will be containerized and transported to an oil/water separator on the Air Station for treatment and discharge as designated by the EAD.

**Table 3-1 (Continued)**  
**Summary of Waste Streams**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

<u>Waste Stream ID</u>	<u>Description</u>	<u>Disposition</u>	<u>Char. Form Required</u>
A General Construction Refuse	General debris and rubbish including field office generated refuse, material shipping containers and packing, discarded temporary facilities, and waste construction materials.	Sanitary Landfill	No
B General Construction Debris	Non-metallic debris generated by demolition of existing facilities including pavement, masonry, wood, insulation, and other materials of construction.	Sanitary Landfill or C&D Landfill	No
C Metallic Debris	Ferrous and non-ferrous metals generated by demolition which can be feasibly segregated from general demolition debris. To include cleaned vessels and piping resulting from tank removal operations and decontaminated drums.	Metals Recycler	No
D Contaminated Soil	Soil removed from areas of known contamination or suspected contamination based on field observations. To include excess soils generated from exploratory borings and miscellaneous excavations.	Materials Recovery Facility or Local Backfill	Yes
E Contaminated Water	Water removed from areas of known contamination or suspected contamination based on field observations. To include water generated by well development and purging, decontamination operations, and excavation dewatering.	Materials Recovery Facility or Treatment by Marine Corps Air Station	Yes

**Table 3-1 (Continued)**  
**Summary of Waste Streams**  
RAC Action for UST Remedial Action  
Buildings 130 and 3996  
Marine Corps Air Station  
Cherry Point, North Carolina

<u>Waste Stream ID</u>	<u>Description</u>	<u>Disposition</u>	<u>Char. Form Required</u>
F Contaminated Debris	General construction refuse and demolition debris which has contacted contaminated soil/water or product. To include personal protective equipment and disposable sampling equipment.	Sanitary Landfill	Yes
G Recovered Free Product	Free Product recovered from the subsurface.	Marine Corps Air Station will pump and dispose	Yes
H Recovered Vessel Sediments/Sludge	Solids and sludges removed from tanks. To include material recovered from ancillary vessels, sumps, and piping.	Sanitary Landfill	Yes
I Treatment Sediments/Sludges	Miscellaneous solids and sludges associated with maintenance of treatment systems. To include residuals from holding tanks, etc.	Sanitary Landfill	Yes
J Hazardous Wastes	Wastes from any waste stream determined to be hazardous per 40 CFR 261 criteria based on analytical results.	RCRA Facility	Yes

Notes: C&D Landfill-Construction/Demolition/Debris Landfill  
Local Infiltration-Discharge of water (i.e. no product or visible sheen) in immediate vicinity of source of water at a rate such that water quickly infiltrates the local ground surface (i.e. no ponding, no run-off to storm drains or sanitary sewers).  
Local Backfill-Backfill on site as clean fill. Soil must be below the Site Sensitivity Evaluation.  
Metals Recycler-Facility that routinely accepts scrap metals for the purpose of reuse/recycle of the metal

**Table 3-2**  
**Summary of Waste Stream Documentation**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Item	Reference Section	Responsible Party
Treatment or Disposal Facility Operating Permit	3.3	Treatment or Disposal Facility
Waste Characterization Form	3.2	Complete - J.A. Jones Environmental Services Certify - MCAS EAD Approve - Treatment or Disposal Facility
Transporter's License	3.4.2	Transporter
Initial Non-Hazardous Waste Manifest	3.4.2	Complete - Transporter Verify - J.A. Jones Environmental Services Sign/Certify - MCAS EAD, Transporter
Weigh Tickets	3.4.2	Transporter
Final Waste Manifest	3.3	Treatment or Disposal Facility
Certificates of Treatment or Disposal	3.3	Treatment or Disposal Facility
Transportation & Disposal Log	3.4.1, 3.4.2	J.A. Jones Environmental Services



## SECTION 4.0

### ENVIRONMENTAL PROTECTION PLAN

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#### 4.1 INTRODUCTION

The work to be performed at the sites will incorporate features to protect the environment during excavation activities. All work will be performed in a manner which meets the intent of federal, state, and local regulations designed to protect the environment.

#### 4.2 EROSION AND SEDIMENT CONTROL

Soil and pipe trench excavations will be completed in a manner which complies with the intent of North Carolina State Erosion and Sediment Control Regulations. An Erosion and Sediment Control Plan is presented in **Appendix B**. Erosion and sediment control details required as part of the development of the Erosion and Sediment Control Plan are included in the construction drawings on **Figure C-15**. Erosion and sediment control features are limited due to the nature and scope of work, and the relatively flat topography at the Cherry Point, MCAS. Soil removed during pipe trenching activities will be screened using a FID and placed on plastic sheeting near the trench excavation areas as depicted in **Figure C-7**. The temporary containment of excavated soil detail shows a method for the temporary containment of excavated soil in the event soil material is left on site overnight. The figure depicts the use of straw bails around the perimeter and plastic sheeting underneath and covering the stockpile.

Petroleum-impacted soil from the installation of the air sparge, SVE, product recovery wells, and the soil cuttings accumulated during horizontal drilling may be used as backfill within the SVE system "area of influence". Soils found to be contaminated outside the SVE "area of influence" may not be utilized as backfill but rather be properly stockpiled, sampled in accordance with Table 2-1, and disposed.

To prevent the migration of dust and debris from the excavation areas and to limit stormwater runoff from entering or eroding soil and/or pipe trench excavations, silt fences will be constructed around the sides of the pipe trench excavation areas. A diagram of the staked silt fence detail is provided in **Figure C-15**. Once the pipe trench excavations are completed, the areas will be filled with the appropriate material specified in the technical specifications and design drawings; and the areas will be regraded, mulched, and seeded; or compacted and repaved with asphalt or concrete as required.

#### 4.3 EXCESS SOIL TREATMENT AND DISPOSAL

Trenching activities will generate excess soil material. This excess soil will be segregated and stockpiled. Three soil samples from each of two borings for every 200 cubic yards of soil to be sampled (total of 6 separate samples) will be collected and submitted to the a NC Department of Water Quality approved laboratory for commingling. The commingled sample will be analyzed for the analytical parameters listed in Table 2-1. Soils will either be identified as RCRA waste and disposed of accordingly, petroleum contaminated and disposed of accordingly, or due to the CERCLA Off-site rule, transported to a Subtitle D landfill for disposal.

#### **4.4 CONSTRUCTION DEBRIS**

Construction activities will generate a small quantity of debris including asphalt and packaging materials. These materials will be collected daily, segregated, containerized, and hauled to a facility licensed to accept construction debris.

#### **4.5 AIR POLLUTION CONTROL**

Air discharge permits for the SVE system should not be required in accordance with NCDENR air quality regulations. Air effluent streams from the treatment system will be vented to the outside. The effluent vapor will be sampled and analyzed for volatile aromatic constituents using USEPA Method 18 as outlined in **Section 2.2.2 Operation and Maintenance Sampling**.

#### **4.6 WATER POLLUTION CONTROL**

Water accumulated from the development of air sparge and product recovery wells, drilling fluid accumulated during horizontal drilling activities, and any accumulated decontamination water and/or water accumulated during dewatering activities will be properly containerized and disposed of according to the following. If the liquid is from areas previously determined to contain chlorinated solvents it will be transported to the IWTP for disposal, with prior approval from the EAD and FMD. Sediment will be removed from the rain, purge, and development water before disposal at the IWTP. Sediment will be stockpiled in the contaminated soil pile onsite for later sampling and disposal. Product will be deposited in the "slop fuels tanks" at Tank Farm "A" with prior approval from the Fuels Division. Liquid collected from areas outside the areas previously determined to contain chlorinated solvents will be containerized and transported to an oil/water separator on the Air Station for treatment and discharge as designated by the EAD.

#### **4.7 DUST CONTROL**

Pipe trench excavation activities will be performed in a manner which limits blowing dust and tracking of mud onto site access roads. Potential dust control measures that will be employed when appropriate include water spray, sweeping, or covering with plastic

sheeting. Access roads will be swept or washed periodically when construction activities track mud and dust material onto road surfaces.

#### **4.8 SPILL CONTAINMENT**

Due to the nature of site activities, the risk of accidental fuel or oil spills is minimal. Heavy machinery used at the project sites will be in good working condition and will be inspected periodically during site work. If significant oil or fuel leaks develop from machinery, J.A. Jones will arrange for the prompt repair or replacement of the equipment. Absorbent pads and/or a quick dry chemical absorbent will be available on site should leaks occur. Used material will be placed in 55-gallon drums, sampled in accordance with the disposal and/or treatment facility requirements, and delivered to a facility permitted to accept petroleum-impacted material. Report each spill to the Air Station Fire Division by telephone by dialing 911. An EAD spill report form (Figure 5-14) shall be completed and forwarded to EAD within five days for each spill.

#### **4.9 ENVIRONMENTAL CONDITIONS REPORT**

J.A. Jones and the ROICC will conduct an environmental conditions survey, at each of the Buildings 130 and 3996, prior to the commencement of construction. Photographs will be taken of the pre-construction condition of the facilities, including grassy areas, trees, shrubs, paving, gutters, curbs, buildings, and facilities. A written report describing the pre-construction condition of each project site, to include copies of the photographs and comments on the condition of existing paved areas, will be submitted to the ROICC within two weeks from the construction start date.

#### **4.10 HAZARDOUS MATERIALS**

If required, hazardous materials brought on site for construction will be managed in a manner that minimizes the risk to human health and property.

## SECTION 5.0

### SITE HEALTH AND SAFETY PLAN

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#### 5.1 INTRODUCTION

J.A. Jones is submitting this SHSP for the installation and subsequent operation and maintenance activities associated with the soil and groundwater treatment system at Buildings 130 and 3996, located on the MCAS, Cherry Point, North Carolina. This SHSP contains procedures and protocols pertaining to personnel and public health and safety issues encountered during the environmental restoration project at the site. It is through the implementation of this plan, along with J.A. Jones' overall Health and Safety Program, that site hazards and risks with regard to remediation activities will be controlled and minimized.

I hereby certify the SHSP shown and marked in this submittal is that proposed to be incorporated into the Atlantic Division Remedial Action Contract, LANTDIV RAC Contract No. N62470-93-D-3033 is in compliance with the Contract Specifications, and is submitted for government approval. Government approval of any proposed variation is recommended.

Certified by CIH \_\_\_\_\_,  
(C. Myers, CIH)

Date \_\_\_\_\_

### **5.1.1 Health and Safety Program Maintenance**

J.A. Jones recognizes that health and safety concerns continually change at project sites. Therefore, this plan will be reviewed periodically and otherwise as needed. During these periodic checks, the Site Health and Safety Officer (SHSO) will conduct a safety audit to check SHSP compliance, and to see if the SHSP requires additional revisions. Additionally, in the event of an emergency response, the response will be evaluated as to its effectiveness; and revisions to the Contingency Plan will be made, if necessary.

### **5.1.2 Plan Acceptance**

All personnel, subcontractors, and others engaged in environmental restoration activities will be required to review this plan prior to the commencement of work. These individuals will be required to sign their name, indicating that they have read this plan and will comply with the rules, practices, and procedures contained herein. The SHSP Acceptance Form is included here as **Figure 5-1**.

### **5.1.3 References**

The following documents were used as references in the preparation of this SHSP:

- Standard First Aid Manual, American Red Cross
- OSHA Safety and Health Standards, 29 CFR 1910 and 1926 (specifically 1910.120)
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, National Institute of Occupational Safety and Health (NIOSH)/OSHA/United States Coast Guard/USEPA
- A Guide to Industrial Respiratory Protection, NIOSH
- Standard Operating Safety Guides, USEPA
- Occupational Health Guidelines for Chemical Hazards, NIOSH/OSHA
- Threshold Limit Values and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists (ACGIH)
- Safety and Health Requirements Manual, EM-385-1-1, September 1996, US Army Corps of Engineers
- Hazardous Chemicals Desk Reference, Third Edition, Van Nostrand-Reinhold
- J.A. Jones Safety Procedures and Programs Manual, (Contract N62470-93-D-3033, POL Remedial Action Contract)

### **5.1.4 Description of Environmental Services**

Environmental services scheduled to be completed under this Health and Safety Plan include, but are not limited to, the following: mobilization and construction of temporary facilities, surface water control, air sparge and SVE system installation, product recovery system installation, hand excavation near underground utilities, excavation and backfilling by machinery, treatment building and system installation, soil and water

sampling, pipe trenching, treatment system connections, pipe trenching, site restoration, operation and maintenance, and demobilization.

### **5.1.5 Site History and Description**

Building 130 is the site of an aircraft hanger for seaplanes and is located northeast of and adjacent to Sixth Avenue. Petroleum-impacted soil and groundwater present at the site were suspected to be caused by an underground aviation fuel pipeline system, lubrication waste oil UST, and aircraft washrack. Additionally, two USTs are suspected to be located on the northeast and southwest side of Building 130.

Building 3996 is located southwest of and adjacent to "A" Street. Petroleum-impacted soil and groundwater present at the site were suspected to be caused by Building 130's underground aviation fuel pipeline system, a former fueling station located adjacent to Building 131, three USTs located on the north side of Building 3996, and two hydraulic lift pits located inside Building 3996. The Drawings in **Section 8.0 Contractor Generated Construction Drawings**, illustrate the work areas, decontamination areas, the location of the soil and groundwater treatment system, and the location(s) of temporary facilities, which will house safety equipment. Construction activities at the sites are anticipated to last from the initial start of work approximately twenty weeks.

## **5.2 SITE HEALTH AND SAFETY PERSONNEL**

Site safety is accomplished through an integrated team effort. The health and safety personnel, supervisors, site workers and administrative team perform essential safety roles.

### **5.2.1 Certified Industrial Hygienist**

The Certified Industrial Hygienist (CIH) for the hydrocarbon restoration project at the Cherry Point, MCAS is Mr. Charles J. Myers. Mr. Myers possesses the necessary experience in the health and safety aspects of remedial action projects. He will oversee the health and safety program and be available for consultation when required; however, he will not be required to be on site.

### **5.2.2 Site Health and Safety Officer**

Aspects of site health and safety are the responsibility of the SHSO. Mr. Richard Johnson, J.A. Jones' Project Superintendent, will be the SHSO. He has experience in hazardous waste management, environmental assessments, UST remediation projects, and emergency response in the southeast region including North Carolina, Virginia, and Tennessee.

Mr. Don Osmann, J.A. Jones Corporate Health and Safety Director, will serve as the SHSO alternate. In addition, Mr. Osmann will be available to address any health and

safety concerns that may arise during restoration activities. He possesses remedial action experience and a working knowledge of the State and Federal occupational safety and health regulations. He is a Certified USEPA Response Manager and a Certified OSHA 1910.120 Trainer. He has ten years of experience in hazardous waste management, environmental assessments, UST remediation projects, Superfund site clean-up projects, and emergency response in the southeast region to include North Carolina and Virginia.

Mr. Johnson and one additional site worker will be trained in standard first aid and cardiopulmonary resuscitation (CPR). All training certificates and certifications will be retained at the project site. The SHSO possesses demonstrable experience and specialized training in personal protective equipment program implementation. Furthermore, he has experience in the proper use of air monitoring instrumentation and sampling procedures specific to activities to be performed at the site. The SHSO will be on site when work is in progress.

Mr. Johnson will contact the MCAS Fire Station (911), Project Manager's Office, and ambulance services, as well as the nearest poison control center. He will communicate to these agencies the following information: type of work being conducted, potential health and safety hazards present at the sites, and duration of the project.

The Project Superintendent/SHSO will be in direct communication with the Navy On-Scene Coordinator (OSC), who is the primary contact in an emergency situation. The Project Superintendent will also be in contact with the Local Emergency Planning Committee (LEPC); ROICC; Construction Representative (ConRep); J.A. Jones personnel; and other site workers. It will be the Project Superintendent/SHSO's responsibility to coordinate with these individuals regarding the health and safety aspects of the petroleum-impacted soil and groundwater remediation activities.

### **5.2.3 Site Labor Forces**

Site labor forces will be comprised of personnel who possess the appropriate training and experience to work at a remedial site (40-Hour Training and/or current 8-Hour Refresher Training, Supervisory Training, Standard First Aid, CPR, etc.). Proper documentation of prior training experience for all site workers will be retained at the site.

## **5.3 TRAINING REQUIREMENTS**

### **5.3.1 OSHA 1910.120 Training**

All J.A. Jones Environmental employees will have completed the 40-hour health and safety training and/or 8-Hour Refresher Training as required by OSHA regulations, 29 CFR 1910.120. In addition, all site personnel expected to enter the contamination reduction zone/exclusion zone (CRZ/EZ) will have completed this training. The SHSO will have completed the required additional eight hours of specialized supervisor training. Personnel who are on site occasionally for specific duties such as groundwater

monitoring will have the minimum health and safety training required by 29 CFR, 1910.120. For visitors and workers such as land surveyors and pick up/delivery personnel on site for a limited duration who will not be entering the CRZ/EZ, the requirements of 29 CFR, 1910.120 do not apply. However, their activities will be monitored by the SHSO. J.A. Jones will maintain a record of the training history for on site personnel, a log of visitors to the site, including name, date, activities conducted, and the health and safety documentation during project activities. **Figure 5-2** shows the proposed standard form for sign-in and sign-out procedures used during site activities.

### **5.3.2 Site-Specific Training**

The SHSO will provide site-specific training to site personnel involved in the remediation activities. The training will address potential hazards found at the work sites and safety measures that must be followed on certain areas of the site where health and potential safety hazards may exist. Training will include discussion of general site conditions and general procedures regarding the buddy system, fire prevention/suppression techniques, levels of protection, overexposure to chemical hazards, and air monitoring. Recognition of the potential safety and health hazards will be emphasized during the site-specific training meetings.

### **5.3.3 Daily Safety Meeting**

Project personnel will be given briefings by the SHSO on a daily and on an as needed basis determined by the SHSO. These daily meetings will further assist site personnel in conducting their activities in a safe manner and recognizing potential risks at the work sites. Daily safety meetings will provide workers with information concerning new operations, necessary changes in work practices, or changes in the site or environmental conditions. Briefings will also be given to facilitate conformance to prescribed safety practices when performance deficiencies are identified during routine daily activities, or as a result of safety audits. Workers will be given the opportunity to communicate health and safety concerns to the SHSO. It will be the responsibility of the SHSO to investigate and/or address workers' concerns. **Figure 5-3** presents the form to record daily pre-planning activities, health and safety activities, and events and issues discussed during the daily safety meeting. A copy of the completed form will be attached to the Daily Report.

### **5.3.4 Emergency First Aid Training**

The SHSO and one additional on site employee will be trained in bloodborne pathogens procedures in accordance with 29 CFR 1910.1030, American Red Cross Standard First Aid and CPR. This training has been required, so that in the event of an emergency or other incident, primary care can be given to an individual in need before professional response providers arrive on site.

### 5.3.5 Spill Response Training

Onsite personnel will be trained to respond to spills. The SHSO will provide training during the project site training. The training will range from awareness of spill potential to responding to spill situations. Onsite personnel will learn spill prevention, spill identification, and the location and proper use of the portable spill containment kit. Specifically, spill response training will include the following:

- Spills will be reported to the MCAS Fire Station (911) immediately;
- Control of an area where a spill has occurred including setup of barriers to keep personnel not involved in cleanup efforts out of the area;
- Training in the proper use of sorbent, and other cleanup materials; and
- Training in the proper notification and documentation of a spill occurrence to include completion of the Spill Report form as illustrated in **Figure 5-14** of this Work Plan.

The portable spill containment kit will include absorbent pads and vermiculite. In the occurrence of a spill, these materials will be used to contain and clean up the spill. Once used, these materials will be containerized and disposed of at a facility licensed to accept such contaminated material.

Spills associated with motorized construction vehicles will most likely be fuel spills, oil leaks, or hydraulic fluid leaks. All equipment will be inspected on a regular basis to ensure that all seals are tight and no hoses have the potential to leak. Caution will be taken to ensure that no fuel is spilled during refueling of the vehicle. If any of the above should occur, the area will be cleaned up and reported as discussed in **Section 5.7 Potential Safety Hazards** of this Work Plan.

In addition, the potential exists for contaminated groundwater to spill during the start-up and testing of the soil and groundwater treatment system. If any spillage occurs because of this work, the spill will be contained immediately and reported as discussed in **Section 5.7 Potential Safety Hazards** of this plan. Water generated during testing of equipment will be minimal and will be contained in the 500-gallon vertical polyethylene storage tank.

The spill prevention training will significantly reduce the potential of any spill to occur during construction at the site. The training will be modified, as necessary, during construction to meet any different potential spill problems. This implementation and periodic review will result in a safe work area and minimize potential environmental impacts.

## 5.4 MEDICAL SURVEILLANCE PROGRAM

### 5.4.1 Personnel Screening

All employees who are potentially exposed to hazardous substances or health hazards and/or wear a respirator are to receive an annual medical examination conducted by or under the supervision of a certified occupational medicine physician. Medical examinations are required prior to assignment, termination of employment or reassignment, and at more frequent times, if deemed medically necessary by the examining physician. In addition, any worker exhibiting symptoms relating to extreme heat/cold stress or other work related physical disorder will be examined by a licensed occupational physician as soon as practicable upon exhibiting these symptoms. An accurate record of the medical surveillance and health and safety training will be retained by J.A. Jones (in accordance with 29 CFR 1910.120). Additionally, a copy of each worker examination will include the following minimum medical requirements:

- Complete medical and work histories; physical examination,
- Pulmonary function tests,
- Chest x-ray (frequency to be determined by physician),
- Eye examination,
- Audiometer, and
- Urinalysis.

If the employee passes the physical he/she will be categorized as fit-for-duty and able to wear respiratory protection. A copy of the occupational physician's letter, stating that the employee is fit-for-duty, will be retained at the site throughout the project. The SHSO will fit test site personnel to verify proper fit of respirators.

### 5.4.2 Site Medical Surveillance

The SHSO will verify that safe working conditions are being maintained when temperatures reach extremes (90°F and 20°F). Criteria for implementing such measures is found in **Section 5.11.5.2 Heat/Cold Stress** of this plan. Workers will be given rest periods (implemented by the SHSO using ACGIH's work rest regime for extreme temperatures) and fluids when conditions warrant such action. The SHSO will discuss these measures with the site workers at the site-specific training. In addition to this site medical surveillance, the SHSO will require all site workers to complete an Employee Medical Authorization/Data Sheet, provided as **Figure 5-4**. This form will assist physicians in evaluating the site worker in an emergency situation. It will be sent with the worker in such an emergency and/or forwarded to a local emergency facility if directed. To prevent further similar accidents a Lost Time Injury, Accident Investigation Written Statement, Contractor Significant Incident, and Accident Investigation Photo Log Report forms, **Figures 5-5 through 5-8**, will be completed by the SHSO.

## 5.5 WORK ACTIVITIES

This section contains hydrocarbon restoration Listed below are the work activities to be conducted by J.A. Jones personnel at Buildings 130 and 3996. Potential health and safety hazards related to these activities are found in **Sections 5.6 Potential Health Hazards** and **5.7 Potential Safety Hazards** of this plan, respectively. Specifically, these activities are as follows:

- Mobilization/Construct Temporary Facilities
- Surface Water Control
- Vertical Well Installation
- Horizontal Boring
- Hand Excavation Near Utilities
- Machine Excavation and Backfilling
- Treatment System Installation
- Pipe Trenching
- Treatment System Connections
- Soil/Water/Air Sampling
- Site Restoration
- Operation and Maintenance
- Demobilization

## 5.6 POTENTIAL HEALTH HAZARDS

The following section outlines the primary potential health hazards that have been identified at Buildings 130 and 3996. Subsequent sections outline the potential for exposure to the known contaminants during each of the site activities. During on site safety/pre-construction briefings, particular attention will be paid to the potential health hazards associated with the activities conducted at the site. These hazards will be reaffirmed in the daily safety meetings. The primary constituents of concern were identified in the CAP prepared by Law. The maximum groundwater contaminant concentrations detected in groundwater samples collected during site assessment activities are provided in **Section 1.1 Site History and Project Objectives** as follows.

Contaminants at these work sites are expected to be petroleum hydrocarbons, and more specifically aviation and diesel fuels, and should not pose a significant health risk from vapor inhalation unless disturbed during construction. However, if air monitoring equipment reveals that vapor concentrations pose a risk, the SHSO will require the use of appropriate equipment and safety measures. The use of appropriate PPE based on, monitoring of organic vapors during the restoration activities is outlined in **Section 5.8.1 Health Hazard Protection**. MSDSs supplying the chemical and physical properties of the known site contaminants are provided in **Appendix E**.

### **5.6.1 Mobilization/Construct Temporary Facilities**

During the mobilization phase of each project, site personnel will not be exposed to contaminated soil or groundwater. No chemicals and/or other substances are expected to be used during this phase of the project. Respiratory protective equipment and air monitoring will not be required during this phase of the project.

### **5.6.2 Surface Water Control**

The surface water control portion of the work will involve the placement of silt fencing around excavation and trench areas. Workers are not expected to encounter significant petroleum-impacted material during fence placement. As a result, air monitoring will not be performed during this phase of the project.

### **5.6.3 Vertical Well Installation and Horizontal Drilling Activities**

Vertical air sparge, SVE, and product recovery wells will be installed at the Building 130 site. At the Building 3996 site, vertical air sparge and SVE wells will be installed. Site workers will not enter any trench over three feet in depth without the required benching, shoring and/or sheeting in accordance with Subpart P, Appendix B, 29 CFR 1926; and/or Section 25.D of EM 385 1-1, dtd 3 September 1996, U.S. Army Corps of Engineers Safety and Health Requirements Manual, respectively. Drill cuttings from the vertical well installation and horizontal drilling activities will be placed in 55- gallon drums or other appropriate container and sampled in accordance with the requirements outlined in **Section 2.0 Sampling and Analysis Plan**. Compressed air and vapor extraction piping will be installed from the sides of the trenches. Workers may be exposed to petroleum-impacted soil and groundwater during the vertical well installation and horizontal drilling activities.

### **5.6.4 Hand Excavation Near Utilities**

The majority of horizontal trenching will be performed with a backhoe to minimize employee contact with petroleum-impacted soils. However, near utilities and other obstructions, hand excavation may be necessary. Air monitoring will, be conducted periodically during excavation activities using a photoionization detector (PID). If organic vapors are present above the limits outlined in **Section 5.8.1 Health Hazard Protection**, workers will be required to don Level C PPE. Site-specific training will outline the importance of safe work practices during this phase of the project. Daily safety meetings will also reaffirm the proper excavation of potentially impacted soils. Should air monitoring results and/or site conditions warrant the upgrading of personal protection, the SHSO will implement such measures.

### **5.6.5 Machine Excavation and Backfilling**

The potential exists for personnel to be exposed to petroleum-impacted soil. Machine operators will principally be involved in excavating activities and, therefore, will have adequate ventilation from potential health hazards. Personnel identified as spotters will use caution during operation of excavation and other heavy machinery. Periodic monitoring of organic vapors in the immediate proximity of machine operators and spotters will be conducted using a PID to verify that workers are not being exposed to organic vapor concentrations above those outlined in **Section 5.8.1 Health Hazard Protection**. In addition, whenever possible, machinery will be positioned such that workers may maintain a position upwind of the excavation. Site-specific training will outline the importance of safe work practices during this phase of the project. Should air monitoring results and/or site conditions warrant the upgrading of personal protection, the SHSO will implement such measures.

### **5.6.6 Treatment Building and System Installation**

No potential health hazards will be present during installation of the treatment building and physical treatment system. The treatment system will be located in an area unaffected by petroleum contamination. The various trades involved with installation of the treatment system will not require training in accordance with 29 CFR 1910.120. The treatment system will be installed on a concrete slab, and a pre-fabricated building will be placed around it.

### **5.6.7 Recovery Pump Installation**

Product pumps are submersible and as a result, site workers may be exposed to hydrocarbon product/contaminated groundwater if the pumps and associated equipment are removed from the recovery wells for adjustment or maintenance. Personnel performing these tasks will be outfitted with PPE necessary to minimize contact with petroleum contaminated fluids (**Section 5.8.1.1 Personnel Protective Equipment**). Air monitoring (**Section 5.8.1.2 Frequency and Types of Air Monitoring**) will be performed in the immediate vicinity of the recovery well and site workers prior to the start and during this work phase. The appropriate PPE will be provided for workers based on the results of air monitoring and/or if product is visually observed.

### **5.6.8 Pipe Trenching**

The majority of horizontal trenching will be performed with a backhoe to minimize employee contact with contaminated soils. However, near utilities and other obstructions, hand excavation may be necessary. Air monitoring will, be conducted periodically during the excavation using a PID. If organic vapors are present above the limits outlined in **Section 5.8.1 Health Hazard Protection**, workers will be required to don Level C PPE. Site-specific training will outline the importance of safe work practices during this phase of the project. Daily safety meetings will also reaffirm the

### 5.6.13 Demobilization

Demobilization activities will be non-intrusive and should not present a situation in which site workers will be exposed to potential health hazards. Air monitoring will not be required during this phase of the project.

## 5.7 POTENTIAL SAFETY HAZARDS

The following sections outline the potential safety hazards associated with hydrocarbon restoration activities at Buildings 130 and 3996. Particular attention will be paid in the site-specific training to discussion of the potential safety hazards associated with such activities. All emergency numbers will be maintained on site in the event of an emergency. The potential safety hazards will be reaffirmed in the daily safety meetings.

### SPECIAL SAFETY CONCERNS

#### Open Trenches and Excavations

Horizontal pipe trenches will exceed three feet in depth; however, personnel will not enter the trenches, so shoring or sloping should not be necessary. When working in the area around trenches and excavations, the safety procedures found in Section 6.04 of the *J.A. Jones Safety Programs and Procedures Manual* will be followed. A copy of the J.A. Jones "Excavation Permit" found in this same manual will be properly filled out if the excavation goes below four feet. The following precautions will be taken when in this environment:

- All excavations work will proceed according to the requirements set forth in OSHA regulations 29 CFR 1926, SubPart P - Excavations;
- Construction fencing and caution tape will be placed around the trench work area to restrict access to the immediate exclusion zone. This barrier will prohibit access to the trench for workers who are not involved in the trenching activity;
- Workers will be tied off to a stable structure using the lanyard and belt system;
- Workers will not jump across the open trenches; and,
- Walkways with railings will be installed across the trenches as necessary.

Protective systems will be reviewed and approved by the Senior Project Engineer. Daily inspections of the excavations and trenches will be conducted by the SHSO. As defined by OSHA, the SHSO is identified as the on site "competent person." The daily inspections will include the following:

- Observation of excavation/trench conditions for situations that could result in possible cave-ins; and,
- Indications of protective systems failure.

Inspection of the excavations and trenches will be conducted prior to the start of work, and frequently, throughout the work shift. Inspection will also be conducted after every rain storm or other potential hazard increasing occurrence.

### Spill Containment

During hydrocarbon restoration projects at the Cherry Point, MCAS, the "Reporting Hazardous Material Spills/Incidents" found in Section 2.02 of the *J.A. Jones Safety Procedures and Programs Manual* will be implemented. The *J.A. Jones Safety Procedures and Programs Manual* will be on site during construction activities. However, the SHSO will review, during on site safety meetings, the responsibilities of site personnel in the event of a spill. In the event of a small spill, site workers will evaluate the spill and respond to the situation by controlling and/or containing the spill. Small spills will be controlled and contained with absorbent pads and/or quick dry chemical absorbent. Once the spill is under control, the Spill Containment Program will be consulted. In the event of a large spill (or extraordinary spill event), the SHSO will respond by notifying his primary contact, the NOSC. The risk of potential spills during site activities, however, is limited to leaking machinery. As previously mentioned, all heavy machinery brought on site will be in good mechanical condition and will be inspected periodically for fluid leaks.

### Hard Hat Areas

For all hydrocarbon restoration projects at the Cherry Point, MCAS, all workers and site visitors will wear hard hats while at the project sites.

### Lockout/Tagout Procedures

Site personnel involved with activities where potential hazardous energy sources may exist will follow the procedures found in the "Danger Tag, Lock, and Try Program," found in Section 6.10 of the *J.A. Jones Safety Procedures and Programs Manual*. A hazardous energy source is defined as any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or any form of stored energy that could unexpectedly energize a piece of equipment and injure an employee. The SHSO will review the procedures to be maintained during the on site safety meetings; however, no lockout/tagout measures are expected to be required at the work sites.

### Soil Stockpile Maintenance

Suspected petroleum-impacted soil and fill will be temporarily staged at areas designated on the construction drawings. The soil will be placed on and covered with polyethylene sheeting, and the cover will be secured. Backfill stockpiles will be maintained in a manner to minimize the risk of collapse or slide. The soil stockpiles will be kept to a maximum height of approximately six feet.

### **5.7.1 Mobilization/Construct Temporary Facilities**

During this site activity, workers will be setting up equipment and bringing materials to the work sites. Slip, trip, and fall hazards; lifting hazards; traffic hazards; and other safety hazards associated with movement of equipment and materials will be present during this activity.

Site personnel may be involved in activities entailing potential safety hazards during the initial setup activities. Personnel involved in utility location will work within the project sites including roadways used by site vehicles. Workers will take precautions in potentially dangerous situations such as crossing lanes of traffic and working near motorized vehicles. Topography within the work areas are both sloped and flat; however, workers should take precautions to avoid slip, trip, and fall hazards at the work sites.

### **5.7.2 Surface Water Control**

The surface water control activities will involve workers using shovels to redirect surface water runoff during construction. It will be the responsibility of the SHSO to identify unsafe work practices, to instruct workers on proper handling of equipment while in the vicinity of utilities and to stop work progress, if necessary. Workers should use caution when walking around trenches, being cognizant of slip, trip, and fall hazards. In addition, on site personnel shall be aware of any equipment operating in the area. The potential to encounter unknown underground utilities is unlikely; however, workers will stop work and notify the SHSO if any questionable object is encountered. The SHSO will authorize the start of work after such an encounter.

### **5.7.3 Vertical Well Installation and Horizontal Drilling Activities**

Vertical well, installation, and horizontal drilling activities will involve work activities in the vicinity of drilling equipment. Drilling equipment will be operated by trained personnel, on site geologists/engineers will maintain a minimum distance of five feet from the active drilling equipment. Overhead, lifting, slip, trip, and fall, and noise hazards will be present during drilling activities. Hard hats, steel toed boots, and hearing protection will be utilized during drilling activities. Precautions taken during the installation of wells will be identical to those described in **Section 5.7 Potential Safety Hazards** for open trenches and excavations.

### **5.7.4 Hand Excavation Near Utilities**

Hand excavations will involve workers using shovels to uncover buried utilities. Level D PPE will be worn during this phase. The SHSO will inspect the work progress periodically to verify that workers demonstrate caution while working in these areas. It will be the responsibility of the SHSO to identify unsafe work practices, to instruct workers on proper handling of equipment while in the vicinity of utilities, and to stop work progress, if necessary. Workers should use caution when walking around trenches,

being cognizant of slip, trip, and fall hazards. The potential to encounter unknown underground utilities is unlikely; however, workers will stop work and notify the SHSO if any questionable object is encountered. The SHSO will authorize the start of work after such an encounter. Precautions taken during hand excavation near utilities will be identical to those described in **Section 5.7 Potential Safety Hazards** for open trenches and excavations.

#### **5.7.5 Machine Excavation and Backfilling**

During soil excavation activities, personnel will be utilizing powered excavation equipment. Workers will use caution when working around the powered equipment. The use of hand signals for work activities will assist both the operator and site worker in the safe operation of equipment and will be discussed at daily safety briefings. Although underground utilities will have been located prior to excavation, workers will be briefed as to the potential of encountering unknown underground utilities during the excavation activities. Onsite workers will cease work and notify the SHSO if any questionable object is encountered. Workers will also be aware of potential uneven ground surfaces and other hazards that could cause an individual to slip, trip, and/or fall. The SHSO will inspect the work progress periodically to verify that workers demonstrate due care while working in these areas. It will be the responsibility of the SHSO to identify unsafe work practices, to instruct workers on proper handling of equipment while in the vicinity of utilities, and to stop work progress, if necessary. Precautions taken during machine excavation and backfilling will be identical to those described in **Section 5.7 Potential Safety Hazards** for open trenches and excavations.

#### **5.7.6 Treatment System Installation**

A pre-fabricated treatment building will be assembled and treatment equipment installed during this activity. During placement of the treatment building, workers will be required to stage building materials and treatment equipment at the site. Workers will also be exposed to slip, trip, and fall hazards; and lifting hazards during installation of treatment systems. The various trades involved with installation of the treatment buildings will not be trained in accordance with 29 CFR 1910.120. The treatment system will be installed on a concrete slab, and a pre-engineered building will be erected to enclose the treatment system.

#### **5.7.7 Pipe Trenching**

During pipe trenching activities, personnel will be utilizing powered excavation and trenching equipment. Workers will use caution when working around powered equipment. The use of hand signals for work activities will assist both the operator and site worker in the safe operation of equipment and will be discussed at daily safety briefings. Although underground utilities will have been located prior to trenching, workers will be briefed to the potential of encountering unknown underground utilities during pipe trenching activities. It will be the responsibility of the SHSO to identify

unsafe work practices, to instruct workers on proper handling of equipment while in the vicinity of utilities, and to stop work progress, if necessary. Workers will also be aware of potential uneven ground surfaces and other hazards that could cause an individual to slip, trip, and/or fall. The SHSO will inspect the work progress periodically to verify that workers demonstrate caution while working in these areas. Workers should use caution when walking around pipe trenches, being cognizant of slip, trip, and fall hazards.

#### **5.7.8 Treatment System Connections**

During the connection of the system piping and equipment controls to the treatment system, workers will be exposed to safety hazards associated with lifting and potential hazardous energy sources. Workers will follow the proper lockout/tagout procedures as outlined in **Section 5.7 Potential Safety Hazards** during the connection of system controls and sensors.

#### **5.7.9 Soil/Water/Air Sampling**

Geologists and/or field sampling technicians will use caution and be aware of potential uneven ground surfaces and other hazards that could cause an individual to slip, trip, and/or fall during sampling activities. Prior to sample collection activities of soil stockpiles and excavations and trenches less than three feet in depth, a firm and stable location in the immediate sample collection area will be identified. The use of hand signals during sampling activities will assist both the field technician and any operator of heavy equipment used in the area of sample collection activities.

#### **5.7.10 Operation and Maintenance**

The operation phase of each project includes the monitoring and maintenance of treatment equipment and sample collection activities. The physical hazards which may be encountered during operation and maintenance activities include, but are not limited to, heat stress or heat stroke conditions, vehicular traffic, holes or ditches, sharp objects, and uneven terrain. Operation and maintenance personnel will maintain body fluid levels during hot and humid conditions and will take breaks as necessary to prevent heat-inflicted injuries. Personnel will wear reflective clothing and work in pairs when there is danger from vehicular traffic. Familiarization with the local terrain at the site will minimize slip, trip, and fall hazards. Site workers will work around enclosed treatment equipment and a potentially slippery floor surface. Workers will be trained in the operation and maintenance of the equipment prior to the start of this work activity. During the operation and maintenance activities, site workers may contact petroleum-impacted media such as groundwater and air.

#### **5.7.11 Site Restoration and Demobilization**

Site restoration and demobilization activities will involve site clean-up activities and dismantling structures and/or devices used during the installation of remediation systems.

Site workers will be exposed to potential safety hazards related to lifting; heavy equipment, traffic; and slips trips, and falls.

## **5.8 PERSONNEL PROTECTION**

Anyone entering the designated hydrocarbon restoration work area shall be advised of and protected from potential hazards. The purpose of PPE is to shield or isolate individuals from the potential health and safety hazards that may be encountered at the site. PPE for this project was selected based on the potential health hazards expected at the work sites, the work tasks to be performed, and previous project experience. It is understood that site workers have learned the proper donning and doffing, maintenance, and inspection of PPE; however, J.A. Jones will review these topics during the daily on site safety briefings.

### **5.8.1 Health Hazard Protection**

This section describes the site-specific requirements for the designated levels of protection (Levels C through D). The required PPE to be worn at the specific protection levels and air monitoring requirements are also discussed.

#### Level D

The following criteria determine Level D protection:

- Air monitoring readings up to 5 ppm above background as detected by a PID (sustained monitoring for a one minute period in the immediate vicinity occupied by site workers).
- When remote potential exists for physical contact of petroleum hydrocarbons or inhalation of organic vapors during work operations.

#### Level D-Modified

The following criteria determine Level D-Modified protection:

- Air monitoring readings up to 10 ppm above background as detected by a PID (sustained monitoring for a one minute period in the immediate vicinity occupied by site workers),
- When the potential exists for physical contact of petroleum hydrocarbon or inhalation of organic vapors.

## Level C

The following criteria determine Level C protection:

- Air monitoring readings from 10-100 ppm above background as detected by a PID (sustained monitoring for a one minute period in the immediate vicinity occupied by site workers),
- The small area of skin left unprotected by chemical resistant clothing will not be adversely affected by atmospheric contaminants, liquid splashes, or other direct contact.

Any positive air monitoring results above 100 ppm will require evacuation of workers and ventilation of the area. The Project Superintendent/SHSO will evaluate when the area is safe and personnel may resume work.

### **5.8.1.1 Personal Protection Equipment**

The minimum required PPE for each level of protection is provided below:

## Level D

- Coveralls or other appropriate clothing
- Gloves (discretionary)
- Back support braces/lifting belts (hand excavation personnel)
- Leather or chemical resistant boots or shoes with steel toe and shank
- Safety glasses
- Hard hat

## Level D-Modified

- Coveralls or other appropriate clothing
- Gloves
- Back support braces/lifting belts (hand excavation personnel)
- Full-face or half-face air-purifying canister equipped respirator [Mine Safety Health Administration (MSHA)/NIOSH approved] available at work area
- Leather or chemical resistant boots or shoes with steel toe and shank
- Disposable outer boots (chemical resistant)
- Safety glasses
- Hard hat

## Level C

- Full-face or half-face air-purifying canister equipped respirator (MSHA/NIOSH approved)

- Chemical resistant clothing (coveralls, hooded two-piece splash suit, or hooded one piece splash suit, at the discretion of the SHSO)
- Back support braces/lifting belts (hand excavation personnel)
- Inner and outer chemical-resistant outer gloves
- Chemical resistant boots with steel toe and shank
- Disposable outer boots (chemical resistant)
- Safety glasses
- Hard hat

### Levels of Protection for Work Activities

Initially the most conservative level of PPE specified for each particular task will be worn during the initial performance of that task. Downgrading of PPE will result if air monitoring results warrant and/or at the discretion of the SHSO. The SHSO will monitor the use and effectiveness of PPE during site work and require that site workers inspect their PPE for proper fit and performance. **Figure 5-9** lists the required levels of protection required for various project tasks.

### **5.8.1.2 Frequency and Types of Air Monitoring**

#### Direct Reading/Real Time Monitoring Instruments

The following real-time air monitoring devices will be use at the site:

A PID will be used to monitor organic vapors during intrusive activities involved with pipe trench excavation and horizontal well installation. The PID cannot, however, indicate specific compounds while monitoring. Also, a combustible gas meter will be used to evaluate lower explosive limit (LEL) values in the working areas of the site.

Periodic air monitoring will be performed prior to excavation to attain an ambient reading for the area. Subsequent readings will be collected after trench excavation and well installation activities commence. Air monitoring will be performed frequently at the commencement of site work and will be performed at least hourly thereafter. Once soil is removed, the areas will be monitored again to verify LEL values and the existence of any potential chemical hazard. After the SHSO has declared the area suitable for work (based on PID readings), site personnel will be permitted to continue with their activities.

#### Action Levels

Organic vapor action levels to evaluate required personal protection needs are provided in **Section 5.8.1 Health Hazard Protection** of this SHSP.

## Reporting Air Monitoring Results

Air monitoring readings detected will be recorded in the site Ambient Air Monitoring Log. The log will also include date, time, and location of readings, weather conditions, calibration information, and name and signature of person performing the monitoring. **Figure 5-10** presents the standard form that will be used for recording air monitoring results. The SHSO will post monitoring results, so that all values are properly communicated to site personnel.

## Personal Monitoring

Personal monitoring equipment will not be used during the site work. Periodic monitoring for organic vapors using a PID will be conducted as outlined above to verify workers are not exposed to harmful levels of organic vapors. In addition, it is not expected that the excavation activities will create excessive dust due to the soil moisture content. Wind or work activities create visible amounts of dust, and as a result, misting and/or the use of plastic sheeting in the areas of concern will be employed. In addition, workers will conduct site work in a non-downwind direction whenever possible to minimize dust exposure.

### **5.8.2 Potential Safety Hazard Protection**

A number of preventative measures that can be taken to complete site activities in a safe manner are presented below:

- During site activities, all site workers will obey all United States Navy (USN) rules and regulations as well as those presented in this Plan. Of special concern, with respect to site health and safety, are preventative measures and safe working practices that can minimize the risk of injury to site personnel.
- Back strain can be prevented by employing proper lifting techniques when moving supplies, equipment, and tools.
- Slipping on wet surfaces can be prevented by using an absorbent material in a wet area, as well as wearing boots with a deep tread.
- Heavy equipment hazards can be avoided by posting signs that notify site personnel. Individuals operating pieces of heavy machinery should understand their surroundings and the presence of workers in their respective areas. Back-up alarms on heavy equipment provide additional safety measures during operation.
- All electrical lines and/or bare wires will be avoided at all times. Equipment operating in an area where the movement of one of its parts (boom, lift, backhoe) may come in contact with electrical lines, should be used in a different area or replaced with a suitable alternative. An alternating current-minimum distances table provides a reference of minimum working distances to be maintained while working in the area of electricity. This table is provided in

the US Army Corps of Engineers, Safety And Health Requirements Manual (EM 385-1-1, September 1996, page 184).

- Eye protection will be worn at all times.
- All personnel will be instructed regarding the location and use of fire suppression equipment.
- To minimize a potential hazard, miscellaneous trash and debris that interferes with on site work activities will be collected and properly containerized.

### **5.8.3 Hazard Communication Program**

In accordance with 29 CFR 191.1200, J.A Jones will implement a "Hazard Communication Program" found in Section E of the *J.A. Jones Safety Programs and Procedures Manual*. The J.A. Jones Safety Procedures and Programs Manual will be on site during construction activities. A material safety data sheet (MSDS) station will be located at the site trailer. The MSDS for all potential contaminants and any other chemical used during the project will be posted as part of this program.

### **5.8.4 Hearing Conservation Plan**

The SHSO will be responsible for monitoring noise at the site, because the potential for high noise levels exists during all phases of work. **Figure 5-11** lists the OSHA 29 CFR part 1926 approved permissible noise levels for personnel working an eight hour shift. Monitoring will be performed initially, and then periodically during site work. Site vehicles and equipment are expected to be the sources of extraneous noise. Should the SHSO determine excessive noise levels exist at the work sites, appropriate hearing protection will be distributed. Regardless of noise levels determined by the SHSO, hearing protection will be available to site workers. The SHSO will follow the procedure outlined in the "Hearing Conservation Program" found in Section G of the *J.A. Jones Safety Programs and Procedures Manual*.

## **5.9 WORK ZONE AND SITE CONTROL**

**Figure C-6** found in **Section 8.0 Contractor Generated Construction Drawings** of this Work Plan identify the established decontamination areas (personnel and equipment) and the location of temporary facilities which will house emergency equipment. Personnel entering the area must check-in with the SHSO, sign the site Sign-in Log, and read this plan. The SHSO will retain a copy of the SHSP at the site at all times. The SHSP will be located at the site trailer. Overall site control will be regulated by the USN. The work zones that will be established at each construction area are identified and defined in this section.

- Exclusion Zone (EZ)

An EZ is established to identify an area that contains potentially contaminated soil and/or groundwater. A five foot area around any open trench will be considered the exclusion zone. During well installation, the EZ will include a five foot radius around the drill rig. After the installation of each individual well, the EZ will follow the drill rig to the next well. The EZ can be identified by engineering controls (temporary barricades, fencing or tape), and a sign that identifies the area as an "exclusion zone."

- Contamination Reduction Zone (CRZ)

A CRZ serves as a buffer area between potentially contaminated and non-contaminated areas. The CRZ is defined as the ingress/egress path to/from the EZ (including decontamination areas). As stated previously, contaminated soil is not expected during trenching activities, so the CRZ will coincide with the EZ. However, soil from drilling and drilling operations will be considered contaminated. Therefore, the CRZ will be a two foot radius around the EZ. The CRZ will follow the EZ to each well installation point and drilling site, and will serve as a buffer area for decontamination purposes. The CRZ's will be delineated with engineering controls as outlined above.

Soil from drilling operations will be considered petroleum-impacted. Therefore, the CRZ will be a two-foot radius around the EZ during on site drilling activities. The CRZ will follow the EZ to each well installation point and will serve as a buffer area for decontamination purposes. The CRZs will be delineated with engineering controls as outlined above.

- Support Zone (SZ)

A SZ is a non-contaminated area where support facilities are located. The SZ is identified as that area that lies outside of the EZ and CRZ.

Within the established support zone (SZ), workers will have toilet facilities and an area to wash their hands. Workers will be permitted to take their scheduled breaks and eat lunch within the established area; there will be no hand-to-mouth activity permitted in any area other than the SZ.

Communication with on and off site personnel will be conducted via telephone. J.A. Jones will have a mobile telephone on the site at all times. Should the need arise, radios will be used; however, telephones will serve as the primary communication device for general communication and reporting hazards.

## 5.10 DECONTAMINATION

J.A. Jones will erect a portable decontamination area for personnel and equipment at the work site. The location of the decontamination equipment will be specified by the contracting officer to prevent operational conflicts at the MCAS. The decontamination equipment includes but is not limited to separate wash water and rinse tubs for equipment (hand tools, etc.) and personnel, and an on site water source and eye wash station. If applicable, used wash and rinse water that comes in contact with potential petroleum-impacted material at this area will be containerized in 55-gallon drums. A sample of the containerized decontamination water will be collected and the decontaminated water will be hauled to an off site facility permitted to accept petroleum-impacted water or to an existing groundwater recovery and treatment system located at Cherry Point MCAS designed to treat petroleum-impacted water

Equipment decontamination procedures will consist of manually removing soil from earth moving equipment with brooms and hand tools. Any equipment that comes in contact with petroleum-impacted soil material, if encountered during pipe trench excavation activities, will be decontaminated after completion of field work and before leaving the site. All reusable equipment used to collect, handle, or measure soil and groundwater samples will be decontaminated with a phosphate-free soap before coming into contact with any sample. Decontamination of equipment will occur at the sampling locations.

Used PPE; i.e., gloves (cloth or chemical resistant), Tyveks<sup>®</sup>, boot covers, and respirator cartridges (if applicable); will be containerized and properly disposed of at a disposal facility permitted to accept petroleum contaminated PPE. Complete details of the decontamination procedures to be followed at the work site are below. Sampling equipment decontamination procedures are provided in **Section 2.2.5 Sample Equipment Decontamination** of this plan.

Elements of the decontamination process and the decontamination area have been designed so as to minimize disruption to the environment. The procedures found in this section will be carried out under the direct supervision of the SHSO.

### 5.10.1 Personnel Decontamination

All disposable PPE and respirator cartridges will be containerized and properly disposed of at a disposal facility permitted to accept petroleum-contaminated PPE. Upon exiting the EZ/CRZ all personnel regardless of PPE level shall, at a minimum, wash their hands, face and neck, and arms, prior to eating, drinking, smoking, applying cosmetics, or any other action that would increase the potential of ingesting contaminants.

Air Purifying Respirators (APR) will also be decontaminated. All cartridges will be removed prior to decontamination and disposed of properly. Each site worker is

responsible for the decontamination and clean storage of his/her own APR. The SHSO will discuss proper respirator decontamination techniques and advise site personnel of how to properly dispose of their used cartridges.

Limited temporary decontamination areas will be designated at each work site. The location of these facilities will be coordinated by the SHSO and USN personnel at the site. J.A. Jones will maintain the decontamination facilities, so that the following decontamination steps at the respective levels:

#### Level C Decontamination Steps

- Step 1: Boot Cover and Outer Glove Wash
- Step 2: Boot Cover and Outer Glove Rinse
- Step 3: Tape Removal
- Step 4: Boot Cover Removal
- Step 5: Outer Glove Removal
- Step 6: Suit/Safety Boot Wash
- Step 7: Suit/Safety Boot Rinse
- Step 8: Safety Boot Removal
- Step 9: Splash Suit Removal
- Step 10: Inner Glove Wash
- Step 11: Inner Glove Rinse
- Step 12: Face Piece Removal
- Step 13: Inner Glove Removal
- Step 14: Remove Respirator
- Step 15: Personal Hygiene

#### Level D Decontamination Steps

#### Level D (Modified)

- Step 1: Outer Glove Wash
- Step 2: Outer Glove Rinse
- Step 3: Tape Removal
- Step 4: Boot Cover Removal if Worn
- Step 5: Outer Glove Removal
- Step 6\* Inner Glove Rinse
- Step 7\* Inner Glove Removal
- Step 8: Tyvek Removal if Worn
- Step 9: Safety Boot Wash
- Step 10: Safety Boot Rinse
- Step 11: Inner Glove Removal
- Step 12: Personal Hygiene

## Level D

- Step 1: Remove Outer Garments (i.e., coveralls)
- Step 2: Remove Outer Gloves
- Step 3\* Remove Inner Gloves
- Step 4: Personal Hygiene

\* Note: Inner gloves will be included as a part of these respective PPE ensembles if the SHSO so warrants.

### **5.10.2 Equipment Decontamination**

Excavation and/or equipment used in the trenching and other site activities will be decontaminated after excavation and/or trenching tasks are completed and before leaving the site. Excavation and trenching equipment will be decontaminated with a phosphate-free soap. The equipment used during project activities includes but is not limited to the following:

- John Deer 690 Excavator
- Dump Truck (Tandem, 12 Ton)
- Compactor (13 inch vibratory plate)
- Pickup Truck (3/4 ton, 4WD)
- John Deer 624 3 yd. Loader
- Miscellaneous Trenching Tools
- Miscellaneous Piping/Hand Tools

In the event of inclement weather, where precipitation is of concern, wheels on trucks and equipment which may have contamination on them will be cleaned before permitted to depart the site. This will minimize the potential for foreign material to accumulate in areas where mud, dirt, and other debris are unwanted. **Figure C-6** shows the location of the equipment decontamination area.

### **5.10.3 Wastewater Disposal**

Wastewater will be disposed of in accordance with the transportation and disposal plan presented in **Appendix C**.

## **5.11 CONTINGENCY PLAN**

The following contingency plan has been developed in the case that extraordinary situations arise at the Cherry Point MCAS facility during project activities. The SHSO will discuss the identification, signaling, and required response for the extraordinary situations listed in this section of the plan during the site-specific training. **Figure 5-12** shows the Emergency Telephone Numbers that will be posted at the site. The nearest

hospital to the air station is the Craven Regional Medical Center, New Bern, North Carolina. A map to the hospital will be posted at the site, see **Figure 5-13**.

### **5.11.1 General Response Conditions**

Emergencies at the site must be dealt with in a manner that minimizes the health and safety risk to both site personnel and the public. In regard to the general emergency response procedures, J.A. Jones will follow the "Emergency Response Procedures" as outlined in Section 1.06 of the *J.A. Jones Safety Programs and Procedures Manual*. The J.A. Jones Safety Programs and Procedures Manual will be on site during construction activities. The following sections deal with potential incidents.

#### **5.11.1.1 First Aid**

First aid will be administered by the closest, certified individual to the accident/incident. These certified individuals include the SHSO and one additional on site employee that is trained in bloodborne pathogens procedures, American Red Cross Standard First Aid, and CPR. This assistance will be coordinated by the SHSO and will be conducted in a manner so that those rendering assistance are not placed in a situation of unacceptable risk. The primary concern will be to avoid placing a greater number of individuals in jeopardy.

#### **5.11.1.2 Accident Report and Response Procedure**

All personnel will report any accidents or unusual incidents to the SHSO. The SHSO is responsible for conducting the emergency response in an efficient and safe manner. It will be the responsibility of the SHSO to determine whether or not off site assistance and/or medical treatment is required. The SHSO will be responsible for alerting the USN on site representative and off site authorities to arrange for their assistance during this time.

The SHSO is responsible for completing a Lost Time Injury, Accident Investigation Written Statement, Contractor Significant Incident, and Accident Investigation Photo Log reports as presented in **Figures 5-5** through **5-8**.

#### **5.11.1.3 Response Requirements**

To respond to emergencies, the SHSO will be certified in Adult CPR and First Aid by the American Red Cross or other approved agency. This individual will be available to provide first aid in the event of an emergency.

### **5.11.2 Responsibilities**

The SHSO will be responsible for directing response activities in the event of an emergency/incident. The SHSO will:

- Assess the situation,
- Determine the required response measures,
- Notify the appropriate individuals,
- Direct on site personnel during the emergency, and
- Contact and coordinate with government agencies if appropriate.

### **5.11.3 Public Response Agencies**

A telephone number list of public response agencies to be contacted in the event of on site emergencies is provided in **Figure 5-12**. In the event of an emergency, the SHSO and Site Supervisor will assume authority for contacting the appropriate emergency response agency. All agencies will be notified prior to commencement of work as to the nature of activities at the site. In the event of an emergency situation, site personnel will lend all necessary assistance to the agency in charge.

The SHSO will post at the site trailer emergency telephone numbers and a map showing the preferred route to the nearest hospital along with the local and permanent home phone numbers of the SHSO (during non-working hours) and other site personnel.

### **5.11.4 Emergency Response Equipment**

Before on site project activities commence, the following emergency equipment will be stored at the site trailer and tested if applicable to verify working order:

- First aid kit;
- Air horn;
- Emergency eyewash station;
- 20 pound fire extinguisher (ABC-type);
- Spare PPE, such as safety glasses, hard hats, and respirators; and,
- Water for washing hands and face.

Other equipment used for the routine implementation of the worker health and safety protection and monitoring programs will be made available as needed to support emergency response activity.

### **5.11.5 Accidents and Non-Routine Events**

Possible emergencies are outlined in the following subsections. These are not intended to cover all potential situations. Every incident is unique and must be dealt with in a manner that will not cause further harm to site personnel and/or the surrounding environment. Appropriate initial response is to be provided to assist those in jeopardy without placing additional personnel at unnecessary risk.

### **5.11.5.1 Workers Injury**

The hydrocarbon restoration activities to be performed at Buildings 130 and 3996 have the potential to cause worker injury. Many of these injuries will be non-chemical in nature. Any sprains, rashes, and lacerations will be treated promptly. It is of utmost importance that follow-up care be taken, so that minor injuries do not become aggravated by existing site conditions. Employees are required to report all injuries and illness to the SHSO.

If a worker is physically injured, American Red Cross First Aid procedures will be followed. Depending on the nature of the injury, off site/emergency medical response may be sought. If the employee is injured in a potentially contaminated area and can be moved, he/she will be taken (via stretcher) a safe distance from the work area where contaminated clothing will be removed and emergency decontamination performed, emergency first aid administered, and transportation to a local emergency medical facility conducted.

If a worker in a potentially contaminated area can only be moved by emergency medical personnel, the SHSO will decide what protective equipment is required to be worn by medical personnel.

If the injury to the worker is chemical in nature, the following first aid procedures will generally be instituted as soon as possible:

- Skin exposure - If contaminated soil or liquid comes into contact with skin, wash immediately with the proper rinsing agent as specified in the MSDS;
- Inhalation - If a person inhales large amounts of organic vapor, move/ambulate to fresh air immediately. If breathing has ceased, perform mouth-to-mouth resuscitation; and if the heart has stopped, perform CPR immediately. Always keep the individual warm and as calm as possible. Medical attention should be sought immediately; and,
- Ingestion - If a contaminated solid or liquid is swallowed, medical attention should be sought immediately. In the interim, the local Poison Hotline should be contacted, so that proper medical procedures can be performed while emergency personnel are in transit.

### **5.11.5.2 Heat/Cold Stress**

Adverse weather conditions are an important consideration in planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and personnel injury. Of particular importance during the stages of this project is heat stress. Heat stress is possible while working at certain levels of PPE protection, when impermeable layers are donned.

Heat stress occurs when the body's physiological processes fail to maintain a normal body temperature because of excessive heat. The body reacts to stress related to heat a number of different ways. The reactions range from mild, such as fatigue, irritability, anxiety, and decreased concentration, to severe, such as death. Heat related disorders are generally classified into four basic categories: heat rash, heat cramps, heat exhaustion, and heat stroke. The descriptions, symptoms, and treatment for these disorders are described as follows.

### Heat Rash

Description - Heat rash is caused by continuous exposure to heat and humid air and is generally aggravated by coarse clothing. This condition decreases the ability to tolerate heat. This condition is the mildest of heat related disorders.

Symptoms - Mild red rash which is generally more prominent in areas of the body in contact with personal protective equipment.

Treatment - Decrease the amount of time in personal protective equipment and use powder to help absorb moisture.

### Heat Cramps

Description - Heat cramps are caused by perspiration that is not off-set with adequate fluid intake. This condition is the first sign of a situation that can lead to heat stroke.

Symptoms - Acute, painful spasms occurring in the voluntary muscles (e.g., abdomen and extremities).

Treatment - Remove a victim to a cool area and loosen clothing. Have victim drink 1 - 2 cups of water immediately and every 20 minutes thereafter until the symptoms subside. Total water consumption should be 1 - 2 gallons per day. Consult with a physician.

### Heat Exhaustion

Description - Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. This condition is more severe than heat cramps.

Symptoms - Pale, clammy, moist skin with profuse perspiration and extreme weakness. Body temperature is generally normal and the pulse is weak and rapid. Breathing is shallow. The victim may show signs of dizziness and may vomit.

Treatment - Remove the victim to a cool, air conditioned atmosphere. Loosen clothing and require that the victim lay in a flat position with the feet slightly elevated. Have the victim drink 1 - 2 cups of water immediately and every 20 minutes thereafter until the symptoms subside. Seek medical attention, particularly in severe situations.

### Heat Stroke

Description - Heat stroke is an acute and dangerous situation. It can happen in a very short time period. The victims temperature control system shuts down completely resulting in a rise in body core temperature to levels that can cause brain damage and can be fatal if not treated promptly and effectively.

Symptoms - Red, hot, dry skin, with no perspiring. Rapid respiration, high pulse rate, and extremely high body temperature are other symptoms.

Treatment - Cool the victim quickly. If the body temperature is not brought down quickly, permanent brain damage or death can result. The victim should be soaked in cool water. Get medical attention as soon as possible.

The following control measures will be employed to help control heat stress:

- Workers wearing permeable clothing (i.e., standard cotton or synthetic work clothes) will be monitored according to the ACGIH Threshold Limit Values for Heat Stress. Personnel wearing semi-permeable or impermeable encapsulating ensembles will be monitored when the temperature in the work area is above 70°F (21°C). Minimum monitoring requirements will include measuring the heart rate and visually monitoring body water loss.
- Provision for adequate liquids to replace lost body fluids. Employees must replace water and salt lost through perspiration. Employees will be encouraged to drink more than the amount required to satisfy thirst, since thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement. Replacement fluids can be fresh cool water and commercial mixes such as Gatorade.
- Acclimate employees to working conditions by slowly increasing workloads over extended periods of time. Do not begin site work activities with the most demanding physical tasks.
- Where possible, conduct strenuous activities during cooler portions of the day, such as early morning or early evening.
- Establish a work-rest regimen that will provide adequate rest periods for cooling down.
- Breaks will be taken in a cool rest area.
- Employees will not be assigned other tasks during rest period.

- Employees will be informed of the importance of adequate rest, acclimatization, and proper diet in the prevention of heat stress.

Injury due to cold exposure may be either local or systemic. Local, cold exposure is generally described as frostbite and systemic cold exposure is referred to as hypothermia.

Frostbite injuries most commonly occur on the body extremities (nose, cheeks, hands, feet). Hypothermia is a decrease of core temperature to 95° F or below. Risk factors for the development of frostbite and hypothermia include temperature, medication/drugs, alcohol, wetting, and wind. Frostbite and hypothermia can occur at moderate temperatures (15-40°F) with moderate winds (1-4 mph). When temperatures fall within the aforementioned range, the SHSO will implement the proper controls found in Section 4.01, "Controlling Heat/Cold Stress" of the *J.A. Jones Safety Procedures and Programs Manual*.

One or more of the following control measures can help prevent frostbite and hypothermia:

- Do not allow skin to be continuously exposed to sub-zero temperatures
- Dry, loose clothing over extremities
- Proper diet, acclimation, and rest
- Dry clothing
- Establishment of work-rest regimen that will provide adequate rest periods of warming
- Taking breaks in warm area

As with warm environments, individuals can achieve a certain degree of acclimation when working in cold environments. The body will undergo some changes that will increase the body's comfort and also reduce the risk to cold injury. Working in a cold environment causes significant water losses through the skin and the lungs as a result of the dryness of the air. Increased fluid intake is essential to prevent dehydration, which effects the flow of blood to the extremities and increases the risk of cold injury.

### **5.11.5.3 Fires**

Personnel in each work crew will be knowledgeable in fire-suppression techniques. The site-specific training will cover:

- Location and use of fire extinguishers
- Techniques for smothering fires, using available non-combustible materials
- Emergency evacuation procedures in the event fires reach an out-of-control level

Each piece of heavy equipment will be equipped with a fire extinguisher.

## Small Fires

In the event of a small fire at the site, the SHSO will, at a minimum, take the following actions:

- Evacuate all unnecessary personnel from the area to an upwind location, if possible
- Attempt, using properly protected personnel, to extinguish fire using portable fire extinguishers or by smothering
- Request emergency response assistance (ambulance, fire, hospital, poison control center) as needed for any injuries or exposures to hazardous chemicals.

## Large Fires

In the event of a large or small fire, which cannot be extinguished, the SHSO will undertake the following actions:

- Immediate notification of the MCAS Fire Department (911)
- Evacuate all personnel from the area of the fire, preferably to an upwind location

## Evacuation Procedures

In the event that the SHSO should declare an evacuation, all personnel would be required to exit the defined work area to an upwind location near the site perimeter or beyond.

### **5.11.5.4 Inclement Weather Conditions**

Inclement weather conditions may occur without warning. It will be the responsibility of the SHSO to halt work due to eminent danger. In the event that extreme weather conditions caused by high winds, hurricanes, etc. arise, site personnel will secure or remove all site facilities, materials, and equipment so that it does not become a hazard; secure temporary utilities where possible; verify trailer tiedowns; and cover all exposed openings in existing facilities to minimize potential wind and water damage. The SHSO will also be responsible to commence work once the danger has passed.

Housekeeping and maintaining the cleanliness of the site will be a priority during construction activities to minimize the potential of foreign object debris dangers to personnel and equipment during inclement weather conditions.

The hurricane season in the immediate area surrounding the MCAS commences on June 1st and continues through November 30th. Storms of non-tropical origins such as frontal passage, local thunderstorms and tornadoes are much more frequent and can occur year round. J.A. Jones will review all Navy notification procedures and local readiness plans concerning inclement weather once they are made available. The various types of storms

which occur in the Cherry Point area and their readiness conditions are provided as follows.

### Storms

1. Thunderstorm: Associated with cumulo-nimbus clouds - usually affects only a small area. It always produces thunder and lightening and may generate hailstorms and violent wind gusts.
2. Tornado: A tight rotary windstorm. Although small in scale, it is one of the most violent storms known.
3. Waterspout: A tight rotary windstorm over or close to the watch area.
4. Gale: A non-tropical windstorm with expected wind speeds 37 to 47 knots.
5. Storm: A non-tropical windstorm with wind speeds 48 knots or greater.

### Storm Readiness Conditions

1. Small Craft Warning: Harbor and inland waters are experiencing winds of 33 knots or less and wind driven waves of concern to small craft.
2. Tornado Watch: Conditions are favorable for tornadoes and associated thunderstorms to form within or close to the watch area.
3. Tornado Warning: A tornado has been sighted or verified by radar within or close to the watch area.
4. Severe Thunderstorm Watch: Severe thunderstorms (wind gust of 50 knots or greater and/or hail of 0.75 inch diameter or greater) are probable within or close to the watch area.
5. Severe Thunderstorm Warning: A severe thunderstorm has been sighted or verified by radar within or close to the watch area.
6. Thunderstorm/Tornado Condition II: Destructive winds and the weather phenomena indicated are expected in the general area within 6 hours. Associated lightening, torrential rain, hail, severe downbursts, and sudden wind shifts are possible. Take precautions which will maintain an appropriate state of readiness on short notice.
7. Thunderstorm/Tornado Condition I: Destructive winds and the weather phenomena indicated are imminent or are occurring. Associated lightening, torrential rain, hail, severe downbursts, and sudden wind shifts are possible. Take immediate safety precautions and shelter.
8. Gale/Storm Warning (as applicable): Destructive winds of the force indicated are anticipated within 12 hours.

### Tropical Cyclonic Storms

1. Tropical Depression: A tropical cyclone with wind speeds to 33 knots.
2. Tropical Storm: A tropical cyclone with wind speeds from 34 to 63 knots.
3. Hurricane: A tropical cyclone with wind speeds of 64 knots or greater.  
Class 1 - winds of 64 to 82 knots. Storm surge 4 to 5 feet above normal.

Class 2 - winds of 83 to 95 knots. Storm surge 6 to 8 feet above normal.  
Class 3 - winds of 96 to 113 knots. Storm surge 9 to 12 feet above normal.  
Class 4 - winds of 114 to 135 knots. Storm surge 13 to 18 feet above normal.  
Class 5 - winds above 135 knots. Storm surge more than 18 feet above normal.

#### Major Tropical Storm/Hurricane Conditions

1. Tropical Storm/Hurricane Condition V: Destructive winds of the force indicated (or as specified) are possible within 96 hours.
2. Tropical Storm/Hurricane Condition IV: Destructive winds of the force indicated (or as specified) are possible within 72 hours.
3. Tropical Storm/Hurricane Condition III: Destructive winds of the force indicated (or as specified) are possible within 48 hours.
4. Tropical Storm/Hurricane Condition II: Destructive winds of the force indicated (or as specified) are possible within 24 hours.
5. Tropical Storm/Hurricane Condition I: Destructive winds of the force indicated (or as specified) are possible within 12 hours.

#### **5.11.5.5 Refuges for an Emergency Situation**

J.A. Jones has identified a preliminary emergency refuge at the Buildings 130 and 3996 site as Building 131 or 1700. The final refuge location for a potential emergency situation will be identified by MCAS personnel prior to the initiation of field construction activities. This refuge will shield workers from inclement weather an/or other hazards that may arise in an emergency situation. Heat/Cold Stress work breaks will be taken in this area.







SECTION 16 - PRE-TASK PLANNING

**SAFETY PRE-PLANNING CHECKLIST**

Job name: RAC Action for UST Remedial Action, Buildings 130 and 3996, MCAS, Cherry Point, North Carolina

Job number: 005-0203-045; POLRAC Delivery Order No. 045

Project Manager/Supt. JoAnne Snelson/Richard Johnson

Maximum number of workers expected on the job: *Direct hire* 5 *Subcontractor* 3 *Total* 8

Who will be designated as the jobsite safety representative? Richard Johnson

Is the company safety manual on site? Yes Is the most current edition of the Construction Industry

Standards 29 CFR 1926/1910 on site? Yes

**INSURANCE**

Insurance Carrier - *Name:* Aetna Casualty & Surety Company

*Address:* 151 Farmington Ave. Hartford, Connecticut *Phone:* 203/273-2104 *Fax:* 203/273-8437

*Safety Representative:* Steve Cloutier *Phone:* 704/553-3574

*Local Claim Office:* 201 S. College Street Charlotte NC *Phone:* 704/353-7663

Do we have the necessary insurance claim forms? Yes Have subcontractors furnished insurance certificates? Yes Have we been named as additional insured on our subcontractors' General Liability policy? Yes

**TREATMENT FOR JOB RELATED INJURIES**

Physicians - <i>Name</i>	<i>Address</i>	<i>Phone</i>	<i>Fax</i>
1. _____	_____	_____	_____
2. _____	_____	_____	_____

Has physician and/or clinic providing medical care for our workers' compensation cases been contacted?

Hospital - *Name:* Craven Regional Medical Center

*Address:* 2000 Neuse Boulevard, New Bern, North Carolina 28562

*Phone:* (919) 633-8104

Ambulance - *Name:* \_\_\_\_\_ *Phone:* 911

Fire Department - *Phone:* 911 Police - *Phone:* 911

Have emergency telephone numbers been posted at all jobsite telephones? Yes

Who will be responsible for first-aid treatment, records, and supplies at the jobsite? Richard Johnson

Has your first-aid technician received blood-borne pathogen training? \_\_\_\_\_ Hepatitis B vaccination? \_\_\_\_\_



## SECTION 16 - PRE-TASK PLANNING

---

Have first-aid supplies been obtained? Yes

Who will be responsible for reporting accidents to Charlotte? Richard Johnson

### DRUG TESTS

Who will perform the lab analyses of urine samples? A certified laboratory through the clinic.

Who will perform the collection of urine samples? The staff nurse or technician.

Do you plan to perform random testing? Not during this delivery order. However, J.A. Jones does perform random testing.

### COMPETENT PERSON

Who has been identified as a competent person for the following types of construction activities?

Blasting Not Applicable

Ladders Richard Johnson

Respirator use Richard Johnson

Medical services/First-aid Local Paramedics/Richard Johnson

Tunnels Not Applicable

Steel erection Not Applicable

Excavation, including trenches Richard Johnson

Aerial lifts Not Applicable

Jobsite inspections Richard Johnson

Scaffolding Not Applicable

Crane use and inspection, including wire rope and hooks Not Applicable

Electrical installation and regular inspections of temporary power Cherry Point Electrical Inspector

Have our subcontractors identified competent persons for such activities? Yes

### PERSONAL PROTECTIVE EQUIPMENT

What protective equipment will workers need?

*Hard hats*

*Eye protection*

*Rubber boots*

*Safety foot wear*

*Fall protection*

*Respirators*

*Hearing protection*

*Other: Gloves*

### SAFETY ADMINISTRATION

What miscellaneous forms are needed?

*Employer's first report of injury*

*Supplemental report for disabling injuries*

*First-aid log*

*Supervisor's accident report*

*OSHA 200 form*

*Safety check lists*



## SECTION 16 - PRE-TASK PLANNING

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### TRAINING

Do you have a video tape player and monitor available for the following training:

- Employee Safety Orientation Not Applicable
- Craft Supervisor and Superintendent Safety Training Not Applicable
- Haz-Com Not Applicable
- First Aid Not Applicable
- Bloodborne Pathogens Not Applicable

Do you have a supply of Safe Practices booklets to be provided to new employees? Yes

### HAZARD COMMUNICATION PROGRAM

Do you have a project copy of the written company Haz-com program? Yes Have you obtained copies of our subcontractor's written Haz-com program? Yes Have we documented Haz-com training of all company employees at the time of hire? Yes Have we required our subcontractors to provide us with a copy of Material Safety Data Sheets (MSDSs) on each substance brought onto our jobsite that could potentially become a hazard to project personnel? Yes Where will we keep the MSDS file for project personnel to access information? Superintendent will keep available on-site Is the Chemical Inventory Sheet in place and current? Yes

### FIRE PROTECTION

What provisions will be made for maintaining jobsite housekeeping? Keep trash containerized

Has a safe place been designated for the storage and/or disposal of scrap material? If needed, it will be evaluated in the field and properly maintained

Where will materials and equipment be stored? On the base where directed

Have portable fire extinguishers been distributed around the project? Yes

Where will gas, oil, and other flammables be stored? In approved containers

Are tanks labeled as to contents, have warning signs been posted, and are tanks vented adequately? Yes

Are fuel tanks grounded and diked? Not Applicable

### ELECTRICAL

Have provisions been made to assure that temporary power is protected by GFCIs? Yes

Who will maintain and check GFCIs? Richard Johnson

---

### SAFETY MANUAL

Figure 5-3 (Continued)



SECTION 16 - PRE-TASK PLANNING

TRAFFIC

Have arrangements been made for employees' parking area? Not Applicable

Any arrangements necessary to control traffic? Yes

What signs will be necessary?

- Speed limit
- Barricade tape
- Promote safety: Entrance slogan, bulletin board
- Direct traffic
- Traffic barrels
- To define parking areas
- Warn of special hazards: Excavation, high voltage, crane working, etc.

SAFETY MEETINGS

How will subcontractors participate in the general safety program? Mandatory attendance required

What will be the schedule of safety meetings?

- Tool Box Talks (craft)
- Supervisors
- Jobsite Safety Committee

Who will conduct safety meetings?

Tool Box Talks Richard Johnson

Supervisors \_\_\_\_\_

Safety Committee \_\_\_\_\_

Is the "Take 5" Program in place?\* Yes

*\*This program is designed as a supplement to the weekly Tool Box Meetings. Before assigning work, all craft supervisors will meet with their crews to address necessary safety equipment to be used for each assigned work activity, and to specify special safety considerations. This form must be completed before each shift starts work.*

FALL EXPOSURES

Will temporary accesses need to be built in work areas, or can permanent stairs be expedited and used? No

Have scaffold needs been determined? Not Applicable Built-up \_\_\_\_\_ Hung \_\_\_\_\_

Decking selected and marked? Not Applicable

Who will inspect prior to use? Not Applicable Guard rails included? Not Applicable

Who will be responsible for maintaining temporary guard rails? Not Applicable

What type of "leading edge" fall protection will be employed? Not Applicable



## SECTION 16 - PRE-TASK PLANNING

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### CRANES AND HOISTS

Will cranes be used on the jobsite? No *What types?*

---

Have we received a copy of the annual inspection report for each? Not Applicable

Who will perform frequent and/or periodic inspections of the crane(s)? Not Applicable

Will material hoist be used? Not Applicable *Where located?* Not Applicable

Who will inspect hoisting equipment? Not Applicable Company and local safety standards met? Not Applicable

### EXCAVATION AND TRENCHING

Are there any underground utilities such as water or gas lines, sewers, cables, or power lines which should be located or marked to prevent damage? Yes Have utility companies been contacted? Yes

Who will be responsible for supervising excavation and/or trenching operations and for employment of the proper worker protection systems? Richard Johnson

Have employees been trained to identify symptoms of an excavation in danger of collapse? Yes

### LOCK-OUT/TAG-OUT

Will it be necessary to lock-out/tag-out mechanical, pneumatic, electrical, and hydraulic equipment to protect workers performing work on such systems? Yes

Have employees been trained to understand the lock-out/tag-out procedure? Yes

### CONFINED SPACES

Will there be any work taking place in an OSHA defined "confined space"? No

Will a confined-space entry permit be required? Yes If so, who will perform air testing within the confined space? Richard Johnson

Have employees who will enter a permit-required confined space received special training? Yes

Do you have air testing equipment available or on order? Yes



SECTION 16 - PRE-TASK PLANNING

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SANITATION

Is there a safe source of drinking water? Yes

Who will be responsible for sanitizing drinking water containers? Richard Johnson

What temporary toilet facilities will be needed? Not Applicable

ENVIRONMENTAL

Have you made considerations for control of hazardous material spills? Yes

*Soil contamination*

*Surface water contamination*

*Wet land contamination*

Will hazardous waste and/or substances be generated from the jobsite? No

Is there potential for employee exposure to concentrations of asbestos, lead, etc.? No

SAFETY INCENTIVE PROGRAM

What type of safety incentive program will be established for the jobsite? Not Applicable



SECTION 16 - PRE-TASK PLANNING

TAKE 5 FOR SAFETY

This daily five-minute safety program is designed to take place at the start of each work shift. All craft supervisors will be required to meet with their crews to discuss the tasks to be accomplished and the steps that need to take place to work safely, and to address any special conditions. Focusing on safety at the start of each work shift will reemphasize to our employees that we can and will plan safety into our work.

The "Take 5 for Safety" program does not replace our weekly Tool Box Safety meetings. Instead, this program becomes a supplement to the project safety communication system. A sample of the "Take 5" form is shown below:

COMPANY J.A. Jones Environmental Services Company CRAFT \_\_\_\_\_

PROJECT No \_\_\_\_\_ CREW No. \_\_\_\_\_

TASKS TO BE COMPLETED

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SAFETY REQUIREMENTS

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PERSONAL PROTECTIVE EQUIPMENT REQUIRED \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

TOOLS REQUIRED

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SPECIAL CONDITIONS

\_\_\_\_\_  
\_\_\_\_\_

BY \_\_\_\_\_ DATE \_\_\_\_\_  
CRAFT SUPERVISOR



Figure 5-4

MEDICAL AUTHORIZATION

(Physician, Hospital, Clinic, etc.)

Please render immediate medical treatment to employee named below.

JOB NAME & NUMBER
-------------------

1. INJURED EMPLOYEE (Type/Print)			3. DATE OF INJURY			5. TIME OF INJURY		
Last Name	First	Initial	Month	Day	Year	Hour	Minutes	AM/PM
4. DATE INJURY REPORTED						6. EMPLOYEE BADGE		7. SOCIAL SECURITY NUMBER
			Month	Day	Year			

Medical treatment rendered is subject to the provisions of the State Workers' Compensation Act.

How long employed \_\_\_\_\_ year(s) \_\_\_\_\_ month(s) \_\_\_\_\_ week(s) \_\_\_\_\_ day(s).  
Supervisor \_\_\_\_\_ Social Security # \_\_\_\_\_

Give a brief description of injury: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please send your report and bill directly to:  
(Insurance Carrier's Name) \_\_\_\_\_  
Mailing Address) \_\_\_\_\_  
By: \_\_\_\_\_ Title \_\_\_\_\_

TREATMENT/RETURN TO WORK AUTHORIZATION

PHYSICIAN: For our information, we request that the following information be completed and this form given to the employee or return to us. If the employee is not to return immediately to work, please mail this form to us.

TREATMENT RENDERED \_\_\_\_\_  
\_\_\_\_\_

RETURNED TO: REGULAR WORK \_\_\_\_\_ LIGHT DUTY \_\_\_\_\_ SENT HOME \_\_\_\_\_

ESTIMATED TIME OFF FROM WORK \_\_\_\_\_

DATE OF NEXT TREATMENT \_\_\_\_\_

THE INJURY APPEARS TO BE: OCCUPATIONAL \_\_\_\_\_ NON OCCUPATIONAL \_\_\_\_\_

PHYSICIAN'S SIGNATURE \_\_\_\_\_ INJURED EMPLOYEE \_\_\_\_\_ (NAME)

DATE \_\_\_\_\_

LIGHT DUTY WORK IS AVAILABLE FOR THIS EMPLOYEE

TO EMPLOYEE: This section must be returned to jobsite office prior to returning to work.





SECTION 17 - ACCIDENT INVESTIGATION

LOST TIME INJURY REPORT

PROFIT CENTER: \_\_\_\_\_ PROJECT NAME: RAC Action for UST Remedial Action,

Buildings 130 and 3996, Marine Corps Air Station, Cherry Point, NC PROJECT No: 005-0203-045

PROJECT MANAGER/SUPT: Richard Johnson PROJECT PHONE #: (\_\_\_\_)

EMPLOYEE: \_\_\_\_\_ AGE: \_\_\_\_ CRAFT:

INJURY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ AM/PM

DESCRIPTION:

IS THERE POTENTIAL THIRD-PARTY LIABILITY? \_\_\_\_ IF SO, EXPLAIN:

WITNESS(ES): \_\_\_\_\_, \_\_\_\_\_,

THE FOLLOWING STEPS HAVE BEEN TAKEN TO PREVENT A SIMILAR ACCIDENT:

REPORTED BY: \_\_\_\_\_

DATE:

-----  
THIS REPORT (TYPED) MUST BE FAXED TO C. T. DAVIDSON UPON NOTICE OF A LOST TIME INJURY. A COPY SHOULD BE SENT TO THE DIVISION MANAGER AND TO THE SAFETY AND LOSS PREVENTION DEPARTMENT.

FAX NUMBERS

C. T. DAVIDSON (704) 553-3214

LOSS PREVENTION (704) 553-3195



ACCIDENT INVESTIGATION

Figure 5-6  
WRITTEN STATEMENT

EXHIBIT 2

NAME \_\_\_\_\_

EMPLOYER \_\_\_\_\_

ADDRESS \_\_\_\_\_

POSITION \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

THIS STATEMENT IS IN REFERENCE TO

TELEPHONE NUMBER \_\_\_\_\_

\_\_\_\_\_

DATE \_\_\_\_\_

\_\_\_\_\_

DESCRIBE THE EVENTS THAT LED TO THE ACCIDENT, HOW THE ACCIDENT HAPPENED, AND ANY OTHER INFORMATION THAT WOULD BE HELPFUL.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NAMES OF OTHERS WITH KNOWLEDGE OF THE ACCIDENT

NOTE: RECORD WHO AT ALL TIMES WILL KNOW YOUR WHEREABOUTS.

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

PHONE \_\_\_\_\_

The foregoing statement is true to the best of my knowledge and memory.

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Signature of Person Accepting Statement

Figure 5-7

## Contractor Significant Incident Report

Report Date:		Contracting Activity/ROICC Office:				
<b>1. Accident Classification:</b>						
<input type="checkbox"/> Injury <input type="checkbox"/> Illness <input type="checkbox"/> Fatality <input type="checkbox"/> Property Damage <input type="checkbox"/> Procedural Issues <input type="checkbox"/> Environmental						
<b>Involving:</b>						
<input type="checkbox"/> Hazardous Materials		<input type="checkbox"/> Electrical		<input type="checkbox"/> Equipment/Motor Vehicle/ Material Handling		
<input type="checkbox"/> Confined Space		<input type="checkbox"/> Crane/Rigging		<input type="checkbox"/> Diving <input type="checkbox"/> Falls		
<input type="checkbox"/> Waterfront Operations		<input type="checkbox"/> Demolition/Renovation		<input type="checkbox"/> Trenching/Entrapment <input type="checkbox"/> Fire <input type="checkbox"/> Other		
<b>2. Personal Data:</b>						
A. Name (Last, First, MI)			B. Age	C. Sex	D. Social Security Number	
E. Job Description/Title		F. Employed By			G. Supervisor's Name	
<b>3. Witness Personal Data (Attach Signed Witness Statements to Report):</b>						
A. Name (Last, First, MI)				B. Age	C. Sex	
D. Job Description/Title			E. Employed By			
<b>4. General Information:</b>						
A. Date of Accident (Month/Day/Year)		B. Time of Accident		C. Exact Location of Accident	D. Type of Construction Equipment (Make, Model, Serial Number, VIN Number)	
E. Contract Number/Title		F. Construction Activity SIC		G. Hazardous Material Spill/Release		
H. Type of Contract <input type="checkbox"/> Construction <input type="checkbox"/> A/E <input type="checkbox"/> Service <input type="checkbox"/> RAC <input type="checkbox"/> CLEAN <input type="checkbox"/> JOC <input type="checkbox"/> Other _____			I. Contractor's Name/Address/Phone Number  (1) Prime:  (2) Sub:			
J. Safety Manager's Name/Phone Number  (1) Prime:                      (2) Sub:				K. Insurance Carrier  (1) Prime:                      (2) Sub:		

Figure 5-7 (Continued)

L. Work Activity Involved at Time of Accident		M. Personal Protective Equipment? (1) Available & Used (2) Not Required (3) Available & Not Used (4) Not related to mishap (5) Wrong PPE for Job (6) List Type(s) Used:	
<b>5. Injury/Illness/Fatality Information:</b>			
A. Severity of Illness/ Injury	B. Estimated Days Lost	C. Estimated Days Hospitalized	D. Estimated Days Restricted Duty
E. List Body Part(s) Effected	F. Nature of Illness/Injury	G. Type and Source of Injury/Illness (1) Type (2) Source	
<b>6. Accident Description:</b>			
A. Describe in your own words what happened. Use additional paper if necessary.			
B. Who provided first aid and/or cleanup of mishap site?			
C. Any blood borne pathogen exposure by other than EMT's? If so, who?			
D. Was site secured and witness statements taken immediately?			
E. List OSHA and EM-385-1-1 standards that were violated.			
<b>7. Casual Factors (Explain "yes" answers on supplementary sheet.)</b>			
			<u>Yes</u>
			<u>No</u>
Design - Was design of facility, workplace, or equipment a factor?			
Inspection/Maintenance - Were inspection & maintenance procedures a factor?			
Person's Physical Condition - In your opinion, was the physical condition of the person a factor?			
Operating Procedures - Were operating procedures a factor?			
Job Practices - Were any job safety/health practices not followed when the accident occurred?			
Human Factors - Did any human factors such as size or strength of person, etc., contribute to accident?			

Figure 5-7 (Continued)

	<u>Yes</u>	<u>No</u>
<b>Environmental Factors</b> - Did heat, cold, dust, sun, glare, etc., contribute to the accident?		
<b>Chemical &amp; Physical Agent Factors</b> - Did exposure to chemical agents, such as dust, fumes, mists, vapors, or physical agents such as noise, radiation, etc., contribute to the accident?		
<b>Office Factors</b> - Did office setting such as lifting office furniture, carrying, stopping, etc., contribute to the accident?		
<b>Support Factors</b> - Were inappropriate tools/resources provided to properly perform the activity/task?		
<b>Personal Protective Equipment</b> - Did the improper selection, use, or maintenance of personal protective equipment contribute to the accident?		
<b>Drugs/Alcohol</b> - In your opinion, were drugs or alcohol a factor?		
<b>Job Hazard Analysis</b> - Was the lack of an adequate (EM-385-1-1 Sec. 01.A) activity hazard analysis a contributing factor? - Was it site specific and addressed the type of work/operations performed when the mishap occurred?		
<b>Management</b> - Did a lack of adequate supervision contribute to the accident? - Was inadequate information provided at pre-con meeting?		
<b>8. Training:</b>		
A. Was person trained to perform activity/task?		
B. Type of Training?		
C. Date of most recent formal training:  List topics discussed:		
<b>9. Full Explanation of What Allowed or Caused the Accident:</b>		
A. Direct Cause:		
B. Indirect Cause:		
C. Action(s) taken to prevent occurrences or provide on-going corrective actions:		
D. Corrective Action Dates:  (1) Beginning (Mo/Da/Yr) _____ (2) Anticipated Completion (Mo/Da/Yr) _____		

Figure 5-7 (Continued)

<b>10. OSHA:</b>		
A. Date OSHA was notified: _____	B. Date OSHA investigated: _____	
C. Date of OSHA Citation: _____ City of Citation: _____	D. \$ Amount of Penalties: \$ _____	
<b>11. Report Preparer:</b>		
Supervisor Completing Report		
Name (Print): _____		Title: _____
Signature: _____		Date: _____
<b>12. Management Review (Contracting Officer):</b>		
A. Accepted	B. Amendments Required	C. Comments (include program improvements required for your command, NAVFACHQ construction safety program, and EM-385-1-1)
D. Official Completing Report		
Name (Print): _____		Title: _____
Signature: _____		Date: _____
<b>13. Safety and Occupational Health Office Review</b>		
A. <input type="checkbox"/> Concur	B. <input type="checkbox"/> Non Concur	C. <input type="checkbox"/> Additional Actions/Comments
D. Safety Personnel Reviewing		
Name (Print): _____		Title: _____
Signature: _____		Date: _____

## Figure 5-7 (Continued)

# CONTRACTOR SIGNIFICANT INCIDENT REPORT INSTRUCTIONS

Complete Sections Appropriate to Incident.

**GENERAL.** Complete a separate report for each person who was injured, caused or contributed to the accident (excluding uninjured personnel and witnesses). Please type or print legibly. Appropriate items shall be marked with an "X" in box(es), non-applicable sections shall be marked "N/A". If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated.

**REPORT DATE** - Enter the date on which report was initiated.

**CONTRACTING ACTIVITY/ROICC OFFICE** - Enter the name and address of the Contracting Office administering the contract under which the mishap took place.

### SECTION 1 - ACCIDENT CLASSIFICATION. (Mark All Boxes That Are Applicable.)

**INJURY/ILLNESS/FATALITY/PROPERTY DAMAGE/PROCEDURAL ISSUES/ENVIRONMENTAL** - Mark the appropriate block if the incident resulted in any contractor lost-time injury, illness, fatality or near miss. If the mishap involved any of the conditions listed under "Involving" mark the appropriate box(es). Specific questions associated with each condition are available from the Contracting Officer.

### SECTION 2 - PERSONAL DATA

- A. **NAME** - Enter last name, first name, middle initial of person involved.
- B. **AGE** - Enter age.
- C. **SEX** - Enter M for Male and F for Female.
- D. **SOCIAL SECURITY NUMBER** - Enter the social security number if available.
- E. **JOB DESCRIPTION/TITLE** - Enter the job description/title assigned to the injured person, e.g. carpenter, laborer, surveyor, etc.
- F. **EMPLOYED BY** - Enter employment company name of person involved.
- G. **SUPERVISOR'S NAME** - Enter name of the immediate supervisor

### SECTION 3 - WITNESS PERSONAL DATA

- A. **NAME** - Enter last name, first name, middle initial of witness (If more than one, provide information on all witnesses on separate sheet of paper.)
- B. **AGE** - Enter age.
- C. **SEX** - Enter M for Male and F for Female.
- D. **JOB DESCRIPTION/TITLE** - Enter the job description/title assigned to the injured person, e.g. carpenter, laborer, surveyor, etc.
- E. **EMPLOYED BY** - Enter employment company name of person involved.

### SECTION 4 - GENERAL INFORMATION

- A. **DATE OF ACCIDENT** - Enter the month, day, and year of accident.
- B. **TIME OF ACCIDENT** - Enter the local time of accident in military time. Example: 1430 hrs (not 2:30 p.m.).
- C. **EXACT LOCATION OF ACCIDENT** - Enter facts needed to locate the accident scene: (installation/project name, building number, street, direction and distance from closest landmark, etc.).
- D. **TYPE OF CONTRACTOR EQUIPMENT** - Enter the Serial Number, Model Number and specific type of equipment involved in the mishap, e.g. dump truck (off highway), crane (rubber tire), pump truck (concrete), etc.?
- E. **CONTRACT NUMBER /TITLE** - Enter complete contract number and title of prime contract, e.g., N62477-85-C-0100.
- F. **CONSTRUCTION ACTIVITY (SIC)** - Enter your company's SIC
- G. **HAZARDOUS MATERIAL SPILL/RELEASE** - List name(s) of any reportable quantities of hazardous materials spilled/released during the mishap.
- H. **TYPE OF CONTRACT** - Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.
- I. **CONTRACTOR'S NAME/ADDRESS/PHONE NUMBER**
  - (1) **PRIME** - Enter the exact name (title of firm), address and phone number of the prime contractor.
  - (2) **SUBCONTRACTOR** - Enter the exact name, address and phone number of any subcontractor involved in the accident.
- J. **SAFETY MANAGER'S NAME/PHONE NUMBER**
  - (1) **PRIME** - Enter the name and phone number of the prime contractor's safety manager.
  - (2) **SUBCONTRACTOR** - Enter the name and phone number of the subcontractor's safety manager.
- K. **INSURANCE CARRIER**
  - (1) **PRIME** - Enter the exact name (title of firm) of prime's insurance company.
  - (2) **SUBCONTRACTOR** - Enter the exact name of subcontractor's insurance company.
- L. **WORK ACTIVITY INVOLVED IN AT TIME OF ACCIDENT** - Enter the most appropriate work activity the employee was involved in at the time of the accident (e.g. site preparation, painting, paving, masonry, welding, etc.)
- M. **PERSONAL PROTECTIVE EQUIPMENT (PPE)** - Mark appropriate box(es) and list PPE which was being used by the injured person at the time of the accident (e.g. protective clothing, shoes, glasses, goggles, respirator, safety belt, harness, etc.)

Figure 5-7 (Continued)

**SECTION 5 - INJURY/ILLNESS INFORMATION**

A. SEVERITY OF INJURY/ILLNESS - Enter description from list below.

- NO INJURY
- FATALITY
- PERMANENT TOTAL DISABILITY
- PERMANENT PARTIAL DISABILITY
- TEMPORARY DISABILITY
- NO DISABILITY LIKELY
- LOST WORKDAY CASE INVOLVING DAYS AWAY FROM WORK
- RECORDABLE CASE WITHOUT LOST WORKDAYS
- RECORDABLE FIRST AID CASE
- NON-RECORDABLE INJURY

B. ESTIMATED DAYS LOST - Enter the estimated number of workdays the person will lose from work.

C. ESTIMATED DAYS HOSPITALIZED - Enter the estimated number of workdays the person will be hospitalized.

D. ESTIMATED DAYS RESTRICTED DUTY - Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

E. BODY PART(S) AFFECTED - Enter the most appropriate primary and when applicable, secondary, etc. body part(s) affected, e.g. arm; wrist; abdomen; signal eye; jaw; both elbows; second finger; great toe; collar bone; kidney; etc.

F. NATURE OF INJURY/ILLNESS - Enter the most appropriate nature of injury/illness, e.g. amputation, back strain, dislocation, laceration, strain, asbestosis, food poisoning, heart condition, etc.

G. TYPE AND SOURCE OF INJURY/ILLNESS - Type and Source Codes are used to describe what caused the incident.

(1) TYPE Code stands for an "Action" (Example: Worker, installing conduit, lost his balance and fell five feet from a ladder. Type Code: Fell different level".) Select the most appropriate Type of Injury from the list below:

**TYPE OF INJURY/ILLNESS**

STRUCK BY/AGAINST	CONTACTED CONTACTED WITH (INJURED PERSON MOVING) CONTACTED BY (OBJECT WAS MOVING)
FELL, SLIPPED, TRIPPED SAME LEVEL/DIFFERENT LEVEL/NO FALL	EXERTED LIFTED, STRAINED BY (SINGLE ACTION) STRESSED BY (REPEATED ACTION)
CAUGHT ON/IN/BETWEEN	EXPOSED INHALED/INGESTED/ABSORBED/EXPOSED TO
PUNCTURED, LACERATED PUNCTURED BY/CUT BY/STUNG BY/BITTEN BY	TRAVELING IN

(2) SOURCE Code stands for an "object or substance." (Example: Worker, installing conduit, lost his balance and fell five feet from a ladder. Source Code: Ladder".) Select the most appropriate Source of Injury from the list below:

**SOURCE OF INJURY/ILLNESS**

BUILDING OR WORKING AREA WALKING/WORKING AREA STAIRS/STEPS LADDER FURNITURE BOILER/PRESSURE VESSEL EQUIPMENT LAYOUT WINDOWS/DOORS ELECTRICITY	DUST, VAPOR, ETC. DUST (SILICA, COAL, ETC.) FIBERS ASBESTOS GASES CARBON MONOXIDE MIST, STEAM, VAPOR, FUME WELDING FUMES PARTICLES (UNIDENTIFIED)
ENVIRONMENTAL CONDITION TEMPERATURE EXTREME (INDOOR) WEATHER (ICE, RAIN, HEAT, ETC.) FIRE, FLAME, SMOKE (NOT TOBACCO) NOISE RADIATION LIGHT VENTILATION TOBACCO SMOKE STRESS (EMOTIONAL) CONFINED SPACE	CHEMICAL, PLASTIC, ETC. DRY CHEMICAL-CORROSIVE DRY CHEMICAL-TOXIC DRY CHEMICAL-EXPLOSIVE DRY CHEMICAL-FLAMMABLE LIQUID CHEMICAL-CORROSIVE LIQUID CHEMICAL-TOXIC LIQUID CHEMICAL-EXPLOSIVE LIQUID CHEMICAL-FLAMMABLE PLASTIC WATER MEDICINE

Figure 5-7 (Continued)

SOURCE OF INJURY/ILLNESS CONTINUED	
<b>MACHINE OR TOOL</b> HAND TOOL (POWERED: SAW, GRINDER, ETC.) HAND TOOL (NON POWERED) MECHANICAL POWER TRANSMISSION APPARATUS GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK) VIDEO DISPLAY TERMINAL PUMP, COMPRESSOR, AIR PRESSURE TOOL HEATING EQUIPMENT WELDING EQUIPMENT	<b>INANIMATE OBJECT</b> BOX, BARREL, ETC. PAPER METAL ITEM, MINERAL NEEDLE GLASS SCRAP, TRASH, WOOD FOOD CLOTHING, APPAREL, SHOES
<b>VEHICLE</b> AS DRIVER OF PRIVATELY OWNED, RENTAL VEHICLE AS PASSENGER OF PRIVATELY OWNED, RENTAL VEHICLE DRIVER OF GOVERNMENT VEHICLE PASSENGER OF GOVERNMENT VEHICLE COMMON CARRIER (AIRLINE, BUS, ETC.) AIRCRAFT (NOT COMMERCIAL) BOAT, SHIP, BARGE	<b>ANIMATE OBJECT</b> DOG OTHER ANIMAL PLANT INSECT HUMAN (VIOLENCE) HUMAN (COMMUNICABLE DISEASE) BACTERIA, VIRUS (NOT HUMAN CONTACT)
<b>MATERIAL HANDLING EQUIPMENT</b> EARTHMOVER (TRACTOR, BACKHOE, ETC.) CONVEYOR (FOR MATERIAL AND EQUIPMENT) ELEVATOR, ESCALATOR, PERSONNEL HOIST HOIST, SLING CHAIN, JACK CRANE FORKLIFT HANDTRUCK, DOLLY	<b>PERSONAL PROTECTIVE EQUIPMENT</b> PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES RESPIRATOR, MASK DIVING EQUIPMENT SAFETY BELT, HARNESS PARACHUTE

### SECTION 6 - ACCIDENT DESCRIPTION

A. Fully describe the accident in the space provided. If additional space is needed continue on a separate sheet and attach to this report. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Ensure questions B - E are answered.

### SECTION 7 - CAUSAL FACTORS

Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 9 below.

- (1) **DESIGN** - Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?
- (2) **INSPECTION/MAINTENANCE** - Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?
- (3) **PERSONS PHYSICAL CONDITION** - Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was overexertion a factor?
- (4) **OPERATING PROCEDURES** - Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?
- (5) **JOB PRACTICES** - Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?
- (6) **HUMAN FACTORS** - Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person: i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach strength, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?
- (7) **ENVIRONMENTAL FACTORS** - Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lighting, etc., play a part in the accident?
- (8) **CHEMICAL AND PHYSICAL AGENT FACTORS** - Did exposure to chemical agents (either single shift exposure or long-term exposure such as dusts, fibers (asbestos, etc.), silica, gases (carbon monoxide, chlorine, etc.), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?
- (9) **OFFICE FACTORS** - Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?
- (10) **SUPPORT FACTORS** - Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skill(s), number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized and adequate to provide proper tools, equipment, personnel, site preparation, etc.?

## Figure 5-7 (Continued)

- (11) **PERSONAL PROTECTIVE EQUIPMENT** - Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc.) for the task or environment? Did protective equipment provided or worn fail to provide to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?
- (12) **DRUGS/ALCOHOL** - Is there any reason to believe the person's mental or physical capabilities, judgment, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".
- (13) **JOB/ACTIVITY HAZARD ANALYSIS** - Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. If one was performed, attach a copy of the analysis to the report.
- (14) **MANAGEMENT** - Did the lack of supervisor or management support play a part in the mishap?

### SECTION 8 - TRAINING

- A. **WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?** - For the purpose of this section "trained" means the person has been provided the necessary information (either formal and or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.
- B. **TYPE OF TRAINING** - Indicate the specific type of training (classroom or on-the-job) that the injured person received before the accident happened.
- C. **DATE OF MOST RECENT TRAINING** - Enter the month, day, and year of the last formal training completed that covered the activity-task being performed at the time of the accident.
- D. **LIST TOPICS DISCUSSED** - List topics that were discussed at the training identified in item c. above.

### SECTION 9 - CAUSES

- A. **DIRECT CAUSES** - The direct cause is that single factor which most directly lead to the accident. See examples below.
- B. **INDIRECT CAUSES** - Indirect causes are those factors which contributed to, but did not directly initiate the occurrence of the accident.
- C. Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent recurrence of similar accidents/illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.
- D. **CORRECTIVE ACTION DATES** -  
(1) Beginning - Enter the date when the corrective actions(s) identified in c. above will begin.  
(2) Anticipated Completion - Enter the date when the corrective actions(s) identified in c. above will be completed

#### Examples for section 9:

A. Employee was dismantling scaffold and fell 12 feet from unguarded opening.

*Direct cause:* failure to provide fall protection at elevation.

*Indirect causes:* failure to enforce USACE safety requirements; improper training/motivation of employee (possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

B. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by contractor vehicle. (note contractor vehicle was in proper safe working condition).

*Direct cause:* failure of contractor driver to maintain control of and stop contractor vehicle within safe distance.

*Indirect cause:* Failure of employee to pay attention to driving (defensive driving).

### SECTION 10 - OSHA - Complete this section if applicable.

### SECTION 11 - REPORT PREPARER

Enter the name, title and signature of person completing the accident report and provide to the Contracting Officer/ROICC representative responsible for oversight of that contractor activity. Enter the month, day, and year that the report was signed by the responsible supervisor.

### SECTION 12 - MANAGEMENT REVIEW (CONTRACTING OFFICER)

The responsible report preparer, as identified in section 11, shall forward the completed report to the Contracting Officer/ROICC for review. Upon receipt, the Contracting Officer/ROICC shall review the completed report, validate the information, coordinate with supervisor (identified in section 11) for any necessary corrections, mark the appropriate boxes, provide substantive comments, sign, date, and forward to the responsible EFD/EFA/Activity Safety and Health Office.

### SECTION 13- SAFETY AND OCCUPATIONAL HEALTH REVIEW

The Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc. are rectified by the responsible supervisor and management reviewer, provide substantive comments, sign, date and forward the completed report to NAVFACHQ 40K.



**Figure 5-9**  
**Levels of Protection Required for Various Activities**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Task No.	Description of Task	Level of Protection to be Worn
1	Mobilization/Construct Temporary Facilities	D
2	Surface Water Control	D
3	Vertical Well Installation and Horizontal Drilling Activities	D/D - Modified
4	Hand Excavation Near Utilities	D/D - Modified
5	Machine Excavation and Backfilling	D/D - Modified
6	Treatment System Installation	D
7	Pipe Trenching	D/D - Modified
8	Treatment System Connections	D/D - Modified
9	Soil/Water/Air Sampling	D
10	Operation and Maintenance	D
11	Site Restoration and Demobilization	D/D - Modified



**Figure 5-11**  
**Permissible Noise Exposures**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Permissible Noise Exposures	
Duration Hours/day	Sound Level dBA Slow Response
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115

NOTE: When daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If multiple levels of noise exposure occur please refer to 29 CFR Part 1926.52 for calculation of the equivalent noise exposure factor.

**Figure 5-12**  
**Emergency Telephone Numbers**  
RAC Action for UST Remedial Action  
Buildings 130 and 3996  
Marine Corps Air Station  
Cherry Point, North Carolina

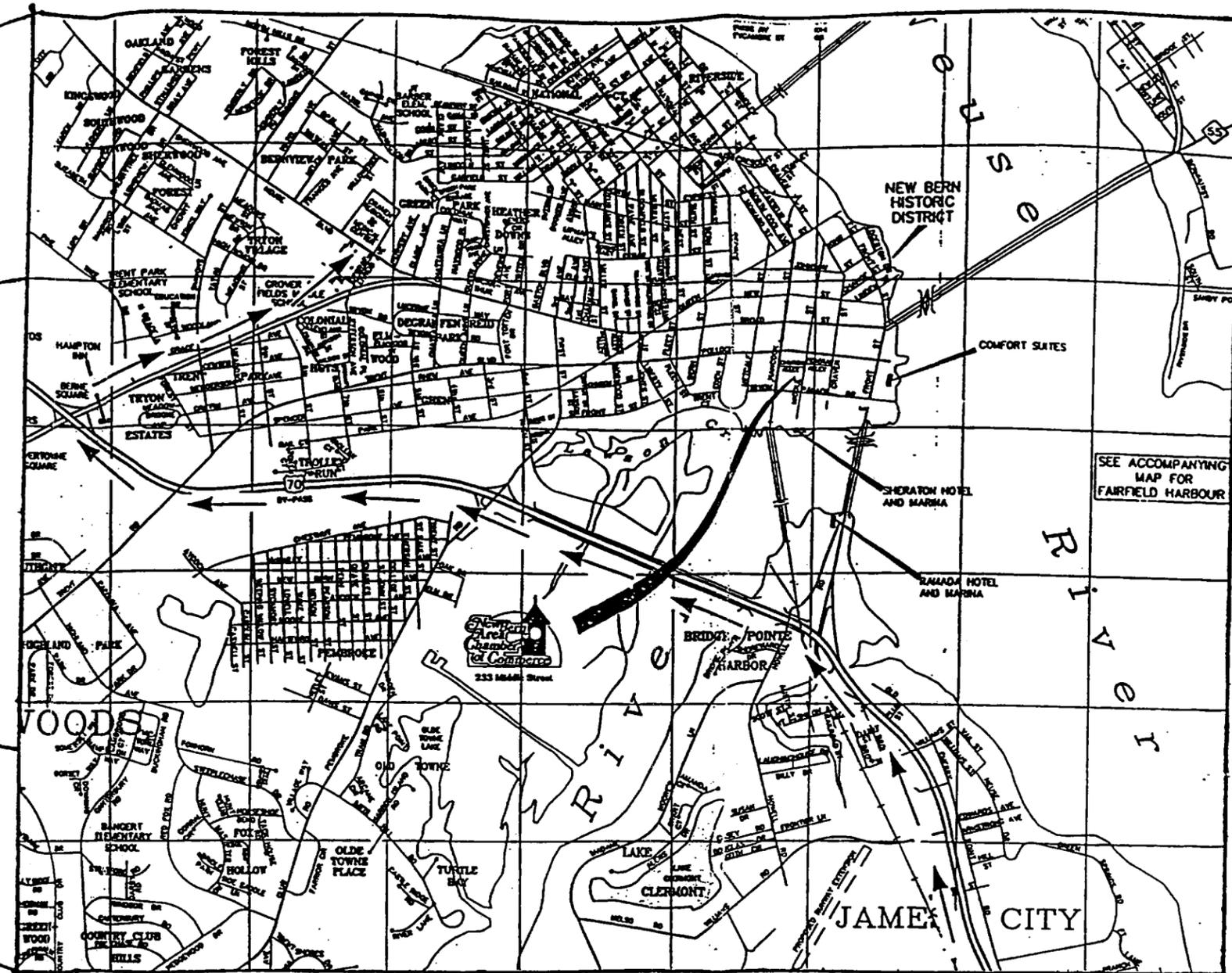
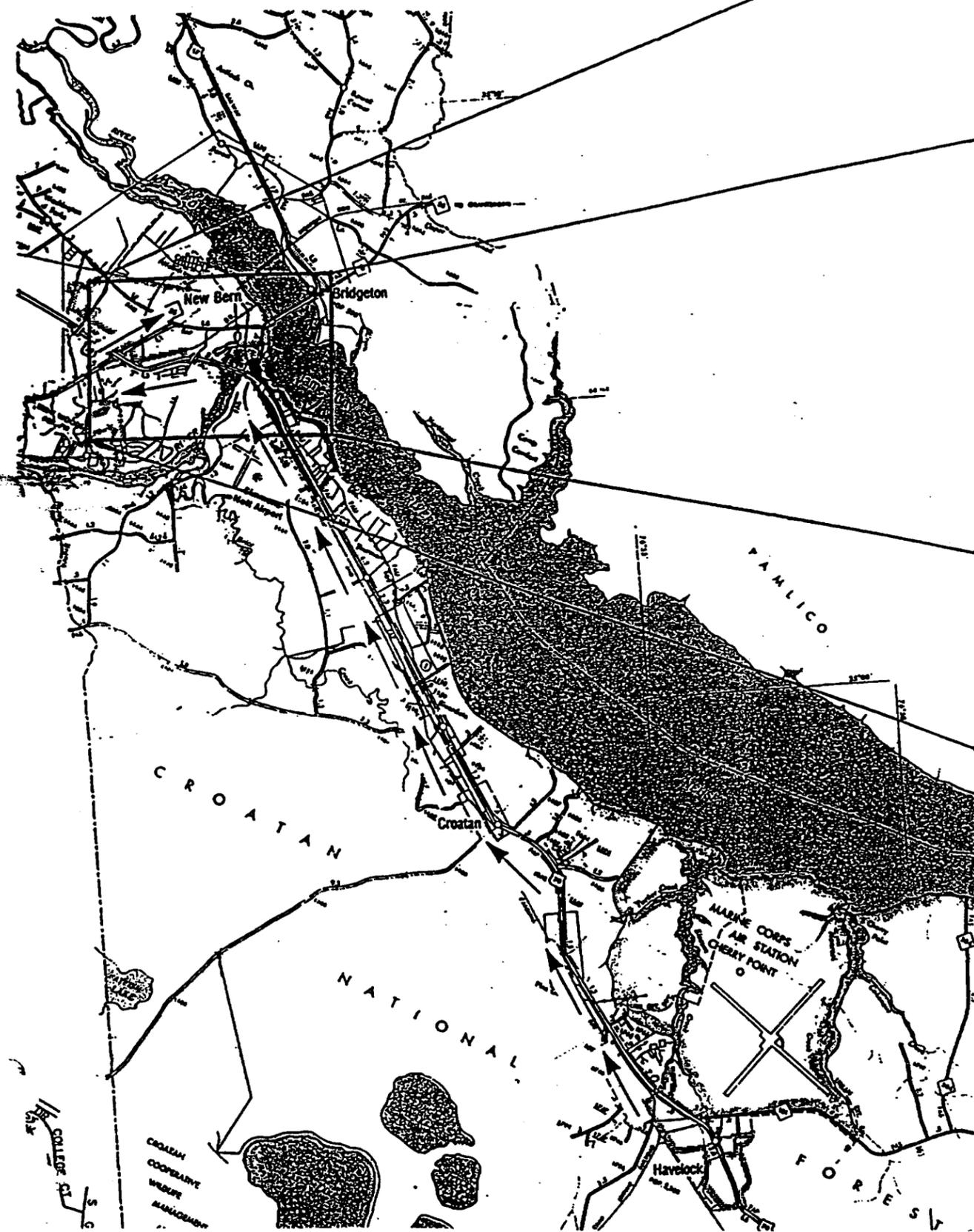
**Marine Corps Base / On-Site Emergency Telephone Numbers**

AROICC/NTR and Construction Representative	466-4731
Fire	911
Security	911
Safety	466-2730
Medical Treatment Facility	466-0266
Emergency Maintenance	466-4364

**Off-Site Emergency Telephone Numbers**

Craven Regional Medical Center	633-8104
Emergency Services of Onslow County	455-9119
Hazardous Chemical Spillage	911
Ambulance	911
Fire	911
Police	911
Poison Control	(800) 672-1697
ChemTrec/Spill Response	(800) 424-9300
National Response Center	(800) 424-8802

Figure 5-13  
Hospital Location Map



**Directions to Craven Regional Medical Center**

Exit Cunningham Boulevard to 101 heading West.  
Take Highway 70 West and exit the second exit after the bridge.  
At the bottom of the hill make a right at the traffic light on to Clarendon Boulevard. Go four lights and make a left after the fourth light on to Degraftenreid. The Hospital is at the end of Degraftenreid.

Figure 5-14

**SPILL REPORT  
for Environmental Affairs Department**

<b>Reporting spill:</b> Unit _____ Person _____ Phone No. _____	<b>Date/time of spill:</b> _____ <b>Date/time cleanup began:</b> _____
<b>Unit responsible for spill:</b> _____	<b>Date/time cleanup completed:</b> _____
<b>Material spilled:</b> _____	<b>Amount spilled:</b> _____
<b>Spill location (bldg., pit, structure, etc.):</b> _____	<b>Type of surface spill was on:</b> Water _____ Asphalt _____ Grass _____ Gravel _____ Soil _____ Concrete _____ Other _____
<b>Spill enter a drainage system?</b> yes _____ no _____	<b>Caused by:</b> Equipment failure _____ Human error _____ Other _____
<b>Procedure to eliminate spill:</b> Shutoff pumps _____ Close valves _____ Overpack container _____ Upright container _____ Nothing available _____ Other _____	<b>Is this a reoccurring problem?</b> yes _____ no _____
<b>Notification: Check each notified</b> Fire Division (2241/3333) _____ Crash Crew (2420) _____ FMD (4363) _____ EAD (4591) _____ Unit Duty Officer (after hrs) _____ Industrial Hygienist (3833) _____ Joint Safety Office (2730) _____	<b>Name of OSCDR:</b> _____ <b>Section Leader's signature</b> _____ <b>Supervisor's signature</b> _____
<b>Additional comments from the reporting activity:</b> _____ _____ _____	

EAD Person Receiving Call \_\_\_\_\_  
 EAD Spill Log Number \_\_\_\_\_



**J.A. JONES**  
ENVIRONMENTAL  
SERVICES

April 8, 2000

Mr. Don Osmann  
6135 Park South Dr., Suite 250  
Charlotte, North Carolina 28210

Reference      Contract N62470-93-D-3033  
                    Task Order No. 045

Dear Mr. Osmann:

This letter is to appoint you as the Invoice Quality Assurance Manager for J.A. Jones Construction Services for this Task Order. As Invoice Quality Assurance Manager, you will verify that the project invoices received are accurate and complete.

Sincerely,

J.A. JONES CONSTRUCTION SERVICES COMPANY

Marshall Sealy  
Program Quality Control Manager



**J.A. JONES**  
ENVIRONMENTAL  
SERVICES

April 8, 2000

Mr. Jim Tan  
6135 Park South Drive 250  
Charlotte NC 28210

Reference      Contract N62470-93-D-3033  
                    Task Order No. 045

Dear Mr. Tan:

This letter is to appoint you as the Project Submittal Quality Control Representative for J.A. Jones Construction Services for this Task Order. As Project Submittal Quality Control Representative, you will be responsible for review and approval of contractually required submittals.

Sincerely,

J.A. JONES CONSTRUCTION SERVICES COMPANY

Marshall Sealy  
Program Quality Control Manager

## SECTION 6.0

### QUALITY CONTROL PLAN

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The requirements of the overall contract Quality Assurance/Quality Control Plan, written by J.A. Jones, including quality assurance procedures, will be followed for this project.

#### 6.1 SUBMITTAL REGISTER

The Submittal Register is included in this section as **Table 6-1**. As the project progresses, J.A. Jones will update the submittal register. Submittals will be approved by the Navy, Law, or J.A. Jones, as identified in Column D of the register. All approved submittals will be distributed by J.A. Jones to the ROICC (in duplicate), to the project site, and to the project file.

#### 6.2 SITE QUALITY ADMINISTRATOR

Attached to this section of the Work Plan are copies of three letters from the Project Quality Control Manager (PQCM), as defined in the J.A. Jones QA Plan. The three separate letters are used to appoint Mr. Brian Steiner, Site Quality Administrator; Mr. Don Osmann, Project Invoice Quality Administrator; and Mr. Jim Tan, Project Submittal Quality Administrator.

Mr. Steiner, as the SQA, will conduct inspections on a continuous basis to verify that the project activities, including required field testing and sample collection procedures, are proceeding according to the technical specifications. The SQA is also the Site Supervisor and will be on site during the construction phase of the project. Each day the SQA will record all activities, pertinent conversations with all military personnel, visitors to the work area, incidents and accidents, and any testing completed.

Separate forms will be used to record the field tests such as compaction testing. Work production will be documented on a daily basis by the Site Supervisor and recorded in a Contractor Production Report. The Contractor Production Report is shown as **Figure 6-1**. A Contractor's Quality Control Report which includes the three phases of control will be completed for each segment of work as discussed in **Section 6.6 Definable Features of Work**. The Contractor's Quality Control Report is presented as **Figure 6-2**. Submission of the Contractor's Quality Control Report and the Contractor Production Report to the ROICC is required daily. A Contractor's Deficiencies Report, **Figure 6-3**, and a Rework Items List, **Figure 6-4**, provide the NTR, on a monthly basis, items and areas of work that are deficient or require modification.

J.A. Jones will conduct a QC inspection in accordance with the Contract QC Plan. The QC inspection will be scheduled and conducted by the SQA. All QC meetings will be

documented by the SQA with meeting minutes delivered to the ROICC within three calendar days after each QC meeting.

### **6.3 INVOICE QUALITY ADMINISTRATOR**

Mr. Osmann, as Project Invoice Quality Administrator, will verify that the project invoices received are accurate and complete.

### **6.4 SUBMITTAL QUALITY ADMINISTRATOR**

Mr. Tan, as Project Submittal Quality Administrator, will be responsible for review and approval of contractually required submittals.

### **6.5 PROJECT ORGANIZATION**

**Figure 6-5** defines the management organization for the soil and groundwater remediation project at Cherry Point, North Carolina.

### **6.6 DEFINABLE FEATURES OF WORK**

A list of the definable work features required for completion of the project is provided below:

- Concrete foundation placement
- Remediation system building construction
- Soil and groundwater treatment system installation, including SVE blowers, SVE moisture separators, condensation storage tank, air compressor, air compressor receiver tank, and utility connection;
- Pipe trench excavation including preparation, pipe placement, bedding, compaction, where required, backfilling and revegetation;
- Horizontal drilling;
- Vertical well installation;
- Waste characterization sampling;
- Transportation and treatment of petroleum-impacted soil and groundwater; and,
- System start-up, and operation and maintenance for six months.

### **6.7 QUALITY CONTROL INSPECTIONS**

Quality Control inspections will be performed by the Contractor's SQA. The types of inspections to be performed include preparatory, initial, follow-up, and completion inspections. All inspections will be documented in Contractor's Quality Control Report, presented as **Figure 6-2**. **Table 6-2** provides a log of quality control tests scheduled to be completed during project construction activities. The details of the type of inspections are included in Section 4.1 of the J.A Jones QC Plan and are summarized as follows.

### Preparatory Phase

The SQA will review drawings, specification requirements, submittal status, material requirements and on site availability, worker qualifications, and equipment requirements prior to beginning a particular work segment.

### Initial Phase

This phase of inspection will document the completeness and acceptability of the particular work segment after a representative portion of the work segment has been completed. The SQA will complete this phase of inspection with input from the PQCM, where necessary. Deficiency Reports will be completed as necessary.

### Follow-up Phase

This phase of inspection involves daily surveillance of the work segment to verify conformance to the drawings and specifications. The SQA, as well as other QC personnel, will be involved in the follow-up inspections as necessary. The follow-up inspections will be documented.

### Completion Phase

At the completion of a work segment, the SQA will conduct a completion inspection to verify all work items are complete and in conformance with the drawings and specifications.

The Navy will participate in each of these levels of inspection where applicable. Each of these levels will be completed on the following major segments of work detailed below.

## **6.7.1 Concrete Foundation Placement**

A concrete foundation will be formed and placed to facilitate construction of the remediation system building. Soil and groundwater treatment equipment will be mounted at appropriate locations on the concrete foundation inside the building.

### Preparatory Phase

The preparatory phase will include a review of the plans and specifications, submittal status, and confirmation of appropriate materials.

### Initial Phase

The multiple inspections will be required in during the construction of the foundation. The initial inspection for the installation of the treatment equipment will be initiated following delivery of the treatment system and the equipment has been placed on the slab and connected to the proper utilities. The SQA will document the inspection and note deviations from plans and specifications and any deficiencies in equipment.

### Follow-up Phase

The SQA and technical personnel will provide continuous oversight of the foundation placement. Compressive strength, slump, and air tests will be completed on the concrete

to verify proper mix design. These tests will be completed in accordance with the requirements provided in **Section 2.3.1 Concrete**. Daily observation will verify compliance with the technical specifications. Deficiencies will be noted and corrected.

#### Completion Phase

At the completion of concrete foundation the SQA will conduct a completion inspection to verify that the work was completed in accordance with the plans and specifications. Deficiencies will be noted and corrected. The SQA will evaluate the compressive strength, slump, and air test data to verify that the results are acceptable based on the requirements provided in **Section 2.3.1 Concrete**.

### **6.7.2 Building Construction**

The building will be constructed following construction of the foundation. Groundwater, SVE, and if required product recovery, equipment will be mounted at the appropriate locations on the concrete foundation inside the building.

#### Preparatory Phase

The preparatory phase will include a review of the plans and specifications, review of the work plan prepared for the site, submittal status, confirmation of appropriate materials and equipment, worker qualifications and availability, and equipment availability. If no deficiencies are noted, construction of the remediation building will commence.

#### Initial Phase

Multiple inspections will be required during the construction of the building. The installation will include frame construction, steel panel placement, brick veneer installation (if required), louver placement, door placement, vent and fan placement, lighting, wiring, etc. The SQA will document the inspection and note deviations from the construction drawings, the work plan, and specifications and any deficiencies in materials or equipment.

#### Follow-up Phase

The SQA and technical personnel will provide continuous oversight of building construction. Daily observation will verify compliance with the construction drawings and technical specifications. Deficiencies will be noted and corrected.

#### Completion Phase

At the completion of building construction, the SQA will conduct a completion inspection to verify that the work was completed in accordance with the construction drawings, the requirements provided in the work plan, and specifications. Deficiencies will be documented and corrected. The SQA will verify that the results are acceptable based upon the requirements provided in the construction drawings and specifications.

### **6.7.3 Subsurface Petroleum Remediation System Installation and Utility Connection**

Subsurface petroleum remediation system installation will include the electrical and utility connection of the treatment system and the anchoring of the skid-mounted system to the concrete foundation.

#### Preparatory Phase

The preparatory phase will include a review of the site plans and specifications, submittal status, confirmation of appropriate materials and treatment equipment, worker qualifications and availability, and equipment availability. If no deficiencies are noted, utility connections to the treatment equipment will commence following construction of the building on the concrete foundation.

#### Initial Phase

Multiple inspections will be required during installation of the subsurface petroleum remediation system. The initial inspection for the installation of the system will be initiated following placement of the system and completed when the system is connected to the proper utilities. The installation will include the plumbing of the headers to the subsurface petroleum remediation system and the electrical connections. The SQA will document the inspection and note deviations from construction drawings, site plans, and specifications and any deficiencies in equipment.

#### Follow-up Phase

The SQA and technical personnel will provide continuous oversight of the treatment equipment placement, piping, and utility connection activities. Deficiencies will be documented and corrected.

#### Completion Phase

At the completion of the subsurface petroleum remediation system installation, including the utility connections, the SQA will conduct a completion inspection to verify that the work was completed in accordance with the plans and specifications. Deficiencies will be documented and corrected. The SQA will evaluate and document the function and operation of the remediation system appropriately.

### **6.7.4 Pipe Trench Excavation**

#### Preparatory Phase

The preparatory phase for the installation of the pipe trenches will include a review of the site plan and specifications, submittal status, construction drawings, confirmation of appropriate materials and construction equipment, worker qualifications and availability, and equipment availability. If no deficiencies are noted, pipe trench excavation will commence.

### Initial Phase

An initial inspection of the pipe trench will be completed when a representative portion of the trench has been excavated. The SQA will measure the depth and slope of the excavation and verify that the depth and slope are being maintained according to the construction drawings and technical specifications.

### Follow-up Phase

The SQA and technical personnel will provide oversight during trench and piping installation activities. The SQA will note the depth of the trench, pipe placement, and bedding and cover material in the trench. Daily observation will verify compliance with the technical specifications. Fill activities will be inspected to verify proper placement, soil loading, and compaction, where necessary. Deficiencies will be documented and corrected.

### Completion Phase

At completion of the pipe trench installation activities, the SQA will conduct a completion inspection to verify the completed work, pipe materials, and associated equipment are in accordance to the construction drawings, requirements of the site plan and technical specifications. Deficiencies will be documented and corrected.

## **6.7.5 Horizontal Drilling Activities**

### Preparatory Phase

The preparatory inspection for horizontal drilling activities will include review of the construction drawings, site plan and specifications, verifying the submittal approval, confirming qualifications and schedule of the driller, verifying that appropriate materials are present, and confirming that the appropriate equipment and geologists and/or technicians are available to complete the work. If no deficiencies are noted, work will commence.

### Initial Phase

Prior to horizontal drilling activities, the SQA will complete an initial inspection of the augers to verify that they have been properly decontaminated. The locations of the horizontal drillings are shown on **Figures C-6** and **C-7**. Deficiencies will be documented and corrected as necessary.

### Follow-up Phase

The SQA and technical personnel will provide oversight during drilling and piping installation activities. The SQA will note the depths and diameters of the drilling and pipe placement. Daily observation will verify compliance with the technical specifications. Deficiencies will be documented and corrected.

### Completion Phase

At completion of the pipe installation activities, the SQA will conduct a completion inspection to verify the completed work, pipe materials, and associated equipment are in

accordance to the construction drawings, requirements of the site plan and technical specifications. Deficiencies will be documented and corrected.

#### **6.7.6 Well Installation Activities**

##### Preparatory Phase

The preparatory inspection for vertical well installation activities will include review of the construction drawings, site plan and specifications, verifying the submittal approval, confirming qualifications and schedule of the well driller, verifying that appropriate materials are present, and confirming that the appropriate equipment and geologists and/or technicians are available to complete the work. If no deficiencies are noted, work will commence.

##### Initial Phase

Prior to vertical well installation activities, the SQA will complete an initial inspection of the augers to verify that they have been properly decontaminated. The locations of the vertical wells are shown on **Figures C-6** and **C-7**. Deficiencies will be documented and corrected as necessary.

##### Follow-up Phase

The geologist or other technical representative will be responsible for oversight of well installation activities. The geologist or technical representative will provide well installation oversight to verify that the work is being completed according to the technical specifications and the well details provided on the construction drawings. Attention will be placed on total well and screen depth and well materials.

##### Completion Phase

At the completion of well installation activities, the SQA will verify that the installation procedures have been completed in accordance with the requirements provided in the work plan, technical specifications, and the well details provided on the construction drawings. Deficiencies will be documented and corrected as necessary.

#### **6.7.7 Waste Characterization and Incidental Waste Stream Sampling**

##### Preparatory Phase

The preparatory stage for sample collection activities includes a review of technical specifications and sampling procedures provided in the work plan, verifying Navy acceptance of the selected laboratory, and confirming that the appropriate equipment and materials are available to complete the sampling activities. The selected laboratory will be certified by the NCDENR. Detailed QC documentation from the laboratory analyses will be available for review. If no deficiencies are noted, work will commence.

##### Initial Phase

Waste characterization and incidental waste stream samples will be collected and analyzed at an approved laboratory in accordance with requirements outlined in **Section**

**2.2.1 Waste Characterization and Incidental Samples.** Sample collection activities including proper chain-of-custody documentation will follow the strict quality control protocols outlined in **Section 2.2.8 Field Sampling Quality Control** and **2.2.12 Laboratory Requirements**.

Follow-up Phase

Sample collection locations and activities will be properly documented throughout the project. Analytical reports from the approved laboratory will be reviewed for accuracy and quality. If required, data validation information from the laboratory will be reviewed to verify any discrepancies in the analytical data.

Completion Phase

At the completion of sampling activities, J.A. Jones personnel will review and tabulate laboratory data and field sampling results and present the findings to the NTR. The complete results including the laboratory data will be provided in the Closeout Report.

**6.7.8 Transportation and Treatment of Petroleum-Impacted Soil and Groundwater**

Preparatory Phase

The preparatory stage for transportation of petroleum-impacted soil and groundwater includes a review of the recycling or treatment facility(s) qualifications, transportation schedule for hauling material off site, and confirming that the appropriate equipment and materials, such as non-hazardous waste manifests, are available to complete the sampling activities. If no deficiencies are noted, work will commence. It is expected that any petroleum-impacted soil accumulated during project activities will be hauled to a facility permitted to accept the petroleum-impacted soil. Any petroleum-impacted water will be hauled to an off site facility permitted to accept petroleum-impacted water or to an existing groundwater recovery and treatment system located at Cherry Point MCAS designed to treat petroleum-impacted water

Initial Phase

Verify that the information provided on the non-hazardous waste manifest is complete and accurate including, but not limited to, generator name, date, type of material being hauled, designated recycling or treatment facility, and volume and/or weight of material. Correct any discrepancies in the non-hazardous waste manifest.

Follow-up Phase

Verify that the recycling or treatment facility has accepted and treated the waste material at their facility and has sent the required completed manifest to the generator's technical representative, MCAS EAD.

Completion Phase

Confirm receipt of the certificate of recycling or treatment from the designated facility and verify that the invoice is complete and accurate.

### **6.7.9 System Start-Up and Operation and Maintenance**

The subsurface petroleum remediation system will be started, operated, and maintained for a period of two months. Collection of treatment system and groundwater monitoring well samples from specified locations will be conducted as specified in **Section 2.2.2 Operation and Maintenance Sampling**. An operation and maintenance manual will be prepared that documents the required sample collection protocol, system start-up conditions, normal operating conditions, and troubleshooting guides.

#### Preparatory Phase

Prior to system start-up, the specifications, submittal status, and manufacturer's operating instructions will be reviewed by the SQA and site personnel. Start-up will not begin until equipment and piping tests have been completed.

#### Initial Phase

The initial phase will be completed by the SQA once start-up has commenced. The SQA will document gauge and flow readings, leaks, equipment malfunctions, and other deficiencies. Deficiencies will be corrected during start-up activities.

#### Follow-up Phase

Technical personnel performing operation and maintenance activities will provide oversight of the system operation and collect any necessary treatment system and groundwater monitoring well samples from the groundwater and/or soil remediation system(s). Deficiencies will be documented and corrected. Technical personnel will abide by the operation and maintenance schedule and complete the required activities as specified in the Operation and Maintenance Manual.

#### Completion Phase

At the completion of operation and maintenance activities, the treatment system will be turned over to the Navy for operation. An operation and maintenance manual, prepared by J.A. Jones will be provided. The SQA and technical personnel will verify that the system is operating in accordance with the technical specifications.

### **6.7.10 Soil Excavation and Backfilling Activities**

#### Preparatory Phase

The preparatory inspection for soil excavation and backfilling activities will include a review of the construction drawings, requirements provided in the site-specific work plan addendum, and specifications; review of the proposed excavation area including depth based on the analytical results from pre-excavation sampling activities; verifying acceptance and approval of the excavation permit from the ROICC office; verifying the submittal approval; confirming acceptability of the backfill and other required materials; and confirming that appropriate equipment and craftsmen are available to complete the work. If no deficiencies are noted, soil excavation activities will commence.

Prior to the commencement of any excavation activity, site controls including construction barricades, roadway signs, and security fencing will be installed. The excavation area at the work site will be marked with paint and stakes, as appropriate, and an underground utility survey will be conducted by contacting a certified utility locating service. J.A. Jones will also coordinate with the ROICC to acquire utility layout plans of the area. Utilities which intersect the excavation area will be physically verified by the locating service. All marked utility lines in the excavation area will be uncovered with hand tools. In addition, the progress of excavation conducted with machinery will be continuously monitored for signs of buried obstructions.

MCAS personnel near the facilities where soil excavation is proposed will be contacted prior to mobilization to allow time to move vehicles which may interfere with access to the proposed excavation area or with the intended excavation and backfill flow patterns. J.A. Jones will review all Marine Corps rules, regulations, and standard operating procedures regarding vehicle movement and control inside the facility.

Dewatering will not be required since the limits of soil excavation will not reach the saturated zone. However, if stormwater runoff enters the excavation, it will be removed, containerized, sampled, and delivered to a Navy approved commercial laboratory where it will be analyzed for volatile aromatic compounds using USEPA Method 602. Once the analytical results are reviewed and approval is received from the Navy, the stormwater runoff will be hauled to an off site facility permitted to accept petroleum-impacted water or to an existing groundwater recovery and treatment system located at Cherry Point MCAS designed to treat petroleum-impacted water.

Since personnel will not enter the soil excavation, shoring or sloping should not be necessary. Safety procedures outlined in **Section 5.7 Potential Safety Hazards** will be maintained during excavation and backfill activities.

#### Initial Phase

Prior to excavation activities, the SQA will complete the initial inspection to verify that the soil excavation follows the planned boundaries, including depth, based on the analytical results from the pre-excavation samples or as outlined in the technical specifications and/or construction drawings. Deficiencies will be documented and corrected as necessary.

#### Follow-up Phase

The SQA will be responsible for daily surveillance of the excavation and backfilling activities. The daily surveillance will verify that the work is being completed according to the construction drawings and technical specifications and will be documented as necessary. Attention will be placed on area and depth of excavation and manifesting of petroleum-impacted soil. Backfill activities will be inspected to verify that proper placement, soil loading, and compaction methods are maintained as outlined in the technical specifications and this work plan.

### Completion Phase

At the completion of the soil excavation and backfilling activities, the SQA will verify that the excavation, fill, and revegetation or pavement activities have been completed in accordance with the construction drawings, the requirements in this work plan and the site-specific work plan addendum, and the technical specifications. Deficiencies will be documented and corrected as necessary.

## **6.8 LABORATORY ANALYSIS**

Air, soil, water, and waste samples will be collected under the direction of a qualified Scientist or Engineer.

Sample shipping and chain of custody records will be kept on record at the J.A. Jones field office. Laboratory analysis will be performed by a laboratory approved by the State of North Carolina as defined in the J.A. Jones Contract QC Plan.

## **6.9 CLOSEOUT REPORT**

At the completion of the project, a Closeout Report will be prepared and submitted to the ROICC. The Closeout Report will include the following information:

- Introduction
- Summary of Action
- Final Health and Safety Report
- Summary of Record Documents
- Field Changes
- Contract Modifications
- Final Documents
- Complete Set of Field Test and Analytical Results
- Off-site Transportation Manifests of Contaminated Materials
- Certificates of Treatment for Contaminated Materials
- Quality Control Summary Report

**Table 6-1**  
**Submittal Register**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Contract Number: N62470-93-D-3033, Task Order No. 045						Location: MCAS Cherry Point, North Carolina			Contractor: J.A. Jones Environmental Services Company					
Title: RAC Action for UST Remedial Action, Buildings 130 and 3996						Contractor QC Action			Government			Contractor		Remarks
No.	Specification Section Material or Product	Spec. Para. No.	Approved by	Trans Control No.	Planned Submittal Date	Action Code	Date of Action	Date Fwd to to Appr Auth/ Date recd from contractor	Date Fwd to other reviewer	Date recd from other reviewer	Action Code	Date of Action	Contr / Recd from Appr Auth	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	
	<b>DIV 1</b>	<b>General Paragraphs</b>												
		SD-09, Reports	---	---	---	---	---	---	---	---	---	---	---	---
1	01115	Work Plan - Draft	1.2.1	NTR	1	4/8/99		4/8/99						
2	01115	Work Plan - Final	1.2.1	NTR		5/7/99								
3	01115	Narrative	1.2.1.a	NTR	1	4/8/99		4/8/99						Section 1.0 of Work Plan
4	01115	Technical Specifications	1.2.1.b	NTR	1	4/8/99		4/8/99						Section 7.0 of Work Plan
5	01115	Environmental Protection Plan	1.2.1.d	NTR	1	4/8/99		4/8/99						Section 4.0 of Work Plan
6	01115	Health and Safety Plan	1.2.1.e	NTR	1	4/8/99		4/8/99						Section 5.0 of Work Plan
7	01115	Quality Control Plan	1.2.1.f	NTR	1	4/8/99		4/8/99						Section 6.0 of Work Plan
8	01115	Submittal Register	1.2.1.f.2	NTR	1	4/8/99		4/8/99						Table 6-1 of Work Plan
9	01115	Testing Laboratory Qualifications	1.2.1.f.3	NTR		5/31/99								Section 6.0 of Work Plan
10	01115	Sampling and Analysis Plan	1.2.1.g	NTR	1	4/8/99		4/8/99						Section 2.0 of Work Plan
11	01115	Directional Drilling Plan	1.2.1.h	A&E		5/31/99								
12	01115	Excavation and Material Handling Plan	1.2.1.i	NTR	1	4/8/99		4/8/99						Section 3.0 of Work Plan
		SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---
13	01115	Erosion Control Plan Drawings	1.2.1.c.1	A&E	1	4/8/99		4/8/99						Section 8.0 of Work Plan
14	01115	Treatment System Drawings	1.2.1.c.2	A&E	1	4/8/99		4/8/99						Section 8.0 of Work Plan
		SD-05, Design Data	---	---	---	---	---	---	---	---	---	---	---	---
15	01115	RAC Design Calculation Briefs	--	A&E	2	4/8/99		4/8/99						
		SD-18, Records	---	---	---	---	---	---	---	---	---	---	---	---
16	01115	As-Built Records	1.3.2.1	ROICC		11/15/99								
17	01115	Environmental Conditions Report	1.2.1.d	ROICC		5/17/99								
18	01115	Status Reports	1.3.2.2.a	Contractor		Monthly								
19	01115	QC Meeting Minutes	1.3.2.3	Contractor		Bi-weekly								
20	01115	Test Results Summary Report	1.3.2.4	NTR		As Required								Included in Close-Out Report
21	01115	Contractor Production Report	1.3.2.5	Contractor		Daily								Submitted weekly at the QC/Production meeting
22	01115	QC Report	1.3.2.6	Contractor		Daily								Submitted weekly at the QC/Production meeting
23	01115	Rework Items List	1.3.2.7	Contractor		Monthly								
24	01115	Permits	1.3.2.8	ROICC		As Required								
25	01115	Excavation Permit	1.3.2.8.b	ROICC		5/31/99								
26	01115	Contractor's Closeout Report	1.3.2.9	NTR		12/15/99								
27	01115	Non-hazardous Waste Manifests	---	Contractor		As Required								Included in Close-Out Report
	<b>DIV 1</b>	<b>Erosion and Sediment Control</b>												
		SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---
28	01561	Filter Barriers	2.1.1	Contractor		5/28/99								
		SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---
29	01561	Erosion Control Plan	1.3.2.1	NTR	1	4/8/99		4/8/99						Section 8.0 of Work Plan
		SD-09, Reports	---	---	---	---	---	---	---	---	---	---	---	---
30	01561	Erosion Control Plan	1.3.2.1	NTR	1	4/8/99		4/8/99						Appendix B of Work Plan

**Table 6-1  
Submittal Register**  
RAC Action for UST Remedial Action  
Buildings 130 and 3996  
Marine Corps Air Station  
Cherry Point, North Carolina

Contract Number: N62470-93-D-3033, Task Order No. 045						Location: MCAS Cherry Point, North Carolina			Contractor: J.A. Jones Environmental Services Company					
Title: RAC Action for UST Remedial Action, Buildings 130 and 3996						Contractor QC Action			Government			Contractor	Remarks	
No.	Specification Section Material or Product	Spec. Para. No.	Approved by	Trans Control No.	Planned Submittal Date	Action Code	Date of Action	Date Fwd to to Appr Auth/ Date recd from contractor	Date Fwd to other reviewer	Date recd from other reviewer	Action Code	Date of Action		Contr / Recd from Appr Auth
a	b	c	d	e	f	g	h	i	j	k	l	m		n
	<b>DIV 1</b>	<b>Operation and Maintenance Data</b>												
		SD-19, Operation and Maintenance Manuals	---	---	---	---	---	---	---	---	---	---	---	---
31	01781	Operation and Maintenance Data	1.2	ROICC	12/8/99									
	<b>DIV 1</b>	<b>Environmental Facility User Manuals</b>												
		SD-09, Reports	---	---	---	---	---	---	---	---	---	---	---	---
32	01783	Concept Submittal	1.5.1.1	ROICC	9/8/99									
33	01783	Preliminary Submittal	1.5.1.2	ROICC	10/8/99									
34	01783	Preliminary Submittal	1.5.1.3	ROICC	11/8/99									
35	01783	Final Submittal	1.5.1.4	ROICC	12/8/99									
	<b>DIV 2</b>	<b>Transportation and Disposal of Contaminated Material</b>												
		SD-08, Statements	---	---	---	---	---	---	---	---	---	---	---	---
36	02223	Treatment Facility Permit	1.1.1.1	ROICC	5/31/99									
		SD-18, Records	---	---	---	---	---	---	---	---	---	---	---	---
37	02223	Shipping Manifests	1.1.2.1	Contractor	12/15/99									Included in Close-Out Report
38	02223	Delivery Certificates	1.1.2.2	Contractor	12/15/99									Included in Close-Out Report
39	02223	Disposal Site Decontamination Certificate	1.1.2.3	Contractor	12/15/99									Included in Close-Out Report
40	02223	Work Site Decontamination Certificate	1.1.2.4	Contractor	12/15/99									Included in Close-Out Report
41	02223	Treatment and Disposal Certificates	1.1.2.5	Contractor	12/15/99									Included in Close-Out Report
	<b>DIV 2</b>	<b>Excavation and Fill</b>												
		SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---
42	02315	Fill and Backfill Test	3.8.2.1	Contractor	12/15/99									Included in Close-Out Report
43	02315	Select Material Test	3.8.2.2	Contractor	12/15/99									Included in Close-Out Report
44	02315	Capillary Water Barrier	3.8.2.3	Contractor	12/15/99									Included in Close-Out Report
45	02315	Density Tests	3.8.2.4	Contractor	12/15/99									Included in Close-Out Report
	<b>DIV 2</b>	<b>Piping System</b>												
		SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---
46	02511	Recovery Piping, Including Carrier Piping	1.4.1.a	A&E	5/31/99									
		SD-05, Design Data	---	---	---	---	---	---	---	---	---	---	---	---
47	02511	Design Calculations for Piping	1.4.2.a	A&E	2	4/8/99	4/8/99							
		SD-06, Instructions	---	---	---	---	---	---	---	---	---	---	---	---
48	02511	Installation Procedures for Piping	1.4.3.a	A&E	5/31/99									
		SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---
49	02511	Pipe Pressure Tests	3.2.2	Contractor	12/15/99									Included in Close-Out Report

**Table 6-1**  
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 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Contract Number: N62470-93-D-3033, Task Order No. 045						Location: MCAS Cherry Point, North Carolina			Contractor: J. A. Jones Environmental Services Company					
Title: RAC Action for UST Remedial Action, Buildings 130 and 3996						Contractor QC Action			Government			Contractor		Remarks
No.	Specification Section Material or Product	Spec. Para. No.	Approved by	Trans Control No.	Planned Submittal Date	Action Code	Date of Action	Date Fwd to to Appr Auth/ Date recd from contractor	Date Fwd to other reviewer	Date recd from other reviewer	Action Code	Date of Action	Mailed to Contr / Recd from Appr Auth	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	
	<b>DIV 2</b>	<b>Well Systems</b>												
		SD-02, Manufacturer's Data												
50	02672	Wells	2.2	A&E	5/31/99									
51	02672	Wellhead	2.3	A&E	5/31/99									
52	02672	Perforated Pipe	2.2.2	A&E	5/31/99									
	<b>DIV 2</b>	<b>Reinforced Cement Concrete Pavement for Roads and Site Facilities</b>												
		SD-02, Manufacturer's Catalog Data												
53	02752	Curing Materials	2.1.7	Contractor	6/30/99									
54	02752	Admixtures	2.1.4	Contractor	6/30/99									
		SD-05, Design Data												
55	02752	Concrete Mix Design	2.2	Contractor	12/15/99									
		SD-10, Test Reports												
56	02752	Fly Ash Tests	1.2.3.a	Contractor	12/15/99									
57	02752	Pozzolan Tests	1.2.3.b	Contractor	12/15/99									
58	02752	Concrete Mix Design Test	1.2.3.c	Contractor	12/15/99									
		SD-12, Field Tests Reports												
59	02752	Consistency Tests	3.6.2.1	Contractor	12/15/99									Included in Close-Out Report
60	02752	Flexural Tests	3.6.2.2	Contractor	12/15/99									Included in Close-Out Report
61	02752	Air Content Tests	3.6.2.3	Contractor	12/15/99									Included in Close-Out Report
	<b>DIV 2</b>	<b>Joints, Reinforcement, and Mooring Eyes in Concrete Pavement</b>												
		SD-04, Drawings												
62	02762	Mooring Eyes	2.1.4	Contractor	6/30/99									
		SD-06, Instructions												
63	02762	Joint Sealents	2.1.3	Contractor	6/30/99									
		SD-08, Statements												
64	02762	Equipment List	1.2.3.a	Contractor	6/30/99									
		SD-11, Factory Test Report												
65	02762	Joint Sealer	2.1.3.1.1	Contractor	6/30/99									
		SD-18, Records												
66	02762	Joint Sealer	1.2.5.a	Contractor	6/30/99									
67	02762	Joint Filler	1.2.5.b	Contractor	6/30/99									

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Submittal Register**  
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Buildings 130 and 3996  
Marine Corps Air Station  
Cherry Point, North Carolina

Contract Number: N62470-93-D-3033, Task Order No. 045 Title: RAC Action for UST Remedial Action, Buildings 130 and 3996						Location: MCAS Cherry Point, North Carolina			Contractor: J.A. Jones Environmental Services Company					
No.	Specification Section Material or Product	Spec. Para. No.	Approved by	Trans Control No.	Planned Submittal Date	Contractor QC Action			Government			Contractor	Remarks	
						Action Code	Date of Action	Date Fwd to to Appr Auth/ Date recd from contractor	Date Fwd to other reviewer	Date recd from other reviewer	Action Code	Date of Action		Mailed to Contr / Recd from Appr Auth
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
	<b>DIV 2</b>	<b>Pavement Removal and Replacement</b>												
		SD-05, Design Data												
68	02951	Job Mix Formula	1.2.1.1	Contractor	6/30/99									
		SD-13, Certificates												
69	02951	Stone Base Course	2.1.2	Contractor	6/30/99									
	<b>DIV 3</b>	<b>Cast-In-Place Concrete</b>												
		SD-13, Certificates												
70	03300	Concrete	1.2.1.a	Contractor	6/30/99									
	<b>DIV 11</b>	<b>Treatment System - General</b>												
		SD-02, Manufacturer's Catalog Data												
71	11300	System Control Panel	2.1	A&E	7/6/99									
		SD-19, Operation and Maintenance Data												
72	11300	Treatment System (Data Package 4)	1.1.2.1	ROICC	12/8/99									
	<b>DIV 11</b>	<b>Pneumatic Pumping System</b>												
		SD-02, Manufacturer's Catalog Data												
73	11315	Air Operated Well Pumps	1.3.1.a	A&E	7/6/99									
		SD-04, Drawings												
74	11315	Air Operated Well Pumps	1.3.2.a	A&E	7/6/99									
		SD-06, Instructions												
75	11315	Air Operated Well Pumps	1.3.3.a	A&E	7/6/99									
		SD-11, Factory Testing												
76	11315	Air Operated Well Pumps	1.3.4.a	A&E	7/6/99									
		SD-12, Field Testing												
77	11315	Air Operated Well Pumps	1.3.5.a	Contractor	12/15/99									Included in Close-Out Report
		SD-19, Operation and Maintenance Manuals												
78	11315	Air Operated Well Pumps (Data Package 3)	1.3.6.a	ROICC	12/8/99									
	<b>DIV 11</b>	<b>Soil Vapor Extraction System</b>												
		SD-02, Manufacturer's Catalog Data												
79	11317	Vapor Extraction System	1.2.1.a	A&E	7/6/99									
		SD-04, Shop Drawings												
80	11317	Vapor Extraction System	1.2.2.a	A&E	7/6/99									

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 Cherry Point, North Carolina

Contract Number: N62470-93-D-3033, Task Order No. 045 Title: RAC Action for UST Remedial Action, Buildings 130 and 3996						Location: MCAS Cherry Point, North Carolina			Contractor: J.A. Jones Environmental Services Company					
No.	Specification Section Material or Product	Spec. Para. No.	Approved by	Trans Control No.	Planned Submittal Date	Contractor QC Action			Government			Contractor	Remarks	
						Action Code	Date of Action	Date Fwd to Appr Auth/ Date recd from contractor	Date Fwd to other reviewer	Date recd from other reviewer	Action Code	Date of Action		Mailed to Contr / Recd from Appr Auth
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
81	11317 SD-06, Instructions Vapor Extraction System	1.2.3 a	A&E		7/6/99									
82	11317 SD-12, Field Test Reports Vapor Extraction System	1.2.4 a	Contractor		12/15/99									Included in Close-Out Report
83	11317 SD-19, Operation and Maintenance Manuals Vapor Extraction System	1.2.5 a	ROICC		12/8/99									
	<b>DIV 11 Air Sparge System</b>													
84	11318 SD-02, Manufacturer's Catalog Data Air Sparge System	1.2.1 a	A&E		7/6/99									
85	11318 SD-04, Shop Drawings Air Sparge System	1.2.2 a	A&E		7/6/99									
86	11318 SD-06, Instructions Air Sparge System	1.2.3 a	A&E		7/6/99									
87	11318 SD-12, Field Test Reports Air Sparge System	1.2.4 a	Contractor		12/15/99									Included in Close-Out Report
88	11318 SD-19, Operation and Maintenance Manuals Air Sparge System	1.2.5 a	ROICC		12/8/99									
	<b>DIV 13 Aboveground Vault Type Storage Tanks</b>													
89	13210 SD-02, Manufacturer's Catalog Data Vault Type Fuel Storage Tanks	2.1	A&E		7/6/99									
90	13210 Containment Piping System	2.2	A&E		7/6/99									
91	13210 SD-04, Drawings Vault Type Fuel Storage Tanks	1.3.2 a	A&E		7/6/99									
92	13210 Containment Piping System	1.3.2 b	A&E		7/6/99									
93	13210 SD-12, Factory Tests, Field Tests, and Warranty Factory Test Reports	1.3.3 a	A&E		7/6/99									
94	13210 Field Test Reports	1.3.3 b	Contractor		12/15/99									Included in Close-Out Report
95	13210 Warranty	1.3.3 c	Contractor		7/6/99									
96	13210 Fuel Level Gauge Data Sheets	1.3.3 d	Contractor		12/15/99									Included in Close-Out Report
97	13210 SD-19, Operation and Maintenance Manuals Vault Type Fuel Storage Tanks (Data Package 2)	1.3.4 a	ROICC		12/8/99									
98	13210 Containment Piping System (Data Package 2)	1.3.4 b	ROICC		12/8/99									

**Table 6-1  
 Submittal Register  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina**

Contract Number: N62470-93-D-3033, Task Order No. 045 Title: RAC Action for UST Remedial Action, Buildings 130 and 3996						Location: MCAS Cherry Point, North Carolina			Contractor: J.A. Jones Environmental Services Company					
No.	Specification Section Material or Product	Spec. Para. No.	Approved by	Trans Control No.	Planned Submittal Date	Contractor QC Action			Government			Contractor Mailed to Contr / Recd from Appr Auth	Remarks	
						Action Code	Date of Action	Date Fwd to Appr Auth/ Date recd from contractor	Date Fwd to other reviewer	Date recd from other reviewer	Action Code			Date of Action
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
	<b>DIV 15</b>	<b>Low Pressure Compressed Air System</b>												
		SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---
99	15211	Air Compressor	2.1	A&E	7/6/99									
100	15211	Pipe	2.3	A&E	7/6/99									
		SD-10, Test Reports	---	---	---	---	---	---	---	---	---	---	---	---
101	15211	Air Compressor	3.3.1.3	Contractor	12/15/99									Included in Close-Out Report
102	15211	Hydrostatic Tests	3.3.1.2.b	Contractor	12/15/99									Included in Close-Out Report
103	15211	Leak Tightness Tests	3.3.1.2.c	Contractor	12/15/99									Included in Close-Out Report
		SD-19, Operation and Maintenance Manuals	---	---	---	---	---	---	---	---	---	---	---	---
104	15211	Air Compressor (Data Package 4)	1.3.3.1	ROICC	12/8/99									
	<b>DIV 15</b>	<b>Ventilating System</b>												
		SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---
105	15700	Exhaust Fan	2.1.1.1	A&E	7/6/99									
		SD-06, Instructions	---	---	---	---	---	---	---	---	---	---	---	---
106	15700	Installation Manual	1.3.2.1	A&E	7/6/99									
		SD-19, Operation and Maintenance Manuals	---	---	---	---	---	---	---	---	---	---	---	---
107	15700	Exhaust Fans (Data Package 2)	1.3.3.a	ROICC	12/8/99									
	<b>DIV 16</b>	<b>Underground Electrical Work</b>												
		SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---
108	16303	Conduit	2.1.1	Contractor	7/13/99									
109	16303	Conductors	2.1.3	Contractor	7/13/99									
110	16303	Fittings	2.1.2	Contractor	7/13/99									
		SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---
111	16303	Field Acceptance Checks and Tests	3.2.1	Contractor	12/15/99									Included in Close-Out Report
	<b>DIV 16</b>	<b>Interior Distribution System</b>												
		SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---
112	16402	Conduit and Fittings	2.2	A&E	7/6/99									
113	16402	Conductors	2.5	A&E	7/6/99									
114	16402	Receptacles	2.9	A&E	7/6/99									
115	16402	Circuit Breakers	2.10.2	A&E	7/6/99									
116	16402	Switches	2.8.3	A&E	7/6/99									
117	16402	Motor Controllers	2.13	A&E	7/6/99									
118	16402	Metering	2.17	Contractor	7/13/99									
		SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---
119	16402	Panelboards	1.3.2.a	Contractor	7/6/99									

**Table 6-1**  
**Submittal Register**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Contract Number: N62470-93-D-3033, Task Order No. 045						Location: MCAS Cherry Point, North Carolina			Contractor: J. A. Jones Environmental Services Company					
Title: RAC Action for UST Remedial Action, Buildings 130 and 3996						Contractor QC Action			Government			Contractor	Remarks	
No.	Specification Section Material or Product	Spec. Para. No.	Approved by	Trans Control No.	Planned Submittal Date	Action Code	Date of Action	Date Fwd to to Appr Auth/ Date recd from contractor	Date Fwd to other reviewer	Date recd from other reviewer	Action Code	Date of Action		Mailed to Contr / Recd from Appr Auth
a	b	c	d	e	f	g	h	i	j	k	l	m		n
	SD-08, Statements	---	---	---	---	---	---	---	---	---	---	---	---	---
120	16402 Fuses	2.11	A&E	---	7/6/99	---	---	---	---	---	---	---	---	---
	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
121	16402 600-volt Wiring Test	3.2.2	Contractor	---	12/15/99	---	---	---	---	---	---	---	---	Included in Close-Out Report
122	16402 Grounding System Test	3.2.4	Contractor	---	12/15/99	---	---	---	---	---	---	---	---	Included in Close-Out Report
123	16402 GFI Receptacle Test	2.9.3	Contractor	---	12/15/99	---	---	---	---	---	---	---	---	Included in Close-Out Report
	SD-19, Operation and Maintenance Manuals	---	---	---	---	---	---	---	---	---	---	---	---	---
124	16402 Metering (Data Package 5)	1.3.5.a	ROICC	---	12/8/99	---	---	---	---	---	---	---	---	---
	<b>DIV 16 Interior Lighting</b>													
	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
125	16510 Fluorescent Lighting Fixtures	2.1	A&E	---	7/6/99	---	---	---	---	---	---	---	---	---
126	16510 Fluorescent Electronic Ballasts	2.1.1	A&E	---	7/6/99	---	---	---	---	---	---	---	---	---
127	16510 Fluorescent Lamps	2.1.2	A&E	---	7/6/99	---	---	---	---	---	---	---	---	---
128	16510 High-intensity-discharge (HID) Lighting Fixtures	2.2	A&E	---	7/6/99	---	---	---	---	---	---	---	---	---
129	16510 HID Ballasts	2.2.1	A&E	---	7/6/99	---	---	---	---	---	---	---	---	---
130	16510 High-pressure Sodium Lamps	2.2.2	A&E	---	7/6/99	---	---	---	---	---	---	---	---	---
131	16510 Emergency Lighting Equipment	2.3	A&E	---	7/6/99	---	---	---	---	---	---	---	---	---
	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
132	16510 Operating Test	3.2	Contractor	---	12/15/99	---	---	---	---	---	---	---	---	Included in Close-Out Report
	SD-18, Records	---	---	---	---	---	---	---	---	---	---	---	---	---
133	16510 Information Card	1.4.3.1	Contractor	---	7/6/99	---	---	---	---	---	---	---	---	---
	<b>DIV 16 Apparatus Inspection and Testing</b>													
	SD-08, Statements	---	---	---	---	---	---	---	---	---	---	---	---	---
134	16950 Qualifications of Organization and Lead Engineering Technician	1.3.1.1	ROICC	---	12/15/99	---	---	---	---	---	---	---	---	Included in Close-Out Report
135	16950 Acceptance Test and Inspections Procedure	1.3.1.2	ROICC	---	12/15/99	---	---	---	---	---	---	---	---	Included in Close-Out Report
	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
136	16950 Acceptance Tests and Inspections	1.3.2.a	Contractor	---	12/15/99	---	---	---	---	---	---	---	---	Included in Close-Out Report

Notes:  
 ROICC - Resident Officer in Charge of Construction  
 Contractor - J. A. Jones Environmental Services Company  
 A&E - Law Engineering and Environmental Services, Inc.  
 AN - Approved As Noted  
 NA - Not Applicable

**Table 6-2**  
**Testing and Analysis Quality Control Log**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station  
 Cherry Point, North Carolina

Spec. No.	Tests	Spec. Par. No.	Quantity	Resp.	Completion Date	Approved	Comments
02315	Fill and Backfill Material Testing	3.8.2.1	One for each material used	SQA			
02315	Select Material Testing	3.8.2.2	One for each material used	SQA			
02315	Density Tests	3.8.2.4	Each Lift / Every 100 square feet	SQA			
02951	Job Mix Formula	1.2.1.1	One for each mix	SQA			
03300	Concrete Slump Test	2.1	One per Load	SQA			Slump shall be between 2 and 5 inches.
03300	Concrete Air Entrainment Test	2.1	One per Load	SQA			Entrainment shall be between 2 and 3 percent.
03300	Concrete Strength Test	2.1	Every 40 cubic yards/One per Load Minimum	SQA			Three cylinders shall be collected. One tested for 7-day compressive strength, one tested for 28-day compressive strength, and one tested if the first 28-day test results are deficient.
11317	Soil Vapor Extraction System Tests	3.4	After Installation	SQA			All equipment shall be tested in operation until the equipment is im proper working order. All equipment and controls shall be tested.
11318	Air Sparge System Tests	3.4	After Installation	SQA			All equipment shall be tested in operation until the equipment is im proper working order. All equipment and controls shall be tested.
16303	600-Volt Wiring Test	3.2.1.1	One	SQA			Applied potential shall be 1000 volts DC for one minute; minimum insulation resistance values shall not be less than 2 megaohms.
16303	Grounding System Test	3.2.1.2	One	SQA			
16402	Manual Operation Devices	3.2.1	One per Device	SQA			Each device shall be operated a minimum of five times demonstrating satisfactory operation each time.
16402	600-Volt Wiring Test	3.2.2	One	SQA			Minimum resistance shall be 250,000 ohms.
16402	Grounding System Test	3.2.4	One	SQA			

Signed: \_\_\_\_\_

Figure 6-1

**CONTRACTOR PRODUCTION REPORT**  
(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

REPORT NO.

TRACT NO.

D.O. #

TITLE AND LOCATION

N62470-83-D-3033

CONTRACTOR: J. A. Jones Construction Services

SUPERINTENDENT

AM WEATHER

PM WEATHER

MAX TEMP

F

MIN TEMP

F

**WORK PERFORMED TODAY**

WORK LOCATION AND DESCRIPTION

EMPLOYER

NUMBER

TRADE

HRS

**JOB SAFETY**

WAS A JOB SAFETY MEETING HELD THIS DATE?

(If YES, attach copy of the meeting minutes)

WERE THERE ANY LOST TIME ACCIDENTS THIS DATE?

(If YES, attach copy of completed OSHA report)

YES  NO

YES  NO

YES  NO

YES  NO

TOTAL WORK HOURS ON  
JOB SITE THIS DATE

CUMULATIVE TOTAL OF  
WORK HOURS FROM  
PREVIOUS REPORT

TOTAL WORK HOURS  
FROM START OF  
CONSTRUCTION

WAS TRENCHING/SCAFFOLD/HV ELECTRICAL/HIGH WORK DONE?

(If YES, attach statement or checklist showing inspection performed)

WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT?

(If YES, attach description of incident and proposed action)

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED

SAFETY REQUIREMENTS  
HAVE BEEN MET

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INCLUDE NUMBER OF HOURS USED TODAY

REMARKS

CONTRACTORS SUPERINTENDENT

DATE

SHEET

OF

Figure 6-2

<b>CONTRACTOR QUALITY CONTROL REPORT</b> (ATTACH ADDITIONAL SHEETS IF NECESSARY)		DATE
PHASE	Y - YES, N - NO, SEE REMARKS; BLANK - NOT APPLICABLE	IDENTIFY DEFINABLE FEATURE OF WORK, LOCATION, AND LIST PERSONNEL PRESENT
<b>P R E P A R A T O R Y</b>	THE PLANS AND SPECS HAVE BEEN REVIEWED	
	THE SUBMITTALS HAVE BEEN APPROVED	
	MATERIALS COMPLY WITH APPROVED SUBMITTALS	
	MATERIALS ARE STORED PROPERLY	
	TESTING PLAN HAS BEEN REVIEWED	
	WORK METHOD AND SCHEDULE DISCUSSED	
<b>I N I T I A L</b>	PRELIMINARY WORK WAS DONE CORRECTLY	
	SAMPLE HAS BEEN PREPARED/APPROVED	
	WORKMANSHIP IS SATISFACTORY	
	TEST RESULTS ARE ACCEPTABLE	
	WORK IS IN COMPLIANCE WITH THE CONTRACT	
<b>F O L L O W - U P</b>	WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE	TESTING PERFORMED AND WHO PERFORMED TEST
		TESTING PERFORMED AND WHO PERFORMED TEST
REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)		REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)
<p>REMARKS</p> <p>On behalf of the contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.</p>		
<b>GOVERNMENT QUALITY ASSURANCE REPORT</b>		DATE
<p>QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT</p>		
GOVERNMENT QUALITY CONTROL MANAGER		DATE

Figure 6-2 (continued)

<b>CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET</b>		DATE
(ATTACH ADDITIONAL SHEETS IF NECESSARY)		REPORT NO.
TRACT NO. <b>N62470-83-D-3033</b>		
USE	Y - YES, N - NO, SEE REMARKS; BLANK - NOT APPLICABLE	IDENTIFY DEFINABLE FEATURE OF WORK, LOCATION, AND LIST PERSONNEL PRESENT
<b>P R E P A R A T O R Y</b>	THE PLANS AND SPECS HAVE BEEN REVIEWED	
	THE SUBMITTALS HAVE BEEN APPROVED	
	MATERIALS COMPLY WITH APPROVED SUBMITTALS	
	MATERIALS ARE STORED PROPERLY	
	TESTING PLAN HAS BEEN REVIEWED	
	WORK METHOD AND SCHEDULE DISCUSSED	
PHASE	Y - YES, N - NO, SEE REMARKS; BLANK - NOT APPLICABLE	IDENTIFY DEFINABLE FEATURE OF WORK, LOCATION, AND LIST PERSONNEL PRESENT
<b>I N I T I A L</b>	PRELIMINARY WORK WAS DONE CORRECTLY	
	SAMPLE HAS BEEN PREPARED/APPROVED	
	WORKMANSHIP IS SATISFACTORY	
	TEST RESULTS ARE ACCEPTABLE	
	WORK IS IN COMPLIANCE WITH THE CONTRACT	
		TESTING PERFORMED AND WHO PERFORMED TEST



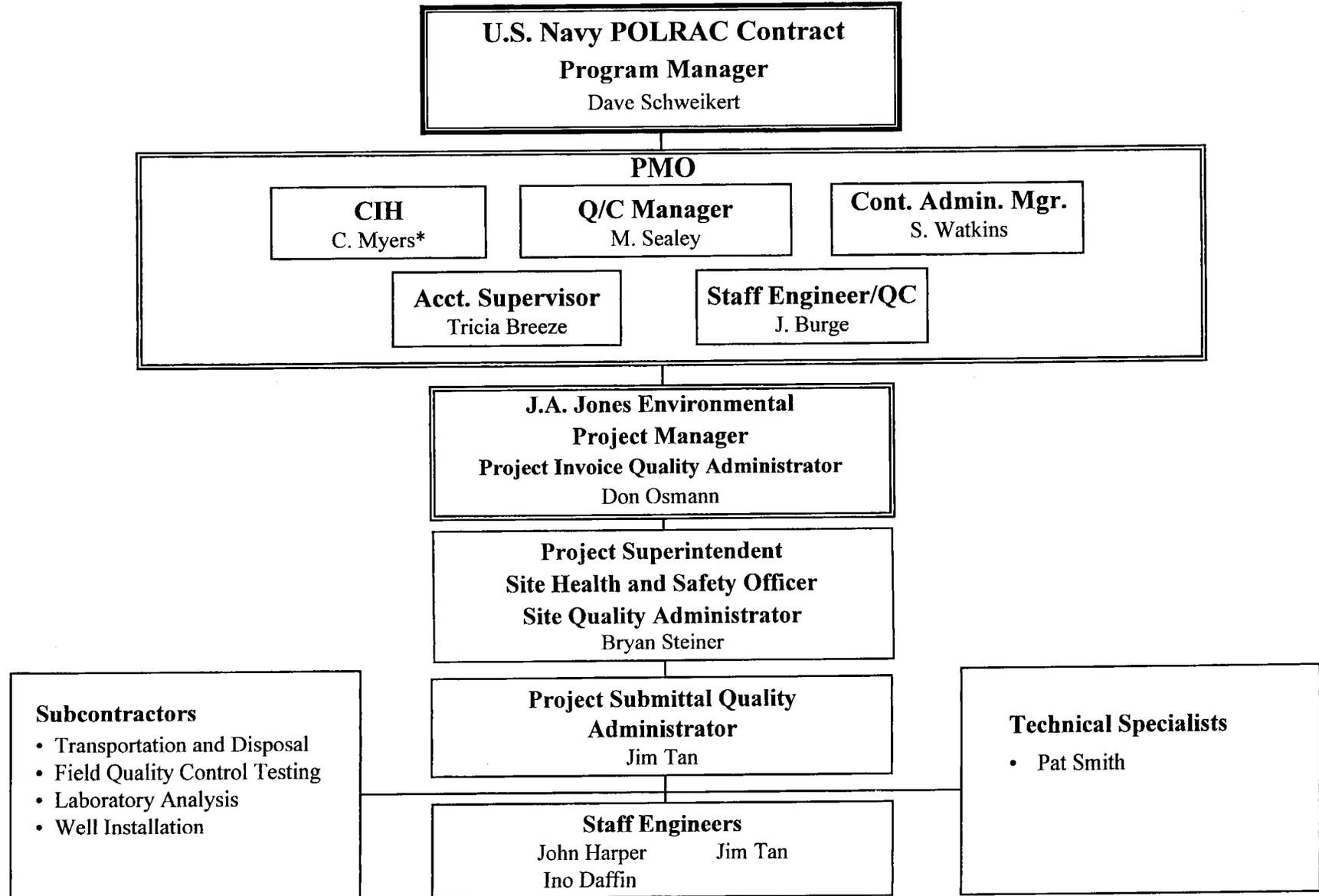
# REWORK IT IS LIST

Contract No. and Title: N62470-93-D-3033

Contractor: J. A. Jones Construction Services

NUMBER	DATE IDENTIFIED	DESCRIPTION	CONTRACT REQUIREMENT (Spec. Section and Par. No., Drawing No. and Detail No., etc.)	ACTION TAKEN BY QC MANAGER	RESOLUTION	DATE COMPLETED

**Figure 6-5**  
**Project Organization Chart**  
 RAC Action for UST Remedial Action  
 Buildings 130 and 3996  
 Marine Corps Air Station, Cherry Point, North Carolina



## SECTION 7.0

### TECHNICAL SPECIFICATIONS

---

This section of the Work Plan addresses any additions or modifications to the technical specifications provided by Law that are required to accurately describe the materials and work procedures to complete the work outlined in this Task Order. The specification sections listed in this section of the Work Plan were provided because they represent the major portions of work to be executed.

<u>Specification Section</u>	<u>Title</u>
01115	General Paragraphs
01150	Special Project Procedures
01561	Erosion and Sediment Control
01781	Operation and Maintenance Data
01783	Environmental Facility User Manuals
02222	Excavation, Removal, and Treatment of Petroleum-Contaminated Soil
02223	Transportation and Disposal of Contaminated Material
02315	Excavation and Fill
02511	Piping System
02672	Well Systems
02752	Reinforced Cement Concrete Pavement for Roads and Site Facilities
02762	Joints, Reinforcement, and Mooring Eyes in Concrete Pavements
02951	Pavement Removal and Replacement
03300	Cast-in-Place Concrete Short Form
11300	Treatment System-General
11315	Pneumatic Pumping System
11317	Soil Vapor Extraction System
11318	Air Sparge System
13210	Aboveground Vault Type Storage Tanks
15050	Basic Mechanical Materials and Methods
15211	Low Pressure Compressed Air System
15700	Ventilating System
16050	Basic Electrical Materials and Methods
16303	Underground Electrical Work
16402	Interior Distribution System (System A)

<u>Specification Section</u>	<u>Title</u>
16510	Interior Lighting
16950	Apparatus Inspection and Testing

The following specification sections provided by Law are not included in this section because of modifications to the original scope of work.

<u>Specification Section</u>	<u>Title</u>
02581	Utility Poles
04200	Unit Masonry
05500	Metal Fabrications
06100	Rough Carpentry
07112	Bituminous Dampproofing
07311	Asphalt Shingles
07600	Flashing and Sheet Metal
07920	Joint Sealants
08110	Steel Doors and Frames
08331	Rolling Service Doors
08710	Door Hardware
10201	Metal Wall Louvers
16301	Overhead Transmission and Distribution
16403	Interior Distribution System (System B)

## **7.1 TECHNICAL SPECIFICATION MODIFICATIONS**

### **7.1.1 Air Sparge/SVE Well Pairs**

In the CAP dated January 1997, Law proposed natural attenuation as the recommended remedial technology for the “fringes” of the dissolved-phase petroleum hydrocarbon contaminant plume. Since “fringe” is defined as an area of the plume where concentrations of benzene are equal to 100 µg/l or less, the four proposed air sparge/SVE well pairs to the north of Building 130, the air sparge/SVE well pair proposed inside of Building 130, and the three proposed air sparge/SVE well pairs to the south of Building 1700 were deleted from the scope of work.

### **7.1.2 Product Recovery Wells**

Two proposed product recovery wells located inside of Building 130 were deleted from the scope of work, and two other proposed product recovery wells, identified as FP1 and FP2, will be re-located from the interior to the exterior of Building 130. The estimated radius of influence of the product recovery wells relocated outside of Building 130 will include the majority of the interpreted areal extent of product identified in the CAP

without the installation of product recovery wells in Building 130. The modified locations of the two product recovery wells are shown on **Figure C-6**.

### **7.1.3 Treatment System Building**

The skid-mounted subsurface petroleum remediation system will be enclosed in a building with insulated, removable wall panels, placed on a concrete pad, and secured by chain-link fencing. A brick treatment system building, as specified in the Task Order Technical Specifications, will not be utilized because the proposed location of the building is in an existing industrial area where potential noise emanating from the building will not be heard above background noise levels expected for this industrial area.

### **7.1.4 System "B"**

Proposed System "B," as specified in the Task Order Technical Specifications, has been incorporated into proposed System "A." One air compressor for the air sparge wells at the Buildings 130 and 3996, one SVE vacuum blower for the SVE wells at the Building 130 site, one SVE vacuum blower for the SVE wells at the Building 3996 site, and, if required, one air compressor for the pneumatic product recovery pumps located in the product recovery wells at the Building 130 site will be enclosed in one building. As a result, the proposed subsurface petroleum remediation system components have been sized to accommodate the modifications. The piping for each system will be installed to each site utilizing directional drilling methods.

### **7.1.5 Submittal Register**

The submittal register presented in **Section 6.0 Quality Control Plan** as **Table 6-1** was modified to include a complete listing of project deliverables.

## SECTION 8.0

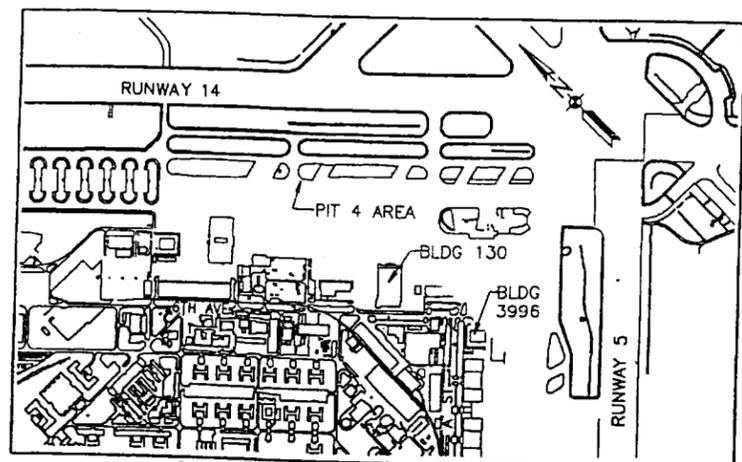
### CONTRACTOR GENERATED CONSTRUCTION DRAWINGS

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Treatment system design drawings included in this Work Plan define the construction details and site layouts. The treatment system layouts shown on **Figures C-6 and C-7** provide the locations of the decontamination, equipment laydown, and soil staging areas. Project work zones which include the exclusion zone, the CRZ, and the SZ will be implemented in the areas of trench excavation, horizontal drilling and vertical well installation. A description of these work zones are provided in **Section 5.9 Work Zone and Site Control**.

A list of the design drawings, included in this work plan, are provided below.

<u>Drawing No.</u>	<u>Title</u>
C-1	Title Sheet with Site Location Map
C-2	General Notes and Legends
C-3	Plan Index and Legend
C-4	Site Plan – Areas 1 and 1A
C-5	Site Plan – Area 2
C-6	Treatment System and Utility Plan – Areas 1 and 1A
C-7	Treatment System and Utility Plan – Area 2
C-8	Site Environmental Conditions
C-9	Soil Vapor Extraction Piping and Instrumentation Diagram
C-10	Air Sparge Piping and Instrumentation Diagram
C-11	Product Recovery System Piping and Instrumentation Diagram
C-12	Treatment System Piping and Electrical Plan
C-13	Horizontal Boring and Pipe Trench Details
C-14	Soil Vapor Extraction Well and Product Recovery Well Details
C-15	Air Sparge and Soil Vapor Extraction Well Pair Details
C-16	Miscellaneous Details
E-1	Power Supply Connection and Control Panel Details
E-2	Electrical Line Diagram and System Control Logic
E-3	Electrical Line Diagram and System Control Logic
E-4	Electrical Line Diagram and System Control Logic



**LOCATION MAP**  
REF: MCAS CAD MAP

INDEX OF SHEETS		
SHEET NO.	DRAWING NO.	SHEET TITLE
SHEET 1 OF 19	C-1	TITLE SHEET WITH SITE LOCATION MAP
SHEET 2 OF 19	C-2	GENERAL NOTES AND LEGENDS
SHEET 3 OF 19	C-3	SITE PLAN - SOIL AND GROUNDWATER SAMPLE LOCATIONS
SHEET 4 OF 19	C-4	SITE PLAN - AREA A SOIL AND GROUNDWATER SAMPLE LOCATIONS
SHEET 5 OF 19	C-5	PLAN INDEX AND LEGEND
SHEET 6 OF 19	C-6	TREATMENT SYSTEM AND UTILITY PLAN - AREA 1
SHEET 7 OF 19	C-7	TREATMENT SYSTEM AND UTILITY PLAN - AREA 2
SHEET 8 OF 19	C-8	SOIL VAPOR EXTRACTION PIPING AND INSTRUMENTATION DIAGRAMS
SHEET 9 OF 19	C-9	AIR SPARGE PIPING AND INSTRUMENTATION DIAGRAM
SHEET 10 OF 19	C-10	PRODUCT RECOVERY SYSTEM PIPING AND INSTRUMENTATION DIAGRAMS
SHEET 11 OF 19	C-11	TREATMENT SYSTEM PIPING AND ELECTRICAL PLAN
SHEET 12 OF 19	C-12	PIPE TRENCH DETAILS
SHEET 13 OF 19	C-13	PRODUCT RECOVERY WELL AND MONITORING WELL DETAILS
SHEET 14 OF 19	C-14	AIR SPARGE AND SOIL VAPOR EXTRACTION WELL PAIR AND JUNCTION BOX DETAILS
SHEET 15 OF 19	C-15	MISCELLANEOUS DETAILS
SHEET 16 OF 19	E-1	POWER SUPPLY CONNECTION AND CONTROL PANEL DETAILS
SHEET 17 OF 19	E-2	ELECTRICAL LINE DIAGRAM AND CONTROL LOGIC
SHEET 18 OF 19	E-3	ELECTRICAL LINE DIAGRAM AND CONTROL LOGIC
SHEET 19 OF 19	E-4	ELECTRICAL LINE DIAGRAM AND CONTROL LOGIC

**NOTE:**  
THESE DRAWINGS ARE PREPARED AND CERTIFIED FOR CONSTRUCTION AND/OR PERMITTING PURPOSES ONLY IN COMPLIANCE WITH NCDENR-APPROVED CORRECTIVE ACTION PLAN (CAP).

RAC ACTION FOR UST REMEDIAL ACTION  
BUILDINGS 130 AND 3996  
MARINE CORPS AIR STATION  
CHERRY POINT, NORTH CAROLINA

		<b>REVISIONS</b> DATE 3/00 APPROVED BY	
DEPARTMENT OF THE NAVY NAVAL STATION NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NORFOLK, VIRGINIA		RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA TITLE SHEET WITH SITE LOCATION MAP	
CODE ID NO. 80091 SIZE B SCALE: N.T.S. EFD NO. STA. PROJ. NO. SPEC. NO. CONSTR. CONTR. NO. N62470-93-D-3033 NAVFAC DRAWING NO.		SHEET 1 OF 19 C-1	

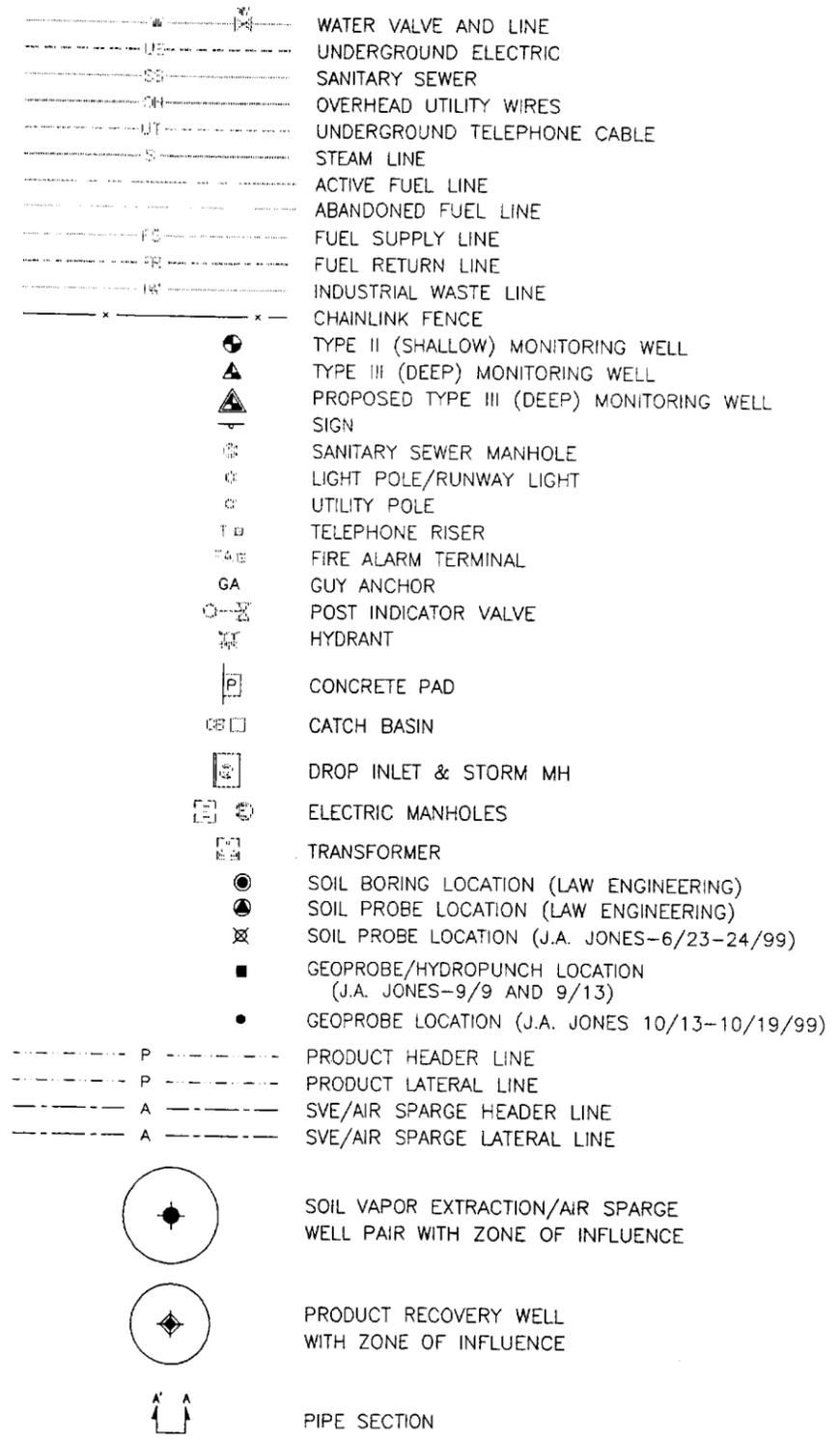
# GENERAL CONSTRUCTION NOTES

1. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND VERIFYING LOCATION OF ALL UTILITIES WITHIN LIMITS TO BE AFFECTED BY CONSTRUCTION.
2. CONTRACTOR TO BE RESPONSIBLE FOR FURNISHING ALL FIELD INFORMATION REQUIRED FOR PREPARATION OF RECORD DRAWINGS BY MAINTAINING A SET OF DRAWINGS IN THE FIELD CURRENT WITH DAILY PROGRESS OF WORK.
3. REFER TO PIPE SPECIFICATIONS FOR TYPE, TESTING REQUIREMENTS, MATERIAL, AND DESIGN CONDITIONS FOR INDIVIDUAL PIPE RUNS.
4. ALL SCREWED PIPE CONNECTIONS TO BE MADE BY WRAPPING MALE THREAD WITH TEFLON TAPE PRIOR TO ASSEMBLY. ALL PVC SOCKET TYPE CONNECTIONS TO BE MADE USING SOLVENT WELDING CEMENT ASTM-D2564.
5. ALL PAVEMENT AND CONCRETE CUTS TO BE SMOOTH EDGE SAW CUTS BY CIRCULAR SAW BLADE TYPE CUTTING MACHINE OR CORE DRILLED TO PREVENT CHIPPING OF EXISTING CONCRETE.
6. ALL CONCRETE AND PAVEMENT AREAS DISTURBED BY TRENCHING TO BE REPLACED TO MATCH EXISTING. ALL GRASSED AREAS DISTURBED BY TRENCHING TO BE REPLACED IN KIND WITH SEED PER SPECIFICATIONS.
7. ALL SOIL BACKFILL TO BE COMPACTED TO 95% OF ASTM D 698 UNLESS OTHERWISE NOTED IN SPECIFICATIONS, OR APPROVED BY NAVY REPRESENTATIVE.
8. ELECTRICAL CONDUIT TO BE MARKED IN TRENCH BY USE OF METAL LOCATING TAPE.
9. CONTRACTOR TO COORDINATE ALL OPENINGS, SLEEVES, DEPRESSIONS, BOLTS, AND OTHER EMBEDMENTS AS ON ALL DRAWINGS AND AS REQUIRED BY ALL TRADES.
10. ALL BURIED LINES TO BE A MINIMUM OF 30 INCHES BELOW GRADE UNLESS OTHERWISE SPECIFIED.
11. NON-SHRINK GROUT TO BE USED WHEN FILLING PIPE SLEEVE PENETRATION VOIDS AND FOR LEVELING PROCESS EQUIPMENT AND PUMPS.
12. PLACEMENT OF GAUGES, INSTRUMENTATION, AND METERS TO BE IN SUCH A MANNER THAT THEY ARE EASILY VISIBLE AND ACCESSIBLE.

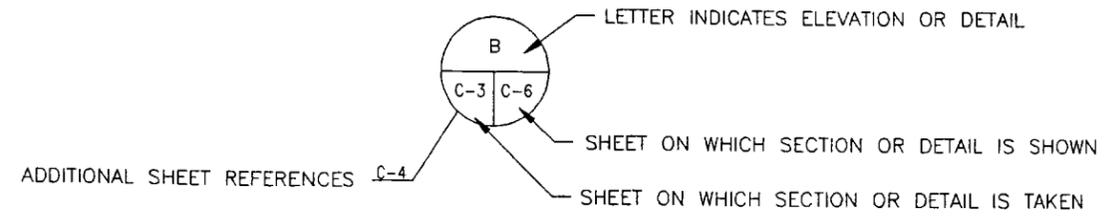
## GENERAL ABBREVIATIONS

ARV	AIR RELIEF VALVE
AS	AIR SPARGE
BV	BALL VALVE
CV	CHECK VALVE
DPI	DIFFERENTIAL PRESSURE INDICATOR
DV	DILUTION GLOBE VALVE WITH FILTER
FP	PRODUCT RECOVERY
G	GREEN RUNNING LIGHT
GV	GATE VALVE
HDPE	HIGH DENSITY POLYETHYLENE
HS	HAND SWITCH
LAH	LEVEL ALARM HIGH
LAHH	LEVEL ALARM HIGH-HIGH
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH-HIGH
LSL	LEVEL SWITCH LOW
MW	MONITORING WELL
N.T.S.	NOT TO SCALE
PI	PRESSURE INDICATOR
PT	PITOT TUBE
PVC	POLYVINYL CHLORIDE
PRV	PRESSURE RELIEF VALVE
R	RED ALARM LIGHT
S	3-WAY SOLENOID VALVE
SP	SAMPLE PORT
SVE	SOIL VAPOR EXTRACTION
VI	VACUUM INDICATOR

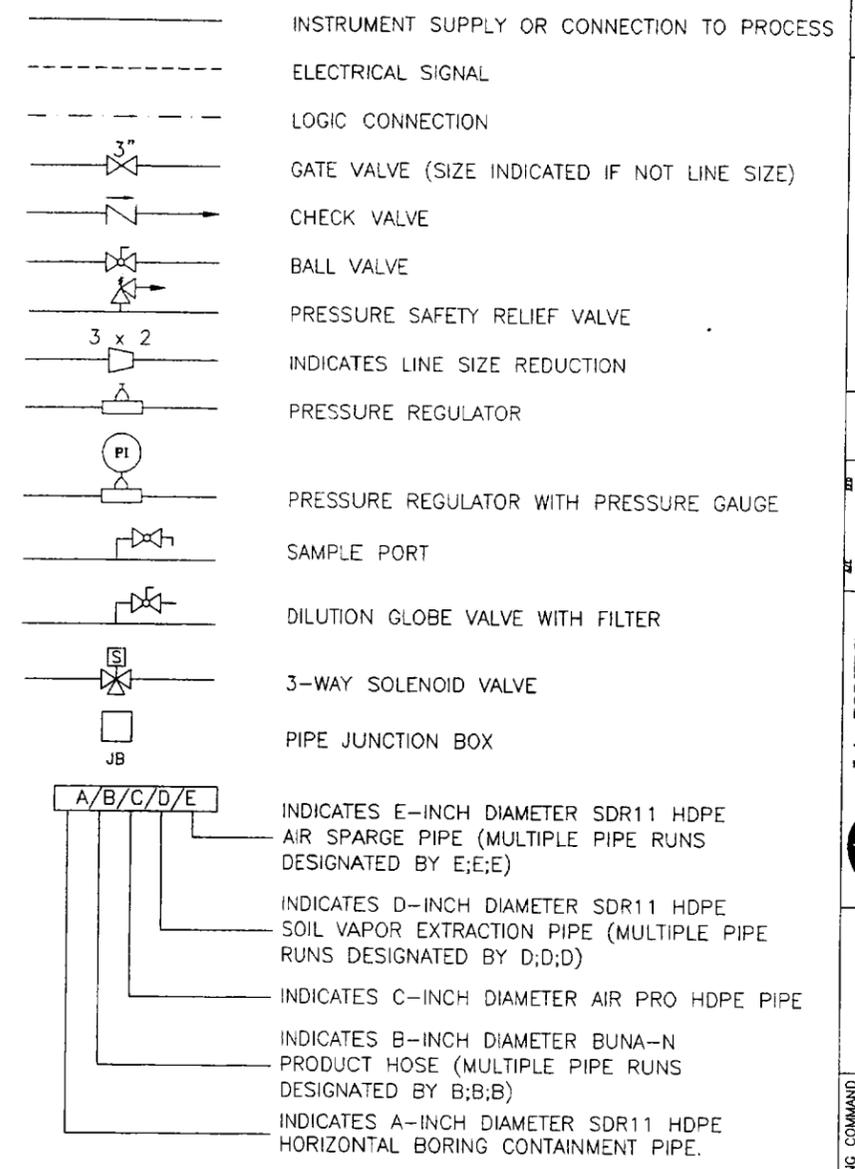
## SITE UTILITIES LEGEND



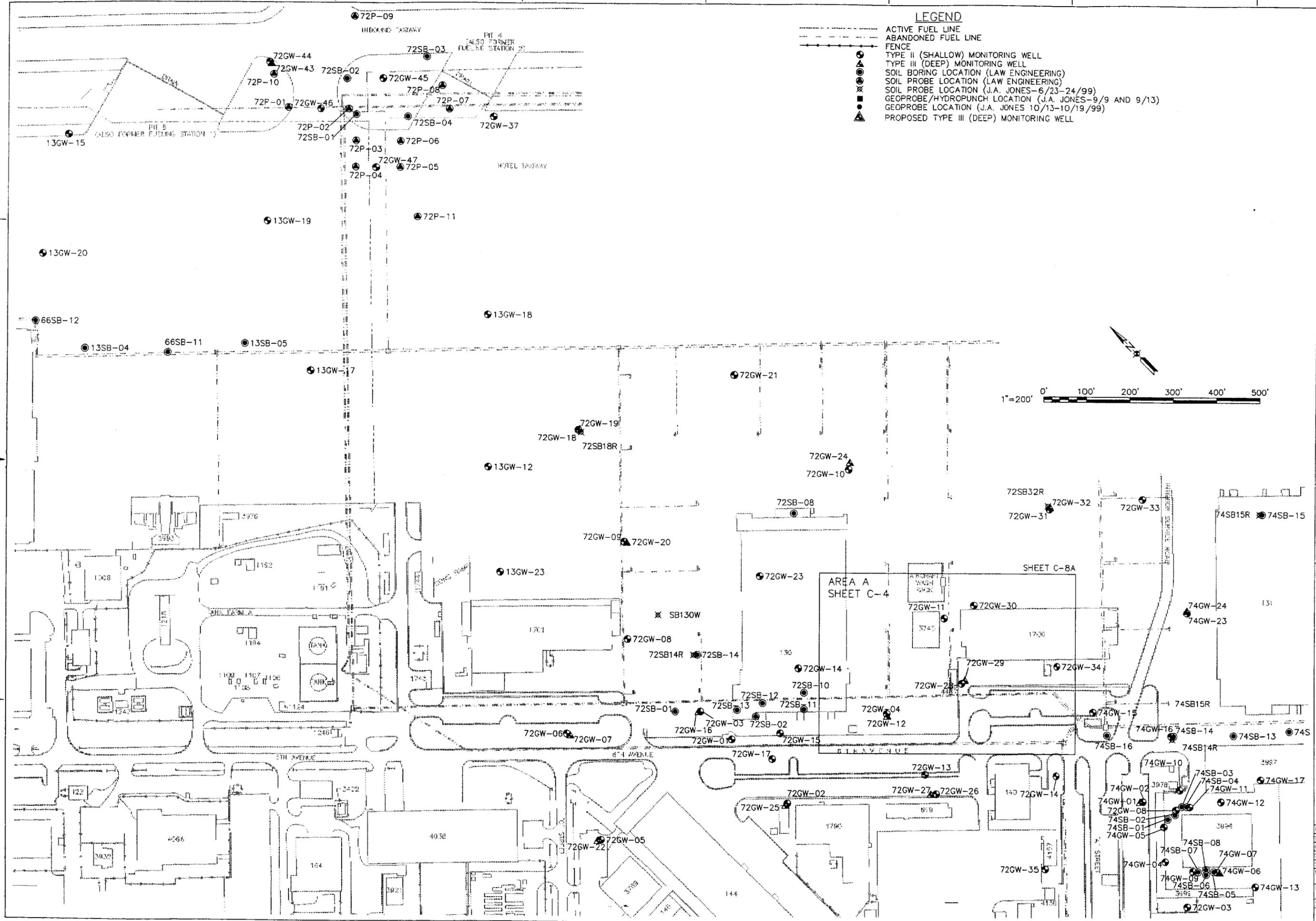
## SECTION OR DETAIL IDENTIFICATION SYMBOL



## PIPING SYMBOLS



DEPARTMENT OF THE NAVY NAVAL STATION RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA	NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NORFOLK, VIRGINIA	J.A. JONES ENGINEER PROJECT MANAGER PROJECT NO. N62470-93-D-3033 DATE	APPROVED BY DATE 3/00
GENERAL NOTES AND LEGENDS		REVISIONS	
CODE ID NO. 80091 SIZE B SCALE: N.T.S. EFD NO. STA. PROJ. NO. SPEC. NO. CONSTR. CONTR. NO. N62470-93-D-3033 NAVFAC DRAWING NO.		SHEET 2 OF 19 C-2	



**LEGEND**

- ACTIVE FUEL LINE
- - - - - ABANDONED FUEL LINE
- FENCE
- TYPE II (SHALLOW) MONITORING WELL
- ▲ TYPE III (DEEP) MONITORING WELL
- SOIL BORING LOCATION (LAW ENGINEERING)
- ⊗ SOIL PROBE LOCATION (LAW ENGINEERING)
- ⊗ SOIL PROBE LOCATION (J.A. JONES-6/23-24/99)
- GEOPROBE/HYDROPUNCH LOCATION (J.A. JONES-9/9 AND 9/13)
- GEOPROBE LOCATION (J.A. JONES 10/13-10/19/99)
- ▲ PROPOSED TYPE III (DEEP) MONITORING WELL

 <b>J.A. JONES</b> ENGINEERS & ARCHITECTS JACKSONVILLE, FLORIDA A/E CONTRACT NO. N62470-93-D-3033 ACTIVITY - SUBSTATION TO THE 130 AND 3996 BLDGS											
DEPARTMENT OF THE NAVY NAVAL STATION <b>ATLANTIC DIVISION</b> NAVY FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA <b>RAC ACTION FOR UST REMEDIAL ACTION</b> BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA SITE PLAN - SOIL AND GROUNDWATER SAMPLE LOCATIONS	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>BY</th> <th>APPROVED BY</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DATE	DESCRIPTION	BY	APPROVED BY					
NO.	DATE	DESCRIPTION	BY	APPROVED BY							
CODE ID NO. 80091   SIZE B SCALE: 1" = 200' EFD NO. STA. PROJ. NO. SPEC. NO. CONSTR. CONTR. NO. N62470-93-D-3033 NAVFAC DRAWING NO.											
SHEET 3 OF 19 <b>C-3</b>											

REVISIONS  
 D  
 C  
 B  
 A

AIRCRAFT  
WASH  
RACK

**LEGEND**

- ACTIVE FUEL LINE
- - - ABANDONED FUEL LINE
- FENCE
- TYPE II (SHALLOW) MONITORING WELL
- ▲ TYPE III (DEEP) MONITORING WELL
- ⊙ SOIL BORING LOCATION (LAW ENGINEERING)
- ⊗ SOIL PROBE LOCATION (LAW ENGINEERING)
- ⊗ SOIL PROBE LOCATION (J.A. JONES-6/23-24/99)
- GEOPROBE/HYDROPUNCH LOCATION (J.A. JONES-9/9 AND 9/13)
- GEOPROBE LOCATION (J.A. JONES 10/13-10/19/99)
- ▲ PROPOSED TYPE III (DEEP) MONITORING WELL

721S29/23 ●

● 721S29/19

● 72GW-30

721S29/20 ●

721S29/17 ●

72GW-11

72SB11R

3745

PROPOSED  
MW04

721S29/07

1700

PROPOSED  
MW02

PROPOSED  
MW03

721S29/08

721S29/21 ●

721S29/16 ●

72SB07R  
72SB-07

PROPOSED  
MW01

72IS28&29/01

721S29/14 ●

72GW-34

721S29/22 ●

721S29/18 ●

72IS28&29/03 ■

721S29/06 ●

72IS28&29/02

PROPOSED  
MW05

721S29/12 ●

721S29/15 ●

721S29/09 ●

721S29/13 ●

72SB-06

72GW-28

72GW-29

4437

72IS28&29/04

PROPOSED  
MW05

721S29/12 ●

721S29/15 ●

72SB-09

72SB-03

72GW-04

72GW-12

72SB-04

721S29/10 ●

72IS28&29/05

721S29/24 ●

72SB-05

74SB-09

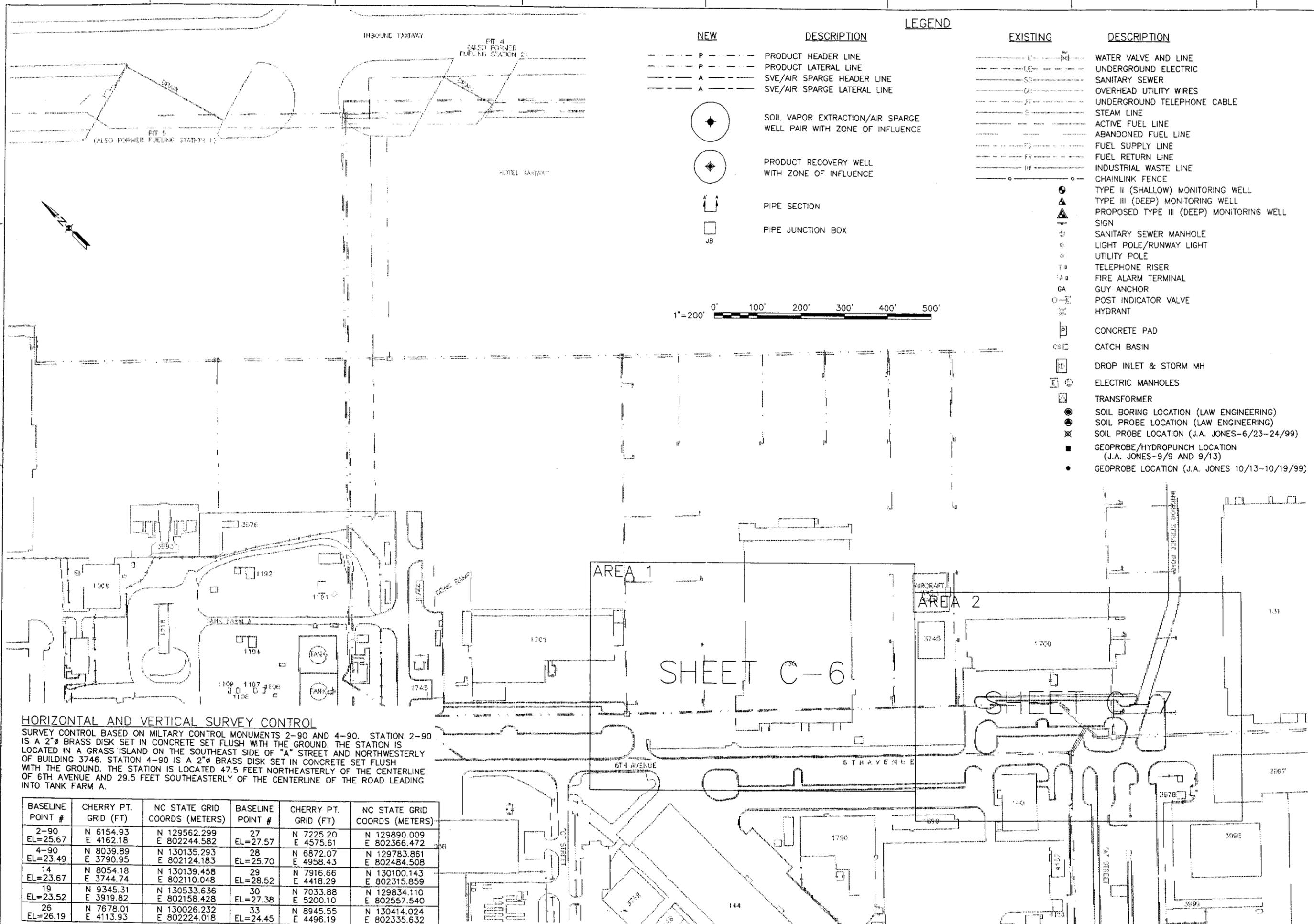
721S29/11 ●

74SB-10

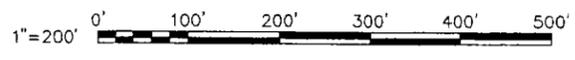
6TH AVENUE

 <p><b>J.A. JONES</b> SERVICES CORPORATION JACKSONVILLE, FLORIDA AZ CONTRACT NO. N62470-93-D-3033</p>		<p>DATE: 1/1/00</p>	
<p>NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA</p>		<p>DATE: 1/1/00</p>	
<p>DEPARTMENT OF THE NAVY NAVAL STATION</p>		<p>DATE: 1/1/00</p>	
<p>CODE ID. NO. 80081</p>		<p>DATE: 1/1/00</p>	
<p>SCALE: 1" = 40'</p>		<p>DATE: 1/1/00</p>	
<p>EFD NO.</p>		<p>DATE: 1/1/00</p>	
<p>STA. PROJ. NO.</p>		<p>DATE: 1/1/00</p>	
<p>SPEC. NO.</p>		<p>DATE: 1/1/00</p>	
<p>CONSTR. CONTR. NO. N62470-93-D-3033</p>		<p>DATE: 1/1/00</p>	
<p>NAVFAC DRAWING NO.</p>		<p>DATE: 1/1/00</p>	
<p>SHEET 4 OF 19</p>		<p>DATE: 1/1/00</p>	
<p>C-4</p>		<p>DATE: 1/1/00</p>	

REVISIONS  
 1  
 SYMBOL  
 DESCRIPTION  
 DATE  
 APPROVED BY



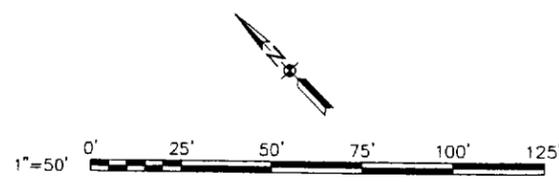
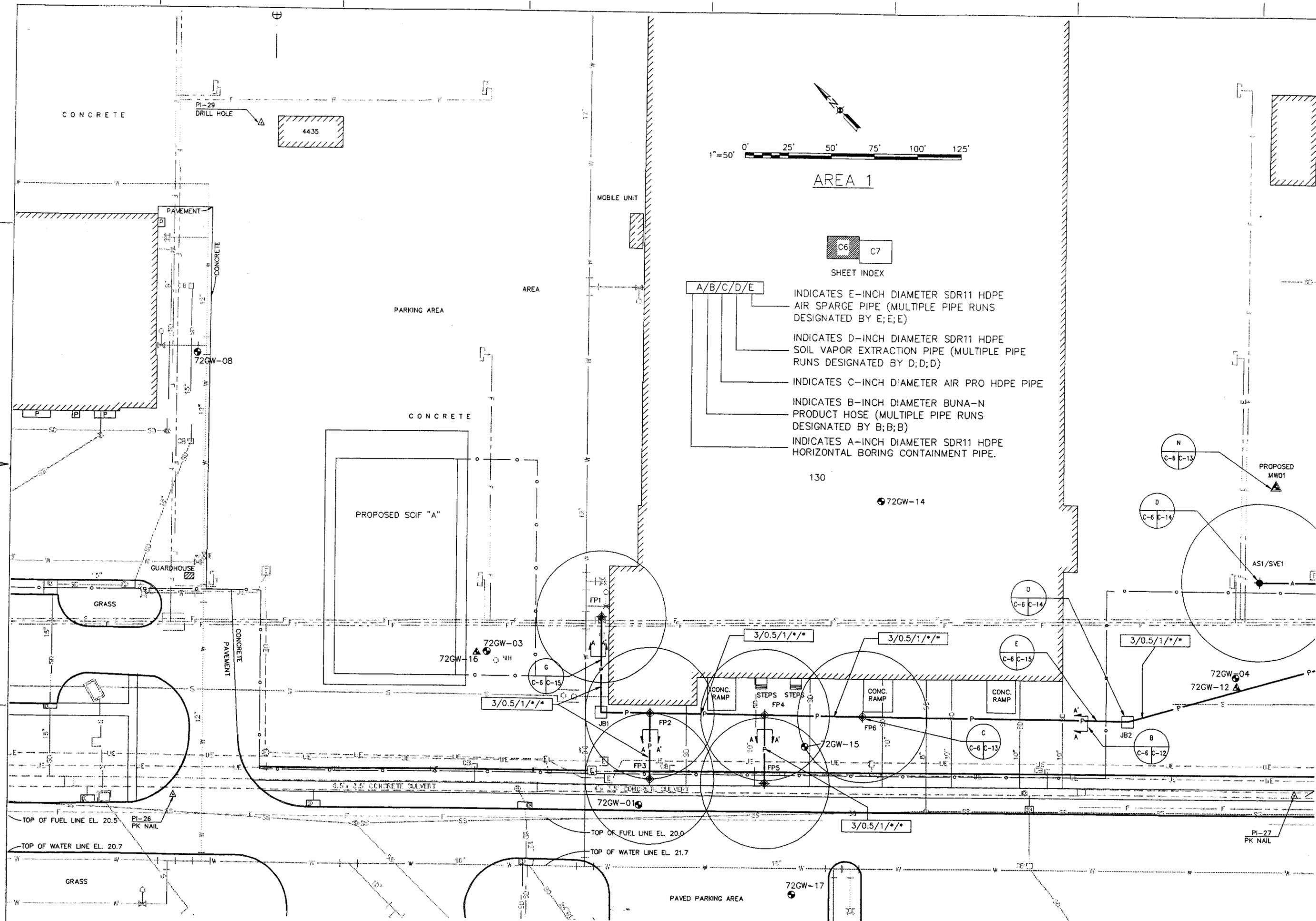
NEW	DESCRIPTION	EXISTING	DESCRIPTION
---	PRODUCT HEADER LINE	---	WATER VALVE AND LINE
---	PRODUCT LATERAL LINE	---	UNDERGROUND ELECTRIC
---	SVE/AIR SPARGE HEADER LINE	---	SANITARY SEWER
---	SVE/AIR SPARGE LATERAL LINE	---	OVERHEAD UTILITY WIRES
○	SOIL VAPOR EXTRACTION/AIR SPARGE WELL PAIR WITH ZONE OF INFLUENCE	---	UNDERGROUND TELEPHONE CABLE
○	PRODUCT RECOVERY WELL WITH ZONE OF INFLUENCE	---	STEAM LINE
↑	PIPE SECTION	---	ACTIVE FUEL LINE
□	PIPE JUNCTION BOX	---	ABANDONED FUEL LINE
		---	FUEL SUPPLY LINE
		---	FUEL RETURN LINE
		---	INDUSTRIAL WASTE LINE
		---	CHAINLINK FENCE
		○	TYPE II (SHALLOW) MONITORING WELL
		○	TYPE III (DEEP) MONITORING WELL
		△	PROPOSED TYPE III (DEEP) MONITORING WELL SIGN
		○	SANITARY SEWER MANHOLE
		○	LIGHT POLE/RUNWAY LIGHT
		○	UTILITY POLE
		○	TELEPHONE RISER
		○	FIRE ALARM TERMINAL
		○	GUY ANCHOR
		○	POST INDICATOR VALVE
		○	HYDRANT
		□	CONCRETE PAD
		□	CATCH BASIN
		□	DROP INLET & STORM MH
		□	ELECTRIC MANHOLES
		□	TRANSFORMER
		○	SOIL BORING LOCATION (LAW ENGINEERING)
		○	SOIL PROBE LOCATION (LAW ENGINEERING)
		○	SOIL PROBE LOCATION (J.A. JONES-6/23-24/99)
		○	GEOPROBE/HYDROPUNCH LOCATION (J.A. JONES-9/9 AND 9/13)
		○	GEOPROBE LOCATION (J.A. JONES 10/13-10/19/99)



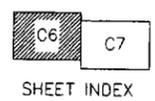
**HORIZONTAL AND VERTICAL SURVEY CONTROL**  
 SURVEY CONTROL BASED ON MILITARY CONTROL MONUMENTS 2-90 AND 4-90. STATION 2-90 IS A 2" Ø BRASS DISK SET IN CONCRETE SET FLUSH WITH THE GROUND. THE STATION IS LOCATED IN A GRASS ISLAND ON THE SOUTHEAST SIDE OF "A" STREET AND NORTHWESTERLY OF BUILDING 3746. STATION 4-90 IS A 2" Ø BRASS DISK SET IN CONCRETE SET FLUSH WITH THE GROUND. THE STATION IS LOCATED 47.5 FEET NORTHEASTERLY OF THE CENTERLINE OF 6TH AVENUE AND 29.5 FEET SOUTHEASTERLY OF THE CENTERLINE OF THE ROAD LEADING INTO TANK FARM A.

BASELINE POINT #	CHERRY PT. GRID (FT)	NC STATE GRID COORDS (METERS)	BASELINE POINT #	CHERRY PT. GRID (FT)	NC STATE GRID COORDS (METERS)
2-90 EL=25.67	N 6154.93 E 4162.18	N 129562.299 E 802244.582	27 EL=27.57	N 7225.20 E 4575.61	N 129890.009 E 802366.472
4-90 EL=23.49	N 8039.89 E 3790.95	N 130135.293 E 802124.183	28 EL=25.70	N 6872.07 E 4958.43	N 129783.861 E 802484.508
14 EL=23.67	N 8054.18 E 3744.74	N 130139.458 E 802110.048	29 EL=28.52	N 7916.66 E 4418.29	N 130100.143 E 802315.859
19 EL=23.52	N 9345.31 E 3919.82	N 130533.636 E 802158.428	30 EL=27.38	N 7033.88 E 5200.10	N 129834.110 E 802557.540
26 EL=26.19	N 7678.01 E 4113.93	N 130026.232 E 802224.018	33 EL=24.45	N 8945.55 E 4496.19	N 130414.024 E 802335.632

<b>J.A. JONES</b> ENVIRONMENTAL SERVICES 1100 W. HARRISVILLE ROAD WARRISVILLE, FLORIDA 32093 TEL: 904.247.0000 FAX: 904.247.0001 WWW: www.jajones.com		DATE: _____ SCALE: 1"=200' SHEET: 5 OF 19 C-5
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA		APPROVED BY: _____ DATE: 3/00
PLAN INDEX AND LEGEND		REVISIONS 1 PRE-CONSTRUCTION 3/00



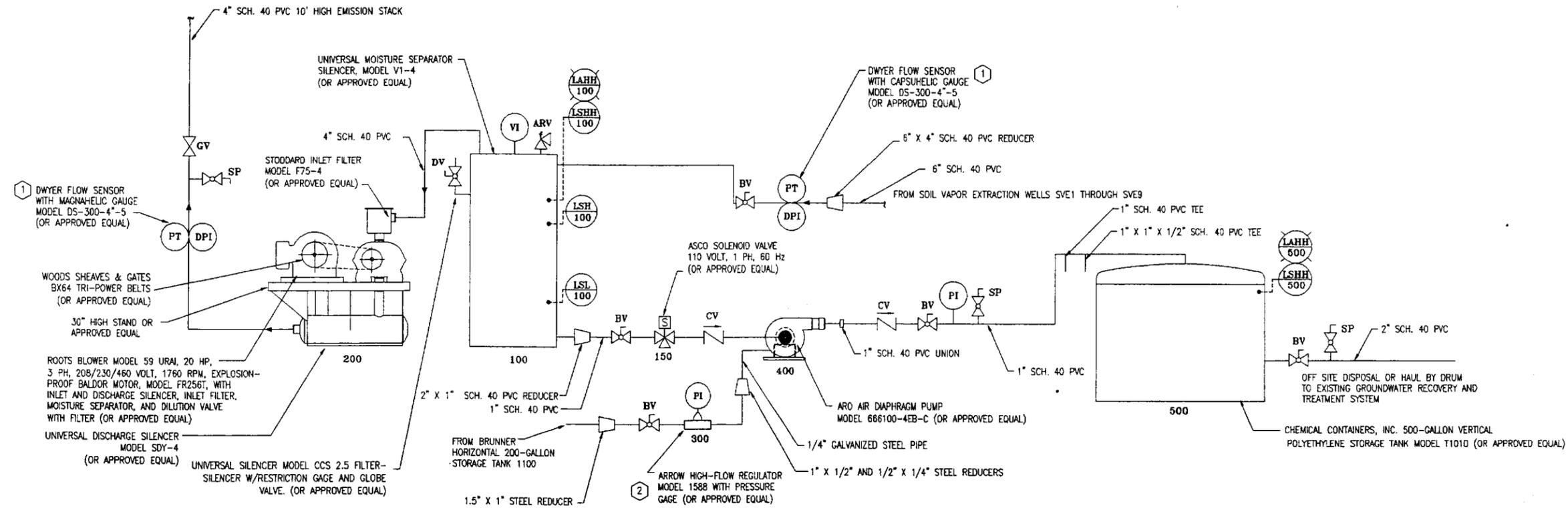
AREA 1



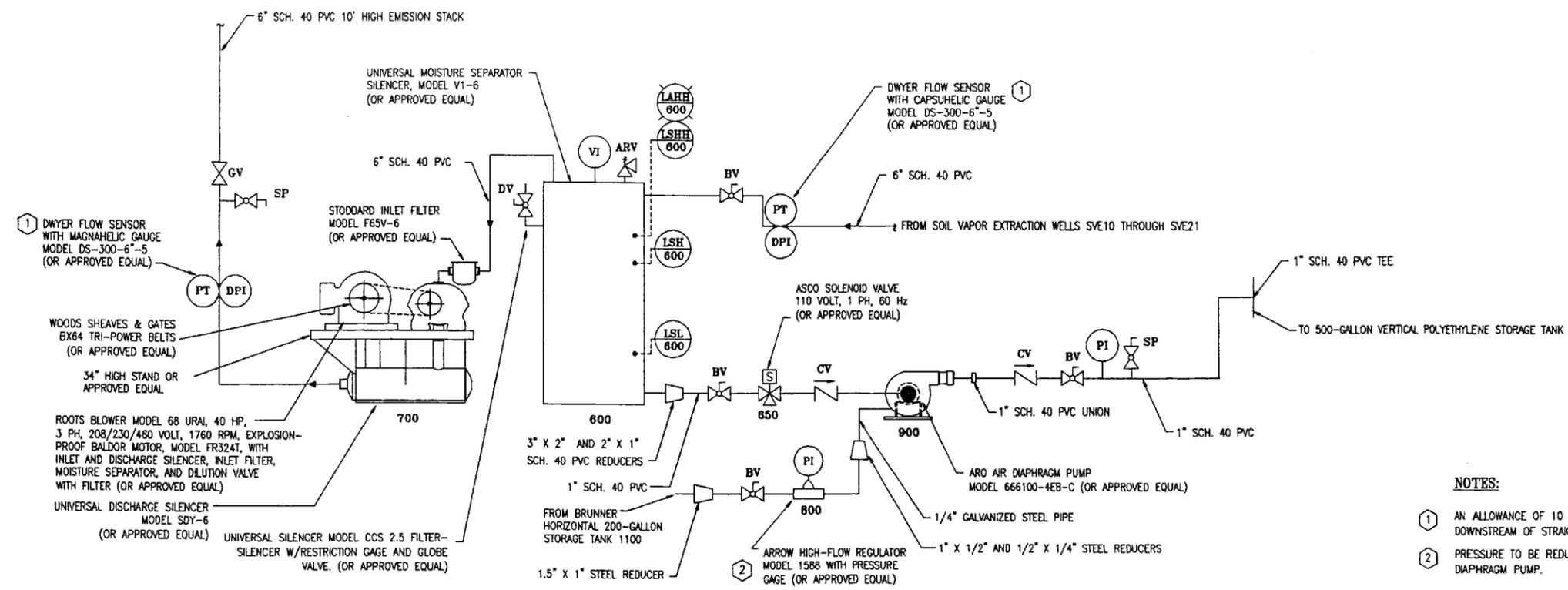
- A/B/C/D/E INDICATES E-INCH DIAMETER SDR11 HDPE AIR SPARGE PIPE (MULTIPLE PIPE RUNS DESIGNATED BY E;E;E)
- D INDICATES D-INCH DIAMETER SDR11 HDPE SOIL VAPOR EXTRACTION PIPE (MULTIPLE PIPE RUNS DESIGNATED BY D;D;D)
- C INDICATES C-INCH DIAMETER AIR PRO HDPE PIPE
- B INDICATES B-INCH DIAMETER BUNA-N PRODUCT HOSE (MULTIPLE PIPE RUNS DESIGNATED BY B;B;B)
- A INDICATES A-INCH DIAMETER SDR11 HDPE HORIZONTAL BORING CONTAINMENT PIPE.

<p><b>J.A. JONES</b> SERVICES CORPORATION JACKSONVILLE, FLORIDA A/E CONTRACT NO. N62470-93-D-3033</p>		<p>DATE: 3/00</p> <p>APPROVED BY:</p>						
<p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FINAL PRE-CONSTRUCTION</td> <td></td> </tr> </tbody> </table>		NO.	DESCRIPTION	DATE	1	FINAL PRE-CONSTRUCTION		
NO.	DESCRIPTION	DATE						
1	FINAL PRE-CONSTRUCTION							
<p>DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND NAVAL STATION ATLANTIC DIVISION NORFOLK, VIRGINIA</p> <p>RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3986 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA</p> <p>TREATMENT SYSTEM AND UTILITY PLAN - AREA 1</p>								
<p>CODE ID. NO. 60091 SIZE B</p> <p>SCALE: 1"=50'</p> <p>EFD NO.</p> <p>STA. PROJ. NO.</p> <p>SPEC. NO.</p> <p>CONSTR. CONTR. NO. N62470-93-D-3033</p> <p>NAVFAC DRAWING NO.</p>								
<p>SHEET 6 OF 19</p>								





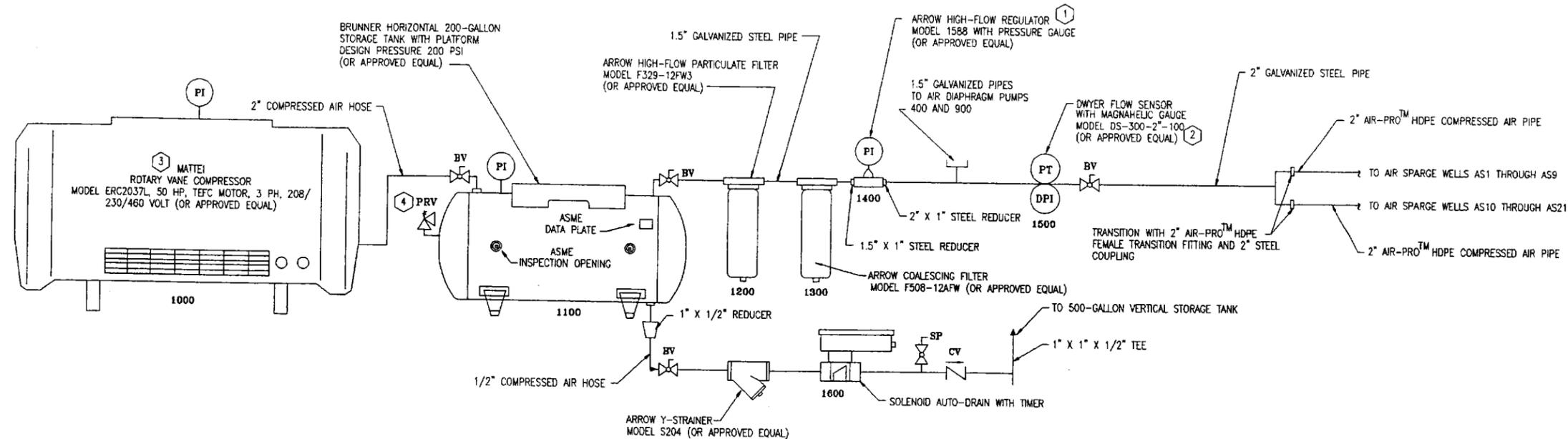
**SOIL VAPOR EXTRACTION LINE NO. 1 PIPING AND INSTRUMENTATION DIAGRAM**  
NOT TO SCALE



**SOIL VAPOR EXTRACTION LINE NO. 2 PIPING AND INSTRUMENTATION DIAGRAM**  
NOT TO SCALE

- NOTES:**
- ① AN ALLOWANCE OF 10 PIPE DIAMETERS UPSTREAM AND 5 PIPE DIAMETERS DOWNSTREAM OF STRAIGHT PIPE RUN IS REQUIRED.
  - ② PRESSURE TO BE REDUCED TO 40 PSI IN THE AIR LINE TO THE AIR DIAPHRAGM PUMP.

<b>J.A. JONES</b> ENVIRONMENTAL SERVICES JACKSONVILLE, FLORIDA A/E CONTRACT NO. N62470-93-D-3033 ACTIVITY - SANITIZATION DATE									
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA SOIL VAPOR EXTRACTION SYSTEM PIPING AND INSTRUMENTATION DIAGRAMS	REVISIONS <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APPROVED BY</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FINAL PRE-CONSTRUCTION</td> <td>3/00</td> <td></td> </tr> </tbody> </table>	NO.	DESCRIPTION	DATE	APPROVED BY	1	FINAL PRE-CONSTRUCTION	3/00	
NO.	DESCRIPTION	DATE	APPROVED BY						
1	FINAL PRE-CONSTRUCTION	3/00							
SYMBOL 1 OFF SITE DISPOSAL OR HAUL BY DRUM TO EXISTING GROUNDWATER RECOVERY AND TREATMENT SYSTEM CHEMICAL CONTAINERS, INC. 500-GALLON VERTICAL POLYETHYLENE STORAGE TANK MODEL T1010 (OR APPROVED EQUAL)									
CODE ID. NO. 80061 SIZE B SCALE: N.T.S. EFD NO. STA. PROJ. NO. SPEC. NO. CONSTR. CONTR. NO. N62470-93-D-3033 NAVFAC DRAWING NO.									
SHEET 8 OF 19 C-8									



**AIR SPARGE PIPING AND INSTRUMENTATION DIAGRAM**  
NOT TO SCALE

**NOTES:**

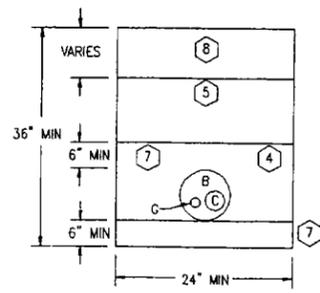
- ① PRESSURE TO BE REDUCED TO 60 PSI IN THE TREATMENT BUILDING.
- ② AN ALLOWANCE OF 10 PIPE DIAMETERS UPSTREAM AND 5 PIPE DIAMETERS DOWNSTREAM OF STRAIGHT PIPE RUN IS REQUIRED.
- ③ THE AIR COMPRESSOR CONTROL PANEL MOUNTED TO THE MATTEI AIR COMPRESSOR WILL BE REMOVED FROM THE AIR COMPRESSOR AND MOUNTED IN THE EXTERIOR TREATMENT SYSTEM CONTROL PANEL TO MEET CLASS 1, DIVISION 2 REQUIREMENTS.
- ④ PRESSURE RELIEF VALVE WILL BE RATED FOR 215 CFM AT 150 PSI.

<p><b>J.A. JONES</b> SERVICES JACKSONVILLE, FLORIDA DATE CONTRACT NO. N62470-93-D-3033</p>	<p>NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA</p>	<p>REVISIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APPROVED BY</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FINAL PRE-CONSTRUCTION</td> <td>3/00</td> <td></td> </tr> </tbody> </table>	NO.	DESCRIPTION	DATE	APPROVED BY	1	FINAL PRE-CONSTRUCTION	3/00		<p>SYMBOL</p>
NO.	DESCRIPTION	DATE	APPROVED BY								
1	FINAL PRE-CONSTRUCTION	3/00									
<p>DATE</p>	<p>DATE</p>	<p>DATE</p>	<p>DATE</p>								

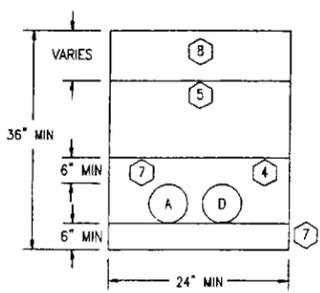
CODE (D. NO. 80091) SIZE B	SCALE: N.T.S.
EFD NO.	STA. PROJ. NO.
SPEC. NO.	CONSTR. CONTR. NO.
NAVAC DRAWING NO.	SHEET 9 OF 19



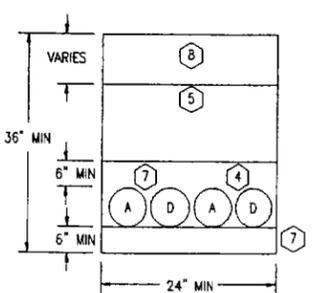




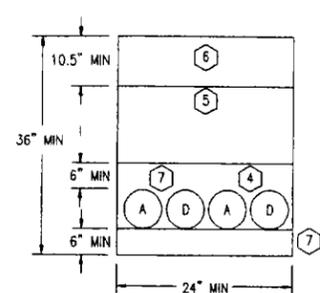
SECTION A-A'



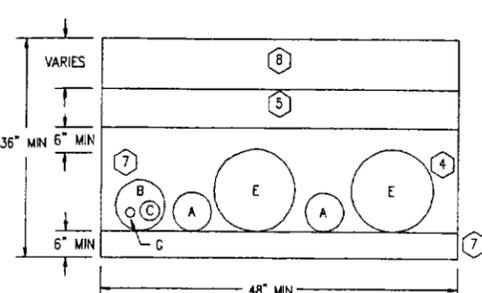
SECTION B-B'



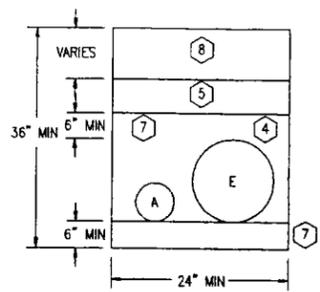
SECTION C-C'



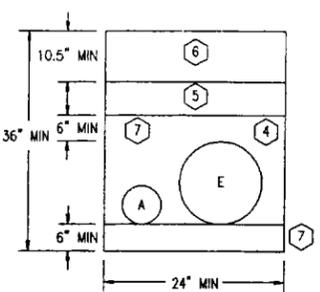
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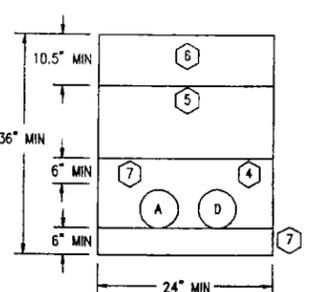
SECTION E-E'



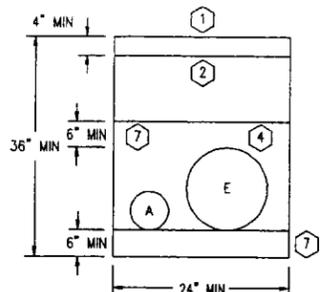
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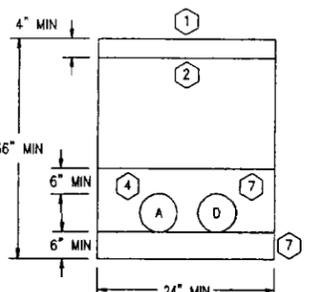
SECTION G-G'



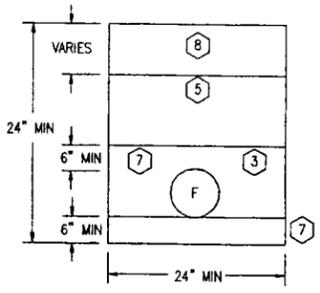
SECTION H-H'



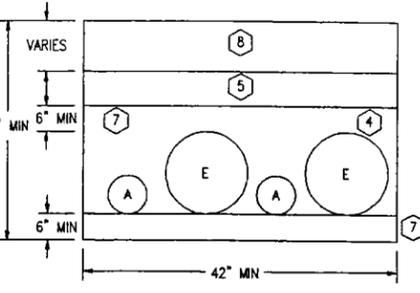
SECTION I-I'



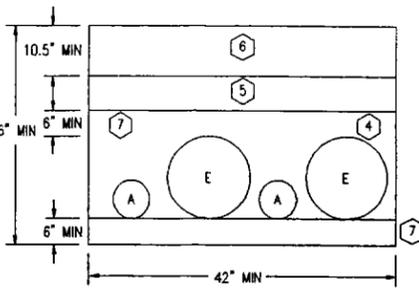
SECTION J-J'



SECTION K-K'



SECTION L-L'



SECTION M-M'

**PIPE LEGEND**

- A. 2" AIR-PRO™ HDPE COMPRESSED AIR PIPE
- B. 3" SDR11 HDPE CONTAINMENT PIPE
- C. 1" AIR-PRO™ HDPE COMPRESSED AIR PIPE
- D. 2" SDR11 HDPE PIPE
- E. 6" SDR11 HDPE PIPE
- F. 3.5" SDR11 HDPE ELECTRICAL CONDUIT
- G. 0.5" BUNA-N PRODUCT RECOVERY HOSE

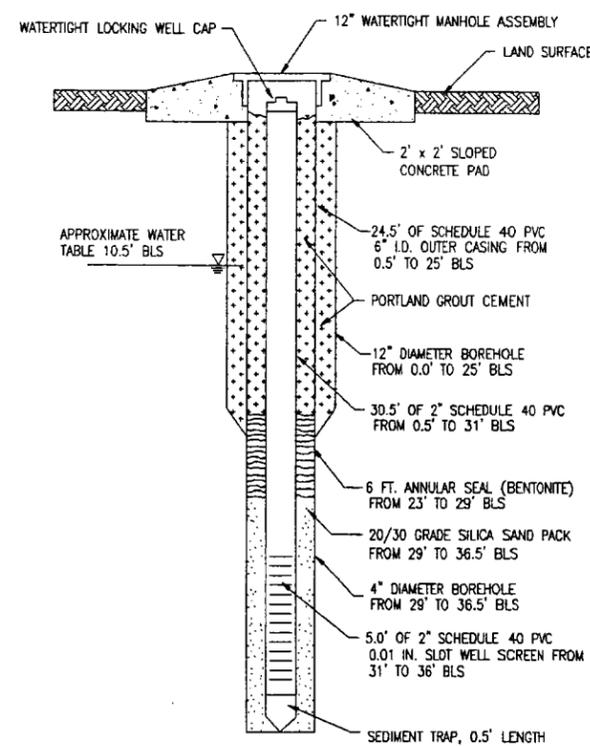
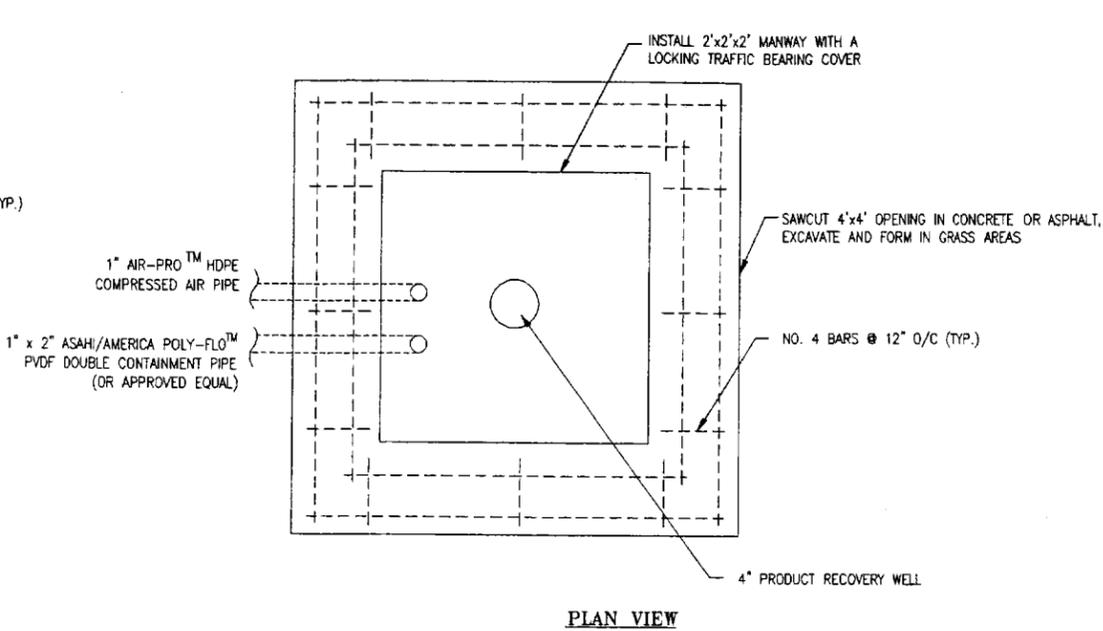
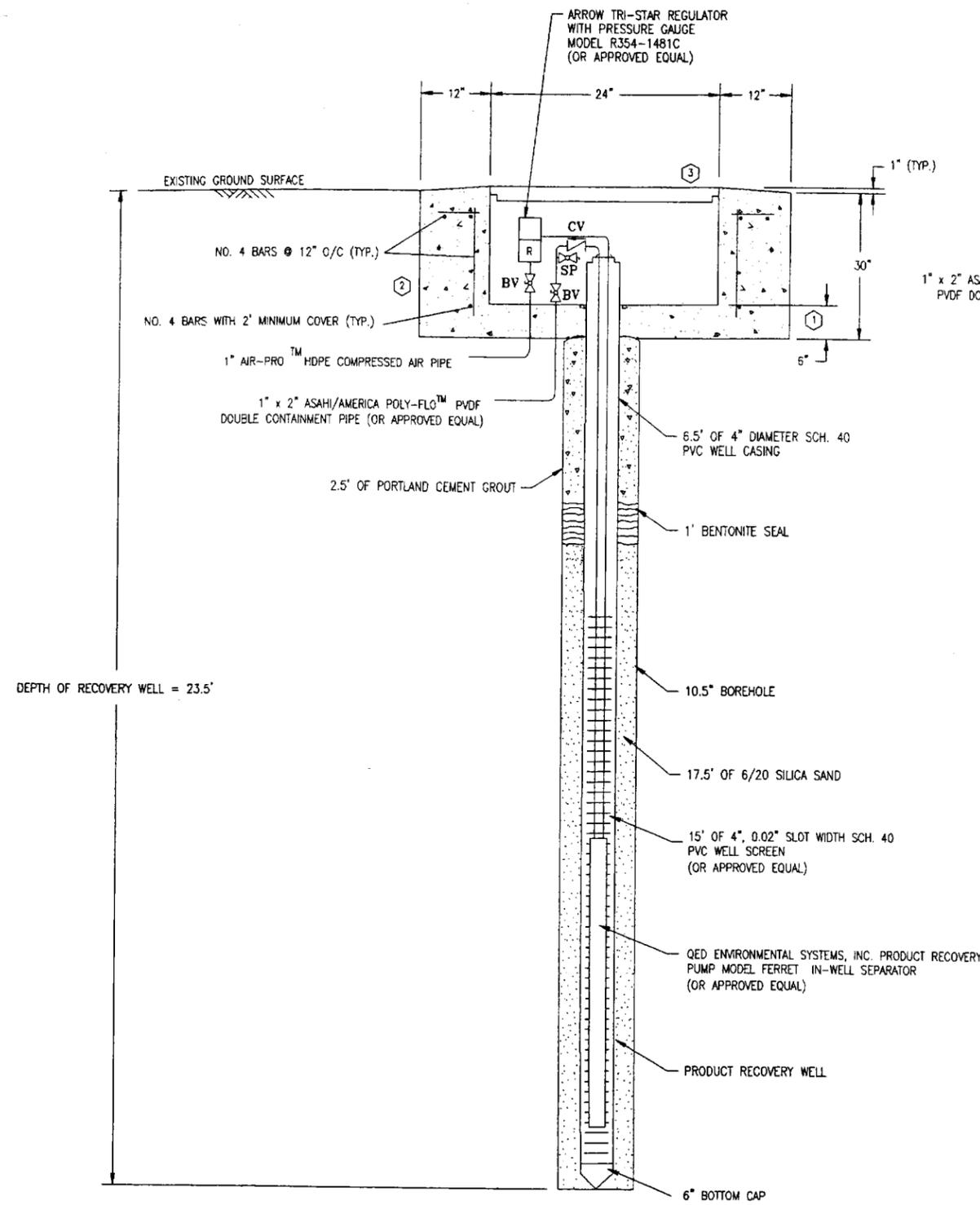
**NOTES:**

- ① MINIMUM 4" OF TOPSOIL. SEED WILL MATCH EXISTING VEGETATION.
- ② SOIL FILL MATERIAL WILL BE COMPACTED TO 85% OF ASTM D 698.
- ③ ELECTRICAL MARKER TAPE WILL BE PLACED 12 INCHES BELOW LAND SURFACE.
- ④ PIPES WILL BE SEPARATED BY A MINIMUM OF 1-1/2 TIMES PIPE DIAMETER.
- ⑤ SOIL FILL MATERIAL WILL BE COMPACTED TO 95% OF ASTM D 698.

- ⑥ MINIMUM 2.5" OF PRIME COAT AND BITUMINOUS COAT, FOLLOWED BY A MINIMUM 8" STONE BASE COURSE AGGREGATE, ABC LIMEROCK, MEETING THE GRADATION REQUIREMENTS OF NORTH CAROLINA DOT. THE LIMEROCK WILL BE COMPACTED TO 95% OF ASTM D 698.
- ⑦ COARSE SANDS AND GRAVELS WITH MAXIMUM PARTICLE SIZE OF 40mm (1.5 INCHES) INCLUDING VARIOUS GRADED SANDS AND GRAVELS CONTAINING SMALL PERCENTAGES OF FINES, GENERALLY GRANULAR AND NON-COHESIVE. SOIL TYPES GW, GP, SW AND SP ARE INCLUDED IN THIS CLASS AS SPECIFIED IN ASTM D2487. COMPACT TO 95% OF ASTM D 698 MAXIMUM DENSITY.
- ⑧ TYPE AND THICKNESS OF CONCRETE VARIES. CONCRETE AND SUBBASE WILL BE REPLACED TO MATCH EXISTING.

**PIPE TRENCH DETAILS**  
NOT TO SCALE

DATE	3/00	APPROVED BY	
SYMBOL	1	DESCRIPTION	FINAL PRE-CONSTRUCTION
PROJECT NUMBER	N62470-93-D-3033		
DATE	1	DATE	
REVISIONS			
<b>J.A. JONES</b> CONSULTING ENGINEER 1000 W. BROADWAY JACKSONVILLE, FLORIDA 32202 A/E CONTRACT NO. N62470-93-D-3033 FACILITY - SANITARIUM THE DOT FOR THE CONTRACTOR			
DEPARTMENT OF THE NAVY <b>ATLANTIC DIVISION</b> NORFOLK, VIRGINIA <b>RAC ACTION FOR UST REMEDIAL ACTION</b> BUILDINGS 130 AND 3998 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA PIPE TRENCH DETAILS			
CODE ID. NO. 80091	SIZE	B	
SCALE:	N.T.S.		
EFD NO.			
STA. PROJ. NO.			
SPEC. NO.			
CONSTR. CONTR. NO.	N62470-93-D-3033		
NAVFAC DRAWING NO.			
SHEET	12	OF	19
C-12			



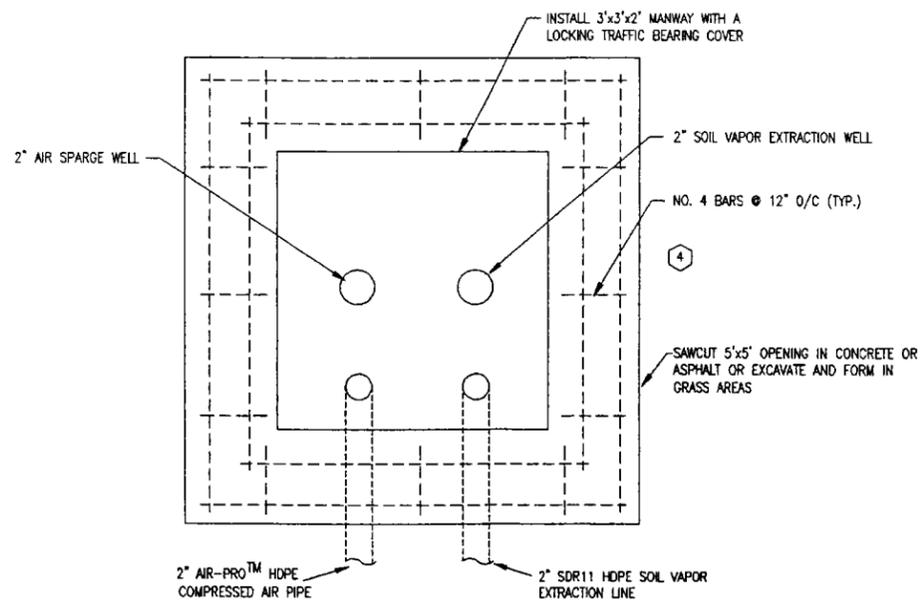
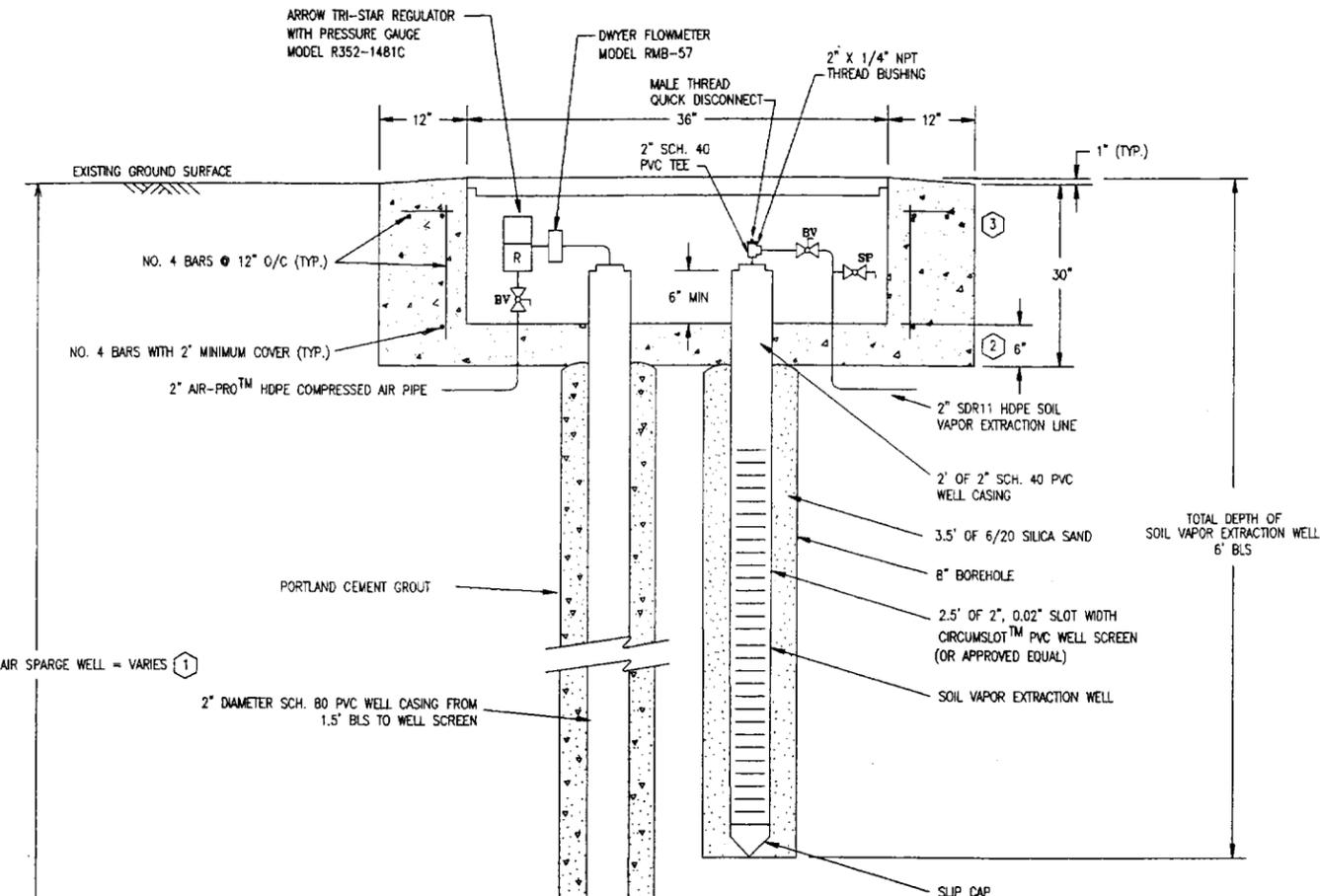
**PRODUCT RECOVERY WELL DETAILS**  
NOT TO SCALE

**MONITORING WELL DETAIL**  
NOT TO SCALE

- NOTES:**
- 1 MANWAY PLACED ON 6" BED OF CONCRETE.
  - 2 ALL CONCRETE SHALL BE 4000 PSI MINIMUM WITH 4-6% AIR ENTRAINMENT AND 4" MAXIMUM SLUMP.
  - 3 MANWAY WILL BE CAPABLE OF SUPPORTING AN AASHTO H-20 LIVE LOAD.

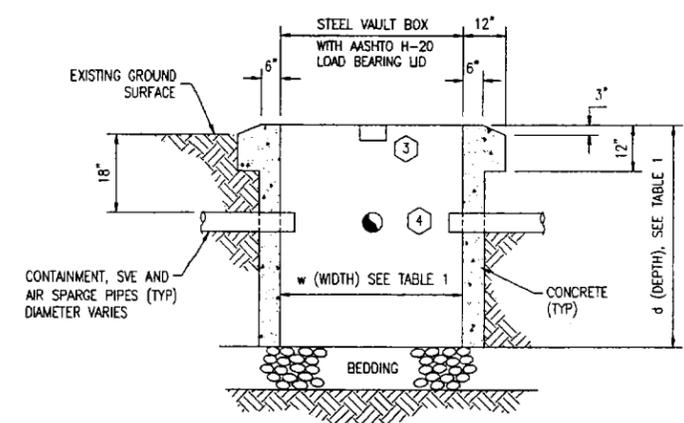
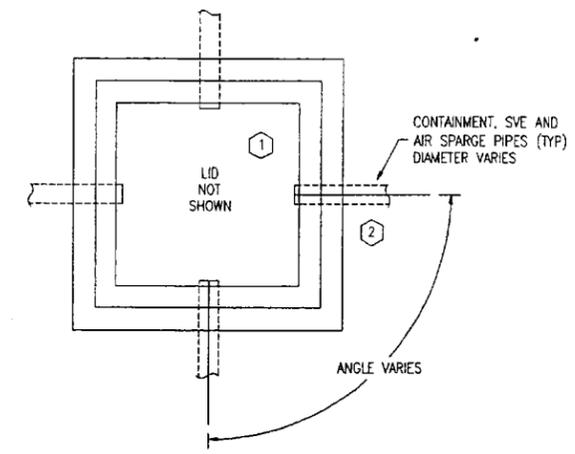
**NOTE:**  
DEPTH AND WELL SCREEN INTERVAL PLACEMENT FOR PROPOSED MONITORING WELLS MW01 THROUGH MW05 MAY BE MODIFIED IN THE FIELD DURING INSTALLATION BASED ON GROUNDWATER TABLE ELEVATION.

<p><b>J.A. JONES</b> SERVICES JACKSONVILLE, FLORIDA A/E CONTRACT NO. N62470-93-D-3033</p>	
<p>DEPARTMENT OF THE NAVY NAVAL STATION ATLANTIC DIVISION RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA</p>	<p>NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA PROJECT NAME PROJECT NUMBER PERMIT NUMBER QUALITY CONTROL REVISION NUMBER</p>
<p>CODE ID. NO. 80091 SCALE: N.T.S.</p>	<p>DATE: 3/00 APPROVED BY:</p>
<p>SHEET 13 OF 19</p>	<p>REVISIONS</p>



VAULT SCHEDULE  
TABLE 1

VAULT DESIGNATION	VAULT BEARING DESIGN LOAD	VAULT WIDTH FEET	VAULT DEPTH FEET
JB1	AASHTO H20	3	3
JB2	AASHTO H20	3	3
JB3	AASHTO H20	3	3
JB4	AASHTO H20	4	4
JB5	AASHTO H20	4	4
JB6	AASHTO H20	4	4
JB7	AASHTO H20	4	4
JB8	AASHTO H20	4	4
JB9	AASHTO H20	3	3



- NOTES:
- 1 NUMBER OF CONTAINMENT, SVE, AND AIR SPARGE PIPES CONNECTED TO JUNCTION BOX VARIES BETWEEN TWO AND FIVE.
  - 2 PROVIDE 6" MIN CLEARANCE FROM CONTAINMENT, SVE AND AIR SPARGE PIPES TO ADJACENT INSIDE VAULT WALL.
  - 3 ALL WELL VAULTS/JUNCTION BOXES WILL HAVE HYDRAULICALLY-ASSISTED LIDS.
  - 4 REFER TO SHEET C-14 DETAIL 'D' FOR WELL CONFIGURATION.

- NOTES:
- 1 DEPTHS OF AIR SPARGE WELLS VARY. WELL SCREEN TO BE PLACED TO THE TOP OF YORKTOWN FORMATION. DEPTH TO YORKTOWN FORMATION RANGES FROM 33 TO 38 FT BLS.
  - 2 MANWAY PLACED ON 6" BED OF CONCRETE.
  - 3 ALL CONCRETE SHALL BE 4000 PSI MINIMUM WITH 4-6% AIR ENTRAINMENT AND 4" MAXIMUM SLUMP.
  - 4 MANWAY WILL BE CAPABLE OF SUPPORTING AN AASHTO H-20 LIVE LOAD.

**AIR SPARGE AND SOIL VAPOR EXTRACTION WELL PAIR DETAILS**  
NOT TO SCALE

**JUNCTION BOX NON-FLIGHTLINE AREAS**  
NOT TO SCALE

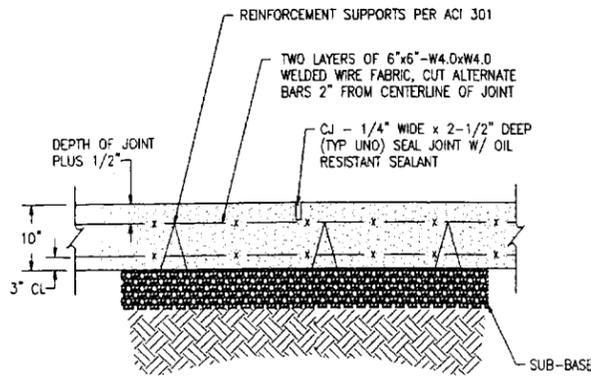
REVISIONS

NO.	DATE	DESCRIPTION	BY	APP. BY
1	3/00	FINAL PRE-CONSTRUCTION		

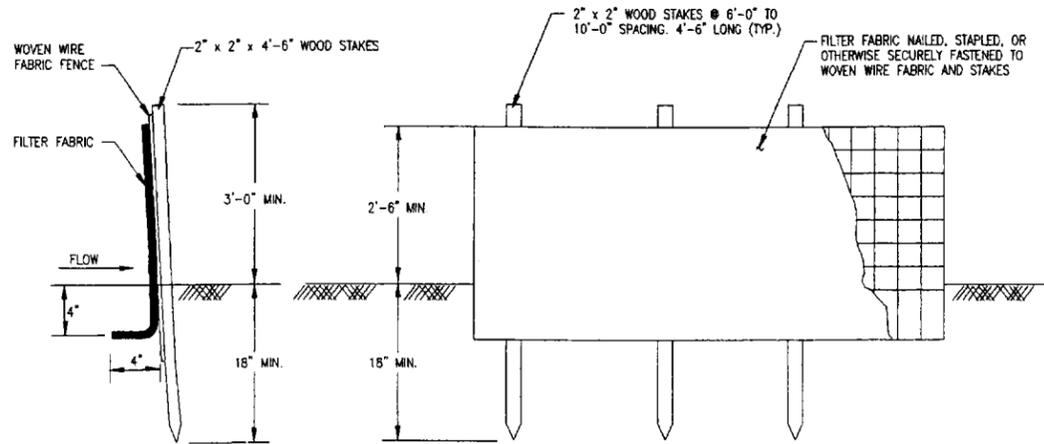
J.A. JONES  
ENGINEERING  
SERVICES  
JACKSONVILLE, FLORIDA  
PROJECT NUMBER: N62470-93-D-3033  
DATE: 03/00  
ACTIVITY: SUBSEQUENT TO  
FOR USE ON CONTRACT ONLY

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND  
ATLANTIC DIVISION  
RAC ACTION FOR UST REMEDIAL ACTION  
BUILDINGS 130 AND 9996  
MARINE CORPS AIR STATION  
CHERRY POINT, NORTH CAROLINA  
AIR SPARGE AND SOIL VAPOR EXTRACTION WELL PAIR AND JUNCTION BOX DETAILS

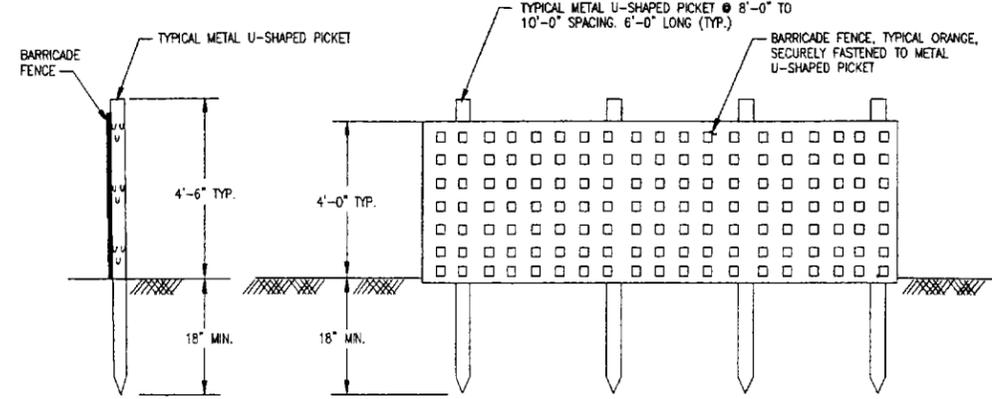
CODE ID NO. 80091 | SIZE: B  
SCALE: N.T.S.  
EFD NO.  
STA. PROJ. NO.  
SPEC. NO.  
CONSTR. CONTR. NO. N62470-93-D-3033  
NAVFAC DRAWING NO.  
SHEET 14 OF 19  
C-14



NOTE:  
SUB-BASE SHALL CONFORM TO ASTM D1241-66 (1989), TYPE 1, GRADATION B AND SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR PER ASTM D1557-91. THICKNESS SHALL BE A MINIMUM OF 8".



SECTION ELEVATION

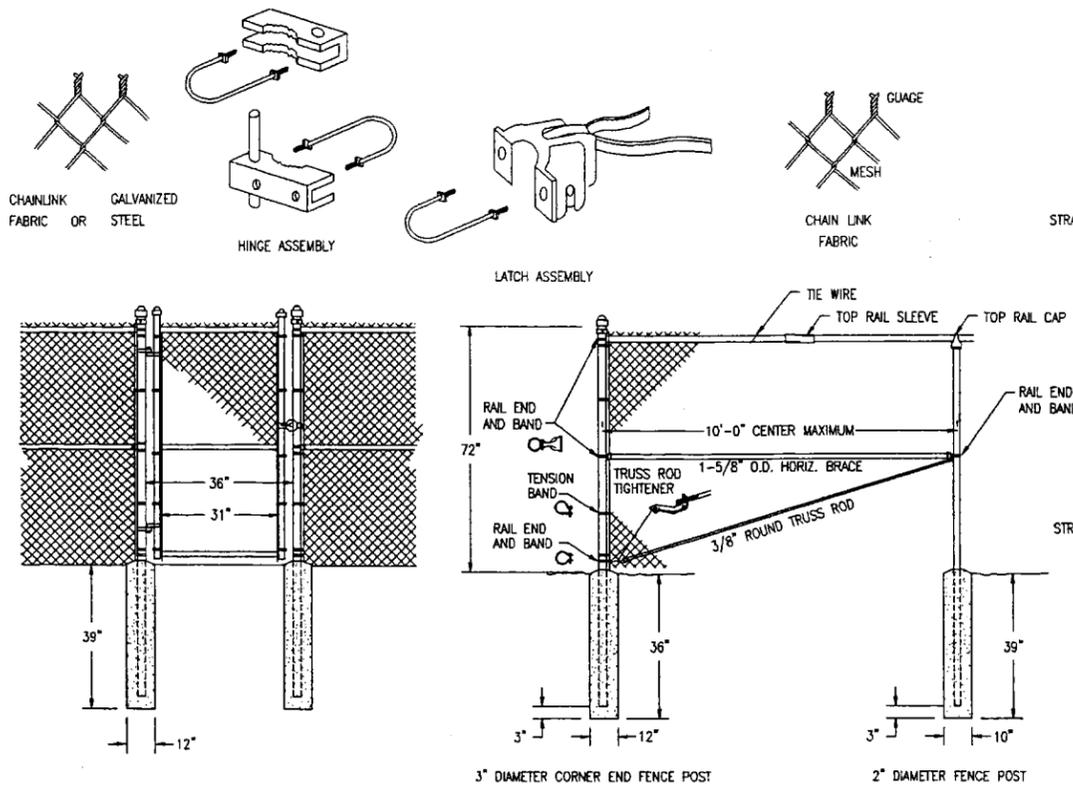


SECTION ELEVATION

E CONCRETE PLACEMENT DETAIL NOT TO SCALE

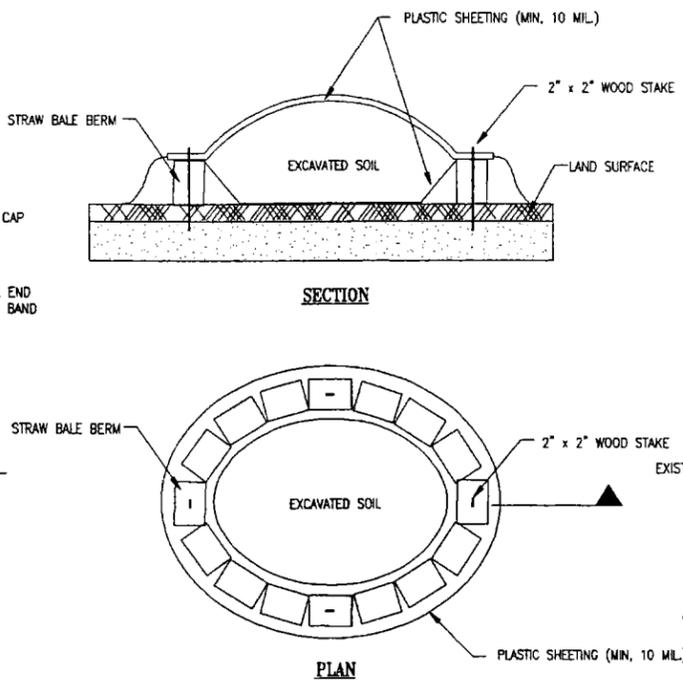
F STAKED SILT FENCE DETAIL NOT TO SCALE

G BARRICADE FENCE DETAIL NOT TO SCALE

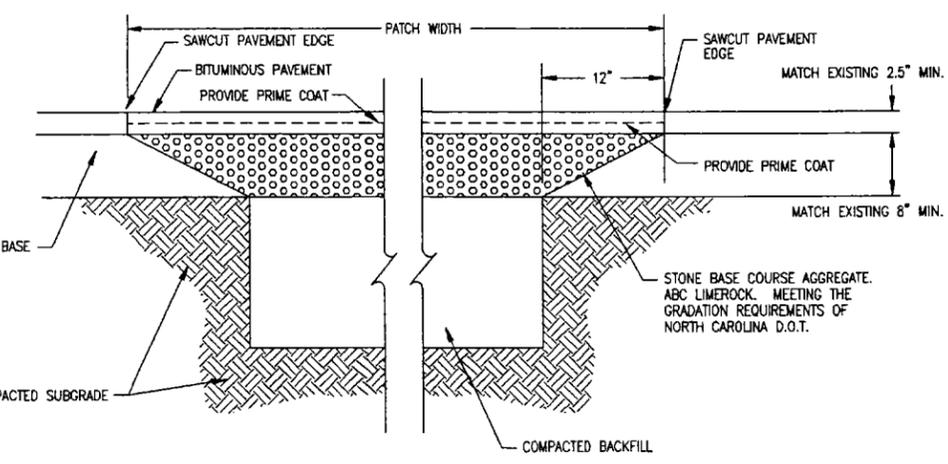


H SINGLE SWING GATE DETAIL NOT TO SCALE

I CHAIN-LINK FENCE DETAIL NOT TO SCALE

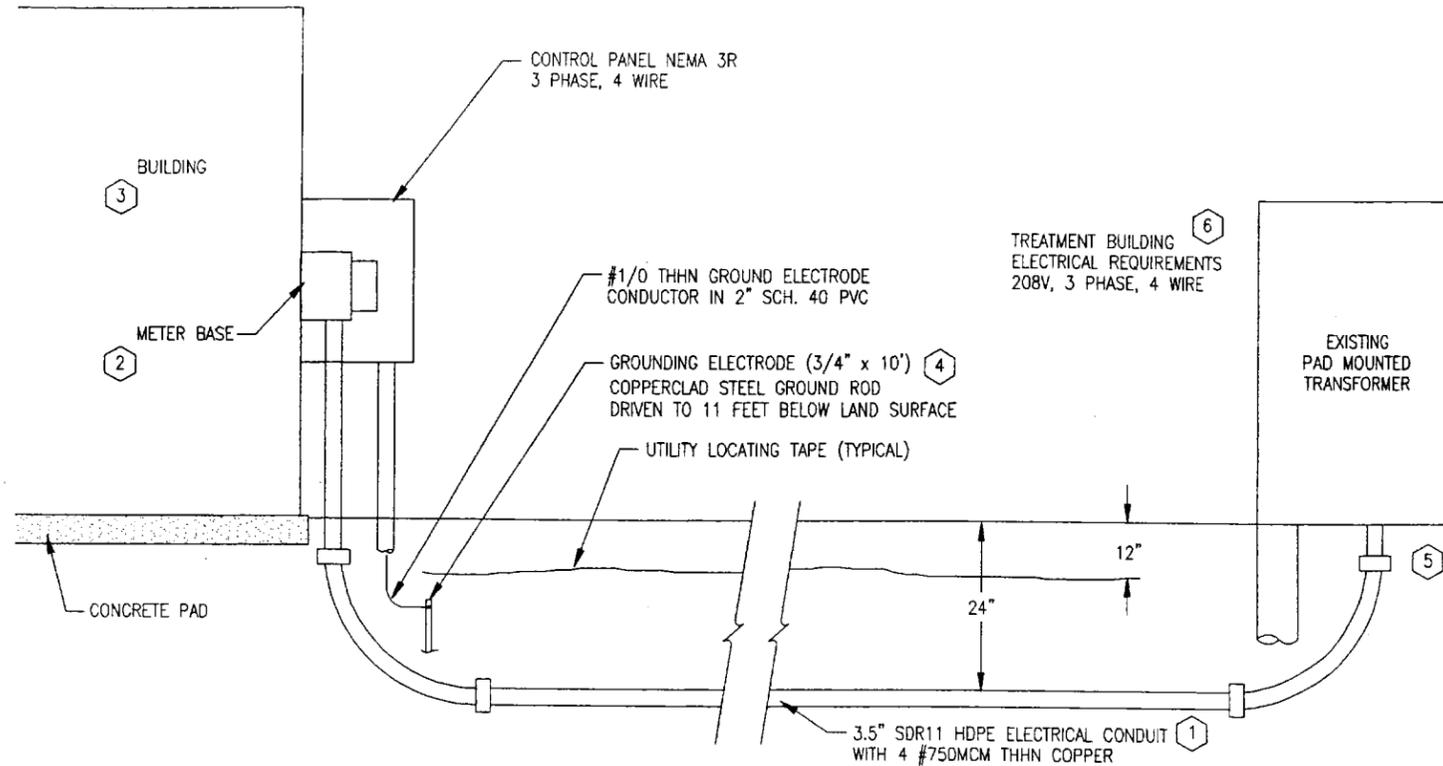


J TEMPORARY CONTAINMENT OF EXCAVATED SOIL DETAIL NOT TO SCALE



K PAVEMENT REPAIR DETAIL NOT TO SCALE

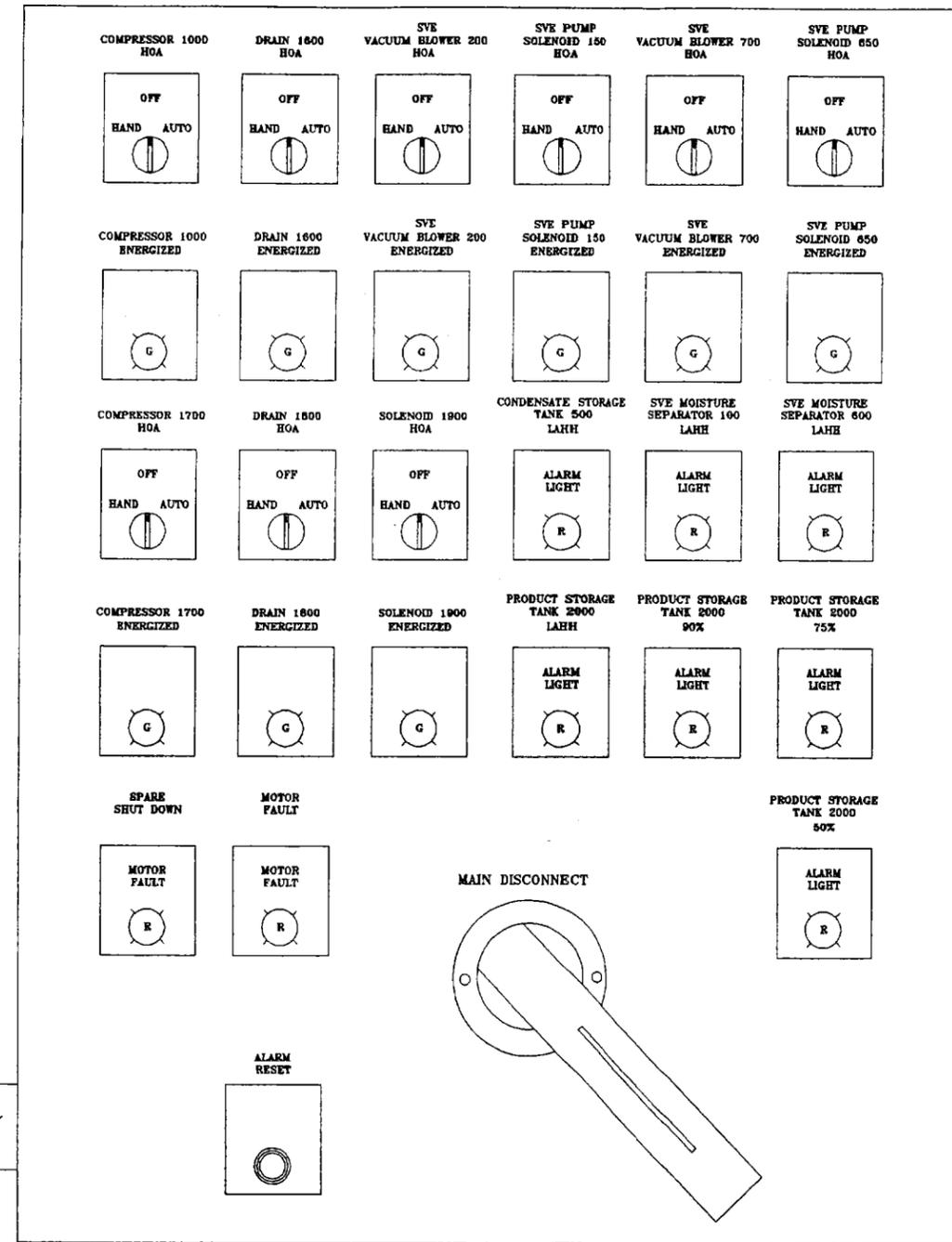
DESIGNED BY	CHECKED BY	DATE	APPROVED BY
PROJECT MANAGER	PROJECT ENGINEER	DATE	DATE
SYMBOL	DESCRIPTION	DATE	DATE
1	FINAL PRE-CONSTRUCTION	3/00	
REVISIONS			
J.A. JONES SERVICES, INC. JACKSONVILLE, FLORIDA A/E CONTRACT NO. N62470-93-D-3033 ACTIVITY - SANITIZATION IS			
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NORFOLK, VIRGINIA NAVAL STATION RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 9996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA MISCELLANEOUS DETAILS			
CODE ID NO.	80091	SIZE	B
SCALE:	N.T.S.		
EFD NO.			
STA. PROJ. NO.			
SPEC. NO.			
CONSTR. CONTR. NO.	N62470-93-D-3033		
NAVFAC DRAWING NO.			
SHEET 15 OF 19			
C-15			



**POWER SUPPLY CONNECTION DETAIL**  
NOT TO SCALE

**NOTES:**

- 1 TRENCH TO EXISTING PAD MOUNTED TRANSFORMER AND PROVIDE CONDUIT AND SECONDARY CONDUCTORS. ELECTRICIANS WILL PLACE AND PROVIDE SERVICE CONNECTIONS TO SECONDARY TRANSFORMER. COORDINATE SERVICE CONNECTION WITH BASE UTILITIES.
- 2 METER AND METER BASE WILL BE PROVIDED BY ELECTRICIAN.
- 3 SOIL AND GROUNDWATER TREATMENT EQUIPMENT ENCLOSURE SHALL BE A SELF CONTAINED UNIT COMPLETE WITH EXTERIOR PANELBOARD AND CONTROLS. INTERIOR OF SOIL AND GROUNDWATER TREATMENT ENCLOSURE IS A CLASS 1 DIVISION 2, GROUP D LOCATION.
- 4 USE ADDITIONAL GROUND RODS, WHEN REQUIRED, TO OBTAIN RESISTANCE VALUE, AS SPECIFIED. GROUNDING REQUIREMENTS SHALL BE IN ACCORDANCE WITH NEC GUIDELINES.
- 5 CONDUIT ROUTED INTO SECONDARY COMPARTMENT OF EXISTING PAD MOUNTED TRANSFORMER.
- 6 FIELD POWER SHALL BE FIELD VERIFIED BY ELECTRICIAN.



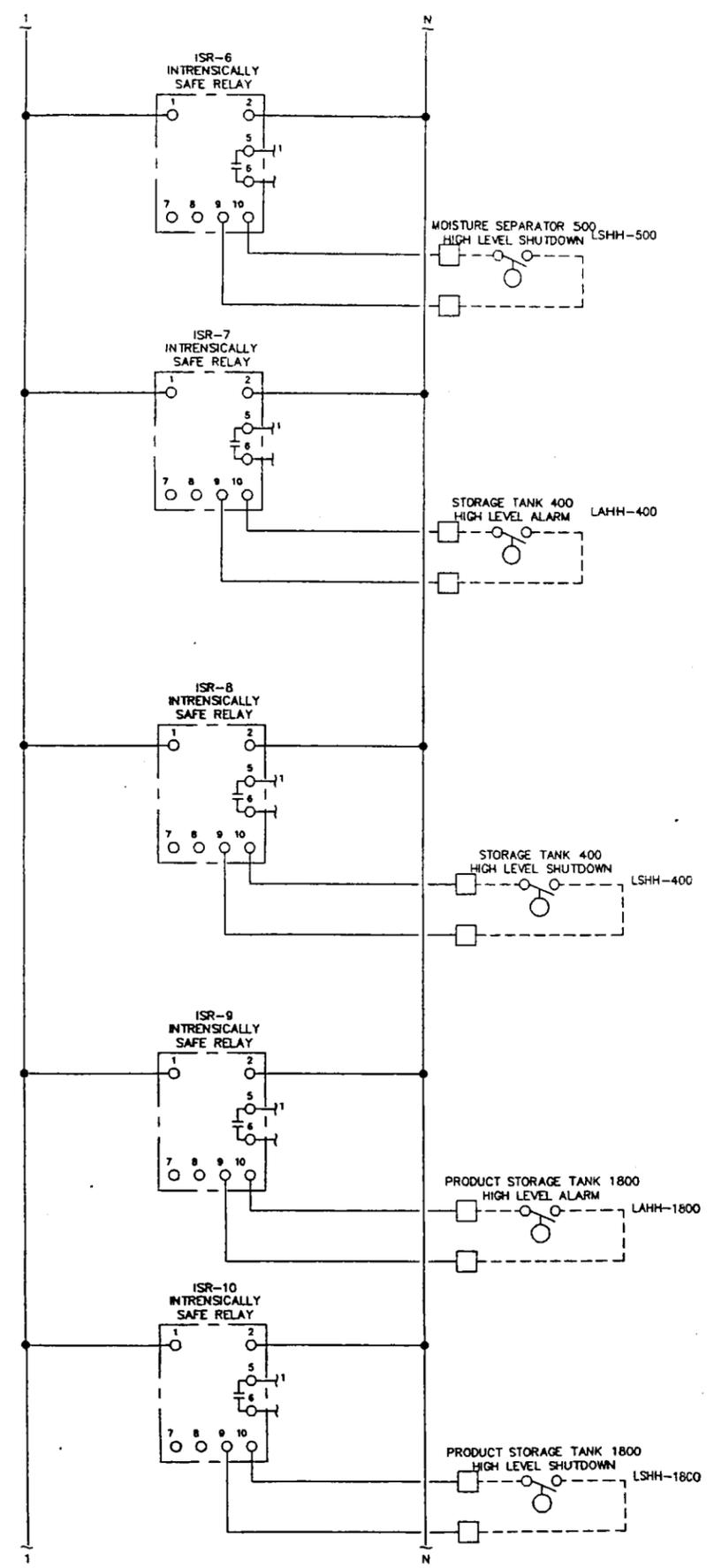
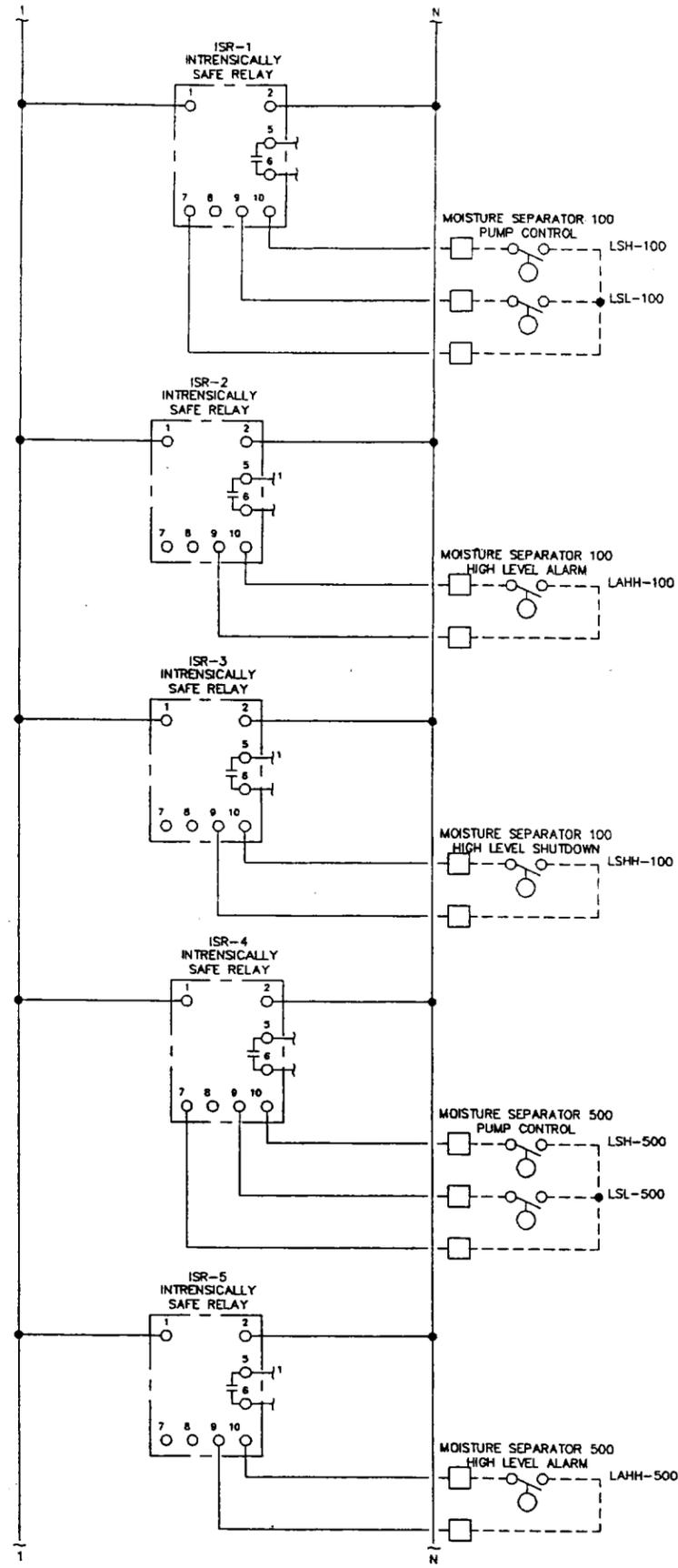
**CONTROL PANEL DETAIL**  
NOT TO SCALE

**NOTES:**

- 1 500 AMP CONTROL PANEL WILL BE UL LISTED AND CERTIFIED FOR USE AS A SERVICE ENTRANCE.

<p>DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NAVAL STATION RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA</p>		<p>NAVY ENGINEER PROJECT MANAGER QUALITY CONTROL CHECK MANAGER DESIGN MANAGER</p>		<p>REVISIONS</p> <table border="1"> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> <tr> <td>1</td> <td>FINAL PRE-CONSTRUCTION</td> <td>3/00</td> </tr> </table>		NO.	DESCRIPTION	DATE	1	FINAL PRE-CONSTRUCTION	3/00
NO.	DESCRIPTION	DATE									
1	FINAL PRE-CONSTRUCTION	3/00									
<p>J.A. JONES SERVICE CENTER JACKSONVILLE, FLORIDA NAVFAC CONTRACT NO. N62470-93-D-3033 ACTIVITY - BENTLEYVILLE TO THE NAVAL FACILITIES ENGINEERING COMMAND</p>		<p>POWER SUPPLY CONNECTION AND CONTROL PANEL DETAILS</p>									
<p>NAVFAC DRAWING NO.</p>		<p>CONSTR. CONTR. NO. N62470-93-D-3033</p>		<p>SHEET 16 OF 19</p>							
<p>SCALE: N.T.S.</p>		<p>E-1</p>									





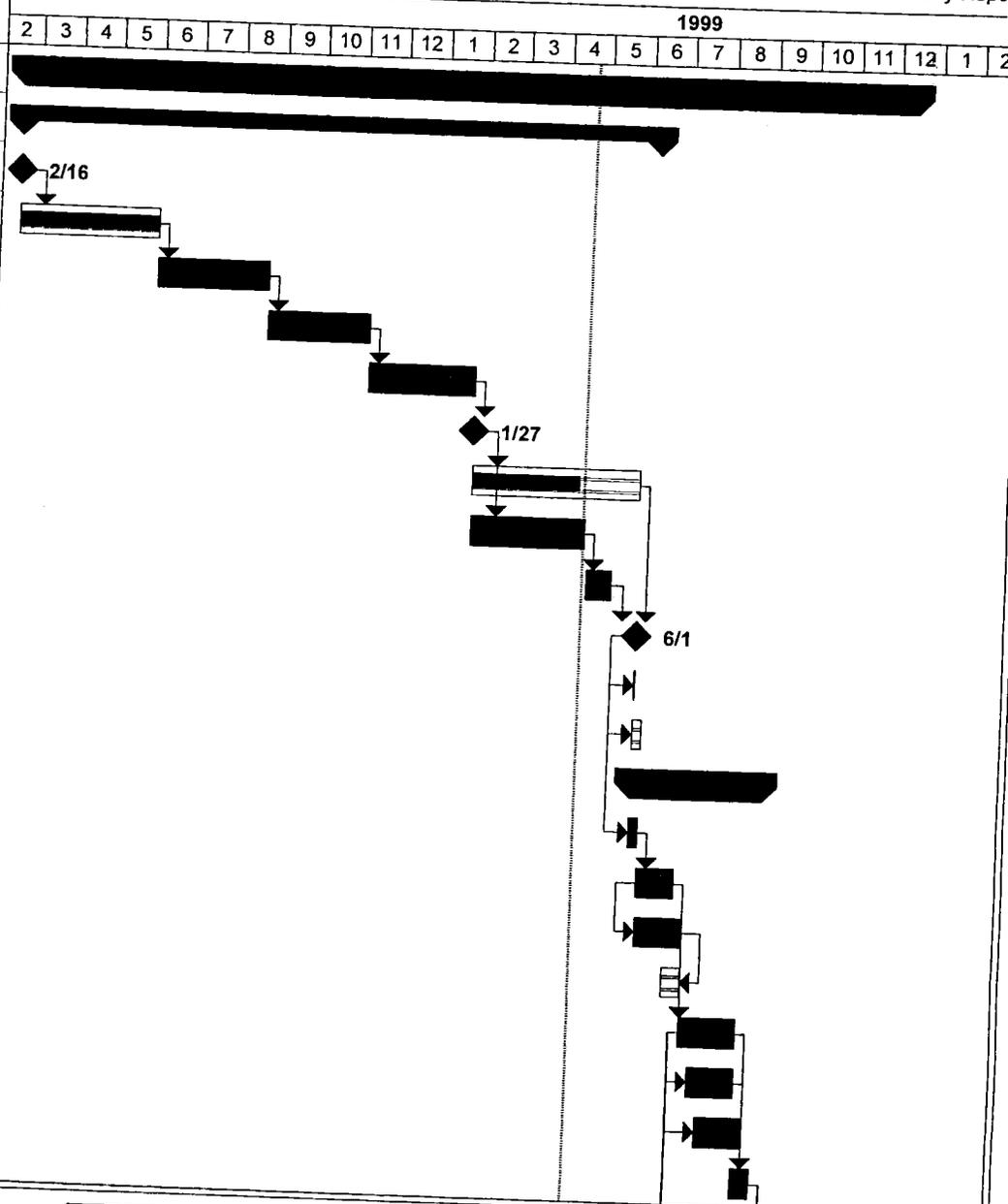
		<b>J.A. JONES</b> ELECTRICAL SERVICES JACKSONVILLE, FLORIDA A/E CONTRACT NO. NG2470-93-D-3033		APPROVED BY DATE
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND NAVAL STATION <b>ATLANTIC DIVISION</b> NORFOLK, VIRGINIA RAC ACTION FOR UST REMEDIAL ACTION BUILDINGS 130 AND 3996 MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA ELECTRICAL LINE DIAGRAM AND SYSTEM CONTROL LOGIC		REVISIONS SYMBOL DESCRIPTION DATE		APPROVED BY DATE
CODE ID. NO. 80091(SIZE D) SCALE: N.T.S. EFD NO. STA. PROJ. NO. SPEC. NO. CONSTR. CONTR. NO. N62470-93-D-3033 NAVFAC DRAWING NO.		SHEET 19 OF 20 E-3		APPROVED BY DATE

**APPENDIX A**

---

**CONSTRUCTION SCHEDULE**

ID	Task Name	Dur	Start	Finish
1	D.O. #0045 - Bldg 130, MCAS Cherry Point	477 d	2/16/99	12/13/00
2	Mobilization and Preparatory Work	342 d	2/16/99	6/7/00
3	Award of Work	0 d	2/16/99	2/16/99
4	Prepare Initial Work Plan	75 d	2/16/99	5/31/99
5	Gov't. Review of Work Plan	60 d	6/1/99	8/23/99
6	Treatment System Design Modification	55 d	8/24/99	11/8/99
7	Request State Approval of System Design	58 d	11/9/99	1/27/00
8	Receive Gov't. Comments on Work Plan	0 d	1/27/00	1/27/00
9	Procurement	89 d	1/28/00	5/31/00
10	Prepare Final Work Plan	61 d	1/28/00	4/21/00
11	Gov't. Review/Approval of Final Work Plan	15 d	4/24/00	5/12/00
12	Mobilization	0 d	6/1/00	6/1/00
13	Preconstruction Conference	1 d	6/1/00	6/1/00
14	Setup/Construct Temp Facilities	5 d	6/1/00	6/7/00
15	Air Sparge, VES, Free Product Line Installation	70 d	6/1/00	9/6/00
16	Silt Fence Installation	5 d	6/1/00	6/7/00
17	Well Drilling	20 d	6/8/00	7/5/00
18	Handling of Cuttings/Water	25 d	6/8/00	7/12/00
19	Asphalt and Concrete Demolition	10 d	6/29/00	7/12/00
20	Trenching Activities	30 d	7/13/00	8/23/00
21	Piping Installation Activities	25 d	7/20/00	8/23/00
22	Transp/Disposal Activities	25 d	7/27/00	8/30/00
23	Site Restoration Activities	10 d	8/24/00	9/6/00



Project: D.O. #0045  
Date: 4/20/00

Task		Summary		External Tasks	
Critical		Rolled Up Task		Project Summary	
Progress		Rolled Up Milestone		Split	
Milestone		Rolled Up Progress		Rolled Up Split	



**APPENDIX B**

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**EROSION AND SEDIMENT CONTROL PLAN**

## **1.0 INTRODUCTION**

### **1.1 PROJECT DESCRIPTION**

The work scope includes the construction of a soil and groundwater treatment system for two sites. The Building 130 site will consist of eighteen air sparge wells, eighteen vertical SVE wells, and eight product recovery wells; the Building 3996 site will have eighteen air sparge wells and twenty vertical SVE wells. The sites will also have combined system start-up and operation and maintenance activities.

### **1.2 EXISTING SITE CONDITIONS**

Topography at the work site is mainly flat. Building 130 is the site of an aircraft hanger for seaplanes and is located northeast of and adjacent to Sixth Avenue. Building 3996 is located southwest of and adjacent to "A" Street.. Asphalt roads and concrete curbs and sidewalks will need to be traversed in order to construct the treatment system.

### **1.3 ADJACENT AREAS**

Since the project site is located within the boundaries of the Cherry Point, MCAS, the adjacent areas are generally well developed with large paved areas consisting of access roads, buildings, parking areas, and military support facilities.

### **1.4 OFF-SITE AREAS**

The construction activities associated with this project will generate excess excavated soil and some asphalt and concrete debris. The soil will be sampled and analyzed for hydrocarbon constituents and subsequently recycled, treated, or disposed of in accordance with applicable federal, state, and local regulations.

### **1.5 SOILS**

Soil drillings have been performed at the work site as part of the site characterization studies. Lithologic logs prepared for the site can be found in the Basis of Design prepared by Law. These logs indicate the subject area is generally underlain by a lithology which varies from silty sand to clayey sand.

### **1.6 CRITICAL AREAS**

The site has many drainage ditches and culverts which could ultimately allow for erosion and sediment migration. Therefore, silt fencing will be used to control erosion and to prevent soil material from reaching the protected surface water body. Because of the large area of the project, consideration as to the most appropriate location of silt fences on the site during the phases of construction will be continually evaluated.

## **1.7 EROSION AND SEDIMENT CONTROL MEASURES**

Unless otherwise indicated, all vegetative and structural erosion control measures will be constructed and maintained in a manner which meets the intent of the minimum standards defined under North Carolina Erosion and Sediment Control Regulations.

### **2.0 STRUCTURAL PRACTICES**

#### **2.1 SILT FENCE BARRIER**

Silt fences will be erected in the appropriate locations surrounding the construction areas for the Buildings 130 and 3996 site. Weather conditions will be taken into consideration for other areas which may be affected by open trenches and soil stockpiles. Silt fence will be installed when rain or wind indicate possible off site migration of soil material. Silt fence barriers and straw hay bales will be available at the work site in the event unforeseen circumstances warrant the use of sediment control measures. A detail of the staked silt fence installation is provided as Detail J, **Figure C-16**.

#### **2.2 STORM DRAIN INLET PROTECTION**

Storm drains located within the drainage areas of the construction sites will be protected from sediment laden waters by use of filter fabric in grassy areas and stone filter covers along paved access road gutters.

### **3.0 REVEGETATION PROCEDURES**

Straw or hay mulch will be applied to reseeded areas to reduce gully erosion and promote seed germination.

### **4.0 MANAGEMENT STRATEGIES**

The following erosion and sediment control management strategies will be maintained during project activities.

- The Project Superintendent will be responsible for the installation and maintenance of the erosion and sediment control features.
- Erosion and sediment control features will be installed as the first step of construction operations.
- Seeding and stabilization will follow immediately after final grading is completed. After achieving adequate stabilization, the erosion and sediment control features will be removed.

- Asphalt and concrete will be restored once the installation and testing of all the pipes has been completed. Soil stockpiles will be covered to reduce chances of blowing soil.

**APPENDIX C**

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**TRANSPORTATION AND DISPOSAL PLAN**

## **1.0 OFF-SITE WASTE DISPOSAL**

### **1.1 WASTE IDENTIFICATION AND DOCUMENTATION**

J.A. Jones will review waste analyses and any historical information for each waste type to facilitate the preparation of manifest packages for submittal to the ROICC or the EAD representative. Because contaminants identified at the site are attributable to petroleum contamination, it is anticipated that no hazardous waste will be generated during on site project activities since it is unlikely that any hydrocarbon-impacted material removed from the site will meet the definition of a characterized hazardous waste in accordance with 40 CFR Part 261. However, the NTR will be notified under the unlikely event hazardous waste is generated during project activities.

If hazardous waste is generated at the site, then J.A. Jones will use the specific provisions outlined in 40 CFR Parts 261, 262, 268, 302, and 49 CFR Part 172, to evaluate waste streams for characteristic and listed wastes, proper shipping codes, and appropriate disposal methods. The complete manifest package (waste manifests, waste profile sheets, analytical results, and other shipping information) will be certified by the on site regulatory specialist before wastes are transported off the MCAS. J.A. Jones will submit the completed manifest package for generator designation, review, and approval. No hazardous wastes will be transported without approval and manifest signature from the EAD representative.

### **1.2 SELECTION OF OFF-SITE TRANSPORTER AND TREATMENT AND DISPOSAL FACILITIES**

Waste material will not be transported off site until written approval to receive the waste has been provided by the selected treatment or disposal facility. Selection of the transporter and treatment or recycling facility will be based on the review of the received bid submittals. An EAD representative must sign a manifest for any waste which is transported from the Air Station.

#### **1.2.1 Transporter**

The selected transporter will haul any petroleum-impacted soil or water waste stream generated during the project to the selected treatment or recycling facility. If the waste is non-hazardous, a non-hazardous waste hauler may be selected. A non-hazardous waste hauler is not required to have a USEPA transportation identification number. USEPA identification numbers are required only for hazardous waste transportation companies.

#### **1.2.2 Treatment Facility**

Petroleum-impacted soil accumulated at the project site is will be hauled to a facility permitted to accept the petroleum-impacted soil. Petroleum-impacted groundwater accumulated at the project site is will be hauled to the IWTP for disposal in the OU1 Hotspot treatment train, with prior approval from EAD and FMD. Sediment and free phase product will be removed prior to treatment. Sediment will be stockpiled in the contaminated soil pile on the site for later sampling and disposal. Product will be deposited in the "slop fuel tanks" at Tank Farm "A" with prior approval from the Air Station Fuels Division.

Waste shipping documents signed by the appropriate Navy and transporter personnel must accompany all petroleum-impacted groundwater and soil that is treated on base. This Non-Hazardous Waste Shipping Document is presented in this work plan as **Figure 3-1**.

### **1.3 PACKAGING, LABELING, AND TRANSPORTATION OF CONTAMINATED WASTE**

#### **1.3.1 Packaging and Labeling**

All non-hazardous waste being prepared for transport off site will be classified, containerized, and labeled according to applicable USEPA and United States Department of Transportation (USDOT) regulations (40 CFR Parts 262 and 263, 49 CFR Parts 172, 173, and 178).

#### **1.3.2 Transportation**

J.A. Jones will verify that only waste types and quantities specified by the completed manifest package are loaded in vehicles identified for off site transportation. If necessary, J.A. Jones will also verify that materials are properly containerized, labeled, and loaded, and that the proper placards are placed on the transport vehicle prior to departure.

**APPENDIX D**

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**TASK-SPECIFIC HAZARD ANALYSIS**

## HAZARD ANALYSIS

Mobilization/Equipment  
 Setup/Construction of  
 Temporary Facilities/  
 Treatment Building and  
 System Installation/  
 Treatment System  
 Connections/Demobilization

ACTIVITY \_\_\_\_\_ ANALYZED BY/DATE C. Myers REVIEWED BY/DATE \_\_\_\_\_

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	
1. Mobilization 2. Equipment set-up 3. Construction of temporary facilities 4. Treatment building and system installation 5. Demobilization	1. Slip, trip, fall hazards 2. Heavy equipment 3. Noise 4. Traffic	1. Inspect work area for slip, trip, fall hazards. Good housekeeping. 2. Trained heavy equipment operators. Routine Inspections. 3. Utilize hearing protection. 4. Restrict area to necessary traffic.	
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
1. Small hand tools 2. Heavy equipment for equipment set-up, system installation, and construction of temporary facilities, and treatment building	1. Inspect all equipment in accordance with manufacturer's recommendations. 2. Rigging, as necessary.	1. HAZWOPER, 40-hour health and safety training, as required 2. Heavy equipment operation 3. Rigging	

## HAZARD ANALYSIS

ACTIVITY Concrete Placement ANALYZED BY/DATE C. Myers REVIEWED BY/DATE \_\_\_\_\_

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	
1. Grade and compact subbase 2. Place concrete and asphalt 3. Testing and analysis	1. Slip, trip, fall hazards 2. Contaminant exposures 3. Motorized equipment	1. Work upwind, where possible 2. Provide ambient air monitoring 3. Provide personnel protection equipment 4. Use ground guides for heavy equipment 5. Maintain work site cleanliness	
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
1. Sampling equipment 2. Flame Ionization Detector 3. Backhoe 4. Compactor 5. Concrete vibrator and floats	1. Inspect and calibrate sampling and air monitoring equipment in accordance with manufacturer's recommendations 2. Inspect all equipment in accordance with manufacturer's recommendations	1. HAZWOPER, 40-hour health and safety training, as required 2. Air monitoring equipment 3. Sample collection equipment 4. Heavy equipment operation	

## HAZARD ANALYSIS

Hand Excavation near Utilities/  
Machine Excavation And  
Backfilling/Air Sparge and Soil  
Vapor Extraction System

ACTIVITY Installation/ Pipe Trenching ANALYZED BY/DATE C. Myers REVIEWED BY/DATE \_\_\_\_\_

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	
<ol style="list-style-type: none"> <li>1. Locate areas requiring trenching or excavating</li> <li>2. Mobilize equipment</li> <li>3. Trench and/or excavate soils</li> </ol>	<ol style="list-style-type: none"> <li>1. Slip, trip, fall hazards</li> <li>2. Vehicular accidents</li> <li>3. Subsurface utilities</li> <li>4. Contaminant exposures</li> <li>5. Cave-ins</li> <li>6. Noise</li> </ol>	<ol style="list-style-type: none"> <li>1. Survey areas for slip, trip, fall hazards. Good housekeeping</li> <li>2. Trained operators</li> <li>3. Secure excavation permit</li> <li>4. Work upwind where possible</li> <li>5. Provide ambient air monitoring</li> <li>6. Routine excavation inspections. Shore/slope, where necessary</li> <li>7. Utilize hearing protection</li> </ol>	
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
<ol style="list-style-type: none"> <li>1. Backhoe</li> <li>2. Air sampling equipment</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect equipment daily</li> <li>2. Maintain calibration in accordance with manufacturer's specifications</li> </ol>	<ol style="list-style-type: none"> <li>1. HAZWOPER, 40-hour health and safety training, as required</li> <li>2. Heavy equipment operator training</li> </ol>	

## HAZARD ANALYSIS

ACTIVITY Site Restoration ANALYZED BY/DATE C. Myers REVIEWED BY/DATE \_\_\_\_\_

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	
1. Backfilling 2. Compaction	1. Vehicle accidents 2. Noise 3. Dust	1. Maintain traffic control 2. Initialize hearing protection 3. Monitor for visible dust. Use dust suppression, as appropriate	
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
1. Backhoe 2. Compactor	1. Inspection in accordance with manufacturer's specifications	1. HAZWOPER, 40-hour health and safety training, as required 2. Heavy equipment operation	

## HAZARD ANALYSIS

ACTIVITY Soil/Water Sampling  
Surface Water  
Control

ANALYZED BY/DATE C. Myers

REVIEWED BY/DATE \_\_\_\_\_

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	
1. Soil/Water Sampling 2. Surface Water Control	1. Slip, trip, fall hazards 2. Containment exposures	1. Work upwind, when possible. 2. Provide ambient air monitoring 3. Provide personnel protection equipment	
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
1. Sampling equipment 2. Flame Ionization Detector 3. Backhoe	1. Inspect and calibrate sampling and air monitoring equipment in accordance with manufacturer's recommendations. 2. Inspect surface water diversion trenches and silt fences, as necessary.	1. Hazwoper, 40-hour health and safety training, as required. 2. Air equipment monitoring 3. Sample collection equipment	

## HAZARD ANALYSIS

ACTIVITY Operation and Maintenance ANALYZED BY/DATE C. Myers REVIEWED BY/DATE \_\_\_\_\_

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	
1. Operation and maintenance of groundwater treatment system	1. Electrical sources 2. Pneumatic sources 3. Machinery hazards 4. Contaminant exposure	1. Lockout/Tagout procedures 2. Personnel protection equipment	
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
1. Hand tools	1. Inspection per manufacturer's specifications	1. HAZWOPER, 40-hour health and safety training, as required 2. Lockout/Tagout as required	

**APPENDIX E**

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**CHEMICAL AND PHYSICAL PROPERTIES OF KNOWN SITE  
CONTAMINANTS**

**Section 1. Material Identification**

39

**Toluene (C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub>) Description:** Derived from petroleum i.e., dehydrogenation of cycloparaffin fractions followed by the aromatization of saturated aromatic hydrocarbons or by fractional distillation of coal-tar light oil and purified by rectification. Used widely as a solvent (replacing benzene in many cases) for oils, resins, adhesives, natural rubber, coal tar, asphalt, pitch, acetyl celluloses, cellulose paints and varnishes; a diluent for photogravure inks, raw material for organic synthesis (benzoyl & benzilidene chlorides, saccharine, TNT, toluene diisocyanate, and many dyestuffs), in aviation and high octane automobile gasoline, as a nonclinical thermometer liquid and suspension solution for navigational instruments.

**Other Designations:** CAS No. 108-88-3, Methacide, methylbenzene, methylbenzol, phenylmethane, toluol, Tolu-sol.  
**Manufacturer:** Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*<sup>(73)</sup> for a suppliers list.

**Cautions:** Toluene is an eye, skin, and respiratory tract irritant becoming narcotic at high concentrations. Liver and kidney damage has occurred. Pregnant women chronically exposed to toluene have shown teratogenic effects. Toluene is highly flammable.

R	1	NEPA 
I	3	
S	2*	
K	3	
* Skin absorption		
HMIS		Chronic effects
H	2	
F	3	
R	0	
PPE-Sec. 8		

**Section 2. Ingredients and Occupational Exposure Limits**

Toluene, < 100%; may contain a small amount of benzene (~ 1%), xylene, and nonaromatic hydrocarbons.

**1991 OSHA PELs**  
8-hr TWA: 100 ppm (375 mg/m<sup>3</sup>)  
15-min STEL: 150 ppm (560 mg/m<sup>3</sup>)

**1992-93 ACGIH TLV (Skin)**  
TWA: 50 ppm (188 mg/m<sup>3</sup>)

**1990 IDLH Level**  
2000 ppm

**1990 DFG (Germany) MAK\***  
TWA: 100 ppm (380 mg/m<sup>3</sup>)  
Half-life: 2 hr to end of shift  
Category II: Substances with systemic effects  
Peak Exposure Limit: 500 ppm, 30 min  
average value, 2/shift

**1990 NIOSH RELs**  
TWA: 100 ppm (375 mg/m<sup>3</sup>)  
STEL: 150 ppm (560 mg/m<sup>3</sup>)

**1985-86 Toxicity Data†**  
Man, inhalation, TC<sub>Lo</sub>: 100 ppm caused hallucinations, and changes in motor activity and changes in psychophysiological tests.  
Human, oral, LD<sub>Lo</sub>: 50 mg/kg; toxic effects not yet reviewed  
Human, eye: 300 ppm caused irritation.  
Rat, oral, LD<sub>50</sub>: 5000 mg/kg  
Rat, liver: 30 μmol/L caused DNA damage.

\* Available information suggests damage to the developing fetus is probable.

† See NIOSH, RTECS (XS5250000), for additional irritation, mutation, reproductive, and toxicity data.

**Section 3. Physical Data**

**Boiling Point:** 232 °F (110.6 °C)  
**Melting Point:** -139 °F (-95 °C)  
**Molecular Weight:** 92.15  
**Density:** 0.866 at 68 °F (20/4 °C)  
**Surface Tension:** 29 dyne/cm at 68 °F (20 °C)  
**Viscosity:** 0.59 cP at 68 °F (20 °C)  
**Refraction Index:** 1.4967 at 20 °C/l

**Water Solubility:** Very slightly soluble, 0.6 mg/L at 68 °F (20 °C)  
**Other Solubilities:** Soluble in acetone, alcohol, ether, benzene, chloroform, glacial acetic acid, petroleum ether, and carbon disulfide.  
**Vapor Pressure:** 22 mm Hg at 68 °F (20 °C); 36.7 mm Hg at 86 °F (30 °C)  
**Saturated Vapor Density (Air = 0.075 lb/ft<sup>3</sup> or 1.2 kg/m<sup>3</sup>):** 0.0797 lb/ft<sup>3</sup> or 1.2755 kg/m<sup>3</sup>  
**Odor Threshold (range of all referenced values):** 0.021 to 69 ppm

**Appearance and Odor:** Colorless liquid with a sickly sweet odor.

**Section 4. Fire and Explosion Data**

**Flash Point:** 40 °F (4.4 °C) CC

**Autoignition Temperature:** 896 °F (480 °C)

**LEL:** 1.27% v/v

**UEL:** 7.0% v/v

**Extinguishing Media:** Toluene is a Class IB flammable liquid. To fight fire, use dry chemical carbon dioxide, or 'alcohol-resistant' foam. Water spray may be ineffective as toluene floats on water and may actually spread fire. **Unusual Fire or Explosion Hazards:** Concentrated vapors are heavier than air and may travel to an ignition source and flash back. Container may explode in heat of fire. Toluene's burning rate = 5.7 mm/min and its flame speed = 37 cm/sec. Vapor poses an explosion hazard indoors, outdoors, and in sewers. May accumulate static electricity. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing provides only limited protection. Apply cooling water to sides of tanks until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from fire and let burn. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire because a BLEVE (boiling liquid expanding vapor explosion) may be imminent. Do not release runoff from fire control methods to sewers or waterways.

**Section 5. Reactivity Data**

**Stability/Polymerization:** Toluene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization can't occur. **Chemical Incompatibilities:** Strong oxidizers, concentrated nitric acid, nitric acid + sulfuric acid, dinitrogen tetroxide, silver perchlorate, bromine trifluoride, tetranitromethane, and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidione. **Conditions to Avoid:** Contact with heat, ignition sources, or incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of toluene can produce carbon dioxide, and acrid, irritating smoke.

**Section 6. Health Hazard Data**

**Carcinogenicity:** The IARC<sup>(164)</sup> NTP<sup>(169)</sup> and OSHA<sup>(164)</sup> do not list toluene as a carcinogen. **Summary of Risks:** Toluene is irritating to the eyes, nose, and respiratory tract. Inhalation of high concentrations produces a narcotic effect sometimes leading to coma as well as liver and kidney damage. 93% of inhaled toluene is retained in the body of which 80% is metabolized to benzoic acid, then to hippuric acid and excreted in urine. The remainder is metabolized to *o*-cresol and excreted or exhaled unchanged. Toluene metabolism is inhibited by alcohol ingestion and is synergistic with benzene, asphalt fumes, or chlorinated hydrocarbons (i.e. perchloroethylene). Toluene is readily absorbed through the skin at 14 to 23 mg/cm<sup>2</sup>/hr. Toluene is absorbed quicker during exercise than at rest and appears to be retained longer in obese versus thin victims; presumably due to its lipid solubility. There is inconsistent data on toluene's ability to damage bone marrow; chronic poisoning has resulted in anemia and leucopenia with biopsy showing bone marrow hypoplasia. These reports are few and some authorities argue that the effects may have been due to benzene contaminants. Chronic inhalation during pregnancy has been associated with teratogenic effects on the fetus including microcephaly, CNS dysfunction, attentional deficits, developmental delay + language impairment, growth retardation, and physical defects including a small midface, short palpebral fissures, with deep-set eyes, low-set ears, flat nasal bridge with a small nose, micrognathia, and blunt fingertips. There is some evidence that toluene

**Section 6. Health Hazard Data**

**Toxicity:** The ACGIH, OSHA, and IARC list benzene as, respectively, a suspected human carcinogen, a cancer hazard, and, based on recent human and animal evidence, a human carcinogen (Group 1).

**Major Risks:** Prolonged skin contact or excessive inhalation of benzene vapor may cause headache, weakness, appetite loss, and fatigue. Most important health hazards are cancer (leukemia) and bone marrow damage with injury to blood-forming tissue from chronic low-level exposure. Higher level exposures may irritate the respiratory tract and cause central nervous system (CNS) depression.

**Special Conditions Aggravated by Long-Term Exposure:** Exposure may worsen ailments of the heart, lungs, liver, kidneys, blood, and CNS.

**Target Organs:** Blood, central nervous system, bone marrow, eyes, upper respiratory tract, and skin.

**Primary Entry Routes:** Inhalation, skin contact.

**Acute Effects:** Symptoms of acute overexposure include irritation of the eyes, nose, and respiratory tract, breathlessness, euphoria, nausea, dizziness, headache, dizziness, and intoxication. Severe exposure may lead to convulsions and unconsciousness. Skin contact may cause a skin rash (dermatitis).

**Chronic Effects:** Long-term chronic exposure may result in many blood disorders ranging from aplastic anemia (an inability to form blood cells) to leukemia.

**First Aid:**

- Eye:** Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.
- Skin:** Quickly remove contaminated clothing. Immediately rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.
- Inhalation:** Remove exposed person to fresh air. Emergency personnel should protect against inhalation exposure. Provide CPR to support breathing or circulation as necessary. Keep awake and transport to a medical facility.
- Ingestion:** Never give anything by mouth to an unconscious or convulsing person. If ingested, do not induce vomiting since aspiration may be fatal. Call a physician immediately.

**Additional Information:** For first aid, get appropriate in-plant, paramedic, or community medical support.

**Physician's Note:** Evaluate chronic exposure with a CBC, peripheral smear, and reticulocyte count for signs of myelotoxicity. Follow up any laboratory indicators of leukemia with a bone marrow biopsy. Urinary phenol conjugates may be used for biological monitoring of recent exposure. Management is primarily supportive for CNS depression.

**Section 7. Spill, Leak, and Disposal Procedures**

**Leak:** Design and practice a benzene spill control and countermeasure plan (SCCP). Notify safety personnel, evacuate all unnecessary personnel, eliminate all heat and ignition sources, and provide adequate ventilation. Cleanup personnel should protect against vapor inhalation, eye contact, and skin absorption. Absorb as much benzene as possible with an inert, noncombustible material. For large spills, dike far ahead of spill to contain liquid. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of confined areas such as sewers, watersheds, and waterways because of explosion danger. Follow applicable OSHA regulations (29 CFR 1910.120).

**Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

**Designations:**

- Classified as a RCRA Hazardous Waste (40 CFR 261.33), Hazardous Waste No. U019
- Classified as a CERCLA Hazardous Substance\* (40 CFR 302.4), Reportable Quantity (RQ): 1000 lb (454 kg) [\* per Clean Water Act, Sec. 307 (a), (b)(4), 112; and per RCRA, Sec. 3001]
- Classified as an Extremely Hazardous Substance (40 CFR 355): Not listed
- Classified as SARA Toxic Chemical (40 CFR 372.65)

**Air Designations:**

- Classified as an Air Contaminant (29 CFR 1910.1000, Tables Z-1-A and Z-2)

**Section 8. Special Protection Data**

**Respirators:** Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

**Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an air-purifying respirator. **Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.**

**Hand Protection:** Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

**Ventilation:** Provide general and local explosion-proof ventilation systems to maintain airborne concentrations at least below the OSHA PELs.

**Local Exhaust Ventilation:** Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.<sup>(103)</sup>

**Emergency Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

**Contaminated Equipment:** Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

**Personal Hygiene:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, using the toilet, or applying cosmetics.

**Section 9. Special Precautions and Comments**

**Storage Requirements:** Store in tightly closed containers in a cool, dry, well-ventilated area away from all heat and ignition sources and incompatible materials. **Caution! Benzene vapor may form explosive mixtures in air.** To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations in production and storage areas. When opening or closing these containers, use nonsparking tools. Keep fire extinguishers readily available.

**Engineering Controls:** Because OSHA specifically regulates benzene (29 CFR 1910.1028), educate workers about its potential hazards and dangers. Minimize all possible exposures to carcinogens. If possible, substitute less toxic solvents for benzene; use this material with extreme caution and only if absolutely essential. Avoid vapor inhalation and skin and eye contact. Use only with adequate ventilation and appropriate personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation.

**Regulated Areas:** Regulate regulated areas of benzene use (see legend in the box below) and label benzene containers with "DANGER, CONTAINS BENZENE, OSHA HAZARD."

**Other Precautions:** Provide preplacement and periodic medical examinations with emphasis on a history of blood disease or previous exposure.

**Transportation Data (49 CFR 172.101, .102)**

Shipping Name: Benzene (benzol)	IMO Shipping Name: Benzene
Hazard Class: Flammable liquid	IMO Hazard Class: 3.2
UN1114	ID No.: UN1114
Label: Flammable liquid	IMO Label: Flammable liquid
Packaging Exceptions: 173.118	IMDG Packaging Group: II
Packaging Requirements: 173.119	

<p>DANGER BENZENE CANCER HAZARD FLAMMABLE-NO SMOKING AUTHORIZED PERSONNEL ONLY RESPIRATOR REQUIRED</p>
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OSHA Collection References: 1, 2, 12, 26, 73, 84-94, 100, 101, 103, 109, 124, 126, 127, 132, 134, 136, 138, 139, 143

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Material Safety Data Sheets Collection:

Sheet No. 316  
Benzene

Issued: 11/78

Revision: E, 8/90

**Section 1. Material Identification**

32

**Benzene (C<sub>6</sub>H<sub>6</sub>) Description:** Derived by fractional distillation of coal tar, hydrodealkylation of toluene or pyrolysis of gasoline, catalytic reforming of petroleum, and transalkylation of toluene by disproportionation reaction. Used as a fuel; a chemical reagent; a solvent for a large number of materials such as paints, plastics, rubber, inks, oils, and fats; in manufacturing phenol, ethylbenzene (for styrene monomer), nitrobenzene (for aniline), dodecylbenzene (for detergents), cyclohexane (for nylon), chlorobenzene, diphenyl, benzene hexachloride, maleic anhydride, benzene-sulfonic acid, artificial leather, linoleum, oil cloth, varnishes, and lacquers; for printing and lithography; in dry cleaning; in adhesives and coatings; for extraction and rectification; as a degreasing agent; in the tire industry; and in shoe factories. Benzene has been banned as an ingredient in products intended for household use and is no longer used in pesticides.

**Other Designations:** CAS No. 0071-43-2, benzol, carbon oil, coal naphtha, cyclohexatriene, mineral naphtha, nitration benzene, phene, phenyl hydride, pyrobenzol.

**Manufacturer:** Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*<sup>(73)</sup> for a suppliers list.

R	1	NFPA
I	4	
S	2*	
K	4	

3
2
0

\*Skin absorption

H	3
F	3
R	0
PPG†	
† Sec. 8	

**Cautions:** Benzene is a confirmed *human carcinogen* by the IARC. *Chronic low-level exposure may cause cancer (leukemia) and bone marrow damage, with injury to blood-forming tissue.* It is also a dangerous fire hazard when exposed to heat or flame.

**Section 2. Ingredients and Occupational Exposure Limits**

Benzene, ca 100%\*

1989 OSHA PELs

(29 CFR 1910.1000, Table Z-1-A)

8-hr TWA: 1 ppm, 3 mg/m<sup>3</sup>

15-min STEL: 5 ppm, 15 mg/m<sup>3</sup>

(29 CFR 1910.1000, Table Z-2)

8-hr TWA: 10 ppm

Acceptable Ceiling Concentration: 25 ppm

Acceptable Maximum Peak: 50 ppm (10 min)†

1989-90 ACGIH

TLV-TWA: 10 ppm, 32 mg/m<sup>3</sup>

1988 NIOSH RELs

TWA: 0.1 ppm, 0.3 mg/m<sup>3</sup>

Ceiling: 1 ppm, 3 mg/m<sup>3</sup>

1985-86 Toxicity Data†

Man, oral, LD<sub>50</sub>: 50 mg/kg; no toxic effect noted

Man, inhalation, TC<sub>50</sub>: 150 ppm inhaled intermittently over 1 yr in a number of discrete, separate doses affects the blood (other changes) and nutritional and gross metabolism (body temperature increase)

Rabbit, eye: 2 mg administered over 24 hr produces severe irritation

\* OSHA 29 CFR 1910.1000, Subpart Z, states that the final benzene standard in 29 CFR 1910.1028 applies to all occupational exposures to benzene except in some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.

† Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift.

‡ See NIOSH, *RTECS* (CY1400000), for additional irritative, mutative, reproductive, tumorigenic, and toxicity data.

**Section 3. Physical Data**

Boiling Point: 176 °F (80 °C)

Melting Point: 42 °F (5.5 °C)

Vapor Pressure: 100 mm Hg at 79 °F (26.1 °C)

Vapor Density (Air = 1): 2.7

Evaporation Rate (Ether = 1): 2.8

Molecular Weight: 78.11

Specific Gravity (15 °C/4 °C): 0.8787

Water Solubility: Slightly (0.180 g/100 g of H<sub>2</sub>O at 25 °C)

% Volatile by Volume: 100

Viscosity: 0.6468 mPa at 20 °C

**Appearance and Odor:** A colorless liquid with a characteristic sweet, aromatic odor. The odor recognition threshold (100% of panel) is approximately 5 ppm (unfatigued) in air. Odor is *not* an adequate warning of hazard.

**Section 4. Fire and Explosion Data**

Flash Point: 12 °F (-11.1 °C), CC

Autoignition Temperature: 928 °F (498 °C)

LEL: 1.3% v/v

UEL: 7.1% v/v

**Extinguishing Media:** Use dry chemical, foam, or carbon dioxide to extinguish benzene fires. Water may be ineffective as an extinguishing agent since it can scatter and spread the fire. Use water spray to cool fire-exposed containers, flush spills away from exposures, disperse benzene vapor, and protect personnel attempting to stop an unignited benzene leak.

**Unusual Fire or Explosion Hazards:** Benzene is a Class 1B flammable liquid. A concentration exceeding 3250 ppm is considered a potential fire explosion hazard. Benzene vapor is heavier than air and can collect in low lying areas or travel to an ignition source and flash back. Explosive and flammable benzene vapor-air mixtures can easily form at room temperature. Eliminate all ignition sources where benzene is used, handled, or stored.

**Special Fire-fighting Procedures:** Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Structural firefighter's protective clothing provides limited protection. Stay out of low areas. Be aware of runoff from fire control methods. Do not release to sewers or waterways. Runoff to sewer can create pollution, fire, and explosion hazard.

**Section 5. Reactivity Data**

**Stability/Polymerization:** Benzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

**Chemical Incompatibilities:** Benzene explodes on contact with diborane, permanganic acid, bromine pentafluoride, peroxodisulfuric acid, and peroxomonosulfuric acid. It ignites on contact with dioxygen difluoride, dioxygenyl tetrafluoroborate, iodine heptafluoride, and sodium peroxide + water. Benzene forms sensitive, explosive mixture with iodine pentafluoride, ozone, liquid oxygen, silver perchlorate, nitryl perchlorate, nitric acid, and arsenic pentafluoride + potassium methoxide (explodes above 30 °C). A vigorous or incandescent reaction occurs with bromine trifluoride, uranium hexafluoride, and hydrogen + Raney nickel [above 410 °F (210 °C)]. Benzene is incompatible with oxidizing materials.

**Conditions to Avoid:** Avoid heat and ignition sources.

**Hazardous Products of Decomposition:** Thermal oxidative decomposition of benzene can produce toxic gases and vapors such as carbon monoxide.

**16. Health Hazard Data**

**Conditions Aggravated by Long-Term Exposure:** Alcoholism and CNS, kidney, skin, or liver disease. **Target Organs:** CNS, liver, skin. **Primary Entry Routes:** Inhalation, skin contact/absorption. **Acute Effects:** Vapor inhalation causes respiratory tract irritation, fatigue, dizziness, confusion, dizziness, headache, dilated pupils, watering eyes, nervousness, insomnia, parasthesia, and vertigo progressing to narcotic coma. **Eye:** Liquid splash in the eye causes conjunctival irritation, corneal damage and possible burns. Prolonged skin contact leads to drying and fissured dermatitis. Ingestion causes GI tract irritation and symptoms associated with inhalation. **Chronic Effects:** Symptoms include mucous membrane irritation, headache, vertigo, nausea, appetite loss and intolerance. Repeated heavy exposure may result in encephalopathies (cerebellar ataxia and cognitive dysfunction), liver enlargement, and astrophy (wasting away). Symptoms usually appear at workdays end, worsen at weeks end and decrease or disappear over the weekend.

**First Aid:** Eyes: Do not allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding of water until transported to an emergency medical facility. Consult an ophthalmologist immediately. Skin: Quickly remove contaminated clothing and support breathing as needed. Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center unless otherwise advised, have that conscious and alert person drink 1 to 2 glasses of water to dilute. Do not induce vomiting because of risk of aspiration into the lungs. Gastric lavage may be indicated if large amounts are swallowed; potential toxicity needs to be weighed against risk when deciding for or against gastric lavage. Note to Physicians: Monitor cardiac function. If indicated, use epinephrine and other sympathomimetics carefully, because of the possibility of a lowered myocardial threshold to the arrhythmogenic effects of such substances. Obtain CBC, urinalysis, and arterial blood gases. If toluene has > 0.02% (200 ppm) benzene, evaluate for potential benzene toxicity. BEI: 2.5 mg/L; creatinine in urine, sample at shift end (2.5 g/g creatinine); Toluene in venous blood, sample at shift end (1.0 mg/L).

**17. Spill, Leak, and Disposal Procedures**

**Leak:** Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Cleanup personnel protect against inhalation and skin/eye contact. Use water spray to cool and disperse vapors but it may not prevent ignition in closed spaces. Cellosolve, hycar absorbent materials, and carbon water can also be used for vapor suppression/containment. Take up small spill with earth, sand, vermiculite, or other absorbent, combustible material. Dike far ahead of large spills for later reclamation or disposal. For water spills, (10 ppm or greater) apply activated carbon at the spilled amount and remove trapped material with suction hoses or use mechanical dredges/lifts to remove immobilized masses of pollutants and precipitates. Toluene can undergo fluidized bed incineration at 842 to 1796 °F (450 to 980 °C), rotary kiln incineration at 1508 to 2912 °F (820 to 1600 °C), or liquid injection incineration at 1202 to 2912 °F (650 to 1600 °C). Follow applicable OSHA regulations (29 CFR 1910.120). **Ecotoxicity:** Blue gill, LC<sub>50</sub> = 17 mg/L/24 hr; shrimp (*Crangonfraxis coron*), LC<sub>50</sub> = 4.3 ppm/96 hr; fathead minnow (*Pimephales promelas*), LC<sub>50</sub> = 36.2 mg/L/96 hr. **Environmental Degradation:** If released to land, toluene evaporates and undergoes microbial degradation. In water, toluene volatilizes and degrades with a half-life of days to several weeks. In air, toluene degrades by reaction with photochemically produced hydroxyl radicals.

**Spill/Leak:** Treat contaminated water by gravity separation of solids, followed by skimming of surface. Pass through dual media filtration and carbon adsorption units (carbon ratio 1 kg to 10 kg soluble material). Return waste water from backwash to gravity separator. Contact your supplier or a local contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

**Designations**

as a RCRA Hazardous Waste (40 CFR 261.33): No. U220  
 as an Extremely Hazardous Substance (40 CFR 355), TPQ: Not listed  
 as a CERCLA Hazardous Substance\* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg)  
 per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307 (a)  
 as a SARA Toxic Chemical (40 CFR 372.65): Not listed

**OSHA Designations**

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

**18. Special Protection Data**

**Eye Protection:** Wear protective eyeglasses with shatter-resistant glass and side-shields or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 100 ppm, use any chemical cartridge respirator with appropriate organic vapor cartridges, any supplied-air respirator (SAR), or SCBA. For < 200 ppm, use any SAR operated in continuous-flow mode, any SAR or SCBA with a full facepiece, or any air-purifying respirator with a full facepiece having a chin-style, front or back mounted organic vapor canister. For emergency or nonroutine operations (cleaning, reactor vessels, or storage tanks), wear an SCBA. **Warning!** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective suits, boots, aprons, and gauntlets to prevent skin contact. Polyvinyl alcohol with a breakthrough time of > 8 hr, Teflon and Viton are recommended as suitable materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source. **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Remove toluene from your shoes and PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

**19. Special Precautions and Comments**

**Storage Requirements:** Prevent physical damage to containers. Store in a cool, dry, well-ventilated area away from ignition sources and incompatible materials. Outside or detached storage is preferred. If stored inside, use a standard flammable liquids warehouse, room, or cabinet. To prevent static sparks, electrically ground and bond all equipment used with toluene. Do not use open lights in toluene areas. Install Class 1, Group D electrical equipment. Check that toluene is free of or contains < 1% benzene before use. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. **Administrative Controls:** Adopt controls for confined spaces (29 CFR 1910.146) if entering areas of unknown toluene levels (holes, wells, storage tanks). Consider preplacement and periodic medical exams of exposed workers that emphasize the CNS, liver, kidney, and skin. Include hemocytometric and thrombocyte count in cases where benzene is a contaminant of toluene. Monitor air at regular intervals to ensure effective ventilation.

**Transportation Data (49 CFR 172.101)**

<b>Shipping Name:</b> Toluene	<b>Packaging Authorizations</b>	<b>Quantity Limitations</b>	<b>Vessel Stowage Requirements</b>
<b>Hazard Class:</b> 3	a) Exceptions: 150	a) Passenger Aircraft or Railcar: 5L	<b>Vessel Stowage:</b> B
<b>No.:</b> UN1294	b) Non-bulk Packaging: 202	b) Cargo Aircraft Only: 60L	<b>Other:</b> --
<b>DOT Packing Group:</b> II	c) Bulk Packaging: 242		
<b>DOT Label:</b> Flammable Liquid			
<b>Special Provisions (172.102):</b> T1			

**DS Collection References:** 26, 73, 100, 101, 103, 124, 126, 127, 132, 140, 148, 153, 159, 163, 164, 167, 169, 171, 174, 175, 176, 180.  
 Prepared by: M Gannon, BA; Industrial Hygiene Review: PA Roy, CHH, MPH; Medical Review: AC Darlington, MD, MPH



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## Material Safety Data Sheets Collection:

Sheet No. 385  
Ethylbenzene

Issued: 8/78

Revision: B, 9/92

### Section 1. Material Identification

39

**Ethylbenzene (C<sub>8</sub>H<sub>8</sub>) Description:** Derived by heating benzene and ethylene in presence of aluminum chloride with subsequent distillation, by fractionation directly from the mixed xylene stream in petroleum refining, or dehydrogenation of naphthenes. Used as a solvent, an antiknock agent in gasoline; and as an intermediate in production of synthetic rubber, styrene, cellulose acetate, diethylbenzene, acetophenone, ethyl anthraquinone, propyl oxide, and  $\alpha$ -methylbenzyl alcohol. **Other Designations:** CAS No. 100-41-4, ethylbenzol, EB, phenylethane, NCI-C56393. **Manufacturer:** Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*<sup>(73)</sup> for a suppliers list.

R 1  
I 3  
S 2\*  
K 4  
\* Skin absorption

NFPA  
  
HMIS  
H 2+  
F 3  
R 0  
PPE - Sec. 5  
+ Chronic effects

**Cautions:** Ethylbenzene is a skin and mucous membrane irritant considered the most irritating of the benzene series. Inhalation causes acute and chronic central nervous system (CNS) effects. It is highly flammable and forms explosive mixtures with air.

### Section 2. Ingredients and Occupational Exposure Limits

Ethylbenzene, ca >99.0%. Impurities include ~ 0.1% *meta* & *para* xylene, ~ 0.1% cumene, and ~ 0.1% toluene.

1991 OSHA PELs  
1-hr TWA: 100 ppm (435 mg/m<sup>3</sup>)  
15-min STEL: 125 ppm (545 mg/m<sup>3</sup>)  
Action Level: 50 ppm (217 mg/m<sup>3</sup>)

1990 IDLH Level  
2000 ppm

1990 NIOSH REL  
TWA: 100 ppm (435 mg/m<sup>3</sup>)  
STEL: 125 ppm (545 mg/m<sup>3</sup>)

1992-93 ACGIH TLVs  
TWA: 100 ppm (434 mg/m<sup>3</sup>)  
STEL: 125 ppm (545 mg/m<sup>3</sup>)  
1990 DFG (Germany) MAK  
TWA: 100 ppm (440 mg/m<sup>3</sup>)  
Category 1: local irritants  
Peak Exposure Limit: 200 ppm, 5 min momentary value, max of 8/shift  
Danger of cutaneous absorption

1985-86 Toxicity Data\*  
Human, inhalation, TC<sub>Lo</sub>: 100 ppm/8 hr caused eye effects, sleep, and respiratory changes.  
Human, lymphocyte: 1 mmol/L induced sister chromatid exchange.  
Rat, oral, LD<sub>50</sub>: 3500 mg/kg; toxic effects not yet reviewed  
Rat (female), inhalation, TC<sub>Lo</sub>: 1000 ppm/7 hr/day, 5 days/wk, for 3 wk prior to mating and daily for 19 days of gestation produced pups with high incidence of extra ribs.<sup>(179)</sup>

\* See NIOSH, RTECS (DA0700000), for additional irritation, mutation, reproductive, and toxicity data.

### Section 3. Physical Data

Boiling Point: 277 °F (136 °C)  
Melting Point: -139 °F (-95 °C)  
Surface Tension: 31.5 dyne/cm  
Ionization Potential: 8.76 eV  
Viscosity: 0.64 cP at 77 °F (25 °C)  
Refraction Index: 1.4959 at 68 °F (20 °C)  
Relative Evaporation Rate (ether = 1): 0.0106  
Bulk Density: 7.21 lb/Gal at 77 °F (25 °C)  
Critical Temperature: 651 °F (343.9 °C)  
Critical Pressure: 35.6 atm  
Molecular Weight: 106.16  
Density: 0.863 at 77 °F (25 °C)  
Water Solubility: Slightly, 14 mg/100 mL at 59 °F (15 °C)  
Other Solubilities: Miscible in alcohol, ether; soluble in carbon tetrachloride, benzene, sulfur dioxide, and many organic solvents; insoluble in ammonia  
Odor Threshold: 2.3 ppm  
Vapor Pressure: 7.1 mm Hg at 68 °F (20 °C); 10 mmHg at 78.62 °F (25.9 °C); 100 mm Hg 165.38 °F (74.1 °C)  
Saturated Vapor Density (Air = 0.075 lb/ft<sup>3</sup> or 1.2 kg/m<sup>3</sup>): 0.0768 lb/ft<sup>3</sup> or 1.2298 kg/m<sup>3</sup>

Appearance and Odor: Colorless, flammable liquid with a pungent odor.

### Section 4. Fire and Explosion Data

Flash Point: 64 °F (18 °C) CC      Autoignition Temperature: 810 °F (432 °C)      LEL: 1.0% v/v      UEL: 6.7% v/v

**Extinguishing Media:** Class 1B Flammable liquid. For small fires, use dry chemical, carbon dioxide, or 'alcohol-resistant' foam. For large fires, use fog or 'alcohol-resistant' foam. Use water only if other agents are unavailable; EB floats on water and may travel to an ignition source and spread fire. **Unusual Fire or Explosion Hazards:** Burning rate = 5.8 mm/min. Vapors may travel to an ignition source and flash back. Container may explode in heat of fire. EB poses a vapor explosion hazard indoors, outdoors, and in sewers. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Cool container sides with water until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from area and let fire burn. Withdraw immediately if you hear rising sound from venting safety device or notice any tank discoloration due to fire. Do not release runoff from fire control methods to sewers or waterways.

### Section 5. Reactivity Data

**Stability/Polymerization:** Ethylbenzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.  
**Chemical Incompatibilities:** Reacts vigorously with oxidizers.  
**Conditions to Avoid:** Exposure to heat and oxidizers.  
**Hazardous Products of Decomposition:** Thermal oxidative decomposition of EB can produce acrid smoke and irritating fumes.

### Section 6. Health Hazard Data

**Carcinogenicity:** The IARC,<sup>(164)</sup> NTP,<sup>(169)</sup> and OSHA<sup>(164)</sup> do not list EB as a carcinogen. **Summary of Risks:** Occupational exposure to EB alone is rare since it is usually present together with other solvents. EB is irritating to the eyes, skin, and respiratory tract. Vapor inhalation produces varying degrees of CNS effects depending on concentration. The liquid is absorbed through the skin but vapors are not. 56 to 64% of inhaled ethylbenzene is retained and metabolized. Urinary metabolites following exposure to 23 to 85 ppm for 8 hr are mandelic acid (64%), phenylglyoxylic acid (25%), and methylphenylcarbinol/1-phenyl ethanol (5%). Concurrent exposure to xylene and ethylbenzene causes slower excretion of EB metabolites. Based on the rat LD<sub>50</sub>, one manufacturer gives 3 to 4 oz. as the lethal dose for a 100 lb person.

**6. Health Hazard Data**

**Conditions Aggravated by Long-Term Exposure:** Skin and CNS diseases and impaired pulmonary function (especially obstructive disease). **Target Organs:** Eyes, respiratory system, skin, CNS, blood. **Primary Entry Routes:** Inhalation, skin and eye contact. **Acute:** Vapor inhalation of 200 ppm caused transient eye irritation; 1000 ppm caused eye irritation with profuse watering (tolerance developed 30 ppm caused severe and immediate eye irritation and watering, nasal irritation, chest constriction, and vertigo; 5000 ppm was induced caused eye and nose irritation. Inhalation of high concentrations may cause narcosis, cramps, and death due to respiratory paralysis. Exposed to pure ethylbenzene for 10 to 15 min absorbed 22 to 33 mg/cm<sup>2</sup>/hr. Immersion of hand in solutions of 112 & 156 mg/L for 1 hr absorbed 18 & 215.7 µg/cm<sup>2</sup>/hr, respectively. **Chronic Effects:** Repeated skin contact may cause dryness, scaling, and fissuring. Workers exposed to > 100 ppm complained of fatigue, sleepiness, headache, and mild irritation of the eyes and respiratory tract. Repeated vapor may result in blood disorders, particularly leukopenia (abnormally low level of white blood cells) and lymphocytosis.

**First Aid:** Do not allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water transported to an emergency medical facility. Consult a physician immediately. **Skin:** Quickly remove contaminated clothing. Rinse with large amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. **Eyes:** Remove exposed person to fresh air and support breathing as needed. **Ingestion:** Never give anything by mouth to an unconscious or semi-conscious person. Contact a poison control center and unless otherwise advised, have that conscious and alert person drink 1 to 2 glasses of water to not induce vomiting! Aspiration of even a small amount of EB in vomitus can cause severe damage since its low viscosity and surface tension cause it to spread over a large area of the lung tissue.

**Medical Support:** Get appropriate in-plant, paramedic, or community medical support.

**Biological Monitoring:** Physicians: BEI = mandelic acid in urine (1.5 g/g of creatinine), sample at end of shift at workweeks end. Since this test is not specific, confirm in expired air for confirmation.

**7. Spill, Leak, and Disposal Procedures**

**Spills:** Notify safety personnel. Isolate and ventilate area, deny entry and stay upwind. Shut off all ignition sources. Cleanup personnel should wear protective clothing against vapor inhalation and skin/eye contact. Take up small spills with earth, sand, vermiculite, or other absorbent, noncombustible material in suitable container. Dike far ahead of large spill for later reclamation or disposal. Report any release >1000 lb. Follow applicable regulations (29 CFR 1910.120). **Environmental Transport:** If released to soil, EB partially evaporates into the atmosphere, with a half-life of 2 to 3 weeks, and some leaches into groundwater, especially in soil with low organic carbon content. Biodegradation occurs with a half-life of 2 to 3 weeks. EB may absorb to sediment or bioconcentrate in fish. Evidence points to slow biodegradation in groundwater. In air, it reacts with hydroxyl radicals to produce hydroxyl radicals with a half-life of hrs to 2 days. Additional amounts may be removed by rain. **Ecotoxicity Values:** *Sydopis bahia*, LC<sub>50</sub> = 87.6 mg/L/96 hr; sheephead minnow (*Cyprinodon variegatus*) LC<sub>50</sub> = 275 mg/L/96 hr; fathead minnow (*Pimephales promelas*) LC<sub>50</sub> = 42.3 mg/L/96 hr in hard water & 48.5 mg/L/96 hr in softwater. **Disposal:** A candidate for rotary kiln incineration at 912°F (820 to 1600°C), liquid injection incineration at 1202 to 2912°F (650 to 1600°C), and fluidized bed incineration at 842 to 1796°F (400 to 800°C). Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

**Regulations:**  
 RCRA Hazardous Waste (40 CFR 261.21): No. D001  
 SARA Toxic Chemical (40 CFR 372.65)  
 Extremely Hazardous Substance (40 CFR 355), TPQ: Not listed  
 CERCLA Hazardous Substance\* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg) [\* per CWA, Sec. 311 (b)(4) & 307 (a)]

**OSHA Designations:**  
 Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

**8. Special Protection Data**

**Personal Protection:** Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to selection and use. Follow respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 1000 ppm, use a powered respirator with an appropriate organic vapor cartridge, a supplied-air respirator (SAR), SCBA, or chemical cartridge respirator with organic vapor cartridge. For < 2000 ppm, use a SAR or SCBA with a full facepiece. For emergency or nonroutine operations (cleaning reactor vessels, or storage tanks), wear an SCBA. **Warning!** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a respiratory protection program that includes at least: medical certification, training, fit-testing, environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective boots, aprons, and gauntlets made of Viton or polyvinylchloride to prevent skin contact. **Ventilation:** Provide general and local exhaust systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.<sup>(103)</sup> **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from clean clothes and launder before reuse. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work area. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

**9. Special Precautions and Comments**

**Requirements:** Store in a cool, dry, well-ventilated area away from ignition sources and oxidizers. Outside or detached storage is preferred. If inside, store in a standard flammable liquids cabinet. Containers should have flame-arrester or pressure-vacuum venting. To prevent sparks, electrically ground and bond all equipment used with ethylbenzene. Install Class 1, Group D electrical equipment. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations as low as possible. Purge and ventilate reaction vessels before workers are allowed to enter for maintenance or cleanup. **Administrative Controls:** Consider preplacement and periodic medical exams of exposed workers that emphasize the CNS, skin, blood, and respiratory system.

**Transportation Data (49 CFR 172.101)**

**Shipping Name:** Ethylbenzene  
**Hazard Class:** 3  
**UN Number:** UN1175  
**Packaging Group:** II  
**Label:** Flammable liquid  
**Regulatory Provisions (172.102):** T1

**Packaging Authorizations:**  
 a) Exceptions: 173.150  
 b) Non-bulk Packaging: 173.202  
 c) Bulk Packaging: 173.242

**Quantity Limitations:**  
 a) Passenger Aircraft or Railcar: 5L  
 b) Cargo Aircraft Only: 60 L  
**Vessel Storage Requirements:**  
 a) Vessel Stowage: B  
 b) Other: —

**Collection References:** 26, 73, 100, 101, 103, 124, 126, 127, 132, 133, 136, 139, 140, 148, 153, 159, 162, 163, 164, 167, 168, 171, 176, 179  
**Reviewed by:** M Gannon, BA; Industrial Hygiene Review: D Wilson, CIH; Medical Review: W Silverman, MD



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## Material Safety Data Sheets Collection:

Sheet No. 318  
Xylene (Mixed Isomers)

Issued: 11/80 Revision: E, 9/92

### Section 1. Material Identification

**Xylene (Mixed Isomers) (C<sub>8</sub>H<sub>10</sub>)** Description: The commercial product is a blend of the three isomers [*ortho*-(*o*-), *meta*-(*m*-), *para*-(*p*-)] with the largest proportion being *m*-xylene. Xylene is obtained from coal tar, toluene by transalkylation, and pseudocumene. Used in the manufacture of dyes, resins, paints, varnishes, and other organics; as a general solvent for adhesives, a cleaning agent in microscope technique; as a solvent for Canada balsam microscopy; as a fuel component; in aviation gasoline, protective coatings, sterilizing catgut, hydrogen peroxide, perfumes, insect repellants, pharmaceuticals, and the leather industry; in the production of phthalic anhydride, isophthalic, and terephthalic acids and their dimethyl esters which are used in the manufacture of polyester fibers; and as an indirect food additive as a component of adhesives. Around the home, xylene is found as vehicles in paints, paint removers, degreasing cleaners, lacquers, glues and cements and as solvent/vehicles for pesticides.

Other Designations: CAS No. 1330-20-7 [95-47-6; 108-38-3; 106-42-3 (*o*-, *m*-, *p*-isomers)], dimethylbenzene, methyltoluene, NCI-C55232, Violet 3, xylo.  
Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*<sup>(TM)</sup> for a suppliers list.

R	1
I	2
S	2
K	3

NFPA  
  
 HMIS  
 H 2+  
 F 3  
 R 0  
 PPE ‡  
 † Chronic Effects  
 ‡ Sec. 8

**Caution:** Xylene is an eye, skin, and mucous membrane irritant and may be narcotic in high concentrations. It is a dangerous fire hazard.

### Section 2. Ingredients and Occupational Exposure Limits

Xylene (mixed isomers): the commercial product generally contains ~ 40% *m*-xylene; 20% each of *o*-xylene, *p*-xylene, and ethylbenzene; and small quantities of toluene. Unpurified xylene may contain pseudocumene.

**1991 OSHA PELs**  
8-hr TWA: 100 ppm (435 mg/m<sup>3</sup>)  
15-min STEL: 150 ppm (655 mg/m<sup>3</sup>)

**1992-93 ACGIH TLVs**  
TWA: 100 ppm (434 mg/m<sup>3</sup>)  
STEL: 150 ppm (651 mg/m<sup>3</sup>)  
BEI (Biological Exposure Index): Methylhippuric acids in urine at end of shift: 1.5 g/g creatinine

**1985-86 Toxicity Data\***  
Human, inhalation, TC<sub>Lo</sub>: 200 ppm produced olfaction effects, conjunctiva irritation, and other changes involving the lungs, thorax, or respiration.  
Man, inhalation, LC<sub>Lo</sub>: 10000 ppm/6 hr; toxic effects not yet reviewed.  
Human, oral, LD<sub>Lo</sub>: 50 mg/kg; no toxic effect noted.  
Rat, oral, LD<sub>50</sub>: 4300 mg/kg; toxic effect not yet reviewed.  
Rat, inhalation, LC<sub>50</sub>: 5000 ppm/4 hr; toxic effects not yet reviewed.

**1990 IDLH Level**  
1000 ppm

**1990 NIOSH RELs**  
TWA: 100 ppm (435 mg/m<sup>3</sup>)  
STEL: 150 ppm (655 mg/m<sup>3</sup>)

**1990 DFG (Germany) MAK**  
TWA: 100 ppm (440 mg/m<sup>3</sup>)  
Category II: Substances with systemic effects  
Half-life: < 2 hr  
Peak Exposure: 200 ppm, 30 min, average value, 4 peaks per shift

\* See NIOSH, RTECS (XE2100000), for additional toxicity data.

### Section 3. Physical Data

Boiling Point Range: 279 to 284 °F (137 to 140 °C)\*  
Boiling Point: *ortho*: 291 °F (144 °C); *meta*: 281.8 °F (138.8 °C); *para*: 281.3 °F (138.5 °C)  
Freezing Point/Melting Point: *ortho*: -13 °F (-25 °C); *meta*: -53.3 °F (-47.4 °C); *para*: 55 to 57 °F (13 to 14 °C)  
Vapor Pressure: 6.72 mm Hg at 70 °F (21 °C)  
Saturated Vapor Density (Air = 1.2 kg/m<sup>3</sup>): 1.23 kg/m<sup>3</sup>, 0.077 lbs/ft<sup>3</sup>  
Appearance and Odor: Clear, sweet-smelling liquid.  
\* Materials with wider and narrower boiling ranges are commercially available.

Molecular Weight: 106.16  
Specific Gravity: 0.864 at 20 °C/4 °C  
Water Solubility: Practically insoluble  
Other Solubilities: Miscible with absolute alcohol, ether, and many other organic liquids.  
Octanol/Water Partition Coefficient: logKow = 3.12-3.20  
Odor Threshold: 1 ppm  
Viscosity: < 2.6 SUS

### Section 4. Fire and Explosion Data

Flash Point: 63 to 77 °F (17 to 25 °C) OC | Autoignition Temperature: 982 °F (527 °C) (*m*-) | LEL: 1.1 (*m*-, *p*-); 0.9 (*o*-) | UEL: 7.0 (*m*-, *p*-); 6.7 (*o*-)

**Extinguishing Media:** For small fires, use dry chemical, carbon dioxide (CO<sub>2</sub>), water spray or regular foam. For large fires, use water spray, fog or regular foam. Water may be ineffective. Use water spray to cool fire-exposed containers. **Unusual Fire or Explosion Hazards:** Xylene vapors or liquid (which floats on water) may travel to an ignition source and flash back. The heat of fire may cause containers to explode and/or produce irritating or poisonous decomposition products. Xylene may present a vapor explosion hazard indoors, outdoors, or in sewers. Accumulated static electricity may occur from vapor or liquid flow sufficient to cause ignition. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing will provide limited protection. If feasible and without risk, move containers from fire area. Otherwise, cool fire-exposed containers until well after fire is extinguished. Stay clear of tank ends. Use unmanned hose holder or monitor nozzles for massive cargo fires. If impossible, withdraw from area and let fire burn. Withdraw immediately in case of any tank discoloration or rising sound from venting safety device. Do not release runoff from fire control methods to sewers or waterways.

### Section 5. Reactivity Data

**Stability/Polymerization:** Xylene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Xylene is easily chlorinated, sulfonated, or nitrated. **Chemical Incompatibilities:** Incompatibilities include strong acids and oxidizers and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin). Xylene attacks some forms of plastics, rubber, and coatings. **Conditions to Avoid:** Avoid heat and ignition sources and incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of xylene can produce carbon dioxide, carbon monoxide, and various hydrocarbon products.

### Section 6. Health Hazard Data

**Carcinogenicity:** The IARC<sup>(169)</sup> NTP<sup>(169)</sup> and OSHA<sup>(169)</sup> do not list xylene as a carcinogen. **Summary of Risks:** Xylene is an eye, mucous membrane, and respiratory tract irritant. Irritation starts at 200 ppm; severe breathing difficulties which may be delayed in onset can occur at high concentrations. It is a central nervous system (CNS) depressant and at high concentrations can cause coma. Kidney and liver damage can occur with xylene exposure. With prolonged or repeated cutaneous exposure, xylene produces a defatting dermatitis. Chronic toxicity is not well defined, but it is less toxic than benzene. Prior to the 1950s, benzene was often found as a contaminant of xylene and the effects attributed to xylene such as blood dyscrasias are questionable. Since the late 1950s, xylenes have been virtually benzene-free and blood dyscrasias have not been associated with xylenes. Chronic exposure to high concentrations of xylene in animal studies have demonstrated milk reversible decrease in red and white cell

Continue on next page



# Material Safety Data Sheet

From Genium's Reference Collection  
Genium Publishing Corporation  
1145 Catalyn Street  
Schenectady, NY 12303-1836 USA  
(518) 377-8855



No. 624

NAPHTHALENE

Issued: November 1987

## SECTION 1: MATERIAL IDENTIFICATION

24

Material Name: NAPHTHALENE

Description (Origin/Uses): Used as a moth repellent and in many industrial processes.

Other Designations: Naphthalin; Naphthene; Tar Camphor; C<sub>10</sub>H<sub>8</sub>;  
NIOSH RTECS No. QJ0525000; CAS No. 0091-20-3

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the  
*Chemicalweek Buyer's Guide* (Genium ref. 73) for a list of suppliers.

HMIS  
H 2  
F 2 R 1  
R 0 I 4  
PPG\* S 1  
\*See sect. 8 K 2



## SECTION 2: INGREDIENTS AND HAZARDS

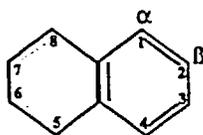
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## EXPOSURE LIMITS

Naphthalene, CAS No. 0091-20-3

ca 100

IDLH\* Level: 500 ppm



ACGIH TLVs, 1987-88  
TLV-TWA: 10 ppm, 50 mg/m<sup>3</sup>  
OSHA PEL  
8-Hr TWA: 10 ppm, 50 mg/m<sup>3</sup>  
Toxicity Data\*\*  
Child, Oral, LD<sub>50</sub>: 100 mg/kg  
Man, Unknown, LD<sub>50</sub>: 74 mg/kg  
Rat, Oral, LD<sub>50</sub>: 1250 mg/kg

\*Immediately dangerous to life and health

\*\*See NIOSH RTECS for additional data with references to irritative, mutagenic, reproductive, and tumorigenic effects.

## SECTION 3: PHYSICAL DATA

Boiling Point: 424°F (218°C)  
Vapor Density (Air = 1): 4.4  
Vapor Pressure: 0.087 Torr at 77°F (25°C)  
Water Solubility: Insoluble

Specific Gravity (H<sub>2</sub>O = 1): 1.162 at 68°F (20°C)  
Melting Point: 176°F (80°C)  
Molecular Weight: 128 Grams/Mole  
% Volatile by Volume: ca 100

Appearance and Odor: White crystalline flakes; strong coal tar odor.

## SECTION 4: FIRE AND EXPLOSION DATA

LOWER

UPPER

Flash Point and Method

Autoignition Temperature

Flammability Limits in Air

174°F (79°C) OC; 190°F (88°C) CC

979°F (526°C)

% by Volume

0.9

5.9

Extinguishing Media: Use water spray, dry chemical, or carbon dioxide to fight fires involving naphthalene. Caution: Foam or direct water spray applied to molten naphthalene may cause extensive foaming.

Unusual Fire or Explosion Hazards: Naphthalene is a volatile solid that gives off flammable vapor when heated (as in fire situations). This vapor is much denser than air and will collect in enclosed or low-lying areas like sumps. In these areas an explosive air-vapor mixture may form, and extra caution is required to prevent any ignition sources from starting an explosion or fire.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

## SECTION 5: REACTIVITY DATA

Naphthalene is stable in closed containers at room temperature under normal storage and handling conditions. It does not undergo hazardous polymerization.

Chemical Incompatibilities: Naphthalene is incompatible with strong oxidizing agents, chromic anhydride, and mixtures of aluminum trichloride and benzoyl chloride.

Conditions to Avoid: Ignition sources like open flame, unprotected heaters, excessive heat, lighted tobacco products, and electric sparks must not occur in work areas where naphthalene vapor may become concentrated.

Hazardous Products of Decomposition: Toxic gases like carbon monoxide are produced during fire conditions. Irritating, flammable vapor forms below the melting point because even solid naphthalene has a significant vapor pressure.

**SECTION 6: HEALTH HAZARD INFORMATION**

Naphthalene is not listed as a carcinogen by the NTP, IARC, or OSHA.  
**Summary of Risks:** Renal shutdown (kidney failure), hemolytic effects (breakdown of red blood cells), hematuria (blood in the urine), oliguria (low volume of urine), jaundice, eye damage, and depression of the central nervous system (CNS) are the primary health concerns associated with exposure to naphthalene. The ACGIH TLVs in section 2 are set to prevent eye damage. These recommended exposure limits may not be low enough to prevent blood changes in genetically hypersensitive individuals.  
**Medical Conditions Aggravated by Long-Term Exposure:** Diseases of the blood, liver, and kidneys. Administer medical aids emphasizing these organs. **Target Organs:** Eyes, skin, kidneys, liver, blood (red blood cell effects), and CNS.  
**Primary Entry:** Inhalation, skin contact. **Acute Effects:** Inhalation of naphthalene vapor causes excitement, confusion, headache, dizziness, and loss of appetite. **Chronic Effects:** Increased incidence of cataracts.

**FIRST AID**  
**Eye Contact:** Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes to remove particles.  
**On Contact:** Immediately wash the affected area with soap and water.  
**Inhalation:** Remove victim to fresh air; restore and/or support his breathing as needed.  
**First Aid:** Call a poison control center. Never give anything by mouth to someone who is unconscious or convulsing. Administer a gastric lavage followed by saline catharsis. Monitor blood and electrolytic balance. Other sources recommend giving the victim several glasses of water to drink.

**GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES.** Seek prompt medical assistance for further treatment, observation, and support after first aid.

**SECTION 7: SPILL, LEAK, AND DISPOSAL PROCEDURES**

**Spill/Leak:** Notify safety personnel, provide ventilation, and eliminate all ignition sources immediately. Cleanup personnel need protection against contact and inhalation of vapor (see sect. 8). Contain large spills and collect waste. Use nonsparking tools to place naphthalene into closable containers for disposal. Keep waste out of sewers, watersheds, and waterways.  
**Waste Disposal:** Consider reclamation, recycling, or destruction rather than disposal in a landfill. Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

**OSHA Designations**  
 Air Contaminant (29 CFR 1910.1000, Subpart Z)  
 PA Designations (40 CFR 302.4)  
 RCRA Hazardous Waste, No. U165  
 CERCLA Hazardous Substance, Reportable Quantity: 100 lbs (45.4 kg)

**SECTION 8: SPECIAL PROTECTION INFORMATION**

**Goggles:** Always wear protective eyeglasses or chemical safety goggles. Follow the eye- and face-protection guidelines of 29 CFR 1910.133. **Respirator:** Use a NIOSH-approved respirator per the *NIOSH Pocket Guide to Chemical Hazards* (Genium ref. 88) or the maximum-use concentrations and/or the exposure limits cited in section 2. Respirator usage must be in accordance with the OSHA regulations of 29 CFR 1910.134. IDLH or unknown concentrations require an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres.  
**Other Equipment:** Wear impervious gloves, boots, aprons, gauntlets, etc., as required by the specific work environment to prevent skin contact. **Ventilation:** Install and operate general and local maximum explosion-proof ventilation systems of sufficient power to maintain airborne levels of naphthalene below the OSHA PEL standard cited in section 2. **Safety Stations:** Make eyewash stations, washing facilities, and safety showers available in areas of use and handling. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove and launder contaminated clothing before wearing it again; clean this material from shoes and equipment.  
**Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep this material off of your clothing and equipment. Avoid transferring this material from hands to mouth while eating, drinking, or smoking. Do *not* smoke, eat, or drink in any immediate work area. Avoid inhalation of vapor!

**SECTION 9: SPECIAL PRECAUTIONS AND COMMENTS**

**Storage Segregation:** Store naphthalene in a cool, dry, well-ventilated area away from chemical incompatibles (see sect. 5).  
**Special Handling/Storage:** Protect containers from physical damage. All bulk storage facilities must be built with an explosion-proof design. All containers used in shipping/transferring operations must be electrically grounded to prevent static sparks. Use monitoring equipment to measure the extent of vapor present in any storage facility containing naphthalene because of potential fire and explosion hazards.  
**Comments:** All operations with naphthalene must be done carefully to prevent accidental ignition of its flammable/explosive vapor. If the weather is warm, more naphthalene vapor forms and the potential for explosion increases. Do *not* smoke in any use or storage area!

**Transportation Data (49 CFR 172.101-2)**  
**DOT Shipping Name:** Naphthalene **DOT ID No.:** UN1334  
**DOT Hazard Class:** ORM-A **IMO Label:** Flammable Solid  
**IMO Class:** 4.1 **DOT Label:** None

**References:** 1, 2, 12, 73, 84-94, 103, PJI

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## Material Safety Data Sheets Collection:

Sheet No. 713  
Lead (Inorganic)

Issued: 8/90

### Section 1: Material Identification

32

**Lead (Inorganic) (Pb) Description:** Exists widely throughout the world in a number of ores. Its main commercial source is galena (lead sulphide). Lead mineral is separated from crude ores by blast-furnace smelting, dressing, or electrolytic refining. Lead is used mostly in manufacturing storage batteries. Other uses are in manufacturing tetraethyllead and both organic and inorganic lead compounds in ceramics, plastics, and electronic devices; in producing ammunition, solder, cable covering, sheet lead, and other metal products (brass, pipes, caulking); in metallurgy; in weights and as ballast; as a chemical intermediate for lead alkyls and pigments; as a construction material for the tank linings, piping, and equipment used to handle the corrosive gases and liquids used in sulfuric acid manufacturing, petroleum refining, halogenation, sulfonation, extraction, and condensation; and for x-ray and atomic radiation protection.

**Other Designations:** CAS No. 7439-92-1, lead oxide; lead salts, inorganic; metallic lead; plumbum.

**Manufacturer:** Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*<sup>(73)</sup> for a suppliers list.

**Cautions:** *Inorganic lead is a potent systemic poison.* Organic lead (for example, tetraethyl lead) has severe, but different, health effects. Occupational lead poisoning is due to inhalation of dust and fumes. Major affected organ systems are the nervous, blood, and reproductive systems, and kidneys. Health impairment or disease may result from a severe acute short- or long-term exposure.

R 0  
I 4  
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Genium  
HMIS  
H 3  
F 1  
R 0  
PPG\*

### Section 2: Ingredients and Occupational Exposure Limits

Lead (inorganic) fumes and dusts, as Pb, ca 100%

1989 OSHA PELs (Lead, inorganic compounds)  
8-hr TWA: 50 µg/m<sup>3</sup>  
Action Level TWA\*: 30 µg/m<sup>3</sup>

1989-90 ACGIH TLV (Lead, inorganic, fumes and dusts)  
TLV-TWA: 150 µg/m<sup>3</sup>

1985-86 Toxicity Data†

Human, inhalation, TC<sub>LD</sub>: 10 µg/m<sup>3</sup> affects gastrointestinal tract and liver

Human, oral, TD<sub>01</sub>: 450 mg/kg ingested over 6 yr affects peripheral and central nervous systems

Rat, oral, TD<sub>01</sub>: 790 mg/kg affects multigeneration reproduction

29 CFR 1910.1025 Lead Standard  
Blood Lead Level: 40 µg/100 g

1988 NIOSH REL  
10-hr TWA: <100 µg/m<sup>3</sup>

\* Action level applies to employee exposure without regard to respirator use.

† See NIOSH, RTECS (OF7525000), for additional mutative, reproductive, and toxicity data.

### Section 3: Physical Data

Boiling Point: 3164 °F (1740 °C)

Melting Point: 621.3 °F (327.4 °C)

Vapor Pressure: 1.77 mm Hg at 1832 °F (1000 °C)

Viscosity: 3.2 cp at 621.3 °F (327.4 °C)

Appearance and Odor: Bluish-white, silvery, gray, very soft metal.

Molecular Weight: 207.20

Specific Gravity (20 °C/4 °C): 11.34

Water Solubility: Relatively insoluble in hot or cold water\*

\* Lead dissolves more easily at a low pH.

### Section 4: Fire and Explosion Data

Flash Point: None reported | Autoignition Temperature: None reported | LEL: None reported | UEL: None reported

**Extinguishing Media:** Use dry chemical, carbon dioxide, water spray, or foam to extinguish fire.

**Unusual Fire or Explosion Hazards:** Flammable and moderately explosive in the form of dust when exposed to heat or flame.

**Special Fire-fighting Procedures:** Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

### Section 5: Reactivity Data

**Stability/Polymerization:** Lead is stable at room temperature in closed containers under normal storage and handling conditions. It tarnishes on exposure to air. Hazardous polymerization cannot occur.

**Chemical Incompatibilities:** Mixtures of hydrogen peroxide + trioxane explode on contact with lead. Lead is incompatible with sodium azide, zirconium, disodium acetylde, and oxidants. A violent reaction on ignition may occur with concentrated hydrogen peroxide, chlorine trifluoride, sodium acetylde (with powdered lead), ammonium nitrate (below 200 °C with powdered lead). Lead is attacked by pure water and weak organic acids in the presence of oxygen. Lead is resistant to tap water, hydrofluoric acid, brine, and solvents.

**Conditions to Avoid:** Rubber gloves containing lead may ignite in nitric acid.

**Hazardous Products of Decomposition:** Thermal oxidative decomposition of lead can produce highly toxic fumes of lead.

### Section 6: Health Hazard Data

**Carcinogenicity:** Although the NTP and OSHA do not list lead as a carcinogen, the IARC lists it as probably carcinogenic to humans, but having (usually) no human evidence. However, the literature reports instances of lead-induced neoplasms, both benign and malignant, of the kidney and other organs in laboratory rodents. Excessive exposure to lead has resulted in neurologic disorders in infants. Experimental studies show lead has reproductive and teratogenic effects in laboratory animals. Human male and female reproductive effects are also documented.

**Summary of Risks:** Lead is a potent, systemic poison that affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal (GI) system. The most important way lead enters the body is through inhalation, but it can also be ingested when lead dust or unwashed hands contaminate food, drink, or cigarettes. Much of ingested lead passes through feces without absorption into the body. Adults may absorb only 5 to 15% of ingested lead; children may absorb a much larger fraction. Once in the body, lead enters the bloodstream and circulates to various organs. Lead concentrates and remains in bone for many years. The amount of lead the body stores increases as exposure continues, with possibly cumulative effects. Depending on the dose entering the body, lead can be deadly within several days or affect health after many years. Very high doses can cause brain damage (encephalopathy).

**Medical Conditions Aggravated by Exposure:** Lead may aggravate nervous system disorders (e.g., epilepsy, neuropathies), kidney diseases, high blood pressure (hypertension), infertility, and anemia. Lead-induced anemia and its effect on blood pressure can aggravate cardiovascular disease.

Continue on next page

**Section 6. Health Hazard Data, continued**

**Target Organs:** Blood, central and peripheral nervous systems, kidneys, and gastrointestinal (GI) tract.

**Primary Entry Routes:** Inhalation, ingestion.

**Acute Effects:** An acute, short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term effects of this magnitude are rare. Reversible kidney damage can occur from acute exposure, as well as anemia.

**Chronic Effects:** Symptoms of chronic long-term overexposure include appetite loss, nausea, metallic taste in the mouth, lead line on gingival tissue, constipation, anxiety, anemia, pallor of the face and the eye grounds, excessive tiredness, weakness, insomnia, headache, nervous irritability, fine tremors, numbness, muscle and joint pain, and colic accompanied by severe abdominal pain. Paralysis of wrist and, less often, extensor muscles may occur after years of increased lead absorption. Kidney disease may also result from chronic overexposure, but few, if any, symptoms appear until severe kidney damage has occurred. Reproductive damage is characterized by decreased sex drive, impotence, and infertility in men; and decreased fertility, abnormal menstrual cycles, and miscarriages in women. Unborn children may suffer neurologic damage. Occupational problems due to excessive lead exposure in pregnant women. Lead poisoning's severest result is encephalopathy manifested by headache, convulsions, coma, delirium, and possibly death.

**First Aid**

**Eye:** Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

**Skin:** Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Consult a physician if any health complaints develop.

**Inhalation:** Remove exposed person to fresh air and support breathing as needed. Consult a physician.

**Ingestion:** Never give anything by mouth to an unconscious or convulsing person. If large amounts of lead were ingested, induce vomiting with syrup. Consult a physician immediately.

**First Aid:** Get appropriate in-plant, paramedic, or community medical support.

**Physician's Note:** For diagnosis, obtain blood pressure, blood lead level (PbB), zinc protoporphyrin (ZPP), complete blood count for microcytosis and basophilic stippling, urinalysis, and blood urea nitrogen (BUN) or creatinine. Examine peripheral motor neuropathy, pallor, and a lead line. Use Ca-EDTA to treat poison, but never chelate prophylactically. Consult an occupational physician or toxicologist.

**Section 7. Spill, Leak, and Disposal Procedures**

**Leak:** Notify safety personnel and evacuate all unnecessary personnel immediately. Cleanup personnel should protect against inhalation of fume and contact with skin or eyes. Avoid creating dusty conditions. Water sprays may be used in large quantities to prevent the formation of dust. Cleanup methods such as vacuuming (with an appropriate filter) or wet mopping minimizes dust dispersion. Scoop the spilled material into closed containers for disposal or reclamation. Follow applicable OSHA regulations (29 CFR 1910.120).

**Spill:** Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

**Designations**

as a RCRA Hazardous Waste (40 CFR 261.33, Appendix II—EP Toxicity Test Procedures)

as a CERCLA Hazardous Substance\* (40 CFR 302.4), Reportable Quantity (RQ): 1 lb (0.454 kg) [\* per Clean Water Act, Sec. 307(a)]

as an Extremely Hazardous Substance (40 CFR 355): Not listed

as a SARA Toxic Chemical (40 CFR 372.65)

**Air Designations**

as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

**Section 8. Special Protection Data**

**Respiratory Protection:** Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

**Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an A2 respirator.

**Warning:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

**Hand Protection:** Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact. Protective clothing made of man-made fibers and lacking pleats, pleats, or pockets retain less dust from lead.

**Engineering Controls:** Provide general and local ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.<sup>(103)</sup>

**Emergency Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

**Contaminated Equipment:** Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

**Personal Hygiene:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially washing hands before drinking, smoking, using the toilet, or applying cosmetics.

**Section 9. Special Precautions and Comments**

**Storage Requirements:** Store in tightly closed containers in a cool, dry, well-ventilated area away from all incompatible materials, direct sunlight, and heat and ignition sources.

**Engineering Controls:** Educate worker about lead's hazards. Follow and inform employees of the lead standard (29 CFR 1910.1025). Avoid inhalation of lead dust and fumes and ingestion of lead. Use only with appropriate personal protective gear and adequate ventilation. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Avoid creating dusty conditions. Segregate under contaminated clothing. Take precautions to protect laundry personnel. Practice good personal hygiene and housekeeping procedures. For a variety of reasons, the lead concentration in workroom air may not correlate with the blood lead levels in individuals.

**Precautions:** Provide preplacement and periodic medical examinations which emphasize blood, nervous system, gastrointestinal tract, and reproductive system, including a complete blood count and urinalysis. Receive a complete history including previous surgeries and hospitalization, allergies, smoking history, alcohol consumption, proprietary drug intake, and occupational and nonoccupational lead exposure. Maintain records for medical surveillance, airborne exposure monitoring, employee complaints, and physician's written opinions for at least 40 years or duration of employment plus 20 years. Measurement of blood lead level (PbB) and zinc protoporphyrin (ZPP) are useful indicators of your body's lead exposure level. Maintain worker PbBs at or below 40 µg/100 g of whole blood. To minimize adverse reproductive health effects to parents and unborn fetus, maintain the PbBs of workers intending to have children below 30 µg/100 g. Elevated PbBs increase your risk of disease, and the longer you have elevated PbBs, the greater your chance of substantial permanent damage.

**Transportation Data (49 CFR 172.102)**

**Shipping Name:** Lead compounds, soluble, n.o.s.

**Hazard Class:** 6.1

**UN Number:** UN2291

**Label:** St. Andrews Cross (X, Stow away from foodstuffs)

**Packaging Group:** III

**Collection References:** 26, 38, 73, 84, 85, 88, 89, 90, 100, 101, 103, 109, 124, 126, 132, 133, 134, 136, 138, 139, 142, 143

**Prepared by:** MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** MJ Uptal, MD, MPH; **Edited by:** JR Stuart, MS

Common Name: Bis (2-Ethylhexyl) Phthalate  
CAS Number: 117-81-7  
DOT Number: None  
Date: July 31, 1986  
-----

#### HAZARD SUMMARY

- \* Bis (2-Ethylhexyl) Phthalate can affect you when breathed in.
- \* Bis (2-Ethylhexyl) Phthalate is a CARCINOGEN and a TERATOGEN  
HANDLE WITH EXTREME CAUTION.
- \* It may damage the testes (male reproductive glands).

#### IDENTIFICATION

Bis (2-Ethylhexyl) Phthalate is a light colored, oily, almost odorless liquid that is used as a plasticizer.

#### REASON FOR CITATION

- \* Bis (2-Ethylhexyl) Phthalate is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DEP, and NTP.
- \* This chemical is also on the Special Health Hazard Substance List because it is a CANCER CAUSING AGENT.
- \* Definitions are attached.

#### HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- \* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- \* If you think you are experiencing any work related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

#### WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 5 mg/m<sup>3</sup> averaged over an 8 hour workshift.  
ACGIH: The recommended airborne exposure limit is 5 mg/m<sup>3</sup> averaged over an 8 hour workshift and 10 ppm as a STEL (short term exposure limit).

- \* Bis (2-Ethylhexyl) Phthalate is a PROBABLE CANCER CAUSING AGENT, and a TERATOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

#### WAYS OF REDUCING EXPOSURE

- \* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- \* Wear protective work clothing.
- \* Wash thoroughly immediately after exposure to Bis (2-Ethylhexyl) Phthalate and at the end of the workshift.
- \* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Bis (2-Ethylhexyl) Phthalate to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

-----  
HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short term) health effects may occur immediately or shortly after exposure to Bis (2-Ethylhexyl) Phthalate:

- \* Exposure may cause irritation to the eyes, nose and throat.

Chronic Health Effects

The following chronic (long term) health effects can occur at some time after exposure to Bis (2-Ethylhexyl) Phthalate and can last for months or years:

Cancer Hazard

- \* Bis (2-Ethylhexyl) Phthalate is a PROBABLE CANCER CAUSING AGENT in humans. It has been shown to cause liver cancer in animals.
- \* Many scientists believe there is no safe level of exposure to a cancer causing agent.

Reproductive Hazard

- \* Bis (2-Ethylhexyl) Phthalate is a PROBABLE TERATOGEN in humans.
- \* Bis (2-Ethylhexyl) Phthalate may damage the testes (male reproductive glands).

Other Long Term Effects

- \* Repeated exposures may affect the kidneys and liver.
- \* Some similar compounds may cause numbness and tingling in the arms and legs.

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following may be useful:

- \* Liver and kidney function tests.
- \* Examination of the nervous system.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

Where possible, automatically pump liquid Bis (2-Ethylhexyl) Phthalate from drums or other storage containers to process containers.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- \* At the end of the workshift, wash any areas of the body that may have contacted Bis (2-Ethylhexyl) Phthalate, whether or not known skin contact has occurred.
- \* Do not eat, smoke, or drink where Bis (2-Ethylhexyl) Phthalate is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

#### PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

#### Clothing

- \* Avoid skin contact with Bis (2-Ethylhexyl) Phthalate. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- \* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
- \* ACGIH recommends Neoprene and Nitrile Rubber as good to excellent protective materials.

#### Eye Protection

- \* Eye protection is included in the recommended respiratory protection.

#### Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- \* At any exposure level, use a MSHA/NIOSH approved supplied air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self contained breathing apparatus with a full facepiece operated in pressure demand or other positive pressure mode.

#### HANDLING AND STORAGE

- \* Prior to working with Bis (2-Ethylhexyl) Phthalate you should be trained on its proper handling and storage.
- \* Bis (2-Ethylhexyl) Phthalate must be stored to avoid contact with OXIDIZING MATERIALS, such as PERMANGANATES, NITRATES, PEROXIDES, CHLORATES, and PERCHLORATES, since violent reactions occur.
- \* Store in tightly closed containers in a cool well ventilated area away from HEAT.
- \* Sources of ignition such as smoking and open flames are prohibited where Bis (2-Ethylhexyl) Phthalate is used,

handled, or stored in a manner that could create a potential fire or explosion hazard.

Common Name: Bis (2-Ethylhexyl) Phthalate  
DOT Number: None  
DOT Emergency Guide code: No Citation  
CAS Number: 117-81-7

-----  
NJ DOH Hazard rating  
FLAMMABILITY Not Found  
REACTIVITY Not Found  
-----

-----  
CANCER CAUSING AGENT  
COMBUSTIBLE LIQUID  
POISONOUS GAS IS PRODUCED IN FIRE  
-----

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

- \* Bis (2-Ethylhexyl) Phthalate is a COMBUSTIBLE LIQUID.
- \* Bis (2-Ethylhexyl) Phthalate may burn, but does not readily ignite.
- \* Use dry chemical, CO2, or foam extinguishers. Water can be used to keep fire exposed containers cool.
- \* POISONOUS GAS IS PRODUCED IN FIRE.
- \* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Bis (2-Ethylhexyl) Phthalate is spilled or leaked, take the following steps:

- \* Restrict persons not wearing protective equipment from area of spill or leak until cleanup is complete.
- \* Ventilate the area of spill or leak.
- \* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
- \* It may be necessary to contain and dispose of Bis (2-Ethylhexyl) Phthalate as a HAZARDOUS WASTE. Contact your state Environmental Program for specific recommendations.

=====  
FOR LARGE SPILLS AND FIRES immediately call your fire department.  
=====

FIRST AID

POISON INFORMATION

Eye Contact

- \* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Skin Contact

- \* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

PHYSICAL DATA

Vapor Pressure: 0.01 mm Hg at 68oF  
Flash Point: 425oF  
Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

Chemical Name:

1,2 Benzenedicarboxylic Acid, Bis (2-Ethylhexyl) Ester

Other Names and Formulations:

Disec Octyl Phthalate; DOP; DEHP.

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Not intended to be copied and sold for commercial purposes.  
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NEW JERSEY DEPARTMENT OF HEALTH

Right to Know Program

CN 368, Trenton, NJ 08625 0368  
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ECOLOGICAL INFORMATION

Bis (2-Ethylhexyl) Phthalate is widely used to make plastics. Bis (2-Ethylhexyl) Phthalate is a component of many products found in homes and automobiles, as well as in the medical and packaging industries. Its wide use and distribution, as well as its high volatility and persistence, lead to its common occurrence in fish, water, and sediments.

ACUTE (SHORT-TERM) ECOLOGICAL EFFECTS

Acute toxic effects may include the death of animals, birds, or fish, and death or low growth rate in plants. Acute effects are seen two to four days after animals or plants come in contact with a toxic chemical substance.

Bis (2-Ethylhexyl) Phthalate has low acute toxicity to aquatic life. Insufficient data are available to evaluate or predict the short-term effects of Bis (2-Ethylhexyl) Phthalate to plants, birds, or land animals.

CHRONIC (LONG-TERM) ECOLOGICAL EFFECTS

Chronic toxic effects may include shortened lifespan, reproductive problems, lower fertility, and changes in appearance or behavior. Chronic effects can be seen long after first exposure(s) to a toxic chemical.

Bis (2-Ethylhexyl) Phthalate has low chronic toxicity to aquatic life. Insufficient data are available to evaluate or predict the long-term effects of Bis (2-Ethylhexyl) Phthalate to plants, birds, or land animals.

WATER SOLUBILITY

Bis (2-Ethylhexyl) Phthalate is slightly soluble in water. Concentrations of less than 1 milligram will mix with a liter of water.

DISTRIBUTION AND PERSISTENCE IN THE ENVIRONMENT

Bis (2-Ethylhexyl) Phthalate is slightly persistent in water, with a half-life of between 2 to 20 days. The half-life of a pollutant is the amount of time it takes for one-half of the chemical to be degraded. About 42.8% of Bis (2-Ethylhexyl) Phthalate will eventually end up in terrestrial soil; about 40% will end up in aquatic sediments; and about 17% will end up in air.

BIOACCUMULATION IN AQUATIC ORGANISMS

Some substances increase in concentration, or bioaccumulate, in living organisms as they breathe contaminated air, drink contaminated water, or eat contaminated food. These chemicals can become concentrated in the tissues and internal organs of animals and humans.

The concentration of Bis (2-Ethylhexyl) Phthalate found in fish tissues is expected to be much higher than the average concentration of in the water from which the fish was taken.

SUPPORT DOCUMENT: AQUIRE Database, ERL-Duluth, U.S. EPA.

**APPENDIX F**

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**MACHINERY AND MECHANIZED EQUIPMENT**

## 1.0 GENERAL

1.1 Before any machinery or mechanized equipment is placed in use, it shall be inspected and tested by a competent person and certified to be in safe operating condition.

1.1.1 Inspections and tests shall be in accordance with manufacturers' recommendations and shall be documented.

1.1.2 Records of tests and inspections shall be maintained at the site by the contractor, and shall be made available upon request of the designated authority, and shall become part of the official project file. Results of the inspections will be provided on the Contractor Quality Control Report, **Figure 6-2**, and attached to the Contractor Production Report, **Figure 6-1**. The Contractor Quality Control Report and the Contractor Production Report will be submitted to the ROICC on a daily basis.

1.2 Daily/Shift Inspections and Tests

1.2.1 All machinery and equipment shall be inspected daily (when in use) to verify safe operating conditions: The employer shall designate competent persons to conduct the daily inspections and tests.

1.2.2 Tests shall be made at the beginning of each shift during which the equipment is to be used to evaluate that the brakes and operating systems are in proper working condition and that all required safety devices are in place and functional.

1.3 Whenever any machinery or equipment is found to be unsafe, or whenever a deficiency which affects the safe operations of equipment is observed, the equipment shall be immediately taken out of service and its use prohibited until unsafe conditions have been corrected.

1.3.1 A tag indicating that the equipment shall not be operated, and that the tag shall not be removed, shall be placed in a conspicuous location on the equipment. Where required, lockout procedures shall be used.

1.3.2 The tag shall remain in its attached location until it is demonstrated to the individual deadlining the equipment that it is safe to operate.

1.3.3 When corrections are complete, the machinery or equipment shall be retested and reinspected prior to being returned to service.

1.4 Machinery and mechanized equipment shall be operated only by designated qualified personnel.

1.4.1 Machinery or equipment shall not be operated in a manner that will endanger persons or property nor shall the safe operating speeds or loads be exceeded.

1.4.2 Getting on or off any equipment while it is in motion is prohibited.

1.4.3 Machinery and equipment shall be operated in accordance with the manufacturers' instructions and recommendations.

1.5 When the manufacturers' instructions or recommendations are more stringent than the requirements of this manual, the manufacturers' instructions or recommendations shall apply.

1.6 Inspections or determinations of road conditions and structures shall be made in advance to verify that clearances and load capacities are safe for the passage or placing of any machinery or equipment.

## 1.7 Equipment requirements

1.7.1 Seats or equal protection must be provided for each person required to ride on equipment.

1.7.2 Equipment operated on the highway shall be equipped with headlights, taillights, brake lights, backup light, and turn signals visible from the front and rear.

1.7.3 All equipment with windshields shall be equipped with powerful wipers. Vehicles that operate under conditions that cause fogging or frosting of windshields shall be equipped with operable defogging or defrosting devices.

1.7.4 Mobile equipment, operating within an off-highway job site not open to public traffic, shall have a service brake system and a parking brake system capable of stopping and holding the equipment while fully loaded on the grade of operation. In addition, it is recommended that all heavy duty hauling equipment have an emergency brake system which will automatically stop the equipment upon failure of the service brake system; this emergency brake system should be manually operable from the driver's position.

## 1.8 Maintenance and repairs

1.8.1 Preventive maintenance procedures recommended by the manufacturer shall be followed.

1.8.2 All machinery or equipment shall be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being completed. Equipment designed to be serviced while running are exempt from this requirement.

1.8.3 All repairs on machinery or equipment shall be made at a location which will protect repair personnel from traffic.

1.8.4 Heavy machinery, equipment, or parts thereof which are suspended or held apart by slings, hoist, or jacks also shall be substantially blocked or cribbed before personnel are permitted to work underneath or between them.

1.9 Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment shall be either fully lowered or blocked when being repaired or when not in use. All controls shall be in a neutral position, with the engines stopped and brakes set, unless work being performed on the machine requires otherwise.

1.10 Stationary machinery and equipment shall be placed on a firm foundation and secured before being operated.

1.11 All mobile equipment and the areas in which they are operated shall be adequately illuminated while work is in progress.

1.12 All vehicles which will be parked or moving slower than normal traffic on haul roads shall have a yellow flashing light or four-way flashers visible from all directions.

1.13 No one shall be permitted in the truck cab during loading operations except the driver and then only if the truck has a cab protector.

1.14 Mechanized equipment shall be shut down prior to and during fueling operations. Closed systems, with automatic shut-off which will prevent spillage if connections are broken, may be used to fuel diesel powered equipment left running.

## 1.15 Towing

1.15.1 All towing devices used on any combination of equipment shall be

structurally adequate for the weight drawn and shall be securely mounted.

1.15.2 Persons shall not be permitted to get between a towing vehicle and the piece of towed equipment until both have been completely stopped with all brakes set and wheels chocked on both vehicle and equipment.

1.16 All machinery or equipment operating on rails, tracks, or trolleys (except railroad equipment) shall be provided with substantial track scrapers or track cleaners - effective in both directions - on each wheel or set of wheels.

1.17 Parking

1.17.1 Whenever equipment is parked, the parking brake shall be set.

1.17.2 Equipment parked on an incline shall have the wheels chocked or track mechanisms blocked and the parking brake set.

1.17.3 All equipment left unattended at night, adjacent to a highway in normal use or adjacent to construction areas where work is in progress, shall have lights or reflectors, or barricades equipped with lights or reflectors, to identify the location of the equipment.

1.18 No modification or additions which affect the capacity or safe operation of machinery or equipment shall be made without the manufacturers' written approval.

1.18.1 If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.

1.18.2 In no case shall the original safety factor of the equipment be reduced.

1.19 Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism prevents road reactions from causing the steering handwheel to spin; when permitted, the steering knob shall be mounted within the periphery of the wheel.

1.20 Safeguards shall be provided to prevent machinery and equipment operating on floating plane from going into the water.

1.21 All industrial trucks shall meet the requirements of design, construction, stability, inspection, testing, maintenance, and operation, as defined in American National Standards Institute (ANSI)/ASME B56.1, Safety Standards and Low Lift and High Lift Trucks.

1.22 Lift trucks, stackers, and similar equipment shall have the rated capacity posted on the vehicle so as to be clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities shall also be clearly shown on the vehicle. The ratings shall not be exceeded.

1.23 The controls of loaders, excavators, or similar equipment with folding booms or lift arms shall not be operated from a ground position unless so designed.

1.24 Personnel shall not work or pass under or ride in the buckets or booms of loaders in operation.

1.25 Tire service vehicles shall be operated so that the operator will be clear of tires and rims when hoisting operations are being performed. Tires large enough to require hoisting equipment will be secured from movement by continued support of the hoisting equipment unless bolted to the vehicle hub or otherwise restrained.

1.26 Each bulldozer, scraper, dragline, crane, motor grader, front-end loader, mechanical shovel, backhoe, and other similar equipment shall be equipped with at

least one dry chemical or carbon-dioxide fire extinguisher with a minimum rating of 5-B:C.

1.27 Fill hatches on water haul vehicles shall be secured or the opening reduced to a maximum of 8 inches.

## 2.0 GUARDING AND SAFETY DEVICES

2.1 Reverse signal [back-up] alarm.

2.1.1 All self-propelled construction and industrial equipment, whether moving alone or in combination, shall be equipped with a reverse signal alarm. Equipment designed and operated so that the operator is always facing the direction of motion does not require a reverse signal alarm.

2.1.2 Reverse signal alarms shall be audible and sufficiently distinct to be heard under prevailing conditions.

2.1.3 Alarms shall operate automatically upon commencement of backward motion. Alarms may be continuous or intermittent (not to exceed 3-second intervals) and shall operate during the entire backward movement.

2.1.4 Reverse signal alarms shall be in addition to requirements for signal persons.

2.2 A warning device or signal person shall be provided where there is danger to persons from moving equipment, swinging loads, buckets, booms, etc.

2.3 Guarding

2.3.1 All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment shall be guarded when exposed to contact by persons or when they otherwise create a hazard.

2.3.2 All hot surfaces of equipment, including exhaust pipes or other lines, shall be guarded or insulated to prevent injury and fire.

2.3.3 All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.

2.3.4 Platforms, footwalks, steps, handholds, guardrails, and toe boards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.

2.3.5 Equipment shall be provided with suitable working surfaces of platforms, guard rails, and hand grabs when attendants or other employees are required to ride for operating purposes outside the operator's cab or compartment; platforms and steps shall be of nonskid material.

2.3.6 Substantial overhead protection shall be provided for the operators of fork lifts and similar material handling equipment.

2.4 Fuel tanks shall be located in a manner which will not allow spills or overflows to run onto engine, exhaust, or electrical equipment.

2.5 Exhaust or discharges from equipment shall be so directed that they do not endanger persons or obstruct views of operator.

2.6 A safety tire rack, cage, or equivalent protection shall be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped

with locking rings or similar devices.

2.7 No guard, safety appliance, or device shall be removed from machinery or equipment, or made ineffective except for making immediate repairs, lubrications, or adjustments, and then only after the power has been shut off. All guards and devices shall be replaced immediately after completion of repairs and adjustments and before power is turned on.

2.8 Seat belts and anchorages meeting the requirements of 49 CFR 571 shall be installed and worn in all motor vehicles (installation and usage on buses are optional); two-piece seat belts and anchorages for construction equipment shall comply with applicable federal specification or SAE J 386a.

2.9 All high rider industrial trucks shall be equipped with overhead guards which meet the structural requirements defined in paragraph 4.21 of ANSI/ASME B51 1, Safety Standards for Low Lift and High Lift Trucks.

2.10 Suitable protection against the elements, falling or flying objects, swinging loads, and similar hazards shall be provided for operators of all machinery or equipment; glass used in windshields or cabs shall be safety glass.

2.11 Falling object protective structures (FOPS).

2.11.1 All bulldozers, tractors, or similar equipment used in clearing operations shall be provided with guards, canopies, or grills to protect the operator from falling and flying objects as appropriate to the nature of the clearing operations.

2.11.2 FOPS for other construction, industrial, and grounds-keeping equipment will be furnished when the operator is exposed to falling objects hazards.

2.11.3 FOPS will be certified by either the manufacturer or a licensed engineer as complying with the following applicable SAE recommended practices:

2.11.3.1 J 231 - Minimum Performances Criteria for FOPS

2.11.3.2 J 1043 - Minimum Performance Criteria for FOPS for

Industrial Equipment

2.12 Rollover Protective Structures (ROPS).

2.12.1 In addition to the requirements of 1.8 and 1.11, seat belts and ROPS shall be installed on:

2.12.1.1 Crawler and rubber-tire tractors including dozers, push and pull tractors, winch tractors, and mowers;

2.12.1.2 Off-the-highway self-propelled pneumatic-tire earth movers such as trucks, pans, scrapers, bottom dumps, and end dumps;

2.12.1.3 Motor graders;

2.12.1.4 Water tank trucks having a tank height less than the cab;

and

2.12.1.5 Other self-propelled construction equipment such as front-end loaders, backhoes, rollers, and compactors.

2.12.2 ROPS are not required on:

2.12.2.1 Trucks designed for hauling on public highways;

2.12.2.2 Crane-mounted dragline backhoes;

2.12.2.3 Sections of rollers and compactors of the tandem steel-wheeled and self-propelled pneumatic tired type that do not have an operator's station;

2.12.2.4 Self-propelled rubber-tired lawn and garden tractors and

side boom pipe-laying tractors operated solely on flat terrain, not exposed to rollover hazards; and

2.12.2.5 Cranes, draglines, or equipment on which the operator's cab and boom rotate as a unit.

2.12.3 ROPS may be removed from certain types of equipment when the work cannot be performed with the ROPS in place and when ROPS removal is approved in writing by the Designated Authority.

2.12.4 The operating authority shall furnish proof from the manufacturer or certification from a licensed engineer that the ROPS complies with the following SAE standards, as applicable:

2.12.4.1 J167a - Overhead Protection for Agricultural Tractors - Test Procedures and Performance Requirements;

2.12.4.2 J 1040c - Performance Criteria for ROPS for Construction, Earthmoving, Forestry, and Mining Machines;

2.12.4.3 J 1042 - Operator Protection for Industrial Equipment;

2.12.4.4 J 1084a - Operator Protective Structure Performance Criteria for certain Forestry Equipment;

2.12.4.5 J 1194 - ROPS for Wheeled Agricultural Tractors.

2.12.5 ROPS shall also be acceptable if they meet the criteria of any state which has a Department of Labor (DOL) approved OSHA program or meet Water and Power Resources Service requirements.

2.12.6 The following information permanently affixed to the ROPS is acceptable in lieu of a written certification:

2.12.6.1 Manufacturer's or fabricator's name and address;

2.12.6.2 ROPS model number, if any; and

2.12.6.3 Machine make, model, or series number that the structure is designed to fit.

2.12.7 Field welding on ROPS shall be performed by welders who are certified by the contractor as being qualified in accordance with American Welding Society Standards D1.1, Military Standard MIL-STD 248, or the equivalent.

2.13 All points requiring lubrication during operation shall have fittings so located or guarded to be accessible without hazardous exposure.

2.14 All machinery or equipment and material hoists operating on rails, tracks, or trolleys shall have positive stops or limiting devices either on the equipment, rails, tracks, or trolleys to prevent overrunning safe limits.

2.15 Whenever long-bed end-dump trailers are used in off-road hauling, they should be equipped with a roll-over warning device: the device should have a continuous monitoring display at the operator station to provide the operator with a quick and easily-read indicator and audible warning of an unsafe condition.

### 3.0 EARTH DRILLING EQUIPMENT

3.1 Earth drilling equipment shall be operated, inspected, and maintained as specified in the manufacturers' operating manual; a copy of the manual will be available at the job site.

3.2 Prior to bringing earth drilling equipment on the job site, a survey shall be conducted to identify overhead electrical hazards and potential ground hazards, such as contact with unexploded ordnance, hazardous agents in the soil, or underground utilities.

3.2.1 The location of any overhead or ground hazards shall be identified on a site layout plan.

3.2.2 The findings of this survey and the controls for all potential hazards shall become a part of the hazard analysis for the activity.

3.3 The hazard analysis for an earth drilling activity will not be accepted unless:

3.3.1 it contains a copy of the material safety data sheet for the drilling fluids, if required;

3.3.2 it meets the requirements of 01.A.09; and

3.3.3 it indicates that the site layout plan specified in 16.M.02 will become a part of the analysis, and will be covered at the preparatory inspection (pre-activity safety briefing), when the plan has been completed.

3.4 Training

3.4.1 All members of drilling crews shall be trained in:

3.4.1.1 the operation, inspection, and maintenance of the equipment;

3.4.1.2 the safety features and procedures to be utilized during operation, inspection, and maintenance of the equipment; and

3.4.1.3 overhead electrical line and underground hazards.

3.4.2 This training will be based on the equipment operating manual and the hazard analysis for the activity.

3.5 Earth drilling equipment shall be equipped with two easily-accessible emergency shutdown devices, one for the operator and one for the helper.

3.6 Clearance from electrical sources shall be as specified in 11.E.05.

3.6.1 Drilling equipment shall be posted with signs warning the operator of electrical hazards.

3.6.2 The equipment operator shall ascertain proper clearance prior to moving equipment. Clearance shall be monitored by a spotter or by the use of an electrical proximity warning device.

3.7 Moving equipment

3.7.1 Before earth drilling equipment is moved, the travel route shall be surveyed for overhead and terrain hazards, particularly overhead electrical hazards.

3.7.2 Earth drilling equipment shall not be transported with the mast up. The exception is movement of the equipment required in drilling a series of holes, such as in blasting, if the following conditions are satisfied:

3.7.2.1 movement is over level, smooth terrain;

3.7.2.2 the path of travel has been inspected for stability and the absence of holes, other ground hazards, and electrical hazards; and

3.7.2.3 the travel distance is limited to short, safe distances.

3.8 Equipment set-up

3.8.1 Equipment shall be set-up on stable ground and maintained level; cribbing shall be used when necessary.

3.8.2 Outriggers shall be extended per the manufacturers' specifications.

3.8.3 When drilling equipment is operated in areas with the potential for classification as a confined space, the health and safety requirements outlined in **Section 5.0 Site Health and Safety Plan** shall be followed.

3.9 Equipment operation

3.9.1 Weather conditions shall be monitored; operations shall cease during electrical storms or when electrical storms are imminent.

3.9.2 Drill crew members shall not wear loose clothing or equipment.

3.9.3 Auger guides shall be used on hard surfaces.

3.9.4 The operator shall verbally alert employees and visually verify that employees are clear from dangerous parts of equipment prior to starting or engaging equipment.

3.9.5 The discharge of drilling fluids shall be channeled away from the work area to prevent the ponding of water.

3.9.6 Hoists shall be used only for their designed intent and shall not be loaded beyond their rated capacity. Steps shall be taken to prevent two-blocking of hoists.

3.9.7 The equipment manufacturers' procedures shall be followed if rope becomes caught in, or objects pulled into, a cathead.

3.9.8 Drill rods shall be neither run nor rotated through rod slipping devices; no more than one foot of drill rod column shall be hoisted above the top of the drill mast. Drill rod tool joints shall not be made up, tightened, or loosened while the rod column is supported by the rod slipping device.

3.9.9 Dust shall be controlled.

3.9.10 Augers shall be cleaned only when the rotating mechanism is in neutral and the auger stopped; long-handled shovels shall be used to move cuttings from the auger.

3.9.11 Open boreholes shall be capped and flagged; open excavations shall be barricaded.